Glenellen Solar Farm Amendment Report

Glenellen Solar Farm Pty Ltd

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Abbreviations

Abbreviation	Description
AADT	Annual Average Daily Traffic
AC	Alternating Current
AEP	Annual Exceedance Probability
AIS	Agricultural Impact Statement
APZ	Asset Protection Zone
AVTG	Assessing Vibration: A Technical Guideline
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016*
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
CVVMP	Construction Noise and Vibration Management Plan
CTMP	Construction Traffic Management Plan
DA	Development Application
DC	Direct Current
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DSE/HA	Dry Sheep Equivalents per hectare
DTM	Digital Terrain Model
EAL	Environmental Analysis Laboratory
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
FRNSW	Fire and Rescue NSW
FTE	Full time equivalent
GHSC	Greater Hume Shire Council

Abbreviation	Description
GPS	Generator Performance Standard
Greater Hume LEP	Local Environment Plan
ha	Hectare
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HGL	Hydrogeological Landscapes
ICNG	Interim Construction Noise Guideline
JSF	Jindera Solar Farm
km	Kilometre
LCU	Landscape Character Unit
LGA	Local Government Area
LLS	Local Land Services
LLS Act	*Local Land Services Act 2013*
LoS	Level of Service
LSC	Land and soil capability
LSPS	Local Strategic Planning Statement
LVIA	Landscape and Visual Impact Assessment
MDA	Marshall Day Acoustics
MEG	Mining, Exploration and Geoscience
MW	Megawatt
NEM	National Electricity Market
NPfI	Noise Policy for Industry
NRAR	Natural Resource Access Regulator
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
O&M	Operation and maintenance
PCT	Plant Community Type
PCU	Power Conversion Unit
PV	Photovoltaic
RBLs	Rating Background Levels
RNP	Road Noise Policy
SAII	Serious and Irreversible Impacts
SAT	Single Axis Tracking
SDGs	Sustainable Development Goals
SSD	State Significant Development
TEC	Threatened Ecological Community

Abbreviation	Description
TfNSW	Transport for NSW
The 'Project'	Glenellen Solar Farm
The 'Proponent'	Glenellen Solar Farm Pty Ltd
TIA	Traffic Impact Assessment
Trina Solar	Trina Solar (Australia) Pty Ltd
VDV	Vibration Dose Value
VPA	Voluntary Planning Agreement
ZVI	Zone of Visual Impact

1. Introduction

Trina Solar (Australia) Pty Ltd (Trina Solar) on behalf of Glenellen Solar Farm Pty Ltd (the 'Proponent') is proposing an approximately 200 Megawatt (MW) Alternating Current (AC) photovoltaic (PV) solar farm at Glenellen, located within the Greater Hume Shire Council (GHSC) Local Government Area (LGA) in southern New South Wales (NSW). The Glenellen Solar Farm (the 'Project') is located on freehold rural land approximately 4 kilometres (km) north-east of Jindera and 20 km north of Albury. As outlined within the Environmental Impact Statement (EIS) (Eco Logical Australia (ELA) 2020), the Project Site covers an area of 398-hectares (ha), with a Development Footprint of 334 ha.

1.1. The Proponent

The Project was originally proposed by CWP Renewables Pty Ltd on behalf of the Proponent. The Project was sold to Trina Solar in early 2020.

Trina Solar are a long-established worldwide provider of photovoltaic systems and solutions. Trina Solar's downstream business includes solar PV project development, financing, design, construction, operations and management, and one-stop system integration solutions for customers. As June 30, 2021, Trina Solar delivered more than 83 Gigawatt (GW) of solar modules worldwide and ranked one of the world's most bankable PV module brands (only module manufacturer for five consecutive years) in the 2020 PV Module and Inverter Bankability report issued by BloombergNEF. Trina Solar also has connected over 5.5 GW of solar power plants to the grid worldwide.

Trina Solar brings considerable experience to the development of large-scale solar farms, having managed the delivery of other projects in Europe, the United Kingdom, Asia and South America. Many people know of Trina Solar for its work in installing rooftop solar panels across thousands of homes in Australia. Trina Solar has over two decades of renewable energy development experience and offices in NSW, with key development activities coordinated from the NSW base in Sydney. Trina Solar's Australian Development Team is responsible for the development of utility scale PV Projects through Australia, Asia, New Zealand and the Pacific. Currently Trina Solar has an existing 300 MW portfolio, and also is shortlisted as a Candidate Founder Generator in the Central West and Orana Renewable Energy Zone, in NSW. Trina Solar is close to build its pipeline target of 1.5 GW by 2025.

- 820 MW (2021) capacity of Trina PV modules deployed for solar farms across Australia
- 100 GW capacity of Trina PV modules deployed for solar farms across internationally
- 40+ GW capacity of the 600 W+ bifacial modules production in 2022
- 7 GW Nclave (Trina Trackers) capacity deployed internationally
- 135 MW Nclave (Trina Trackers) capacity deployed locally (Australia)
- 800 MWh+ Trina Battery Energy Storage System capacity deployed internationally (100 MWH Operational, 700 MWH under construction).

Should it proceed, the Project will be part of Trina Solar's wider, global portfolio of solar farms at the same time as helping to boost renewable energy output domestically.

1.2. Project History

The Project EIS was prepared for Trina Solar on behalf of the Proponent by ELA to support a Development Application (DA) to build and operate a utility-scale PV solar farm at Glenellen, near Jindera.

The Project has an estimated capital value of c. $250 million. Under the *State Environmental Planning Policy (Planning Systems) 2021*, electricity generating works (including solar) that have a capital investment value of more than $30 million are classified as "State Significant Development" (SSD) and require approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) through the preparation of an EIS.

As such, the EIS was prepared under Part 4 of the EP&A Act, in accordance with the Secretary's Environmental Assessment Requirements (SEARs), dated 14 September 2018, and the requirements of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (now repealed and in accordance with Part 8 of *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation)).

Key environmental issues investigated and addressed in the EIS, based on the requirements of the SEARs, included:

- Biodiversity
- Aboriginal cultural heritage
- Bushfire risk
- Visual amenity impacts
- Noise impacts
- Traffic impacts
- Flood hydrology
- Water and soil impacts.

From the list above, higher risk environmental issues such as biodiversity, Aboriginal cultural heritage, bushfire risk, visual amenity impacts, noise impacts and traffic impacts were investigated in the EIS via specialist assessments. Lower risk issues were investigated primarily by desktop assessment (such as flood hydrology, and water and soils). Based upon the impacts identified, a set of mitigation measures were identified to ensure that all environmental impacts associated with the Project could be managed appropriately.

The EIS for the Project was placed on public exhibition between 31 October and 30 November 2020. It was exhibited online at https://www.planningportal.nsw.gov.au/major-projects/project/9550. Hard copies of the EIS were provided to GHSC for display in the local libraries and at the GHSC chambers in Holbrook and Culcairn.

Public communication of the EIS exhibition process was shared via the Project's website and a media release published in the local Border Mail newspaper, with an article appearing on November 4, 2020. Specific communications were also shared with the GHSC (letter to General Manager, dated 1 October 2020). Neighbours and the community were notified of the EIS process via an email mailout to the Project's database of registered recipients. All notification channels provided clear advice that the EIS was an opportunity for consideration of detailed project plans and to provide feedback and input to the Project's planning process.

During the exhibition period, submissions were received from members of the public, community groups and government agencies. These were collated and provided to Trina Solar by Department of Planning, Infrastructure and Environment's (DPIE, now Department of Planning and Environment (DPE)) on 4 December 2020.

During the exhibition period, DPE received submissions from one (1) community group, 107 members of the public, and 14 government agencies (Table 1).

Table 1: Summary of submissions received by the DPIE

Category		Number of Submissions Received
Community Groups		**1**
Individual members of the public		**107**
• Support	27	
• Objection	79	
• Comment	1	
Agency submissions		**14**

• NSW DPE
  ○ Biodiversity and Conservation Division (BCD)
  ○ Crown Lands
  ○ Water and Natural Resources Access Regulator (NRAR)
• NSW Department of Primary Industries (DPI):
  ○ Agriculture
  ○ Fisheries
• NSW Department of Regional NSW
  ○ Mining, Exploration and Geoscience (MEG) - Geological Survey of NSW
• Heritage NSW
• Transport for NSW (TfNSW) – Roads and Maritime Services Division
• NSW Environmental Protection Authority (EPA)
• WaterNSW
• TransGrid
• Fire and Rescue NSW (FRNSW)
• GHSC		

Total Submissions		**122**

1.3. Project Setting

The Project is located approximately 4 km north-east of Jindera and 20 km north of Albury in the south-western slopes area of the NSW Murray Region (Figure 1 and Figure 2). The Project is located within the GHSC LGA. The Project is located within the Murray River catchment and drains to Hume Weir. The Project is situated on a Project Site that contains 398.4 ha of largely cleared agricultural land currently used mostly for grazing with some cultivation.

Critical electricity infrastructure (in the form of an electrical substation) already exists adjacent to the Project Site. Land agreements have been negotiated with the two host landowners (excluding the TransGrid substation, whereby connection agreements are underway). Development Approval is sought for 30 years, with post operational activities to include the decommissioning of the Project and returning of the Project Site to a suitable condition to allow the resumption of agricultural activities.

Surrounding land use is primarily agricultural, with associated rural dwellings comprising two involved residences and non-involved residences, totalling 110 within a 2 km radius of the Project Site. The Project would be located on Lot 3 DP 411022, Lot 27 DP 753342, Lot 101 DP 791421, Lot 1004 DP 1033823, Lot 1 DP 588720, and Lot 1 DP 1283271.

The Project would generate electricity through the conversion of solar radiation to electricity using PV panels laid out across the Project Site in a series of modules, mounted on steel racking with piled, screwed or ballasted supports. Other infrastructure within the Project Site would include electrical power conversion units, underground and/or above ground electrical cabling, telecommunications equipment, operations/maintenance building (including amenities and storage facilities), vehicular access and parking areas, along with perimeter security fencing and gates. The Project will connect to the existing TransGrid Substation located along Ortlipp Road.

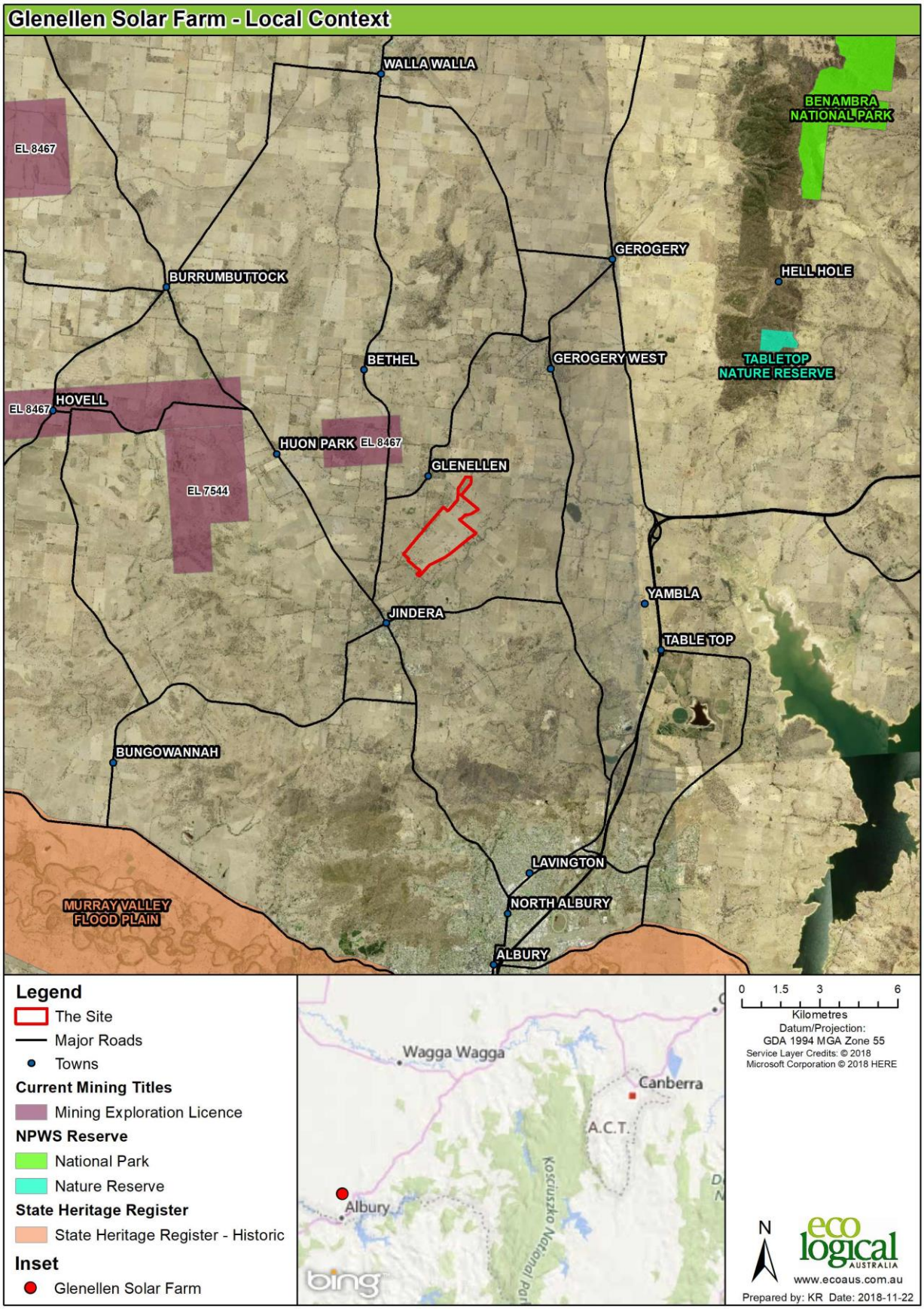


Figure 1: Local Context

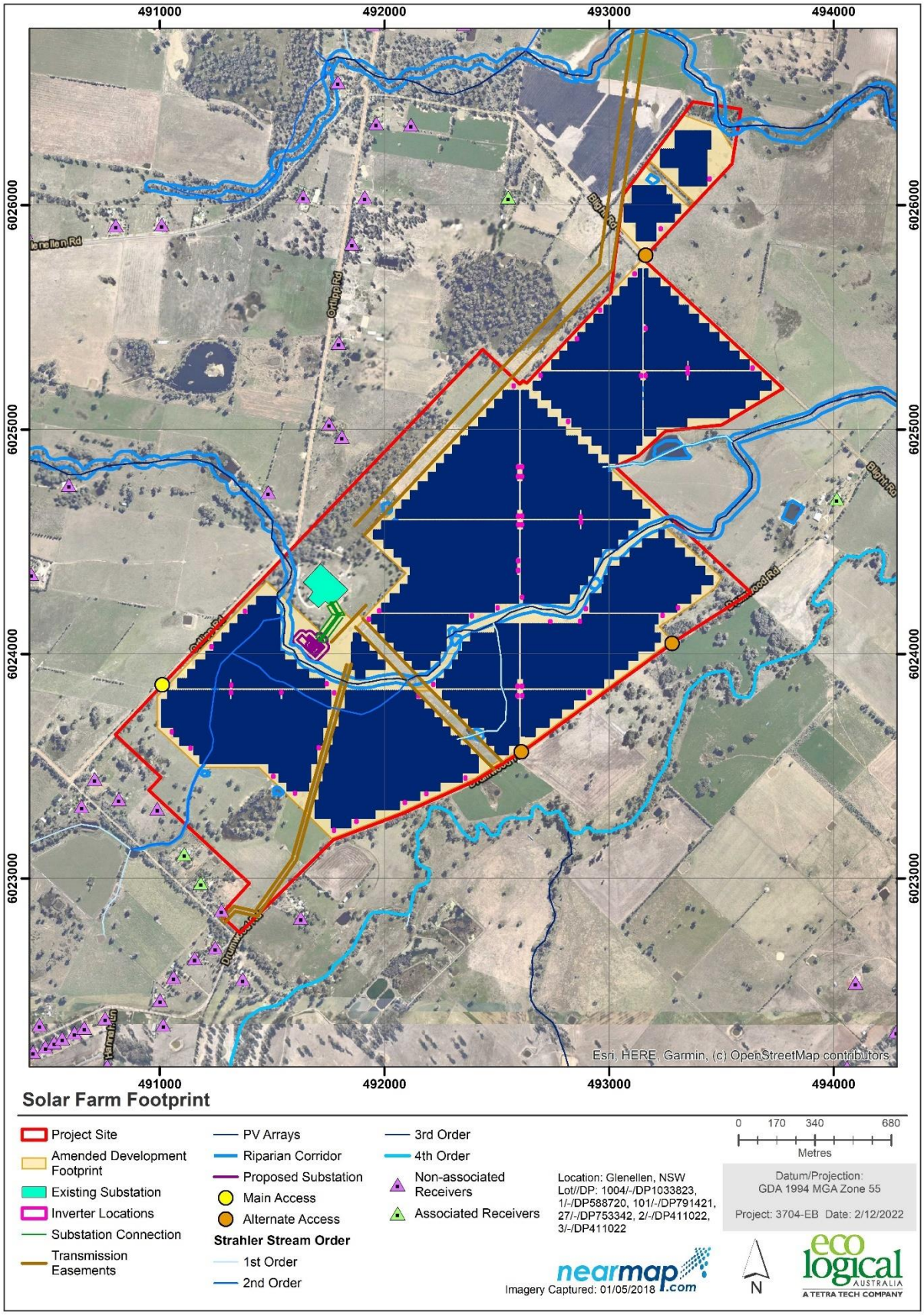


Figure 2: Project Site

1.4. Summary of Project Amendments

ELA has prepared this Amendment Report on behalf of the Proponent to fulfil the requirements of Schedule 1 of the EP&A Act. This Amendment Report has been prepared in accordance with the *State Significant Development Guidelines – preparing an amendment report* (DPIE 2021).

The key purpose of the Amendment Report is to present the amendments of the Project and to assess the economic, environmental and social impacts of the amended Project and to help the community, councils, government agencies and the consent authority to get a better understanding of the proposed amendments and their impacts so they can make informed submissions (if the report is exhibited) or decisions on the merits of the amended project (DPIE 2021).

The Project has been refined in response to the submissions made upon the EIS, findings of revised environmental assessments (biodiversity, visual, noise, traffic and transport, agricultural and flooding), and consultation with relevant government agencies, the community, and other stakeholders in order to further minimise the economic, environmental and social impacts of the project.

The key Project amendments considered within this report include:

- Solar panel and associated infrastructure layout – additional setbacks and reduced number of solar panels
- Substation – relocation of substation
- Transport – revised transportation route to the Project Site
- Water usage – revised water usage during construction and operational phases of the Project
- Project timing – revised Project timelines for construction, operation and decommissioning.

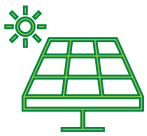
1.5. Relationship to Other Reports

The Submissions Report has been completed (ELA 2022a) and lodged concurrently with this Amendment Report. The Submissions Report contains the detailed responses to all submissions received from the public and agencies in relation to the EIS. These are not repeated in this Amendment Report.

2. Strategic Context

The strategic context of the Project remains consistent with Section 3 (Project Justification) in the EIS (ELA 2020). A summary of the strategic benefits from the Project is provided in Table 2.

Table 2: Summary of the strategic benefits of the Project

Strategic Benefits of the Project	
	Aid in achieving the NSW Energy Security Target by provide additional generation capacity to the grid to assist in meeting future load demands as thermal generators retire.
	Implement the aims of NSW's Electricity Strategy by providing over $250 million in capital investment into NSW's electricity system, particularly in regional NSW. Provide local and regional economic benefits through investment opportunities, and direct and indirect full-time employment construction and operation jobs. Maximise local business participation through contracted work. Provide ongoing economic stimulus through payments to associated landholders.
	Increase large-scale solar energy generation in the National Electricity Market (NEM) to provide low emissions power.
	Mitigate the impacts associated with global warming and climate change by displacing CO_2 from the current NSW energy generation supply, which is heavily reliant on coal powered generation.
	Contribute to achieving the 2016 Paris Agreement to reduce emissions by 26-28% below 2005 levels by 2030 and the United Nation's Sustainable Development Goals (SDGs).
	Implement the aims of NSW's Net Zero Plan Stage 1: 2020-2030 and contribute to NSW's aspirational target of net zero emissions by 2050.
	Aid in achieving three of the SDGs, namely affordable and clean energy (Goal 7).

The strategic need for the Project remains consistent with the EIS (ELA 2020), with Project helping to reduce carbon emissions by displacing approximately 328,000 tonnes of CO_2 annually (based on current NSW emission figures of 0.82 kg of CO_2-equivilent per kWh), providing progress towards the NSW net zero emissions target, as well as national and international environmental commitments.

The Project Site is located in the southwestern slopes part of the NSW Murray Region, within the Murray River catchment and drains to the Hume Weir. The Project Site consists of largely cleared agricultural land currently used mostly for grazing with some cultivation. The location of the Project remains key to the strategic context of the Project, with minimal key landscape features within the Project Site, the location of the Project in close proximity to the township Jindera, and key transport and infrastructure required for the Project, in the form of the Hume Highway and the Jindera Zone Substation.

The Project is consistent with the directions and actions of several local and regional plans, including:

- ***Riverina-Murray Regional Plan*** - The Riverina-Murray Regional Plan 2036 (DPE 2017) is a 20-year blueprint for the future of the Riverina-Murray region. The Plan establishes a framework to grow the region's cities and local centres, supports the protection of high-value environmental assets and makes developing a strong, diverse, and competitive economy central to building prosperity and resilience in the region. The 'vision' of the Regional Plan seeks, in part, to create a diversified economy which includes a thriving renewable energy sector that generates reliable energy for both the region and nation. The Plan identifies that the Riverina-Murray area has significant potential for renewable energy development with vast open spaces and a strategic advantage in hydro-electric energy generating capacity. Areas in the Riverina-Murray region, including Tumut and Wagga Wagga, are suitable for wind farms and TransGrid's NSW Connection Opportunities identifies Darlington Point and Griffith as having capacity for renewable energy generation.
  The Project, which seeks consent for a wind farm using modern renewable energy technology, complies with the actions of Direction 11 of the Riverina-Murray Regional Plan (DPE 2017) which seek to:
  - Encourage renewable energy projects by identifying locations with renewable energy potential and ready access to connect with the electricity network
  - Promote best practice community engagement and maximise community benefits from all utility-scale renewable energy projects
  - Promote appropriate smaller-scale renewable energy projects using bioenergy, solar, wind, small-scale hydro, geothermal or other innovative storage technologies.

- ***Greater Hume Local Strategic Planning Statement (LSPS)*** - The Greater Hume LSPS (GHSC 2020) plans for the economic, social, and environmental land use needs of the community over the next 20 years. It sets land use planning priorities to ensure that the future development within the LGA is appropriate for the local context. The LSPS is closely linked to Council's plans, studies, strategies, the Greater Hume Local Environment Plan (Greater Hume LEP) 2012 and Development Control Plan, as well as the Regional Plan. The three themes of the LSPS include Liveability, Productivity, and Environment and Resources. The LSPS does not directly acknowledge renewable energy as having a key role in a sustainable future. The Project supports Planning Priority 7, GHSC's intent to consider large-scale renewable energy generation as a complementary land use option for the area – given its access to transmission infrastructure, land availability and favourable climate conditions.
- ***Large-Scale Solar Energy Guideline for State Significant Development*** - This guideline, released January 2019, promotes best practice methods to inform site selection and the environmental impact assessment process for solar energy projects that are SSD (DPE 2018). The guideline

does not determine the permissibility of solar projects, but it does identify factors to be considered when planning and siting large-scale solar projects. These include, among other matters, visibility and topography, biodiversity, residences, natural hazards, resources, Crown Lands and agriculture (Biophysical Strategic Agricultural Land (BSAL) and Important Agricultural Land (IAL)). The Proponent has considered all of these environmental features in considering the siting of the Project and the nature of the Project design. The Project's interaction with, and impacts upon, all of these environmental features were assessed within he EIS (ELA 2020) and refined and assessed further through this Amendment Report.

3. Description of Amendments

The Project remains generally as described in Section 4 of the EIS (ELA 2020), however various amendments have been made to the Project in response to public and agency submissions received during the exhibition period of the EIS. Furthermore, specific additional technical studies have been undertaken in response to public and agency submissions received on the EIS.

The outcomes of these additional technical studies have been used to respond to specific issues raised during the exhibition of the EIS and have assisted with the development of amendments to the Project. These are outlined in Table 3 below.

Table 3: Additional technical studies and outcomes for the Project

Study	Author and Date	Scope	Outcomes	Amendments to Project
Land and Soil Capability (LSC) assessment	Tucker Environmental, 2022	To validate the LSC mapping within the Project Site, which has been mapped as Class 3 and Class 5 within the EIS (ELA 2020).	Based upon the decision tables within the LSC Assessment Scheme (OEH 2012) and the findings of the soil survey, the land previously mapped as Class 3 and Class 5 was determined to be Class 4.	No amendments to the Project Design have resulted from the LSC assessment, rather validation of current LSC class and support of the Project for Agri-solar operations rather than cropping based upon validated LSC class.
Agricultural Impact Statement (AIS)	Riverina Agriconsultants, 2022	To investigate the Project's potential impact upon agricultural production and potential agricultural economic implications of the Project.	Based upon the AIS (Riverina Agriconsultants 2022), the Project will reduce pasture production by 25% over the life of the Project. This in turn impacts upon the estimated post-development gross annual farm gate value of agricultural production, the estimated post-development gross related annual economic activity, and the estimated post-development annual reduction in local direct expenditure. However, the post-development sheep enterprise that will co-exist with the Project will continue to generate both upstream (contractors, farm input and service providers) and downstream (distribution and processing) economic benefits at a reduced capacity.	Based upon the AIS, the Project has been amended to increase the spacing between solar panels rows from 6m to 9m. This will in turn provide more areas of the Project Site for sheep grazing. Furthermore, the Proponent has committed to the development of a Groundcover Management Plan (GMP) for the Project, which will be aimed maintaining groundcover across the Project Site through both the construction and operational phases of the Project. The Proponent has also committed to the development of a Decommissioning and Rehabilitation Management Plan, which will aim to remove all infrastructure from the Project Site.
Biodiversity Assessment	ELA, 2022b	To update the Biodiversity Development Assessment Report (BDAR) to meet the requirements of Biodiversity Assessment Method (BAM) 2020 and to amend the BAM Calculator (BAMC) to include the reduced impact area form the amended Project.	The BDAR was initially finalised on 6 October 2020, following the requirements of the BAM 2017 using Version 30 of the BAMC. The BCD (letter Ref DOC22-614542 dated 19 August 2022) requested that the original BDAR (Version 7) be updated to be consistent with BAM 2020. The BDAR has been updated to meet the requirements of BAM 2020. The BAMC has also been updated to reflect the reduced impacts to native vegetation and scattered paddock trees, resulting in reduced offset requirements for the Project. In addition, assessments were further updated to incorporate the dry condition benchmark data as the	The amended Project design has been aimed at reducing impacts upon biodiversity within the Project Site. The design has been amended to reduce impacts upon native vegetation and scattered paddock trees. The impacts to native vegetation have been reduced by 2.72 ha and impacts to scattered paddock trees have reduced by four (4) trees.

Study	Author and Date	Scope	Outcomes	Amendments to Project
			vegetation integrity plot data was collect during a drought year (less than 480 mm).	
Traffic Impact Assessment (TIA)	Cardno, 2021	To alleviate concerns regarding safety along Glenellen, a revised TIA was prepared to assess an alternate haulage route option in consultation with GHSC and Albury City Council. A cumulative assessment was also undertaken for traffic generation during construction from the Project and Jindera Solar Farm (JSF).	A revised haulage route is proposed, assuming that the Project Site key components of the Project will be delivered by heavy vehicles from the Port of Newcastle. More broadly, suitable access and heavy vehicle movements have been considered and proposed upgrades to several roads along the proposed haulage route have been identified, with these works to be undertaken prior to the commencement of the Project construction (Cardno 2021). It was concluded that the impacts of the Project on the road transport environment, both within the vicinity of the Project and along the relevant haulage routes following the upgrades would be minor (Cardno 2021). The cumulative traffic construction volumes along the assessed haulage roads appear to be within acceptable Level of Service (LoS) A indicating the Project has little to no impact on the road network performance when considering the JSF project as well. Union Road is estimated to operate at LoS D which remains unchanged with the additional traffic volumes (Cardno 2021).	Based upon the revised TIA, the heavy vehicle haulage route to the Project Site has been amended and will be via one of two options: • Option 1 – Port of Newcastle – travel along the Hume Highway, Thurgoona Drive, Union Road, Urana Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road. • Option 2 – Port of Melbourne - If by rail, materials are likely to be delivered to the Ettamogah Rail Hub, then travel via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road.
Landscape and Visual Impact Assessment (LVIA)	Moir Landscape Architecture (Moir), 2022	A revised LVIA was undertaken to assess the impacts of the amended Project design and to provide updated mitigation measures for potential visual impacts upon non-involved receptors. A cumulative assessment was also undertaken for potential visual	The revised LVIA has assessed impacts on dwellings within 2,000 m of the Project Site and impacts on dwellings in excess of 2,000 m from the Project Site. The revised LVIA dwelling assessment identified seven dwellings as having a low visual impact rating with mitigation, including LIN003, LIN005, LIN007, LIN001, LIN004, NIK003 and NIK002 (Moir 2022).	Amendments to the Project design have been undertaken to reduce the visual impacts of the Project upon non-involved receptors. Amendments to the Project design include: • Relocation of the Substation to the south of the Jindera Zone Substation • Reduction in number of solar panels • Increased setback from Lindner Road • Increased setback along Ortlipp Road and Drumwood Road

Study	Author and Date	Scope	Outcomes	Amendments to Project
		impacts associated with the Project and the JSF.		• Increased vegetation screening around the Project Site.
Noise and Vibration Impact Assessment (NVIA)	Marshall Day Acoustics (MDA), 2022	A revised NVIA was undertaken to assess the impacts of the amended Project design and to provide updated mitigation measures for potential noise and vibration impacts upon non-involved receptors. A cumulative assessment was also undertaken for potential noise and vibration impacts associated with the Project and the JSF.	Construction noise levels, predicted under a conservative method, could exceed the noise affected management level at some non-involved receptors, however, are predicted to be lower than the highly noise affected management level at all non-involved receptors. Construction vibration is not anticipated to result in any adverse human comfort at the nearest non-involved receptors (MDA 2022).	Amendments to the Project design have been undertaken to reduce the potential noise impacts of the Project upon non-involved receptors. Amendments to the Project design include: • Reduction and relocation of inverters • Reduced construction speed limits along Lindner Road and Ortlipp Road during construction.
Flooding Assessment	ELA, 2022c	A revised flooding was undertaken to determine the flooding impacts upstream and downstream of the Project Site in relation to re-contouring works proposed.	The revised flood modelling indicates that there is a negligible impact on peak water surface height and peak flows with the Project across all modelled flows. This amounts to less than 0.2% difference in these measures between modelled scenarios.	The Project has been amended to incorporate re-contouring of an inundation area in the south-eastern part of the Project Site to allow for natural flows to occur and prevent any backfilling inundation into adjacent properties and agricultural land.

The Project amendments are illustrated in Figure 3 and summarised in Table 4. A consolidated Project Description is provided in Appendix A.

Table 4: Overview of Project amendments

Project Element	Original Project (EIS 2020)	Amended Project
Project Area		
Project Footprint	334.2 ha	308.9 ha
Impacts upon Native Vegetation	11.4 ha	8.68 ha
Impacts upon Paddock Trees	81	77
Physical Layout and Design		
Solar Array	416,000 solar panels	393,960 solar panels
Minimum spacing between rows	6 m	9 m
Piles	Approximately 60,000	Approximately 53,000 to 60,000 dependent upon final solar panel model and supplier
Power Conversion Units (PCU)	Likely to be approximately 2.5 MW to 10 MW each Approximately 100 PCUs	Likely to be approximately 4 MW to 10 MW each Approximately 60 PCUs
Inverters	Typically 2 per PCU	Typically 1 per PCU
Substation	Located south-west of Jindera Zone Substation	Located south of the Jindera Zone Substation
O&M Facility	• Office building, consisting of office, toilets, showers, staff room and kitchen • Maintenance building	• Container type office building, consisting of office, toilets, showers, staff room and kitchen • Container type Maintenance building
Site Access	Heavy vehicle haulage route to the Project Site via the Jindera-Walla-Walla Rd (Southbound), Lindner Road and the existing Ortlipp Road from the south.	Heavy vehicle haulage route to the Project Site via one of two options: • Option 1 – Port of Newcastle – travel along the Hume Highway, Thurgoona Drive, Union Road, Urana Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road. • Option 2 – Port of Melbourne - If by rail, materials are likely to be delivered to the Ettamogah Rail Hub, then travel via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road.
Fencing	2.5 m	2.2 m
Meteorological Station	10 m high	6 m high
	150 m from Lindner Road	165 to 400 m from Lindner Road

Project Element	Original Project (EIS 2020)	Amended Project
Project Setbacks and Vegetation Screening	10 m from Ortlipp Road	30 m from Ortlipp Road (includes a 20 m wide native vegetation corridor, then the security fence, then a 10 m wide corridor containing the Asset Protection Zone (APZ) and perimeter access track)
	10 m from Drumwood Road	20 m from Drumwood Road (includes a 10 m wide vegetation screening corridor, then the security fence, then a 10 m wide corridor containing the APZ and perimeter access track)
Re-contouring	-	Re-contouring of an inundation area in the south-eastern part of the Project Site will be undertaken to allow for natural flows to occur, and prevent any backfilling inundation into adjacent properties and agricultural land.
Construction Water Requirements	• Dust suppression – 18 ML • Panel cleaning – 3.6 ML • Road dust suppression – 18 ML • Potable water – 3.6 ML • Firefighting – 0.45 ML	• Dust suppression – 5.0625 ML • Dust suppression (re-contouring area) – 0.525 ML • Panel cleaning – 1.21 ML • Road dust suppression – 6.9375 ML • Potable water – 3.6 ML • Firefighting – 0.225 ML
Operational Water Requirements (per Year)	-	• Panel cleaning – 1.21 ML • Potable Water – 0.013 ML • Firefighting – 0.225 ML • Other Maintenance Activities – 0.39 ML
Project Timing		
Project Timeline	Construction – Late 2021 Operation / Repowering – Mid 2022 Decommissioning – c. 2050	Construction – Mid 2023 Operation / Repowering – Late 2024 Decommissioning – c. 2054

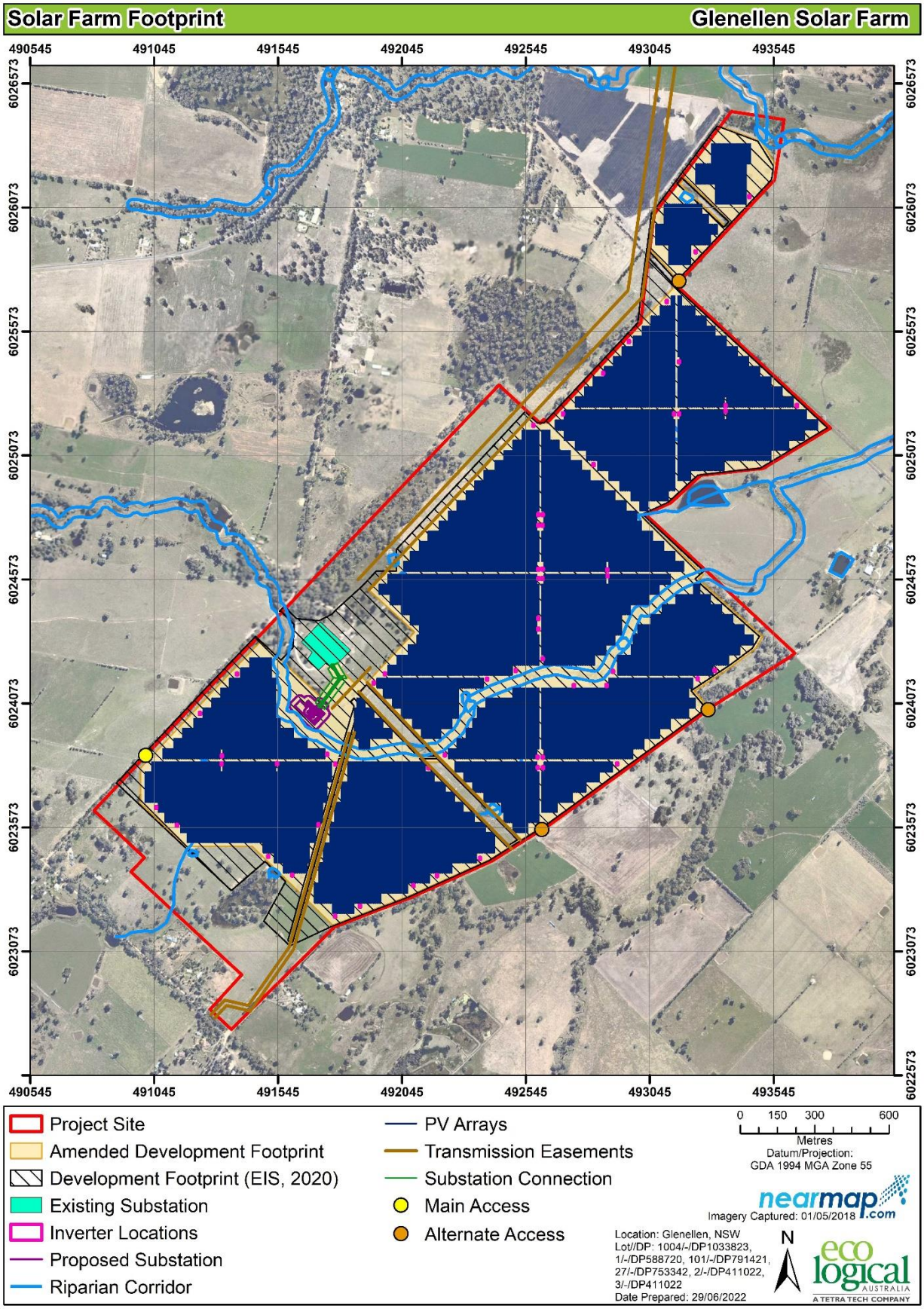


Figure 3: Amended Project Footprint

3.1. Project Area

The Project Site remains unchanged from the lodgement of the EIS (ELA 2020), however there have been several changes to the Project Site. The impacts form the Project have reduced from 334.2 ha as outlined within the EIS (ELA 2020) to 308.9 ha under the amended Project description, refer to Figure 3 above and Appendix A for more details.

3.2. Vegetation Impacts

The impacts upon native vegetation have reduced from 11.4 ha to be cleared as outlined within the EIS (ELA 2020) to 8.68 ha to be cleared under amended Project description, and the impacts upon scattered Paddock Trees have reduced from 81 as outlined within the EIS (ELA 2020) to 77. These amendments to impacts are further defined within Section 6.2.

3.3. Solar Array

The solar array refers to the area of the Project Site within which the PV panels will be located, along with the necessary infrastructure to support them; namely the Single Axis Tracking (SAT) system, inverters, internal track network, and connecting underground cabling.

The solar array has been amended to reflect the current technology available for solar panels, which has advanced since the inception of the Project and outlined within the EIS (ELA 2020). This advancement in solar panel technology, including higher power output (660 W+),higher efficiency, and higher energy yield in low irradiation performance and shading conditions, has resulted in the number of solar panels across the Project Site to be reduced, whilst still maintaining the 200 MW_{AC} output of the Project. This amendment has resulted in the number of solar panels to be installed reduced from 416,000 as outlined within the EIS (ELA 2020) to 393,960 panels across the Project Site.

No changes to the tracking systems and the maximum tilt height above natural ground (5 m) have been made since the submission of the EIS.

In addition to the reduction solar panels, the minimum spacing between each of the rows of trackers has been increased from 6 m as outlined within the EIS (ELA 2020) to 9 m, allowing for an increase in Agri-solar capacity across the Project Site and reduction in shading. In addition, solar radiation will be further dispersed between the solar panel rows, reducing potential heat island effects within and immediately adjacent to the Project Site.

The number of piles to support the solar array has been amended to reflect the reduction in solar panels across the Project Site, however, will be dependent upon the final solar panel model and supplier. The approximate number of piles will range from 53,000 to 60,000 required for the Project. The piles would be mechanically driven, screwed into, drilled and concreted or ballasted to the ground. Depending on the tracking system deployed, piles are typically spaced between 5 m to 10 m apart.

3.4. Power Conversion Units

PV panels produce Direct Current (DC) electricity which would be converted to AC at the many central PCUs. Based up further design iterations, a reduction in solar panels and an increase PCU size (approximately 2 MW to 10 MW each outlined within the EIS (ELA 2020) to approximately 4 MW to 10

MW), the number of PCUs required for the Project has been amended from approximately 100 PCUs as outlined within the EIS (ELA 2020) to approximately 60 PCUs.

An additional amendment to the PCUs will be one inverter per PCU instead of two inverters per PCU as outlined within the EIS (ELA 2020). Through iterative noise modelling, eight (8) inverters were relocated from the perimeter of the Project Site to further within the Project Site to reduce the intervening distance and allow for predicted compliance.

3.5. Substation

The proposed grid connection infrastructure is an expansion to the existing 330/132/22kV Jindera Zone Substation located adjacent to the Project Site. The location of the Project Substation with the EIS (ELA 2020) was to the south-west of the existing TransGrid Jindera Zone Substation, running in parallel to the existing 132KV overhead lines. Whilst considering feedback from the submissions on the EIS and after further consultation with TransGrid, the Project Substation has been relocated to the south of the existing TransGrid Jindera Zone Substation (Figure 3).

The Project Substation has been relocated to achieve two main objectives, the first is to further minimise visual impacts and the second is to minimise operational noise impacts to nearby residences. The Project Substation's equipment and buildings layout has changed with the same objectives.

Visual impacts have been further minimised by the revised location, with the amended location mostly screened by existing vegetation, including mature trees. The majority of the equipment will be located within buildings, whereby the Proponent is committed to have the building walls coloured so that they blend in with the surrounding environment. Outdoor equipment's numbers and the footprint has been minimised by the equipment placement to use the buildings as the first line of screening.

Noise impacts, due to the Project Substation equipment, has been reviewed and the main source of noise will be the power transformer, with its levels closely reviewed during the design process. To reduce the level past the Project Substation fence line, the transformer will be screened from the residences, by the buildings, which walls will absorb significant amount of noise, in turn reducing it at the residences' perimeter.

Furthermore, the Project Substation has been designed so that it will have a profile that is lower than the existing Jindera Zone Substation. The Project Substation will be cut into the existing contour profile, approximately 3 m and has been designed so that is still above the 1:100 flood event levels. To further minimise and potential visual or noise impacts, strategic vegetation screening will be undertaken the east and south will remove all direct views from neighbours. A cross-section of the Project Substation has been provided in Figure 4.

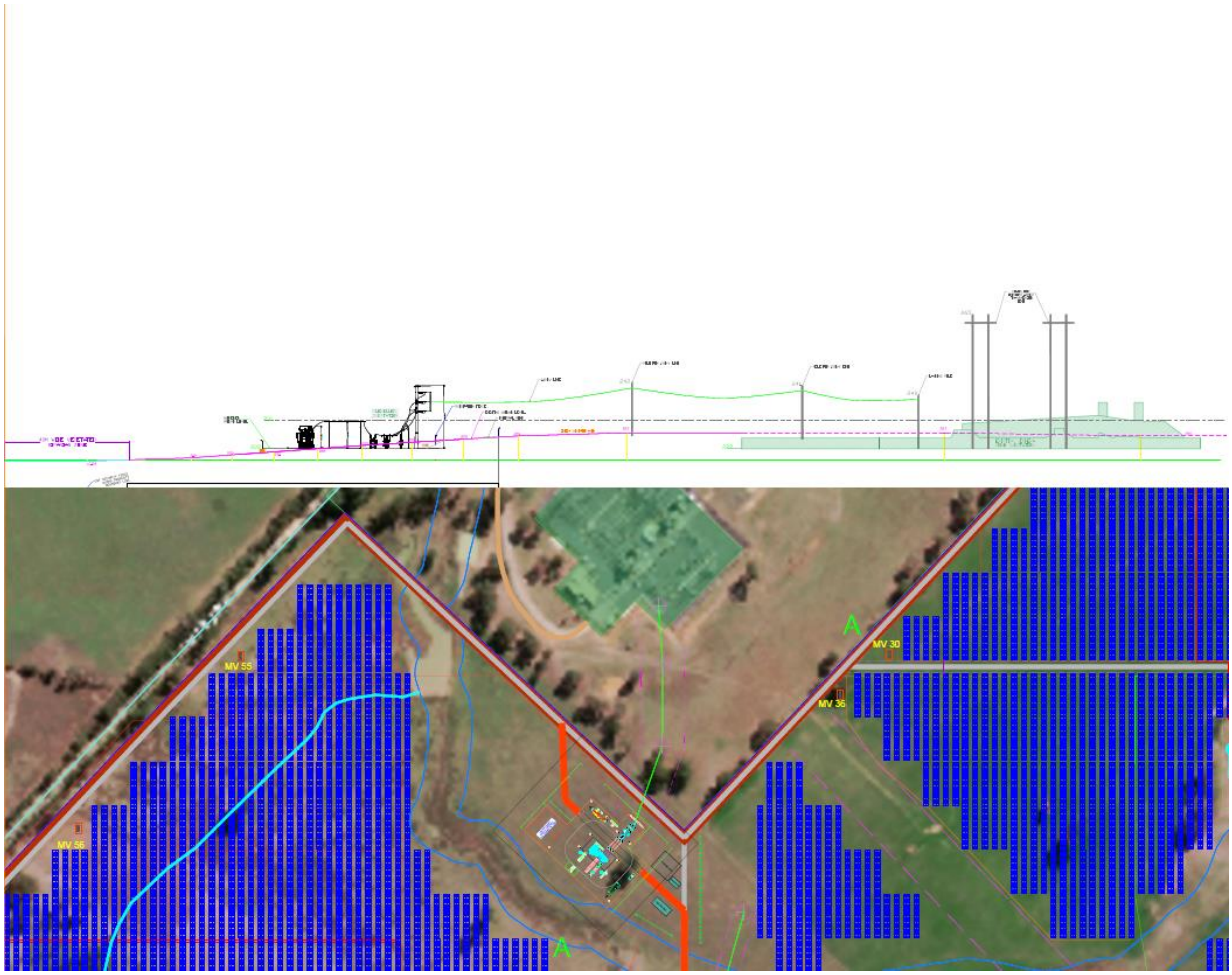


Figure 4: Cross-section of Project Substation

3.6. Operations and Maintenance Facility

A permanent O&M facility will be provided to meet the ongoing operational needs of the Project. The O&M facility has been amended to incorporate a container type office building, consisting of office, toilets, showers, staff room and kitchen, and a container type maintenance building.

3.7. Site Access

Ortlipp Road remains as the main access point to the Project Site. The heavy vehicle haulage route to the Project Site has been amended based upon submissions from the public and GHSC. The EIS (ELA 2020) outlined that the heavy vehicle haulage route to the Project Site would be via the Jindera-Walla-Walla Rd (Southbound), Lindner Road and the existing Ortlipp Road from the south.

The amended heavy vehicle haulage route to the Project Site will be through either one of two options, which will be dependent upon where key components of the Project will be delivered by heavy vehicles from. The first option (Haulage Route 1) is for key components of the Project to come from the Port of Newcastle, with heavy vehicles travelling to the site via the Hume Highway. The route option would travel along the Hume Highway, Thurgoona Drive, Union Road, Urana Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road (Figure 5).

The second option (Haulage Route 2) is for key components of the Project to come from the Port of Melbourne and then moved from the Port by road or rail. If by rail, materials are likely to be delivered to the Ettamogah Rail Hub and then transported to the Project Site via on-road transport via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road (Figure 5).

A revised transport and traffic assessment has been prepared and is outlined in Section 6.5 and Appendix H.

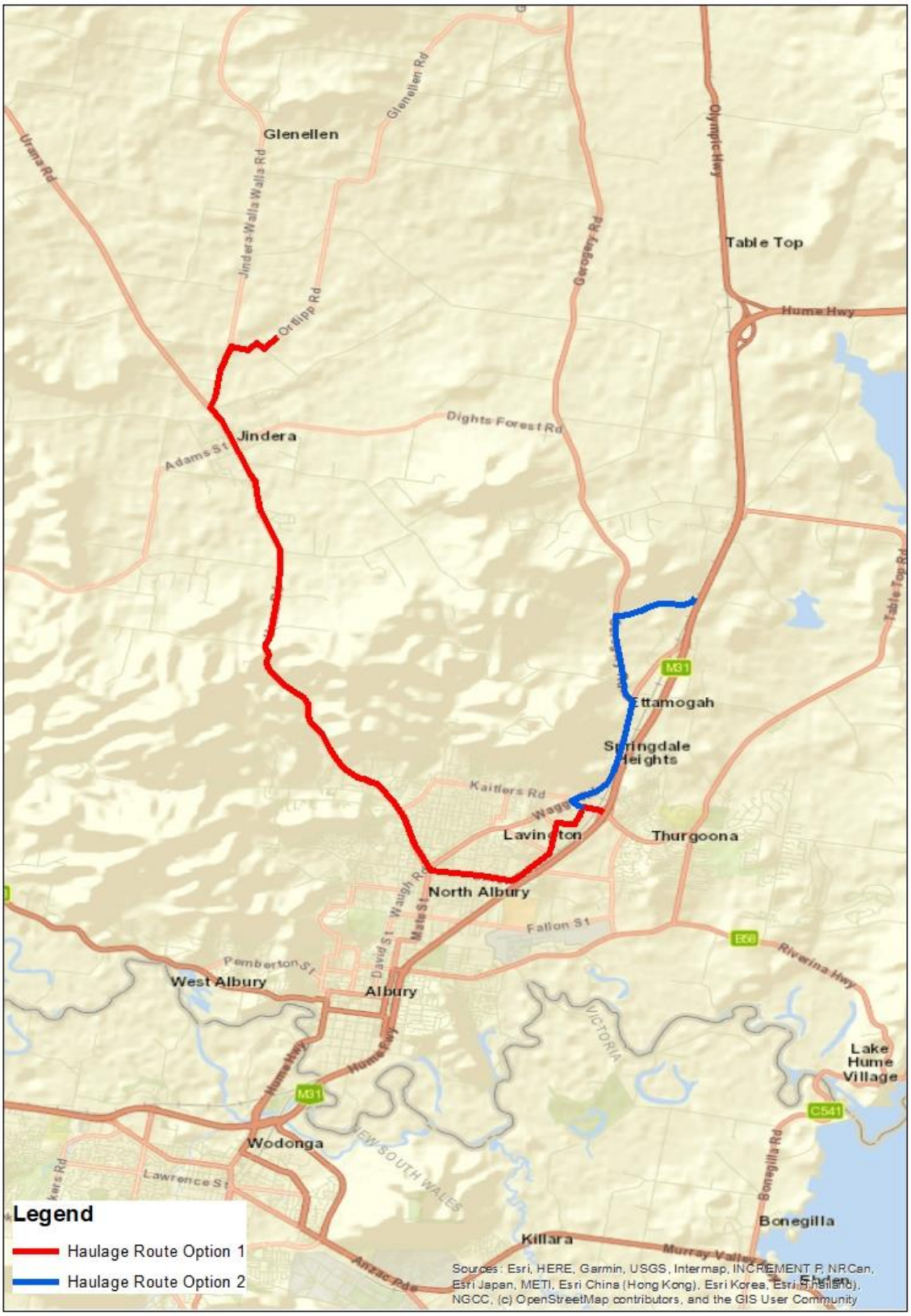


Figure 5: Heavy vehicle haulage route options from the Port of Newcastle and from the Port of Melbourne

3.8. Fencing

To ensure safety and security at the Project Site, a perimeter fence will be installed around the perimeter of the Project in accordance with the Proponent's requirements to ensure entry into the Project Site is controlled. The security fence, as outlined within the EIS (ELA 2020), was proposed to be up to 2.6 m in height, however this has been amended to be up to 2.2 m high.

3.9. Meteorological Station

A number of metrological stations will be located at locations determined as part of the final design, located in proximity to solar arrays and consisting of equipment to measure solar radiation (global and direct), temperature, pressure, rainfall, wind speed and direction. For wind speed, the EIS (ELA 2020) indicated that an installed mast would be approximately 10 m, however this has been amended to approximately 6 m high.

3.10. Project Setbacks and Vegetation Screen

The Project Site has been selected to minimise impacts to surrounding residences through a combination of consultation, consideration of existing vegetation and proximity to the Project. Through consideration of submissions on the EIS from the public and agencies, several amendments have been made Project, providing further setbacks from Ortlipp Road, Lindner Road and Drumwood Road.

The Project setback along Ortlipp Road has been increased from 10 m to 30 m to reduce impacts upon native vegetation along Ortlipp Road. The setback contains a 20 m wide corridor containing native vegetation, then the security fence, then a 10 m wide corridor which contains the APZ and perimeter access track (Figure 6). The mapped native vegetation along Ortlipp Road is Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion which is listed as a Critically Endangered Ecological Community (CEEC) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act).

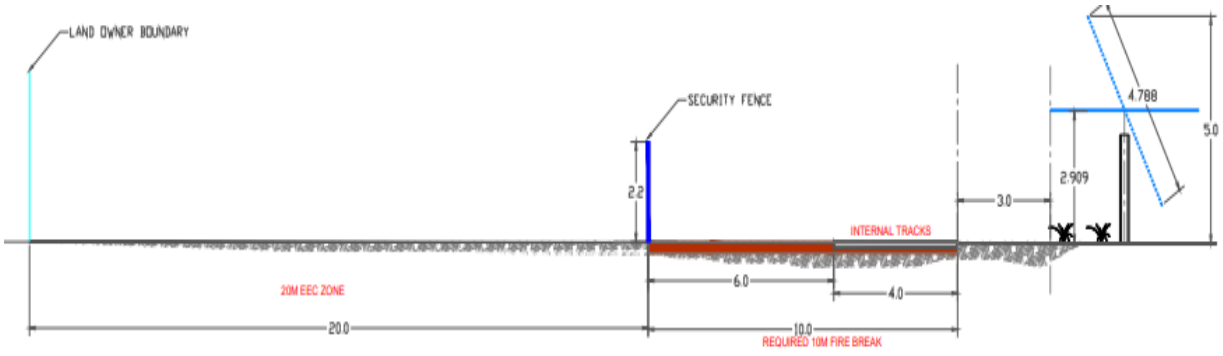


Figure 6: Ortlipp Road Setback cross-section

The Project setback from properties located along Lindner Road has been increased, and now ranges between 175 m and 400 m. Vegetation screening along the Linder Road boundary of the Project will occur outside of the Inner Security Fence in a 20 m corridor and will be protected initially by a temporary fence to limit cattle grazing within the screening corridor. It is envisaged that once the vegetation screening is at a mature state, cattle grazing can be allowed to continue to help manage bushfire risk and weeds.

The Project setback along Drumwood Road has been increased from 10 m to 20 m to allow for a 10 m wide screening corridor. The setback contains a 10 m wide corridor for vegetation screening, then the security fence, then a 10 m wide corridor which contains the APZ and perimeter access track (Figure 7).

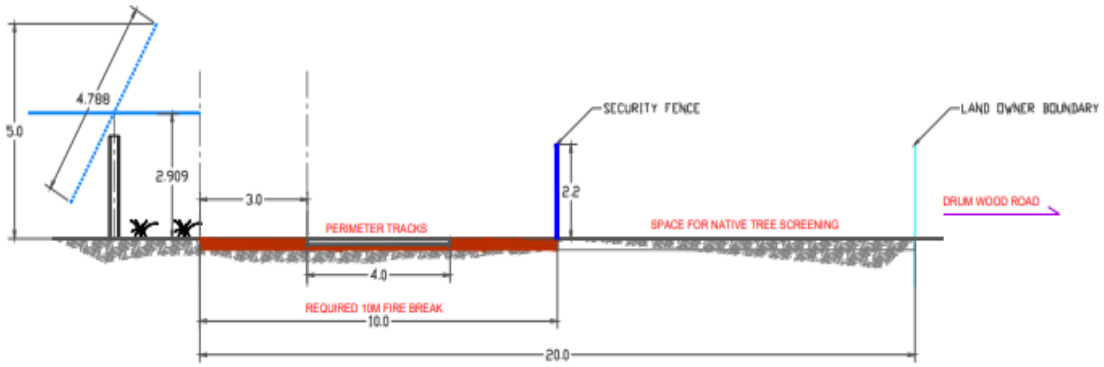


Figure 7: Drumwood Road Setback cross-section

In addition to the amended Project setbacks, a revised LVIA (Section 6.3 and Appendix F) has been prepared for the Project and more detail has been provided on the vegetation screening that will be undertaken to mitigate the visual impacts of the Project.

3.11. Re-contouring

In addressing public comments received upon drainage impacts upon neighbouring properties and agricultural land, the Proponent investigated a number of potential amendments to the Project design. One amendment to the Project Design has been the re-contouring of an inundation area in the south-eastern part of the Project Site to allow for natural flows to occur, and prevent any backfilling inundation into adjacent properties and agricultural land. The inundation area is located along 2nd Order stream adjacent to Ortlipp Road.

The re-contouring will be undertaken through via cut and fill, with Figure 8 illustrating the cut areas in green and the fill areas in pink.

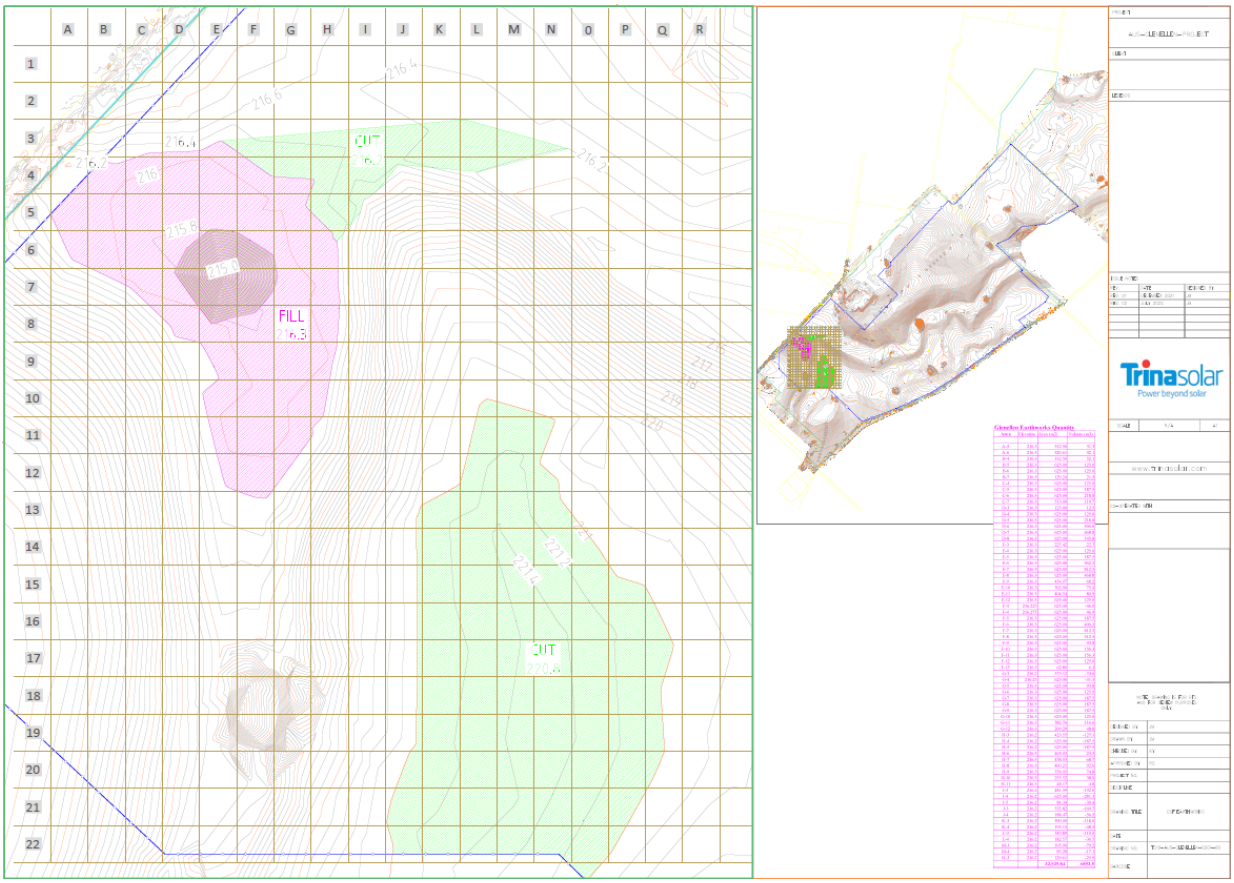


Figure 8: Re-contouring Plan

3.12. Water Requirements

3.12.1. Construction

The EIS (ELA 2020) outlines that water usage during construction is estimated at approximately 44 ML of potable and/or non-potable water for dust suppression and other construction purposes. Water requirements for the construction phase have been revised, taking in more detailed assumptions and the reduced footprint, as well as incorporating additional dust suppression for the re-contouring works that will be undertaken onsite. The revised water consumption during construction will be 17.56 ML, with assumptions provided in Table 5 below.

The Proponent has had initial discussions with GHSC regarding the supply of water during the construction phase of the Project. GHSC has confirmed to the Proponent that the water usage required during the construction phase of the Project can be provided from the GHSC village water scheme (Appendix E of the Submissions Report (ELA 2022a)). The water will be drawn from the standpipe at the intersection of Urana Road and Jindera Walla Walla Road and transported to the Project Site via water truck.

Table 5: Revised construction water consumption

Activity	Volume (L)	No. Times per Week	No. of Weeks	Total (L)
Dust Suppression	13,500	5	75	5,062,500

Activity	Volume (L)	No. Times per Week	No. of Weeks	Total (L)
Dust Suppression (Re-contouring area)	7,500	5	14	525,000
Panel cleaning	11,000 (3 L per panel)	5	22	1,210,000
Road dust suppression	18,500 (2 trucks of 2,000 L every 2 hours)	5	75	6,937,500
Potable Water	40,000	1	90	3,600,000
Firefighting	90,000 (first fill) 45,000 (partial refill)	1	5	225,000
Total				**17,560,000**

3.12.2. Operational

Water requirements during the operational phase of the Project have been refined since the public exhibition of the EIS and are outlined in Table 6.

The Proponent has had initial discussions with GHSC regarding the supply of water during the operational phase of the Project. GHSC has confirmed to the Proponent that the water usage required during the operational phase of the Project can be provided from the GHSC village water scheme (Appendix E of the Submissions Report (ELA 2022a)). The water will be drawn from the standpipe at the intersection of Urana Road and Jindera Walla Walla Road and transported to the Project Site via water truck.

Table 6: Revised operational water consumption

Activity	Volume (L)	No. Times per Week	No. of Weeks (per Year)	Total Per Year (L)
Panel cleaning	11,000	5	22	1,210,000
Potable water	50	5	52	13,000
Firefighting	45,000 (partial refill)	1	5	225,000
Other Maintenance Activities	1,500	5	52	390,000
Total				**1,838,000**

3.13. Project Timeline

It is anticipated that the Project would take approximately 12 to 18 months to construct. The Project would be operational over an initial term for approximately 30 years. Further, it is anticipated that the Project could extend for a further term should market and commercial circumstances dictate.

It is expected that upgrading or repowering of the PV modules and ancillary equipment may be required throughout or to extend the operational life of the Project. This will be a commercial decision at the time based on the relative economics of solar PV generation compared to alternatives and would be subject to a separate Development Application.

Decommissioning and restoration would occur at the end of the operational life of the Project. As such, planning consent for the Project is sought for 30 years to cover one full term of operation and associated

construction, upgrading and decommissioning periods. Details of each project phase are provided below in Table 7.

Table 7: Revised Project Timeline

Phase	Indicative Start	Indicative Period
Construction	Mid 2023	18 months
Operation / Repowering	Late 2024	28 years
Decommissioning	c. 2054	6 months

4. Statutory Context

The statutory context of the Project remains consistent with Section 6 of the EIS (ELA 2020), except in relation to the following legislation revisions that have occurred since the EIS was lodged:

- *State Environmental Planning Policy (State and Regional Development) 2011* is now repealed and incorporated into the *State Environmental Planning Policy (Planning Systems) 2021*
- *State Environmental Planning Policy (Infrastructure) 2007* is now repealed and incorporated into the *State Environmental Panning Policy (Transport and Infrastructure) 2021*
- *State Environmental Planning Policy (Primary Production and Rural Development) 2019* is now repealed and incorporated into the *State Environmental Planning Policy (Primary Production) 2021*
- *State Environmental Planning Policy (Koala Habitat Protection) 2021* is now repealed and incorporated into the *State Environmental Planning Policy (Biodiversity and Conservation) 2021*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *State Environmental Planning Policy No. 55 – Remediation of Land* have now been repealed and are incorporated into the *State Environmental Planning Policy (Resilience and Hazards) 2021*.

The legislation revisions above do not affect the permissibility of the Project which include:

- The Project would have an estimated capital investment cost greater than $30 million and is therefore considered SSD under Part 4 of the EP&A Act
- The Project is located within a rural zone (RU1 Primary Production) under the Greater Hume LEP. Within this zone, electricity generation is not permitted. However, pursuant to Clause 36(1b) of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*, development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial, or special use zone, which in this case is the RU1 (Primary Production zone). Given that the Project is located on prescribed rural land (RU1), and the proposed activity is to generate electricity using solar energy, the Project is permissible with consent under clause 36(1b) of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

5. Engagement

5.1. EIS Communications

Public communication of the EIS exhibition process was shared via the Project's website and a media release published in the local Border Mail newspaper, with an article appearing on November 4, 2020. Specific communications were also shared with the GHSC (letter to General Manager, dated 1 October 2020). Neighbours and the community were notified of the EIS process via an email mailout to the Project's database of registered recipients. All notification channels provided clear advice that the EIS was an opportunity for consideration of detailed project plans and to provide feedback and input to the Project's planning process.

A total of 122 submissions were received following the close of the EIS exhibition period, including one from a community group, 107 from member of the public and 14 from government agencies. Key EIS community issues raised were as follows:

- Inappropriate location
- Loss of prime agricultural land
- Visual impact and aesthetic landscape changes
- Devaluation of property values
- Transport planning – route selection, road degradation and repair
- Biodiversity and loss of existing trees.

Since the launch of the EIS and the end of COVID restrictions the Project Team has returned to face-to-face briefings and engagement where required. Objectives of this targeted engagement were:

- to maintain consultation and engagement with 2km neighbours already engaged through the Concept Development Process and or who expressed interest in knowing more about the Project
- to establish engagement communications with impacted neighbours within 2km that were previously NOT engaged (i.e. new to the area or had not been in contact with the Project)
- via this engagement process, continue to gather input to inform the Project's design and seek to resolve issues where practical to do so
- provide factual, timely information to broader community in order to build awareness and trust in the Project.

Over the course of the past 18 months, the Project Team has visited the area to meet with neighbours and stakeholders on multiple occasions, including five dedicated site trips to meet and talk with adjacent neighbours and groups.

To provide real time advice on project modifications and updates, the Project Team has also launched an interactive site map on its website to provide easily accessible information in response to key concerns raised. Alongside this site map is a 14-question feedback survey form – with details from logged responses shared directly with the Project Team.

An additional website feature has been the creation of a Contractor Registration Form. This enables local businesses, suppliers and workers to register interest in working for the Project, should it be

approved. To date, 12 responses have been received with details of these parties recorded on a register for possible future engagement.

At all times, Trina Solar has attempted to act in a transparent, informative and inclusive manner when dealing with project stakeholders as well as actively monitor consultation outcomes to refine its ongoing engagement approach.

Engagement activities, complaints, themes and outcomes are recorded in a consultation database. Periodical reviews of engagement outcomes are used to further refine the Project's consultation approach.

The following provides a summary of all engagement and consultation outcomes for various environmental matters, and the means by which these have been addressed within this Submissions Report.

5.1.1. Transport Route

In response to council and community concerns raised in response to the EIS, the Proponent engaged with both local Councils (GHSC and Albury) to plan suitable alternative transport routes for Project construction and operations. Neighbours and the Jindera Community Forum were also consulted to confirm the proposed new transport route was in alignment with community expectations and whether any new, unanticipated impacts needed to be considered (i.e. school bus arrangements). Both the TIA (Cardno 2021) and Submissions Report (ELA 2022a) have been updated to reflect this feedback and proposed mitigation measures.

Changes to the transport route and planned approaches to transport safety were included in the Projects' 6th Community Newsletter, issued in August 2022. Previous newsletters for the Project were released in July 2018, August 2018, October 2018, December 2018, and August 2020.

5.1.2. Visual and Aesthetic Impacts

Potential visual impact concerns were addressed through offers of one-on-one consultations with all neighbours where a moderate or high visual impact was likely to occur post construction – and prior to visual screening mitigation reducing these aesthetic impacts to low. The intent of these briefings was to acknowledge the concerns of neighbours worried about visual impacts, and to ensure neighbour feedback was considered during the development of representative visual montages and the Project's landscaping plan. Advice was also sought as to neighbours' preferences for vegetation screening or alternative measures.

Moir Landscape Architecture visited neighbours in October 2021 who opted into initial briefings to collect initial feedback and imagery. A Community notice was also issued at this time for residents wanting advice on the visual impact assessment process. The Project Team then returned in November/December 2021 to meet with neighbours and provide firsthand feedback on landscaping and mitigation measures. Large format visual renders were produced to support this engagement and to provide a realistic impression of what the Project would look like and how it would appear once visual impact mitigations were applied. Copies of these renders were left with neighbours on request.

Detailed input to visual and aesthetic mitigation means (including expansion of vegetation buffers, recessing and screening of the site substation, buffer species preferences and methods to reduce night

lighting impacts) have subsequently been included in current concept plans. In consideration of universal feedback from neighbours, options for temporary shade cloth screening have also been excluded from plans.

5.1.3. Devaluation of Property Value

While not a discreet focus for ongoing engagement, property value concerns have been noted and acknowledged when raised by community and stakeholders. The Project Team has also made contact with local real estate agents to proactively provide contact details for the Project Team should agents or potential property buyers want more details on the Project to consider when making property purchase decisions.

5.1.4. Use of Agricultural Land

Riverina Agriconsultants undertook consultation with the two landholders associated with the Project to clarify current agricultural productivity within the Project Site. This consultation helped determine the likely impact of the Project on post development production. This is further discussed in Section 6.1.2 of the Amendment Report.

The Project Team also sought contact with the Clean Energy Council in order to better understand best practice approaches to Agri-solar. Consideration of pilot studies recently released by the Clean Energy Council will be a key part of designing an approach to Agri-solar should the Project be approved. Potential also exists for the Project to be considered for an additional pilot study given the possibility of co-located cropping on the Project Site, which could be a possible first for Australian industry.

Given 'use of agricultural land' as an ongoing community concern and its prominence in the list of social risks, plans for the Project Site to be utilised for agriculture – once constructed – were also included in Community Newsletters 2 and 3.

5.2. Social Benefit

The Proponent has undertaken ongoing consultation with GSHC, with specific consultation revolving around the transportation issues and the social benefits of the Project. As part of the consultation with GHSC, local government contributions from the Proponent were discussed and an offer to enter into a future Voluntary Planning Agreement (VPA) with the GSHC was made by the Proponent.

In response to the letter of offer, GSHC considered the letter of offer at it Ordinary Meeting held on 21 April 2021 and GSHC resolved to make the following resolution:

'Council advise Trina Solar that the "offer" could form the basis of a draft VPA which would ultimately be signed, subject to public exhibition and consent to the development being granted by the Independent Planning Commission.'

A media statement as to the nature and value of the VPA appeared in the local Border Mail in April 21. Since then, the Proponent has met with GHSC and have agreed to start drafting the VPA for the Project. The broad terms of agreement within the VPA will include:

- For the development of a solar farm within the Lot and Deposited Plan numbers outlined within the EIS.

- The development includes the construction, operation and decommissioning of a photovoltaic solar farm facility and associated infrastructure with an installed capacity of approximately 200 MW of electricity (direct current).
- A Development Contribution of $2,500,000 (excluding GST) will be paid to GHSC in instalments:
    - Development Contribution – First Instalment - $500,000 (excluding GST) within 7 days of the Commercial Operation Commencement Date, and will be utilised as a contribution towards Jindera Multipurpose Centre
    - Development Contributions – Second to Tenth Instalment - $222,222.22 (excluding GST) each instalment, plus CPI adjustment within 7 days of the first anniversary of the Commercial Operation Commencement Date and annually thereafter for nine (9) consecutive years. Expenditure of Development Contributions will be determined and utilised at the discretion of GHSC for any projects deemed to benefit the public within the LGA.

5.3. Neighbour Agreements

In addition to specific commitments to mitigate and minimise receptor impacts, the Proponent has offered Neighbour Agreements to 10 neighbouring properties, regardless of their stance on the Project. Neighbour Agreements were offered to these neighbours as an additional means of acknowledging that residual impacts may still occur, and that the anticipation of potential impacts may be a cause of some concern. Agreements also sought to pre-emptively share a portion of the financial returns from the Project with neighbours. These agreements took the form of a once off financial contribution. Agreements were non-binding – no aspect of the Agreement sought to limit neighbours formally objecting to the project or participating in the approval processes.

- Assessment of eligible neighbours was done according to the following criteria:
- Residual low visual impact as determined through the revised LVIA
- Immediately adjacent to the Project Site and may be residually impacted during the construction and/or operation of the Project by noise or noise levels, traffic movements, visual amenity, solar panel glint or glare, emissions or construction impacts
- Potential for cumulative noise, visual impacts as a result of proximity to the Project and proposed, neighbouring JSF
- Residual impacts are those beyond the impacts that have been prevented, mitigated or reduced as far as possible by the Proponent during the Development Approval process.

Eligible neighbours were informed of Neighbour Agreement offers via meetings, phone calls and email, commencing in December 2021. Neighbour engagement has continued over the past six months to ensure details of these Neighbour Agreements are clear and acceptable to recipients. In addition, Trina Solar has offered to reimburse legal fees up to a set value to allow Neighbours to seek specialist advice on Agreements prior to signing. Further, unique commitments to maintaining positive relations were also provided to some neighbours in response to their specific concerns (i.e. road and transport safety measures). Two landholders have accepted neighbour agreements for the Project.

5.4. New Issues Raised

In meeting with neighbours and stakeholders, several new issues have arisen regarding the next phase of the Project (Construction) which has seen an increase in queries relating to possible impacts (transport, dust, noise, etc.) and what mitigation measures the Project will take to avoid these impacts. Aesthetic changes to the existing landscape remain a dominant concern, with high interest in and input to the Project's approach to mitigating visual impacts to nearby receptors.

Contact information continues to be made readily available to neighbours that have yet to engage with the Project through newsletters and the website.

Engagement with neighbours is ongoing, and neighbours will also be notified at the time Response to Submission documents are available.

5.5. Other Notable Consultation Outcomes

Other notable consultation outcomes include:

- TransGrid – The Proponent has undertaken ongoing consultation with TransGrid in relation to the Project and connection to the Jindera Zone Substation. TransGrid has entered into a Connection Process Agreement with the Proponent for the provision of network connection services, in order to connect the Project to TransGrid's transmission network (Appendix D of Submissions Report (ELA 2022a)). A timeline of consultation with TransGrid for the Project has been provided below:
    - December 2021 – meeting with TransGrid to discuss the finalisation and submission of the Generator Performance Standard (GPS) submission
    - January 2022 – supplementary report with feedback received from TransGrid with transformers impedance clarification and voltage control issues
    - February 2022 – meeting with TransGrid to review the issue around the increase in size of the Project Substation impacting the riparian zone and to review the discrepancy in levels of final height of the Project Substation
    - March 2022 – meeting with TransGrid two discuss the finalised layout and submit drawings and designs for incorporation into the Submissions Report and Amendment Report
    - April 2022 – meeting with TransGrid to confirm the GPS submission in April 2022 and completion of final drawings on layout and site plans
- Murray Local Land Services (LLS) – The Proponent undertook consultation with the Murray LLS to seek feedback on the Project, including any requirements the Murray LLS may have in regard to water across the Project Site. The Murray LLS responded in that they do not see any issues or impacts under the *Local Land Services Act 2013* (LLS Act) for the Project as it has been determined an SSD which requires all vegetation impacts to be assessed under Part 4 of the EP&A Act. Furthermore, the Murray LLS clarified that there appears no past Catchment Management Authority/LLS projects identified within the Project Site.
- DPE - Crown Lands – The Proponent has undertaken ongoing consultation with DPE – Crown Lands in regard to obtaining a Crown Road Licence Application for the Project, specifically to install underground cables beneath the Crown Road within the Project Site. The Crown Road Licence Application (626163) was submitted and processing of licence will be subject to the

approval of the Project. However, since the Crown Road Licence Application was submitted, the main landowner of the Project Site has successfully purchased the Crown Road, therefore no Crown Land will now be impacted by the Project.

- DPE – Water – The Proponent has undertaken consultation with DPE – Water to discuss the water requirements for the Project, re-contouring of a 2nd Order Stream adjacent to Ortlipp Road, and the proposed riparian corridors within the Project Site.
- Forest Air Helicopters. The Project has met with owners of this local business who are also adjacent residents to the proposed project site. Discussions captured specific details of their operations and preferred flight paths and established there would be no impacts to flying arrangements. Should the Project proceed, Trina Solar will explore the option of engaging Forest Air to provide aerial inspection, cleaning services – dependent on project need.
- Progressive updates to the Project concept layout have been reflected on the Project website and interactive map. A feedback survey facility has been maintained alongside this to capture community feedback which has been shared with the Development Team. Originally a means of collating broader community feedback during COVID when face to face and large group gatherings were not possible, this interactive feature has been maintained and continues to be promoted via direct engagement and Community Newsletters.
- The Project team has held an initial introductory briefing with ICN Gateway Riverina in preparation for contracting local suppliers / social enterprises to support construction and operations.
- Accounting for the time that has elapsed since lodgement of the EIS, the Proponent has worked to stay updated on and consult with new neighbours relocating to within 1.5km of the Project.

6. Assessment of Impacts

In response to the submissions made from the public and government stakeholders on the EIS for the Project, several additional technical studies and revised technical studies have been undertaken for the amended Project.

The outcomes of these technical studies have been used to respond to specific issues raised during the exhibition of the EIS and have assisted to inform the changes to the Project. The technical studies have been detailed below and include:

- Land resources, including a LSC assessment and AIS
- Updated biodiversity assessment
- Revised LVIA
- Revised NVIA
- Revised TIA
- Revised Flooding Assessment.

6.1. Land Resources

Many submissions received from the public were related to the loss of prime agricultural land as a result of the Project. Some of the points raised in the public submissions included:

- The proposal will take a large amount of prime/good agricultural land out of production
- Agricultural capacity will be reduced
- How will high quality pasture be grown under the solar arrays with impacts during construction
- Land will be locked up in solar development for at least 30 years
- No reliable plans for rehabilitation.

The GHSC also had concerns around the loss of high-quality agricultural land in their submission on the EIS.

To address the submissions, two additional studies were undertaken to validate the LSC of the Project Site, and to assess the impacts the Project may have upon agricultural productivity within the Project Site and further afield within the region.

6.1.1. Land and Soil Capability Assessment

An LSC assessment was undertaken by Tucker Environmental (2022) to review the LSC classes present within the Project Site (Appendix C). The Project Site is mapped within the EIS (ELA 2020) as Class 3 (eastern extent of the Project Site) and Class 6 (western extent of the Project Site) corresponding to the Soil Landscape Units of Kindra and Yarra Yarra from the Soil and Land Resources of the Murray Catchment 1:250,000 map sheet (OEH 2010).

The LSC mapping dataset is used to understand the land use and management required for different LSC based on the physical capability of the land which is determined by the best available soils natural resource mapping across NSW (OEH 2012; DPIE 2020). Land capability is defined as the inherent physical capability of land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources (OEH 2012). This definition, particularly in relation to

the capability of soils to withstand long term degradation, provides a frame from which a LSC classification can be ascribed for a site.

The process of reviewing the mapped land and soil capability classes included a review of existing information compiled within the EIS (ELA 2020), Hydrogeological Landscapes for the Eastern Murray Catchment (Walla Walla and Burrumbuttock), site observations and a soil survey of the physical and chemical properties of topsoil (0-30cm profile).

Tucker Environmental conducted a soil survey across 10 locations within the Project Site on 23 March 2022. Soil sampling of the 0-30cm layer was undertaken using composite samples taken at 10 locations corresponding with 10 borehole locations previously surveyed at depths of greater than 30cm by Douglas Partners (2019). The composite samples from the 10 locations were sent to the Environmental Analysis Laboratory (EAL) for analysis. The following findings and observations of the soil survey are relevant to the site hazard identification:

- Improved pasture and perennial native pastures on undulating low hills and long colluvial slopes with low terraces adjacent to Kinacroft Creek (no standing water). Some box-gum woodland patches remaining and scattered paddock trees. The sub-station is located on a hill crest at 220m AHD, local site relief 15-20m
- Field texture grade silty loam to silty sandy topsoil, hard setting with apedal single grain structure. Texture contrast observed hard to stiff clay from 25-30cm depth. Orange mottling evident in some locations in clay subsoils
- Low CECs indicative of lighter, lower inherent fertility soils ranging from 3.5-8.7cmol+/kg, with high calcium/magnesium ratios
- Low organic matter and total carbon content of soils with low total nitrogen levels in well balanced ratios of 13-16
- Mostly slightly acid to slightly alkaline pH (1:5 water) levels ranging from 5.6-7.5.

The individual hazards across the site were applied based on the decision tables in Section 5 of the LSC assessment scheme (OEH 2012). The results and justification is provided in Table 8 below.

Table 8: Land and Soil Capability Assessment Results

Hazard Classification	Soil Landscape (EIS)		Soil Landscape (Validated)	Justification
	Kindra	Yarra Yarra		
Soil Acidification	2	4	2	Based on 1 to <3% slopes across the Project Site.
Water Erosion	1	5	3	Moderate site exposure and moderate erosive power >500mm rain
Soil Structure Decline	3	6	4	Light fragile hard setting silty topsoil and poorly structured.
Wind Erosion	2	2	3	Red brown earths ~653mm rain and 6-7.5 pH water.
Shallow soils/Rockiness	1	1	4	Low recharge, moderate discharge and moderate salt store.

Hazard Classification	Soil Landscape (EIS)		Soil Landscape (Validated)	Justification
	Kindra	Yarra Yarra		
Salinity	3	1	4	2-3-month waterlogging, every 2 to 3 years. Imperfectly drained – could be higher in wetter years.
Mass Movement	1	1	1	No surface outcrop and >100cm soil depth
Water Logging	2	3	1	No mass movement present >500mm rainfall.
Land and Soil Capability Class	**3 (High)**	**6 (Low)**	**4 (Moderate)**	

The Hydrogeological landscapes (HGL) are spatially defined areas with similar salt stores and pathways for salt mobilisation. HGLs consider a variety of factors such as: geology, soils, slope, regolith depth and climate (NSW Government 2016). HGLs are relevant to understanding hazard classifications at the Project Site which feature a transition from the Burrumbuttock HGL surrounding the Project Site to the Walla Walla HGL extending southwest to Jindera.

The Walla Walla HGL corresponds with the Kindra soil landscape and features isolated land salinity, low salt load and low in-stream Electrical conductivity (EC) with sodicity in lower landscape, salinity (isolated), waterlogging (common), gully erosion (localised), poor soil structure, acidity, and sheet erosion (OEH 2015a; OEH 2015b). The western extent of the Project Site is the Burrumbuttock HGL which corresponds with the Yarra Yarra soil landscape. Very deep soils (>1.5m) that are imperfectly to moderately well drained with brown and grey Sodosols on lower slopes and chromosols on the upper mid-slopes.

The Eastern Murray Catchment report by Muller et al (2015) provides further detail about the two HGLs located within the Project Site, and further justify that the Project Site is more aligned with a LSC Class 4, as both the Walla Walla and Burrumbuttock are defined as having an LSC Class 4.

Based on the decision tables and associated hazards, it was determined that the land classed as Class 3 and Class 6 LSC for the Project Site better meets the Class 4 LSC classification.

6.1.2. Agricultural Impact Statement

An AIS was undertaken by Riverina Agriconsultants (2022) to independently assess the impact on agricultural production from the Project (Appendix D).

The AIS assesses and quantifies the economic impact of the Project on the agricultural output of the Project area relative to:

- Current production systems
- Potentially higher value production systems.

6.1.2.1. Existing production analysis

The subject land is currently farmed by two landholdings, with the main landholder owning and operating 95% of the Project Site. The main landholder runs cattle trading and sheep breeding (prime lamb) enterprises on a 70:30 basis over the Project Site and adjacent land. The second smaller

landholder (within the north-east of the Project Site) runs cattle breeding and sheep breeding (prime lamb) enterprises over the Project Site and adjacent land (Riverina Agriconsultants 2022).

Based on data provided from the landowners and data from the NSW DPI, the two farm enterprises operate at a carrying capacity of about 9.0 Dry Sheep Equivalents per hectare (DSE/Ha). The value of agricultural production derived from the existing land use on the Project Site has been calculated using NSW DPI Gross Margins, which are:

- Prime Lambs gross revenue is $79,729
- Cattle Trading gross revenue is $307,509
- Cattle Breeding gross revenue is $4,528 (Riverina Agriconsultants 2022).

The total annual value of production (farm gate) from the Project Site is therefore estimated to be $390,000 (rounded to the nearest $10,000). The revenue numbers outlined above have been based upon 2019 and 2020 gross margins. Given that livestock process have increased significantly during 2019 and 2020, Riverina Agriconsultants recalculated the revenues based upon their opinion of long-term prices for livestock and replacement costs. This resulted in an increase in value of agricultural production, with the total annual value of production (farm gate) from the Project Site estimated to be $500,000 (rounded to the nearest $10,000) (Riverina Agriconsultants 2022).

The related economic activity is calculated using an economic multiplier of 2.1788 as used by ABS 2018 is calculated to be approximately $1,090,000 (rounded to the nearest $10,000), which based upon the higher value of agricultural production ($500,000). This includes upstream and downstream activities, including contractors, farm input, service providers, distribution and processing (Riverina Agriconsultants 2022).

6.1.2.2. Alternative Land Uses

Farming in the Jindera district consists predominately of a mixture of broadacre livestock and winter cropping systems, with livestock enterprises most commonly consisting of sheep grazing for met and wool, and cattle grazing for beef (Riverina Agriconsultants 2022).

The current agricultural practices of the Jindera area are reflected by the subject land's existing production system as described above. The Jindera district is, with livestock most commonly sheep and cattle grazing. Based up 2015/16 data, 59% of the value of agricultural commodities produced in the GHSC LGA was derived from livestock, and 40% from cropping and hay (Riverina Agriconsultants 2022).

Alternative land use option explored in the AIS include:

- Alterative animal-based options such as intensive livestock (pigs or poultry) could be technically feasible within the Project Site, however given the proximity of the Project Site to nearby residences and the absence of a secure water source, this type of land use would most likely be ruled out
- Broadacre cropping options and horticulture, including vegetables, fruit and nut trees would be an unlikely option for land use given the moisture deficit across the Project Site, and no irrigation surface or groundwater sources

- Stewardship payments for undertaking environmental conservation and stewardship practices. This may be feasible on areas not subject to development within the Project Site (Riverina Agriconsultants 2022).

When considering alternative land uses for the Project Site, and whether foregoing these future opportunities may exacerbate the impact on agricultural output, the scope of the alternatives is within the parameters of the current broadacre livestock and neighbouring cropping systems. That is, altering the mix of livestock and introducing cropping enterprises within the current system is the only realistic option. Around 50% of land proposed for the Project is unsuitable for cropping due to waterlogging and frost constraints (Riverina Agriconsultants 2022).

6.1.2.3. Agri-solar

Agri-solar is the combination of solar energy generation and agricultural production systems co-located on the same land (Guerin 2019). The objectives of Agri-solar systems includes:

1. Maximising the overall economic productivity from the land
2. Meeting community expectations by ensuring continuity of agricultural land use is maintained post solar development (Riverina Agriconsultants 2022).

Options for integrating an agricultural production system into a solar development may include animal grazing between panels or cropping under the elevated arrays. Internationally, the most common examples of Agri-solar have been co-locating solar development with horticulture crops, whilst in Australia, sheep grazing is the most common example (Riverina Agriconsultants 2022).

There has been limited international research in the field, and most relates to crop production within solar arrays rather than pasture from livestock grazing. The AIS explores a number of trials, which serve to provide background and information about the challenges and opportunities of Agri-solar:

- Oregon University Study (sheep grazing) – This 2018 study sought to measure the effects of a 2.4 ha agrivoltaic solar farm on microbiology, soil and pasture production on the Oregon State University Campus with fixed mounted PV panels 1.1 m above the ground and a distance between panels of 6 m. The pasture below the panels and control areas were in the same paddock actively grazed by sheep, with observations made between full sun, partial sun and fully covered. The study found:

    - Soil moisture depleted more rapidly in the no shade area between panels, than in the episodic and full shade areas, or the control area
    - Starting will a full moisture profile, the soil moisture in the full shade zone was nearly twice than the full sun zone
    - The full shaded areas were three times more water efficient than the control for the grasses present

    The study concluded that solar panels could have a beneficial effect by reducing evapotranspiration in water limited areas, especially semi-arid pastures with wet winters, and as such leaving the water to be stored in the soil for longer periods and supporting pasture growth for extended periods

- Southwestern US Case Study – A US-based university and government researchers have undertaken case study research in the semi-arid southwestern USA, where they found that co-locating agriculture and solar PV in semi-arid regions can provide benefits, including:
    - Maximising water efficiency by decreasing soil evaporation and transpiration from crop canopies
    - Preventing midday and afternoon depression in photosynthesis from heat and vapor pressure deficit stress
    - Reducing irrigation requirements during summer
    - Reducing frost risk under panels in winter
- Fraunhfer Institute Study – This 2017 study focused on determining yield effects across a range of crops on a small-scale (194 kW) agrivoltaic demonstration in southern Germany. Panels were placed 5 m above the ground to allow for crop operations beneath. Crops included wheat, potato, celeriac and clover grasses. The crop yield for clover grass under the PV array was less than 5.3% compared to the reference plot, and yields for wheat, potato and celeriac were between 1% and 18% (Riverina Agriconsultants 2022).

The international research outlined above is useful for drawing broad inferences, however, is not an indicator of specific outcomes that could be expected within southern NSW. This is primarily due to different rainfall patterns, seasonal conditions, pasture types, day length and array configurations.

However, the international research can allow some key inferences and apply them to the Australian context. For example, the findings reflect observations made in discussion with Australian farm managers co-locating grazing stock with solar developments. The following key observations were made:

- Shading can improve soil moisture and maintain plant growth for longer periods at certain times of the year
- Shade and soil moisture variability needs to be factored into the choice of pasture species mix and paddock rotations.

In Australia, no formal trial data relating to Agri-solar systems is yet available to assist in quantifying production outcomes from co-locating grazing stock with solar developments. However, practical experiences from existing commercial Agri-solar systems and recording of these experiences provides some basis for assessing the agricultural impacts of solar development incorporating Agri-solar systems.

Australian Agri-solar adoption to date has involved incorporating pasture-based sheep grazing systems, in preference to other agricultural activities for the following reasons:

- Australia has an abundance of land that may be suitable for solar development (notwithstanding network capacity constraints), with solar development being undertaken at large scale on farms where broadacre production systems have been operating
- There are challenges to incorporating other systems:
    - Broadacre cropping is not feasible given lack of suitable machinery to work in the narrow spaces between solar arrays

- Other livestock options are limited, as they are more likely to damage infrastructure, such as cattle and goats
- Integrating smaller scale and/or more intensive farming is unlikely due to economic reasons
- Horticulture options such as vegetables may be practically feasible, but it does not make sense to diminish the productivity capacity of a high value crop where alternative solar farm locations exist.

Current commercial operations studied for the AIS included the following:

- Numurkah Solar Farm – Downer Utilities Australia outlines observations from using 750 sheep grazing for vegetation management at a 128 MW solar farm at Numurkah in Victoria. The key findings include:
  - Sheep grazing was a successful means by which to control vegetation around the panels, as an alternative to mechanical options
  - Damage and other negative impacts on the solar infrastructure or operations were not observed
  - Prior to construction, it is important to establish clearly defined roles and responsibilities of those responsible for grazing their sheep within the facility
  - Proper planning in advance of construction to establish a seed bank of an agreed pasture mix is important
  - Sowing a clover species can reduce prevalence of invasive species and avoid high grasses (such as ryegrass) that pose fire risk
  - Livestock fencing should be incorporated into design plans prior to construction.
  - Integrating smaller scale and/or more intensive farming is unlikely due to economic reasons
- Dubbo Solar Farm - Neoen commenced commercial operations of a 55 ha solar farm in June 2018, which incorporates sheep grazing among the panels. The landowner observed the following:
  - The productive capacity of pastures is around 80% of typical sheep grazing systems
  - Performance may potentially be better during drought due to shade and moisture retention protecting pastures
  - Dew run off from the panels creates irrigated green strips of pasture growth
  - Merino wethers are best suited because of their temperament, using cell grazing rotation.
- Phil Graham (Livestock Consultant) – In 2019, specialist livestock consultant Phil Graham prepared a report on sheep grazing on solar farms, and based his report on observations from visits to Neon solar farms at Coleambally, Parkes and Dubbo. Observations made included the following:
  - Sheep grazing can be a cheap and effective way of managing vegetation on solar farms
  - Differences between herbage levels in wet and dry seasons are substantial, requiring four to six times the number of livestock to achieve pasture height targets
  - Flexibility to vary stock numbers in wet years is essential, and the stock owner should have land adjacent to the site so they can vary stock numbers as required

- The largest effect on pasture production from solar development is the area removed from production by roads, buildings and associated infrastructure
- Small rainfall events can be more beneficial as panels can distribute strip irrigation events to use moisture more effectively
- Altered patterns of moisture availability distributed biomass differently but didn't reduce overall production
- Animal performance could be improved by shelter from heat in summer and wet/cold weather during winter
- The solar farm should be fenced in 40 - 50 ha watered blocks each with a water source to best manage pastures and control weeds
- Establishing pasture before construction is optimal but may be challenging given the small sewing window, and dependent on construction timing
- If land is being used for cropping, the landholder could under sow a pasture in the crop the year before the lease commences (Riverina Agriconsultants 2022).

The AIS concludes that the emerging sheep grazing approach to Agri-solar systems in Australia is the most suitable, where co-location of solar and agriculture is intended. This reflects the intent of the Project landowners.

Alternative production systems such as cropping or other livestock grazing would not be a better solution. Cropping is not practically feasible and other large stock options such as cattle present an unacceptable risk to infrastructure. Sheep grazing is a common land use in the GHSC LGA and would be more suitable for the land proposed for the Project (Riverina Agriconsultants 2022).

6.1.2.4. Impact on value of production

To assist the impact of an Agri-solar system at the Project Site upon the overall agricultural productivity, the following issues were considered within the AIS:

- Soil moisture retention and distribution
- Effect of panels on moisture capture and distribution
- Suitable pasture species mix for the Agri-solar environments
- Limitations on fertiliser application
- Paddock design for effective mustering and pasture management
- Stock water access, quality and distribution
- Flexibility to vary stocking density for pasture management
- Weed control
- Bushfire risk management
- Dust suppression practises (Riverina Agriconsultants 2022).

The following observations about the proposed Agri-solar system within the Project Site include:

- The paddock area available for stocking would be reduced by approximately 10%
- Shading from the solar panels will likely reduce overall pasture growth in winter and early spring, however it will assist to support extended pasture growth in summer and autumn
- The unevenness of soil moisture retention and distribution will not greatly affect available soil moisture overall but will encourage altered patterns of pasture growth

- A pasture species mix needs to be selected that will be best suited to meeting pasture height parameters, will best respond to periodic shading and will provide cover for avoiding invasive weed infestations and provide feed for stock
- Pasture establishment prior to construction will achieve the best outcome, as undertaking sowing post-construction will limit pasture establishment potential
- Fertiliser applications will be able to be maintained, albeit using smaller scale equipment, potentially with a similar approach taken in a viticultural or orchard setting. Aerial applications may not be feasible
- Stocking the area with Merino or 1st cross sheep is preferable to other breed options due to their temperament and non-wool shedding nature
- Manual weed control is still likely to be required, including the use spray rigs capable of operating between panel arrays
- Careful planning and design work will be required to ensure paddock size and layout is conducive to both the construction and management of solar infrastructure, and the rotational grazing, watering and mustering requirements of the sheep enterprise
- Sound contractual grazing agreements are needed to ensure there is flexibility to vary stocking density within the Project Site to avoid pasture growth outstripping grazing capacity, or the overstocking and subsequent loss of ground cover resulting in dust creation during dry periods
- A clear agreement between the solar company and grazier will be required in advance of construction planning being finalised, to ensure pasture sowing, paddock layout, vegetation management and other key issues are understood and implemented prior to construction, after which decisions to alter arrangements become more difficult.
- Well maintained pastures increase soil organic matter overtime. If pastures are top dressed, weeds controlled, not over grazed and lime is applied periodically, the pastures are likely to remain productive for the life of the Project and soil organic matter will increase (Riverina Agriconsultants 2022).

The AIS estimated a 25% reduction in productive sheep carrying capacity across the Project Site. This estimate is based on assumptions drawn from the current information available on Agri-solar systems, including insights from available scientific literature, interviews with landholders that have adopted or are considering this system, and agronomists. Key assumptions include:

- 10% of the land will be removed from agricultural productivity due to the construction of physical infrastructure
- A reduction in solar radiation across the Project Site has the potential to limit pasture growth overall
- The different patterns and timing of pasture growth compared with typical grazing paddocks may have some overall benefit to the farming operation
- There are risks that include:
    - The pasture species mix ultimately selected is not well suited to the Agri-solar environment, or there is sub-optimal sowing practice and/or timing
    - Fertiliser regimes are not conducted to the same extent as in other paddocks due to inconvenience and cost

- An optimal rotational grazing layout cannot be negotiated and implemented, hindering efficient mustering, pasture management and stock watering (Riverina Agriconsultants 2022).

The Post-Development reduction in productivity based on a 25% reduction using an economic multiplier of 2.1788 of the farm gate is detailed in Table 9 below. The assessment in Table 9 indicates the most likely outcome of the Project is a reduction in annual farm gate gross revenue of $275000 and a reduction in annual related economic activity of $600,000 (Riverina Agriconsultants 2022).

Table 9: Annual Gross Revenue Analysis (25% reduction in productivity)

	Pre-Development	Post-Development	Post-Development Impact
Farm Gate	$500,000	$225,000	$275,000
Related Economic Activity	$1,090,000	$490,000	$600,000

Related economic activity from the existing landowners' enterprises includes upstream activities such as contractors, farm input and service providers. The key downstream activities include processing and distribution. Impacts of the Project will include less reliance on contractors, input and service providers and less produce to be transported to off take locations. There are limited (if any) processing facilities within the GHSC LGA. Therefore, some but not all of the related economic activity impacts will be felt within the GHSC LGA (Riverina Agriconsultants 2022).

The above does not consider rental income derived from the Project.

6.1.2.5. Social Impacts

The two farming families that own and manage the Project Site currently employ one full time equivalent (FTE) employee, plus some casuals at peak times. The proposed post development sheep grazing enterprise is estimated to require 0.75 FTE employees (Riverina Agriconsultants 2022).

As reported within the EIS (ELA 2020), up to 10 FTE positions will be created from the Project, up to 200 employees for the 12 to 18 month peak of construction. Maintenance contracts for panel cleaning, fence repair, road grading, etc. will also be required and will likely be met by local contractors.

There are a range of upstream and downstream employment roles associated with agricultural production, which include agronomy services, input providers, machinery sales and mechanical support, grain and livestock transport, production marketing, shearing, fencing, harvesting and other contractors (Riverina Agriconsultants 2022).

As indicated previously, the likely reduced carrying capacity of the Project Site post-development is estimated to be 25% with a reduced annual gross revenue of approximately $250,000 per annum. Assuming a 2 year period of disruption to agricultural outputs for land preparation and construction, the first two years of the Project will generate reduced agricultural revenue of $1,000,000. Over the 30 year life of the Project, the farm gate revenue could be reduced by $8,700,000. Applying an economic multiplier of 2.1788, the related economic activity reduction is $18,960,000 (Riverina Agriconsultants 2022).

The post-development sheep enterprises will generate upstream and downstream benefits as is the case now for the existing enterprises, albeit with a reduced level of productivity. All current and potential cropping activities will cease post-development. This is typical across the broader farming region, with cropping land being converted to livestock production and vice vera with seasons, market and other forces dictating ongoing transitions (Riverina Agriconsultants 2022).

The landowners will also be receiving rental payments from the Proponent, and would typically, which is another source of business revenue, albeit from a non-agricultural land use enterprise. Although rental income from solar farming does not attract the same agricultural service industry expenditure, a significant proportion of the revenue could be expected to be reinvested in supporting the productive capacity of the businesses remaining agricultural enterprises. For example, purchasing more land, investing in infrastructure upgrades on-farm, more efficient machinery, or soil health improvements. Finally, in a transition from regular production to solar farming some service industries will benefit (Riverina Agriconsultants 2022).

In addition, transition from regular production to solar farming would see other industries benefit. For example, fencing contractors will see an increase, while agronomist services and spray and seeding contractors may only experience marginal downturn, if at all (Riverina Agriconsultants 2022).

6.2. Biodiversity

A large number of submissions received from the public was in regards to the impacts to vegetation communities and threatened species habitat as a result of the Project. Some of the points raised in the public submissions included:

- Loss of vegetation communities including paddock trees
- Loss of threatened species habitat
- Reduction in groundcover
- Tubestock not sufficient to replace vegetation lost.

The GHSC also had concerns around the impacts on native vegetation in their submission on the EIS.

The BCD of the DPE outlined that the EIS, including the BDAR does meet the Secretary's requirements for biodiversity, contingent addressing the following issues:

- There is no evidence to support the definition of category 1 land on the development site. Evidence should include historic imagery showing lack of native vegetation since 1 January 1990 and field data to demonstrate that persisting groundcover is of low conservation value according to the definition at s.60H of the LLS Act 2013. Category 1 land defined in this way can be treated as one homogenous vegetation zone in the BAM and disregarded from further assessment of direct impact
- Clearing the vegetation within the development footprint along Ortlipp Road between the substation and Lindner Road has not been adequately assessed against the impacts prescribed in the *Biodiversity Conservation Regulation 2017*
- The BDAR and EIS should include additional mitigation measures relevant to a solar farm in this location. There should be a commitment to preparing a Biodiversity Management Plan (BMP) to develop, implement, monitor and report on the mitigation measures to be used.

To address the submissions, the Proponent has made some amendments to the Project design to reduce impacts upon vegetation communities within the Project Site. These amendments have led to an updated BDAR (Appendix E) and summarised below.

6.2.1. Existing Environment

The Project Site is located within a low hill landscape or alluvial / colluvial plain, with elevation ranging between 200 - 220 m (Australian Height Datum (AHD)), and is influenced by modifications to the natural creek and ephemeral and permanent drainage channels. The Project Site is in the Mitchell Landscape 'Brokong Plains – NSS Lower Slopes'.

The Australian Soil Classification mapping indicates Chromosols associated with the Yarra Yarra landscape in the south, and Sodosols associated with the Kindra landscape in the north (OEH 2010). The Project Site comprises land that is highly modified, with paddock trees and an understorey of exotic pasture or pasture improved land. The surrounding area shows a long history of clearing and agricultural activities such as grazing and land improvement. Native species persistence within the Project Site are largely limited to the canopy.

6.2.1.1. Native Vegetation

The Project Site covers an area of approximately 308.9 ha, which includes 8.68 ha of native vegetation and approximately 300.2 ha of cleared land and exotic pasture. The extent of native vegetation within the Project Site is shown on Figure 9. The extent of native vegetation was determined through aerial imagery, in conjunction with field assessments.

Two Plant Community Types (PCT) were identified within the Project Site (Table 10), all of which occur in varying condition states / vegetation zones:

- PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. This PCT was stratified into three vegetation zones based on three condition classes (grazing / exotic pasture, planted vegetation and low condition). PCT 277 has also been selected as the likely PCT for the mapped paddock trees (vegetation zone 5) (Figure 9)
- PCT9: River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion. This PCT contained one condition class and has been stratified into a single vegetation zone (Figure 9).

Table 10: PCTs within the Project Site

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area (ha)	Percent cleared
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	7.66	94%
9	River Red Gum – wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	Inland Riverine Forests	Forested Wetlands	1..02	66%
Total – Native vegetation				8.68	
Category 1 Land				300.22	
Total				**308.9**	

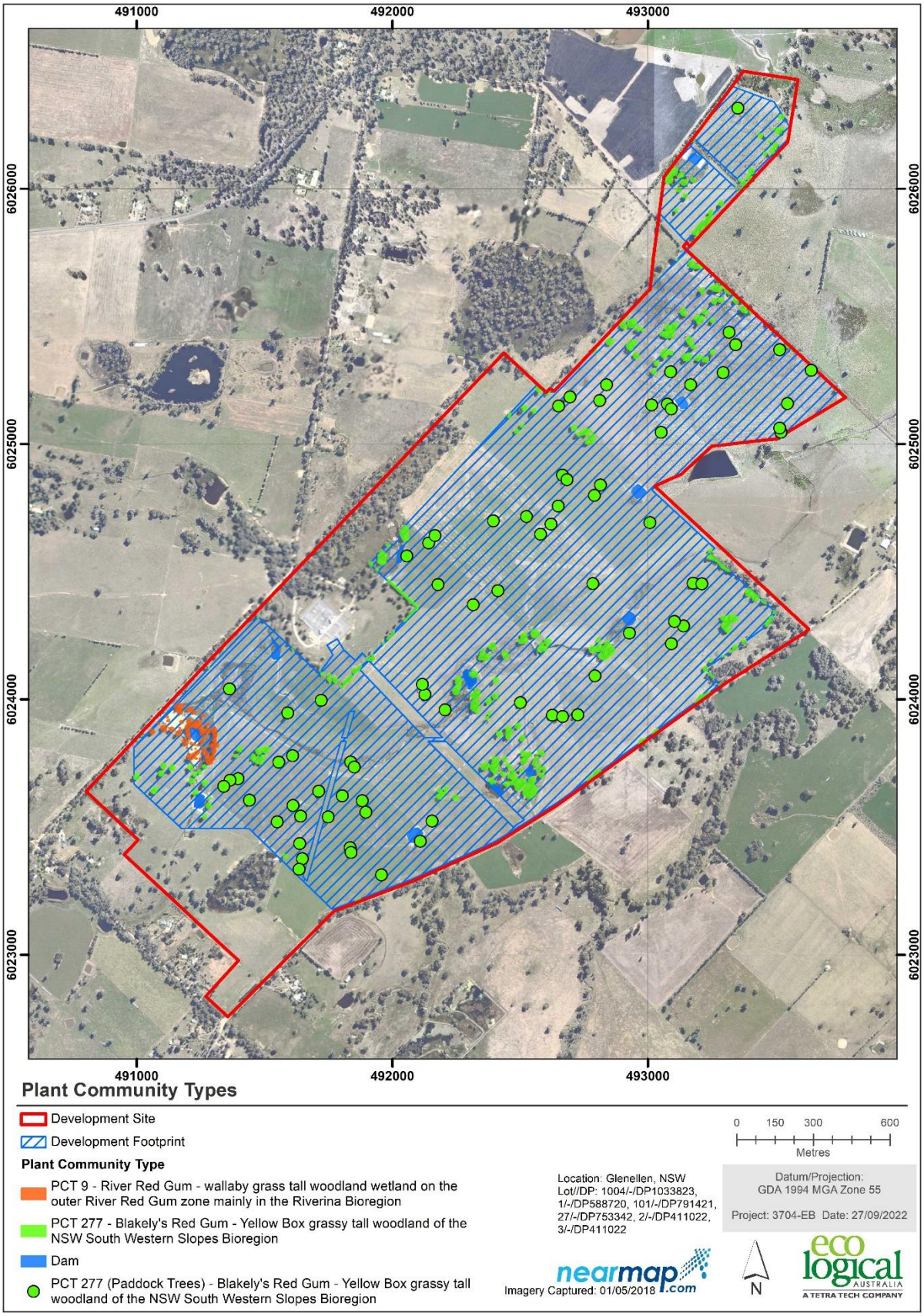


Figure 9: PCTs and native vegetation extent

The PCTs within the Project Site fall within a category of vegetation that has been highly disturbed, with the mid-storey and ground-layer species diverging considerably from species characteristic of these PCTs. PCT 277 was comprised of the canopy species *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus melliodora* (Yellow Box). A few *Eucalyptus bridgesiana* (Apple Box) were also present along the western edge of the Project Site.

6.2.1.2. Paddock Trees

Paddock trees form a considerable component of the vegetation within the Project Site and have been mapped as paddock trees based on the definition provided in Appendix 1 of BAM 2017. The paddock trees mapped within the Project Site form part of PCT 277 and are scattered across the Project Site. A total of 77 paddock trees have been mapped within the Project Site (Figure 10).

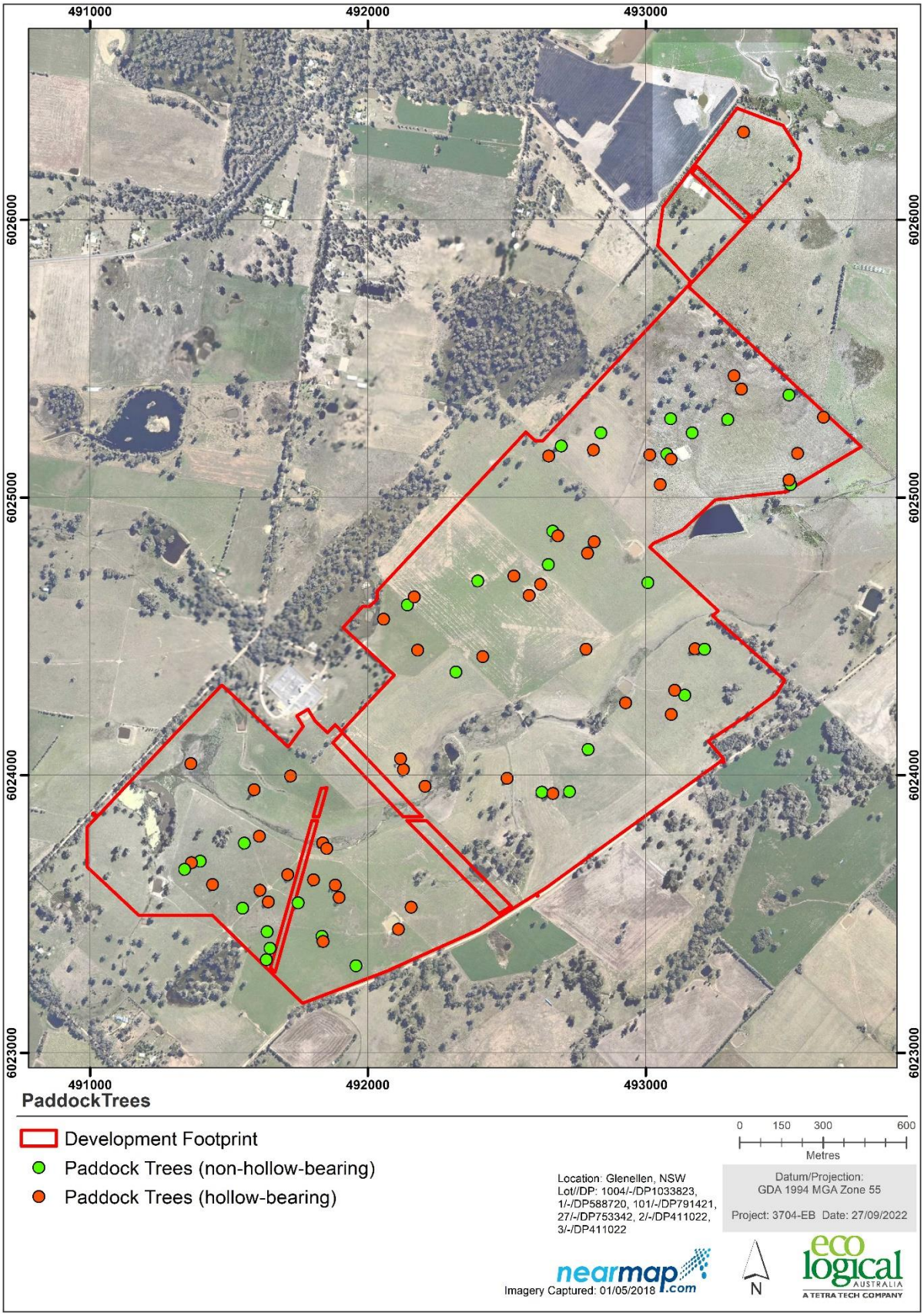


Figure 10: Paddock Trees

6.2.1.3. Category 1 – Exempt Land assessment

Vegetation and loss of habitat on Category 1 – Exempt Land (Category 1 Land) within the meaning of Part 5A of the LLS Act is not assessed under the BAM, as per section 1.5 of the BAM. The Native Vegetation Regulatory Map, which identifies Category 1 Land, is not available for the Development Footprint. In the absence of this mapping, the assessor is required to identify Category 1 Land, by applying the definitions in the LLS Act. The LLS Act defines Category 1 Land as land which meets any of the following criteria:

- Land cleared of native vegetation as at 1 January 1990 or lawfully cleared after 1 January 1990
- Low conservation grasslands
- Land containing only low conservation groundcover (not being grasslands)
- Native vegetation identified as regrowth in a Property Vegetation Plan under the repealed *Native Vegetation Act 2003*.

To determine the status of exotic pasture throughout the Project Site desktop assessment of relevant databases along with field data was used.

Review of the earliest publicly available aerial imagery for the Project Site (3 October 1961; NSW Spatial Services 2022) indicates that the Project Site was cleared of native woody vegetation prior to 1964 (Figure 11). Review of aerial imagery in subsequent years (1973, 1987, 1990 and 1996) indicates that cleared areas throughout the Project Site have been subject to intensive agricultural practices, as evidenced by the presence of cropping lines within these images.

Furthermore, review of the NSW Landuse Layer (DPIE 2020) indicates that the majority of the Project Site is mapped as 'cropping' or 'grazing modified pastures', with small sections of 'grazing native pastures'. All land within the Project Site without trees is also mapped as PCT 0 (i.e., exotic vegetation) on the Riverina SVTM (OEH 2016).

During field surveys, a vegetation integrity plot was undertaken to validate the conservation value of the exotic vegetation, and the vegetation integrity score of this vegetation was 0.8 (Table 11). This vegetation integrity score is well below the offset requirements for impacts on vegetation as per section 9.2 of the BAM.

Table 11: Vegetation integrity of exotic vegetation

Composition	Structure	Function	Current VI Score
6	13.3	0	0.8

The species assemblage present, at time of survey, throughout the exotic vegetation included the perennial exotic pasture species *Phalaris aquatica* (Phalaris), and annual exotic pasture species *Trifolium* spp. (clovers) and *Lolium* sp. (ryegrasses) which are indicative of pasture improvement and long-term agricultural activities. Whilst native species were present, they were also species typically of intensive agricultural use, such as *Rytidosperma caespitosum* (Ringed Wallaby Grass) and contributed very small amounts to overall projected foliage cover, compared to exotic species.

As such, exotic vegetation within the Project Site is considered a 'low conservation grassland' in accordance with the LLS Act and is therefore deemed to be Category 1 Land.

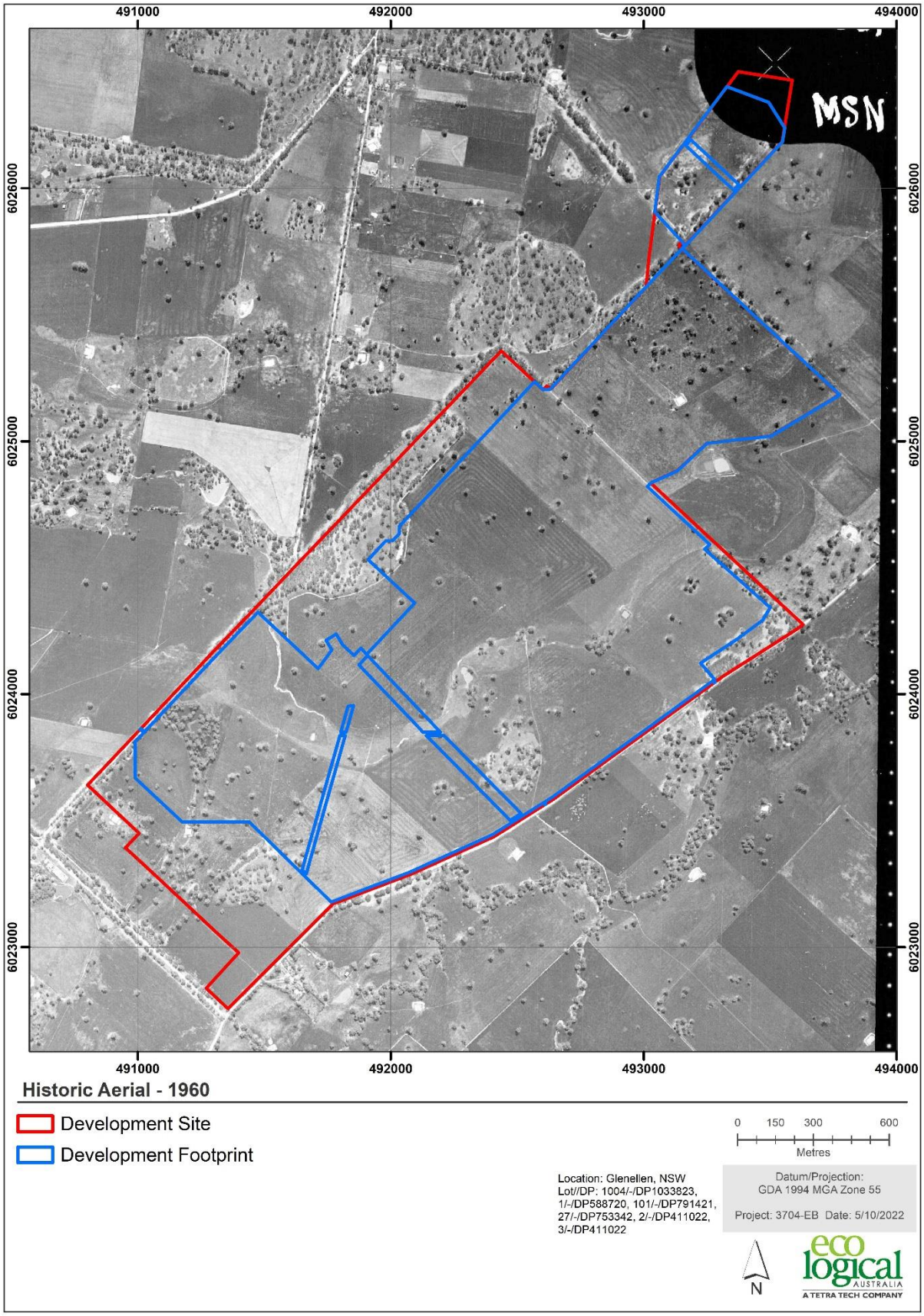


Figure 11: Historical aerial imagery – 1960

6.2.1.4. Threatened Ecological Communities

One CEEC listed under the NSW BC Act occurs within the Project Site, 'White Box Yellow Box Blakely's Red Gum Woodland' (Box Gum Woodland).

In the initial assessment (pre 2018) it was considered that only vegetation zone 3 of PCT 277 conformed to the previously listed Endangered Ecological Community (EEC). Vegetation zones 1 and 2 (PCT 277) were not considered to meet the listing criteria for the EEC under the BC Act. However, in 2020 Box Gum Woodland TEC was upgraded to CEEC. Given the new listing advice, all of PCT 277 is likely to meet the listing criteria for the CEEC.

The Project Site contains three vegetation zones assigned to PCT 277 all of which are highly degraded and modified vegetation, with varying degrees of disturbance:

- PCT 277_grazed / exotic (7.27 ha)
- PCT 277_planted (0.29 ha)
- PCT 277_low (0.1 ha).

Vegetation zone 1 consisted of a native canopy over exotic pasture (decades of pasture improvement), with the natural soil and seed bank unlikely to be intact, however due to the presence of native canopy associated with the Threatened Ecological Community (TEC) this zone is now considered to meet the Final Determination (NSW Scientific Committee 2011) for Box-Gum Woodland.

Vegetation zone 2 consisted of mixed native tree and shrub plantings with an exotic understorey. It was assigned to PCT 277 as it contained species native to NSW (including those present within Box-Gum Woodland). PCT 277 was the most likely vegetation community prior to previous clearing and current plantings, based on the surrounding vegetation. Whilst this zone is highly modified with mixed planted species and disturbance to the natural soil and associated seed bank, this vegetation zone was still considered to represent the CEEC due to the presence of overstory species associated with Box-Gum Woodland.

Overall the total area of TEC impacted by the Project is 7.66 ha of which 7.27 ha is below the vegetation integrity threshold for offsets (VI = 14.8).

While PCT 277 can also comprise part of the CEEC 'White Box Yellow Box Blakely's Red Gum Woodland', listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the condition of vegetation in the Project Site did not meet the minimum condition thresholds under the EPBC Act, primarily because the vegetation did not contain a native ground layer.

6.2.2. Potential Impacts

6.2.2.1. Avoidance of impacts

The Project has been located in a way which avoids and minimises impacts (Table 12). The Project Site has been highly modified through historical clearing and grazing which is reflected by the low biodiversity values within the Project Site. Direct impacts including the final Project footprint (construction and operation) are shown in Figure 3, with a comparison of impacted (8.6 ha) and retained (11.4 ha) native vegetation within the Project Site shown in Figure 12.

Table 12: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Locating the project in areas where biodiversity values are lowest	Areas of cleared land containing low biodiversity values have bene utilised.	The placement of the Project Site has been centred on the area of lowest biodiversity value (cleared, grazed). The footprint has been adjusted to avoid adjacent areas of higher biodiversity value, such as the stand of Box-Gum Woodland along the western boundary. The Project has undergone a development design following BAM surveys to further avoid areas of biodiversity values, such as the drainage channel in the far north of the Project Site and parts of the substation lot.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	Project Site placed on area of significant previous disturbance from historical clearing and constant agricultural practices (e.g. improvement and grazing).	The placement of the Project Site has centred on the area of lowest biodiversity value (cleared, grazed), with majority of native vegetation containing lower vegetation integrity scores. Nearby areas of remnant native vegetation outside the footprint to the south and west will not be impacted by the proposal, and following project design changes, will not impact on much of the vegetation within the substation and will avoid the drainage channel in the far north of the Project Site.
Locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	The location of the Project Site has been designed to avoid areas of high quality vegetation and species habitat, e.g. by including Biodiversity Retention areas that retain patches of PCT 277.	The placement of the Project Site primarily utilises an area of low biodiversity value (cleared, grazed) and the footprint has been designed to avoid areas or higher biodiversity value, such as remnant stands of PCT 277 along the western edge of the Project Site. These areas contain the CEEC Box-Gum Woodland and are marked for biodiversity retention. They also serve a screening function.
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The Project Site has been able to avoid any impediments to connectivity.	The Project Site contains limited habitat connectivity and is located within a fragmented landscape. Lands directly adjoining (not impacted by project) are either heavily grazed and no habitat connectivity exists, or contain remnant vegetation (avoided) and contribute to the connectivity function. The Project Site has been placed to minimise any barrier to the movement of species and genetic material between areas of nearby habitat.

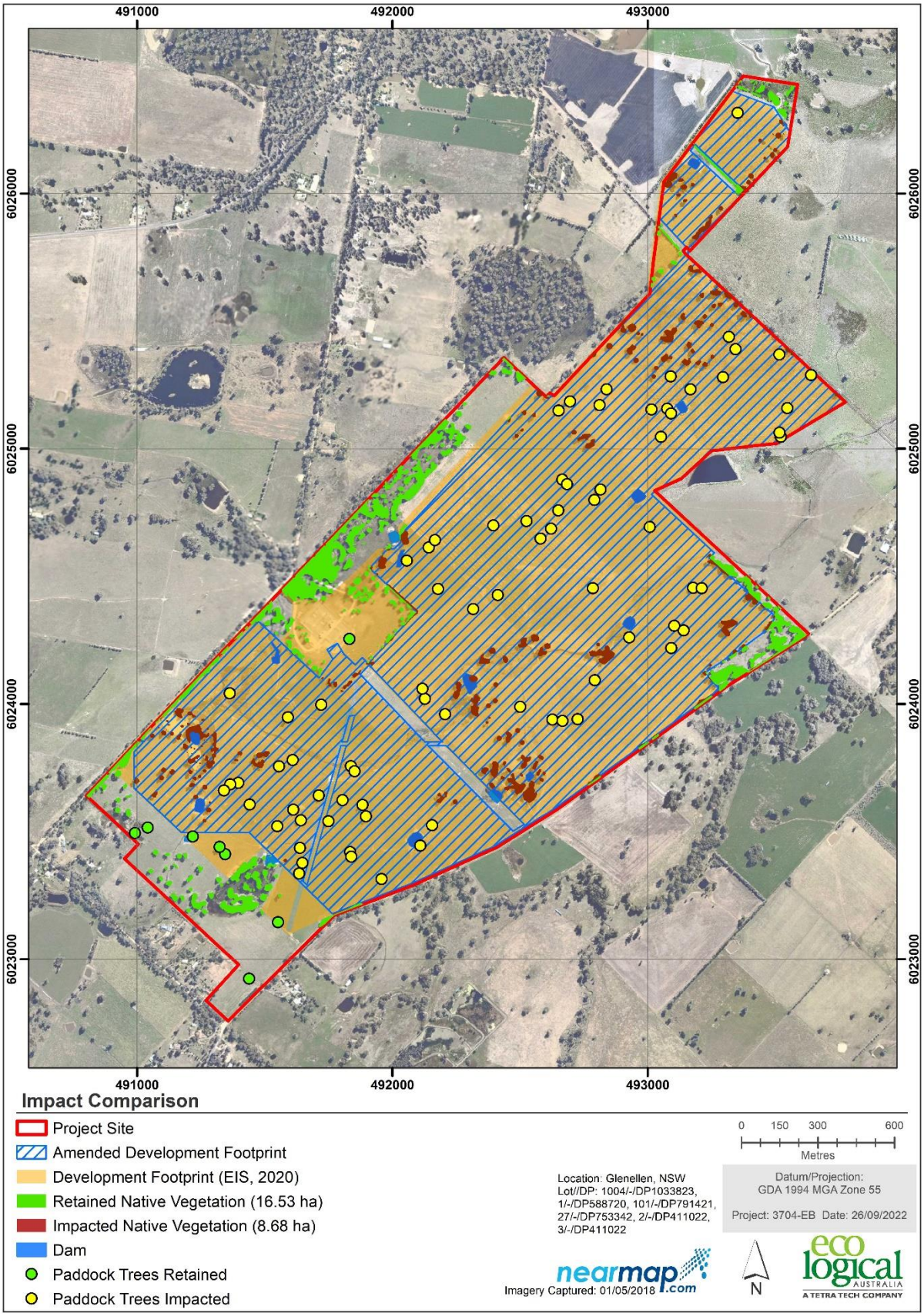


Figure 12: Impact comparison

6.2.2.2. Impact on Native Vegetation

The Project will unavoidably impact up to 8.68 ha of native vegetation and 77 paddock trees, which includes vegetation communities listed under the BC Act. Noteworthy is that this area calculation includes an overestimation of the actual vegetation to be cleared because it uses the entire solar PV inclusion area as a 'block' of vegetation which will be completely cleared whereas the solar panel arrangement is panels in rows separated by approximately 9 m between which current vegetation will mostly remain. A summary of the vegetation zone areas to be directly impacted by the Project is shown in Table 13.

Table 13: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	7.66 ha
9	River Red Gum – wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	Inland Riverine Forests	Forested Wetlands	1.02 ha
Total				**8.68**
Scattered trees	Category 1 Land	Western Slopes Grassy Woodlands	Grassy Woodlands	77 Individuals

The changes in vegetation integrity scores as a result of clearing for the Project for each vegetation zone are shown in Table 14.

Table 14: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha) or Individuals	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	277	Degraded	7.27 ha	18.1	0	-18.1
2	277	Planted	0.29 ha	35.1	0	-35.1
3	277	Low	0.10 ha	28.8	0	-28.8
4	9	Low	1.02 ha	25.5	0	-25.5
5	-	Paddock Trees	77	-	-	-

6.2.2.3. Loss of species credit species habitat or individuals

The loss of species credit species habitat or individuals as a result of the Project's direct impacts is shown in Table 15.

Table 15: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact Habitat (ha)	BC Act Listing status	EPBC Act Listing status
Myotis macropus	Southern Myotis	1.02 ha (PCT 9[1])	V	Not Listed
Pilularis novae-hollandiae	Austral Pillwort	1.02 ha (PCT 9)	E	Not Listed

6.2.2.4. Indirect Impacts

The construction and operational phases of the Project have the potential to impact biodiversity values within the Project Site that cannot be avoided. Indirect impacts that may occur during the construction and operational phases of the Project are detailed in depth within the BDAR (Appendix E) and include:

- Sedimentation and contamination and/or nutrient rich run-off - construction
- Noise, dust or light spill - construction
- Inadvertent impacts on adjacent habitat or vegetation - construction
- Transport of weeds and pathogens from the Site to adjacent vegetation - construction
- Vehicle strike – construction/operation
- Trampling of threatened flora species – construction/operation
- Rubbish dumping – construction/operation
- Wood collection – construction/operation
- Bush rock removal and disturbance – construction/operation
- Increase in predatory species populations – construction/operation
- Increase in pest animal populations – construction/operation
- Increased risk of fire – construction/operation
- Disturbance to specialist breeding and foraging habitat. – construction/operation.

6.2.2.5. Serious and Irreversible Impacts (SAIIs)

The Project Site contains two SAII candidate entities, as identified in Table 16. It is noted that the SAII threshold for these entities are yet to be published. Given the majority of the area is highly degraded and does not require offsets (7.27 ha), the small area of 0.29 ha planted and low condition (0.10 ha) of PCT 277 it is considered unlikely that the development would result in an SAII to this entity. Changes to the development footprint to avoid clearing of native vegetation resulted in 2.8 ha of this community being retained. Similarly, considering the low potential occurrence of *Pilularia novae-hollandiae* within the Development Footprint, and that only 1.02 ha of highly degraded and modified habitat (vegetation integrity score of 19.6) to be cleared, it is considered unlikely that the development would result in an SAII to this entity.

[1] Habitat is consistent with the OEH (2018) document, Species credit threatened bats and their habitat – NSW survey guide for the BAM and corresponds to PCTs that are associated with the species and that are within 200m of a waterbody (e.g. creek or dam). PCT 9 is listed in the TBDC as being associated with both species.

Table 16: Candidate Serious and Irreversible Impacts

Species/Community	Common Name	Principle	Direct Impact Individuals/area (ha)	Threshold
White Box Yellow Box Blakely's Red Gum Woodland (BC Act)	Box Gum Woodland	Principle 1 and Principle 2	7.66 ha	No threshold is currently available
Pilularia novae-hollandiae	Austral Pillwort	Principle 1 and Principle 2	1.02 ha	No threshold is currently available

6.2.3. Revised Mitigation Measures

The BDAR (Appendix E) outlines the measures taken to avoid, minimise and mitigate impacts on the vegetation and species habitat present within the Project Site and measures to minimise impacts during construction and operation of the Project. Following consideration of the above aspects, the residual unavoidable impacts of the project were calculated in accordance with BAM by utilising the BAMC.

A total of 101 ecosystem credits, 70 scattered tree offset credits and 33 species credits are required to offset the residual impacts of the Project (Table 17).

Table 17: Residual Impacts Offsetting requirements

PCT #	PCT Name	Condition	Vegetation Zone	Area (ha) or Number*	Vegetation Integrity Score	Credits
Ecosystem Credits						
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Exotic pasture / Grazing	1	7.27	18.1	82
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Planted	2	0.29	35.1	6
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	3	0.10	28.8	2
9	River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	Low	4	1.02	25.5	171
Total						**101**
Scattered Paddock Trees						
Eucalyptus blakelyi				29		38
Eucalyptus melliodora				19		32
Total						**70**
Species Credits						
Southern Myotis			N/A	1.02 ha	N/A	13
Pilularia novae-hollandiae			9	1.02 ha	N/A	20

6.3. Landscape and Visual

A large number of submissions received from the public was in regards to the aesthetic changes to the rural lifestyle and visual amenity as a result of the Project. Some of the points raised in the public submissions included:

- The loss of visual amenity in a rural landscape
- Solar farms should not be part of the rural landscape and are a visual eyesore
- Screening
- Proposed planting will not establish quick enough or be effective screening for the Project
- Fencing should be behind screening
- Transforming the locality from a rural landscape to an industrial zone.

To address the submissions, the Proponent commissioned a revised LVIA for the Project. The revised LVIA has been prepared by Moir Landscape Architecture Pty Ltd (Moir 2022), and has been undertaken in accordance with the requirements of the SEARs, which include:

An assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.

The revised LVIA is provided in Appendix F. This section provides a summary of the existing environment, methods, results, and discussion of the LVIA and steps to be taken to mitigate potential impacts to nearby sensitive receptors and the environment.

The purpose of the revised LVIA is to identify and describe the existing landscape character and identify visual amenity receptors and, as a consequence of the introduction of the Project, to assess potential visual impacts (including glint and glare).

The revised LVIA quantifies visual impact ratings for receivers based only on the visibility of the Project and does not account for any potential cumulative impacts. Cumulative visual impacts are discussed in Section 6.7.1 and Appendix F.

The revised assessment adopts a conservative approach, identifying potential receptors based on the broader Project Site, and potential impacts, based on a maximum indicative solar panel area, rather than considering individual components within the Development Footprint. The assessment area boundaries vary depending upon which of the following assessments are being considered:

- Landscape Character Assessment Area – covers the Project Site and its surrounds, out to a distance of 2 km
- Visual Amenity Assessment Area – focuses on an area out to 5 km from the Project Site.

6.3.1. Existing Environment

6.3.1.1. Landscape Character of the Region

The Project is located approximately 2.8 km northeast of Jindera, in the GHSC LGA and approximately 17 km to the north of the major regional centre of Albury, NSW, within the Southwestern Slopes bioregion. The landscape is relatively flat with minor undulations and is rural in nature, mainly

supporting agricultural enterprises and rural residences. However, there are no residences present within the Site itself. The majority of the Project Site is primarily zones RU1 Primary Production within the Greater Hume LEP. Existing vegetation within the site indicates extensive clearing of existing vegetation throughout the general area. The majority of the Project Site can be attributed as modified and improved pastures with cropping.

The Study Area is located within the GHSC LGA and is in located within the suburbs of Glenellen and Jindera. The township contains public buildings, schools, stores, rural and non-rural dwellings. The Project Site is defined by large lot rural residential properties with an estimated population of 2,222 people living in Jindera and 127 people living in Glenellen (ABS, 2016 from Moir).

The Project Site is wedged between three (3) minor local roads (Drumwood Road, Lidner Road and Ortlipp Road). Drumwood Road runs along the southwestern edge of the Project Site. It serves as an access to properties along the road as well as access for the Jindera Golf Country Club located close to the Project Site. Project Site access is currently proposed via the western part of Lidner Road, leading into Ortlipp Road. Other public roads that provide access to dwellings include:

- Glenellen Road
- Urana Road
- Walla Wall – Jindera Road.

The land within the Project Site is defined as modified land with improved pastures for cropping and grazing. Pockets of vegetation are scattered throughout the Project Site but the majority of appears to have undergone historical modifications. An existing TransGrid 330 Kv substation lies adjacent to the Project Site to the north of the Project Boundary. The Project will connect to this substation and feed into the national electricity market.

6.3.1.2. Landscape Character Units

The Project is likely to become a feature of the visual landscape. However, it is likely that the landscape character units will be largely unaffected due to the relatively confined area of visibility as a result of level topography and areas of remaining woody vegetation. The Project Site is generally most visible from the cleared paddocks to the northeast and elevated areas to the southeast of the Project Site. Views from these locations are generally buffered by distance and vegetation.

The landscape character of the Project Site and the majority of the surrounding area is classified as one Landscape Character Unit (LCU), however a second LCU exists in the wider landscape containing the village of Jindera. Table 18 describes the landscape character units for the area.

Table 18: LCUs of the Project Site

LCU	Description
LCU01 Agricultural Lands including the Project Site	The LCU is dominated by predominantly flat to gently undulating agricultural land. The LCU is rural, with dwellings scattered across the wider landscape, and includes the locality of Glenellen. Due to historic clearing for grazing and cropping, vegetation cover is generally low except for within road reserves, in isolated patches in paddocks and within gardens surrounding residences. A representative image of LCU01 is shown in Figure 13.
LCU02 Broader Locality	The LCU comprises the village of Jindera which lies in the south-west of the wider 5 km Visual Impact Area. This LCU is a more urbanized area containing just over 400 private dwellings and businesses

LCU	Description
	including several local heritage-listed places. Vegetation is retained along parts of Bowna Creek and cultivated in parks and gardens.

Figure 13: Typical views of LCU01, showing flat rural landscape and cleared vegetation across the Project Site

6.3.2. Potential Impacts

6.3.2.1. Non-involved Dwellings

There are ninety (90) non-involved dwellings within a 2 km buffer of the Project and LCU01 and four (4) dwellings identified outside the Study Area. Given the largely level topography of the Project Site and the low-lying design of the solar panels, not all dwellings are anticipated to experience views of the Project, before or after mitigation measures are enacted. The Zone of Visual Influence (ZVI) illustrated topography will screen views from six (6) dwellings. Of the remaining eighty-four (84) dwellings with potential views, detailed assessment of sixty-six (66) dwellings using aerial imagery, identified the Project would be screen by vegetation or topography.

The revised LVIA dwelling assessment identified 16 dwellings as either having a low (eight), moderate (six) or high (three) visual impact rating without mitigation (Table 19). The revised LVIA dwelling assessment identified seven dwellings as having a low visual impact rating with mitigation (Table 19).

Table 19: Summary of dwelling assessment (Moir 2022)

Receptor ID	Visual Assessment	Visual Impact Rating (without mitigation)	Visual Impact Rating (with mitigation)
BRE001	The Project is located to the west of this dwelling. It lies 1.5 km away from the Project Site. Surrounding vegetation and	Low	Negligible

Receptor ID	Visual Assessment	Visual Impact Rating (without mitigation)	Visual Impact Rating (with mitigation)
	other structures along the boundary will screen majority of the Project from this location.		
ORT008	The Project is located southeast of this dwelling. Proximity to the development and lack of screening vegetation will provide direct views towards the Project from this residence.	Low	Negligible
WWJ006	The Project is located southeast of this dwelling. View to the Project will likely be fragmented by vegetation surrounding the dwelling and roadside vegetation along Ortlipp Road. However, due its elevated position and proximity to the development majority of the Project will be visible from this location.	Low	Negligible
WWJ016	The Project is located east of this dwelling. View to the Project will likely be fragmented by scattered vegetation surrounding the dwelling and roadside vegetation along Ortlipp Road. However, due its elevated position and proximity to the development direct views of the Project will be possible from this location.	Moderate	Negligible
DRM008	The Project is located generally north of this dwelling. Vegetation surrounding the dwelling and roadside vegetation associated with Drumwood Road will filter views to only parts of the development from this location. Additionally, due to the deciduous nature of the vegetation, this dwelling will have direct views towards the development during the dry months.	Moderate	Negligible
LIN001	The Project is located generally north of this dwelling. Vegetation surrounding the dwelling will likely fragment views of the Project from this location. However, due to its proximity to the development, it will be visible through breaks in the vegetation.	High	Low
LIN004	The Project is located generally northeast of this dwelling. Vegetation surrounding the dwelling and along its perimeter will likely fragment views of the Project from this location. However, due to its proximity to the development, there is potential for visibility through breaks in the vegetation.	Moderate	Low
LIN005	The Project is located generally northeast of this dwelling. Due to the proximity to the development and lack of regular dense screening vegetation, majority of the Project will be visible from this location.	High	Low
LIN006	The Project is located generally northeast of this dwelling. Vegetation surrounding the dwelling will likely fragment views of the Project from this location. However, due to its proximity to the development, there is potential for visibility through breaks in the vegetation.	Low	Negligible
LIN007	The Project is located generally northeast of this dwelling. Currently vacant, a proposed dwelling is generally oriented with views towards the development. Due to the proximity to the development and lack of regular dense screening	High	Low

Receptor ID	Visual Assessment	Visual Impact Rating (without mitigation)	Visual Impact Rating (with mitigation)
	vegetation, majority of the Project will be visible from this location.		
NIK002	The Project is located generally to the north of this dwelling. The Project will be discernible from this dwelling due to lack of surrounding vegetation and its elevated position.	Low	Low
NIK003	The Project is located generally to the north of this dwelling. The Project will be discernible from this dwelling due to lack of surrounding vegetation and its elevated position.	Moderate	Low
NIK010	The Project is located generally to the north of this dwelling. The Project will be visible from this dwelling due to lack of surrounding vegetation and its elevated position.	Low	Negligible
FMO002	The Project is located south of this dwelling. Majority of the Project will likely be visible due to lack of screening vegetation and elevated position. However, distance to the Project may reduce the overall impact.	Low	Negligible
MLA01	The Project is located northwest of this dwelling. Majority of the Project will likely be visible due to lack of screening vegetation and elevated position. However, distance to the Project may reduce the overall impact.	Moderate	Low
MLA02	The Project is located generally to the north of this dwelling. Majority of the Project will be visible from the elevated Position. However, distance of the development to dwelling may reduce the overall impact.	Low	Negligible

Jindera is the most populated area within close proximity to the Project Site. The town of Jindera is characterised by rural residential properties that are located to the south of the Project Site. The locality of Glenellen located approximately 1.25 km north of the Project and Tabletop to the south of the Project. Dwellings along Nioka Road and Table Top Road are elevated and will perceive the majority of the Project (Appendix F).

The visual sensitivity of LCU01 has been assessed as low, as though it is an attractive rural landscape, it is of a type and scale that is widespread in the local area, and which does not display particularly defining qualities of note. LCU01 is not covered by a designated landscape classification such as a State Forest, National Park, or a World Heritage Area.

6.3.2.2. Viewpoint Analysis

The viewpoint analysis considers the likely impact that the development would have on the existing landscape character and visual amenity by selecting prominent public sites, otherwise referred to as viewpoints. Once the viewpoint has been selected, panoramic photographs were taken on a level tripod at a height of 150 cm (to represent eye level). Photographs were taken with a Canon EOS 5D Mark IV Full Frame digital SLR camera through a 50 mm fixed focal length which closely represents the central field of vision of the human eye. The visual impact of the viewpoint was then assessed using a combination of 3D terrain modelling, topographic maps and on-site analysis.

Out of the twenty-three (23) public viewpoints recorded as part of the field work process, eleven (11) viewpoints represent public views most impacted by the development and have been considered for this report. The locations of the viewpoints have been identified in Figure 14 and the general viewing direction of each viewpoint is identified on each viewpoint. The viewpoints have been carefully selected to be representative of the range of views within the study area. The selection of viewpoints is informed by topographical maps, field work observations and other relevant influences such as access, landscape character and the popularity of vantage points.

Viewpoints are selected to illustrate a combination of the following:

- Areas of high landscape or scenic value
- Visual composition (i.e. focused or panoramic views, simple or complex landscape patterns)
- Range of distances
- Varying aspects
- Various elevations
- Various extent of development visibility (full and partial visibility)
- Views from major routes
- Representative dwellings with potential visibility.

It is noted that all viewpoints included in the study were taken from accessible public land (typically gates, walking tracks, roads, recreation reserves and lookouts) and residential dwellings (with permission from land owners) which were identified as having a potentially high visual impact through the desktop review process and community consultation.

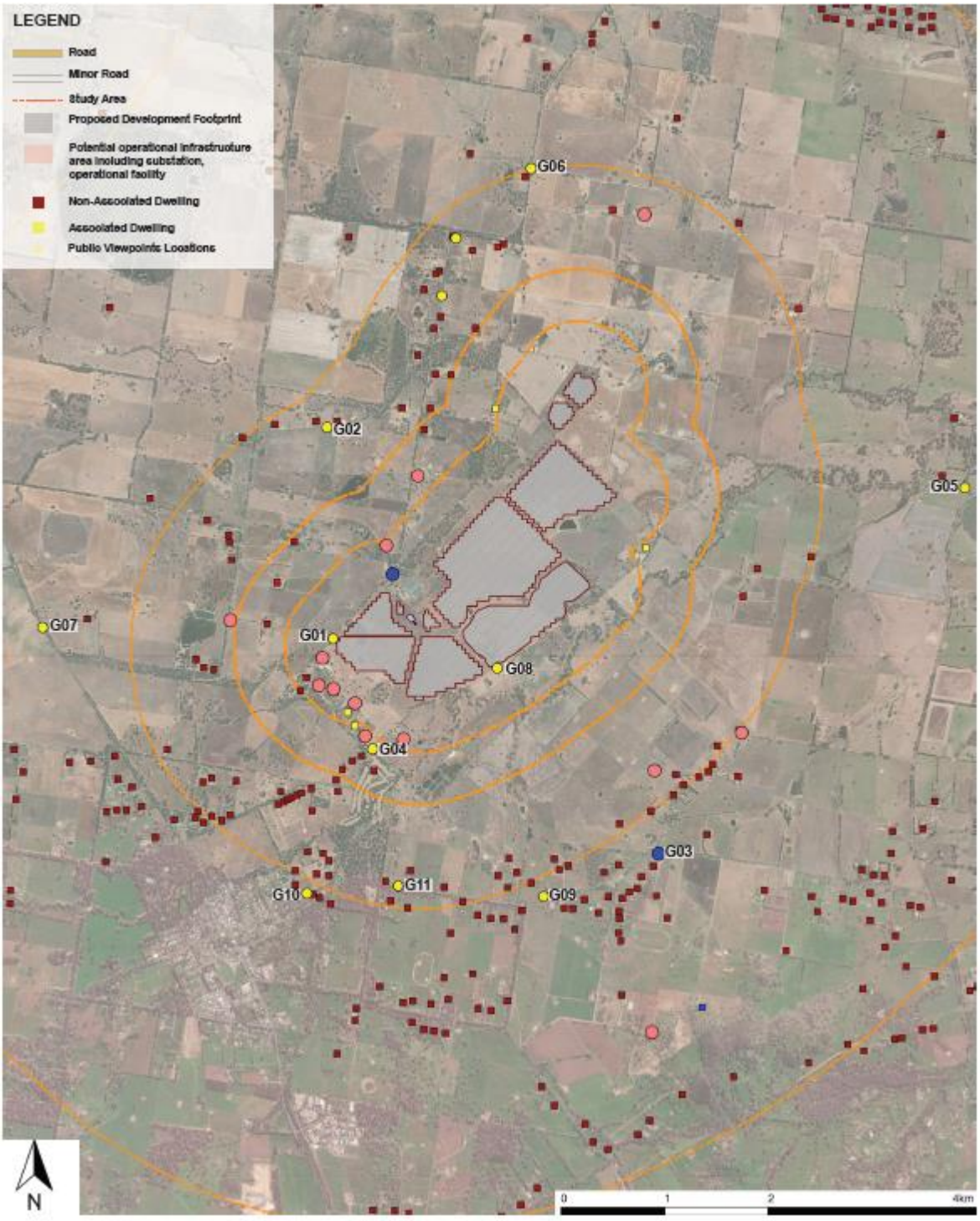


Figure 14: Viewpoint assessment locations (Moir 2022)

6.3.2.3. Visual Amenity of the Existing Landscape and Key Public Viewpoints

The viewpoint selected for the Public Viewpoint Analysis were selected to be representative of the worst-case scenario. For each viewpoint, the potential visual magnitude was analysed through the use of a combination of topographic maps and on-site analysis. The visual sensitivity and visual magnitude of each viewpoint have been assessed which, when combined, result in the overall visual impact for the viewpoint as shown in Table 20.

Of the eleven (11) viewpoints assessed as part of the LVIA, eight (8) received a visual impact rating of 'Negligible', two (2) were rated as 'Low' and one (1) of the viewpoints was rated as 'Moderate – Low'. It is noted that visual impacts associated with the Project are likely to be higher during the construction phases and mitigated over time with the implementation of measures to ultimately achieve a low or negligible visual impact level. The incorporated mitigation measures outlined in Section 6.3.3 seek to avoid, reduce and where possible, remedy adverse visual effects arising from the Project.

Generally, there are very limited opportunities to view the Project from public viewpoints. The viewpoints that were rated as low or negligible contained limited views to the Project Site, which with adequate screening or roadside vegetation would become obscured. The viewpoints which were rated as having potential views to the Project Site were taken within close proximity in locations of the Proposal or located on higher elevation than the Project Site where there was an absence of existing vegetation to screen views into the Project.

Overall, the Project will result in minor modifications to the existing visual landscape. There will be limited opportunities within the Study Area to view the Project from publicly accessible land and no accessible viewing locations within the Study Area to view the Project in its entirety. Existing landscape features including roadside vegetation and topography screen the Project from the majority of public locations. These public viewpoints are limited to local roads with a low frequency.

Table 20: Public Viewpoint Visual Impact Summary (Moir 2022)

Viewpoint	Location	Visual Sensitivity	Visual Magnitude	Potential Visual Impact
G01	Ortlipp Road, Jindera	Moderate	Low	Moderate-Low
G02	Glenellen Road, Glenellen	Low	Negligible	Negligible
G03	Corner of Dights Forest Road & Nioka Road, Jindera	Negligible	Negligible	Negligible
G04	Corner of Drumwood Road and Lindner Road, Jindera	Low	Low	Low
G05	Gerogery Road, Gerogery	Negligible	Negligible	Negligible
G06	Corner of Glenellen Road & Fielder Moll Road	Negligible	Negligible	Negligible
G07	Urana Road, Jindera	Negligible	Negligible	Negligible
G08	Drumwood Road, Jindera	Moderate	Low	Low
G09	Dights Forest Road, Jindera	Low	Negligible	Negligible
G10	Dights Forest Road, Jindera	Low	Negligible	Negligible
G11	Dights Forest Road, Jindera	Low	Negligible	Negligible

6.3.2.4. Zone of Visual Influence

An initial visibility assessment was undertaken using ZVI mapping. The tool helps to define theoretical areas from which the Project would have potential visibility and create a 'Visual Catchment'. The ZVI represents the area over which a development can theoretically be seen and is based on a Digital Terrain Model (DTM). The ZVI is a desktop tool used to make fieldwork more efficient, with the subsequent

field assessment undertaken predominately within the potential impact areas. It is important to note that given a lack of height and coverage information for vegetation and buildings, the ZVI is based solely on topographic information. Therefore, the mapping represents the worst-case scenario. In reality the zone of visibility of the Glenellen Solar Farm is far less than that shown in Figure 15.

The ZVI was prepared based on the development footprint of the Project at a maximum assumed height of the panels of 5 metres representing the worst-case scenario. The ZVI identified large areas of land surrounding the Project Site to the northeast, east and southwest from which topography will potentially screen views to the Project. As seen in Figure 15, topography will screen views from six (6) non-involved dwellings within the 2,000 m Study Area of the Project, seventeen (17) non-associated dwellings identified a small portion (1% - 25%) of potential visibility towards the Project (based on topography alone). The remaining sixty-seven (67) non-associated dwellings within the Study Area were identified as having a 75% -100% of potential visibility towards the Project (based on topography along). The ZVI has been used to identify areas of potentially high visibility which informed the viewpoint analysis.

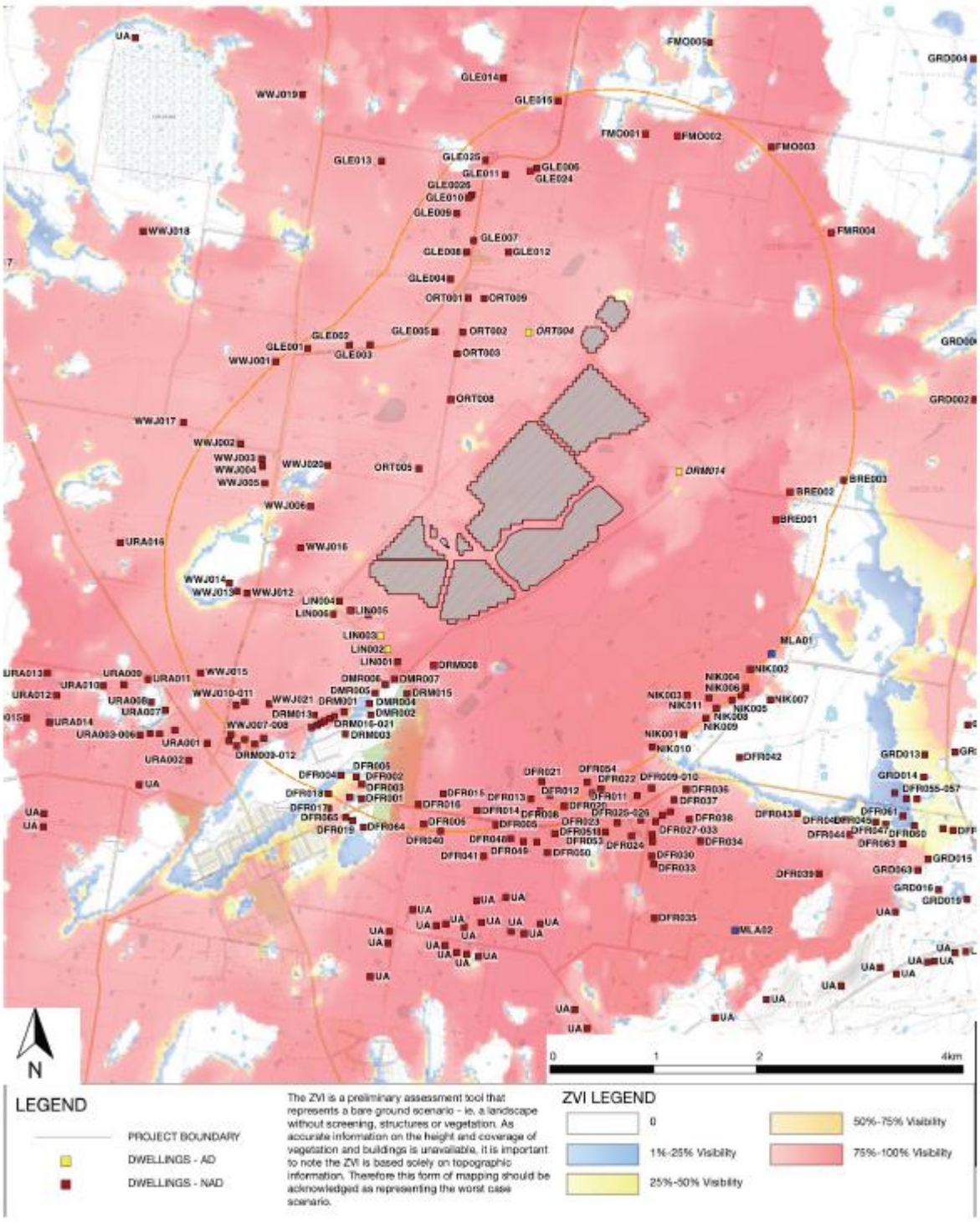


Figure 15: Zone of Visual Influence surrounding the Project Site (Moir 2022)

6.3.2.5. Ancillary Infrastructure

SUBSTATION

The proposed substation location is situated next to the existing TransGrid Substation along Ortlipp Road in a generally isolated location (Figure 16). The footprint of the substation is indicative and not all will be built form. The majority of the substation will remain under 10 m high. If mitigation methods

outlined in Section 6.3.3 are employed, overtime the proposed substation will be screened at either location.

TRANSMISSION LINES

Transmission lines and poles associated with the existing TransGrid Substation feature in the existing landscape and form part of the existing landscape character of the area. 33 kV overhead or underground electrical reticulation are being considered to connect the invertor stations to the onsite substation. Connection from the substation will be to the existing transmission line running north at the Project Site. If underground cables are selected, visual impacts would be negligible.

SITE ACCESS

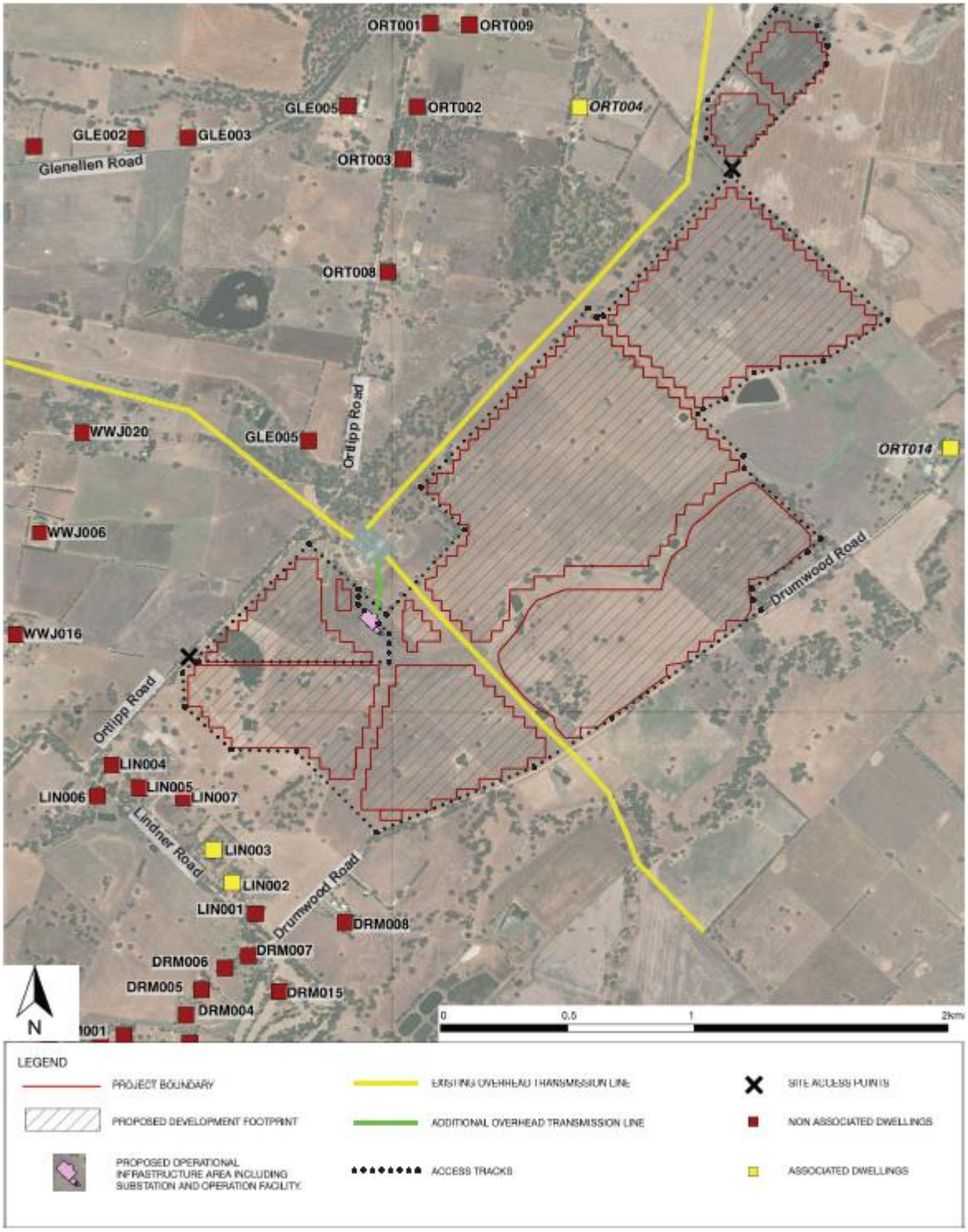
An external access point is proposed along Ortlipp Road. The proposed access road has been sited to reduce potential visual impacts and will be in keeping with existing farm roads within the Study Area. A Project Site security fence is proposed around the Project in accordance with the Proponent's recommendations to control entry to the Site. Once operational, all access points will be fenced and gated. Project Site security systems may include CCTV and sensor lighting around the Project Site. The proposed site fencing will have a low potential visual impact and will be integrated into the surrounding character.

Facilities for the operation of the proposal include an operations and maintenance facility including staff office and car parking facilities. The appearance of these facilities are in keeping with existing farm structures within the landscape.

6.3.2.6. Night Lighting

Due to the relatively isolated location of the Project, very little existing sources of lighting are present in the night-time landscape of the Study Area. Some existing lighting associated with homesteads and motor vehicles are dispersed around the Study Area. Isolated receptors within the Study Area experience a dark night sky with minimal light sources. The impact of night lighting is unlikely to be experienced from inside of a dwelling as internal lights reflect on windows and limit views to the exterior at night-time.

The requirements for night lighting on ancillary infrastructure is generally limited to security lighting to the substation and within the O&M facility. The light sources are limited to low-level lighting for security, night-time maintenance and emergency purposed. There will be no permanently illuminated lighting installed. The proposed ancillary infrastructure has been carefully sited to minimise visibility from existing residences and publicly accessible viewpoints. It is unlikely the proposed night lighting associated with the ancillary infrastructure would create a noticeable impact on the existing night-time landscape.


ORT001
ORT009
GLE005
ORT002
ORT004
GLE002
GLE003
Glenellen Road
ORT003
ORT008
Ortlipp Road
WWJ020
GLE005
ORT014
WWJ006
Drumwood Road
WWJ016
Ortlipp Road
LIN004
LIN005
LIN006
LIN007
Lindner Road
LIN003
LIN002
LIN001
Drumwood Road
DRM008
DRM007
DRM006
DRM005
DRM015
DRM004
N
0
0.5
1
2km
LEGEND
PROJECT BOUNDARY
EXISTING OVERHEAD TRANSMISSION LINE
SITE ACCESS POINTS
PROPOSED DEVELOPMENT FOOTPRINT
ADDITIONAL OVERHEAD TRANSMISSION LINE
NON ASSOCIATED DWELLINGS
PROPOSED OPERATIONAL INFRASTRUCTURE AREA INCLUDING SUBSTATION AND OPERATION FACILITY
ACCESS TRACKS
ASSOCIATED DWELLINGS

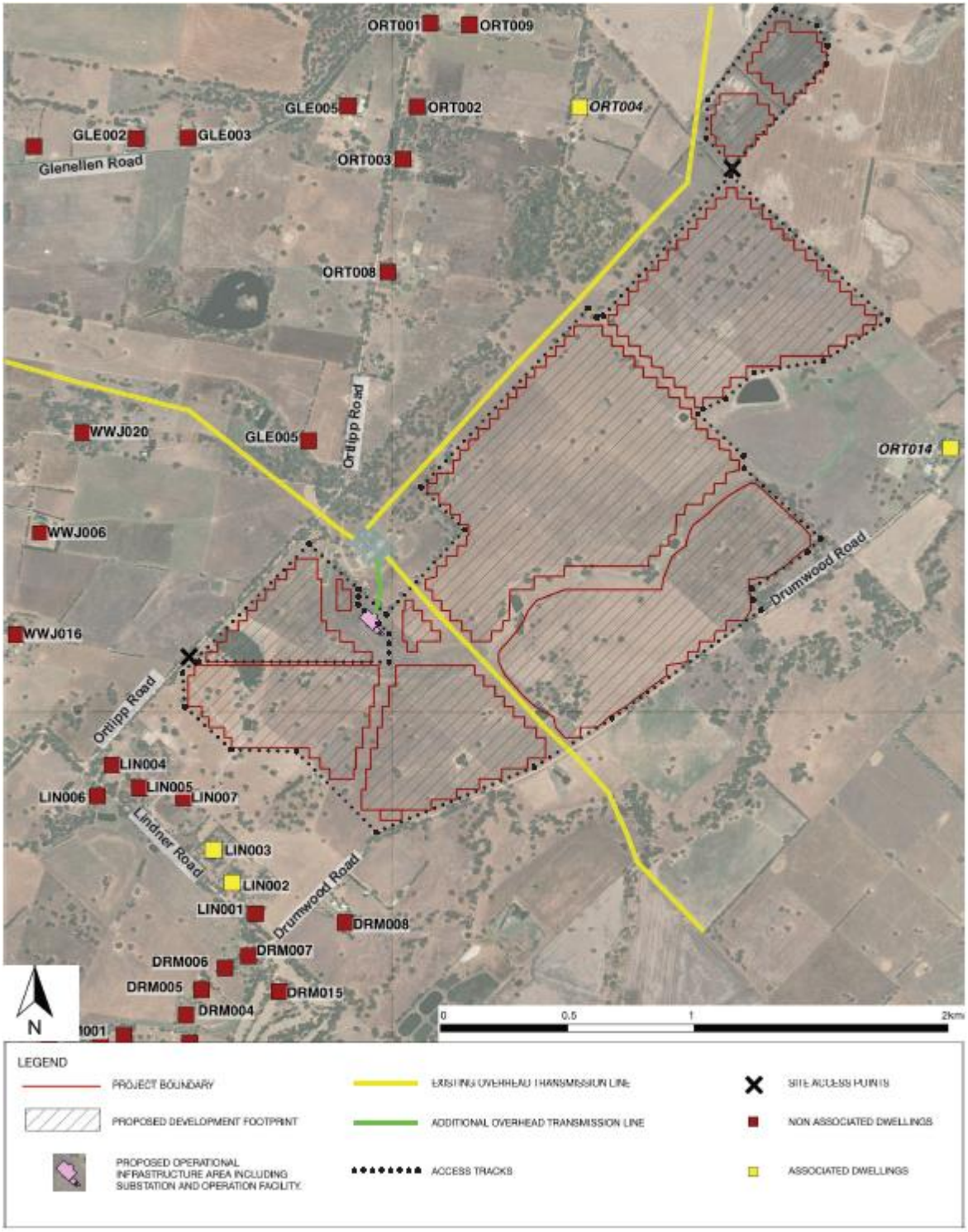


Figure 16: Assessment of existing and proposed infrastructure associated with the Proposal (Moir 2022)

6.3.3. Revised Mitigation Measures

The revised LVIA provides an overview of mitigation measures that are aimed at minimising impacts from the Project upon non-involved receptors as much as possible, and seeking to achieve a better visual integration of the project and the existing visual character from public and private viewing locations. Mitigation measures are best considered as two separate phases. These include:

- Design Considerations
- On-site Mitigation
- Landscaping Principles.

6.3.3.1. Design Considerations

The following outlines the design considerations that have been applied to the Project Site:

- Where possible the Project has been designed to retain the existing vegetation where possible. Existing vegetation is generally present around the Project Site, and will be retained and protected to maintain the existing level of screening where possible
- Consideration will be given to ancillary structures to ensure minimal contrast and to help blend into the surrounding landscape to the extent practicable
- Consideration has been given to the location of the substation to reduce potential visibility from surrounding residences.

6.3.3.2. On-Site Mitigation Methods

Due to the relatively low height of the proposed solar panels, the most effective mitigation measure is for on-site planting. There are opportunities to screen the Project from within the Project Site.

Observations made by Moir during site inspections suggest dense pockets of vegetation remain around the Project Site. Vegetation associated with Bowna Creek, to the south of the Project Site, will provide screening towards the Project. Roadside vegetation associated with Ortlipp Road and Glenellen Road to the north, combined with a generally flat topography of the area will help minimise the potential to experience visual impact.

On Site mitigation will include but will not be limited to 10 - 20 metres buffer planting to fragment views from the Lindner Road residences, vegetation bands along surrounding roads to match existing vegetation, supplementary planting will be proposed around the Project Site and enhance vegetation along Kilnacroft Creek using species with similar character. A draft landscaping plan is provided in Figure 17.

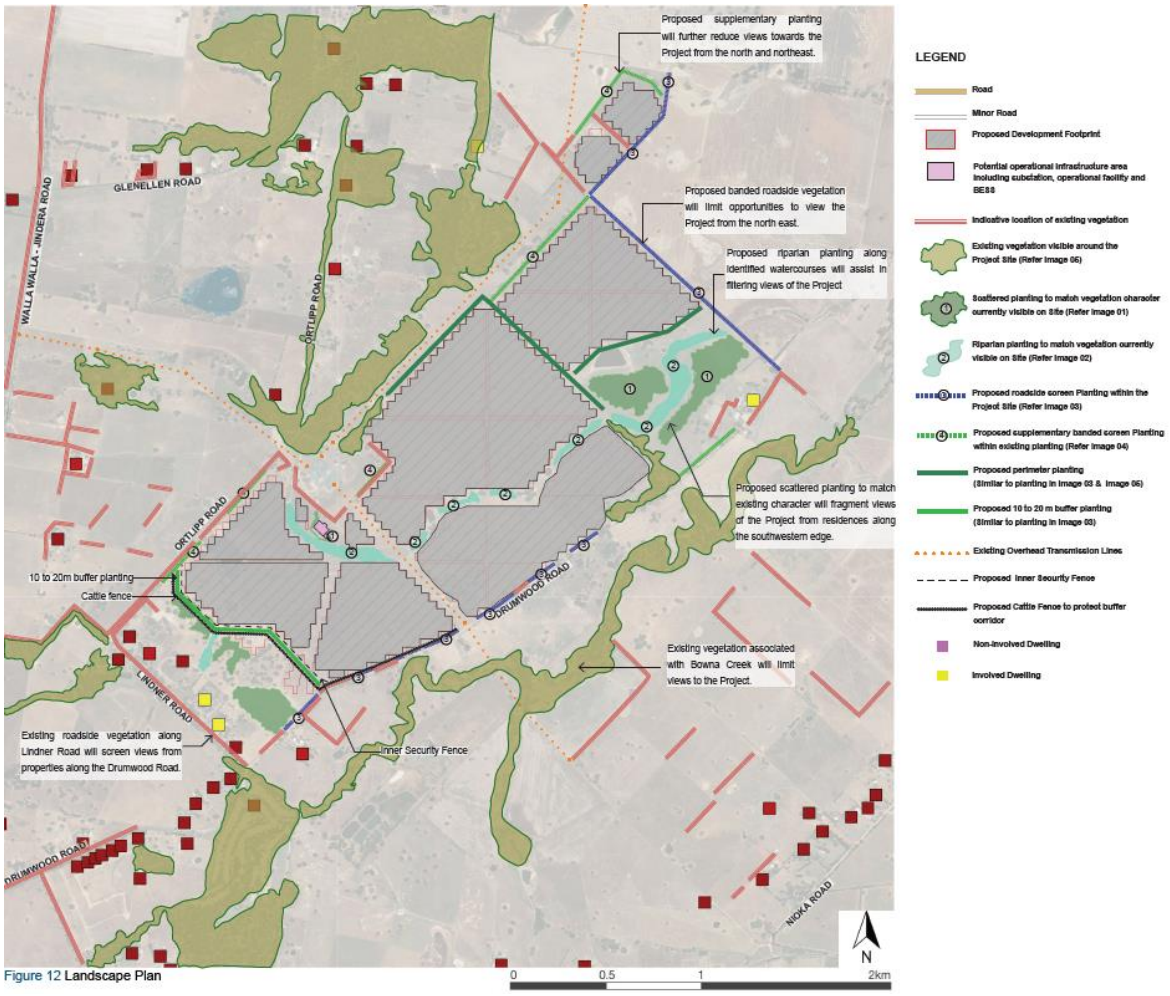


Figure 12 Landscape Plan

Figure 17: Draft Landscaping Plan (Moir 2022)

6.3.3.3. Landscaping principles

The photomontages provided in Appendix B of the LVIA (Appendix F) show an example of mitigation measures implemented. These are presented solely to illustrate the effectiveness of screen planting. Prior to commencing construction, the Proponent will prepare a detailed Landscaping Plan for the Project in consultation with GHSC and to the satisfaction of DPE.

Plant species to be planted as part of the vegetation screening for the Project have been provided in the LVIA and have been selected based on the vegetation communities (Box-Gum Woodland) within the Project Site, local conditions and quick growing species initially.

It is anticipated the proposed planting will successfully establish and function to reduce the potential visual impacts within the estimated timeframes (3-5 years) given the following considerations:

- Species selected are native and will reflect local conditions (i.e.. Soil types, climate)
- Mix of species to ensure longevity and success and tie in with the existing landscape character
- Planting will be undertaken at the commencement of the construction phase of the Project
- Planting is to be undertaken by a qualified landscape contractor using correct planting practises, soil testing and remediation prior to undertaking planting, plant protection to prevent animals

- Maintenance and management period will be in place to ensure successful establishment (replacement of loss to vegetation where density requirements are not achieved, weed control, routine watering etc.).

The revised LVIA mitigation measures are summarised in Table 21.

Table 21: Summary of LVIA mitigation measures

Environmental Impact	Mitigation Measure	Reference Code
Visual Amenity	The following principles should continue to guide the design process of the Project during the detailed design phase to reduce visual impact: • Where possible, use muted, low contrast colors for all supporting infrastructure, so that they blend into the landscape as far as possible • Consider the visual impact of ancillary structures to ensure minimal contrast and select materials that minimise potential for reflectivity and glare to help blend into the surrounding landscape	LV01
	Develop a detailed Landscape Plan for the Project in consultation with non-involved receptors, GHSC and to the satisfaction of the DPE. The Landscaping Plan will detail the location of planning, species to planted and an ongoing maintenance schedules, including a contingency plan if plantings suffer die-back.	LV02
	Due to the relatively low height of the proposed solar panels, there are opportunities to screen the Project from within the Project Site. Vegetation associated with Bowna Creek south of the Project Site will provide screening towards the Project. To capitalize on pockets of dense vegetation within the Project Site: • a 10 – 20 metre planting buffer should be employed to fragment views from the Lindner Road residences • Plant vegetation bands along surrounding roads to match existing vegetation • Plant supplementary planting around the Project Site. Enhance vegetation along Kilnacroft Creek using species with similar character	LV03
Residential	Conduct tree planting between the Project and homestead in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the solar panels following general guidelines such as: • Planting post construction in consultation with the landowner • Keeping with existing landscape character • Species selection is to be typical of the area • Avoid screening views of the broader landscape • Avoid the clearing of existing vegetation. Where appropriate reinstate any lost vegetation. Locally native plant species are preferred, as they will assist and maintain the connectivity of the area, help preserve the landscape character and scenic quality of the area as well as building habitat for local fauna. Native species are also well-suited to local conditions (i.e soil, climate, etc.) and will build ion the existing vegetation assemblages.	LV04

Environmental Impact	Mitigation Measure	Reference Code

Night Lighting	To reduce the potential visual impacts of night lighting associated with the Project, the following should be considered during lighting design:
	• Only use lighting for areas that require lighting (i.e. paths, building entry points)
	• Reduce duration of lighting:
	  ○ Switch off lighting when not required
	  ○ Consider the use of sensors to activate lighting and timers to switch of lighting
	• Use the lowest intensity light required for the situation in accordance with relevant Australian Standards
	• Use energy efficient bulbs and warm colors
	• Keep lights low to the ground and direct light downwards to help eliminate light spill
	• Ensure lights are not directed at reflective surfaces
	• Use non-reflective dark colour surfaces to reduce reflections
	• Use light shield fittings to avoid light spill
	• Maintenance of lighting and sensors.
		LV05

6.4. Noise and Vibration

A large number of submissions received from the public was in regards to the noise impacts as a result of the Project. Some of the points raised in the public submissions included:

- Peace, quiet and tranquillity loss
- Noise impacts during construction and operation
- Noise impacts during construction are likely to seriously affect the physical and mental health of residents in this community.

To address the submissions, the Proponent commissioned a revised NVIA for the Project. The revised NVIA has been prepared by MDA (Appendix G).

The purpose of the revised NVIA was to consider the potential impacts of the Project to members of the broader community and better assist in the development and evolution of the Project. The revised NVIA was undertaken to assess the impacts of the Project on the existing environment and provide mitigation and management measures that seek to minimise potential impacts as a result of the construction and operational phases of the Project. The SEARs for the noise component include:

An assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (NPfI) 2017, and cumulative noise impacts (considering other operations in the area) and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.

The assessment considers how mitigation measures could be implemented to reduce the effects of noise and vibration of any identified impacts on receivers. The revised NVIA quantifies noise and vibration impact ratings for receivers surrounding the Project Site during the construction and operation phases as well as accounts for any potential cumulative impacts, including the operation of the Project alongside

the JSF located to the northwest of the Project. Cumulative noise impacts are discussed in Section 6.7.3, Section 6.7.4 and Appendix G.

6.4.1. Existing Environment

The Project Site is located approximately 20 km north of Albury in NSW, between the towns of Jindera and Glenellen. The Project includes over 400,000 individual solar panels producing an output of up to 200 MW, a substation with a 300 MVA transformer and 60 x 4,600 kVA inverter units.

Figure 18 presents the Project Site shown with nearby noise receiver locations. The acoustic environment of the area is dominated in most parts by natural sounds associated with rural landscapes and agricultural activities. The area is generally characterised by low background noise levels, and having low road traffic noise originating from Ortlipp, Lindner and Drumwood Roads. Higher noise levels are likely occasionally higher as a result of departures and arrivals from Forest Air helicopter business operating out of ORT001 and ORT009 to the northwest of the Site. Consultation with the operators indicates that flight paths into and out of the helicopter base often traverse airspace above the Project Site.

The criteria applicable to construction and operational noise also considers background noise levels measured at and around the Project. Background noise levels in the NPfI and the ICNG, referred to as Rating Background Levels (RBLs), are assessed in terms of $L_{A90,\ 15\ min}$, that being the noise level exceeds a threshold for more than 90% of the sample period (15 minutes). Ambient/background noise levels have not been measured for this desktop assessment, and as such, the typical existing background noise levels for a rural residential area prescribed in the NPfI have been adopted as the RBLs. These levels are reproduced from Table 2.3 of the NPfI (Table 22).

Table 22: Ratings Background Levels based on typical existing background noise levels for a rural residential area, dB $L_{A90,\ 15\ min}$ (NPfI 2017)

Period	Rating Background Level
Day	40
Evening	35
Night	30

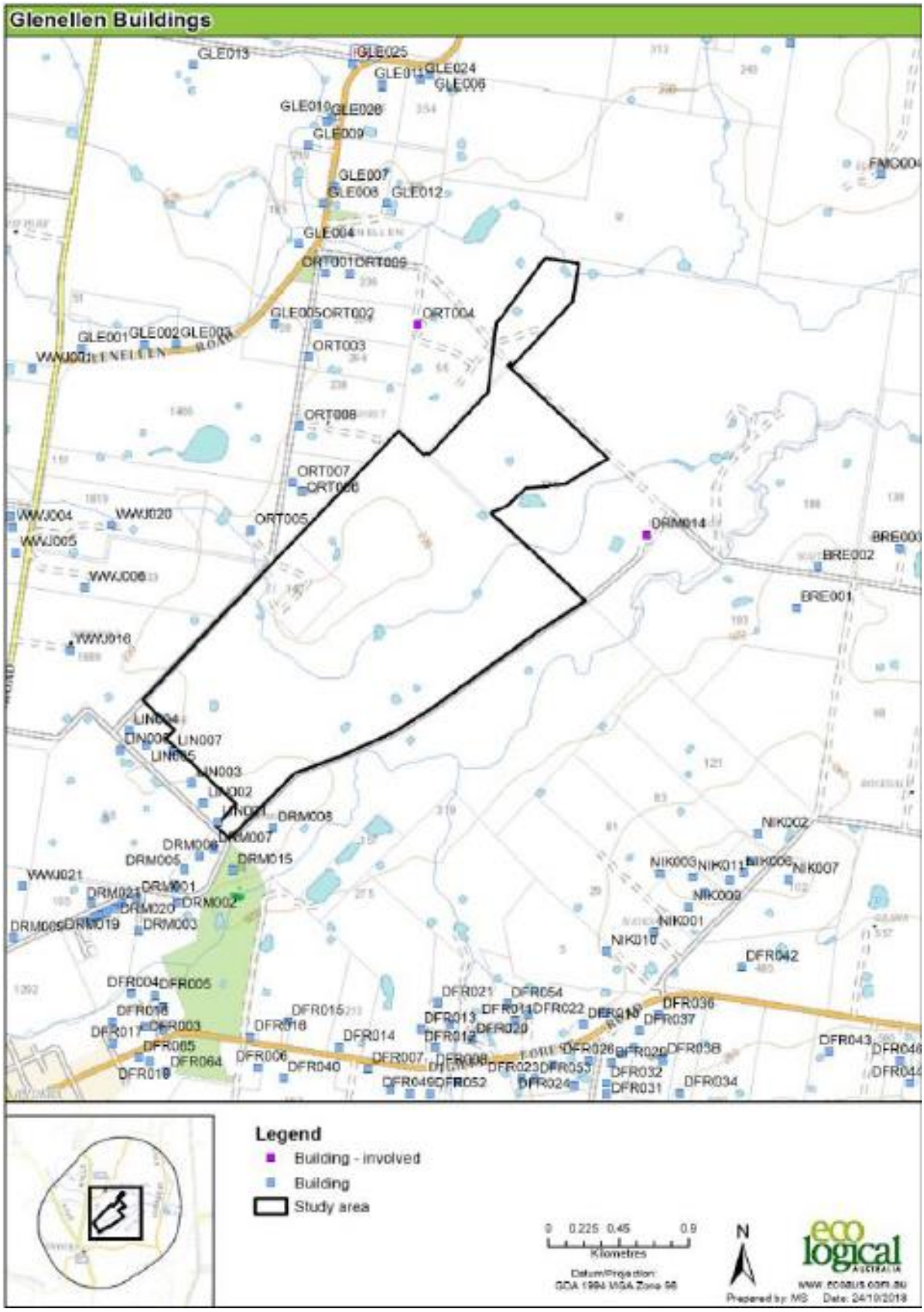


Figure 18: Project Site and receiver locations

6.4.2. Potential Impacts

The NVIA assesses the potential impacts of noise and vibration as a result of construction and operation to nearby receivers based on a number of guidelines and policies. This ensures that the predicted noise levels as a result of the Project do not exceed the recommended and/or defined limits put in place. The following NSW publications are relevant to the assessment of construction and operational noise from the Project:

- NSW EPA NPfI 2017
- NSW DECC ICNG 2009
- NSW DECCW *Road Noise Policy* (RNP) 2011
- NSW DECC *Assessing Vibration: A Technical Guideline* (AVTG) 2006.

These publications inform the assessment undertaken by MDA.

6.4.2.1. Construction Noise

Predicted Noise levels have been calculated in accordance with the method detailed in Australian Standard 2436:2010 Guide to noise and vibration control on construction, demolition, and maintenance sites (AS2436). This method enables the prediction of noise levels for sound propagation over hard or soft ground but does not provide the ability to calculate predicted noise levels for mixed ground cover with varied soil conditions. The standard also notes that caution must be applied when considering predicted noise levels at distances beyond 100 m. For these reasons, predicted noise levels have been determined as the average of the hard and soft ground prediction methods.

This approach is broadly consistent with the equivalent prediction procedure in British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites: Noise (BS 5228, referenced in AS 2436), and provides a margin of caution with respect to ground conditions for the typical magnitude of separating distances between construction activities and neighbouring sensitive receivers.

6.4.2.2. Operational Noise

Operational noise levels with the Project (typical operation of panels, related infrastructure, and maintenance) are predicted using:

- Noise emission data for the inverters, tracking motors, transformers, related infrastructure, and maintenance activities
- A 3D digital model of the Project and the surrounding environment using proprietary noise modelling software SoundPLAN (version 8.2)
- International standards used for the calculation of environmental sound propagation.

The method selected to predict noise levels is International Standard ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613). The implementation of ISO 9613 within proprietary noise modelling software enables multiple sound transmission paths, including reflected and screen paths, to be accounted for in the calculated noise levels. ISO 9613 was designed to assume conditions that favour the propagation of noise from meteorological effects, described as a slight wind (1 to 5 m/s) blowing from source to receiver, or a well-developed moderate ground-based temperature inversion.

Geometry data for the model has been sourced from public aerial photography and typical equipment dimensions. The geometries in the model are simplified representations of the built environment that have been configured to a level of detail that is appropriate for noise calculation purposes.

Terrain data for the Project Site and surrounds has been sourced from publicly available terrain data. 2 m elevation contours were available and are considered an appropriate resolution for noise modelling purposes.

Several assumptions were required to undertake the noise modelling, including:

- The ground effect attenuation has been based on 60% hard ground
- The various equipment items exhibit noise levels as presented in Table 23 below

Table 23: Operational equipment sound power data, dB L_W

Item	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	A
Transformer[2] – Day and Evening only	105	107	102	102	96	91	86	103
Tracking Motors[3] - Day and Evening only	74	74	74	74	74	74	74	80
Maintenance Activities[4] – Day only	109	107	109	108	108	103	97	111

For the purposes of this planning assessment, all receivers have been considered to be Rural in nature as defined in Table 2.2 of the NPfI. Project noise trigger levels for assessment of operational noise have been developed and are shown Table 24.

Table 24: NPfI project noise trigger levels, dB $L_{Aeq,\ 15\ min}$

Time of Day	Project Noise Trigger Level
Day	45
Evening	40
Night	35

The Project has three primary operational scenarios; one requiring assessment against the day, one against the evening and one against the night period project noise trigger levels. The operational noise sources that operate during the night period typically give rise to steady noise levels (i.e., inverter noise

[2] Derived using the proposed size of the transformer using Australian Standard AS 60076-10:2009 Power transformers – Part 10: Determination of sound levels (AS 60076-10:2009) and consideration of the overall sound power levels provided by Trina Solar.

[3] MDA has taken the overall single value dB level provided by the client and compared to MDA library data. No publicly available octave band or 1/3 octave band data could be located for the tracking motors. As such, MDA provides a flat spectrum summing to the overall sound power level. During actual selection, the client will need to ensure that the tracking motors selected to not exhibit tonal, intermittent, or low frequency characteristics as defined in the NPfI.

[4] Maintenance activities based on the logarithmic sum of the sound power of a typical tractor, a pump and small truck sourced from BS 5228.

is not typically characterised by brief momentary increase in noise levels). Accordingly, the additional procedures defined in the NPfI for assessing potential sleep disturbance from brief elevated noise levels associated with transient noise sources are not relevant. The assessment is therefore primarily based on the equivalent noise levels of the plant.

6.4.2.3. Construction Noise Assessment

The construction of a solar farm project will generate noise and vibration as a result of activities occurring both on and off the Project Site. Construction noise is typically assessed in accordance with the ICNG and construction vibration in accordance with the AVTG.

Off-site noise generating activities primarily relate to heavy goods vehicle movements to and from the Project and is addressed in the traffic noise assessment below in Section 6.5. On-site works include a range of activities such as construction of access tracks, connection of infrastructure and construction of solar panels and farming.

As per the ICNG, noise associated with the construction of the solar farm may require the adoption of reasonable and feasible general management measures and considerate working practices. These measures are normally documented and agreed in a Construction Noise and Vibration Management Plan (CNVMP) for inclusion in a broader Environmental Management Plan (EMP), typically prepared prior to commencing any construction works.

The following sections provide general information regarding the types of activities that are expected to be associated with the construction of the solar farm, and reference data that should be considered as part of the preparation of a future CNVMP for the Project once a main contractor is appointed and specific equipment and processes are known. Upon consultation with the Proponent, the following construction activities are anticipated to be required:

- Site clearing works
- Access road construction
- Civil construction of benches
- Construction of fencing, site offices, concrete foundations, piling, solar panel and tracking systems
- Cable trench digging.

Specific details of the construction program and the number, type, and duty of the construction plant to be used would be determined during the advanced stages of the Project when a construction contractor has been selected. The types of equipment associated at different stages of construction typically include excavation plant, pneumatic equipment and lifting equipment.

A conservative construction noise assessment was undertaken by MDA to inform the Project of the potential worst-case impacts.

Four primary scenarios have been detailed in Table 25. To determine the nearest receiver, the various scenarios were assumed to operate at the edge of the Project Site closest to each receiver. The assessment assumes that all construction activity described in the various scenarios occurs at the closest point and occurs simultaneously, presenting a highly conservative approach.

Table 25: Construction scenarios and equipment

Construction Task	Plant/Equipment	Total scenario sound power level, dB L_W
Site preparation – site clearing, access road construction and civil construction	3x Bulldozer, 2x Delivery Trucks, 2x Dump truck, 6x Excavator (100 to 200kW), 1x Front end loader, 1x Grader, 1x Rock crusher, 3x Roller, 1x Tractor, 1x Wood Chipper, 1x Bobcat	125
Solar Farm installation – construction and installation of solar panels, tracking motors and inverters	2x Bulldozer, 1x Concrete pump, 3x Concrete truck, 2x Crane (200t), 6x Delivery Trucks, 1x Dump truck, 4x Excavator (100 to 200kW), 1x Front end loader, 1x Grader, 1x Tracked loader, 6x Tractor, 3x Forklift, 2x Bobcat, 2x Ute + Trailer, 7x Telehandler, 1x Piling Rig, 1x Trencher, 1x EWP, 1x Drill Rig, 1x Backhoe, 2x Sand Cart	125
Transformer installation – construction and installation of the transformer at the substation location	2x Bulldozer, 1x Concrete pump, 3x Concrete truck, 2x Crane (200t), 6x Delivery Trucks, 1x Dump truck, 4x Excavator (100 to 200kW), 1x Front end loader, 1x Grader, 1x Tracked loader, 6x Tractor, 3x Forklift, 2x Bobcat, 2x Ute + Trailer, 7x Telehandler, 1x Piling Rig, 1x Trencher, 1x EWP, 1x Drill Rig, 1x Backhoe, 2x Sand Cart	125
Deliveries and waste collection – on-site vehicle movements	1x Crane (200t), 4x Delivery Trucks, 1x Front end loader	116

Noise levels associated with each of the main construction tasks have been predicted at the nearest noise sensitive receivers to provide an indication of the upper range of noise levels. Given that the precise equipment selections and methods of working would be determined during the future development of a CNVMP, and that the noise associated with the construction plant and activity varies significantly, the predicted noise levels are provided in the following sections as an indicative range of levels which may occur in practice.

Table 26 details the predicted noise level ranges for each of the main construction tasks at the nearest receivers.

Table 26: Indicative range of construction noise predictions, dB L_{Aeq}

Construction Task	Nearest Receiver	Predicted Level Range	Noise Affected Management Level	Exceedance	Highly Noise Affected Management Level	Exceedance
Site Preparation	LIN007	62-68	45	17-23	75	-
Solar Farm Installation	LIN007	61-68	45	16-23	75	-
Transformer Installation	ORT005	51-60	45	6-15	75	-
Deliveries and Waste Collection	LIN007	51-58	45	6-13	75	-

The noise affected management level is described by the NPfI represent the levels of noise that, if exceeded, would indicate a potential noise impact on the community and therefore 'trigger' a management response. The Project noise trigger levels are derived from an analysis of the background

noise environment and zoning information, accounting for amenity-based criteria and, in the case of residential receivers, intrusiveness criteria. Where noise from the construction works is above the noise affected management level, all feasible and reasonable work practices should be applied. Where the noise from construction works is above highly noise affected management level for residential receivers, restriction to the hours of construction may be required. Neither the noise affected management level or the highly noise management affected level are intended as strict noise criteria. The ICNG indicates that they are intended as trigger levels for additional assessment and the implementation of appropriate noise controls.

As seen in Table 26, the noise affected management levels could be exceeded at the nearest residences to the construction activities. The highly noise affected management levels are not expected to be exceeded at any receivers. Exceedances above the noise affected management levels are not unique to this project and are characteristic of most construction assessments due to the typically high source noise levels of construction equipment, particularly in quieter rural locations.

The assessment undertaken is considered highly conservative as it places many noise sources at the closest point between the edge of the Project Site and each receiver. In reality, these sources would likely be operating at different times and spread out at different distances.

The ICNG indicates the noise affected level represents the point above which there may be some community reaction to noise:

- *Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater that the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level*
- *The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.*

6.4.2.4. Construction Vibration Assessment

The prediction of vibration propagation through the ground is considered convoluted and complex, and depends on several factors including damping, reflection and impedance of in-ground conditions. A detailed vibration propagation assessment is considered to be a site-specific assessment and often requires a combination of baseline vibration assessment, empirical measurement of equipment and analytical methods. Assessment of this nature is outside of the scope of a planning stage vibration risk assessment. The AVTG provides guidance with respect to the assessment of human comfort due to vibration from construction works. This guideline distinguishes between intermittent, impulsive and continuous vibration sources, which can be generated by construction activities. For the purposes of this planning risk assessment, only residential receivers are considered

The AVTG indicates that intermittent vibration should be assessed in terms of the Vibration Dose Value (VDV). These values for intermittent construction activities are highly specific to site conditions, equipment selections and operational durations. As such, calculations of VDV levels is not typical or practical at the planning stage but will need to be considered as part of a later detailed vibration assessment. The AVTG recommends that best management practices in all cases should be to reduce values as far as practicable, and a comprehensive community consultation program should be developed.

Continuous vibration as a result of some construction operations may occur depending on the duration and nature of the works. Since the guide values for continuous vibration are independent of exposure duration, indicative safe working distances can be developed. Section 7.1 of the NSW *Construction Noise & Vibration Guideline* (CNVG) sets out the minimum working distances from sensitive receivers for typical items of vibration intensive plant. The minimum distances are quoted for effects relating to human comfort and are outlined in Table 27 below.

Table 27: Recommended minimum working distances for human response limits for vibration intensive plant at nearest receivers (reproduced from Table 2, Section 7.1 of the CNVG)

Plant Item	Rating/Description	Minimum working distance, m
Vibratory Roller	< 50 kN (typically 1-2 tonnes)	15 to 20
	< 100 kN (typically 2-4 tonnes)	20
	< 200 kN (typically 4-6 tonnes)	40
	< 300 kN (typically 7-13 tonnes)	100
	> 300 kN (typically 13-18 tonnes)	100
	> 300 kN (> 18 tonnes)	100
Small hydraulic hammer	300 kg – 5 to 12 t excavator	7
Medium hydraulic hammer	900 kg – 12 to 18 t excavator	23
Large hydraulic hammer	1,600 kg – 18 to 34 t excavator	73
Vibratory pile driver	Sheet piles	20
Pile boring	≤ 800 mm	4
Jackhammer	Handheld	2

The CNVG notes that the minimum distances for human comfort relate to continuous vibration and are indicative. In practice, appropriate minimum working distances will vary depending on the particular item of plant and local geotechnical conditions. The CNVG further notes that for most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are allowed, likely equating to greater minimum working distances. All receivers proximate to the Project are located at distances greater than the minimum working distances detailed in Table 27. No adverse vibration impacts are expected.

Similar construction activities as detailed above are expected to be required during the decommissioning of the Project and as such, the same outcomes should be considered in preparation of the CNVMP.

6.4.2.5. Operational Noise Assessment

The proposed operational use of the Project includes a number of fixed equipment items as well as some mobile operations involved in maintenance activities and are detailed in Table 28 below.

Table 28: Operational equipment used on by the Project

Equipment Item	Description	Relevant Period
Transformer	One transformer located at the substation operating constantly during the day and evening	Day Evening

Equipment Item	Description	Relevant Period
Inverters	60 Inverters located around the outside of the solar panels operating constantly	Day Evening Night
Solar Panel tracking motors	3,576 tracking motors operating intermittently to adjust solar panel angles. The motors operate for a cumulative total of approximately 1.25 minutes every 15 minutes while the sun is present	Day Evening
Mobile maintenance vehicles and equipment	Tractors, pumps, and utes used for slashing grass and cleaning solar panels. Likely only to take place a few times per annum and only during the day	Day

Noise data for the operational noise sources has been provided by the Proponent or developed by MDA and confirmed as appropriate by the Proponent. Sound power data for the operational equipment is Appendix G.

Predicted noise levels associated with the operation of the Project during the day period have been demonstrated to be less than the applicable project trigger noise levels, without the requirement for additional noise controls. This includes the application of tonality adjustments where required. Predicted noise levels associated with the cumulative operation of the Project in conjunction with the nearby JSF, which is limited to the day period, have also been demonstrated to be less than the applicable project trigger noise levels, without the requirement for additional noise controls. This includes the application of tonality adjustments where required.

For the night-time assessment, the application of tonality adjustments at some receiver locations means that applicable night-time project trigger noise levels may be exceeded without the inclusion of additional noise controls.

PREDICTED NOISE LEVELS

Noise levels have been predicted at the nearest receivers based on the method detailed above. The section below presents the operational noise level results for the different operational periods.

Day and Evening Noise Levels

For the majority of the time, operational noise will be due to the fixed equipment related to the Project including the solar panel tracking motors, inverters, and the transformer at the substation. On a few days of the year, maintenance vehicles will be present on the Project Site to slash grass around the solar panels, repair damaged equipment, and clean the solar panels.

While these instances will be atypical, maintenance activities have been included in the operational noise predictions for the day period to represent a worst-case scenario, assessed against the day period project noise trigger levels. Operational noise of just the fixed equipment has been assessed against the more stringent evening period project noise trigger levels, to account for the summer months of the year, when it is possible that solar energy will still be generated after 1800 hours.

The solar inverters provided by the Proponent for review exhibit tonal characteristics. Tonality is assessed at the receiver location and accordingly the results of the predictive noise modelling were reviewed for tonality at the identified receiver locations.

The predicted operational noise levels at the receiver locations most affected by typical day and evening operations are presented in Table 29, alongside the corresponding day period maintenance activities. Other receivers are predicted to be subject to noise levels of lower magnitude. Operational noise levels are predicted to stay below the project noise trigger levels during the day and evening, including during maintenance activities. Noise reduction kits for inverters are not applied to the tonality affected results in Table 29, as a higher degree of compliance would be evident once fitted.

Night Noise Levels

During the night-time period, only the solar inverters are proposed to operate, to allow reactive power to be generated. The predicted operational noise levels during the night period for the ten (10) receiver locations subject to the highest predicted noise levels are presented in Table 29. All other receivers are predicted to be subject to noise levels of lower magnitude.

Table 29: Predicted operational noise levels for day and evening period and night period, dB $L_{Aeq\ 15\ min}$

Receiver Location	Day and Evening Period		Day period (inc. maintenance)		Night period	
	Predicted Noise Level	Noise Trigger Level	Predicted Noise Level	Noise Trigger Level	Predicted Noise Level	Noise Trigger Level
LIN001	29	40	38	45	25	35
LIN002	30	40	39	45	26	35
LIN003	30	40	41	45	26	35
LIN004	29	40	42	45	-	-
LIN005	29	40	42	45	-	-
LIN007	31	40	44	45	25	35
ORT004	-	-	-	-	26	35
ORT005	32	40	41	45	28	35
ORT006	30	40	42	45	25	35
ORT007	29	40	40	45	25	35
DRM008	28	40	36	45	25	35
DRM014	27	40	39	45	25	35

Operational noise levels are predicted to meet the project noise trigger levels during the night period at all identified receiver locations without noise reduction kits fitted to relevant inverters.

6.4.2.6. Traffic Noise

The NSW RNP provides noise level criteria for increased traffic flow as a result of a land-use development with the potential to create additional traffic as outlined in Table 30. Additionally, the RNP requires that the relative increase in noise levels at residential receivers does not exceed 12 dB for land use developments with the potential to generate additional traffic on existing freeways, arterial or sub-

arterial roads. The relative increase criterion does not apply for local roads. The RNP notes that in assessing feasible and reasonable mitigation measures, an increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.

Table 30: Road traffic noise assessment criteria for residential land uses

Type of Development	Day (0700-2200 hrs)	Night (2200-0700 hrs)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	60 dB $L_{Aeq, 15\ hr}$ (external)	55 dB $L_{Aeq, 9\ hr}$ (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	55 dB $L_{Aeq, 1\ hr}$ (external)	50 dB $L_{Aeq, 1\ hr}$ (external)

Where night-time construction traffic is likely to occur, an assessment if sleep disturbance is appropriate, with the RNP providing guidance:

- Maximum internal noise levels below 50-55 dB L_{Amax} are unlikely to awaken people form sleep
- One or two noise events per night, with maximum internal noise levels of 65-60 dB L_{Amax} are not likely to affect health and wellbeing significantly.

Based on the generally accepted assumption that an open window provides 10 dB attenuation, or the reduction of the amplitude of a signal, electric current, or other oscillation such as sound, noise levels below 60-65 dB L_{Amax} outside an open bedroom window would be unlikely to cause awakening reactions. Furthermore, one or two events with a noise level of 75-80 dB L_{Amax} outside an open bedroom window would be unlikely to affect health and well-being significantly.

Noise criteria for the assessment of off-site traffic associated with the construction and operation of the solar farm are laid out in Table 30. The traffic report indicates that traffic generation during the operational stages is limited, with construction stage traffic likely to comprise the majority of traffic associated with the Project. Operational traffic impacts on public roads are likely to be very low and have negligible noise impacts and are not considered further in this report. Construction traffic flows in a format suitable for noise assessment was obtained from the traffic report and is presented in Table 31.

Table 31: Construction traffic and base traffic flows on public roads - vehicles (% heavy vehicles)

Road category	Existing Traffic		Future: Existing Traffic + Construction Traffic	
	Day[1]	Night[1]	Day[1]	Night[1,2]
Local Roads				
Lindner Road	10 (20%)[2]	4 (25%)[2]	20 (40%)[2]	4 (25%)[2]
Ortlipp Road	10 (20%)[2]	4 (25%)[2]	20 (40%)[2]	4 (25%)[2]
Freeways/Arterial/Sub-Arterial Roads				
Walla Walla Jindera Road	762 (10%)[3]	70 (10%)[4]	880 (18%)[3]	70 (10%)[4]
Urana Street	3,992 (10%)[3]	334 (73%)[4]	4,130 (12%)[3]	334 (73%)[4]
Union Road	956 (10%)[3]	407 (73%)[1]	970 (11%)[3]	407 (73%)[1]

Road category	Existing Traffic		Future: Existing Traffic + Construction Traffic	
	Day[1]	Night[1]	Day[1]	Night[1,2]

[1] – Day is 0700 – 2200 hrs; Night is 2200 – 0700 hrs

[2] – Peak 1 hour AADT (Annual Average Daily Traffic) / Heavy vehicle (%)

[3] – Total 15 hour AADT / Heavy Vehicle (%)

[4] – Total 9 hour AADT / Heavy Vehicle (%)

In considering feasible and reasonable mitigation measures, the RNP states that an increase of up to 2 dB represents a minor impacts that is considered barely perceptible to the average person. Therefore, to assess noise impacts from construction traffic, an initial screening test was undertaken to evaluate whether existing road traffic noise levels would increase beyond this threshold.

Where the predicted traffic noise increase is 2 dB or less, no further assessment is conducted, as impacts will be barely perceptible. However, where the road traffic noise levels are predicted to increase by more than 2 dB as a result of additional traffic, consideration is given to the actual noise levels associated with the construction traffic and whether or not these levels comply with the following road traffic noise criteria detailed in Table 32.

SCREENING ASSESSMENT

For the freeway/arterial/sub-arterial roads listed in Table 31, the increase in road traffic is relatively minor compared to the existing traffic flows, less than a 15% increase in all cases. Based on the estimated construction traffic flows presented above, the relative increase in traffic noise level associated with construction activities is predicted below the 2 dB threshold during the day and night periods. Therefore, further detailed noise level predictions and assessments at receivers along the identified freeways/arterial/sub-arterial roads have not been considered.

However, the local roads listed in Table 31, Lindner Road and Ortlipp Road, have low existing traffic flows and the proposed construction activities result in the doubling of traffic on these roads. The relative traffic noise level increase due to the proposed construction activities is predicted to be above the 2 dB threshold. Therefore, further detailed noise level predictions and assessments at receivers along the identified local roads are provided in the following section.

CONSTRUCTION TRAFFIC PREDICTIONS

Traffic volumes for the local roads under assessment are low in absolute levels for both the existing and predicted future volumes. From the traffic data in Table 31 and a review of receivers adjoining the affected local roads, traffic noise levels have been predicted to the nearest identified receivers on each road using the following method and assumptions:

- Traffic speed assumed at 100 km/h (based on the traffic report)
- Roads assessed as local roads as defined in the RNP
- Predicted noise levels include an additional +2.5 dB correction for façade reflection as required by the RNP
- $L_{Aeq,\ 1hr}$ noise levels are calculated as CoRTN $L_{A10(1hr)}$ – 3 dB, per RMS practice
- Grass or cultivated fields assumed between the road and receivers.

Modifying corrections for Australian conditions (e.g., per Australian Road Research Board report ARR 121, 1983) or for road surface conditions have not been applied as applicable data for the local road surfaces in question are not available.

The additional vehicle flows during construction, particularly on roads carrying very little existing traffic, may result in a noticeable increase for some residents. However, the total vehicle flows are still low (20 vehicles per hour for both roads) in an absolute sense. It is also noted that the assessments presented for local roads are based on the peak 1 hour AADT traffic data which is considered a worst-case scenario. Table 32 shows a summary of the expected noise levels due to the existing and construction traffic levels on local roads.

Table 32: Construction traffic and base traffic flows on local public roads

Road	Existing peak one hour traffic volume (% HV)	Construction peak one hour traffic volume (% HV)	Total peak one hour traffic volume (% HV)	Distance to nearest residence (m)	Predicted level at nearest residence	Absolute level criteria	Absolute level compliance
Lindner Road	10 (20%)	10 (60%)	20 (40%)	20	55 dB $L_{Aeq,\ 1\ hr}$	55 dB $L_{Aeq,\ 1\ hr}$	Yes
Ortlipp Road	10 (20%)	10 (60%)	20 (40%)	30	53 dB $L_{Aeq,\ 1\ hr}$	55 dB $L_{Aeq,\ 1\ hr}$	Yes

Compliance with the RNP road traffic noise assessment criteria is expected to be achieved with the introduction of construction traffic. At the respective dwellings there is little to no margin to the recommended criteria. As these are unsealed, minor local roads, the inputs to the calculation may be conservative. Consideration could be given to limiting the speed of construction related traffic on this road to 40 km/h, which can result in up to 1.5 dB decrease in predicted noise levels. Residents on these local roads should be included in consultation prior to commencement of construction. It should be noted that whilst the posted speed limit is 100 km/h, the condition of the subject road would mean that heavy vehicles are unlikely to be travelling at the absolute speed limit.

Construction activities are only scheduled to occur during the day period, and so sleep disturbance impacts have not been assessed. If any construction activities are scheduled during the night, then offsite traffic impacts should be addressed in the CNVMP, and consideration given to alternate traffic routes and/or minimising the number of movements to only once or twice per night.

6.4.3. Revised Mitigation Measures

The revised NVIA mitigation measures are summarised in Table 33.

Table 33: Revised NVIA mitigation measures

Environmental Impact	Mitigation Measure	Reference Code
Construction Noise	Construction work will be restricted to the following hours: • Monday to Friday – 7 am to 6 pm • Saturday – 8 am to 1 pm • No construction work on Sundays or public holidays. • Notwithstanding works undertaken outside these hours may occur where the activity is inaudible, for emergency works,	NM01

Environmental Impact	Mitigation Measure	Reference Code
	delivery of certain materials, in accordance with Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020 or where agreement from the Secretary has been provided.	
	Construction and decommissioning activities will be managed to minimise noise impact in accordance with the ICNG 2009 and outlined in the EMP. This may include maximising separation distances, use of acoustic barriers, acoustic enclosures, scheduling work and / or modifying work practices.	NM02
Construction Vibration	Where residential dwellings are located within 100 m of construction works and a 10 tonne vibratory/foot roller is expected to be used, it is recommended to use a smaller vibratory/foot roller to suit the required buffer distance.	NM03
Operational Noise	Implement sound reduction strategies if invertor/non-involved receptor separation distances cannot be met. The operator will maintain effective relationships with non-involved receptors and work in a proactive manner to minimise operational noise impacts.	NM04
	The Proponent will investigate the most appropriate inverter model that does not exhibit tonal characteristics. This would follow general best practice and further reduce the risk of tonality related amenity impacts.	NM05
Construction Noise and Vibration	A CNVMP will be developed for the Project and will include site and process specific noise management work practices designed to mitigate the impact of construction noise activities, including traffic noise.	NM06

6.5. Traffic and Transport

A large number of submissions received from the public was in regards to the traffic management and road damage as a result of the Project. Some of the points raised in the public submissions included:

- Increased safety risk along roadways with predicted traffic volumes, including children and school bus safety
- Glenellen Road safety concerns
- Lack of any suitable access road infrastructure to allow for the immense increase in heavy vehicle movements
- Heavy construction impacts on animals and farming enterprise
- Concerns about damage that increased heavy vehicle traffic will cause to local roads.

The GHSC also had safety concerns in relation to the proposed access route to the development in their submission on the EIS.

To address the submissions, the Proponent commissioned a revised TIA for the Project. The revised TIA has been prepared by Cardno (Appendix H). The revised TIA has been undertaken in accordance with the requirements of the SEARs, which include:

- *an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation*

- *an assessment of the likely transport impacts to the site access route (including Walla Walla Jindera Road, Lindner Road and Ortlipp Road), site access point, rail safety issues, and Crown land, particularly in relation to the capacity and condition of the roads*
- *a cumulative impact assessment of traffic from nearby developments*
- *a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required)*
- *a description of the measures that would be implemented to mitigate any transport impacts during construction*
- *demonstration of consideration of potential cost-sharing of road upgrades with JSF.*

This includes a TIA as well as an independently prepared Road Safety Audit associated with both the construction and operational phases of the Project (Appendix H). The impacts for decommissioning have not been prepared as future traffic volumes, and road conditions as they are likely to exist in 30 years cannot be accurately determined or assessed. However, the impacts are anticipated to be similar to those identified for the construction phase.

The scope of the transport aspects investigated included:

- Likely traffic generation and impacts
- Access arrangements for staff and deliveries
- Assessment of the implications and recommendations arising from the independently prepared Road Safety Audit
- Identification of any roads or intersections which need to be upgraded, in addition to mitigations for pavement impacts
- Assessment of the outcomes of the Road Safety Audit
- TIA.

To inform the proposed transport arrangements, the Project has been assessed against the following guidelines and planning documents:

- RMS (RTA) *Guide to Traffic Generating Developments Version 2.2* (2002)
- RMS (RTA) *Road Design Guide* (as amended)
- Austroads *Guide to Road Safety: Part 6; Road Safety Audit Third Edition* (2009)
- RMS (RTA) *Traffic Control at Work Sites Version 5* (June 2018)

6.5.1. Existing Environment

The Project Site is located approximately 20 km north of Albury NSW as shown in Figure 1. The Project Site is located on land within the Greater Hume LGA and land predominately used for grazing. Direct access to the Project Site is via Ortlipp Road.

The transport and delivery of construction haulage will come from either southern Victoria with access to the southern ports, or via NSW ports. In either case, the majority of material delivery traffic will be via the Hume Highway.

A previous TIA was prepared by TTM Consulting (TTM 2020) for the EIS for which responses were received in December 2020. The haulage route proposed by the previous TIA (TTM 2020) was via Hume Highway, Olympic Highway, Gerogery Road, Glenellen Road, Walla Walla Jindera Road, Lindner Road,

and Ortlipp Road. However, it is understood that the GHSC is opposed to this haulage route due to the unsuitable roads that currently exist, whilst TfNSW have advised that the route has B-Double approval for incident management only and not for ongoing operation purposes.

Other aspects of the previous TIA will remain highly relevant such as the construction and the operational traffic generation, which will be maintained for this revised assessment.

6.5.1.1. Revised Haulage Routes

For the purpose of the revised haulage route, it is assumed that site key components of the solar farm will be delivered by heavy vehicles, up to 26 m B-Double and originate from a Port of Newcastle (North), with heavy vehicles travelling to the site via the Hume Highway. The route considered as shown in Figure 5 includes the following:

- Hume Highway
- Thurgoona Drive
- Union Road
- Urana Road
- Walla Walla Jindera Road
- Lindner Road
- Ortlipp Road.

Subject to construction scheduling and potential travel restrictions as a result of the COVID-19 pandemic, an alternate route may be utilised which results in materials delivered to a Port of Melbourne and then moved from the Port by road or rail. If by rail, materials are likely to be delivery to the Ettamogah Rail Hub and then transported to the site via on-road transport via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road (Figure 5).

Consultation was undertaken with the GSHC and Albury City Council to determine the suitable route and key traffic and transport implications that need to be considered as part of the revised assessment. The consultation outcomes are summarised in Table 34.

Table 34: TIA Consultation outcomes with GSHC and Albury City Council (Cardno 2021)

Council	Consultation Outcome
GHSC	• Cumulative assessment is to account for Jindera Solar Farm, with other developments in the GHSC LGA located further north of the Project Site and don't require inclusion in the assessment • Provision of traffic volume data held by GHSC • GHSC is unaware of any further progress of the Jindera Solar Farm beyond the approval that was granted in December 2020 • Urana Road is believed to be the most suitable route for heavy vehicle transport. The expected percentage increase on this corridor compared to some of the other local roads that could service the Project Site would be minor and less likely to result in residential objection • Intersection of Walla Walla Jindera Road/Ortlipp Road likely to have sight line issues on the northern approach. GHSC's expectation is this intersection to operate at a reduced speed and traffic control measures • Ortlipp Road likely to require road widening to suit heavy vehicle movements and horizontal curves.
Albury City Council	• Union Road has wider traffic lanes and less disruption than Wagga Road and is Albury City Council's preference when utilising roads for heavy vehicles/B-Doubles

Council	Consultation Outcome
	• Albury City Council's expectation based on traffic generation (45 heavy vehicles daily) during construction of the Project is unlikely to result in adverse conditions along Union Road • Use of the B-Double approved routes through the industrial area on Catherine Crescent is suitable given these roads are utilised already by heavy vehicles/B-Doubles • Provision of traffic volume data held by Albury City Council.

6.5.1.2. Road Network

TfNSW and local governments establish an administrative framework of State, Regional and Local Road categories to help manage the extensive network of roads. The key road network surrounding the Project Site is shown in Table 35. GHSC classifies all roads within the LGA for the purpose of ongoing asset maintenance as detailed in the *Greater Hume Roads Strategy 2017-2019*.

Table 35: Key road network surrounding the Project Site (Cardno 2021)

Road	Speed Limit	No. of Lanes	Road Authority	GHC Class
Glenellen Road	100 km/h	1	Council	4A – Rural Sealed Road
Walla Walla Jindera Road	100 km/h		Council	3 – Regional Road
Lindner Road	100 km/h		Council	5 – Rural Unsealed Road
Ortlipp Road	100 km/h		Council	5 – Rural Unsealed Road
Urana Road	100 km/h		Council	3 – Regional Road
Hume Highway	110 km/h		TfNSW	1 – National Highway
Thurgoona Drive	60 km/h		Council	-
Wagga Road	100 km/h		Council	-
Catherine Crescent	60 km/h		Council	-
Union Road	60 km/h		Council	-

6.5.1.3. Road Network Performance

For the purposes of determining mid-block road capacity, traffic performance was assessed using criteria contained within Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis*. The midblock LoS assessment criteria contained with the Austroads Guide provide a useful benchmark to assess changes as a result of development particularly for road segments which have relatively low traffic volumes whereby intersection performance and delay is not necessarily the appropriate measure.

Austroads describes Service Flow Rate as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point under the prevailing roadway, traffic and control conditions while maintaining a designated level of service. They indicate the vehicle capacity for each LoS and are used to determine the level of service corresponding to actual traffic volumes. For example, a traffic flow of 1,450 passenger cars per lane travelling at 110 km/h results in LoS C, however, the same volume travelling at an average speed of 60km/h results in LoS E. These thresholds were used to assess level of service as part of the study.

Furthermore, Austroads *Guide to Traffic Management Part 3* stipulates the capacity for a two-lane highway as 1,700 passenger cars per hour (pc/h) in each direction whilst for extended lengths the

capacity will not exceed 3,200pc/h for both directions of travel combined. At each level of service, the service flow rate is defined as the maximum for that level. Service flow rates are discrete values, whereas the level of service represents a range of conditions. Service flow rates therefore effectively define the flow boundaries between the levels of service. The description of each LoS class and associated speed and flow ranges can be found in Appendix H.

In order to determine the existing road network performance, the criteria contained within the Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* was utilised. Table 36 shows the existing road performance. The baseline road traffic volumes appear to be within acceptable LoS.

Table 36: Existing road performance (Cardno 2021)

Road	Baseline AADT	AM Peak Hour		PM Peak Hour	
		Two-way Volume	LoS	Two-way Volume	LoS
Urana Street	4,325	328	A	435	A
Lindner Road	1002[1]	10	A	10	A
Ortlipp Road	1002[1]	10	A	10	A
Union Road	9,564	956	D	956	D

[1] – The TIA assumed 11% of AADT as per Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings*

6.5.1.4. Public Transport Rotes

Based on the desktop review, it was determined that there are limited regular public transport buses running near the Project Site.

There are on-demand services operated by M&M Kane Pty Ltd and A. P. Ofak Pty Ltd to Albury from Burrumbuttock, Walla Walla and Jindera. The service picks up at predefined points within Albury and vice versa.

The hours of the on-demand bus service are Monday to Friday 7am to 6pm with no service available on weekends and public holidays. It should also be noted that Martin's Albury Bus Service runs a bus service between Albury and Jindera

6.5.1.5. Traffic Volumes

State Road traffic volumes for the Hume Highway are shown in Table 37. The previous assessment (TTM 2020) provided summarized traffic volume data for the Hume Highway. Upon review, the data appears to be the same as that available on TfNSW Volume Viewer site.

Table 37: Hume Highway daily traffic volumes with directional flows (Cardno 2021)

Road	Direction	Daily Volume[5]			Location	Station ID
		2016	2017	2018		
	Northbound	5,745	5,848	6,006		ALBSTC

[5] Note that Heavy vehicle percentages of total daily road traffic are shown in brackets

Road	Direction	Daily Volume[5]			Location	Station ID
		2016	2017	2018		
Hume Highway		(28.16%)	(29.77%)	(29.04%)	10 km south east of the Project Site	
	Southbound	5,710 (28.98%)	5,884 (30.35%)	6,101 (29.54%)		
	Total	11,455 (28.57%)	11,732 (30.06%)	12,107 (29.29%		

Year Period	Annual Growth Rate
2016 – 2017	2.4%
2017 – 2018	3.2
AVERAGE	2.8%

The adopted Annual Average Daily Traffic (AADT) for Hume Highway for the assessment is shown in Table 38.

Table 38: AADT for the Hume Highway (Cardno 2021)

Road	AADT	2021 Estimated AADT	Peak Hour Two Way Volume
Hume Highway	12,107	13,124	1,444[6]

Regional and Local Road traffic volumes in relation to the Project are shown in Table 39. Reference is made to the JSF EIS (Stantec 2019) as well as traffic volume data provide by GHSC and Albury City Council and the previous TIA (TTM 2020). The previous EIS (TTM 2020) notes that traffic flows on Lindner Road and Ortlipp Road are around ten vehicles per hour during the weekday (depending on seasonal farming activities.

Table 39: Regional and Local Road traffic volumes in relation to the Project (Cardno 2021)

Road Section	Surveyed Duration	Average Weekday Daily Traffic Volume	AM Peak Volumes	PM Peak Volumes
Regional Roads				
Walla Walla Jindera Road (100 m South from Glenellen Road)	Tuesday, 9 July 2019 – Thursday, 8 Aug 2019	832	74	82
Urana Street (Between Adam Street and Creek Street)	Tuesday, 1 Dec 2020 – Thursday 17 Dec 2020	4,325	328	435

[6] The TIA assumed 11% of AADT as per Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings*

Road Section	Surveyed Duration	Average Weekday Daily Traffic Volume	AM Peak Volumes	PM Peak Volumes
Urana Street (Between Molkentin Road and Dight Street	Tuesday, 1 Dec 2020 – Thursday 17 Dec 2020	4,695	367	460
Urana Road (50 m inside the 50 km/h zone, northern end)	Tuesday, 16 Jan 2018 – Monday 19 – Feb 2018	947	72	81
Urana Road (50 m inside the 50 km/h zone, southern end)	Tuesday, 16 Jan 2018 – Monday, 19 Feb 2018	571	43	51
Urana Road (between 50 km/h zones close to shop)	Tuesday, 16 Jan 2018 – Monday, 19 Feb 2018	920	72	77
Urana Road (between Jelbart Road and Hueske Road)	Tuesday, 25 July 2017 – Wednesday, 16 Aug 2017	5,016	451	477
Urana Road (between Quartz Hill Road and Colonial Drive)	Tuesday, 20 Oct 2015 – Tuesday, 3 Nov 2015	1,18	94	110
Union Road (between Wagga Road and Corella Street)	Thursday, 20 Feb 2020 – Friday, 6 March 2020	9,564	959	956
Local Roads				
Glenellen Road (100 m from Walla Walla Jindera Road)	Tuesday 9 July 2019 – Thursday, 8 Aug 2019	249	25	25
Ortlipp Road	-	100	10	10
Lindner Road	-	100	10	10
Adopted Baseline Traffic Volumes				
Walla Walla Jindera Road (100 m South from Glenellen Road)	-	832	74	82
Urana Street (Between Adam Street and Creek Street)	-	4,325	328	435
Lindner Road	-	100[2]	10[1]	10[1]
Ortlipp Road	-	100[2]	10[1]	10[1]
Union Road	-	9,564	956[1]	956[1]

[1] TTM 2020

[2] Assumed peak hour traffic volumes is 11% of AADT

The adopted traffic volumes for the TIA include the following along Glenellen Road, Walla Walla Jindera Road, Urana Road and Street, Lindner Road and Ortlipp Road as shown in Figure 19. It should be noted that the traffic volumes shown in Table 39 along Walla Walla Jindera Road are taken north from the proposed Project Site access on Lindner Road. The previous EIS (TTM 2020), using a conservative assessment, assumed that the same volume of traffic would occur along Walla Walla Jindera Road south of the proposed site access on Lindner Road. The locations of the various count locations adopted for this assessment are mapped in Figure 19.

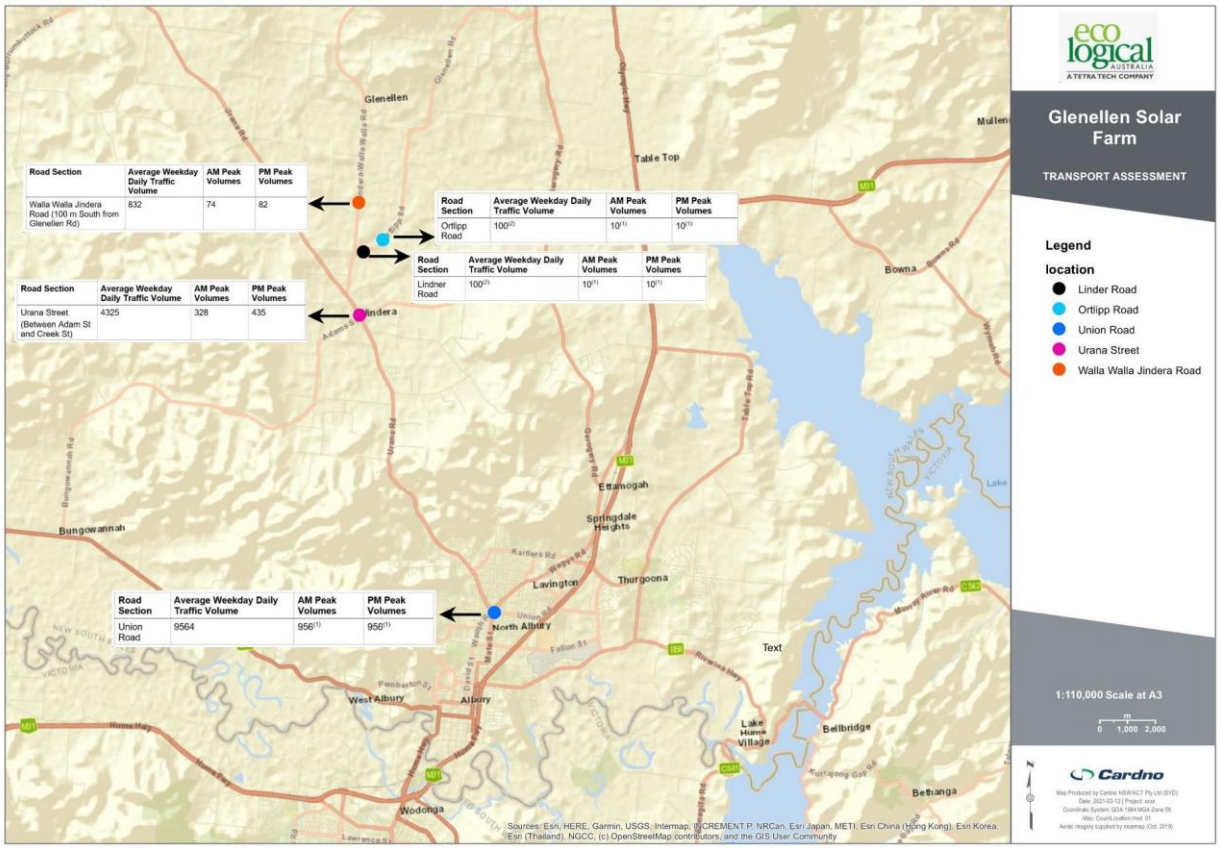


Figure 19: Traffic count locations during TIA (Cardno 2021)

6.5.1.6. Accident History

Data collected between 2014 and 2018 on accidents in the area were accessed through TfNSW Centre for Road Safety. Crashes along the construction haulage route as shown in Table 40 Crash severity is categorized under five classes, which include fatal, serious injury, moderate injury, minor injury, and non-casualty but resulted in vehicles being towed away. Approximately 32% of crashes resulted in a moderate injury, however, there have been no reported fatalities.

Table 40: Crash severity based on route option 1 (Cardno 2021)

Crash Severity	Number of Crashes	Percentage
Non-casualty	23	32%
Minor/Other	7	10%
Moderate	23	32%
Serious	19	26%

Crash Severity	Number of Crashes	Percentage
Fatal	0	0%
Total	**72**	**100%**

6.5.2. Potential Impacts

6.5.2.1. Traffic Distribution and Generation

The Project proposes to utilise around 5,000 heavy and light vehicles over a construction period of approximately 12 to 18 months (TTM 2020). On average, there will be up to 45 construction vehicles visiting the site daily. There is a potential for up to 60 to 100 heavy vehicles per day during the peak of construction when delivery and waste collection occur at the same time.

The construction traffic generated will consist of low loader trailers, truck and dog moxy, B-Double trucks, utility vehicles, trailers, and waste collection vehicles. Overall daily traffic movements during construction will be approximately 40 light vehicles, 13 buses, and up to 45 heavy vehicles, totalling 98 movements (for simplicity, the total has been rounded up to 100 two-way vehicle movements). For the purpose of peak hour assessments, it is assumed that up to 10% of these movements (or 10 vehicle movements) occur during the morning and evening peak hour (5 vehicles inbound, 5 vehicles outbound).

The forecast truck movements are based on the previous EIS as shown in Figure 20. The forecasts are estimates based on a construction period of 47 weeks (Table 41).

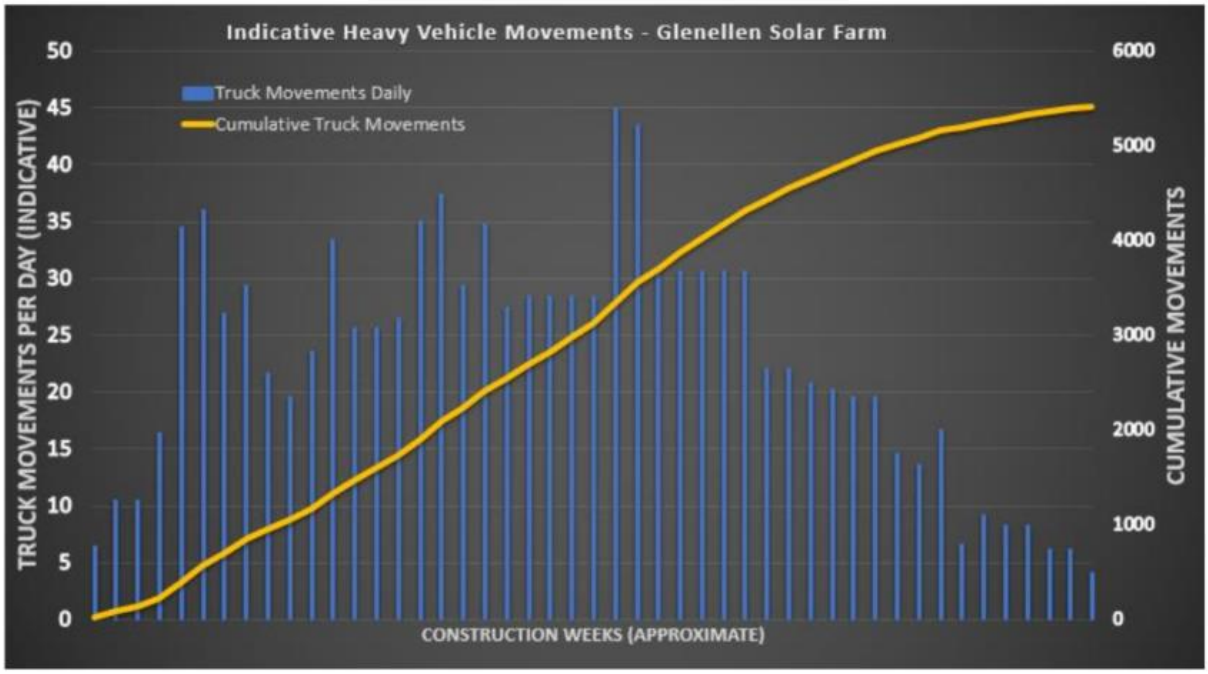


Figure 20: Indicative daily and cumulative heavy vehicle movements for Glenellen Solar Farm (TTM 2020)

Table 41: Construction traffic during construction period (Cardno 2021)

Stage	Area of Work	Typical Delivery Vehicle	Typical Quantity	Duration (approx..)
Site Clearing Works	Earthworks construction machinery	Low Loader	25	27 Weeks
	Tree removal	Low Loader	6	27 Weeks
Access Road Construction	Earthworks construction machinery	Low Loader	21	20 Weeks
	Access Track Road Base	32 T Truck and Dog Moxy	20	20 Weeks
Civil Construction of Benches	Construction Equipment	Low Loader	25	10 Weeks
	Foundation Compound	32 T Truck and Dog Moxy	15	10 Weeks
Construction/ Installation Activities	Site Fencing	Low Loader Utes and trailer concrete truck	20	20 Weeks
	Site Offices	Low Loader Flatbed truck / Hiab truck	20	4 Weeks
	Concrete Foundations	Concrete truck Water cart / Sand truck	30	Ad Hoc
	Piling Works	Low Loader	15	30 Weeks
	Pre-drilling works	Low Loader Utes and trailers	10	15 Weeks
	Tracking System Installation	Low Loader Tractors and trailers	20	40 Weeks
	PV Module Installation	Low Loader Tractors and trailers	20	40 Weeks
	Onsite Logistics	Low Loader Tractors and trailers Side loader	20	40 Weeks
	Cable and Trenching	Low Loader Utes and trailer Medium rigid vehicle Front end loader	20	35 Weeks
	OHL Construction	Low Loader Utes and trailer Medium rigid vehicle Front end loader	20	25 Weeks
	Dust Suppression	5,000 L Water Truck		Daily during Summer Weekly at all other times
Deliveries	Piling Machines	Low Loader or side loader semi	7	2 Weeks
	Main Equipment (Tracking, Piers, Modules, Inverters)	B Double	2000	6 Months
	Gravel / Access Track Road base	B Double	430	25 Weeks
	Sand	B Double	350	35 Weeks

Stage	Area of Work	Typical Delivery Vehicle	Typical Quantity	Duration (approx..)
	Mobile Crane	180T Mobile Crane	3	Ad Hoc as needed
Waste Collection	Waste Collection	Waste collection truck	20	30 Months (approx. 20 trucks weekly)
Workforce Requirements	Management	Light vehicles	30	Daily
	Labour Workers	20 PAX buses	13	Daily
	Misc.	Light vehicles	10	Daily

6.5.2.2. Sourcing of Materials

The construction haulage route for the majority of the project infrastructure will be required from a container port to the site. Most of the site delivery traffic will be accessing the site via the Hume Highway with ports in Newcastle NSW, or Melbourne Victoria being utilised. The haulage routes, as described in Section 6.5.1.1 will utilise Union Road when travelling through the Lavington area within the Albury City LGA before travelling on Urana Road.

During the operational stage of the Project, there is expected to be up to ten (10) vehicle movements daily. This is anticipated to have negligible traffic related impacts. It is understood that in the operational phase, traffic will enter and exit the site via Ortlipp Road from Hume Highway.

Subject to construction scheduling and potential travel restrictions as a result of the COVID-19 pandemic, an alternate route may be utilised which results in materials delivered to a Port in Melbourne and then moved from the Port by road or rail. If by rail, materials are likely to be delivered to the Ettamogah Rail Hub and then transported to the site via on-road transport via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road.

6.5.2.3. Road Safety Assessment

As part of Cardno's assessment, a road safety assessment was undertaken along the haulage routes from Lavington to the Project Site. The detailed findings on the existing conditions are provided in Appendix H. The majority of the route traverses on B-Double approved routes, heavily utilised by light and heavy vehicle traffic. The majority of the findings are established as existing conditions with the responsibility for mitigation being the relevant road authority (Council and / or TfNSW).

The Projects main impacts are likely to be along Walla Walla Jindera Road, Lindner Road and Ortlipp Road. Potential measures to respond to identified constraints are provided in Table 42.

Table 42: Road safety preliminary responses (Cardno 2021)

Road	Safety Item	Description of action	Responsible Party
Wagga Road / Catherine Crescent	Intersection Priority	This is an existing safety deficiency in a location frequently utilised by heavy vehicles. The Project will add increased traffic however this will be relatively minor and does not result in creating a traffic hazard. The priority issue can be rectified through installation of give way hold lines and signage for the left turn slip lane.	

Road	Safety Item	Description of action	Responsible Party
Catherine Crescent	Downgrade on Catherine Crescent	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Project will add increased traffic but does not create the safety hazard and the minor increase will not have tangible impacts on crash rates / outcomes at this location. The travel speed of vehicles could be rectified through installation of a roundabout for the four-way intersection, installation of traffic calming on the east and west approaches, installation of advisory "slow down" signage.	**Albury City Council**
	Kerbside Parking	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Projects increased traffic in this location does not create the hazard and is unlikely to have a tangible impact on the crash outcomes along Catherine Crescent. Parking restrictions could be implemented to maintain a suitable travel lane through the horizontal curve.	**Albury City Council**
Union Road / Wagga Road	Pavement Markings	The extent of queuing coupled with the pavement marking placements is an existing issue. The additional traffic is relatively low at this point during the peak hours and is unlikely to detrimentally impact the issue. The deficiency could be rectified with increased pavement markings and / or advisory signage for wayfinding.	**Albury City Council**
	Wayfinding	This wayfinding and lane allocation is an existing issue. Contracted vehicles associated with the Project will be familiar with their route choice and required land choice therefore not contributing to the issue. Additional wayfinding signage could be provided to advise motorists on the required lane choice of upcoming intersections	**Albury City Council**
Urana Road / Centuar Road	Urana Road Lane Termination near Centuar Road	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Projects increased traffic in this location does not create the hazard and is unlikely to have a tangible impact on the crash outcomes at this location. Improved signage of the terminating lane can be provided to advise motorists.	**Albury City Council**
Urana Road / Burrows Road	Loose Debris	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Project will increase traffic in this location however, the implementation of a proposed TMP would require laden vehicles to cover their loads. Ongoing street sweeping and maintenance at this location should be continued with frequency increased to maintain the debris.	**Albury City Council**
Urana Road / Dight Street	Poor Line marking	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Projects increased traffic in this location does not create the hazard and is unlikely to have a tangible impact on the crash outcomes at this location. Updated line marking can be undertaken to improve delineation.	**GHSC**

Road	Safety Item	Description of action	Responsible Party
Walla Walla Jindera Road / Lindner Road	Poor Sight Distance	The sight distance to the north is an existing issue. The Project, during construction, has the potential to exacerbate this issue due to the increased turning volumes and increased exposure. During the Projects operation, the relatively low traffic volumes will unlikely result in adverse conditions. To address the sight distance issue, a speed reduction during construction (under traffic control) should be considered. Post construction, Council can reinstate the existing limit with no speed zone review or application necessary.	**GHSC and Proponent**
Lindner Road and Ortlipp Roads	Narrow carriageways on both roads	This is an existing issue where the carriageway appears to be below GHC standard requirements for a class 5 road. The increased traffic along this road will require improvements to road surface and delineation. To address the issue, widening of Lindner Road and Ortlipp Road to meet GHC standard requirements for a class 5 road are recommended.	**Proponent**
Jelbart Road	Incorrect pavement markings	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Projects increased traffic in this location does not create the hazard and is unlikely to have a tangible impact on the crash outcomes at this location. The pavement markings appear to be left over by recent road works and can easily be scrubbed out and / or replaced with the correct line markings.	**GHSC**
General Roadways	Landscaping and narrowing cycle lane	The placement of landscaping and narrowing of cycle lanes is an existing issue. The Project does not propose any changes to Urana Road in this location. This issue could be rectified by modifying the landscaping or increasing the cyclist travel land width.	**Albury City Council**
	Steep embankments	This is an existing deficiency in a location frequently utilised by heavy vehicles. The Projects increased traffic in this location does not create the hazard and is unlikely to have a tangible impact on the crash outcomes at this location. The steep embankments in this location could be protected through the use of guardrails or wire rope, with sufficient clearances. An alternative would be to flatten the embankment; however this would require significant earthworks to achieve the result.	**Albury City Council**

6.5.3. Revised Mitigation Measures

The revised TIA mitigation measures are summarised in Table 43.

Table 43: Summary of TIA mitigation measures

Environmental Impact	Mitigation Measure	Reference Code
	Prior to the commencement of construction, a CTMP will be prepared for the Project in consultation with TfNSW and the GHSC.	TM01

Environmental Impact	Mitigation Measure	Reference Code
Traffic and Transport Impacts during Construction	Road dilapidation surveys will be undertaken in accordance with guidelines and standards established by Austroads of the designated vehicle route prior to construction and decommissioning works and post construction and decommissioning. Following completion of construction and decommissioning works, any development related damage identified in post dilapidation survey will be rehabilitated / repaired.	TM02
	Any road upgrades required will be subject to detailed design and constructed to the relevant Australian road design standards.	TM03
	Should transportation of oversize loads be required, the proponent will investigate the procedures and requirements for special permits for oversized loads in the traffic management plan and in liaison with Transport for NSW. The proponent will liaise with the Special Permits Unit early in the process to assess the appropriateness of the route and identify potential issues.	TM04
	Road upgrades along the haulage route will be undertaken as per recommended within the TIA (Cardno 2021). Consultation will be undertaken with TfNSW and GHSC for all road upgrades. Road upgrades will include: • Upgrade the Urana Road / Walla Walla Jindera Road intersection to a Channelised Right Turn • Upgrade the Walla Walla Jindera Road / Lindner Road intersection to a Basic Auxillary Right Turn. Widen the Lindner Road approach to accommodate the passing of a 26m B-double and passenger car • Widen Lindner Road to a formation width of 8m with 3.5m wide travel lanes. Provision of advisory signage to notify motorists of heavy vehicle traffic • Widen Ortlipp Road to a formation width of 8m with 3.5m wide travel lanes • Upgrade the intersection of Lindner Road / Ortlipp Road to accommodate 26m B-double movements.	TM05
	During construction, speed limits will be reduced for all heavy vehicles along Linder Road and Ortlipp Road accessing the Project Site. Speed limits for heavy vehicles will be reduced to 40 km/hr.	TM06
	During construction, heavy vehicle access to the Project Site will be restricted during school bus pick off and drop off times along the haulage route. These times will be determined through consultation with bus companies operating along the haulage route and will be incorporated into the CTMP. The Proponent has agreed to provide right-of-way to existing bus routes in the area, enabled via two-way communication with traffic control associated with the Project.	TM07
	The Proponent has made a commitment to the residence at ORT005 that will be given priority access through traffic control during construction.	TM08

6.6. Flooding

A number of submissions received from the public was in regards to flooding impacts as a result of the Project. Some of the points raised in the public submissions included:

- Effects on drainage to surrounding properties unknown.
- Increased water shed
- Impacts to neighbouring agricultural land.

The Biodiversity and Conservation Division of the DPE outlined that the EIS, including flooding does meet the Secretary's requirements, contingent to addressing the following issue:

- Mapping of the flood hazards and hydraulic categories across the development site has not been completed as required in the flooding SEARs. This additional information is needed for the appropriate location of infrastructure, in particular to avoid areas of high hazard flood ways.

In addressing the comments received upon potential flooding impacts upon neighbouring properties and agricultural land, the Proponent investigated a number of potential amendments to the Project design. One amendment to the Project Design has been the re-contouring of an inundation area in the south-eastern part of the Project Site to allow for natural flows to occur, and prevent any backfilling inundation into adjacent properties and agricultural land. This re-contouring was assessed through a revised flooding assessment (ELA 2022c) to determine if the re-contouring would have any downstream impacts during flooding events. The revised Flood Assessment is provided in Appendix I.

6.6.1. Existing Environment

The overall topography of the Project Site and surrounding areas is generally undulating, sloping downward in a west-to-east direction, with mostly cleared and relatively flat areas within the Project Site. Localised, relatively high elevation areas are located within the north, south and south-west outside the boundary of the Project Site (Figure 21). Primary overland flow paths and catchment watersheds were delineated using the ArcHydro package within the ArcGIS ESRI software.

The revised flood modelling undertaken was based on available topographic and regional rainfall data, supplemented by ground-based survey data. Flood modelling was then undertaken to assess the impacts of the Project using rainon-grid water level modelling in HEC-RAS (Hydrologic Engineering Center's River Analysis System) software (U.S. Army Corps of Engineers, 2008; Appendix I). The modelling assesses the likely effects of the Project on flooding, and the potential impacts of any changes on the downstream environment. Such modelling provides an opportunity to examine likely flood behaviour and to form an opinion as to whether the Project is likely to have a significant impact on flood behaviour and downstream flood risks. Further details of the methods and model configuration are provided in Appendix I.

Modelled peak inundation extents for the following Annual Exceedance Probability (AEP) design events: 10% AEP, 5% AEP, 2% AEP, 1% AEP, 0.5 AEP%, 0.2% AEP and 0.1% AEP (essentially equivalent to the 1 in 10-year, 20-year, 50-year, 100-year, 200-year, 500-year and 1000-year Average Recurrence Interval (ARI), respectively) and produced inundation maps for the Project Site.

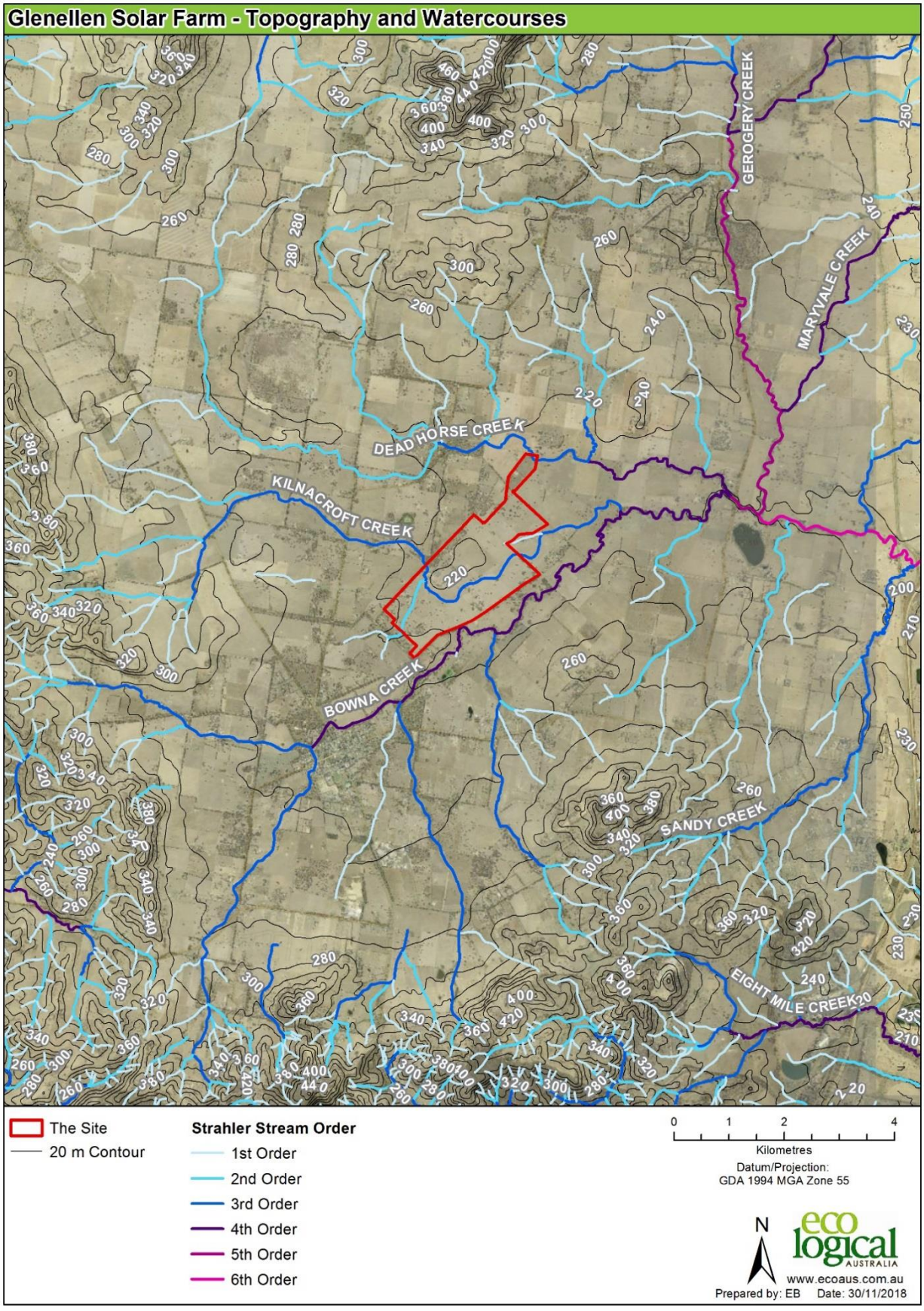


Figure 21: The Project Site and surrounding topography and watercourses

6.6.2. Potential Impacts

Existing conditions inundation extent maps were generated for 10% AEP, 5% AEP, 2% AEP, 1% AEP, 0.5 AEP%, 0.2% AEP and 0.1% AEP (1 in ~10-year, 20-year, 50-year, 100-year, 200-year, 500-year and 1000-year ARI, respectively).

Figure 22 through Figure 28 shows the maximum inundation depths and extents for the selected events across the Project Site. Sheet flow inundation depths of less than 5 cm are not shown in the figures.

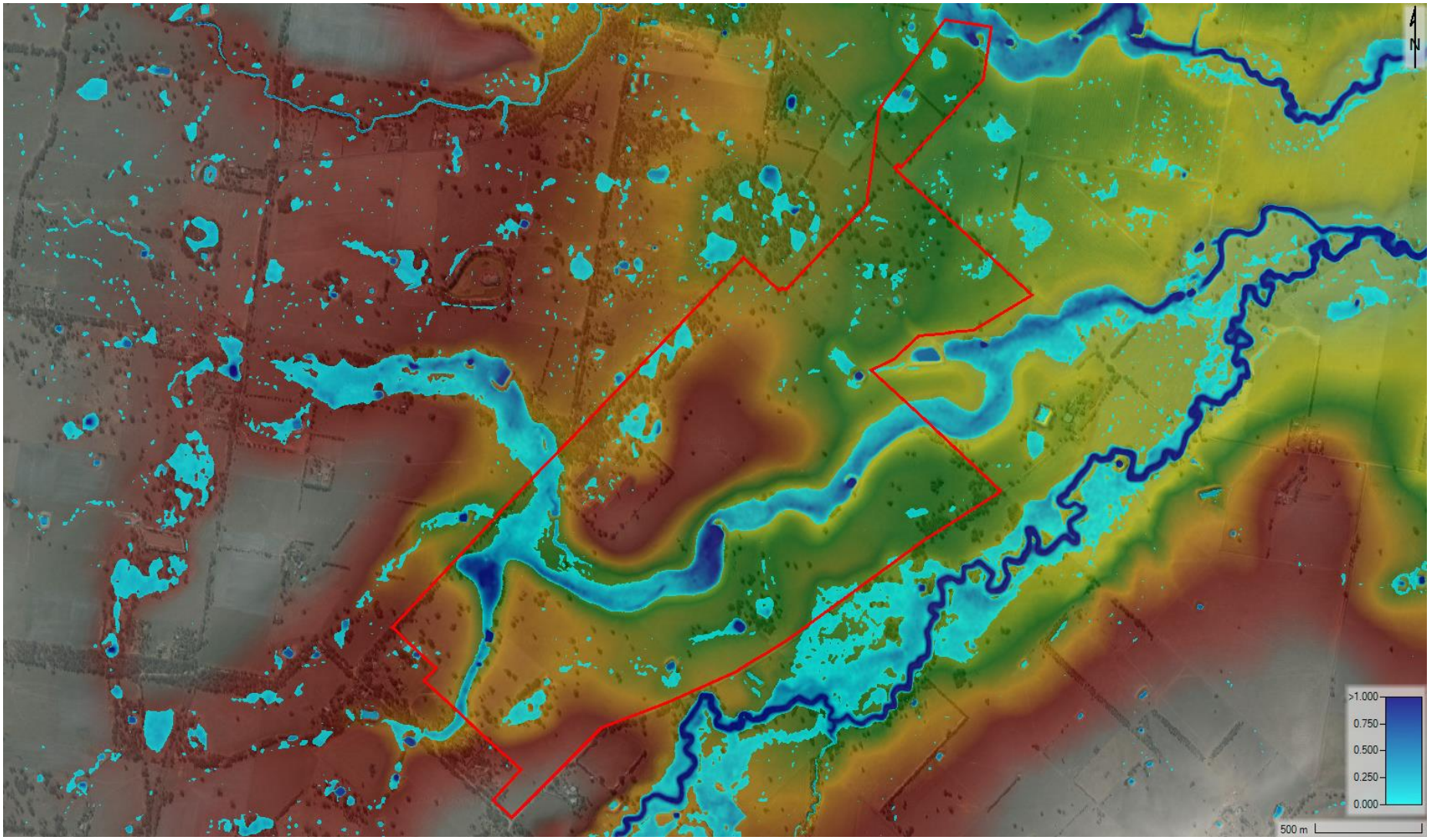


Figure 22: 10% AEP (10-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

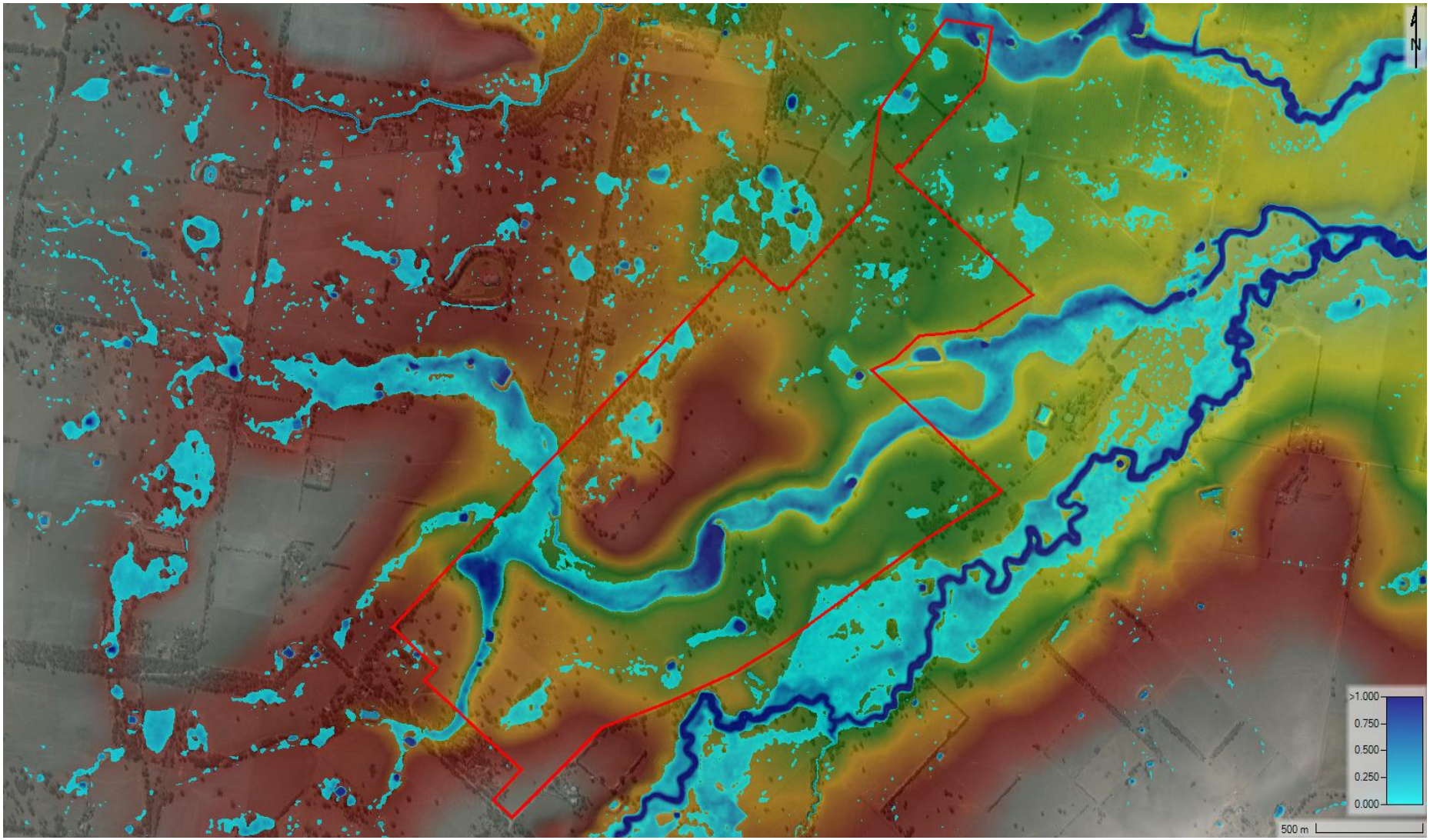


Figure 23: 5% AEP (20-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

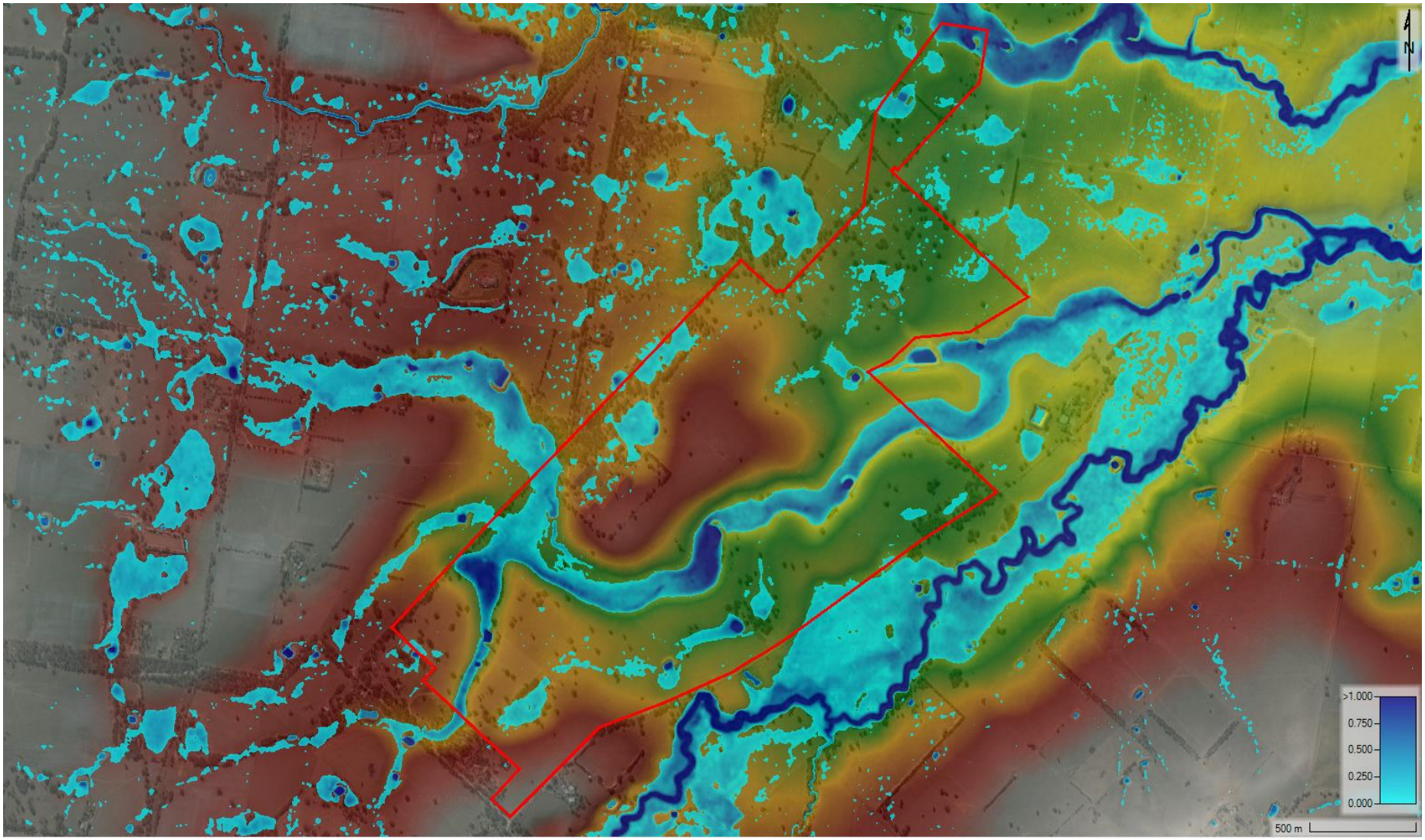


Figure 24: 2% AEP (50-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

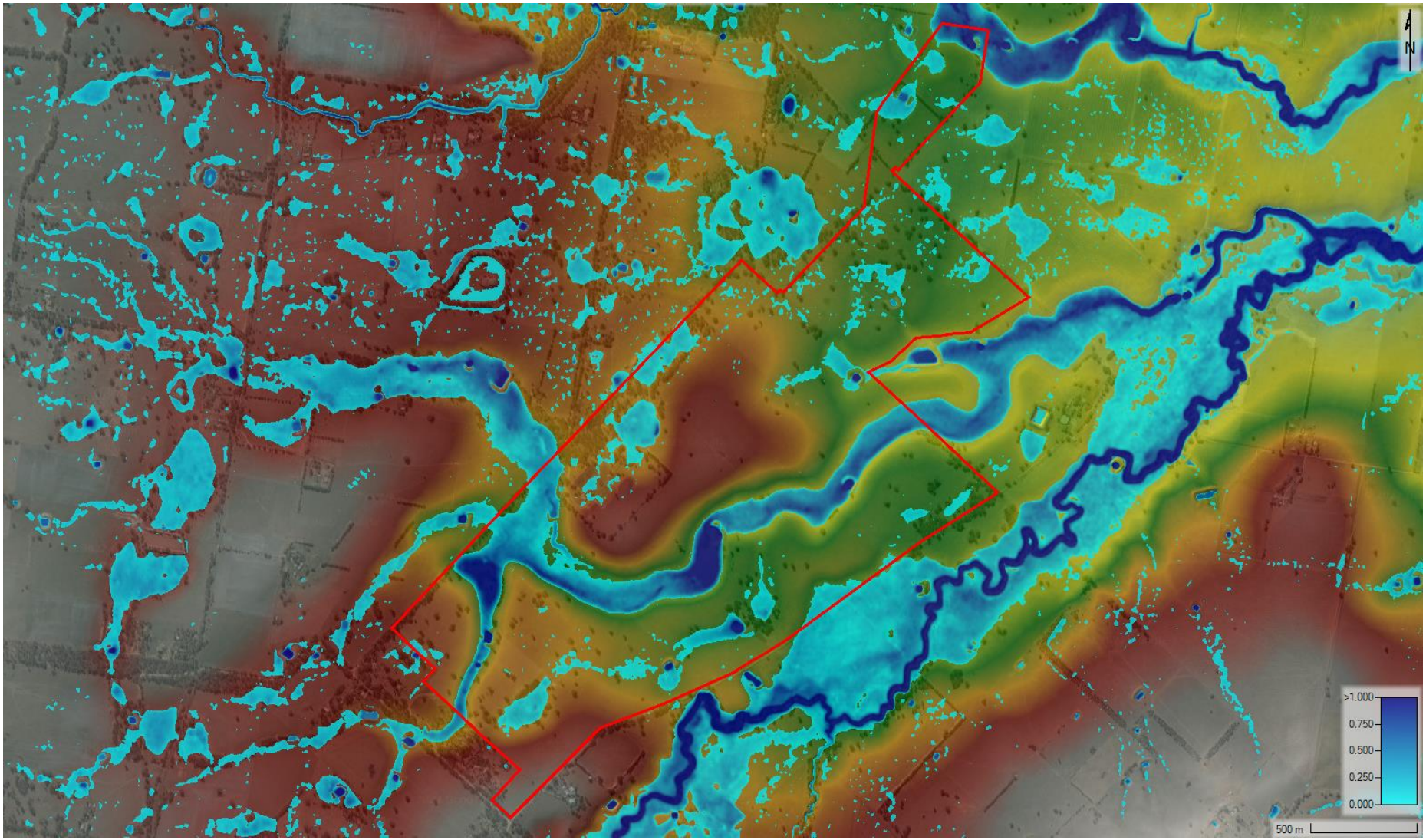


Figure 25: 1% AEP (100-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

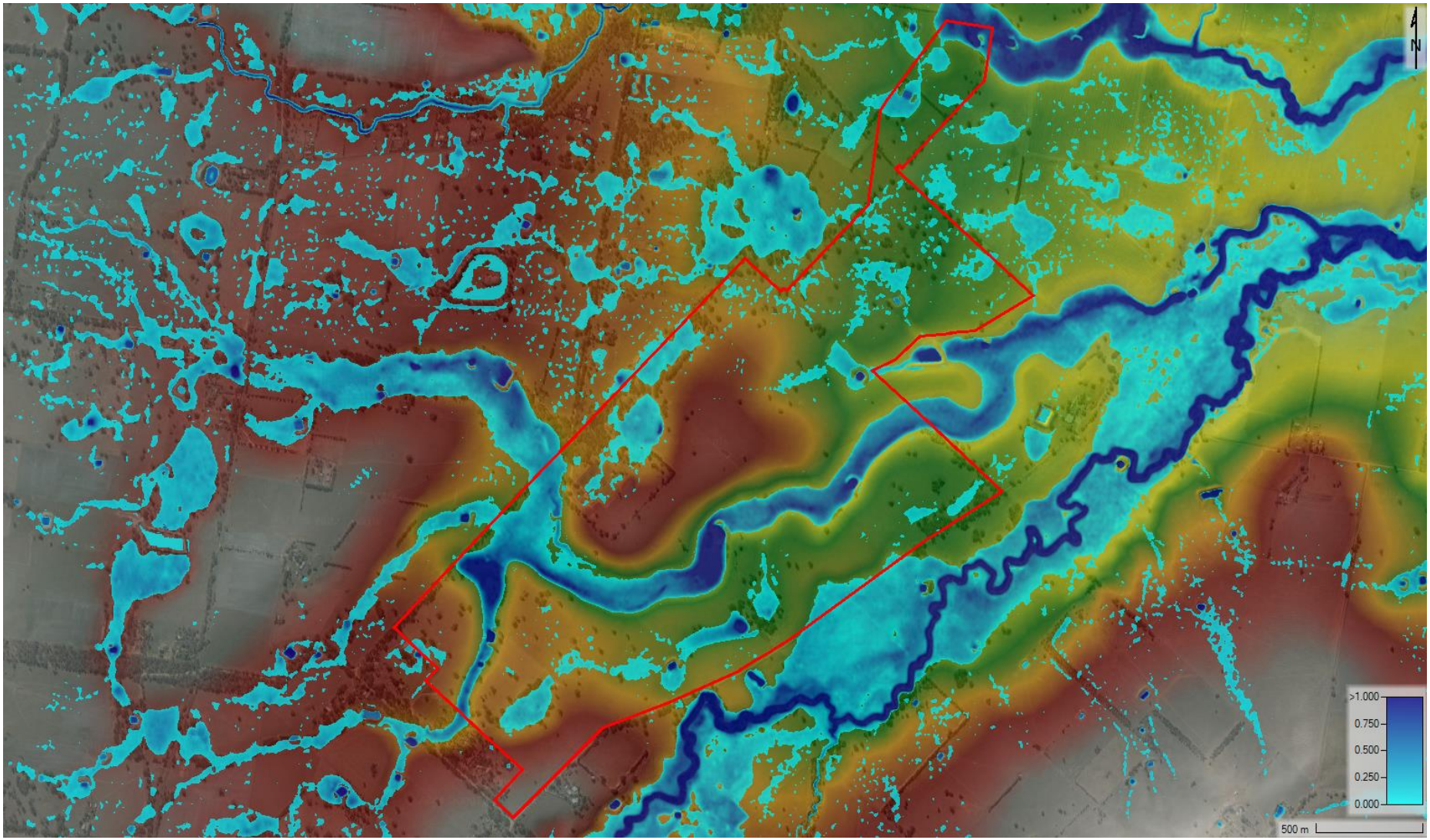


Figure 26: 0.5% AEP (200-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

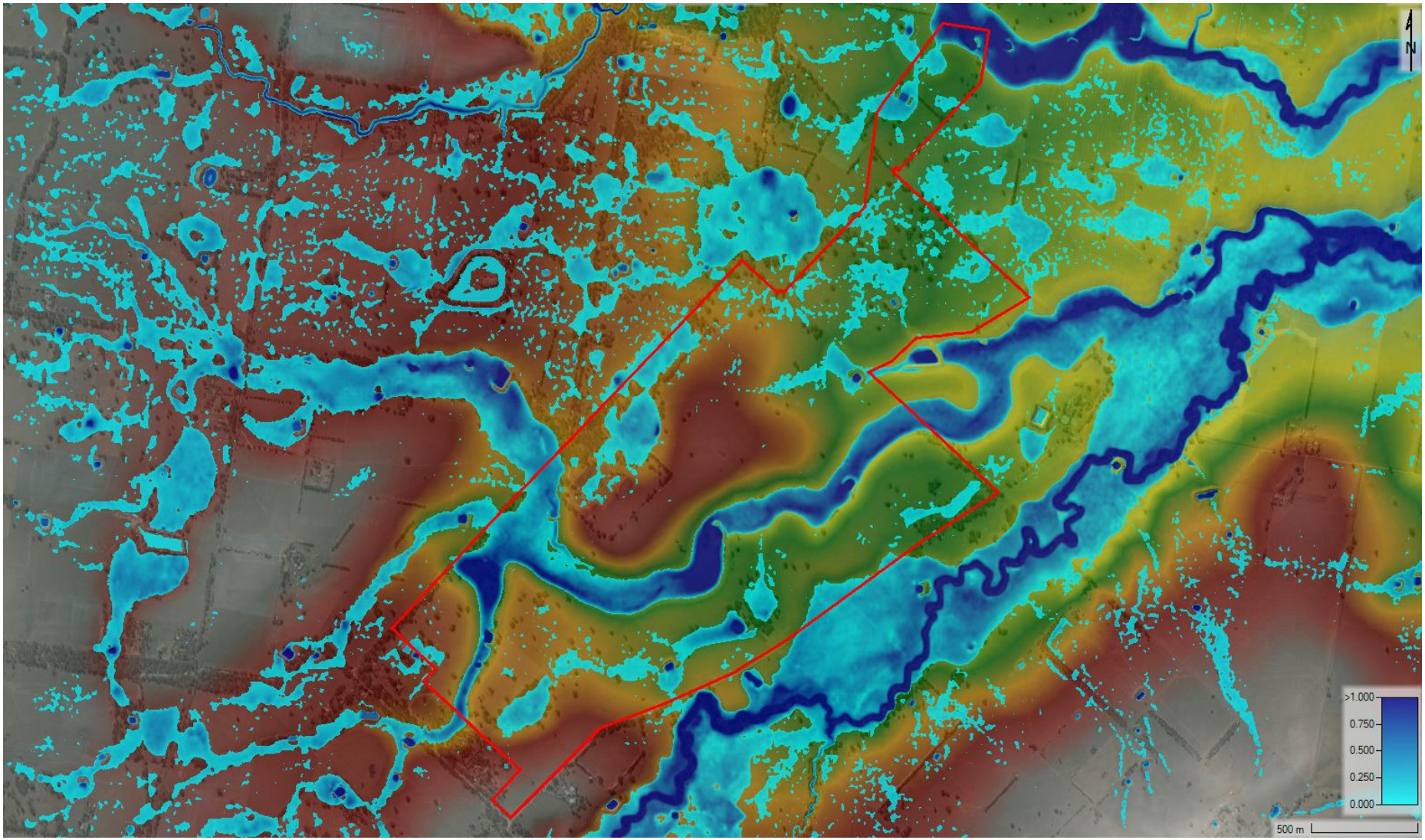


Figure 27: 0.2% AEP (500-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

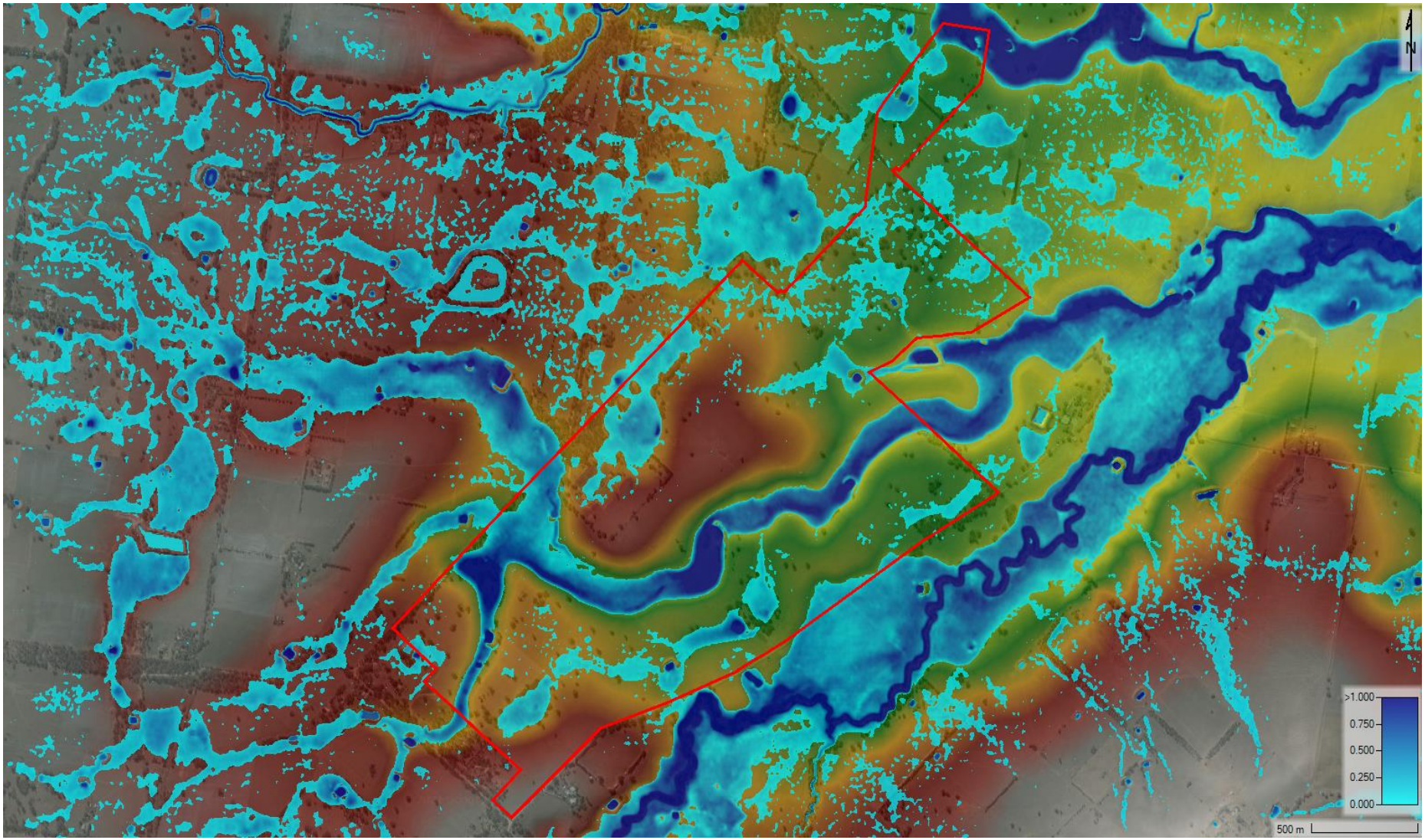


Figure 28: 0.1% AEP (1,000-year ARI) maximum flood extent with depths in metres for existing conditions. Red polygon represents the Project Site

To determine the impact of the Project on flooding, proposed earthworks were incorporated into the terrain surface. The solar array itself was not included in the modelling, as the installed solar panels will be raised above the ground on piers (and therefore do not obstruct to the flow of water across the Project Site) and the ground elevations, vegetation, and infiltration properties of the soil in the array area are likely to remain unchanged in the proposed condition. In addition, because the solar array within the Project Site is proposed to be located in locally ponded areas only, without significant flow conveyance, the piers would not significantly affect flow characteristics of concentrated runoff. The decision to omit the solar array from impact modelling is supported by research on the hydrological effects of solar arrays by Cook and McCuen (2013). These authors found that there was little influence of solar panels on runoff volumes, peak flows or the time to peak flows, when the groundcover under the solar array was unchanged.

Figure 29 shows the proposed earthworks associated with the re-contouring area and Substation location, and the location of the cross section used to assess downstream changes in water surface elevations and flood hydrographs. In the immediate vicinity of building pads, stormwater runoff will be routed around the pads, and some localised increases in water surface elevation (up to 200 mm) and velocities are expected (Figure 30). These impacts can be managed onsite through the implementation of the stormwater management plan and may require the use of armour rock to prevent local scour (Austroads 1994 and Austroads 2013a, 2013b).

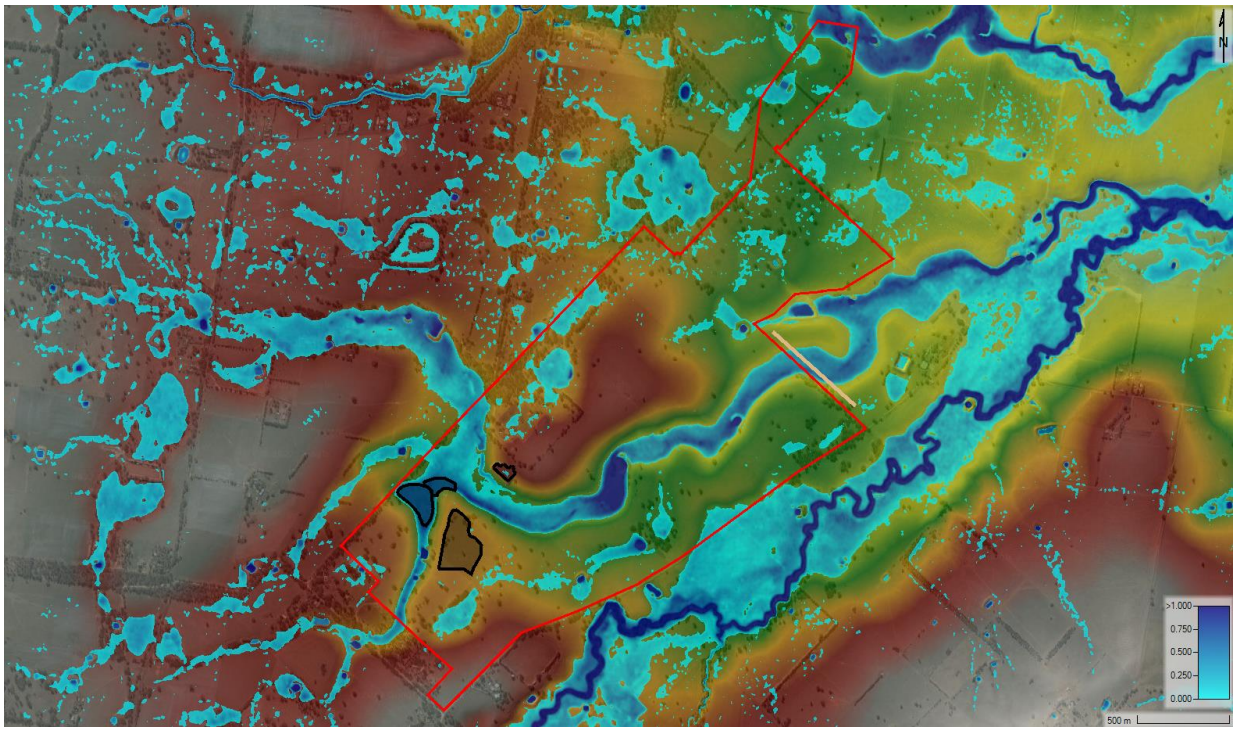


Figure 29: Locations of proposed building pads and the modelled water depths in metres for the 1% AEP (100-year ARI) event. The cross section used for downstream impact assessment is also shown ('XS Location'). Red polygon represents the Project Site

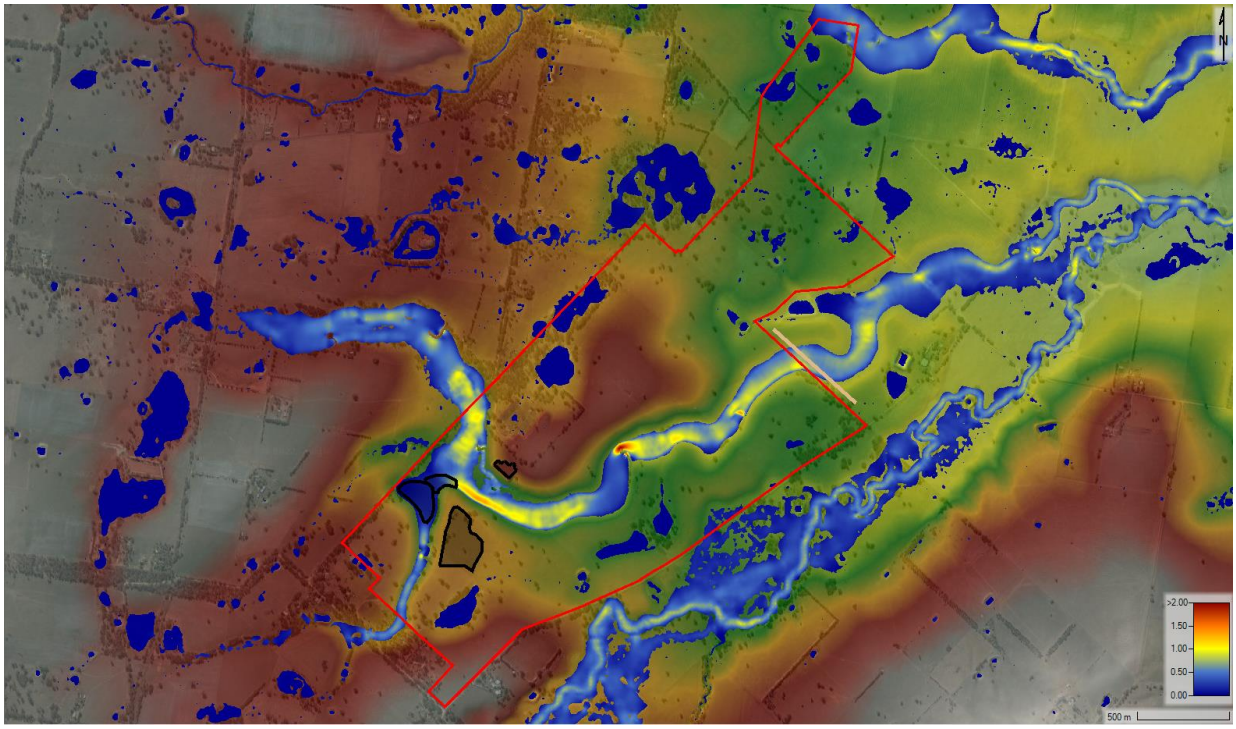


Figure 30: Maximum velocities (m/s) for 1% AEP (100-year ARI) event under the proposed conditions. Red polygon represents the Project Site

Comparisons of maximum water surface elevation (Figure 31) and the flood hydrographs (Figure 32) for the selected modelled events, under existing and proposed conditions at the downstream cross section, suggest negligible differences between scenarios. The only discernible differences are during the initial local rainfall event. The differences at peak flow conditions amount to less than 0.2% across a range of event sizes for both peak discharge and maximum water level (Table 44).

The Project is not expected to create adverse effects to beneficial inundation of the floodplain environment on, adjacent to or downstream of the Project Site during these activities. The Project is not expected to affect the hydraulic functions of flow conveyance in floodways, nor the storage in flood storage areas on adjacent lands. As a result, no detrimental increases in the potential flood levels are expected within the Project Site, or in surrounding properties, assets and infrastructure outside of the Project Site. Flood hazards under proposed conditions are low and can be managed using localised scour protection where needed. No increase in flood hazard is predicted on neighbouring tenement areas.

Table 44: Comparison of peak flow and maximum depth across index section (See Figure 25 for section location)

Peak discharge (m3/s)								
10-year ARI (10% AEP)			50-year ARI (2% AEP)			100-year ARI (1% AEP)		
Existing	Proposed	Diff	Existing	Proposed	Diff	Existing	Proposed	Diff
23.0	22.96	0.2%	31.18	31.17	0.03%	47.47	47.46	0.02%
Maximum depth (m)								
10-year ARI (10% AEP)			50-year ARI (2% AEP)			100-year ARI (1% AEP)		
Existing	Proposed	Diff	Existing	Proposed	Diff	Existing	Proposed	Diff
0.72	0.72	0.0%	0.79	0.79	0.0%	0.91	0.91	0.0%

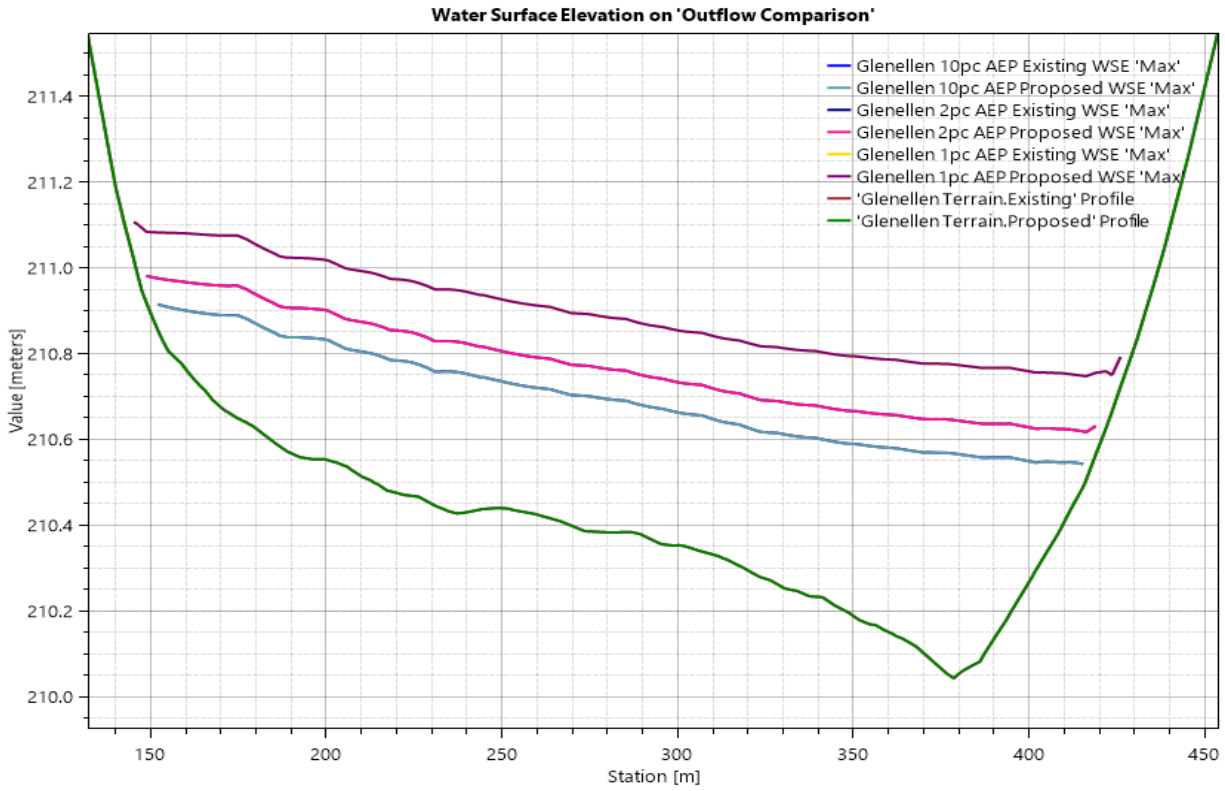


Figure 31: Comparison of maximum water surface elevation profiles across the index section (existing vs. proposed conditions)

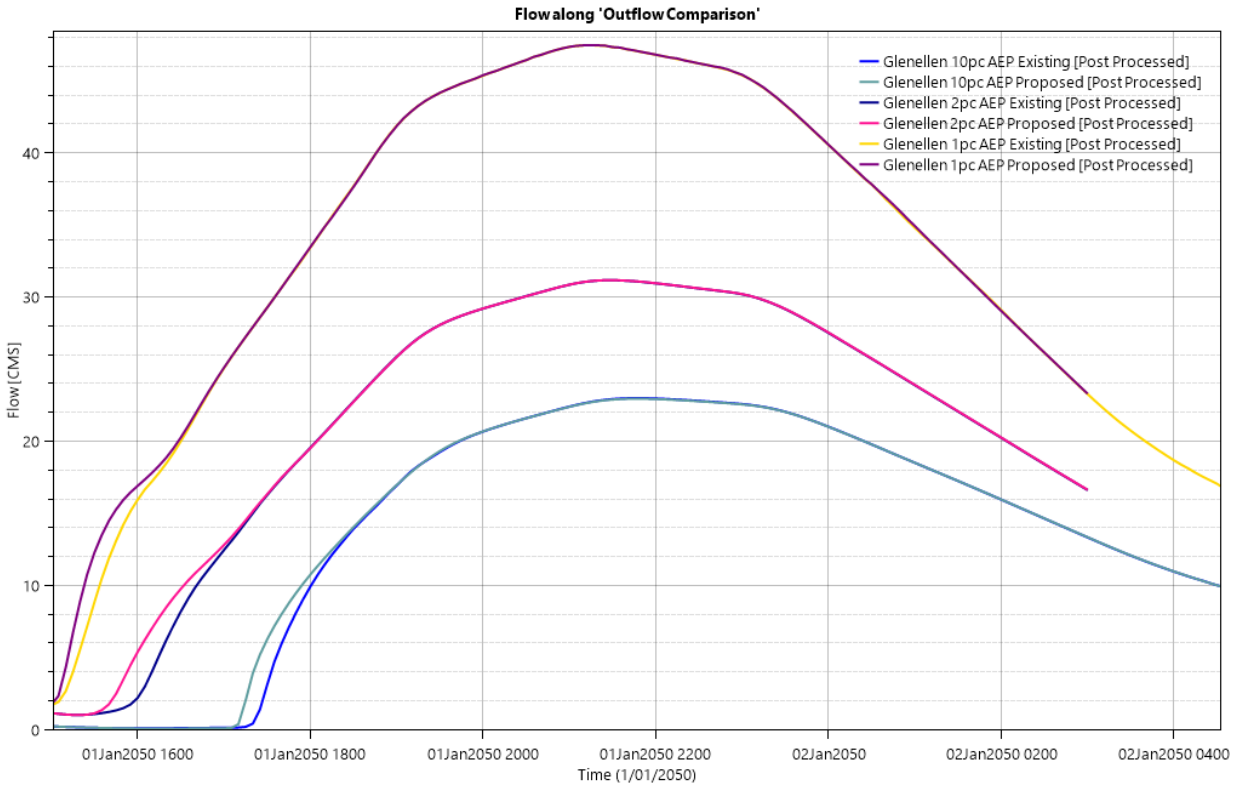


Figure 32: Comparison of discharge hydrographs across the index section (existing vs. proposed conditions)

6.7. Cumulative Impacts

6.7.1. Landscape and Visual Cumulative Impacts

Cumulative landscape and visual effects result from additional changes to the landscape or visual amenity caused by the Project in conjunction with other developments (associated with or separate to it) or actions that occurred in the past, present or are likely to occur in the foreseeable future (Landscape Institute et al, 2008). Cumulative effects may also affect the way a landscape is experienced and can be positive or negative. Where they comprise benefits, they may be considered to form part of the mitigation measures.

At the time of submitting, there were four (4) proposed/approved solar farms within the wider regional context as shown in Table 45, including the Project.

Table 45: Description of proposed solar farms within the region

Project	Status	Location	Potential Cumulative Impact
Jindera Solar Farm	Approved	Located approximately 4 km northwest of the Project within the GHSC. The EIS was submitted to DPIE in December 2020.	Opportunities to view the two solar farms simultaneously are limited
Walla Walla Solar Farm	Approved	Located in Walla Walla, the solar farm is approximately 4.5 km northeast of Walla Walla and approximately 12 km southwest of Culcairn in the GHSC LGA. The EIS was submitted to DPIE and approved in November 2020	Walla Walla solar farm is located approximately 20 km northeast of the Project, therefore no opportunities to view the two solar farms simultaneously exist
Culcairn Solar Farm	Approved	Located approximately 7.5 km southwest from Culcairn and approximately 9 km northeast of Walla Walla in the GHSC LGA. The EIS was submitted to DPIE and approved in March 2021	The Culcairn Solar Farm is located approximately 26 km northeast of the Project. There are no opportunities to view the two solar farms simultaneously

Due to distance and intervening vegetation, there are no or limited opportunities to view any additional solar farms simultaneously from a static viewpoint presently or in the foreseeable future. The potential cumulative visual impact must also be assessed in relation to the potential visual impact when viewed sequentially.

If a number of solar farms are viewed in succession as a traveller moves through the landscape (e.g., motorist travel routes or walking tracks) this may result in a change in the overall perception of the landscape character. The viewer may also see one solar farm at a time, but if each successive stretch of the road is dominated by views of a solar farm, then that can be argued to be a cumulative visual impact (EPHC 2010). Due to the relatively isolated location, the Project is set back from major travel routs which prevents any opportunities to view solar farms in succession along travel routes.

6.7.2. Construction Traffic Cumulative Impacts

The Jindera Solar Farm is located approximately 6.3 km north of Jindera. The Project is expected to be a solar farm with a total capacity of 130 MW. The submitted TIA (Stantex 2019) estimated that traffic generated by the JSF and its distribution on the road network. It is proposed that all construction vehicles will access the site from the south through Albury, via Urana Road, and Walla Walla Jindera Road. Maintenance and emergency vehicles are proposed to access the site via Lindner Road and

Ortlipp Road. If the construction periods of both the JSF and the Project happen to overlap, it is not expected that the combined traffic generation of both solar farms would have a considerable impacts on the operations of Lindner Road or Ortlipp Road.

During peak construction periods, expected to last approximately three months, the Jindera Solar Farm is expected to generate up to 40 heavy vehicle movements per day, approximately five vehicle movements per hour. The total number of heavy vehicle movements generated during construction is expected to be spread evenly across the accesses. On the basis Of the Stantec assessment, the estimated contribution of the JSF traffic vehicle movements on the Urana Road and Walla Walla Jindera Road is assumed to be the following:

- Urana Road (South of Walla Walla Jindera Road) - 40 heavy vehicle movements per day, five vehicle movements per hour
- Urana Road (North of Walla Walla Jindera Road) - 20 heavy vehicle movements per day, two-vehicle movements per hour
- Walla Walla Jindera Road - 20 heavy vehicle movements per day, two vehicle movements per hour.

The cumulative construction daily traffic due to the Project and the JSF on the assess road network is summarised in Table 46.

Table 46: Cumulative construction traffic from Glenellen Solar Farm and Jindera Solar Farm (Cardno 2021)

Road Section	Baseline Daily Traffic	GSF Daily Traffic	Jindera SF Daily Traffic	Total Cumulative Daily Traffic
Urana Street	4,325	100	40	4,465
Walla Walla Jindera Road	832	100	20	952
Lindner Road	100	100	-	200
Ortlipp Road	100	100	-	200
Union Road	9,564	45	40	9,649

The cumulative peak hour traffic and cumulative network performance based on criteria from Austroads as detailed previously is summarised in Table 47.

Table 47: Cumulative Network Performance (Cardno 2021)

Road Section	Baseline Peak Hour Traffic		Peak Hour Traffic		Cumulative Peak Traffic		Peak LoS	
	AM Peak	PM Peak	GSF	Jindera SF	AM Traffic	PM Traffic	AM LoS	PM LoS
Urana St	328	435	10	5	343	A	450	A
Walla Walla Jindera Rd	74	82	10	5	89	A	97	A
Lindner Rd	10	10	10	-	20	A	20	A
Ortlipp Rd	10	10	10	-	20	A	20	A
Union Rd	956	956	9	5	970	D	970	D

The cumulative construction volumes along the assessed roads appear to be within acceptable LoS A indicating the Project has little to no impact on the road network performance when considering the JSF as well. Union Road is estimated to operate at LoS D which remains unchanged with the additional traffic volume.

6.7.3. Construction Noise Cumulative Impacts

The adjacent JSF is being developed at a similar time to the Project. Therefore, there exists a risk that the two sites could be constructed simultaneously and cumulative noise levels from the construction activities therefore warrants investigation.

The likelihood of worst-case construction activities occurring simultaneously in proximity to common receivers is low. The highest affected common receiver to both solar farms is ORT006 (or R10 in the JSF report). The maximum predicted construction noise from JSF at this location is 54 dB L_{Aeq} and from the Project is 60 dB L_{Aeq}, resulting in a cumulative worst case construction noise level of 61 dB L_{Aeq}. This is 16 dB above the noise affected management level and 14 dB below the highly noise affected management level. Therefore, work practices and mitigation measures should be considered and included in the future CNVMP, as outlined in Section 6.4.3 (mitigation measures).

6.7.4. Operational Noise Cumulative Impacts

The JSF is located to the northwest of the Project and has the potential to be operating simultaneously. An assessment of cumulative operational noise is therefore relevant for receivers located between the two projects. The likelihood of worst-case maintenance activities taking place on both solar farms simultaneously is very low, and if they were to take place on the same day, the likelihood of maintenance activities taking place at the worst case location for cumulative impacts to occur is extremely low. A cumulative assessment of maintenance activities has therefore not been undertaken.

Cumulative noise levels related to typical operation of the two projects have been considered based on the noise predictions presented in Table 29 and the publicly available acoustic assessment for JSF. The JSF report describes that there is no operational noise from JSF during the evening and night periods, and so the assessment below only considers noise during normal operation during the day period. The respective receiver locations presented in this assessment and the JSF report have been compared and the predicted cumulative noise levels at the receivers common to both assessments are summarised in Table 48. The results indicate that the Project noise trigger levels will not be exceeded when considering cumulative operational noise from JSF and the Project and where necessary including a + 5 dB tonality adjustment.

Table 48: Predicted cumulative operational noise, dB $L_{Aeq\ 15\ min}$

Receiver Location (JSF report ref)	Project contribution	JSF contribution	Cumulative level	Project Noise trigger level
ORT002 (R12)	24	30	31	45
ORT006 (R10)	37[7]	35	39	45

[7] includes a + 5 dB tonality adjustment

Receiver Location (JSF report ref)	Project contribution	JSF contribution	Cumulative level	Project Noise trigger level
ORT009 (R13)	21	30	30	45
LIN004 (R45)	35[8]	8	35	45
LIN005 (R47)	35[9]	8	35	45
LIN006 (R46)	27	8	27	45
WWJ006 (R07)	24	22	26	45
WWJ016 (R06)	27	17	27	45
WWJ020 (R08)	24	30	31	45

[8] includes a + 5 dB tonality adjustment

[9] includes a + 5 dB tonality adjustment

7. Justification of Amendment Report

In summary, the Amended Project when compared to the EIS (ELA 2020) will not result in an increase in environmental, social and economic impacts, rather the Amended Project will reduce and further mitigate the environmental, social and economic impacts outlined within the EIS (ELA 2020).

The Amended Project has:

- Reduced the Project footprint from 334.2 ha to 308.9 ha, resulting in a reduction in impacts upon native vegetation (reduced from 11.4 ha to 8.68 ha) and paddock trees (reduced 81 paddock trees to 77 paddock trees)
- Reduced the number of solar panels required for the Project from 416,000 solar panels to 393,960 solar panels by utilising solar panels with a higher output, higher efficiency, and higher energy yield in low irradiation performance and shading conditions. This has also resulted in a potential decrease in the number of piles needed, PCUs and inverters
- Relocated a number of inverters from along the Ortlipp Road and Lindner Road boundaries of the Project Site to decrease potential noise impacts upon non-involved receptors
- Increased the distances between solar panel rows from 6 m to 9 m, allowing for increased agricultural productivity whilst the Project is in operation, and also allowing increased access for emergency services within the Project Site
- Reduced the potential for visual and noise impacts through the relocation of the Substation within the Project Site
- Reduced the potential visual and noise effects through increased setbacks surrounding the Project Site (increased along Lindner Road from 150 m to between 165 and 400 m, along Ortlipp Road from 10 m to 30 m and along Drumwood Road from 10 m to 20 m) and vegetation screening
- Reduced potential visual impacts from fencing (reduced from 2.5 m to 2.2 m) and the meteorological station has been reduced in height (reduced form 10 m to 6 m)
- Reduced the potential for flooding on neighbouring properties and agricultural land upstream of an inundation area in the south-eastern part of the Project Site through re-contouring of an inundation area to allow for natural flows to occur
- Reduced the construction water requirements for the Project from 43.2 ML to 17.56 ML, and GHSC has confirmed that water can be supplied form their village water scheme
- Confirmed the operational water requirements for the Project to be 1.838 ML per year, and GHSC has confirmed that water can be supplied form their village water scheme
- Revised the heavy vehicle haulage route to the Project Site to improve road safety
- Provided additional mitigation measures to further mitigate potential environmental, social and economic impacts, including:
    - ***LR07*** - Develop a GMP for the Project
    - ***LR08*** - Ongoing dust suppress through the use of a water truck upon exposed surface during construction
    - ***LR09*** - Develop a Decommissioning and Rehabilitation Management Plan
    - LR***10*** - Recycle all solar panels at the completion of the Project

- ***TM05*** - Road upgrades along the haulage route will be undertaken as per recommended within the TIA (Cardno 2021)
- ***TM06*** - During construction, speed limits will be reduced for all heavy vehicles along Linder Road and Ortlipp Road accessing the Project Site
- ***TM07*** - During construction, heavy vehicle access to the Project Site will be restricted during school bus pick off and drop off times along the haulage route
- ***TM08*** - The Proponent has made a commitment to the residence at ORT005 that will be given priority access through traffic control during construction
- ***LV01*** -The following principles should continue to guide the design process of the Project during the detailed design phase to reduce visual impact:

    - Where possible, use muted, low contrast colours for all supporting infrastructure, so that they blend into the landscape as far as possible
    - Consider the visual impact of ancillary structures to ensure minimal contrast and select materials that minimise potential for reflectivity and glare to help blend into the surrounding landscape

- ***LV02*** - Develop a detailed Landscape Plan for the Project in consultation with non-involved receptors, GHSC and to the satisfaction of the DPE
- ***LV03*** -To capitalize on pockets of dense vegetation within the Project Site:

    - a 10 – 20 metre planting buffer should be employed to fragment views from the Lindner Road residences
    - Plant vegetation bands along surrounding roads to match existing vegetation
    - Plant supplementary planting around the Project Site
    - Enhance vegetation along Kilnacroft Creek using species with similar character

- ***LV04*** - Conduct tree planting between the Project and homestead in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the solar panels
- ***LV05*** - To reduce the potential visual impacts of night lighting associated with the Project
- ***SE02*** - Develop an Accommodation, Local Business and Employment Strategy which will be aimed at maximising the use of accommodation, local businesses and workers within the GHSC LGA in the first instance and further afield if required within the City of Albury LGA.

The Project would also provide a number of employment opportunities and benefits to the local economy, and will be aimed at maximising benefits to the local community as much as possible, as well as the GHSC LGA and neighbouring LGAs, for example the City of Albury. The Project will also contribute to reducing carbon emissions by displacing approximately 328,000 tonnes of CO_2 annually (based on current NSW emission figures of 0.82 kg of CO_2-equivilent per kWh) and providing progress towards national and international environmental commitments.

As outlined within the EIS (ELA 2020), the Project continues to meet the principles of Ecologically Sustainable Development (ESD), and the amendments made to the Project further contribute to the achieving the principles. The principles include:

- Precautionary principle – The Project has been amended and refined to further reduce economic, environmental and social impacts and where there is uncertainty, assessments have been undertaken as a worst-case scenario or conservative overestimates have been used. Where potential residual impacts have been identified, Improved valuation and pricing of environmental resources
- Social equity in inter-generational equity – The Project continues to be consistent with this principle, providing efficient use of a renewable energy source that provides a number of benefits to society, within the local area, LGA and across the NEM. Amendments to the project in the form of recycling of PV panels and the commitment of the development of an Accommodation, Local Business and Employment Strategy will further increase the Project's ability to achieve this ESD principle.
- Conservation of biological diversity and maintenance of ecological integrity – The Project has been amended to reduce the impacts upon native vegetation and scattered paddock trees. These refinements to the Project further increase the Project's ability to achieve this ESD principle.
- Improved valuation and pricing of environmental resources – The Project continues to recognise this principle through converting an abundant, renewable natural resource (sunlight) into a valuable and valued commodity (electricity). The commitment to offset impacts to native vegetation and to fund future biological conservation activities through the BDAR recognises and places an appropriate monetary value on environmental protection and the maintenance of biodiversity.

Based upon the Amended Project, it is concluded that the Project presents relatively minor and manageable environmental, social and economic impacts, which can be effectively mitigated using best practice strategies and methodologies. Potential benefits associated with the Project are a substantial reduction in greenhouse gas emissions, reduced reliance on non-renewable energy sources and positive outcomes for the local community. On this basis the Project is strongly justified.

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Appendix A Amended Project Description

KEY COMPONENTS OF THE PROJECT

The Project involves the installation of solar PV panels with a generation capacity of approximately 200 MWAC.

The project would include, but not necessarily be limited to, the following elements:

- Solar arrays: solar PV panels supported by a mounting system[10] with a maximum height of 5 m above natural ground at maximum tilt installed on piles driven, screwed, drilled and stabilised with a cement mix or ballasted to the ground
- Power Conversion Units (PCU's) inclusive of Inverters/Rectifiers, Ring Main Units, Medium Voltage (MV) and/or High Voltage (HV) step-up Transformers located throughout the Project
- Collector systems: above and/or below ground onsite cabling and electrical connections between the grid connection substation and collector substations and between the substations and the respective PCU's
- Road safety upgrades as identified within the TIA
- Operation and maintenance (O&M) building including workshop, warehouse, offices, ablutions, and carpark
- Site access and onsite access tracks
- Fencing and security system
- Meteorological stations
- Vegetation buffers for visual screening
- Asset Protection Zones (APZ) containing category 1 fire track.

In addition to the key components outlined above, there would be a temporary construction compound and material laydown areas required to facilitate the construction, upgrading and decommissioning phases of the Project.

The construction compound would include:

- Temporary construction offices
- Car and bus parking areas (the transport assessment has considered car transport only as a worst-case scenario)
- Staff amenity block including portable toilets, showers and a kitchen) designed for peak staff numbers during the construction period
- Laydown areas
- Enclosed secure areas with security fencing.

[10] The mounting system will be a SAT arranged north-south. A SAT system tracks the daily movement of the sun and motorised linkages rotate the modules from the east in the morning to the west in the afternoon, constantly aligning towards the sun to maximise energy output performance. The modules are laid out in rows, typically referred to as arrays, approximately 4 to 16 m apart depending on the technology used. The racking system will be supported by steel piles, typically comprised of C-section or I-section beams which are driven into the ground or otherwise placed in bored holes and secured in place with concrete, stabilised sand or other backfill material.

The material laydown areas would include:

- Temporary facilities
- Plant and equipment storage areas
- Unloading areas
- Enclosed secure areas with security fencing.

All land required for the temporary construction activities will be rehabilitated for agricultural use following completion of construction.

SCALE OF DEVELOPMENT

The Project Site has been assessed and, through avoidance, a Development Footprint has been defined that incorporates impact minimisation and mitigation measures. Within the Development Footprint, flexibility is sought for internal infrastructure such as associated permanent and temporary infrastructure. This flexibility is to allow for detailed design to derive an optimal layout for financing, construction and operation; ultimately driving the cost of energy produced from the project down while remaining considerate of overarching impact minimisation and mitigation measures.

The final scale and capacity of the Project will be optimised within the Development Footprint during post-consent design based on a combination of the most suitable technology at the time of procurement along with detailed geotechnical and grid connection studies. The placement of the permanent and temporary compound-style infrastructure (such as the main construction Site compound(s), operations and maintenance facilities) will be driven by an impact avoidance and risk minimisation process during detailed design.

That process will consider the functional requirements for the infrastructure (such as ease of access, geotechnical suitability, constructability, proximity to required inputs) and any identified environmental features including (but not limited to):

- vegetated and functional riparian zones
- areas of higher biodiversity value (including Threatened Ecological Communities (TECs))
- heritage artefacts
- proximity to receivers (potential noise and visual impacts)
- separation distances from surrounding woodland vegetation.

This approach has been adopted in undertaking assessments for the EIS and revised reports, therefore any placement of the compound-style infrastructure has been considered according to the relevant potential impacts. Therefore, this application seeks a flexible consent which will enable this optimisation to occur within the approved Development Footprint.

INDICATIVE TIMELINE

It is anticipated that the Project would take approximately 12 to 18 months to construct. This time to construct could be reduced should the Project be granted approval for an out of hours works protocol. The Project would be operational over an initial term for approximately 30 years.

Further, it is anticipated that the Project could extend for a further term should market and commercial circumstances dictate. It is expected that upgrading or repowering of the PV modules and ancillary equipment may be required throughout or to extend the operational life of the Project.

This will be a commercial decision at the time based on the relative economics of solar PV generation compared to alternatives and would be subject to a separate Development Application. Decommissioning and restoration would occur at the end of the operational life of the Project. As such, planning consent for the Project is sought for 30 years to cover one full term of operation and associated construction, upgrading and decommissioning periods. Details of each project phase are provided below in Table A-1.

Table A-1: Indicative timeframe for project phases

Phase	Indicative Start	Indicative Period
Construction	Mid 2023	18 months
Operation / Repowering	Late 2024	28 years
Decommissioning	c. 2054	6 months

DESCRIPTION OF SOLAR FARM KEY COMPONENTS

Solar array

The solar array refers to the area of the Development Footprint within which the PV panels will be located, along with the necessary infrastructure to support them; namely the SAT system, inverters, internal track network, and connecting underground cabling. These components and other supporting infrastructure are described in detail below.

The solar array would comprise of approximately 393,960 individual solar panels with a combined generation capacity of approximately 200 MW_{AC}. Regardless of the size of the individual solar panels selected, when attached to a tracking system, the maximum tilt height above natural ground would not exceed 5 m during operational daylight hours, which is the height used in the visual impact assessment to ensure the potential maximum visual effect of the Project has been assessed.

The solar panels would be fitted to a SAT system which would track the sun from east to west as it moves throughout the day. The tracking system is installed in rows orientated in a north south direction. The tracking system tracks the panels from 60 degrees towards the east in the morning, to face straight upwards at midday (0 degrees) and finally to face 60 degrees towards the west in the afternoon. Note, for the majority of the day, as explained above, the PV panels will be below the maximum tilt height of 5 m.

The minimum spacing between each of the rows of trackers would be 9 m, this enables vehicles to access the rows for maintenance and the management of vegetation across the Array Area.

The solar array will be supported by up to 60,000 piles (dependent upon the final solar panel model and supplier) which would be mechanically driven, screwed into, drilled and concreted or ballasted to the ground. Depending on the tracking system deployed, piles are typically spaced between 5 m to 10 m

apart. Figure A-1 below shows an example of a solar farm during construction. Figure A-2 illustrates an operational tracking solar farm.

Figure A-1: Piles for the solar farm in place (image source Infinergy UK)

Figure A-2: Fully assembled tracking array solar farm showing inverter housing (image courtesy Nextracker Australia, actual tracking system may differ)

The solar array would be wired in 'blocks' that would be connected to PCUs (likely to be approximately 4 MW to 10 MW each) located throughout the Project. Blocks would not necessarily appear as discrete entities but would appear as a series of continuous rows. The SAT system would be installed in rows

that are oriented typically north to south. The solar array would connect to the Substation through a series of 33 kV lines that would be above or below ground depending on local ground conditions, which would be internal to the Project Site and not interact with the public roads.

Substation

The proposed grid connection infrastructure is an expansion to the existing 330/132/22kV Jindera Zone Substation located adjacent to the Project Site. Proposed works to enable connection of the solar farm generally consist of expanding the fence line to accommodate installation of a transportable building and depending on the final design, installation of a new power transformer and outdoor switchyard equipment, which will be supported by concrete foundations and steelwork, depending on the requirements of the network service provider (TransGrid).

Power Conversion Units

PV panels produce Direct Current (DC) electricity which would be converted to Alternating Current (AC) at the many central PCUs. Depending on the final PCU selection, the project will have approximately 60 PCUs that would be installed throughout the Project Site. The PCUs will be approximately 4 MW to 10 MW each, though subject to procurement processes. PCUs are typically a containerised solution or a skid mounted solution located on a prefabricated transportable galvanised steel platform, either singularly the size of a 20 ft container, measuring approximately 6.1 m (l) x 2.9 m (h) x 2.5 m (w), or doubly the size of a 40 ft container measuring approximately 12.2 m (l) x 2.9 m (h) x 2.5 m (w). Each PCU would also have:

- Inverters (typically 1 per PCU)
- A 33 kV MV transformer
- Circuit breakers
- Communication equipment.

PCUs will be transported to Project Site ready-made and require little in the way of foundations, either attached to steel or concrete pilings depending on ground conditions or a raft concrete foundation approximately 300 mm thick, with structural edge thickening. Figure A-3 and Figure A-4 below illustrate a double and single PCUs respectively. Figure A-5 illustrates the skid mounted medium voltage power station (MVPS).

Figure A-3: Double PCU container (image courtesy of SMA)

Figure A-4: Single PCU container (image courtesy of SMA)

Figure A-5: SMA MVPS Skid Mounted Solution (image courtesy of SMA)

Collector Systems

A typical collector system will include DC reticulation cabling run along each solar array (which may be mechanically protected as required to facilitate co-use of land for grazing purposes) and then below ground to the PCUs. Inverters will convert the DC to AC with MV and/or HV transformers increasing the voltage for export to the grid.

Collector cables will be of sufficient length to minimise wherever possible the use of cable joints between PCU's and the Substation. In-ground or above ground looped joint pits will be utilised to ensure recovery of joints for repairs if joints are required for underground cables. Where underground, single mode fibre and the radial earth conductor (where required) will be laid in parallel to other cables in a common trench. All cables will be designed based on Project Site conditions in accordance with relevant Australian and international standards. Subject to final design, cable trenches will contain:

- Below ground warning tapes
- Below ground Polymeric cover strips (where required)
- Electrical cables to export power
- Electrical supply cables where necessary
- Earthing cable
- Communications and SCADA links
- Above ground warning signs (where required).

Where possible, trenches will be located alongside/underneath internal access tracks to minimise ground disturbance (Figure A-6). MV/HV cables may be either laid underground or constructed overhead to connect sections of the Project to the Substations.

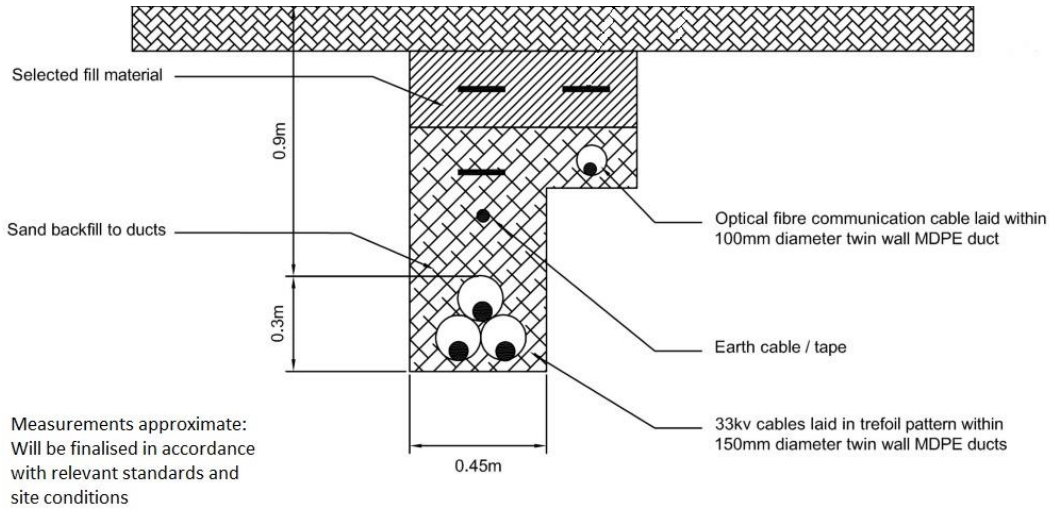

Figure A-6: Indicative 33 kV cable trench design[11]

Operations and Maintenance Facility

A permanent O&M facility will be provided to meet the ongoing operational needs of the Project. A typical arrangement and design are shown in Figure A-7. Building fit-out will include power, lighting, air-conditioning, security, fire detection, and communication systems as required.

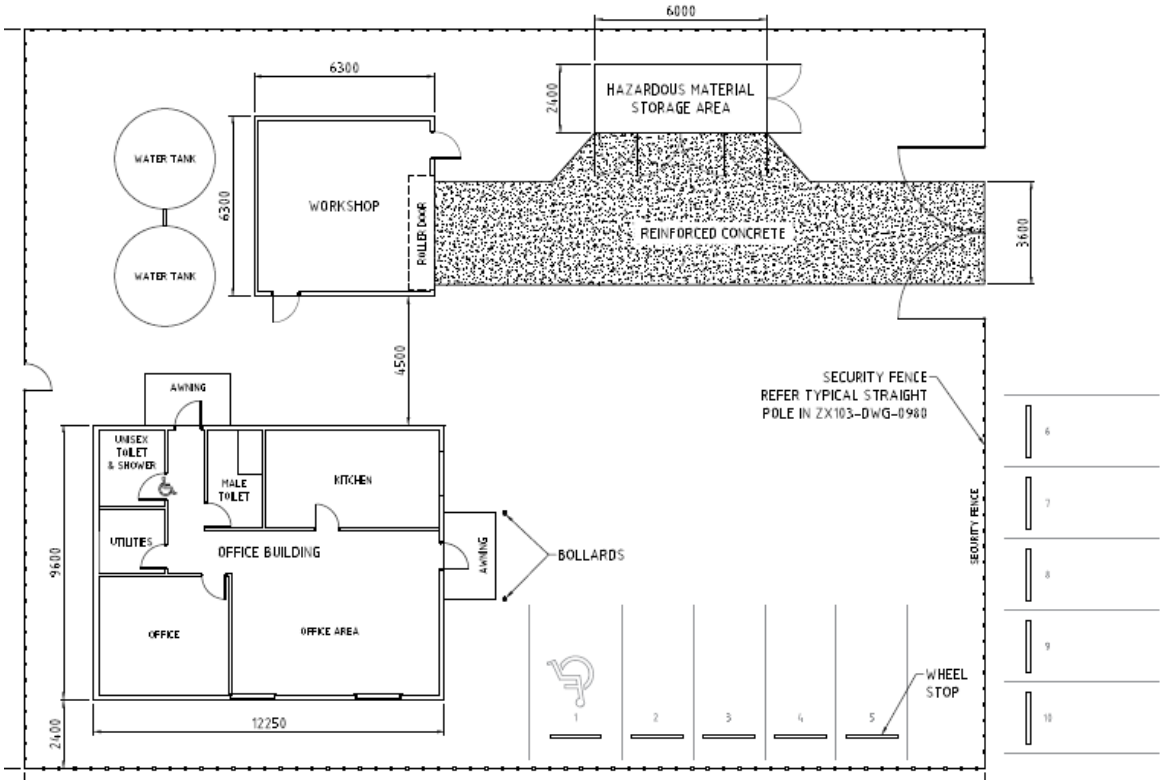

Figure A-7: Typical O&M Facility

[11] Indicative design only. Cables may be direct buried rather than trenched. Cables will be buried to a depth >500 mm in land with a cropping history or land with a capability of cropping. MDPE ducts may not be required and may not be used.

The O&M facility, including associated parking, would occupy an area of approximately 50 m by 50 m or 0.25 ha and may include the following:

- Container type office building, consisting of office, toilets, showers, staff room and kitchen
- Container type maintenance building
- Up to 3 storage buildings/sheds
- Parking
- Water storage
- A septic tank
- A workshop.

Onsite support buildings will comply with all relevant Australian building standards and regulations. They will be designed to accommodate the maximum number of staff that will be required during the operational life of the Project. Water for the support buildings will be supplied to the Project Site by commercial contractors and stored in onsite water tanks. In addition, there will be a requirement for a 20,000-litre water tank solely for the purposes of fire protection.

Site Access and Onsite Access Tracks

Ortlipp Road has both south and north access. The heavy vehicle haulage route to the Project Site will be via will be through either one of two options, which will be dependent upon where key components of the Project will be delivered by heavy vehicles from. The first option (Haulage Route 1) is for key components of the Project to come from the Port of Newcastle, with heavy vehicles travelling to the site via the Hume Highway. The route option would travel along the Hume Highway, Thurgoona Drive, Union Road, Urana Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road (Figure A-8).

The second option (Haulage Route 2) is for key components of the Project to come from the Port of Melbourne and then moved from the Port by road or rail. If by rail, materials are likely to be delivered to the Ettamogah Rail Hub and then transported to the Project Site via on-road transport via Hub Road, Gerogery Road, Wagga Road, Union Road, Walla Walla Jindera Road, Lindner Road, and Ortlipp Road (Figure A-8).

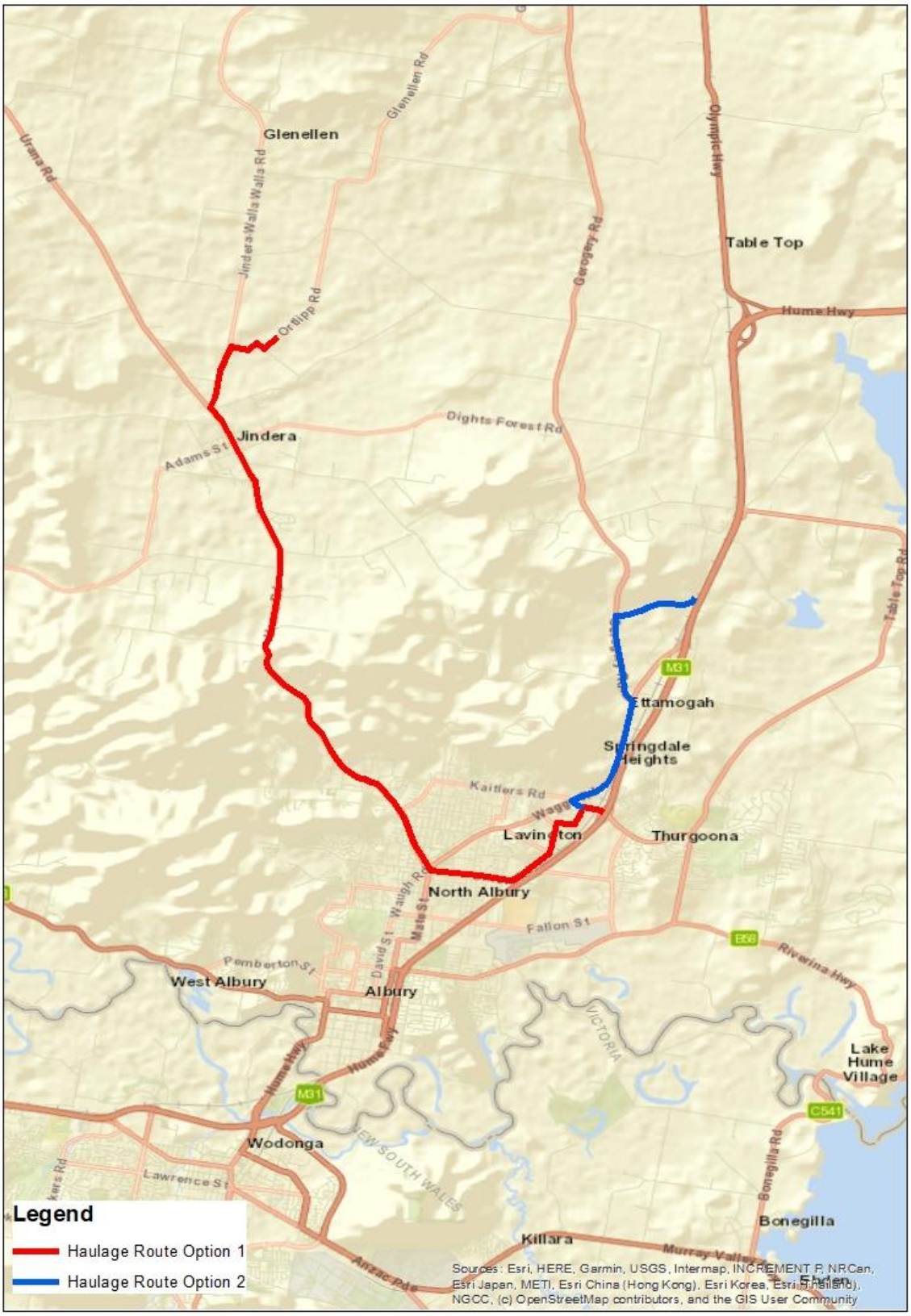

Figure A-8: Heavy vehicle haulage route option from Port of Newcastle and route option from Port of Melbourne

Internal tracks will be constructed of compacted gravel to an approximate depth of 150 mm depending on soil conditions (Figure A-9). Internal access tracks would be approximately 4 m wide, with intermittent wider stretches for passing, parking, and at corners. Small culverts over identified stream crossings would also be constructed where required. Culverts will be designed in line with the following guidance:

- Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull, 2013)
- Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge, 2003).

Approximately 15 km of internal access tracks will be installed on the Project Site, which would require c. 9,000 m3 of gravel material to be imported to the project or approximately 440 truck and dog aggregate deliveries over the duration of the project. It should be noted that the access track length is dependent on the manufacturer of the final SAT system and will be optimised during detailed project design.

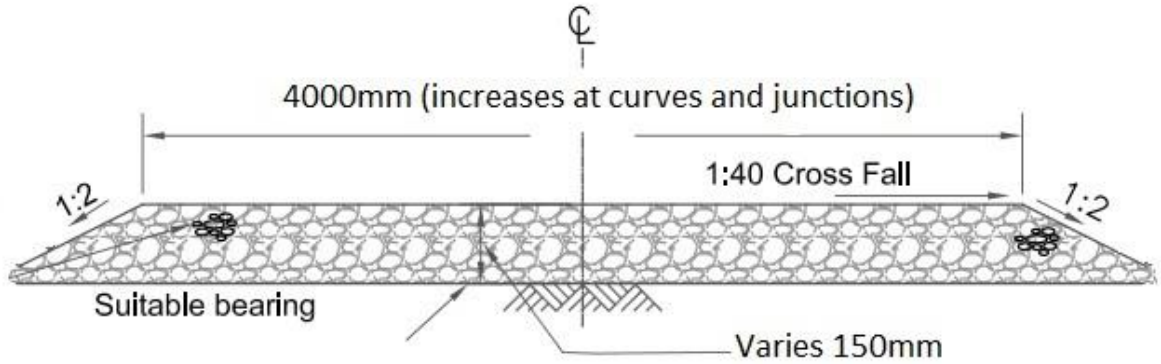

Figure A-9: Typical track cross section

Fencing and Security System

To ensure safety and security at the Project Site, a perimeter fence up to 2.2 m will be installed around the perimeter of the Project in accordance with the Proponent's requirements to ensure entry into the Project Site is controlled. Once operational, all access points will be gated. The Project Site security system may also include sensor lighting and closed-circuit television (CCTV) at several locations around the Project Site.

Meteorological Station

A number of metrological stations will be located at locations determined as part of the final design, located in proximity to solar arrays and consisting of equipment to measure solar radiation (global and direct), temperature, pressure, rainfall, wind speed and direction. For wind speed, a mast approximately 6 m high would be installed. Ancillary power and optic fibre will be provided to each unit.

Vegetation Screen

The Project Site has been selected to minimise impacts to surrounding residences through a combination of consultation, consideration of existing vegetation and proximity to the Project.

Substantial concessions have been made to adjacent residences in the creation of the Development Footprint. Vegetation screening will also be created along other parts of the Project Site perimeter in response to community feedback. If required, additional vegetation screening post construction may be planted in other areas of the Project Site or adjoining land (subject to landowner consent).

Asset Protection Zones (APZs)

APZs will be established and maintained around the perimeter, between the security fence and the solar panel array (and associated infrastructure), which allows for a defendable firefighting space that permits unobstructed vehicle access. The perimeter APZ will comprise a setback distance of all project infrastructure (excluding fence lines and access tracks) of:

- 20 m width from woodland areas
- 10 m width from grassland areas.

The APZ is to be ploughed, mowed or grazed, and maintained from the commencement of construction in perpetuity in accordance with the Bushfire Emergency Management and Operations Plan (see Section 8.10.4) and the NSW Rural Fire Service (RFS) (2019) APZ requirements for an Inner Protection Area. The APZ is to incorporate a 4 m Category 1 perimeter fire trail, established and maintained in accordance with NSW RFS requirements (NSW RFS, 2019) standards for fire trails (NSW RFS, 2019a) including provisions for passing bays and turn around points.

The APZs are to ensure, as far as possible, that a fire that originates within the Project Site does not escape into the wider landscape or, conversely, the APZs should reduce the potential of a fire that originates offsite encroaching onto the Project Site.

Grid Connection

The existing Jindera Substation will be the point of connection into the NEM. Augmentation within the Substation may be required inside the existing building, or on the land immediately surrounding the existing substation.

Existing Overhead Lines

The existing 22 kV overhead line bisecting the southern section of the Project Site was originally proposed to be either relocated along the Project Site boundary or undergrounded as a part of the works to limit the shading on the solar array and improve safety during construction and operations. This is no longer proposed: instead, the existing22 kV line will be retained in place and an easement will be established as part of the Development Footprint that restricts disturbance to only three crossings (one where the line enters Lot 101 DP 791421 after exiting the TransGrid Lot, one where the line exists the Development Footprint in the south in Lot 1004 DP 1033823, and the third crossing will be decided upon during the detailed design phase for the GSF), but is generally expected to maintain the same shape as illustrated in Figure 2 3. The existing 132 kV overhead lines will be retained in place.

Waste

A waste management plan will be developed for the project to reduce the quantity of waste generated (by eliminating waste, returning waste to the equipment manufacturer for re-use where possible,

through use of on-site recycling and other initiatives). Local waste recycling, reuse and disposal options will be explored during the development of the Project design.

Appendix B Updated Mitigation Measures

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
Management Plans								
Detailed Design	Minimise impact	The project will be designed and constructed with the key objective to reduce environmental impacts. This will include avoiding and minimising impacts where practicable.	Proponent and Construction Contractor	✓				EM01
General	Minimise impact	An Environmental Management System (EMS) will be developed which outlines practices and procedures to be followed during construction and operation of the development.	Proponent	✓	✓	✓		EM02
	Minimise impact	An Environmental Management Plan (EMP) will be developed by the construction contractor to outline environmental management measures and procedures to be implemented during construction. This will include sub-plans to address: • Water quality • Air quality • Heritage (including unexpected finds) • Biodiversity • Noise and vibration • Environmental Incident response and notification • Traffic • Waste • Contamination • Storage of chemicals, oils and fuels • High risk activities • Training and induction.	Construction Contractor	✓				EM03
	Minimise impact	All employees and contractors will attend a project induction including details of environmental approvals, site management requirements and an overview of sub-plans contained in the EMP.	Proponent and Construction Contractor		✓	✓	✓	EM04
Biodiversity								
Biodiversity impacts during construction	Minimise impact	• Prior to the commencement of construction, a BMP will be developed in consultation with BCD.	Proponent and Construction Contractor	✓	✓			BM01

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		• Pest and feral animal management strategies will be implemented to control vertebrate pest populations within the Project Site and minimise their spread to and from the Project Site. • Weed management strategies will be implemented aiming at preventing and minimising the spread of priority weeds to and from, and within the Project Site. These include controlling any existing priority weed infestations prior to construction activities and implementing weed hygiene protocols. • Pre-clearing surveys will be undertaken by a qualified ecologist to determine if roosts, nests or dens are present in any trees proposed for clearing. • An ecologist/wildlife handler will be present to supervise during clearing of identified fauna roosting or nesting habitat. • Vegetation that is to be removed nearby to retained vegetation will be removed using a chain-saw rather than heavy machinery to avoid any additional impacts on adjacent vegetation.						
Biodiversity Offset	Compliance	A BOS will be developed prepared prior to commencement of construction to demonstrate the Proponent's capability to acquire and retire the full quantum of credits as required by the BAMC.	Proponent	✓	✓			BM02
Aboriginal Heritage								
Aboriginal heritage items	Minimise impact	Community collection in partnership with the RAPs will be undertaken prior to works commencing in order to mitigate impacts against AHIMS sites: 55-6-0111, 55-6-0112 and 55-6-0113.	Construction Contractor	✓				AH01

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
	Avoid	A CHMP will be prepared in consultation with DPE and Aboriginal stakeholders. The CHMP will incorporate an unexpected finds procedure. Additional archaeological assessment will be carried in any areas which are proposed for impacts that have not been surveyed during the current assessment. Design and ground disturbance will be undertaken to minimise impact to heritage items. If cultural heritage material is located during works that work will cease immediately and a suitably qualified person engaged to ascertain whether the material is of cultural origins and if so, they will advise how to proceed. If human remains are found, works should immediately cease, and the NSW Police should be contacted. If the remains are suspected to be Aboriginal, the BCD may be contacted to assist in determining appropriate management.	Proponent and Construction Contractor	✓	✓			AH02
Historic Heritage								
Historic Heritage Items	Avoid	If potential historic heritage is identified all work within a 10 m radius of the site will cease and advice sought from an historic archaeologist. If required, notification under Section 146 of the Heritage Act would be undertaken and works would not recommence in the area until permitted.	Construction Contractor		✓			HH01
Land Resources								
Erosion	Minimise	As part of the EMP the contractor will prepare an erosion and sedimentation control sub plan. The plan will be prepared in accordance with the Blue Book Managing Urban Stormwater: Soils and Construction (Landcom, 2004) and include: • Site constraints and receiving waters; • Stockpile management;	Proponent and Construction Contractor	✓	✓	✓	✓	LR01

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		• Temporary site stabilisation and progressive revegetation; • Management measures for disturbance of sodic soils; • Separation of clean and dirty water; • Progressive erosion and sediment controls drawings prepared by a Certified Professional in Erosion and Sediment Control; and • An inspection, monitoring and maintenance schedule.						
	Minimise	Cable trenches will be constructed in accordance with relevant regulations and ground conditions. Trenches will be excavated and filled progressively to ensure they are left open for the shortest period possible. Surface conditions will be returned to pre-disturbance conditions and groundcover rehabilitated as soon as practicable to prevent the formation of preferential flow pathways. Where sodic soils are identified in areas to be disturbed by trenching activities, soil ameliorating additives will be considered (such as the use of Gypsum or alternatives as guided by soil testing results during detailed design).	Construction Contractor		✓		✓	LR02
Land Use Conflicts	Detailed Design	The solar array would be designed to ensure there is sufficient space between panels to allow establishment and maintenance of groundcover and weed control activities. Where practicable, the existing pasture composition will be retained. Where establishment fails in disturbed areas or under the panels agronomic advice may be sought to determine alternative management options for groundcover to protect soil from erosion in addition to the above erosion measures.	Proponent	✓				LR03
	Minimise	Areas used for temporary construction compound and laydown areas during construction will be restored to original condition or revegetated with	Construction Contractor		✓			LR04

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		grasses suitable to achieve the ground cover and erosion minimisation goals.						
Contamination	Avoid	To avoid release to the environment, all hazardous materials (fuels, lubricants, herbicides, etc.) will be disposed of site in accordance with NSW EPA guidelines. Onsite refuelling shall occur in a dedicated area that is located greater than 100m from the nearest drainage line, on an impervious, flat and bunded surface (such as an appropriate drip tray). Machinery will be inspected regularly to ensure no oil, fuel or lubricants are leaking from the machinery.	Proponent and Construction Contractor		✓			LR05
Dust	Minimise	Modify working practices by limiting construction activities during periods of high winds (greater than 20 km/hour). Modify activities if dust is observed leaving the Site towards nearby sensitive receptors. May require use of a water truck. Stage clearing and excavation activities to minimise total areas of cleared ground. Minimise the number and volume of stockpiles on-site and the number of work faces on stockpiles.	Construction Contractor		✓	✓	✓	LR06
	Minimise Impact	Develop a Groundcover Management Plan for the Project. The Groundcover Management Plan will be developed in consultation with non-involved receptors, GHSC and to the satisfaction of the DPI. The Plan will outline protocols for groundcover management within the Project Site, including minimising ground disturbance to groundcover during construction, ongoing weed control, rehabilitation of any temporary construction areas and the re-contouring areas, and grazing management. A monitoring program will also be developed to monitoring the groundcover and contingency protocols if groundcover dies-back during the operation of the Project.	Proponent and Construction Contractor	✓	✓	✓		LR07

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
	Minimise Impact	Ongoing dust suppress through the use of a water truck upon exposed surfaces (i.e. internal access tracks, re-contouring area, and Lindner and Ortlipp Road haulage routes) will be undertaken during the construction and decommissioning of the Project.	Construction Contractor		✓		✓	LR08
Decommissioning & Rehabilitation	Rehabilitate	Develop a Decommissioning and Rehabilitation Management Plan that outlines the procedure to decommission the Project and rehabilitate the land at the completion of the Project lifespan.	Proponent and Construction Contractor	✓				LR09
	Minimise	Recycle all solar panels at the completion of the Project at a facility that recycles all components of the solar panel for re-use and avoids any components entering landfill.	Proponent				✓	LR10
Visual								
~~Visual Amenity~~	~~Minimise Impact~~	~~Visual impact mitigation measures will be offered to owners of non-involved neighbouring residences where there is opportunity to significantly reduce potential visual impacts from the proposal. Visual impact mitigation measures may include landscaping, screen plantings, which can be located on the owner's land to minimise visual impacts of the Project at the residence and its curtilage. Mitigation measures will be determined through consultation with the owner, be reasonable and feasible, and directed towards reducing the visual impacts of the Project on the residences, commensurate with the level of visual impact.~~ ~~However, this mitigation measure will not apply where the Proponent has an agreement with the relevant owner/s of these residences with regard to visual impact.~~	~~Proponent~~	~~✓~~	~~✓~~			~~VM01~~
~~Impact to Receivers~~	~~Minimise Impact~~	~~To minimise impact from external lighting, lighting will be low intensity lighting (except where required for safety or emergency purposes), erected to not shine above the horizontal and comply with Australian Standard AS 4282 (INT) 1997 — Control~~	~~Proponent~~	~~✓~~	~~✓~~			~~VM02~~

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		~~of Obtrusive Effects of Outdoor Lighting, or its latest version.~~						
Visual Amenity	Minimise Impact	The following principles should continue to guide the design process of the Project during the detailed design phase to reduce visual impact: • Where possible, use muted, low contrast colors for all supporting infrastructure, so that they blend into the landscape as far as possible • Consider the visual impact of ancillary structures to ensure minimal contrast and select materials that minimise potential for reflectivity and glare to help blend into the surrounding landscape	Proponent	✓	✓			LV01
	Minimise Impact	Develop a detailed Landscape Plan for the Project in consultation with non-involved receptors, GHSC and to the satisfaction of the DPE. The Landscaping Plan will detail the location of planning, species to planted and an ongoing maintenance schedules, including a contingency plan if plantings suffer die-back.	Proponent and Construction Contractor	✓				LV02
	Minimise Impact	Due to the relatively low height of the proposed solar panels, there are opportunities to screen the Project from within the Project Site. Vegetation associated with Bowna Creek south of the Project Site will provide screening towards the Project. To capitalize on pockets of dense vegetation within the Project Site: • a 10 – 20 metre planting buffer should be employed to fragment views from the Lindner Road residences • Plant vegetation bands along surrounding roads to match existing vegetation • Plant supplementary planting around the Project Site • Enhance vegetation along Kilnacroft Creek using	Proponent and Construction Contractor	✓	✓			LV03

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		species with similar character						
Residential	Minimise Impact	Conduct tree planting between the Project and homestead in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the solar panels following general guidelines such as: • Planting post construction in consultation with the landowner • Keeping with existing landscape character • Species selection is to be typical of the area • Avoid screening views of the broader landscape • Avoid the clearing of existing vegetation. Where appropriate reinstate any lost vegetation. Locally native plant species are preferred, as they will assist and maintain the connectivity of the area, help preserve the landscape character and scenic quality of the area as well as building habitat for local fauna. Native species are also well-suited to local conditions (i.e soil, climate, etc.) and will build ion the existing vegetation assemblages.	Proponent and Construction Contractor	✓	✓			LV04
Night Lighting	Minimise Impact	To reduce the potential visual impacts of night lighting associated with the Project, the following should be considered during lighting design: • Only use lighting for areas that require lighting (i.e. paths, building entry points) • Reduce duration of lighting: ○ Switch off lighting when not required ○ Consider the use of sensors to activate lighting and timers to switch of lighting • Use the lowest intensity light required for the situation in	Proponent and Construction Contractor		✓	✓		LV05

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		accordance with relevant Australian Standards • Use energy efficient bulbs and warm colors • Keep lights low to the ground and direct light downwards to help eliminate light spill • Ensure lights are not directed at reflective surfaces • Use non-reflective dark colour surfaces to reduce reflections • Use light shield fittings to avoid light spill • Maintenance of lighting and sensors.						
Noise								
Construction Noise	Minimise impact	Construction work will be restricted to the following hours: • Monday to Friday – 7 am to 6 pm; • Saturday – 8 am to 1 pm; and • No construction work on Sundays or public holidays. Notwithstanding works undertaken outside these hours may occur where the activity is inaudible, for emergency works, delivery of certain materials, in accordance with Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020 or where agreement from the Secretary has been provided.	Proponent and Construction Contractor	✓	✓		✓	NM01
	Compliance	Construction and decommissioning activities will be managed to minimise noise impact in accordance with the Interim Construction Noise Guidelines 2009 and outlined in the EMP. This may include maximising separation distances, use of acoustic barriers, acoustic enclosures, scheduling work and / or modifying work practices.	Proponent and Construction Contractor		✓		✓	NM02
Construction Vibration	Minimise impact	Where residential dwellings are located within 100 m of construction works and a 10 tonne vibratory/foot roller is expected to be used, it is recommended to use a smaller vibratory/foot roller to suit the required buffer distance.	Construction Contractor		✓			NM03

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
Operational Noise	Compliance	Implement sound reduction strategies if invertor/non-involved receptor separation distances cannot be met. The operator will maintain effective relationships with non-involved receptors and work in a proactive manner to minimise operational noise impacts.	Proponent and Construction Contractor			✓		NM04
Operational Noise	Minimise impact	The Proponent will investigate the most appropriate inverter model that does not exhibit tonal characteristics. This would follow general best practice and further reduce the risk of tonality related amenity impacts.	Proponent	✓				NM05
Construction Noise and Vibration	Minimise impact	A CNVMP will be developed for the Project and will include site and process specific noise management work practices designed to mitigate the impact of construction noise activities, including traffic noise.	Proponent and Construction Contractor	✓				NM06
Transport								
Traffic and Transport Impacts during Construction	Minimise Impact	Prior to the commencement of construction, a CTMP will be prepared for the Project in consultation with TfNSW and the GHSC.	Proponent and Construction Contractor	✓				TM01
	Minimise Impact	Road dilapidation surveys will be undertaken in accordance with guidelines and standards established by Austroads of the designated vehicle route prior to construction and decommissioning works and post construction and decommissioning. Following completion of construction and decommissioning works, any development related damage identified in post dilapidation survey will be rehabilitated / repaired.	Construction Contractor	✓			✓	TM02
	Minimise Impact	Any road upgrades required will be subject to detailed design and constructed to the relevant Australian road design standards.	Construction Contractor	✓	✓			TM03
	Minimise Impact	Should transportation of oversize loads be required, the proponent will investigate the procedures and requirements for special permits for oversized loads in the traffic management plan and in liaison with	Construction Contractor	✓	✓			TM04

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		Transport for NSW. The proponent will liaise with the Special Permits Unit early in the process to assess the appropriateness of the route and identify potential issues.						
	Minimise Impact	Road upgrades along the haulage route will be undertaken as per recommended within the TIA (Cardno 2021). Consultation will be undertaken with TfNSW and GHSC for all road upgrades. Road upgrades will include: • Upgrade the Urana Road / Walla Walla Jindera Road intersection to a Channelised Right Turn • Upgrade the Walla Walla Jindera Road / Lindner Road intersection to a Basic Auxillary Right Turn. Widen the Lindner Road approach to accommodate the passing of a 26m B-double and passenger car • Widen Lindner Road to a formation width of 8m with 3.5m wide travel lanes. Provision of advisory signage to notify motorists of heavy vehicle traffic • Widen Ortlipp Road to a formation width of 8m with 3.5m wide travel lanes • Upgrade the intersection of Lindner Road / Ortlipp Road to accommodate 26m B-double movements.	Construction Contractor	✓				TM05
	Minimise Impacts	During construction, speed limits will be reduced for all heavy vehicles along Linder Road and Ortlipp Road accessing the Project Site. Speed limits for heavy vehicles will be reduced to 40 km/hr.	Construction Contractor		✓			TM06
	Minimise Impacts	During construction, heavy vehicle access to the Project Site will be restricted during school bus pick off and drop off times along the haulage route. These times will be determined through consultation with bus companies operating along the haulage route and will be incorporated	Construction Contractor		✓			TM07

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		into the CTMP. The Proponent has agreed to provide right-of-way to existing bus routes in the area, enabled via two-way communication with traffic control associated with the Project.						
	Minimise Impacts	The Proponent has made a commitment to the residence at ORT005 that will be given priority access through traffic control during construction.	Construction Contractor		✓			TM08
Water								
Water Use	Design	As a result of a design philosophy that, in the first instance, seeks to avoid impacts, the following environmental protections apply: • Sourcing of non-potable, construction and operational water from rainwater tanks and existing farm dams • Sourcing from offsite all potable water requirements.	Proponent and Construction Contractor	✓				WM01
	Minimise	Potable water will be sourced off-site, via registered water suppliers. Non-potable construction water requirements will be sourced either off-site or from farm dams and creeks under existing Water Sharing Plan licences within the lease area. Rainwater tanks installed to support buildings provide an additional source of non-potable construction water and a climate independent firefighting source. The Proponent will source no more than 10% of the total surface water from existing surface water dams located within the Site.	Proponent and Construction Contractor		✓	✓		WM02
Water Resources (Including Groundwater, Aquatic and Riparian Environments)	Design	As a result of a design philosophy that, in the first instance, seeks to avoid impacts, the following environmental protections apply: • Exclusion of 3rd order and higher streams from the Development Footprint (except infrastructure	Proponent and Construction Contractor	✓				WM03

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		crossings across Kilnacroft and Dead Horse Creeks) • Application of a 20 m (from stream thalweg) buffer zone for 3rd order and higher riparian zones • Minimisation of creek crossings for within site access and electrical cabling • Localised scour protection around building pads						
	Minimise	Activities with the potential for adverse water quality impacts would be managed through the development of site specific sediment control plans and spill controls. Culverts (if in design) on Kilnacroft Creek will be designed as per the Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull, 2013) and Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003). Installation of cables across Kilnacroft Creek will follow relevant design considerations as per the NSW Office of Water's Controlled Activities: Guidelines for laying pipes and cables in watercourses. Solar arrays will be designed and installed so as to not impede overland flow. Construction and operational structures will not be located within flood prone land.	Proponent and Construction Contractor		✓	✓		WM04
Water Use	Design	If required, the Proponent will obtain relevant approvals and licences under the *Water Management Act 2000* before commencing any works which intercept or extract groundwater or surface water from the Project Site or alter the flow of floodwaters from the Project Site.	Proponent and Construction Contractor	✓	✓			WM05
Hazards and Risks								
Bushfire and Electrical Fire	Minimise Risk	Develop bushfire management measures and an emergency response plan in consultation with the RFS prior to commencing construction activities,	Proponent	✓				HR01

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		and for the operational and decommissioning phases, to manage site specific risks. This will include high risk tasks, seasonal constraints, fuel load management, mitigation strategies and emergency response procedures.						
	Minimise Risk	An area of grassland (which may contain gravel access roads) serving as a defendable space (a minimum width of 10 m) would be provided for the operations and maintenance buildings, substation and solar array.	Proponent and Construction Contractor		✓	✓		HR02
	Minimise Risk	Asset protection zones would also be designed and maintained around buildings and infrastructure to reduce the risk of fuel loads building up around sensitive assets	Proponent and Construction Contractor		✓	✓		HR03
	Minimise Risk	Electrical equipment selected for the life span of the Proposed Development would be designed, installed and earthed appropriately to limit the potential risk of fire from lightning strike and to minimise potential for ignition and would be certified to comply with relevant Australian Standards.	Proponent and Construction Contractor	✓	✓			HR04
	Minimise Risk	Four 10,000 litre water tanks will be provided at locations agreed with the RFS for the sole use of fire protection in line with the RFS standards.	Proponent and Construction Contractor		✓			HR05
	Minimise Risk	Restrictions imposed during declared Total Fire Bans will be observed and consultation carried out with the RFS where required.	Construction Contractor		✓	✓	✓	HR06
Electromagnetic Fields	Minimise	Engineering and administrative controls will be used to reduce the potential for EMF emissions in accordance with Interim guidelines on limits of exposure to electric and magnetic fields ARPANSA/National Health and Medical Research Council and Overhead Line Design AS/NZS 7000. .	Proponent		✓	✓	✓	HR07
Waste and Resource Use								
Waste and Resource Use	Minimise and Avoid	Wastes will be classified in accordance with the NSW EPA Waste Classification	Proponent and		✓	✓	✓	WRR01

Impact	Objective	Mitigation Measure	Responsibility	Stage				Code
				PC	C	O	D	
		Guidelines – Part 1: classifying waste (EPA 2014) and addendum (EPA 2016). All waste will be handled and stored on site in accordance with its classification and disposed of at appropriately licensed waste facilities. In order to minimise the potential for waste, purchasing protocols to reduce the likelihood for equipment failure will be adhered to in the selection of all components of the Proposal. With specific regard to panels: • As a minimum, panels will meet the Australian standard AS/NZS 5033 for photovoltaic modules and the international standard IEC 62804 (Clean Energy Council, 2018) • Panels will be backed by a 25 year warranty (DNVGL, 2017).	Construction Contractor					
Socio-economic Factors								
Socio-Economic Factors	Minimise	Recruitment of construction staff, contractors and suppliers from the local areas and purchase of local products will be encouraged during all phases of the development. The Proponent will liaise with local industry and local councils if there is a conflict arising from demand for accommodation and related services.	Proponent	✓	✓	✓		SE01
	Minimise	Develop an Accommodation, Local Business and Employment Strategy which will be aimed at maximising the use of accommodation, local businesses and workers within the GHSC LGA in the first instance and further afield if required within the City of Albury LGA.	Proponent	✓				SE02

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