Premise

Environmental Impact Statement

IN SUPPORT OF A DEVELOPMENT APPLICATION

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27 July 2022

DOCUMENT AUTHORISATION					
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CERTIFICATION

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Address	154 Peisley Street, Orange, NSW, 2800,
Project details	
Project name	Marulan Solar Farm
Application number	SSD-13137914
Address of the land in respect of which the development application is made	Lot 55 DP1141136 154 Munro Road/740 Carrick Road, Carrick
Applicant details	
Applicant name	Terrain Solar
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Declaration	
Name	David Walker
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with Clause 192 of the *Environmental Planning and Assessment Regulation 2021*; • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates; • does not contain information that is false or misleading; • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project; • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments;

	• has been prepared having regard to the Department's State Significant Development Guidelines - Preparing an Environmental Impact Statement; • contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development; • contains a consolidated description of the project in a single chapter of the EIS; • contains an accurate summary of the findings of any community engagement; and • contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	27/07/2022

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GLOSSARY AND ABBREVIATIONS

Term	Definition
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AC	Alternating Current
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHCRP	Aboriginal cultural heritage consultation requirements for proponents
AEMO	Australian Energy Market Operator
AEMC	Australian Energy Market Commission
AEP	Annual Exceedance Probability
AER	Australian Energy Regulator
AGO	Australian Greenhouse Office
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ARI	Average Recurrent Interval
APZ	Asset Protection Zone
ARENA	Australian Renewable Energy Agency
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASRIS	Australian Soil Resource Information System
AV	Articulated Vehicle
BAL	Basic Left Turn
BAM	Biodiversity Assessment Methodology
BAR	Basic Right Turn
BC Act	Biodiversity Conservation Act 2016
BCSD	Biodiversity Conservation and Science Division (formally within Office of Environment and Heritage (OEH))
BDAR	Biodiversity Development Assessment Report
BFMC	Bush Fire Management Committee
BFSA	Bush Fire Safety Authority
BOM	(Australian) Bureau of Meteorology
BSAL	Biophysical strategic agricultural land
CCP	Community Consultation Plan
CCTV	Closed-circuit television
CEC	Clean Energy Council

Term	Definition
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CER	Clean Energy Regulator
CHMP	Cultural Heritage Management Plan
CIV	Capital Investment Value
CML	Concessional Mass Limit
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
DAWE	(Commonwealth) Department of Agriculture, Water and the Environment (Formally Department of Energy and Environment (DoEE))
dB(A)	Decibels, a measure of A-weighted *(c.f.)* sound levels.
DC	direct current
DECC	Department of Climate Change (now DPE)
DECCW	Department of Climate Change and Water (now DPE)
DEMP	Decommissioning Environmental Management Plan
DoA	(NSW) Department of Agriculture
DP	deposited plan
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
DPI	Department of Primary Industries
EEC	Endangered Ecological Community
EES	(NSW) Environment Energy and Science
EIS	Environmental Impact Statement
ELF	Extremely low frequency, in relation to Hz *(c.f.)*
EMFs	Electric and magnetic fields
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP&A Act	(NSW) Environmental Planning and Assessment Act 1979
EP&A Regulation	(NSW) Environmental Planning and Assessment Regulation 2021
EPA	(NSW) Environment Protection Authority
EPBC Act	(Commonwealth) Environment Protection and Biodiversity Conservation Act 1999
EPC	Engineering Procurement and Construction
EPI	Environmental Planning Instruments
ERP	Emergency Response Plan
ESD	Ecologically sustainable development
GDE	Groundwater Dependent Ecosystems

Term	Definition
GHG	Greenhouse gas
GML	General Mass Limit
GRP	gross regional product
GWh	Gigawatt hours
ha	hectares
HBT	Hollow Bearing Tree
Heritage NSW	The Heritage Council of NSW
IBRA	International Bioregions of Australia
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPA	Inner protection area
kl	kilolitres
km	kilometres
kV	kilovolts
kW	kilowatts
LALC	Local Aboriginal Land Council
LEMC	local emergency management committee
LEP	Local Environment Plan
LGA	Local Government Area
LSC	Land and Soil Capability
LUCRA	land use conflict risk assessment
m	metres
mm	millimetres
ML	Megalitres
MNES	Matters of National Environmental Significance, under the EPBC Act (*c.f.*)
MSDS	Material and Safety Data Sheet
MW	Megawatt
MWh	Megawatt hours
NEG	National Energy Guarantee
NEM	National Electricity Market
NML	Noise Management Level
NPfI	NSW Policy for Industry (2017)
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
NRET	National Renewable Energy Target

Term	Definition
O&M	Office and Maintenance
OEMP	Operation Environmental Management Plan
PBFP	Planning for Bushfire Protection
PCT	Plant Community Type
PCU	Power Conversion Unit
PHA	Preliminary Hazard Analysis
Planning Systems SEPP	State Environmental Planning Policy (Planning Systems) 2021
PMF	Probable Maximum Flood Level
POEO Act	(NSW) Protection of the Environment Operations Act 1997
PV	Photovoltaic
RAPs	Registered Aboriginal Parties
RBL	Rating Background Level - the level of background noise
RE Act	(Commonwealth) Renewable Energy (Electricity) Act 2000
RET	Renewable Energy Target
REZ	Renewable Energy Zone
RFS	(NSW) Rural Fire Service
RNP	Road Noise Policy
Roads Act	(NSW) Roads Act 1993
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEIFA	Socio Economic Indexes for Areas
SEPP	(NSW) State Environmental Planning Policy
SHI	State Heritage Inventory
SSD	State Significant Development
SWMP	Soil and Water Management Plan
TEC	Threatened Environmental Communities
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
LVIA	Visual Impact Assessment
V	Volts
WAD	Works Authorisation Deed
WAL	Water Allocation License
WARR Act	Waste Avoidance and Resource Recovery Act 2001
WMP	Waste Management Plan

SUMMARY

Introduction

Terrain Solar (ABN 13 616 856 172) is an Australian owned and operated business that is developing innovative and strategically located solar farms across regional Australia. From initially locating suitable land and partnering with landowners, Terrain Solar takes projects through engineering design, planning approval, grid connection, financing and investment stages and into construction and operation.

Terrain Solar seeks to develop approximately 152 megawatt (MW) solar farm, to be known as the Marulan Solar Farm, on land at 740 Carrick Road/154 Munro Road, Carrick. The site is located approximately 5km to the west of the town of Marulan and approximately 17 km to the east of the city of Goulburn. The site is located within the Goulburn Mulwaree Local Government Area.

The proposed development represents state significant on the basis that the project entails the delivery of an electricity generating works with a capital investment value of more than $30 million (Clause 20 of Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021*).

Subject to planning and approvals, and detailed design, the construction of the facility is expected to take approximately 18 months, noting an expected three month mobilisation and de-mobilisation period at the beginning and end of the project. The project will employ approximately 300 people during the peak of construction, around five (5) full time equivalent operational workers and has the potential to employ up to 50 casual workers during maintenance periods (such as panel washing or periods of groundcover management).

Decommissioning would entail the removal of all project components with the exclusion of limited electricity infrastructure that would remain the property of the electrical authority (e.g., switching station) and limited infrastructure of ongoing use to the farming operator, followed by rehabilitation to enable the land to return to an agricultural use.

Proposal

The proposal consists of the following components:

- The solar array development area of approximately 330 hectares (including ancillary elements such as a bushfire asset protection zone, external fencing, landscaping as required, and internal access roads);
- Exclusion areas of approximately 35.5 hectares;
- The grid connection infrastructure/substation area of approximately 4-8 hectares;
- A switching station area of up to 2 hectares;
- A BESS, which may be distributed amongst the solar array development area (if DC coupled), or grouped into an area proximate to the substation (if AC coupled); and
- A connecting overhead transmission line.

The proposed development site has been designed iteratively in conjunction with, and informed and modified based on learnings from, the carrying out of specialist investigations to arrive at a development site area that maximises the project potential whilst avoiding and minimising project impacts to the largest extent possible.

The proposed MSF provides for the delivery of clean, green, and sustainable renewable energy , with associated and integrated battery storage that will allow this energy to be supplied to the grid when it is most needed, and will help to ensure the reliability and stability of the energy grid into the future. This will provide significant benefits to both local, regional, state-wide, and broader Australian communities with respect to cost effective, reliable, and carbon free power.

The project is strongly aligned with the objectives of the NSW Government's Electricity Strategy 2019 and is consistent with and will help to ensure delivery of the NSW Electricity Infrastructure Roadmap.

Recent events have strongly supported the need for delivering the renewable energy capacity required generation into the NSW and Australian grid at the earliest possible opportunity to replace expensive, unreliable, and high carbon emitting fossil fuel. A majority of proposed projects that can help to deliver the substantial scale of this required capacity will likely be delayed as a result of the need to wait for either regulatory changes, or the physical delivery of long lead time and expensive transmission infrastructure upgrades.

MSF stands out from the pack on this basis as it utilises the existing network infrastructure so it can be delivered much sooner, contributing more quickly to the new generation capacity requirements of the grid and the state of NSW.

Further, MSF limits the building of new infrastructure to the single host landholder's property, so there is no additional disruption or impact to the broader community created by the need to construct significant additional electrical infrastructure on either public or private land.

By now it is accepted truth that the cheapest source of electricity is from renewable sources. Consequently, demand for renewable energy is high from corporations striving to reduce their electricity costs and to meet their own sustainability targets.

The following is also noted with respect to the project site:

- Under the NSW Transmission Infrastructure Strategy (DPE 2018), upgrades are planned to the 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga;
- The site is mapped under the Renewable Energy Map of New South Wales (NSW Government 2018) as receiving the same or higher level of average daily solar exposure (megajoules per square metre) as parts of the New England REZ and parts of the Hunter-Central Coast REZ; and
- There is a high density of existing and planned wind and solar energy projects in the vicinity of the site.

Environmental issues

An analysis of site constraints via an environmental risk assessment process has identified the following key environmental issues which it was deemed warranted quantitative assessment:

- Aboriginal and historic heritage;
- Water quality
- Hydraulic impacts
- Biodiversity;
- Traffic and access impacts;
- Noise and vibration;
- Social impacts
- Technological hazards;
- Land and soil;
- Visual Impacts;
- Construction and operational noise and vibration

Other matters requiring qualitative assessment in the body of the EIS include cumulative impacts, air quality, land use, hazards, waste management and bushfire assessment.

Mitigation measures outlined in relation to each of the above matters would be addressed in a construction environmental management plan or operational environmental management plan as appropriate.

ABORIGINAL AND HISTORIC HERITAGE

The ACHA (Premise 2022) attached at **Appendix E** concludes that whilst the development would result in impacts to identified Aboriginal objects, these have been assessed as having low to moderate scientific significance. Ongoing consultation with Registered Aboriginal Parties has ensured community awareness of the project and that local cultural knowledge is understood with respect to the land. A range of recommendations are proposed to ensure that residual impacts are appropriately managed.

The SOHI (Premise 2022) attached **Appendix F** provides an assessment of the impact of the proposed development on the locally listed Ruins of Kyle and Lockyersleigh Homestead within the site, as well as on the unlisted historical timber bridge. It concludes that the proposed development would result in no physical impacts to the Ruins of Kyle, moderate physical and visual impact to the heritage curtilage of the Ruins of Kyle, neutral physical impact and negligible visual impact to the Lockyersleigh Homestead and nil impact on the historical timber bridge. A number of recommendations are made to mitigate impacts to the heritage items, including the installation of a high-visibility barriers during construction in relation to heritage items and the provision of a development buffer area around the Ruins of Kyle.

WATER QUALITY

The Water Cycle Management Study Report (Premise 2022) attached at **Appendix J** confirms that the proposed development would result in a neutral or beneficial impact on water quality. The WCMSR notes with respect to water quality:

> *Results of MUSIC modelling demonstrate that post development pollutant loads are less than and/or equal to pre-development pollutant loads. While cumulative frequency graphs portray a slight increase in Phosphorus and Nitrogen levels between the 50th to 98th percentile a neutral or beneficial effect is achieved for mean annual loads within the post development model.*
>
> *The proposed development, if undertaken in accordance with the principles outlined in this assessment, would ensure that stormwater pollutants were reduced and that mean annual load reductions in Total Suspended Solids and Total Phosphorus meet NorBE. Total Nitrogen Mean annual loads may require additional treatment to satisfy NorBE requirements.*
>
> *Additional reductions to phosphorus and nitrogen levels through the 50th and 98th percentile may require the inclusion of additional treatment detailed during the engineering design phase.*
>
> *All system components would be subject to further detailed assessment and design during the engineering design phase, based on the principles outlined in this assessment.*

HYDRAULIC IMPACTS

The Hydraulic Assessment (Premise 2022) attached in **Appendix H** provides an assessment of pre and post development flood affectation within the site based on hydraulic modelling. The modelling indicates that the proposed solar farm will not cause external impacts in terms of water surface levels and peak discharges and accordingly no mitigation measures such as detention basins are required. Additionally, proposed solar panels are within the bounds of low flooding risk (depth less than 0.9 metres and velocities less than 1m/s) and other infrastructure including the substation is outside of the 1% AEP flood extent. The risk of erosion and scour is considered to be minimal.

BIODIVERSITY

The BDAR (Premise 2022) attached at **Appendix K** provides an assessment of the loss of biodiversity as a consequence of the proposed development in accordance with the BC Act and *Biodiversity Conservation Regulation 2017* (the BC Regulation). It concludes that the proposed solar farm will result in the loss of 7.89 hectares of native vegetation and 16 isolated scattered trees, as well as 0.17 hectares of rock outcrop and 3.6 hectares of exotic grassland that is potential habitat for threatened species. The BDAR confirms that Terrain Solar will satisfy the biodiversity credit requirements using offset mechanisms allowed by the NSW Biodiversity Offsets Scheme (i.e. contribution to the Biodiversity Trust Fund administered by the NSW Biodiversity Conservation Trust, purchase of existing credits on the market, funding of a biodiversity conservation action, retirement of biodiversity credits and/or mine site ecological rehabilitation).

The process identified that referral of the project to the Commonwealth Department Agriculture, Water and the Environment (DAWE) was prudent, however this referral confirmed that the project does not represent a controlled action.

TRAFFIC AND ACCESS

The TIA (Premise 2022) attached at **Appendix L** provides an assessment of the traffic generation of the proposed development, it's impact on the Hume Highway and Munro Road, the intersection of the Hume Highway and Munro Road, and the intersection of Munro Road and the proposed solar farm service road. It concludes that whilst construction traffic will have greater impact than operational traffic, traffic during the construction phase can be accommodated by the existing road network along the Hume Highway and Munro Road and associated intersections. However, the implementation of a driver code of conduct and upgrades to Munro Road are recommended. The code of conduct ensures that, *inter alia*, drivers only enter and exit Munro Road via left-turn movements. The road upgrades will allow sufficient road width for heavy vehicles using Munro Road and pass in opposite directions.

NOISE & VIBRATION

An NVIA is provided at **Appendix N**. It includes an assessment of construction noise, operational noise, road traffic noise and vibration impacts. It concludes that the proposed development will result in compliant noise impacts to nearby, non-associated sensitive receptors during the construction (both construction activities and road traffic noise) and operational phase. Additionally, it confirms that vibration impacts will not be significant. Recommended mitigations measures are limited to appropriate use, selection and maintenance of construction equipment.

SOCIAL IMPACTS

A Rapid Social Impact Assessment is conducted at **Section 6.15**. It concludes that the proposed development will have:

- Negative impacts with medium significance on a small number of adjacent neighbours, nearby residents and the broader local community during the planning and assessment phase;
- During the construction phase:
    - Positive impacts with high significance on employment and labour and general economic activity for local and regional people and businesses; and
    - Negative impacts with low to high significance on rental housing and short-term accommodation, way of life, local area roads, amenity (noise, air quality, lighting), community composition and social infrastructure on vulnerable populations, neighbouring and nearby residents and Goulburn and surrounding towns.

- Negative impacts with low to medium significance on visual amenity, glare and reflectivity, way of life, amenity (noise, lighting), safety and hazard risks and landscape values on a small number of adjacent neighbours, neighbouring and nearby residents and the broader local community.

The following mitigation measures are recommended:

- Targeted engagement with neighbouring landholders focused on addressing issues and developing ongoing trust to mitigate health and wellbeing (stress and anxiety), decision-making systems (lack of inclusion), pressure on rental and short-term accommodation, visual amenity and glare and reflectivity;
- An accessible complaints process with a timely response protocol to mitigate health and wellbeing (stress and anxiety), decision-making systems (lack of inclusion), way of life (travel, quiet enjoyment) and amenity impacts during construction (noise, air quality, lighting);
- A Local Industry Participation Plan to promote employment and labour and increase in economic activity impacts;
- An Accommodation and Employment Strategy to mitigate pressure on rental housing and short-term accommodation impacts;
- A Construction Traffic Management Plan and Driver Code of Conduct to mitigate way of life (travel, quiet enjoyment), local area roads and amenity impacts during construction (noise, air quality, lighting);
- A Noise Management Plan to mitigate way of life (travel, quiet enjoyment) and amenity impacts during construction (noise, air quality, lighting);
- Continued implementation of the CSEP, regular community updates about the progress of the Project and findings of the technical assessments and consideration of development of a community benefit sharing scheme to mitigate decision-making systems (lack of inclusion) impacts;
- Local Procurement Policy where possible to mitigate increase in economic activity impacts; and
- Measures as per the Visual Impact Assessment (see **Section 6.8**) and the glare assessment (see **Section 6.10**) to mitigate visual amenity and glare impacts during the operation of the solar farm.

TECHNOLOGICAL HAZARDS

Riskcon has prepared a Preliminary Hazard Analysis (PHA) in relation to the project attached as **Appendix O**. The PHA provides a comprehensive assessment of potential impacts with respect to hazard, including specifically:

- Li-ion battery fault, thermal runaway and fire.
- Li-ion battery fire and toxic gas dispersion.
- Electrical equipment failure and fire.
- Transformer internal arcing, oil spill, ignition and bund fire.
- Electromagnetic field Impacts.
- Gas pipeline impacts.

The assessments conclude that, subject to the implementation of standard mitigation measures, the proposed development is unlikely to lead to significant risk and that risks at the site boundary are not considered to exceed the acceptable risk criteria.

LAND AND SOIL

Premise has completed an LSC Assessment for the MSF project in accordance with the LSC Scheme attached at **Appendix G**. The study area is not considered highly productive agricultural land as defined in the LSC Scheme.

The assessment found that overall land and soil capability for the study area ranges from Class 5 (moderate – low capability land) to Class 7 (very low capability land). The land and soil capability limitations of the study

area will require careful management. Potential impacts to soil from the proposed development have been identified with appropriate mitigation measures provided for the construction, operation and decommissioning phases.

A Land Use Conflict Risk Assessment (LUCRA) prepared by Premise is attached at **Appendix I**. The LUCRA identifies a range of potential risks associated with the project.

Through the effective implementation of management strategies, it is considered likely that the above potential land use conflicts can be effectively minimised to an acceptable level. Management strategies include the implementation of mitigation measures as recommended throughout this EIS and associated supplementary reporting.

Revised risk rankings identified moderate risk conflicts for the following:

- All land uses
  - Risk to property, including bushfire and flooding risks.
- Agricultural land use
  - Economic Interest, including impacts to insurance premiums and land values.
- Extractive industry land use
  - Environmental concerns, including the potential for cumulative impacts.
  - Health and safety, including concerns regarding the proximity of the solar farm to quarry operations
  - Economic Interests, including impacts to insurance premiums

Key mitigation measures designed to reduce risks as they relate to remaining moderate conflicts include:

- Implementation of effective bushfire mitigation measures, including the provision of adequate asset protection zone, appropriate site access arrangements, on site supply of fire-fighting water and preparation of appropriate CEMP and OEMP sub-plans;
- Implementation of effective measures to ensure control of erosion and sediment through adoption of appropriate CEMP and OEMP sub-plans;
- Preparation of a project specific construction traffic management plan, including consultation with GMC and TfNSW;
- Preparation of a construction noise management plan; and
- Ongoing consultation with stakeholders around issues with the potential to cause conflict to ensure clear lines of communication and a clear understanding of proposed risk mitigation.

The average revised risk ranking for all identified land use was 7.5 (low risk) which is consistent with the LUCRA objective to lower the risk ranking to 10 or below.

VISUAL IMPACTS

Iris Visual Planning and Design has prepared a Landscape and Visual Impact Assessment (LVIA) attached at **Appendix M**. The assessment provides a comprehensive review of potential visual and glare impacts, with consideration of key viewpoints and potentially visible locations.

The LVIA concludes that the proposed development has a generally low level of visibility and is capable of being accommodated within the receiving environment with generally low to negligible visual and glare impacts to potentially sensitive receivers and viewpoints.

ENGAGEMENT

WSP were engaged to conduct community and stakeholder engagement on behalf of Terrain Solar.

The engagement process included direct and indirect engagement with the community and receivers in proximity to the project, together with targeted discussions with regulatory agencies, including site visits with representatives of Biodiversity, Conservation and Science Directorate and the Commonwealth Department of Agriculture, Water and the Environment.

The main areas of feedback identified throughout the engagement process were:

- Visual amenity – questions raised about the potential for visual impacts, including possible glare and reflectivity;
- Traffic impacts – interest and questions around the construction and operational access routes to the property, including the ability of Munro Road to adequately accommodate heavy vehicles and higher volumes of traffic during construction;
- Aboriginal and Cultural Heritage – concerns around the significance of the land and the potential for impacts to known and unknown sites and artefacts of Aboriginal significance.

As a result of this information, the project was able to be amended in the following meaningful ways:

- The project footprint was able to be refined to provide internal exclusions zones, incorporated robust landscape plantings, to soften the visual impact of the project;
- An analysis identified Munro Road is under capacity, and subject to minor works in certain areas, can accommodate the predicted volumes of construction traffic;
- Adoption of the use of b-double sized vehicles reduces the number of construction trips needed for the project; and
- Careful and ongoing engagement with Aboriginal representatives ensures the views of the Aboriginal community are clearly understood and areas of sensitivity avoided.

A range of ongoing measures are proposed throughout project delivery, as summarised in the section above on Social Impacts, to ensure that the community and neighbours remain engaged by the project and that clear lines of communication between the project developers and the community are maintained.

Environmental Management and Monitoring Framework

Throughout construction, management measures will be implemented through the adoption of a construction environmental management plan, which will consist of a range of sub-plans, including but not limited to the following:

- Traffic Management Plan
- Bushfire Management Plan
- Construction Noise and Vibration Management Plan
- Landscape Implementation Plan
- Soil and Water Management Plan
- Emergency Response Plan
- Community Engagement Plan
- Waste Management Plan
- Incident Management Procedures

Operation and monitoring of the facility would be governed by an adopted operational environmental management and monitoring plan that would clearly identify any residual matters requiring ongoing attention during operation, with particular emphasis on groundcover management, bushfire management, risk management, landscape implementation, and monitoring and ongoing noise monitoring to ensure ongoing compliance with adopted criteria.

The site is expected to operate for a period of approximately 30-35 years, after which it would be decommissioned, in accordance with the measures outlined in a decommissioning management plan.

Justification

The assessments presented in the EIS indicate that the proposed Marulan Solar Farm should be approved on the basis that it provides a range of benefits to the local region, the region, the state and the country, in the context of meeting renewable energy targets. Recent events have made abundantly clear the need to meet these targets at the earliest possible opportunity is imperative, from climate, environmental, energy supply, and energy reliability and security perspectives.

Given the ability of this project to utilise existing network infrastructure, without the requirement for waiting for further transmission infrastructure to be constructed, the project can be delivered and contribute to those objectives relatively quickly. The need to replace expensive, unreliable, and high carbon emitting fossil fuel generation with clean, low cost, renewable generation at the earliest possible opportunity could not be clearer.

The technical studies supporting the EIS confirm that the proposed development would not lead to any significant or detrimental impacts to the environment, and that residual impacts are manageable through the implementation of standard measures.

The Proposal is consistent with the objects and matters for consideration in the EP&A Act and with the principles of Ecologically Sustainable Development.

The EIS concludes that the Proposal would not significantly affect environmental, cultural, social and economic values at the local or regional scale and is therefore considered to be in the public interest.

1. INTRODUCTION

1.1 The Applicant

Terrain Solar (ABN 13 616 856 172) is an Australian owned and operated business that is developing innovative and strategically located solar farms across regional Australia. From initially locating suitable land and partnering with landowners, Terrain Solar takes projects through engineering design, planning approval, grid connection, financing and investment stages and into construction and operation.

The company brings together industry leaders with a strong track record in the development of large-scale renewable energy projects. The team have collectively developed over 2,000 megawatts of renewable energy projects across Australia, South Africa and the Pacific Region and are specialists in the land use, planning, engineering, energy and finance sectors.

Terrain Solar has successfully established solar farms at Warwick (Southern Downs QLD), Corowa (Murray NSW), Junee (Riverina NSW), Wagga Wagga (Riverina NSW) and Molong (Central-West NSW). Other than the site subject of this application, Terrain Solar has additional current projects, all at various stages of development at Myrtle Creek (North Coast NSW), Monaro (Southern Tablelands NSW), Singleton (Hunter Valley NSW), Kingaroy (South Burnett QLD) and Moama (Murray NSW).

1.2 Simple Description of the Project

Premise has been commissioned by Terrain Solar (the Applicant) to prepare an Environmental Impact Statement (EIS) to support a State Significant Development Application (SSDA) for an approximately 152 MW solar farm and associated works at Lot 55 DP1141136 (otherwise known as 740 Carrick Road/154 Munro Road, Carrick NSW 2580). Lot 55 DP1141136, hereafter referred to as '**the site**', has an area of approximately 1,400 hectares and is located in the Goulburn Mulwaree Council (GMC) Local Government Area (LGA) (refer to **Figure 1**). The project is to be known as the Marulan Solar Farm (MSF).

The solar farm is to occupy approximately 375.5 hectares of the site, hereafter referred to as '**the project area**'. As shown in the project layout drawing (**Figure 13**), and described in greater detail in **Section 3** of this report, the project area is located on the southern side of an existing gas pipeline running east-west through the site. The solar farm will include an office and maintenance compound, Battery Energy Storage System (BESS), 132 kV substation, switching station, 132 kV overhead or underground power lines connecting the solar farm substation to the switching station, temporary construction compound and internal access roads. Batteries would be provided either via an AC-coupled arrangement (ie, co-located with the substation) or a DC-coupled arrangement (ie, distributed throughout the site). Both arrangements have been assessed via this EIS to ensure all potential impacts are understood.

Terrain Solar's objectives for the project are as follows:

- Develop a sustainable, safe and efficient electricity generating resource that assists with achieving the state and national renewable energy goals and assisting with the decarbonisation imperative;
- Provide on-site battery storage with connection to the grid to allow this renewable energy to be supplied to the grid when it is most needed for better management of peak load requirements;
- Ensure ongoing compliance with key environmental and regulatory requirements, in conjunction with key stakeholders;
- Be a good neighbour; and
- Contribute positively to the local and regional economy through employment and investment.

This EIS is prepared subsequent to a Scoping Report, also prepared by Premise, submitted to the (then) Department of Planning, Industry and Environment (DPIE) on 21 January 2021. This EIS has been prepared pursuant to Part 5, Division 5.1, Subdivision 3 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation), *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021) and SEARs issued by DPIE on 19 February 2021 in response to the Scoping Report (refer to **Appendix A**).

1.3 Background

1.3.1 RELEVANT HISTORY

A portion of the site was formerly the subject of a request for SEARs for another solar farm development, known as the Carrick Solar Farm (SSD-8734), proposed to be developed by Photon Energy AUS SPV 6. As a result of the land option lapsing, Photon have not proceeded with the project and the SEARs for that project have now lapsed.

Terrain Solar has entered into an agreement with the land owner to enable the development to proceed. A range of studies were completed by Photon in the initial stages of the Carrick SF project, and a small number of these have been used to scope and inform studies prepared in relation to this EIS.

1.3.2 KEY STRATEGIES ADOPTED TO AVOID, MINIMISE OR OFFSET IMPACTS

The priority for the project has been to initially avoid impact, followed by an approach of impact minimisation. Where avoidance or minimisation still results in impact, offsetting is proposed.

An initial constraints mapping exercise, including with respect to Aboriginal heritage, hydraulic impacts, water quality and visual impacts, and informed by site survey, has identified areas of sensitivity across the site. This has also included liaison with specific regulatory agencies where relevant, including NRAR - with respect to water corridors, NSW Biodiversity Conservation Science Division (BCSD) - with respect to habitat and species, NSW Department of Agriculture (DoA) - with respect to biosecurity and important agricultural land, and the Department Agriculture, Water and Environment (DAWE) - with respect to federally listed species.

As a result of the mapping and site analysis, exclusion areas have been adopted to ensure areas of higher sensitivity are avoided. Recommended management techniques assist to manage residual impacts. Where further management is required with respect to biodiversity impacts, offsetting is proposed – refer **Section 6.4**.

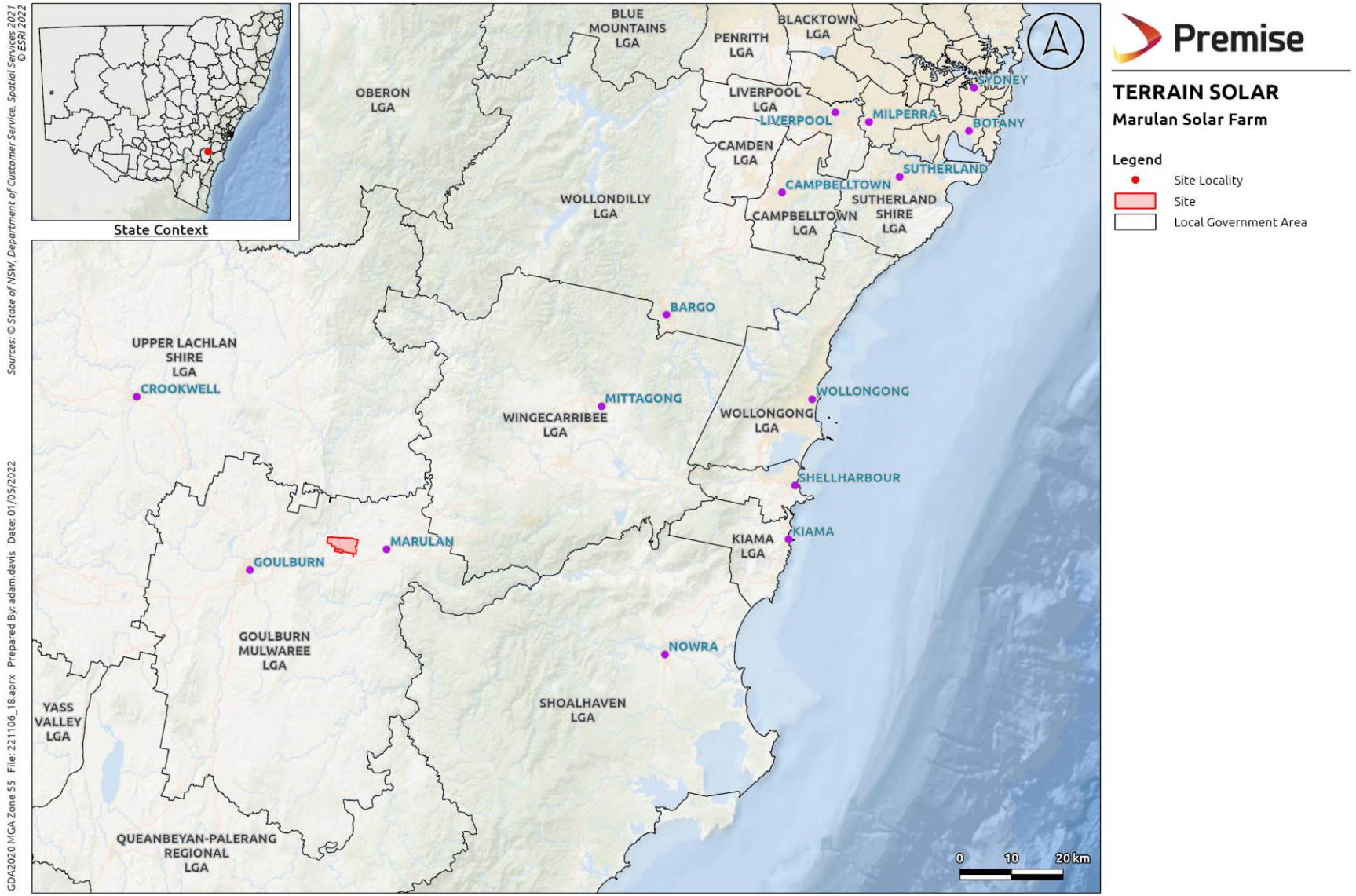
A summary of mitigation measures is provided in **Appendix D**.

1.4 Related Development

Review of GMC's DA tracker identified a single approval pertaining to the site, being a Subdivision Construction Certificate (CC/0192/1011) issued on 17 February 2011. There are no known existing or continuing use rights applying to the site. Besides the Scoping Report which precedes this EIS (and the scoping report prepared for the Carrick SF) no other approvals apply to the site.

Subject to agreement with Essential Energy, the transmission line connecting the substation (in the south) with the switching station (in the north), together with the development of the switching station, may be delivered via a Part 5 approval management by Essential Energy (as this infrastructure, once built and operational, would be dedicated to Essential Energy and built to their standards). Notwithstanding, to ensure that all impacts of the project are appropriately assessed, impacts associated with the proposed connection, the substation and switching station have been assessed via this EIS.

Figure 1 – Regional Context



1.5 Restrictions or covenants

The land is impacted by a range of restrictions and covenants, as listed below:

- Reservations and conditions in the crown grant(s)
- Land excludes minerals within the part(s) shown so indicated in the title diagram
- D247817 – Easement for transmission line 30.48 metres wide affecting the part(s) shown so burdened in the title diagram 2358684 now vested in New South Wales Electricity Transmission Authority and AC874454 easement now vested in country energy vested in the NSW Electricity Transmission Authority;
- H826489 easement for transmission line 60.96 metre(s) wide affecting the part(s) shown so burdened in the title diagram 2158017 now vested in New South Wales Electricity Transmission Authority;
- DP1095572 restriction(s) on the use of land referred to and numbered (7) in the s. 88b instrument affecting the part(s) shown so burdened in the title diagram
- K135416 easement for transmission line 60.96 metre(s) wide affecting the part(s) shown so burdened in the title diagram 2154355 easement vested in New South Wales Electricity Transmission Authority
- DP1095572 restriction(s) on the use of land referred to and numbered (8) in the s. 88b instrument affecting the part(s) shown so burdened in the title diagram
- DP1095572 positive covenant referred to and numbered (9) in the s. 88b instrument affecting the part(s) shown so burdened in the title diagram
- Q147076 easement for pipeline 24.385 metre(s) wide by notification in Australian government gazette 73a of 5.9.1974 affecting the part(s) shown so burdened in the title diagram O335764 easement vested in the commonwealth of Australia and East-Australian pipeline limited
- DP1095572 positive covenant referred to and numbered (11) in the s.88b instrument affecting the part(s) shown so burdened in the title diagram
- I329034 easement for transmission line 45 metre(s) wide affecting the part(s) shown so burdened in the title diagram 2470213 easement vested in the New South Wales Electricity Transmission Authority AC875169 easement now vested in Country Energy
- DP1095572 right of access variable width appurtenant to the part(s) shown so benefited in the title diagram AF660624 mortgage to Commonwealth Bank of Australia
- AI26295 easement for pipeline and water supply 6 wide affecting the part designated (w) in DP1171368.

The above restrictions/easements do not inhibit the carrying out of the proposed development. These easements would not be impacted by the project and all permissions would be maintained.

1.6 Planning Framework

The proposed solar farm is consistent with the definition of 'electricity generating works', defined under the applicable LEP, the *Goulburn Mulwaree Local Environmental Plan 2009* (the GMLEP 2009) as:

> *a building or place used for the purpose of—*
>
> *(a) making or generating electricity, or*
>
> *(b) electricity storage.*

Section 4.36(2) of the EP&A Act provides that a State Environmental Planning Policy may declare any development, or any class or description of development, to be SSD. Clause 2.6(1) of the Planning Systems SEPP provides that development is declared to be SSD for the purposes of the EP&A Act if:

(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act; and

(b) the development is specified in Schedule 1 or 2 of the SEPP.

The proposed development is SSD on the following grounds:

- The development is permitted with consent in the RU1 Primary Production zone applying to the site under the GMLEP 2009, satisfying Section 2.6(1)(a) of the Planning Systems SEPP; and
- The proposed solar farm has CIV exceeding $30 million in accordance with Clause 20 in Schedule 1 of the Planning Systems SEPP, satisfying Clause 2.6(1)(b) of the SEPP.

The applicable statutory context is considered in greater detail in **Section 4** and compliance with the SEARs is provided in **Appendix B**.

1.7 Report Structure

In accordance with the *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021), this EIS has been prepared and is provided in the following format.

- **Section 1** of this report sets the context for detailed assessment of the project in the following sections of the EIS and includes a description of the applicant, the project, the background to the project, any related development and any restrictions or covenants that apply to the site.
- **Section 2** of this report provides the strategic context and includes any supporting strategies, policies or plans, key features of the site and surrounds, likelihood of generating cumulative impacts any agreements entered into with other parties.
- **Section 3** outlines the proposed development, including the project area, physical layout and design, uses and activities and timing.
- **Section 4** details the statutory context relevant to the justification and evaluation of the project.
- **Section 5** identifies the key stakeholders for the project and describes what actions were taken with respect to community engagement in accordance with *Undertaking Engagement Guidelines for State Significant Projects* and SEARs.
- **Section 6** identifies the impacts of the proposed development, including the condition of the existing environment, the ability to avoid, mitigate and/or offset the impacts of the development, the scale and nature of the predicted impacts, key uncertainties associated with the assessment and proposed measures to deal with these uncertainties.
- **Section 7** provides the justification for the proposed development, including impact avoidance or minimisation measures, consistency with the strategic context, compliance with any relevant statutory requirements, outcomes of community engagement, the scale and nature of the impacts of the project, how compliance will be monitored and how key uncertainties will be addressed.

2. STRATEGIC CONTEXT

2.1 Policy

2.1.1 NSW ELECTRICITY STRATEGY 2019

The NSW Electricity Strategy 2019 is:

the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy.

The aims of the strategy are to:

- deliver Australia's first coordinated *Renewable Energy Zone* in the Central-West Orana region
- save energy, especially at times of peak demand, via the *Energy Security Safeguard*
- support the development of new electricity generators
- set a target to bolster the state's energy resilience
- make it easier to do energy business in NSW.

The strategy recognises that congestion in the transmission system can have the effect of dampening investment in new types of generation that would have the effect of reducing electricity prices, improving reliability and protecting the environment.

As part of the strategy, the establishment of Renewable Energy Zones is proposed, including in the Central West and Orana, New England region and South-West. This is discussed further below.

2.1.2 NSW ELECTRICITY INFRASTRUCTURE ROADMAP

DPIE released the NSW Electricity Infrastructure Roadmap in November 2020. Key actions from the Roadmap include:

- Renewable Energy Zones (REZs);
- Transmissions development scheme;
- Electricity Infrastructure Investment Safeguard;
- Pumped Hydro Recoverable Grants Program; and
- Internationally competitive NSW industries.

Five REZs are at various stages of development including in the Central West-Orana, New England, South-West, Hunter-Central Coast and Illawarra, selected based on the availability of resources and existing connecting infrastructure. Whilst the site is not located within any of the current REZs:

- Under the NSW Transmission Infrastructure Strategy (DPE 2018), upgrades are planned to the 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga;
- The site is mapped under the Renewable Energy Map of New South Wales (NSW Government 2018) as receiving the same or higher level of average daily solar exposure (megajoules per square metre) as parts of the New England REZ and parts of the Hunter-Central Coast REZ; and
- There is a high density of existing and planned wind and solar energy projects in the vicinity of the site.

2.1.3 SOUTH EAST AND TABLELANDS REGIONAL PLAN 2036 (DPE 2017)

The South East and Tablelands Regional Plan prepared by the Department of Planning and Environment (DPE) establishes the 20-year vision for the region to 2036 as *"A borderless region in Australia's most geographically diverse natural environment with the nation's capital at its heart"*. The vision is supported by 28 Directions grouped under four Goals. A number of Actions sit under each Direction.

Relevant to the proposed development, Direction 6 *Position the region as a hub of renewable energy excellence* under Goal 1 *A connected and prosperous economy* includes the following Actions:

- Action 6.1: Identify opportunities for renewable energy industries.
- Action 6.2: Develop analytical tools to map large-scale renewable energy potential.

- Action 6.3: Encourage the co-location of renewable energy projects to maximise infrastructure, including corridors with access to the electricity network.
- Action 6.4 Promote best practice community engagement and maximise community benefits from renewable energy projects.
- Action 6.5 Promote appropriate smaller-scale renewable energy projects using bioenergy, solar, wind, small-scale hydro, geothermal or other innovative storage technologies.

The proposed development is consistent with the above actions on the basis that it:

- Is located within land which is mapped as receiving under the Renewable Energy Map of New South Wales (NSW Government 2018) as receiving the same or higher level of average daily solar exposure (megajoules per square metre) as parts of the New England REZ and parts of the Hunter-Central Coast REZ; and
- Is located in an area with a high density of existing and planned wind and solar energy projects, as well as enabling infrastructure including:
  - Two overhead 330kV transmission lines and one 132kV transmission lines running north-south in the western portion of the site, overhead 66kV transmission line running east-west through the southern/central portion of the site; and
  - 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga, identified for upgrade under the NSW Transmission Infrastructure Strategy (DPE 2018).
- Promotes best practice community engagement and maximises community benefits as detailed in **Section 5**.

2.1.4 GOULBURN MULWAREE COUNCIL LOCAL STRATEGIC PLANNING STATEMENT (GMC 2020)

The GMC Local Strategic Planning Statement (LSPS) establishes a 20-year vision for the LGA to 2040 as *"a modern city located in a vibrant, growing rural region…"*. The vision is supported by ten Planning Priorities, each of which is supported by a number of Challenges for Land Use and Planning Principles.

The following Challenges for Land Use and Planning Principles are relevant to the proposed development:

- Planning Priority 6: Primary Industry
  - Planning Principles:
    - Promote renewable energy projects.
    - The co-location of renewable energy projects should occur where possible, in order to maximise infrastructure, including corridors with access to the electricity network.
- Planning Priority 7: Sustainability
  - Challenges for Land Use:
    - Supporting increased take up of renewable energy generation and use.

The proposed development is consistent with the above planning priorities:

- Located in an area with a high density of existing and planned wind and solar energy projects, as well as enabling infrastructure including:
  - Two overhead 330kV transmission lines and one 132kV transmission line running north-south in the western portion of the site, overhead 66kV transmission line running east-west through the southern/central portion of the site; and
  - 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga, identified for upgrade under the NSW Transmission Infrastructure Strategy (DPE 2018).

- Results in acceptable impacts for other land resources (refer to **Section 6.2.3**).

2.1.5 TABLELANDS REGIONAL COMMUNITY STRATEGIC PLAN 2016-2036 (GMC, ET AL. 2016)

- The Tablelands Regional Community Strategic Plan 2016-2036 (TRCSP) is an integrated planning document that aims to identify the main priorities and future aspirations of the tableland's region, including LGAs for Goulburn Mulwaree, Upper Lachlan Shire and Yass Valley. The plan establishes a vision for the region to guide the delivery of services and facilities to achieve community goals: *"To build and maintain sustainable communities while retaining the region's natural beauty."* The vision is supported by 5 strategic pillars and 28 strategic priorities.
- The following strategic priorities are relevant to the proposed development
- Our Environment
  - EN4: Maintain a balance between growth, development and environmental protection through sensible planning
  - EN5: To investigate and implement approaches to reduce our carbon footprint.
- Our Economy
  - EC1: Capitalise on the region's close proximity to Canberra and its position as a convenient location to attract industry and investment
  - EC5: Encourage collaboration between businesses, government, and training providers to develop employment and training opportunities for young people in the region.
  - The proposed development is consistent with the above strategic priorities
- Contributes to development and growth in tablelands region while balancing potential environmental impacts (refer to Section 5.5).
- Provides an alternative to fossil fuel electrical generation and associated high level carbon emissions, generating lower emission renewable energy to the region,
- Capitalises on the regions' convenient location with the site situated in proximity to the Hume highway, a major transport corridor between Sydney and Canberra;
- Encourages employment opportunities for the region.

The proposed development is not considered to be antipathetic to the strategic objectives of the CSP.

2.1.6 MAINTAINING LAND FOR AGRICULTURAL INDUSTRIES

The 2011 NSW Department of Primary Industries policy document *Maintaining land for agricultural industries* seeks:

> *To guide the planning system in providing certainty and security for agricultural enterprises over the long term and to enable those enterprises to respond to future market, policy, technology and environmental changes. Key elements are:*
>
> - *land with the best combination of soil, climate, topography and water for agricultural production is a limited resource in New South Wales and should be maintained for future generations;*
> - *agricultural land should not be alienated directly through lands being used for non-agricultural purposes and indirectly by incompatible developments on adjacent land restricting routine agricultural practices; and*
> - *agricultural industries are a fundamental asset to the state of NSW as they provide a long term means of providing employment, raw materials and fresh safe secure food while supporting regional communities.*

In terms of the policy's scope:

> *This policy document provides direction to Industry and Investment staff and guidance to planning authorities and communities in developing and implementing environmental planning instruments relevant to agriculture or rural communities. These instruments include State Environmental Planning Policies, Regional Environmental Plans, Local Environmental Plans and Development Control Plans developed under the Environmental Planning and Assessment Act, 1979.*

As it relates to the proposed MSF, and the conversion of land currently used for agricultural use to a solar farm, the policy states:

> *The conversion of land used by agricultural enterprises to other uses should only take place where fully justified in the strategic planning context. Considerations include;*
>
> - *all alternative sites and options for non-agricultural developments;*
> - *any decisions to convert agricultural land of high value to regional and state agricultural industries should be a last option; and*
> - *the impact of non-agricultural developments on agricultural business and infrastructure reliant on the surrounding agriculture production.*
>
> *It is recognised that changing community needs and aspirations may require a change in the use of agricultural land. Once land is converted to other uses, especially to residential or industrial uses, it is most unlikely to return to agricultural production. Since these decisions cannot be practically reversed. the long term social and economic costs and benefits (including intergenerational equity), need to be evaluated before a decision is made (i.e. triple bottom line or people, planet, profit assessment).*
>
> *The objective is not to prevent or discourage other land uses, but rather through planning ensure that land resources are efficiently allocated so as to maximise total benefit to the community. To achieve this goal, planning authorities should develop planning strategies for rural and agricultural industries when they develop strategies for other land uses. The determination of the economic, environmental and social contributions from agricultural land uses can be undertaken preferably through an agricultural industry study or regional rural land use study with emphasis on the major agricultural industries.*
>
> *Where a change in land use appears to be desirable, any changes to environmental planning instruments should only be made after open and informed consultation with the community. Spot rezonings and other ad hoc approaches to planning are undesirable. Changes should be implemented in a way that minimises the impact on existing agricultural enterprises, such as by phasing in the change and providing buffers between agricultural and non-agricultural properties.*

An assessment of the impact of the proposed development on agricultural land within the site and on surrounding land is provided in **Section 6.3.1**.

2.2 Regional Context

As shown in **Figure 1**, the site is located in the locality of Carrick, approximately 4.6 kilometres to the west of the town of Marulan and 10.6 kilometres to the east of Goulburn in the GMC LGA. Munro Road links to the

Hume Highway, which in turn links to the town of Marulan in the east and Goulburn in the west. Marulan is a town of 1,178 people (as at 2016) with a small supermarket, collection of small shops and cafes, hotel and motel accommodation, light industrial uses, open space and a public school.

Marulan benefits from a high level of accessibility owing to its location at the intersection of the Hume Highway and the Main South Line. The former provides access to Canberra (127 kilometres) to the south-west and the Sydney CBD (175 kilometres) to the north-east via Campbelltown (112 kilometres) and Port Botany (169 kilometres). The latter provides access to Campbelltown (2 hours) and Goulburn (20 minutes) Railway Stations via the Marulan Railway Station, located near the centre of the town. Large highway service centres are located on either side of the Hume Highway service the significant number of vehicles travelling between Sydney and Canberra on a daily basis.

2.3 Local Context

As shown in **Figure 2**, the site's local context comprises predominantly agricultural land used for grazing modified pastures and grazing native vegetation to the north and south and extant vegetation between the site's western boundary and the Wollondilly River. Other major land uses include the Holcim Lynwood Quarry and Gunlake Quarry to the east and north of the site respectively, as well as the Southern Tablelands Gliding Club to the north-west.

One associated residential receiver and 18 non-associated residential receivers are located within two kilometres of the site. A further 29 non-associated receivers are located within four kilometres of the site.

2.4 Site Description

2.4.1 OVERVIEW

The proposed approximately 152 MW solar farm and associated works are to be established within Lot 55 DP1141136 (otherwise known as 740 Carrick Road/154 Munro Road, Carrick NSW 2580). Lot 55 DP1141136, hereafter referred to as '**the site**', has an area of approximately 1,400 hectares and is located in the Goulburn Mulwaree Council (GMC) Local Government Area (LGA) (refer to **Figure 1**). The solar farm project area occupies approximately 375.5 hectares of the site (including mapped exclusion areas), hereafter referred to as '**the project area**'.

As shown in **Figure 2**, the 1,400 hectare site has an irregular shape with a narrow, 27 metre-wide frontage to Munro Road to the south. The site's 5,918 metre northern boundary adjoins the Main South Railway which runs from Sydney to Melbourne. Nearest stations are at Marulan to the east and Goulburn to the west.

The site has undulating topography with low peaks, shallow gullies and creeks scattered throughout, generally coinciding with mapped waterways. The site is currently used for grazing of modified pastures and grazing of native vegetation, with some cropping occurring in the central, northern portion of the site.

2.4.2 ACCESS

As shown in **Figure 3**, the site has a 27 metre-wide access handle located between 3 Graham Lane and Lot 54/DP1141136 connecting to Munro Road. Munro Road is a local road with a speed limit of 100 kilometres per hour in both directions, connecting to the Hume Highway to the south. Along its length Munro Road features a generally seven metres wide formed pavement with 500mm gravel edges. No line marking is provided. There is no existing driveway at the beginning of or within the site access handle. The construction of both a driveway crossover from Munro Road and driveway/access track within the access handle would be necessary to enable vehicular access to the site. As Munro Road is a local road, GMC is the roads authority and approval under Section 138 of the *Roads Act 1993* will be required from GMC for the opening of the new access.

At the Hume Highway/Munro Road intersection, an approximately 125 metre-long channelised left turn into Munro Road is provided for north/east-bound traffic from the Hume Highway and an approximately 155 metre-long channelised right turn into Munro Road is provided for south/west-bound traffic from the Hume Highway. Acceleration lanes for vehicles exiting Munro Road are not available in either direction, requiring vehicles exiting Munro Road to wait for adequate gaps in traffic along the Hume Highway to accelerate in the mainstream lanes to the 110 kilometre per hour speed limit applying in both directions.

The site is separated from Carrick Road to the west by Lot 7007/DP1110763 which has a minimum width of 22 metres. Carrick Road runs north-south to the west of the site with a speed limit of 100 kilometres per hours in both directions between the Hume Highway to the south and Brayton Road at Brayton (north).

Figure 2 – Local Context

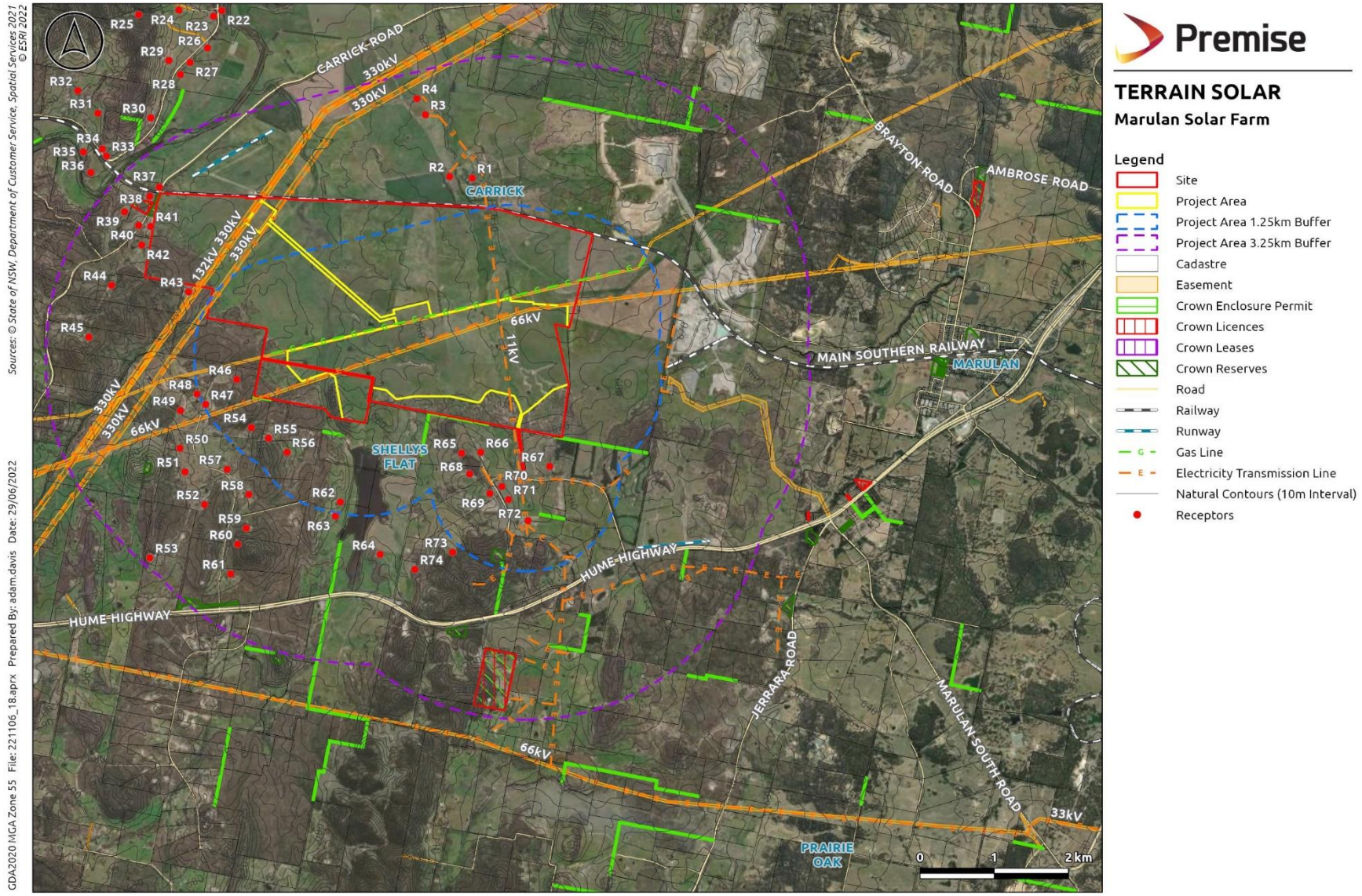
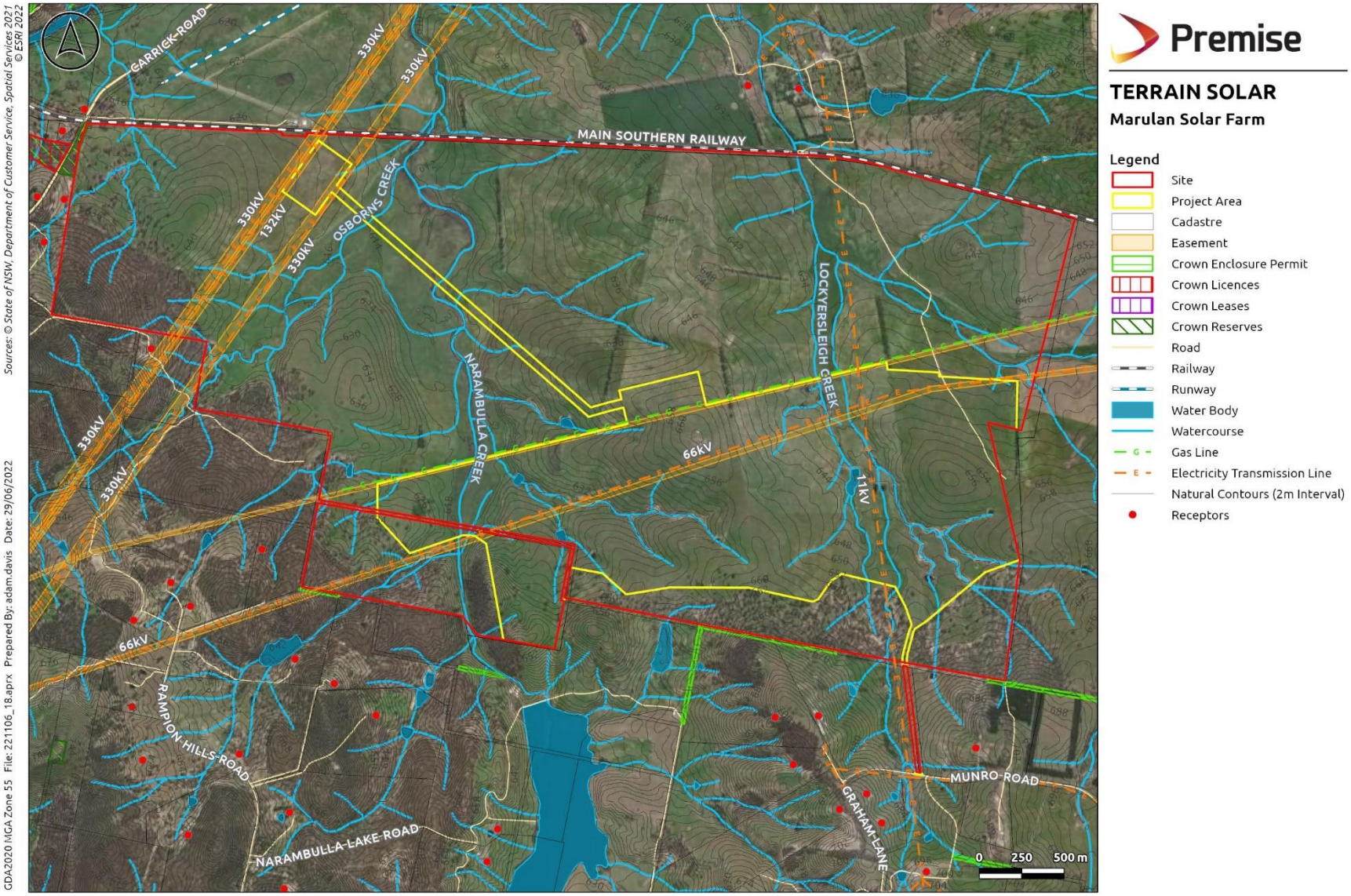


Figure 3 – Site analysis



2.4.3 EXISTING IMPROVEMENTS

As shown in **Figure 3**, the site is vacant with the exception of:

- Farm structures;
- Fences;
- Two overhead 330kV transmission lines;
- An overhead 132kV transmission line, running north-south in the western portion of the site;
- An overhead 66kV transmission line running east-west through the southern/central portion of the site; and
- An underground gas pipeline running east-west through the central portion of the site.

2.4.4 HERITAGE

As shown in **Figure 4**:

- AHIMS Basic Search on 8 February 2022 identified 14 Aboriginal sites or places within the site boundaries;
- The site contains locally significant item number I034 "Ruins of Kyle" as listed under GMLEP 2009;
- The site adjoins locally significant item number I035 "'Lockyersleigh' homestead and gardens (1828)" at 1114 Carrick Road, as listed under the GMLEP 2009; and
- A historical (unlisted) timber bridge is located centrally within the site over the Narambulla Creek.

2.4.4.1 Aboriginal Heritage

An archaeological survey was undertaken on the study area in 2021. The survey was conducted by one team consisting of two qualified archaeologists and one representative from Pejar LALC. The survey was undertaken through pedestrian and vehicle transects, traversing the large area of the host lot. Predefined transects (59 in total) were followed during the survey.

During the archaeological survey, one isolated stone artefact was recorded in the field. Site locations and artefact attributes were recorded on a hand held GPS. No cultural advice information was provided during the site survey.

As a requirement of the SEARS (SSD 13137914) an archaeological test excavation program was undertaken for the MSF project. A test excavation program was carried out over two periods from 20 to 22 December 2021 and from 22 to 23 February 2022.

A total of 72 test pits were excavated in the test excavation program for this project.

Testing locations 2, 3, 4 and 6 were undertaken during the December 2021 excavation program, whilst test locations 1 and 5 were undertaken during the February 2022 test program.

The testing identified a soil profile generally consisting of sandy loams transitioning to damp soils with some gravel, stone and iron inclusions in some areas. As an example, Location 2 excavated pits demonstrate alluvial profiles with iron inclusions, transitioning to sandy loams and then to damp soils, whilst Location 4 consists of a mixed context soil profile with gravel and stone inclusions on the upper slope transitioning to colluvial profile down slope.

No additional archaeological excavation squares were undertaken as expansion of test pits was not determined to be warranted.

Consideration of regional data provides indications of occupation around the hills to the south and east of the study area, with some camping activities evident in the rolling hills of the study area. Analysis of test excavation findings indicates that habitation usage within the study has occurred by larger more complex

groups of Aboriginal people for periods of time within the last 7,000 years, with activity predominantly occurring around the area associated with the Narambulla Creek.

Artefacts were predominantly collected from the top soil and the underlying sandy loam within the upper 15cm of the soil profile.

2.4.4.2 "Ruins of Kyle"

The Ruins of Kyle are located on the south western portion of the larger study area. The ruins are located in an isolated area on the lower slope of a small crest west of the Narambulla Creek and surrounded by remnant vegetation consisting of a grove of Ailanthus trees.

Little information could be obtained on the stone and brick structure located in a grove of trees on the south western boundary of the study area, however it is reported that the first homestead 'Kyle' was built by convicts between 1828 and 1835. It is now referred to as the 'Ruins of Kyle' and is likely associated with the earliest settlement phase of the area.

The extant structure consists of four walls with flagging stones on each entrance and two timber support doorways on the southern elevation. The internal elements include a collapsed fireplace and stone footings with two timber window reveals on the northern elevation and one window reveal on the eastern elevation. No evidence of the roof remains.

An assessment of the impact of the proposed development on the "Ruins of Kyle" is provided in **Section 6.1.2**.

2.4.4.3 "Lockyersleigh"

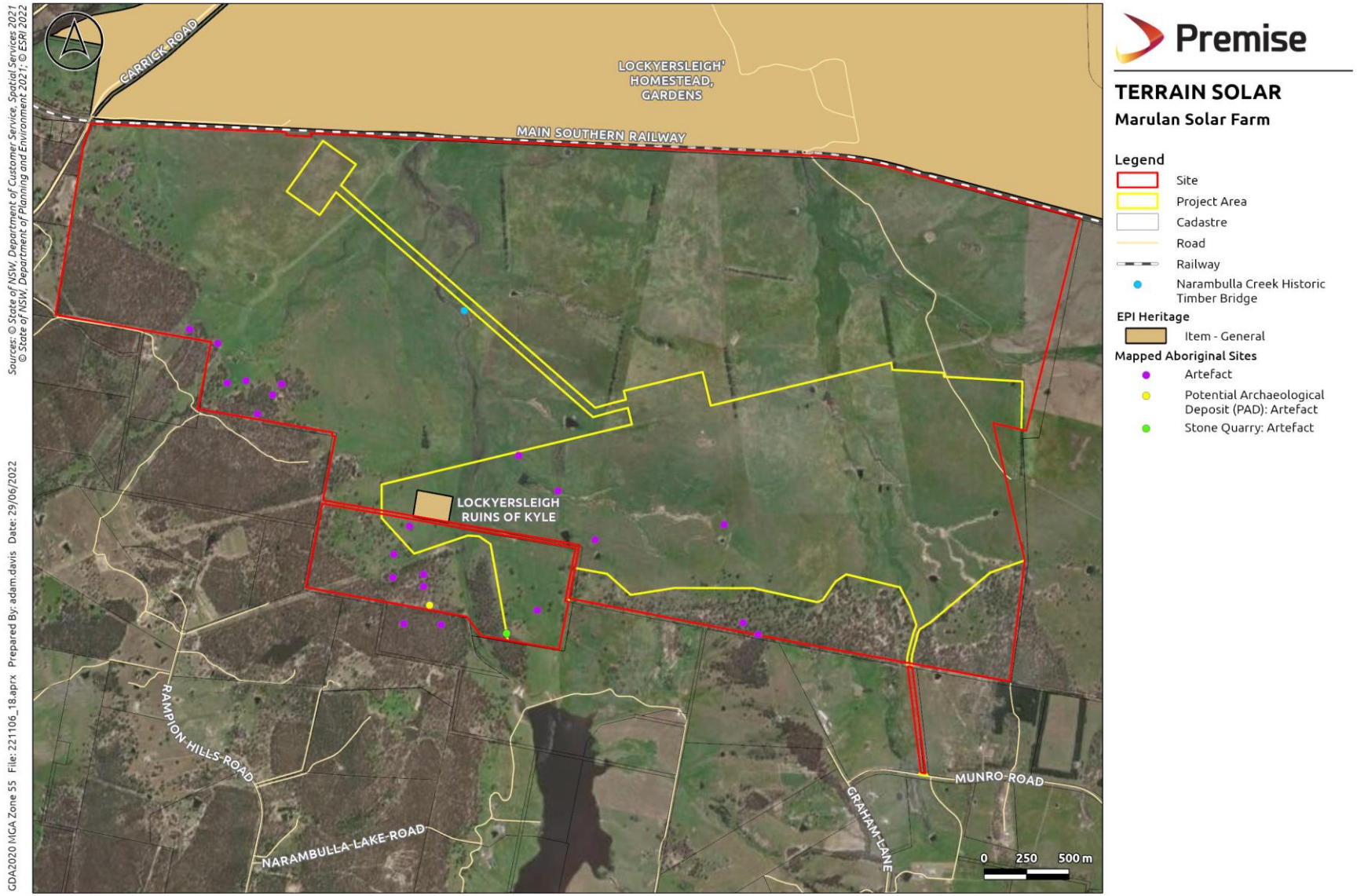
The Lockyersleigh Estate consists of a complex of structures accessed of the Carrick Road and is located on mostly flat land with a very shallow slope to the southeast. The rear of the property is bound by large farming land, with the main south railway bisecting in an east-west direction.

The Lockyersleigh estate consists of a central two storey homestead and established gardens and associated outbuildings. The first phase of construction was completed in 1827 and additions later from 1856.

The homestead is unique in style combining two distinct architectural features with an 1820s symmetrical Georgian stone structure on the ground floor and the 1850s Victorian stone and brick addition on the upper floor (both rendered) with two brick chimneys located on each end.

An assessment of the impact of the proposed development on "Lockyersleigh" is provided in **Section 6.1.2.2**.

Figure 4 – Heritage



2.4.4.4 Historical Timber Bridge

During the site inspection an historic low level timber bridge with iron supports was observed, located in the mid portion of Lot 55 DP1141136 positioned over the Narambulla Creek.

This bridge is not listed on heritage inventory sheets, however, is most likely associated with the earliest pastoral phase of the Lockyersleigh Estate. On review of historical maps dated to 1881 the position of the bridge is located on land identified as the Gold Fields.

The single span bridge is of simple construction measuring approximately 2 m wide and spanning 8 m in length and is in poor condition. The supports are constructed of iron with single timber slats forming the bridge platform, most likely constructed during the same time the main southern railway was introduced. During the 1800s, in order to meet the growing need to span the numerous creeks and rivers to move rural produce, goods and passengers clear of river fords, timber beam bridges offered the cheapest and quickest solution by utilising local hardwoods with simple construction methods.

An assessment of the impact of the proposed development on the historical timber bridge is provided in **Section 6.1.2.3**.

2.4.5 HYDROGEOLOGY

2.4.5.1 Geology

As shown in **Figure 5**, the site is predominantly located over Lockyersleigh Granite in the Lockyersleigh suite and Oberon supersuite. Lockyersleigh Granite, formed in Palaeozoic period and in the carboniferous system, is described as residual-eluvial-saprolite deposits overlying pink medium-grained granite with K-feldspar and lesser zoned plagioclase phenocrysts in a groundmass of quartz, feldspar, biotite, and hornblende, with accessory titanite and magnetite. A circa 500 metre-wide marginal phase comprises grey equigranular granodiorite. Monzodiorite and aplite dykes.

2.4.5.2 Groundwater

A search of the WaterNSW database identified the following boreholes with a known standing water level in the vicinity of the site (refer to **Figure 5**):

- GW110239, located in 658 Carrick Road near the site's western boundary: 2 metres
- GW111929, located near Narambulla Creek in the southern portion of the site: 1.5 metres
- GW111929, located in Lockyersleigh Creek in the northern portion of the site: 1.5 metres

The potential for impacts associated with the development on groundwater is considered in **Section 6.2.1**.

2.4.5.3 Soil Types

Table 1 provides an overview of the soil units identified in the Land and Soil Capability Assessment (LSCA, Premise 2022). A map of soil units is provided in **Figure 6**.

Table 1 – Study area soil units

Unit ID	ASC Soil Type	Soil Type Group
1	Natric Brown Kurosol	Dominant
	Yellow Sodosol	Sub-Dominant
2	Hyponatric Brown Sodosol	Dominant
	Clastic Rudosol	Sub-Dominant

3	Mottled Mesonatric Brown Sodosol	Dominant
	Brown Kurosol	Sub-Dominant
4	Yellow Kandosol	Dominant
5	Natric Red Kurosol	Dominant
	Red and Brown Sodosols	Sub-Dominant
6	Stratic Rudosol	Dominant
7	Brown Sodosol	Dominant
	Brown Kurosol	Sub-Dominant
8	Mesotrophic Brown Chromosol	Dominant
9	Leptic Tenosol	Dominant

2.4.5.4 Contamination

The site is unlikely to be contaminated due to significant distances from known contaminated sites, as listed under the NSW EPA:

- Contaminated Land Record on 20/01/2022:
  - Former Goulburn Gasworks at 1 Blackshaw Road, Goulburn: 15.1 kilometres to the south-west of the site.
  - Mobil Service Station at 129 Lagoon Street, Goulburn: 14.2 kilometres to the south-west of the site.
  - Tarago Railway Siding at Goulburn Street, Tarago: 46 kilometres to the south of the site.
- List of Notified Sites, current as at 9 December 2021:
  - BP Express at Hume Highway, Marulan, northbound: 4.8 kilometres to the east of the site.
  - BP Service Station at Hume Highway, Marulan, southbound: 5.2 kilometres to the east of the site.

Common contaminants that are associated with agricultural land uses can include pesticides, fertilisers, livestock treatment chemicals (such as from sheep dips/shearing sheds) and petroleum products (associated with the use of farm machinery).

Section 2.2 of the project Land and Soil Capability Assessment provides a summary of historic agricultural operations at the site. As per that history, agricultural activities on the site are understood to consist of cropping and grazing.

From site visits and surveys it is notable that the site does not contain any items of agriculture infrastructure (such as shearing or machinery storage sheds, chemical storage sheds or sheep dips). Given the absence of agriculture site infrastructure within the project footprint, the assessed likelihood of contamination from these sources is low.

Pesticides, such as insecticides, fungicides, herbicides and soil fumigants (where used), are considered to have the most likelihood of persisting on site. Pesticides have limited application with traditional forms of broadacre agriculture and are more commonly associated with use in orchards and market gardens in NSW; these can include both organic and inorganic compounds. Pesticides derived from organic compounds are likely to have decomposed within the soil within a year of application (DEC, 2005). Whilst inorganic compounds can persist in the soil, the absence of activities traditionally associated with the use of pesticides suggests that residual quantities in the soil requiring remediation is low. Thus, given their nature and the low likelihood of use, the likelihood of contamination from these types of activities is considered low.

Based on site observations and database checks, it is therefore considered that the site is unlikely to be contaminated and no further assessment is required.

2.4.5.5 Surface Water

As shown in **Figure 7**, the site is traversed by three named fourth-order ephemeral creeks (Lockyersleigh, Narambulla and Osborne Creeks) and their tributaries, all of which flow to the Wollondilly River to the north and west. Localised flooding occurs along the Lockyersleigh, Narambulla and Osborne Creeks and their tributaries in the 1% AEP event to a depth of one metre along the deepest parts of the creeks, travelling to a maximum velocity of 1 metre per second. Edges of the creek are inundated to a height of predominantly 0.2 metres, travelling to a maximum velocity of 0.5 metre per second.

The entirety of the site is located within the Sydney Drinking Water Catchment under Chapter 8 of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (the Biodiversity SEPP). Development within the Sydney Drinking Water Catchment is required to demonstrate that it will have a neutral or beneficial effect (NoRBE) on water quality.

The impacts of the proposed development on the Sydney Drinking Water Catchment and overland flows are considered in **Section 6.2.3** and **Appendix J** of this report.

Figure 5 – Geology and groundwater

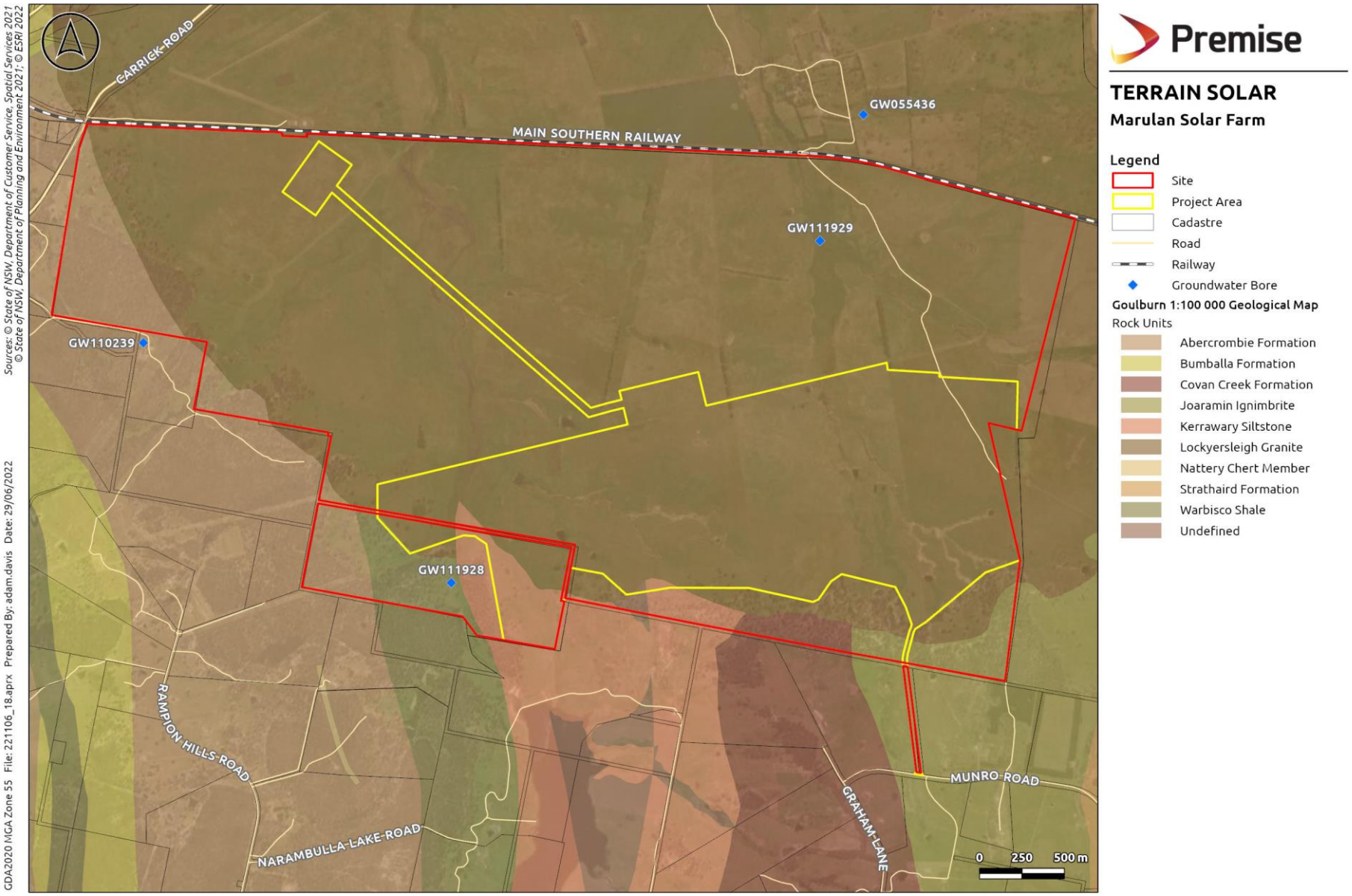
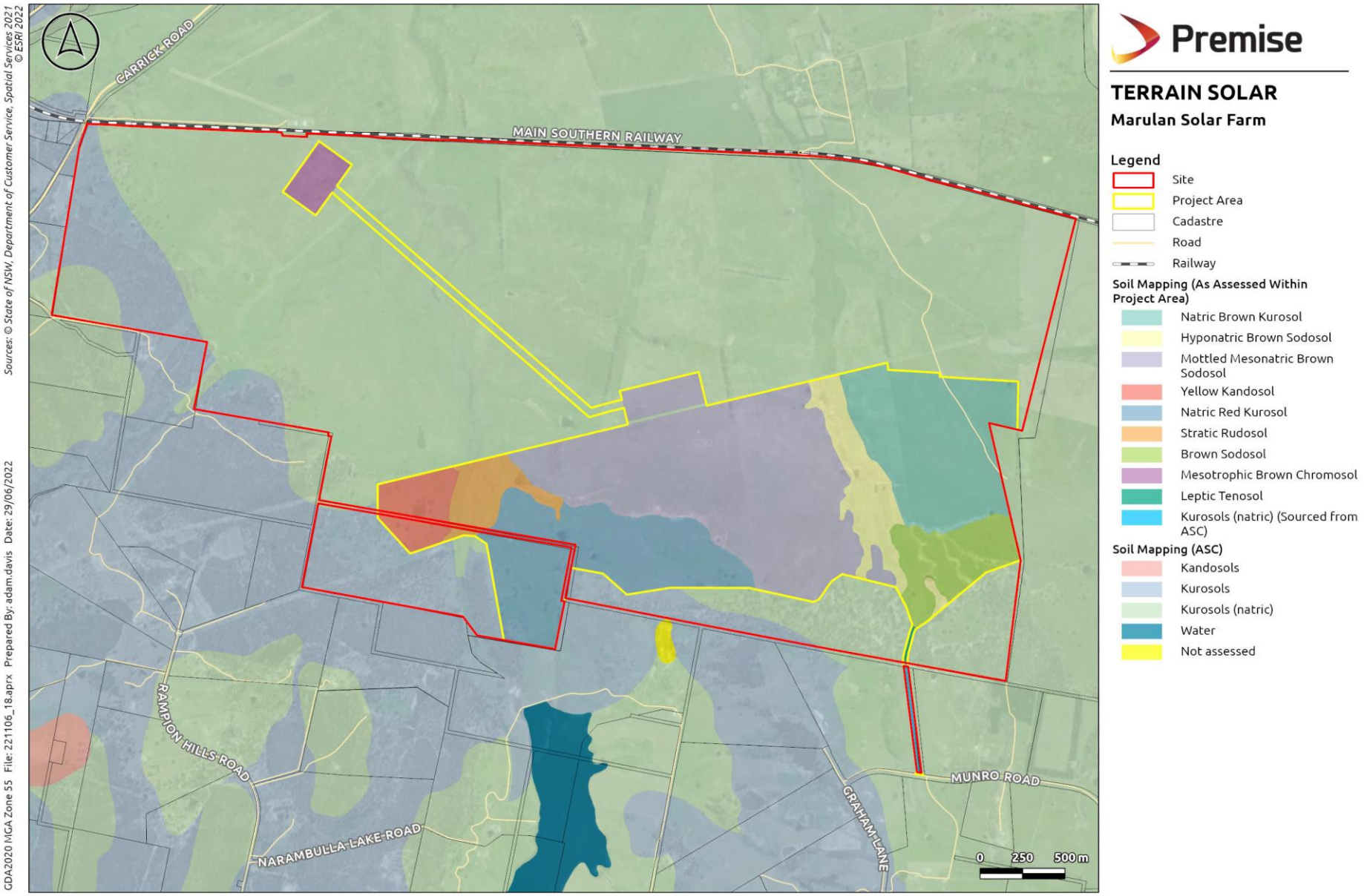
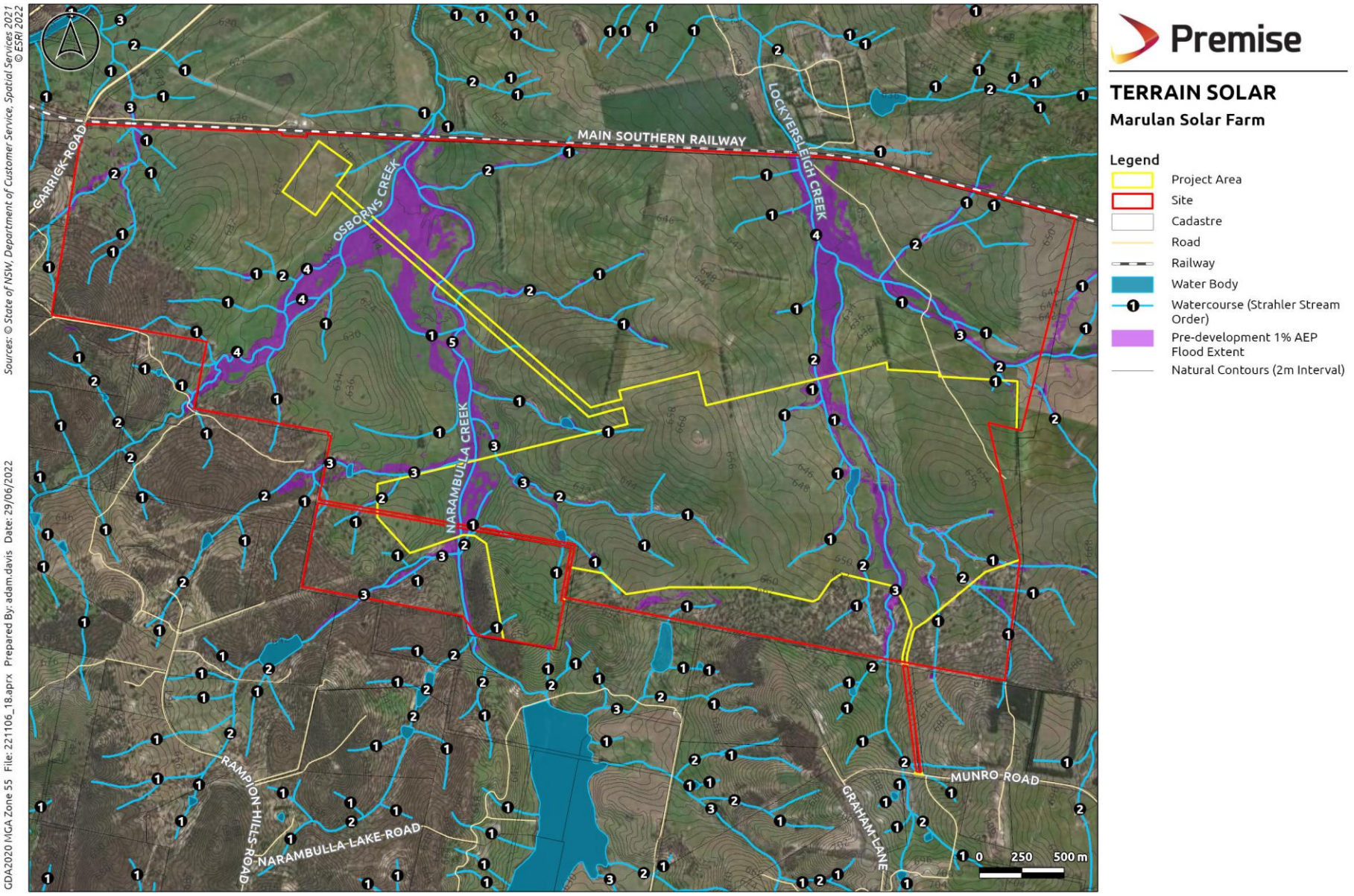


Figure 6 – Soils



Premise

Figure 7 – Hydrology



2.4.6 LAND RESOURCES

The site is not located within a Mine Subsidence District. There are no Exploration or Mining Titles or Exploration or Mining Title Applications applying to the site. Exploration and Mining Title EL8673 held by ACGH II Pty Ltd applying to the western edge of the site, as noted in the Scoping Report (Premise 2021), terminated on 8 August 2021.

A Land and Soil Capability Assessment (LSCA; Premise 2022) is provided at **Appendix G**. It includes consideration of soil type, slope, land capability, agricultural productivity, land characteristics and the history of agricultural land uses on the development site. An overview of the findings in the LSCA are provided in the following sections.

2.4.6.1 Soil Type and Land Capability

Nine (9) different soil units were mapped across the development site, as detailed in **Section 2.4.5.3**.

The Premise (2022) LSCA found that overall land and soil capability (LSC) for the study area ranges from Class 5 (moderate – low capability land) to Class 7 (very low capability land).

Review of LSC classes for each land hazard identifies the most constraining limitations as salinity and waterlogging. Soil units 2 and 6 are the most constrained (Class 7) and are associated with the two watercourses that cross the solar farm site.

LSC classes for the LSCA study area are provided in **Figure 8**.

2.4.6.2 Slope and Erosion

During the Premise (2022) LSCA soil survey, severe deep gully erosion was observed in soil units 5 and 7, including along the boundary of units 3 and 5 which is defined, in part, by a gully. Gullying in these units have evidence of severe sodicity in the subsoil which prevents water after heavy rain events from draining into the substrate, resulting in waterlogging. Water flows downslope through the bleached A2 horizons and washes salt from these subsoils into the flats below Units 2 and 6.

Wombat burrows were also observed within the study area. Disturbance of the burrows may increase risk of tunnelling soil erosion on soils with sodic subsoils. **Figure 9** (overleaf) identifies the location of existing erosion within the LSCA study area.

2.4.6.3 Agricultural Land Use and Productivity

The following content provides an overview of the agricultural history of the study area. The information was obtained via discussions with the property manager as part of Premise (2022) LSCA.

The LSCA study area is within the Lockyersleigh property, established in 1827 as a land grant to Major Lockyer. Lockyersleigh is one of the oldest privately owned properties in the Goulburn area has been in the same family since the 1850s. The property was initially cleared of timber for grazing sheep for wool production but has since also generated income from selling lambs.

As shown in **Figure 10**, current land management practices are primarily for grazing of sheep with occasional harvests in good seasons. An overview of pasture and grazing management at the LSCA study area is provided below.

Most of the current pastures were sown about 15 – 17 years ago after applying 2 – 2.5 tonnes/hectare (t/ha) of lime. Triticale grazing crops have been grown to help reduce weeds. Super phosphate has been applied for over 30 years at a third of the recommended rate to apply necessary amounts of phosphorus and sulphur. Lime is currently being spread in paddocks outside and east of the study area to reduce the acidity of the surface soil.

Grazing is currently time-controlled rotational grazing (30 day grazing period and a 50 day rest period, depending on pasture regrowth) for Prime Line sheep merinos that are bred for wool and meat lambs. Current grazing practices are considered to yield maximum value from the improved grazing management of native and improved pastures. Angus cattle have only occasionally grazed in the study area to reduce excessive pasture growth.

Consideration of income generated from the LSCA study area has considered an area of 400 hectares, that is inclusive of the following areas that total 395.3 ha:

- Solar farm and access investigation area – 377.6 ha
- Substation investigation area – 8.9 ha
- Switching yard investigation area – 8.8 ha.

Most income generated by the portion of the Lockyersleigh property impacted by the project is from sheep grazing. The following information was determined in consultation with the property manager and landowner:

- The carrying capacity of sheep within the approximately 400 hectare project area is estimated to be 2.5 Dry Sheep Equivalent (DSE). However, an approximation of the carrying capacity of Prime Line ewes producing 150% lambs is approximately 1.25 DSE.
- Assuming there are 500 breeding ewes in the 400 hectare project area with a lambing percentage of 150%, then 750 lambs would be produced annually and sold for an average price of approximately $200/head. This would generate approximately $150,000 income from the 400 hectares project area.
- Additional income is provided from wool but is not significant and likely to only cover the cost of shearing. Income from wool is estimated to be approximately $13/head from Prime Line ewes.

Impacts to agricultural land as a consequence of the proposed development are considered in **Section 6.3.1**.

2.4.7 VEGETATION

As shown in **Figure 11**, vegetation on the proposed solar farm area consists of cleared modified pastures, low-lying wetland areas with native grasses and sedges, patches of semi-cleared and remnant native woodland, and one native planting. Sampling by Premise has identified three PCTs within the site:

- PCT 351 - Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion
- PCT 1110 - River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion
- PCT 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Impacts associated with biodiversity are discussed in **Section 6.3.3** and **Appendix K**.

2.4.8 BUSHFIRE

As shown in **Figure 12**, the entirety of the site is mapped as Vegetation Category 3, with the exception of remnant vegetation in the south-eastern corner, along the southern boundary and in the south-western corner which is mapped as Vegetation Category 1. Impacts associated with the site's bushfire affectation are considered in **Section 6.6**.

Figure 8 – LSCA study area LSC classes

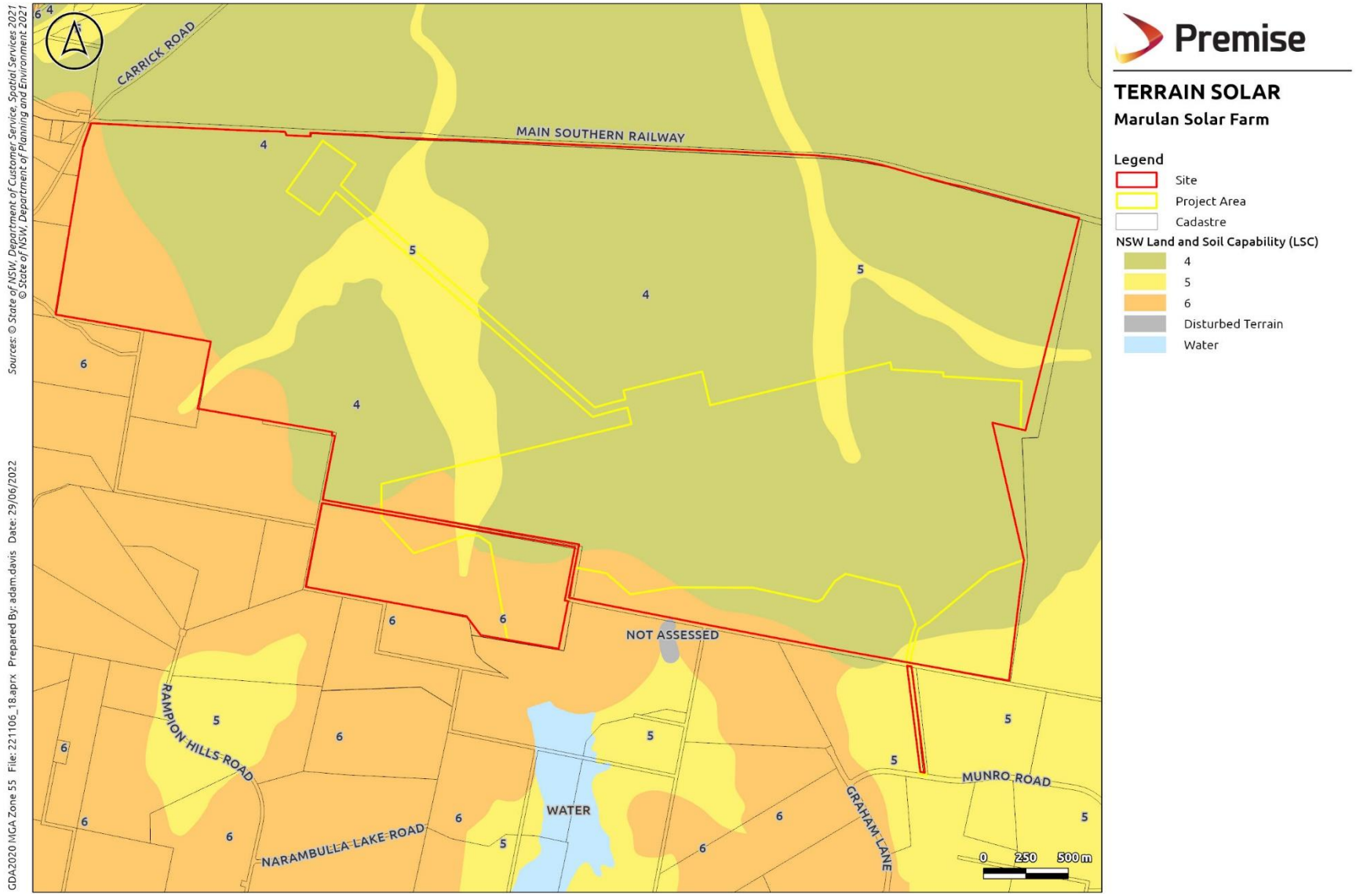


Figure 9 – Erosion Potential

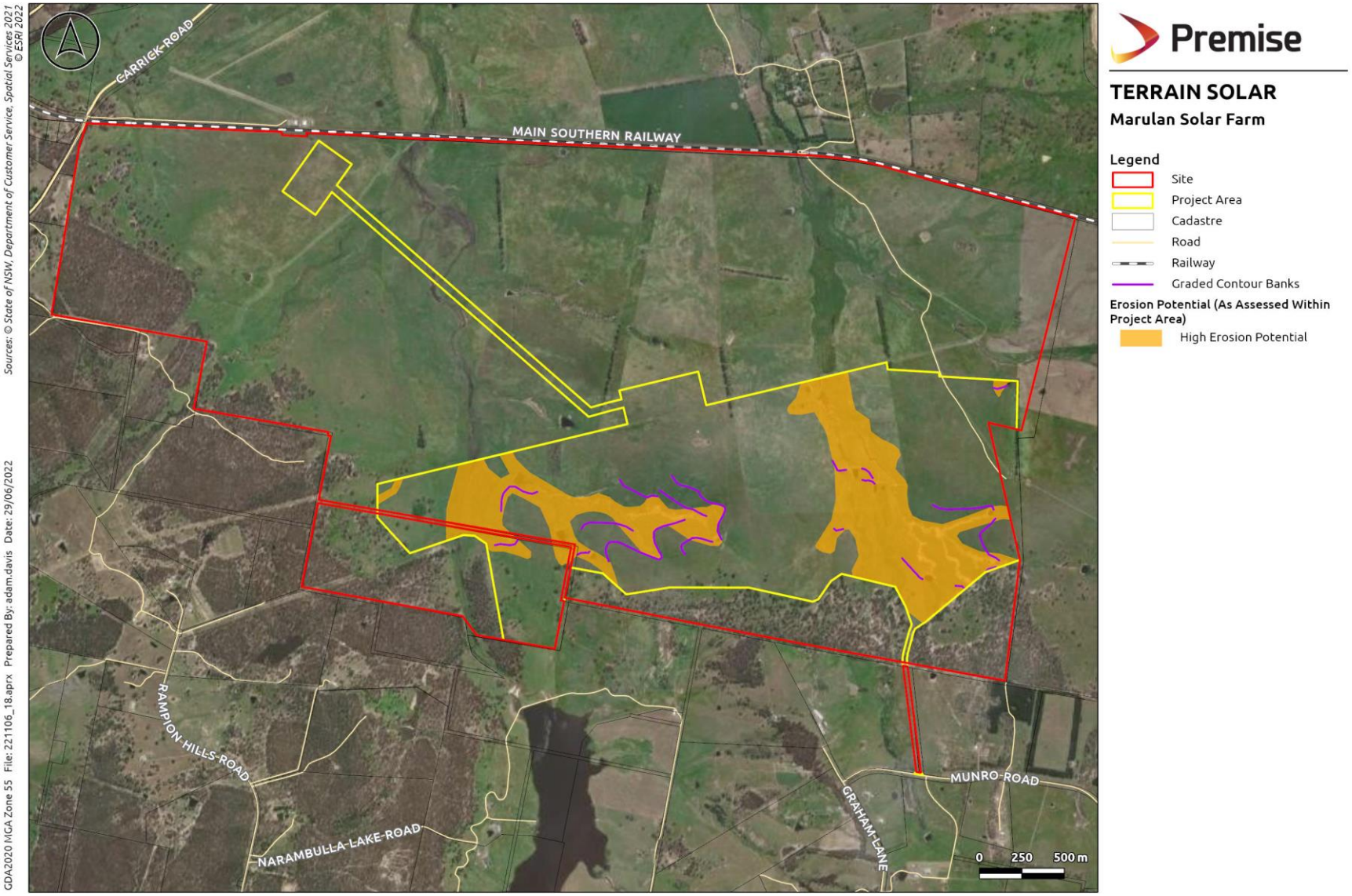


Figure 10 – Land Use

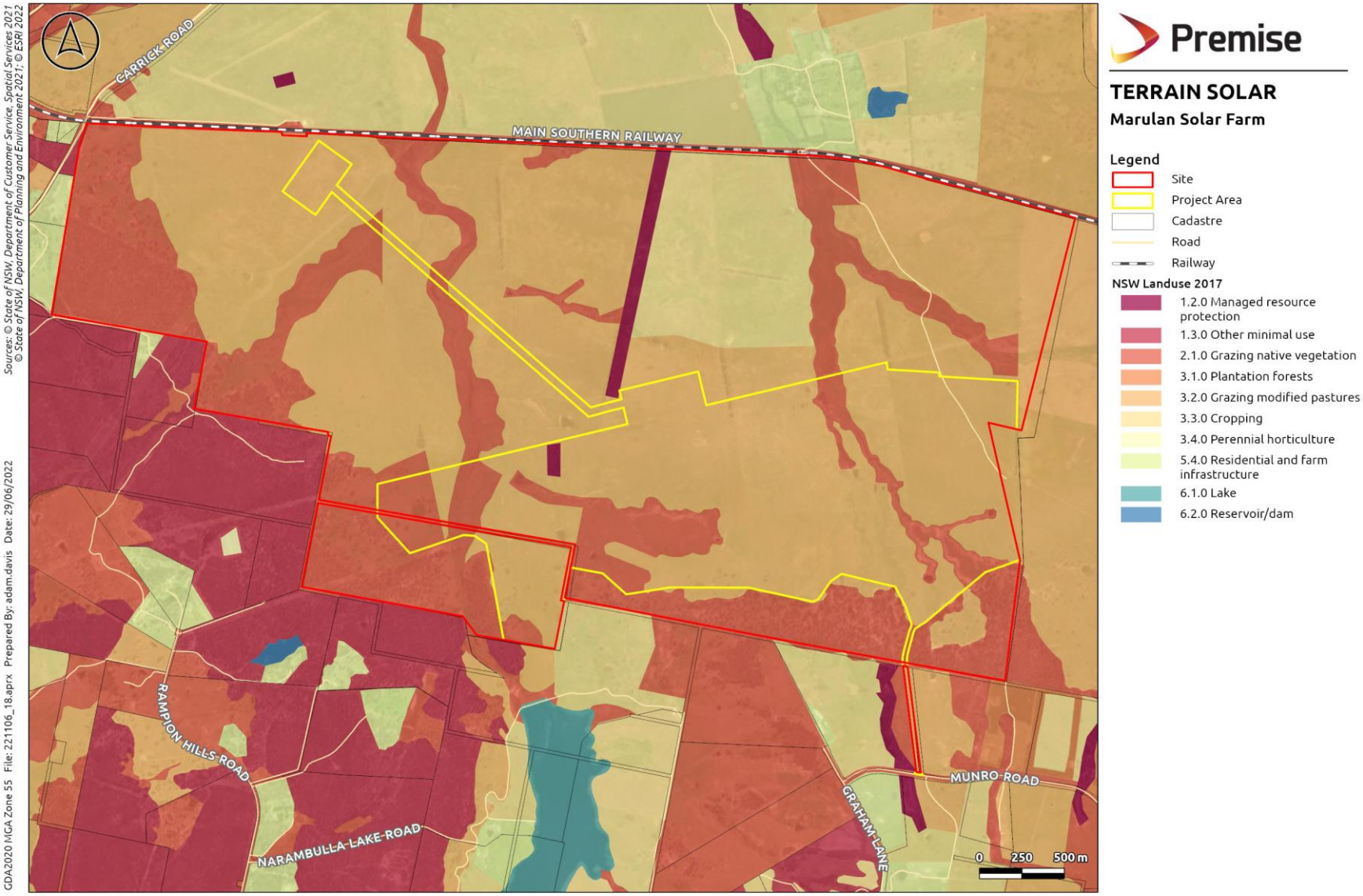


Figure 11 – Vegetation

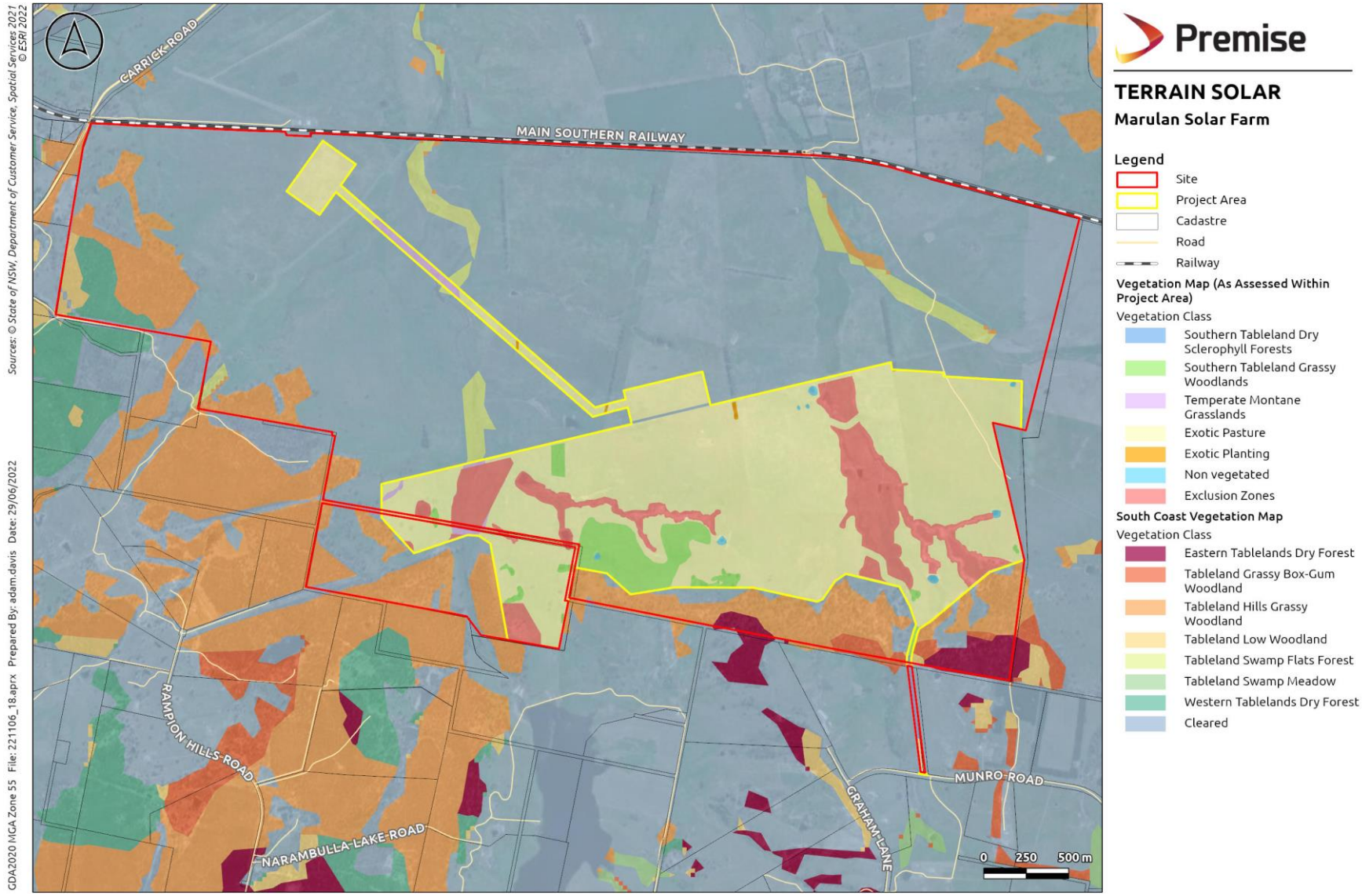
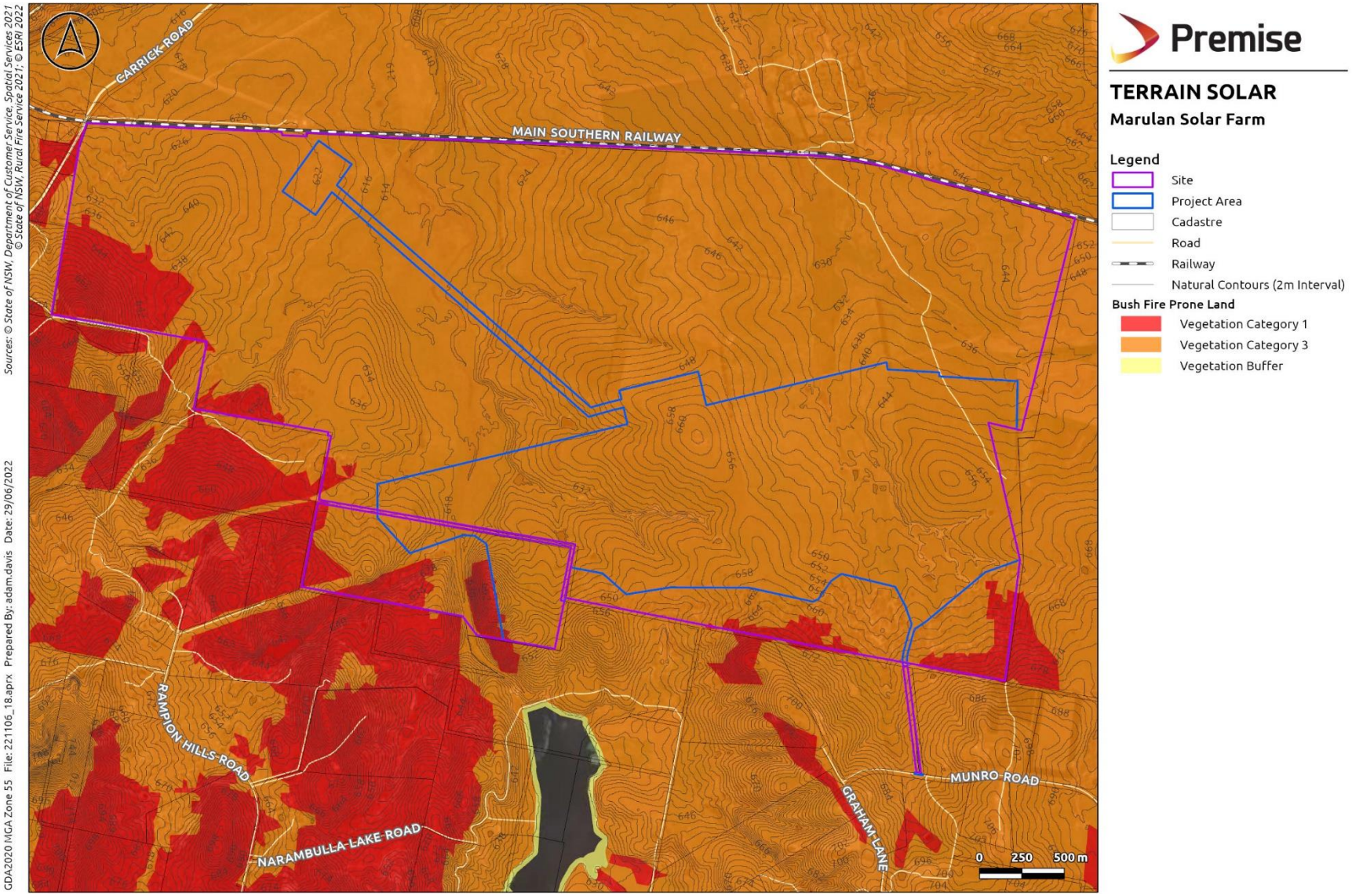


Figure 12 – Bushfire Prone Land



3. PROJECT DESCRIPTION

3.1 Project Area

The project area is located in the southern portion of the site. The positioning of the solar farm in the southern portion of the site is driven mainly by two key factors, being; access to existing Essential Energy owned electricity infrastructure with sufficient available capacity, and a suitably clear project area with minimal environmental constraints.

Access for the project site is from Munro Road to the south, which itself connects to the Hume Highway via a T intersection. The Hume Highway enables connections for construction purposes and for ongoing operation and maintenance staff to Canberra (127 kilometres) to the south-west, the Sydney CBD (175 kilometres) to the north-east via Campbelltown (112 kilometres) and Port Botany (169 kilometres). The project site is intersected and bounded by an Essential Energy owned 66 kV overhead electricity sub-transmission lines, and is also bounded to the north by twin subsurface APA owned high pressure gas pipelines.

The total area occupied by the proposed solar farm is driven by the ability to create new clean renewable energy generation infrastructure close to the major NSW load base of Sydney, and achieve economies of scale (both of which encourage the maximisation of the development footprint), competing with inherent site constraints and limited by the available capacity within the existing Essential Energy 132kV transmission line and associated network infrastructure.

The high-pressure gas pipelines serve as a boundary restricting solar array development to the southern portion of the site, as well as a natural buffer to retained contiguous agricultural lands to the north , and adequate spacing and visual amenity protection from Lockyersleigh homestead. Only connection and conversion infrastructure and potentially battery energy storage system (BESS) infrastructure (under an AC coupled option), is proposed north of the pipelines.

The project area has been further tailored and informed and modified based on learnings from detailed investigations conducted as part of this EIS. Studies including hydraulic analysis, presence of biodiversity, heritage matters, *inter alia*. Consequentially, the portion of the site to be physically disturbed as a result of the installation of solar infrastructure and ancillary project components is approximately 375.5 hectares (including mapped exclusion areas). As shown in the detailed project drawings attached in **Figure 13**, the area includes:

- The solar array development area of approximately 330 hectares (including ancillary elements such as a bushfire asset protection zone, external fencing, landscaping as required, and internal access roads);
- Exclusion areas of approximately 35.5 hectares;
- The grid connection infrastructure/substation area of approximately 4-8 hectares;
- A switching station area of up to 2 hectares;
- A BESS, which may be distributed amongst the solar array development area (if DC coupled), or grouped into an area proximate to the substation (if AC coupled); and
- A connecting overhead or underground transmission line.

3.2 Physical Layout and Design

As shown in **Figure 13**, the proposed development includes:

- An approximately 375.5 hectare solar farm in the southern portion of the site, comprising an approximately 330 hectare area of solar infrastructure (consisting of approximately 360,000 modules (solar panels) mounted on single axis-tracker units) together with mapped exclusion areas of approximately 35.5 hectares;

- Between 24 and 55 inverter stations, each containing an inverter between 2.2 and 4.92MW capacity and a 400V/33kV transformer;
- Cabling, electrical connections, and switch-gear, attached to the mounting frame structures, to interconnect modules;
- Underground cabling connecting arrays and inverter stations;
- A 33/132kV substation;
- A 132 kV switching station in one of two possible locations;
- A BESS, which may be distributed amongst the solar array development area (if DC coupled), or arranged into an area proximate to the substation (if AC coupled);
- Overhead or underground 132kV single circuit line power line connecting the solar farm substation to the switching station, which will cut into the existing Essential Energy owned 132kV transmission line;
- Temporary construction compound south of the solar farm including material laydown areas, site offices, vehicle parking, and amenities;
- Construction of an internal road from a new crossover at the site's Munro Road boundary;
- Chain-link/barbed-wire security fence up to three metres in height; and
- Specific native vegetation screening from identified visual impact locations.

Indicative imagery of proposed project components are provided in **Figure 16 to Figure 19**.

3.2.1 GROUND DISTURBANCE

Some minor grading works are expected to be required within the project area for installation of the solar trackers and associated infrastructure. The solar trackers can tolerate gentle slopes and undulating ground conditions, and therefore grading works would be limited to areas that are steeper in slope. and ground disturbance will be minimal, limited to:

- Filling of six (6) existing man-made farm dams;
- Existing erosion control swales within the property will be retained where possible, and replaced where they are required to be removed. New swales will be installed throughout the property to ensure the control of water within the property, as discussed in **Appendix J**;
- Grass slashing, and removal of rock and timber debris as required in preparation for construction;
- The installation of the piles supporting the solar panels, which would be driven or screwed into the ground to a depth of approximately 1.5 metres;
- Construction of internal access tracks;
- Concrete foundations for the inverter stations, BESS, substation componentry and O&M building;
- Trenches for the installation of cables;
- Establishment of temporary staff amenities and offices for construction; and
- Construction of perimeter security fencing.

Aside from the footprint of permanent infrastructure retained post de-commissioning, any disturbed areas would be restored to pre-development or improved conditions post-construction.

3.2.2 SUBDIVISION

In order to facilitate the dedication of the switching station to the electricity authority it may be required to subdivide it off from the residue to create a separate land parcel.

As noted, the switching station may be located in one of two locations; either in the north-west of the site or proximal to the proposed substation, adjacent to the solar farm infrastructure – refer **Section 3.2.5**.

As such, subdivision of the land to create an infrastructure lot (switching station) together with a residue lot which would host the substation and solar farm infrastructure – refer **Figure 14**. The indicative area of Lot 1 is 3-4 hectares and approximately 1396 hectares for Lot 2 (the residue/substation/solar farm lot).

It is also possible that the management of these areas would be progressed as a lease of premises, which would negate the need for subdivision. As the final delivery method has not yet been determined, both project pathways are proposed as part of this application.

3.2.3 SOLAR ARRAYS

The proposed solar farm comprises approximately 360,000 solar modules (solar panels) which are electrically connected and group into 'solar arrays' – refer **Figure 13** and **Figure 15**. Whilst solar farm infrastructure is to be determined at the detailed design stage, PV modules are expected to use industry standard technology; that is multi-crystalline or thin-file flat plate module technology as is common in residential settings. Typical models are approximately 2.4 metres-long, 1.4 metres-wide and nine millimetres-deep. Subject to technology at the time of procurement, panels are likely to have a capacity of approximately 670W per panel and may be mono or bi-facial.

The assumed spacing between panel 'strings' is at least 5 metres, and the spacing between panels is at least 2.62 metres (horizontal orientation).

The panels would be mounted on single access tracking technology, holding panels in either a single portrait (1P) or double portrait (2P) orientation. Approximately 160,000 piles would be driven or screwed into the ground in order to support the solar array's mounting system and solar panels. Panel height above the ground at full rotation would be 2.4 m (1P) or 5.4 m (2P).

The solar PV panels installed on the mounting system would be interconnected so as to obtain a number of "strings" whose overall voltage would be adequate for the operating input voltage of the inverters.

3.2.1 BATTERIES

The proposed BESS contains enclosed lithium-ion type batteries which will be manufactured offsite and delivered to the site for installation. The number and exact layout of battery modules, inverters, transformers and switchgear would be confirmed during detailed design. However, the location of this equipment would be limited to the areas shown on **Figure 13**. Indicative imagery of the enclosed BESS is shown in **Figure 20**.

3.2.2 INVERTER STATIONS

Between 24 and 55 inverter stations would be installed and located at regular intervals across the site. Each would contain an inverter of between 2.2 and 4.92 MW size as well as 400V/22-33kV transformer. The inverter stations (containerised) would measure up to 12.2 metres-long by 2.4 metres-wide by 3.4 metres-high (being the sum of the 2.9 inverter station height plus up to 0.5 metre foundation height). Indicative imagery of an inverter is depicted in **Figure 17**. Inverters are located throughout the site – refer **Figure 18 and Figure 19**.

3.2.3 UNDERGROUND CABLING

Underground cabling would be designed in accordance with the relevant Australian and international standards and manufacturer's specifications and installed in trenches, measured approximately 0.6 metres-wide and 0.8 metres-deep. The cabling would be installed over a sand bed, covered with a layer of sand and backfilled with fill obtained on site.

3.2.4 TRANSMISSION LINE

The electrical connection from the solar farm would be via approximately 2.5km of 132kV powerline running entirely within the site to the existing Essential Energy owned 132kV line running approximately north-south

in the western portion of the site – refer **Figure 13**. If overhead, the powerline would be installed on 15 to 35 metre-high steel, lattice, wood or concrete poles . Any future vegetation growth within the easement would be maintained to mitigate fire risk and allow safe operation of the powerline.

Figure 13 – Proposed Development Layout

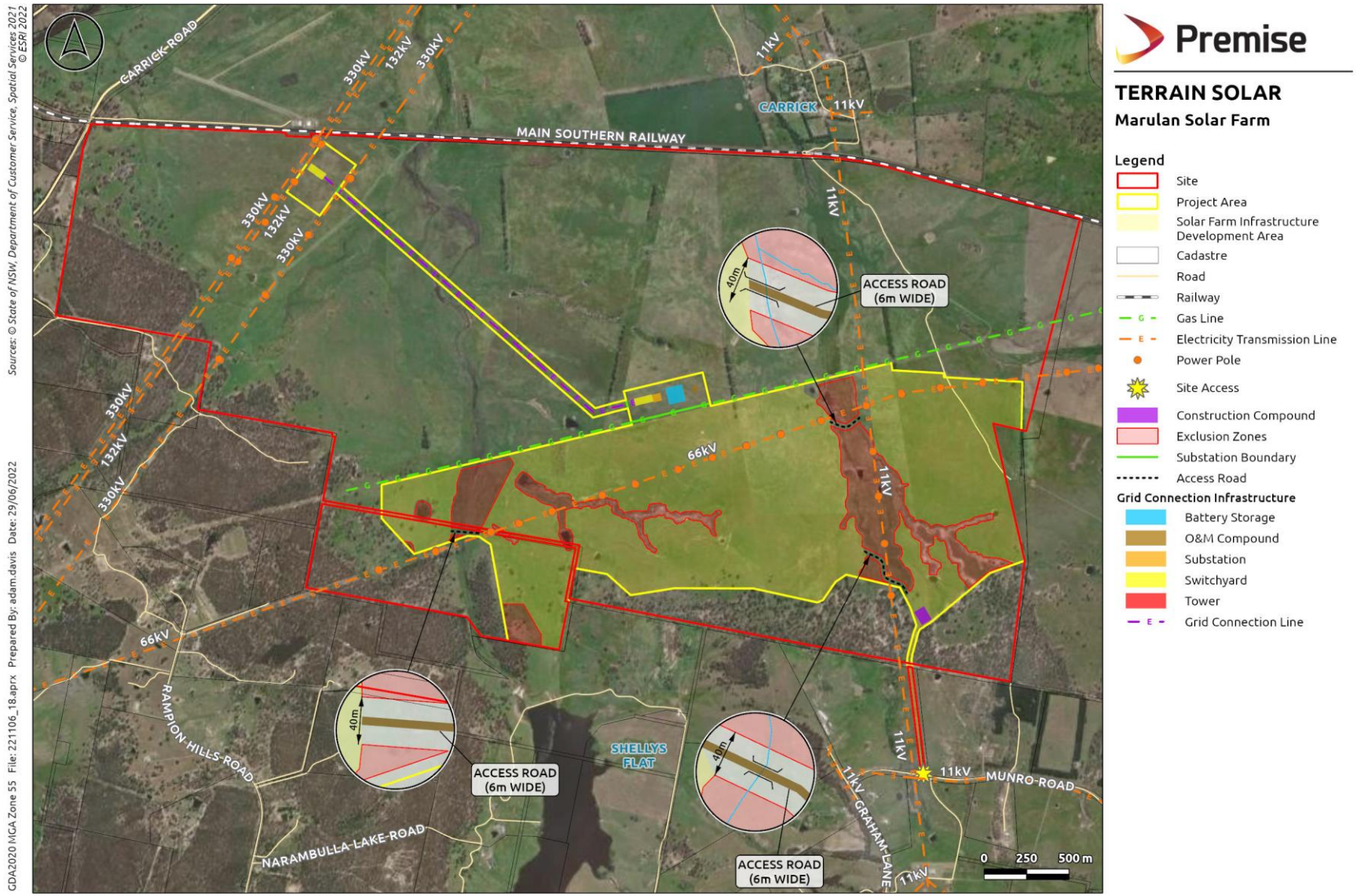


Figure 14 – Proposed Plan of Subdivision

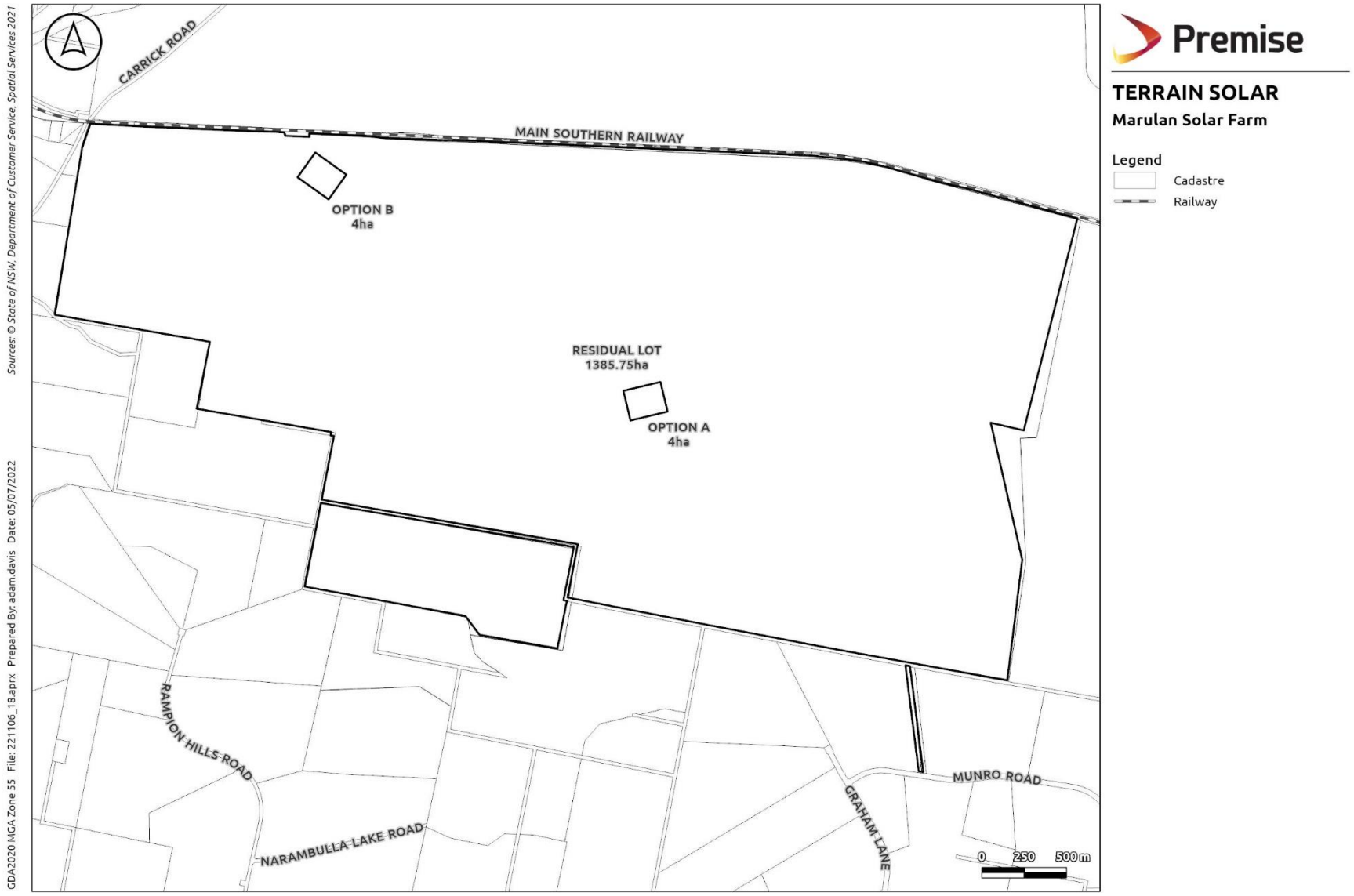


Figure 15 – Indicative solar array arrangement

Figure 16 – Indicative tracker section

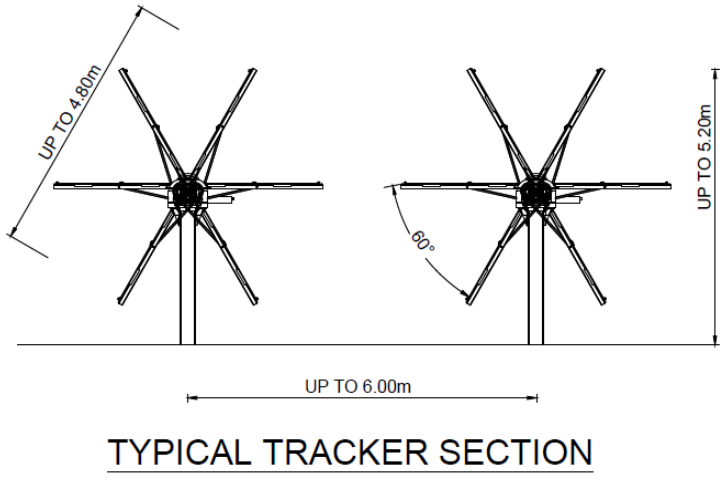


Figure 17 – Inverter skid

Figure 18 – Inverter block with DC-coupled battery

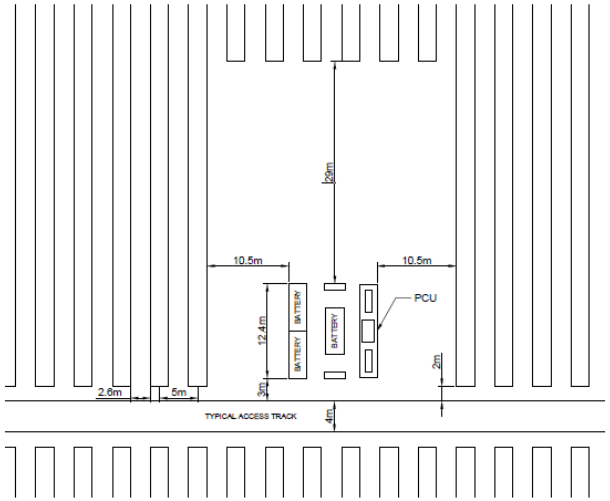


Figure 19 – Inverter block without battery

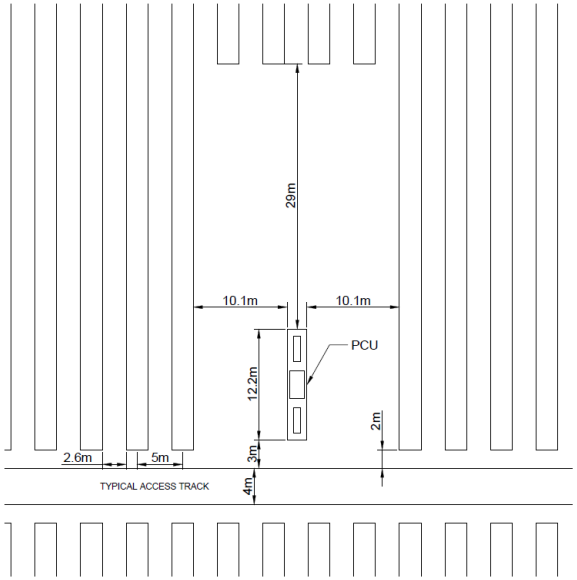


Figure 20 – Indicative BESS image (Source: Shutterstock)

3.2.5 SUBSTATION / SWTICHING STATION

As per **Figure 13**, a site substation would be located adjacent to the northern edge of the solar farm arrays, and a switching station is proposed to be located either adjacent to the substation or, in the north-west of the site, in proximity to the connecting Essential Energy owned electricity transmission lines.

The substation will feature a busbar, circuit breakers, current transformers, voltage transformers, switchgear/electrical protection, and a 33/132kV step up transformer. The substation will be surrounded by security fencing to restrict access. Vegetation to restrict visual impact would be planted in accordance with the landscaping plan.

3.2.6 ACCESS AND INTERNAL TRACKS

An approximately four (4) metre wide compacted gravel internal access track would be constructed from the Munro Road frontage, to enable access throughout the site during construction and operational life of the project. This access track would be designed and constructed to ensure that it is capable of accommodating construction vehicles and fully loaded firefighting appliances.

3.2.7 ANCILLARY FACILITIES AND CONSTRUCTION COMPOUND

Ancillary facilities include:

- Material laydown areas;
- Temporary construction site offices;
- Vehicle parking areas for construction workers' transportation;
- Staff amenities including chemical sanitary modules, water tank, changing rooms, dining hall, administrative office, undercover storage area, emergency muster point, and genset for electricity supply, providing capacity to accommodate up to 300 staff on-site; and
- Parking for staff and visitors.

3.2.8 SECURITY FENCING

The perimeter of the site is to be fenced with up to three (3) metre-high security fencing along the site boundaries. It is expected that chain-link fencing with strands of barbed wire at the top would be used. Double gates are to be installed either at the access point to the site or at the northern end of the Munro Road access driveway.

The access handle would feature standard rural style fencing and gates to integrate this area with the surrounding rural aesthetic.

3.2.9 WATER DEMAND

Water demand during construction would be limited to that required for dust mitigation and/or moisture conditioning of material, as well as a potable supply for construction staff. The former will be sourced from a legal supply source, including farm dams on-site (if available) and/or commercial water suppliers.

There is no intent or need for any volumetric water licencing requirement. No water entitlement is needed or required to be purchased.

The quantity of water required for dust mitigation during construction can only be roughly estimated. Ultimately, it will be determined by the detailed design, the EPC contractor's approach to the construction program and the climatic conditions experienced at the time the works are undertaken. Assuming a maximum daily use, in excessively dry and windy conditions, would be 50 kL, and that these conditions are experienced 50% of the time during the 12 month construction peak, this equates to 7.2 ML. This requires approximately

264 x 27 kL bulk tankers. By reference to the traffic assessment and the 52 week peak construction program, this equates to just over 5.1 trucks per week. This is approximately one per day and will be accommodated within the projected maximum traffic movements of 160 light vehicles and 28 heavy vehicles.

Potable supply will be provided through provision of an on-site food grade water tank in the locality of the construction compound.

Dry port-a-loos would be provided for amenities throughout construction minimising water demand and negating the need for on-site domestic sewage treatment.

3.2.10 MANAGEMENT PLANS

Construction and Operational Environmental Management Plans (CEMP and OEMP) would be developed prior to construction and operation respectively of the MSF.

The CEMP would document the environmental procedures and controls that would be implemented throughout construction. The CEMP would describe the role, responsibility, authority and accountability of all key personnel involved in construction and detail all monitoring that would be undertaken. A draft construction noise and vibration management plan is provided in the NIA at **Appendix N**.

The CEMP would comprise various sub-plans detailing the specific mitigation measures that would be implemented to avoid and manage potential environmental impacts. These would include plans covering biodiversity, Aboriginal heritage, soil and water protection, dust, noise and vibration, waste management, and bushfire prevention. Mitigation measures relevant to these issues, as identified in this EIS, are detailed in **Appendix D**.

The OEMP will include procedures, reporting, and the allocation of responsibilities designed to minimise environmental impacts. The OEMP will document the environmental procedures and controls that would be implemented to operate the solar farm as a responsible rural land owner.

The OEMP would comprise various sub-plans detailing the specific mitigation measures that would be implemented to avoid and manage potential environmental impacts and minimise risks.

3.2.11 MONITORING AND ONGOING MANAGEMENT

Operation and monitoring of the facility would be governed by an adopted operational environmental management and monitoring plan that would clearly identify any residual matters requiring ongoing attention during operation, with particular emphasis on groundcover management, bushfire management, risk management, landscape implementation and monitoring and ongoing noise monitoring to ensure ongoing compliance with adopted criteria.

3.3 Sequencing

The project does not propose staging or phasing, with the full extent of the project to be developed via a single construction program.

The construction program is anticipated to occur over an approximately 18-month period, with approximately three (3) month shoulder mobilisation and demobilisation periods, and a peak 12 month construction period.

3.3.1 CONSTRUCTION

3.3.1.1 Construction Activities

As noted above, it is anticipated that the construction and commissioning phase will last approximately 18 months. The main construction activities include:

- Transport of construction personnel, vehicles, and materials to and from site on a day-to-day basis, depending on construction schedule;
- Establishing works including vegetation clearing, minor earthworks, construction of temporary construction compound, Munro Road crossover, and access roads;
- Installation of steel post and rail foundation system for the solar panels;
- Installation of underground cabling (trenching) and installation of inverter stations;
- Constructions of the 132kV transmission line, substation, and switching station to facilitate interconnection with the existing Essential Energy owned 132kV lines in the western portion of the site; and
- Removal of temporary construction facilities, and rehabilitation of disturbed areas.

3.3.1.2 Hours of Operation

Works are to be undertaken during standard working hours:

- Weekdays: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work

Relevant authorities would be consulted in the unlikely event that construction is required to be undertaken outside of the above-described hours. If a permit to conduct work outside of the above hours is granted, neighbouring residents will be notified in advance to minimise the impact.

Any night lighting required during construction would be directed away from native vegetation, surrounding streets, and neighbouring properties.

3.3.1.3 Personnel

It is anticipated that up to 300 construction personnel would be required on site during the peak construction period (approximately 12 months). Construction supervisors and the construction labour force, made up of construction labourers and technicians, are to be hired locally where possible. Workers would be accommodated in existing third party owned accommodation in Marulan and Goulburn where possible.

Equipment used during construction is anticipated to include earth-moving equipment for civil works, diesel generators, trucks, and cranes. Pile driving of the solar panel foundations is to be undertaken using a pile driving machine which screws or hammers piles into the ground.

3.3.1.4 Materials and Equipment

The following materials will be transported to site (quantities are approximate):

- 10,000m3 of gravel for work and service tracks, inverter stations, peripheral backfill and compaction;
- 1,500m3 of sand for inverter stations and burying of cables into 16 kilometres of trenches;
- 827 tonnes of metal for the mounting system, inverters, and containers transport in 400 standard shipping containers;
- 8,728 tonnes of glass contained within the panels;
- 44 trucks' worth of concrete for the inverters, substation, and maintenance building foundations;
- Up to 60,000 litres of water per day for dust suppression, depending on weather conditions;
- 900 litres of water per day for drinking which would be sourced locally and stored using a suitable food grade water-tank;
- 360,000 solar panels;
- 132kV switching station; and

- Electricity transmission lines/cables; and
- Equipment used during construction including earth-moving equipment for civil works, diesel generators, trucks, cranes and a pile driving machine.

3.3.1.5 Transport of Materials and Equipment to and From the Site

Haulage Route and Site Access

Traffic generated by the proposed development is anticipated to be predominantly in the construction phase, associated with material deliveries, trade persons and staff. Solar panels and specialist electrical equipment (i.e., inverters, substation etc) are expected to arrive in Port Botany and be transported to the site by road transport along the Hume Highway.

Heavy vehicles will approach from the north i.e. travelling southbound on the Hume Highway and continue on to Goulburn. At the major roundabout entry to Goulburn, heavy vehicles will then return northbound on the Hume Highway allowing a left turn into Munro Road from the deceleration/left turn lane and then accessing the solar farm site. Departing vehicles will also turn left from Munro Road onto the Hume Highway to continue travelling northbound.

3.3.1.6 Vehicular Movements

Anticipated vehicular movements are set out in **Table 2**, based on the following assumptions:

- The 132kV switching station, substation, electricity transmission lines/cables and solar arrays are delivered to the site across 1,081 heavy vehicles;
- The 360,000 solar panels are delivered to the site via heavy vehicles (semitrailers) with a loading capacity of 420 panels across 857 heavy vehicles;
- The panel-related materials for racking, posts, steel, etc. for the installation of the solar panels are delivered to the site by 400 heavy vehicles; and
- Of the 300 staff required for the construction of the solar farm:
  - 200 will arrive/depart by shuttle buses with an average of 20 passengers per shuttle bus; and
  - 100 will arrive/depart in light vehicles with two people per vehicle.

Table 2 – Estimated Total Traffic Generation

Phase	Component	Anticipated Construction Phase Vehicular Trips/Movements
Construction	Heavy Vehicles (Materials Delivery)	2,162
	Heavy Vehicles (Solar Panel Delivery)	1,714
	Heavy Vehicles (Containers)	800
	Light Vehicles (Staff)	36,000
	Shuttle Buses (Staff)	14,400
	Total	55,076 trips

The heavy vehicle trips/movements identified in **Table 2** are to be distributed over the 18 month construction phase as set out in **Table 3**.

Table 3 – Estimated Construction Scheduling Heavy Vehicle Trips

Construction Timeframe	Site Activities	Heavy Vehicle Trips
Month 1	Site Establishment	200
Month 2 to Month 4	Site Clearing Bulk Earthworks	440
Month 5 to Month 8	Bulk Earthworks Solar Farm Grid Connection	1,480
Month 9 to Month 12	Solar Farm Grid Connection Infrastructure Installation	802
Month 13 to Month 15	Infrastructure Installation Panel Installation	1,714
Month 16 to Month 18	Commissioning Demobilisation	40
Total Heavy Vehicle Trips		4,676 trips

Whilst the transport of staff to and from the solar farm development during the 18 month construction period accounts for approximately 92% of the total trips, the heavy vehicle movements totalling 4,676 trips are likely to have the greater impact on the surrounding road network.

An assessment of the traffic generation, volumes on the nearby roads, impacts on nearby intersections and the post development plus ten year scenario, as well as recommended mitigation measures is provided in the Traffic Impact Assessment (Premise 2022; refer to **Appendix L**) forming part of this EIS. A summary of the impacts and mitigation measures contained in the Traffic Impact Assessment is provided in **Section 6.7**.

3.3.2 OPERATION

Once operational, activities are to include daily routine operations and maintenance by two to five personnel, including:

- Routine visual inspections, general maintenance and cleaning operations of the solar arrays;
- Vegetation management beneath panels;
- Site security; and
- Replacement of equipment and infrastructure as required.

During operation, it is likely that no vehicles will be present on the site on a permanent basis with only occasional visits by standard light vehicles. During major maintenance operations (such as groundcover maintenance), this number could increase to 20-30 vehicles for a limited period. Neighbouring properties will be warned in advance should major maintenance operations be required.

Any maintenance operations are to be undertaken during standard working hours (unless emergency works are urgently required):

- Weekdays: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work

Any night lighting used through the array during operation for security and safety purposes is to be directed away from native vegetation, surrounding road network, and neighbouring properties.

Terrain Solar is currently investigating with the host landholders the opportunity to allow sheep grazing within the array areas during operations. Should this occur, a detailed protocol would be developed to confirm biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers, stock or staff.

3.3.3 DECOMMISSIONING

After an anticipated 30-35 years of operation, all above ground infrastructure would be removed. Key elements of decommissioning include:

- Removal of solar arrays, including foundation posts, for recycling or reuse;
- Removal of site amenities and equipment for recycling or reuse;
- Removal of posts and cabling for recycling or reuse;
- Removal of fencing including small concrete footings; and
- Rehabilitation of disturbed soils in consultation with the landowner with the aim of meeting pre-construction land capability.

The transmission line connecting to the 132kV switching station will be decommissioned if owned by the project, or may continue to be operated by the electricity supply authority for public power supply if owned by Essential Energy. In the event that the decision is made to decommission the transmission line above ground infrastructure and posts would be removed and the land would be returned to its pre-construction condition. It is understood, from discussions with Essential Energy, that the switching station will be constructed by Essential Energy as non-contestable works, to be owned by Essential Energy and will form an integral part of their holistic network. It is therefore considered very likely that the switching station, and any connecting transmissions lines, will remain in situ at the end of the project life.

In consultation with the landowner, above ground concrete slabs would be left in place where they do not impact agricultural viability. Cables deeper than 500mm may also be left in place to reduce impact on land capability.

Traffic required for decommissioning would be similar in type but of shorter duration than that anticipated during the construction phase.

4. STATUTORY CONTEXT

In accordance with Section 3.5 of the *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021), the statutory requirements for the development are set out in **Table 4**.

Table 4 – Statutory requirements

Category:	Guidance:	Comment:
Power to grant approval	Identify the legal pathway under which consent is sought, why the pathway applies, and who the consent authority is. If permissibility is relevant to this section, the discussion here should be cross-referenced rather than repeated.	**The legal pathway under which consent is sought** Section 4.36(2) of the EP&A Act provides that a SEPP may declare any development, or any class or description of development, to be SSD. Clause 2.6(1) of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) provides that development is SSD for the purposes of the EP&A Act if: (a) the development on the land concerned is, by the operation of an environmental planning

		instrument, not permissible without development consent under Part 4 of the EP&A Act; and (b) the development is specified in Schedule 1 or 2 of the SEPP. **Why the pathway applies** Refer to next row of this table. **Who the consent authority is** Section 4.5(a) of the EP&A Act provides that the consent authority for SSD is the Minister unless the development is of a kind which the IPC is declared by an environmental planning instrument to be the consent authority. Clause 2.7 of the Planning Systems SEPP provides that the IPC is the consent authority for SSD for any of the following that is not carried out by or on behalf of a public authority and that is not SSI: • Development to which the local council has objected to during the public exhibition of the proposal; • Development which has received at least 50 unique objecting submissions other than from Council during the public exhibition of the proposal; and • Development the subject of a DA made by a person who has disclosed a reportable political donation in connection with the DA. On the basis that reportable political donations have not been made in connection with the DA to the knowledge of Premise, the consent authority will be the Minister in accordance with Section 4.5(a) of the EP&A Act unless objecting submissions of the type or number described in clause 8A of the Planning Systems SEPP are received during the public exhibition of the SSDA.
Permissibility	Identify the relevant provisions affecting the permissibility of the project, including any land use zones. If there are inconsistencies in these provisions, identify the inconsistencies and explain which provisions prevail to the extent of any inconsistency. If the project is partly or wholly prohibited, identify any provisions or actions being taken that would allow the project to be considered on its merits (e.g. making a concurrent amendment to the relevant environmental planning instrument). The rationale for allowing the project to be carried out on this land should be discussed in more detail in the justification and evaluation sections of the EIS.	The proposed solar farm is consistent with the definition of 'electricity generating works', defined under the GMLEP 2009 as: *a building or place used for the purpose of—* *(a) making or generating electricity, or* *(b) electricity storage.* Section 4.36(2) of the EP&A Act provides that a State Environmental Planning Policy may declare any development, or any class or description of development, to be SSD. Clause 2.6(1) of the Planning Systems SEPP provides that development is declared to be SSD for the purposes of the EP&A Act if:

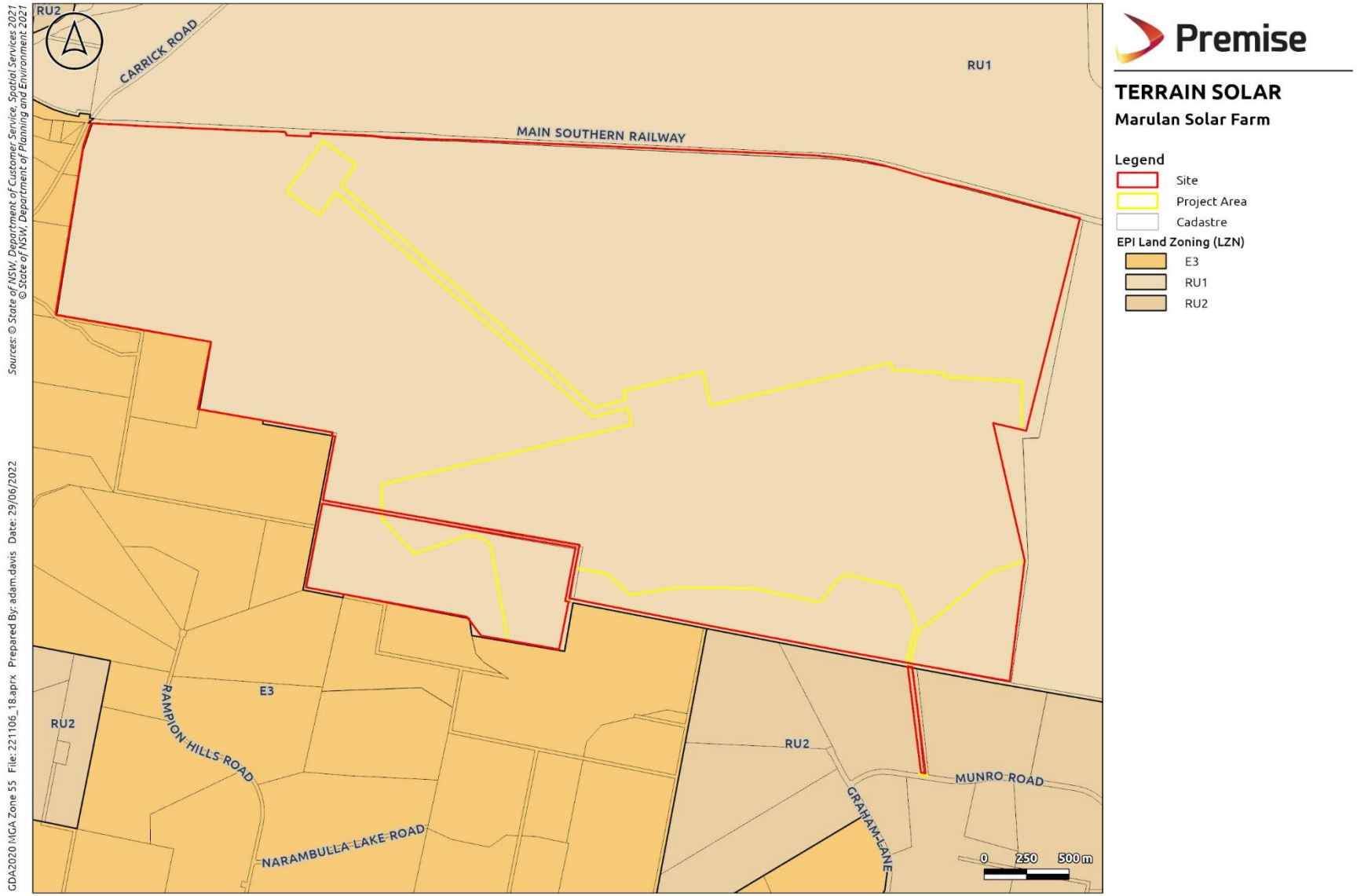
		(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act; and *(b) the development is specified in Schedule 1 or 2 of the SEPP.* The proposed development is SSD on the following grounds: • Permitted with consent in the RU1 Primary Production zone applying to the site under the GMLEP 2009 (refer to **Figure 21**), satisfying Section 2.6(1)(a) of the Planning Systems SEPP; and • The proposed solar farm has CIV exceeding $30 million in accordance with Clause 20 in Schedule 1 of the Planning Systems SEPP, satisfying Clause 2.6(1)(b) of the SEPP. Compliance with the SEARs is discussed in **Appendix B**.
Subdivision	Permissibility of subdivision and heads of consideration.	The proposal includes subdivision of the land to provide create a lot of the switching station (in one of two potential) locations and create a residue lot. Subdivision is permissible within the RU1 zone pursuant to clause 2.6 of the LEP, subject to satisfying the applicable minimum lot size (MLS), pursuant to LEP clause 4.2. In this instance, the applicable MLS is 100 hectares. Proposed Lot 1 has an of 4 ha and is therefore inconsistent with the MLS. Proposed Lot 2 has a lot size in excess of 1,400 ha and is compliant with the MLS. The proposal is permissible by the Minister pursuant to Section 4.38(3) of the EP&A Act despite being partly prohibited. The proposed subdivision is considered to be acceptable by reference to the objectives of the RU1 zone on the basis that: • The proposed subdivision is associated with the carrying out of a permissible activity in the RU1 zone and does not prejudice the carrying out of primary industry production; • The proposed lot is small in size and facilitates the carrying out of a renewable project, which is permissible in the zone, and will host permanent electrical infrastructure that will be managed and retained by Essential Energy in the discharge of their functions as an electricity authority;

		• The lot is well separated from property boundaries and will not lead to conflict with adjacent land uses. The proposed use of the land for housing electricity infrastructure is compatible with the use of the adjacent land for the purposes of primary production and for the purposes of electricity generating works. • The proposed lot is well separated from sensitive environments and would not lead to unacceptable impacts to watercourses or groundwater. Premise consulted by phone with the GMC Director Planning & Environment to discuss the matter of the proposed subdivision below the MLS and GMC confirmed no objection to the approach outlined by the application
Other approvals	Identify any other approvals that are required to carry out the project and why they are required. These approvals should be grouped into the following categories: • Consistent approvals: approvals that cannot be refused if the project is approved and must be substantially consistent with the approval22 • EPBC Act approval, and whether the bilateral agreement23 applies • Other approvals: approvals that are not expressly integrated into the SSD assessment under the EP&A Act (e.g. water access licences under the Water Management Act 2000, leases under the National Parks and Wildlife Act 1974). Also identify the approvals that would have been required if the project was not an SSD project24.	The following consistent approvals are required: • A licence under Section 48 of the *Protection of the Environment Operations Act* 1997 (the POEO Act) to perform an activity listed under Schedule 1 of the POEO Act, including the general electricity works with capacity to generate more than 30 megawatts of electrical power as specified in Section 17, Schedule 1 of the POEO Act; and • A consent to connect a road to Munro Road or Carrick Road or any of the other listed activities under Section 138 of the *Roads Act 1993* (the Roads Act). It has been confirmed (as per **Appendix K**, and the correspondence at **Appendix Q**) that the project does not represent a controlled action via a referral to DAWE. A search for potential matters of national environmental significance (MNES) via the online Protected Matters Search Tool (PMST), conducted with a 10 kilometre buffer of the site: – Did not identify any World Heritage Properties, National Heritage Places, Wetlands of International Importance, Great Barrier Reef Marine Park or Commonwealth Marina Area protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and – Identified three listed threatened ecological communities, 48 listed threatened species and 13 migratory species with the potential to occur in proximity to the site. A review of National Native Title Tribunal's Native Title Register did not identify any Native Title claims or applications, or Indigenous Land Use Agreements at or near the site under the *Native Title Act 1993* (the Native Title Act).
Pre-condition to exercising the power to grant approval	Identify any pre-conditions to exercising the power to grant approval for the project. These will include mandatory conditions that must be satisfied before the consent authority may grant approval. Each pre-condition should be summarised in a table with cross-references to the relevant sections of the EIS where it is addressed in more detail (see example in Appendix D).	

Mandatory matters for consideration	Identify the matters that the consent authority is required to consider in deciding whether to grant approval. Each mandatory matter should be summarized in a table with cross-references to the relevant sections of the EIS where it is addressed in more detail (see example in Appendix E).	Pursuant to Section 1.7 of the EP&A Act, the *Biodiversity Conservation Act* 2016 (the BC Act) is a mandatory matter for consideration. Section 7.9 of the BC Act provides that any application under Part 5 of the EP&A Act for SSD must be accompanied by a biodiversity development assessment report (BDAR) unless the Planning Agency Head and Environment Agency Head determine that the development is not likely to have any significant impact on biodiversity values. The project was referred to DAWE to determine whether the development would be considered as a 'controlled action' under the EPBC Act. As per the correspondence at **Appendix Q** the project does not represent a controlled action. Pursuant to Section 4.15 of the EP&A Act, the following mandatory matters for consideration apply: • Relevant environmental planning instruments, including: – *State Environmental Planning Policy (Resilience and Hazards) 2021;* – *State Environmental Planning Policy (Transport and Infrastructure) 2021;* – *State Environmental Planning Policy (Planning Systems) 2021;* – *State Environmental Planning Policy (Biodiversity and Conservation) 2021; and* – *Goulburn Mulwaree Local Environmental Plan 2009.* • The relevant development control plan, being the *Goulburn Mulwaree Development Control Plan 2009* (noting that the application of development control plans is excluded from SSD under Section 2.10 of the Planning Systems SEPP); • The likely impacts of the development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality; • The suitability of the site for the development; and • The public interest.
LEP Clause 7.2	(1) The objectives of this clause are to protect, maintain or improve the diversity of the native vegetation, including— (a) protecting biological diversity of native flora and fauna, and (b) protecting the ecological processes necessary for their continued existence, and	(1) The project is not inconsistent with the provisions of clause 7.2 on the basis that: (a) The project has been the subject of a detailed assessment via a BDAR, including engagement with NSW BCS and the Commonwealth DAWE, with avoidance of impact being key to project delivery (b) The outcome of the BDAR is that the project is unlikely to lead to a significant impact through careful avoidance and mitigation of impacts, with offsetting being proposed for residual

	(c) encouraging the recovery of threatened species, communities or populations and their habitats. (2) This clause applies to development on land that is identified as "Biodiversity" on the Terrestrial Biodiversity Map. (3) Development consent must not be granted to development on land to which this clause applies unless the consent authority has considered a report that addresses the following matters— (a) identification of any potential adverse impact of the proposed development on any of the following— (i) a native vegetation community, (ii) the habitat of any threatened species, population or ecological community, (iii) a regionally significant species of plant, animal or habitat, (iv) a habitat corridor, (v) a wetland, (vi) the biodiversity values within a reserve, including a road reserve or a stock route, and (b) a description of any proposed measures to be undertaken to ameliorate any such potential adverse impact. (4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development is consistent with the objectives of this clause and— (a) the development is designed, sited and managed to avoid the potential adverse environmental impact, or (b) if a potential adverse impact cannot be avoided, the development— (i) is designed and sited so as to have minimum adverse impact, and (ii) incorporates effective measures so as to have minimal adverse impact, and (iii) mitigates any residual adverse impact through the restoration of any existing disturbed or modified area on the site.	impacts. Via this approach, the project will protect ecological processes (c) As above (2) The land includes areas mapped on the LEP terrestrial biodiversity map and thus clause 7.2 applies to the project (3) By reference to sub-clause (3), the following is noted: (a) Adverse impacts have been identified via the preparation of a site specific BDAR, and consultation with BCS and DAWE (b) Measures to avoid and mitigate impacts is discussed in the BDAR at **Appendix K** and summarised in **Appendix D**; (4) In relation to the points raised at sub-clause (4), the following is noted: (a) As outlined in Section 3.1.1. of the BDAR at **Appendix K**, the development has been designed, sited and managed to minimise and avoid potential adverse impacts to the fullest extent possible; (b) Where impacts cannot be avoided, the project has been designed: (i.) To ensure residual impacts are minimised, through the application of appropriate mitigation measures, as outlined in Section 3.3 of the BDAR at **Appendix K;** (ii.) As above (iii.) Residual impacts are mitigated through careful on site management of the landscape, to be managed via an Operational Environment Management Plan, to be adopted and implemented for the life of the project – refer **Section 6.18**

Figure 21 – Land Use Zoning



5. ENGAGEMENT

5.1 Introduction

WSP have been engaged by Terrain Solar to complete engagement with respect to the project.

An engagement plan was prepared to set out the method of engagement and to identify project messaging, confirm key project milestones and facilitate the transfer of information between the proponent, the community and relevant regulators.

Details of the engagement completed by WSP is outlined in **Appendix C**. A summary of the process and outcomes of the engagement strategy is outlined in **Section 5.2**.

5.2 Engagement process and objectives

The objectives of the engagement of consultation are summarised as:

- Enable Terrain Solar to be transparent about development decisions and design modifications (if required).
- Explain the project drivers, what approvals processes and assessments will be undertaken and opportunities for input.
- Share information on the EIS process and parallel planning processes with the community and stakeholders.
- Identify and understand community and stakeholder needs, drivers and motivations.
- Provide community and stakeholders with easy to understand, timely and relevant information about the proposal as well as opportunities to provide feedback and insights.
- Adequately meet community engagement requirements, particularly during COVID-19 restrictions, and be prepared to change consultation approaches if and when required.
- Understand and address community and stakeholder issues, concerns and enquiries as they arise and where possible update the design to reflect feedback.

A Community and Stakeholder Engagement Plan (CSEP) was developed to ensure the above objectives would be achieved. The plan outlined several techniques to ensure that all relevant stakeholders and community members were reached and have an opportunity to be informed and provide feedback on the EIS.

5.3 Key findings

The key findings of the outcomes report are summarised in **Figure 22**.

Figure 22 – Engagement Key Findings

Theme	Summary
Community benefits 	Generally, community members, landowners and stakeholders consulted with ahead of the EIS lodgement were comfortable with what Terrain Solar is proposing for the Marulan Solar Farm. Many recognise the positive impacts that the renewable energy project will have in the region. Main areas of feedback and concern focused on aspects such as visual amenity, access, and transport.
Visual amenity 	Some local residents noted concerns and questions regarding the impact of the solar infrastructure on visual amenity, glare and reflectivity. Local landowners sought a greater understanding of where the proposed infrastructure will be situated on site, how the visual amenity assessment will be carried out and how this would impact sight lines from their property.
Traffic impacts 	Noting that the solar proposal will provide local employment opportunities during construction, stakeholders were interested in further details about proposed access roads. Particular interest was around the proposed access route along Munro Rd, and the ability for this Council owned road to accommodate heavy vehicles and higher volumes of traffic.
Aboriginal and Cultural Heritage 	Registered Aboriginal Parties (RAPS) attended both information sessions, with questions about the proposed methodology to undertake the field studies for the Aboriginal Cultural Heritage Assessment (ACHA). Ongoing consultation with the local Aboriginal community members was encouraged.

It was noted that, overall, sensitive receivers were not opposed to the project but rather sought clarification on the impacts to their respective properties. These discussions with landowners are preliminary and will be ongoing throughout the EIS process.

As the EIS progresses through the approval process, Terrain Solar will continue to consult with the community through workshops, community newsletters, local community groups and Aboriginal community representatives. Consultation will be undertaken during the exhibition phase of the EIS ensure community and stakeholders are aware of the that the EIS is on exhibition and have an opportunity to provide an informed submission to DPE as the assessor.

5.4 Agency consultation

Alongside the engagement completed by WSP, Premise and other specialist consultants have engaged with key statutory stakeholders in relation to the preparation of the various supplementary reports. The outcomes of this are summarised below.

Table 5 – Agency engagement

Impact area	Agency	Comments raised	Relevant EIS section
Heritage	Heritage NSW	No response received	Refer **Section 6.1**
Heritage	Registered Aboriginal Parties	A range of comments throughout the ACHAR process. The final ACHAR updated to reflect comments received. The final ACHA was provided to RAPs for information on the 6 July 2022.	**Section 6.1.1** and **Appendix E**
Heritage	Gundungurra Tribal Council Aboriginal Corporation	Contacted when the project commenced, but no response received. Did not register for involvement. A copy of the final ACHA provided for information on the 14 July 2022.	This table
Hydraulic	NRAR	No objection to development of solar infrastructure within those mapped waterways with no defined bank or bed.	Refer **Appendix Q**
Water	Water NSW	Acknowledgement but no detailed response received	This table and **Appendix Q**
Land	ARTC	Acknowledgement but no response received	This table
Land	CASA	No objections due to the nearby airports being non-tower airports	Refer **Appendix Q**
Land	GM Council	Confirmed no impact to rate value of adjacent land	No written response received; telephone conversation with Council staff confirms impacts limited to change in rating of subject land with respect to the developed portion (business rather than agriculture)
Land	Department Agriculture	Noted that the land is lower land capability class thus appropriate for the project	Refer **Appendix Q**
Land	Insurance Council of Australia	No response received	This table
Biodiversity	DPE BSC	Ongoing consultation during preparation of the BDAR including a site visit with BSC staff	**Section 6.5 and Appendix K**

Impact area	Agency	Comments raised	Relevant EIS section
Biodiversity	DAWE	Ongoing consultation during preparation of the BDAR including a site visit with DAWE staff	**Section 6.5 and Appendix K**
Traffic	TfNSW	Draft TIA provided. Response received and TIA updated to reflect TfNSW comments. Final TIA provided to TfNSW for comment but no response received.	Refer **Section 6.7 and Appendix L**
Traffic	GM Council	Munro Road preferred to other roads Traffic data shared	**Appendix Q** and this table
Hazard	APA	No requirement for safety management study	**Section 6.13.4 and Appendix Q**
Fire	RFS	No response received	Refer **Section 6.6**
Fire	F&RNSW	No response received	Refer **Section 6.6**
Social impacts	GM Council	Supportive of the project	Refer **Section 6.15**
Social impacts	Landowners	Concerns around visual impacts raised by a number of receivers. Specifically regarding: • Noise • Dust • Impacts during construction	**Sections 5 and 6.15, and Appendix C**

5.5 Ongoing engagement

Terrain Solar is committed to ongoing and open engagement with landowners and affected communities as a component of this project and will continue to engage with all parties throughout EIS assessment and subsequent project development.

6. ASSESSMENT OF IMPACTS

Pursuant to the State Significant Development Guidelines, this section of the report outlines the environmental impacts of the proposed development and any measures required to protect the environment or lessen the harm to the environment.

6.1 Heritage

6.1.1 ABORIGINAL HERITAGE

6.1.1.1 Impact

The Aboriginal Cultural Heritage Assessment (ACHA, Premise 2022) attached at **Appendix E** makes the following conclusions with respect to the impact of the development to items or sites of Aboriginal heritage significance:

The proposed works as identified at the time this report was prepared, would result in impacts to all identified Aboriginal objects, however these have been assessed as having low to moderate scientific significance and high cultural significance.

The impact assessment for each location and previously recorded AHIMS site is provided below in **Table 6**.

Table 6 – Aboriginal Heritage Impact Assessment

Site Number	Type of Harm	Degree of Harm	Consequence of Harm
AHIMS ID #51-6-0364	Direct	Total	Total loss of value
AHIMS ID #51-6-0373	Direct	Total	Total loss of value
AHIMS ID #51-6-0374	Direct	Total	Total loss of value
AHIMS ID #51-6-0375	Direct	Total	Total loss of value
AHIMS ID #51-6-0376 Location 4	Direct	Total	Total loss of value
AHIMS ID #51-6-0908	Direct	Total	Total loss of value
Osborns Creek OS-1	Direct	Total	Total loss of value
Narambulla Creek OS-1	Direct	Total	Total loss of value
Lockyersleigh Creek OS-1	Direct	Total	Total loss of value

6.1.1.2 Mitigation Measures

In summary, the following safety and management measures are recommended in the Premise ACHA:

1. *The development proposal should proceed, conditional upon the recommendations outlined in this report and surface collection of recorded sites within the study area.*

2. *Any Aboriginal object that is newly identified during the surface collection will be recorded appropriately.*

3. *No further Aboriginal archaeological investigations are proposed.*

4. *As the project is assessed as being State Significant Development (SSD), an Aboriginal Heritage Impact Permit (AHIP) is not required under Part 4.7 clause 4.41 (1)(d) of the EP&A Act. Instead, Aboriginal cultural heritage within the study area will be managed by an Aboriginal Cultural Heritage Management Plan (ACHMP) that will be developed following project approval in consultation with the RAPs and Heritage NSW. The ACHMP will contain the recommendations of this report, as well as an unanticipated finds protocol, procedures to manage unexpected discoveries of human remains, and policies on the fate of any Aboriginal objects either salvaged following project approval or from the test excavation program.*

5. *Site Cards for AHIMS #51-6-0736 and AHIMS #51-6-0364 will be updated to reflect the findings of the test excavation program of Locations 4 and 5.*

6. *Three newly recorded sites at Locations 1-3 will be uploaded to the AHIMS database:*

    - *Location 1 will be named Osborns Creek OS-1.*

- *Location 2 will be named Narambulla Creek OS-1.*
- *Location 3 will be renamed Lockyersleigh Creek OS-1.*

7. *The following AHIMS sites will be impacted:*
   - *AHIMS ID #51-6-0364*
   - *AHIMS ID #51-6-0373*
   - *AHIMS ID #51-6-0374*
   - *AHIMS ID #51-6-0375*
   - *AHIMS ID #51-6-0376*
   - *AHIMS ID #51-6-0908*
8. *All Aboriginal sites that are subject to impact will be recorded on an Aboriginal Site Impact Recording form and submitted to Heritage NSW.*
9. *The proponent should consider avoiding the south-western portion of the study area containing AHIMS ID #51-6-0364 (test excavation Location 5) and European archaeological material. If this is possible, no further archaeological investigation at AHIMS ID #51-6-0364 will be required.*
10. *If Location 5 of the test excavation program is harmed, limited salvage excavations must take place prior to ground disturbance by the project. This would include the manual excavation of an additional 4 excavation squares (1 metre squared) around the three test squares recording the highest numbers of artefacts. There would be triggers for expansion but only to a maximum of 6 square metres in total.*
11. *Sites recorded during the test excavation program (Osborns Creek OS-1, Narambulla Creek OS-1, and Lockyersleigh Creek OS-1) are subsurface manifestations only and as subsurface artefacts were recorded at a low artefact density representative of a background scatter that would be common in most landforms of the region, no further archaeological investigation is warranted at these sites.*
12. *Sites with a surface expression of artefacts in the study area (AHIMS ID #51-6-0373, AHIMS ID #51-6-0374, AHIMS ID #51-6-0375, AHIMS ID #51-6-0376, AHIMS ID #51-6-0908) will be salvaged through a collection of surface artefacts prior to impacts. Given that these sites are low-density artefact scatters and isolated finds, their scientific significance is low, and the recording and collection of visible artefacts is considered to be sufficient mitigation with regard to the proposed impact. Specific recommendations for AHIMS ID #51-6-0364 are provided in Recommendations 5 and 9.*
13. *It is proposed that Aboriginal objects recovered from the salvage surface collection together with test excavation artefacts, will be reburied within the study area, outside the proposed impact area. Terrain Solar (or proponent) would need to identify a location that will not be impacted by the proposed solar farm operation for consideration by the RAPs. Management*

of Aboriginal objects recovered during the salvage program and test excavation program will be discussed through consultation with RAPs during the development of the ACHMP.

14. *An unexpected finds procedure would be implemented as part of the management considerations for Aboriginal Cultural Heritage. Uknexpected finds policy should be included as part of the proposed ACHMP. If unanticipated Aboriginal objects are uncovered during works, all work in the vicinity should cease immediately. A qualified archaeologist should be contacted to assess the find and Heritage NSW and Pejar LALC must be notified.*

15. *All impacts must remain within the assessed study area or further archaeological investigation may be required.*

Subject to the implementation of the above measures, it is concluded that impacts as a result of the project with respect to Aboriginal heritage are acceptable.

6.1.2 HISTORIC HERITAGE

6.1.2.1 "Ruins of Kyle"

The Statement of Heritage Impact (SOHI; Premise 2022) attached in **Appendix I** makes the following findings with respect to the impact of the proposed development on the locally listed "Ruins of Kyle":

Physical impact assessment

While the design detail of the proposal is to be confirmed, the proposal would involve works adjacent to the heritage item, which would encroach upon the northern and eastern portion of the item's boundary. This would potentially result in excavation and earth movements in close proximity to the ruins. Construction activities would be undertaken in close proximity to the ruins, which would potentially result in vibration impact to the heritage item. Potential evidence of earlier structures, including sandstone footings and rubble embedded in the soil immediately to the south of ruins will be protected by the proposed exclusion zone.

The proposal would result in a moderate physical impact to the heritage curtilage of the Ruins of Kyle. There is potential for moderate direct physical impact from works vibrations.

Visual impact assessment

The proposed works would encroach upon the heritage curtilage of the Ruins of Kyle and are understood to result in construction activities immediately adjacent to the ruins themselves. This would potentially change views to and from the ruins, including vistas toward the Lockyersleigh Homestead and existing rural outlook to the north, east and west. It is noted that the historic fabric of the ruins has been diminished over time. The item's setting is located within overgrown vegetation and cannot be easily seen within the landscape, which has further obscured the visual setting and character of the heritage item. The item historically most likely had visual associations with the Lockyersleigh Homestead to the north east.

The proposal would result in a moderate visual impact to the Ruins of Kyle.

6.1.2.2 "Lockyersleigh"

The SOHI (Premise 2022) attached in **Appendix I** makes the following findings with respect to the impact of the proposed development on the locally listed "Lockyersleigh":

Physical impact assessment

While the proposal would involve works to land adjacent to the Lockyersleigh Homestead in the south, the proposal would not directly impact or encroach upon the item's heritage curtilage.

The proposal would result in a neutral physical impact to the Lockyersleigh Homestead.

Visual impact assessment

The proposal would involve works adjacent to the heritage curtilage of the Lockyersleigh Homestead site. Removal of vegetation and planting, and construction of associated infrastructure in the northern portion of the host lot as part of the solar farm development would not change views to and from the item. However the rural landscape setting to the south of the heritage item will be significantly altered. It is noted that the main southern railway line bisects Lockyersleigh Homestead from the development area. Retention of tree lines will be maintained and would ensure that any visual impacts would be negligible.

The proposal would result in a negligible visual impact to the Lockyersleigh Homestead.

6.1.2.3 Historical Timber Bridge

The Historical Timber Bridge is located within the channel of Narambulla Creek which is avoided by the proposed development. Accordingly, the proposed development will not result in any impact on the historical timber bridge. Nevertheless, its conservation and preservation is encouraged so as to retain its fabric in the SOHI (Premise 2022) attached in **Appendix I**.

6.1.2.4 Mitigation Measures

In summary, the following safety and management measures are recommended in the SOHI for the "Ruins of Kyle" and "Lockyersleigh":

- GMC and State Heritage Inventory to update their records to reflect consistent details for heritage item numbers associated with the Ruins of Kyle and Lockyersleigh Homestead.
- Installation of a high-visibility barrier that is set at least 10 metres from heritage items during construction, not to be removed until construction is complete.
- Provision of a minimum 60 metre buffer area to the north and east of the Ruins of Kyle to ensure only a partial loss of views and vista occurs to the heritage item. The minimum buffer to the south and west of the Ruins of Kyle would be to the extent of the mapped curtilage of this item.
- Heritage induction for all workers prior to works commencing, including values of the site, avoidance procedure and contacts (site manager, etc) for reporting unexpected archaeological finds, or inadvertent impacts to heritage items.
- Retention of natural screening in the form of vegetation wherever possible. Where impact to vegetation cannot be avoided, planting of new vegetation is recommended.

6.2 Hydrogeology

6.2.1 GROUNDWATER

Groundwater at the proposal site is greater than 1.5 metres below surface level. The installation of the panel support piers would involve screwing or piling to a depth no greater than 1.5 metres. The installation would not intercept or interfere with groundwater. The construction of the transmission line would involve installing

poles up to seven metres deep. There is a potential for the foundations for these poles to intercept the local groundwater table. The volume of groundwater to be displaced during construction of the transmission line poles is expected to be minimal. An approval from the NSW Department of Industry (Water) would be sought in the event that dewatering is required which exceeds three mega litres per year.

6.2.2 SOILS

6.2.2.1 Construction Impacts

The Land and Soil Capability Assessment (LSCA; Premise 2022) attached in **Appendix G** makes the following findings with respect to impact of the of the proposed development at construction phase:

> *The construction of the solar farm would disturb surface and subsurface soils. In general, disturbances during construction that are likely to cause impacts to soils include:*
> - *Vegetation clearing that exposes soils*
> - *Disturbance near existing Wombat burrows*
> - *Construction (and use) of tracks*
> - *Earthworks (cut and fill, grading and compacting)*
> - *Excavation for trenching and sediment basins*
> - *Stockpiling of soils*
>
> *Potential impacts to soils during construction are likely to include:*
> - *Reduced soil stability*
> - *Mixing of soil horizons, affecting soil quality and impeding vegetation growth*
> - *Exposure of saline and sodic sub-soils, affecting soil quality and plant growth*
> - *Erosion, soil loss and sedimentation*
> - *Reduced soil permeability and increased run-off*
> - *Ground collapse and gullying near existing Wombat burrows*

6.2.2.2 Operational Impacts

The LSCA (Premise 2022) attached in **Appendix G** makes the following findings with respect to impact of the of the proposed development at operation phase:

> *The operation of the solar farm is anticipated to involve minimal disturbance to soils. However, potential impacts may include:*
> - *Erosion, soil loss and sedimentation.*
> - *Localised erosion under solar panels from panel water run-off during rainfall or cleaning. This is likely if groundcover is not maintained under the panels.*
> - *Reduced soil permeability and localised run-off. It is noted that the Hydraulic Assessment (Premise, 2021) completed for MSF concludes that "hydraulic modelling showed that there are no impacts external to the site" (p. 12).*
> - *Downstream salinity impacts if water infiltration to saline subsoil increases; this may occur where pasture is not utilised (i.e. grazing or slashing) which reduces removal of water and salt from the soil profile.*
> - *Impacts to metal or concrete structures in contact with acidic or saline soils in soil units 2 and 6.*

6.2.2.3 Decommissioning Impacts

The LSCA (Premise 2022) attached in **Appendix G** makes the following findings with respect to impact of the of the proposed development at decommissioning phase:

Potential impacts during decommissioning are anticipated to be similar to construction impacts from soil disturbance. Longer term impacts of decommissioning may include:

- *Failure to return the site to existing land and soil capability (as outlined in this report) or improved land and soil capability.*
- *Failure to return the site to a safe, stable and non-polluting landform.*

6.2.2.4 Mitigation Measures

In summary, the LSCA (Premise 2022) attached in **Appendix G** includes the following mitigation measures:

- Prior to construction:
  - Ensure the detailed sign incorporates all necessary measures from a Construction Erosion and Sediment Control Plan (ESCP) and Soil and Water Management Plan (SWMP).
  - Where possible, detailed design will be sympathetic to existing internal tracks, and where new tracks are required, they will seek to be established within minimal disturbance.
  - Seek advice from the NSW Soil Conservation Service during detailed to identify the appropriate treatment and management strategies for gullies, creek beds, sand seams, pipe bedding materials and excavated soil amelioration.
  - Treat weeds, remove Sifton bushes and undertake application of lime and gypsum.
  - Establish and maintain a perennial pasture to ensure 100% groundcover.
- During construction:
  - Implement all measures from ESCP and SWMP.
  - Minimise all ground disturbance where possible.
  - Minimise construction activities during wet weather conditions.
  - Retain, stockpile, treat for weeds and ameliorate (in accordance with advice obtained from the NSW Soil Conservation Service) all disturbed or excavated soil, with all topsoils and subsoils stockpiled separately and returned in order.
  - Ensure that sodic soils or intervals are clearly identified and not mixed with other soils.
  - Return stockpiled soil and cleared vegetation or organic matter to its original location (where possible) as soon as reasonably practicable.
  - Exclude livestock during construction and install fencing around existing gullies that are not being filled for the construction of the solar farm.
  - Undertake rehabilitation and revegetation in accordance with an appropriate landscape, revegetation or rehabilitation plan prepared by a suitably qualified professional.
  - Ensure rehabilitation is undertaken progressively to minimise the total disturbance area at any one time.
- During operation:
  - Implement and maintain all operational requirements of the SWMP.
  - Prepare and implement a Pasture Management Plan.
  - Undertake monitoring to identify potential soil impacts requiring mitigation or remediation.
- During decommissioning:
  - Prepare an appropriate decommissioning management plan that incorporates appropriate soil management to return the site to existing or improved land and soil capability.
  - Specific soil management practices should be determined at the time of decommissioning.

6.2.3 SURFACE WATER

The Hydraulic Assessment (Premise 2022) attached in **Appendix H** makes the following findings with respect to potential impacts associated with the proposed development (pp. 10-11):

> *The results* [of the hydraulic modelling] *show that the proposed solar farm is predicted to not cause external impacts in terms of water surface levels and peak discharges.*
>
> *…*
>
> *The modelling also indicates that no mitigation measures (such as a detention basin) are required. The proposed location of the solar panels and access are within the bounds of low flooding risk (depths less than 0.9m and velocities less than 1m/s). The locations identified for the substation are outside of the 1% AEP flood extent. … the infrastructure is located outside of areas with high flow depth and velocity, and the risk of erosion or scour is considered to be minimal.*

The Premise Water Cycle Management Study Report (WSMSR) provided at **Appendix J** provides an assessment of the project in order that the consent authority may be satisfied that the development would have a neutral or beneficial effect on water quality.

For the purpose of the assessment, the site was separated into three (3) catchments associated with drainage channels for Narambulla Creek and Lockyersleigh Creek, including the following catchment areas:

- Narambulla Creek (Western Catchment) – 189.6 ha
- Lockyersleigh Creek (Eastern Catchment), including the access handle – 172.83 ha
- Lockyersleigh Creek (North-eastern Catchment) – 33.27 ha

The assessment considered an area of 395.7 ha, which accounts for the maximum proposed footprint of the development. Water quality modelling was confined to the three (3) above catchments defined within the site as per **Figure 23**.

The assessment identified a number of pre-development source nodes, including:

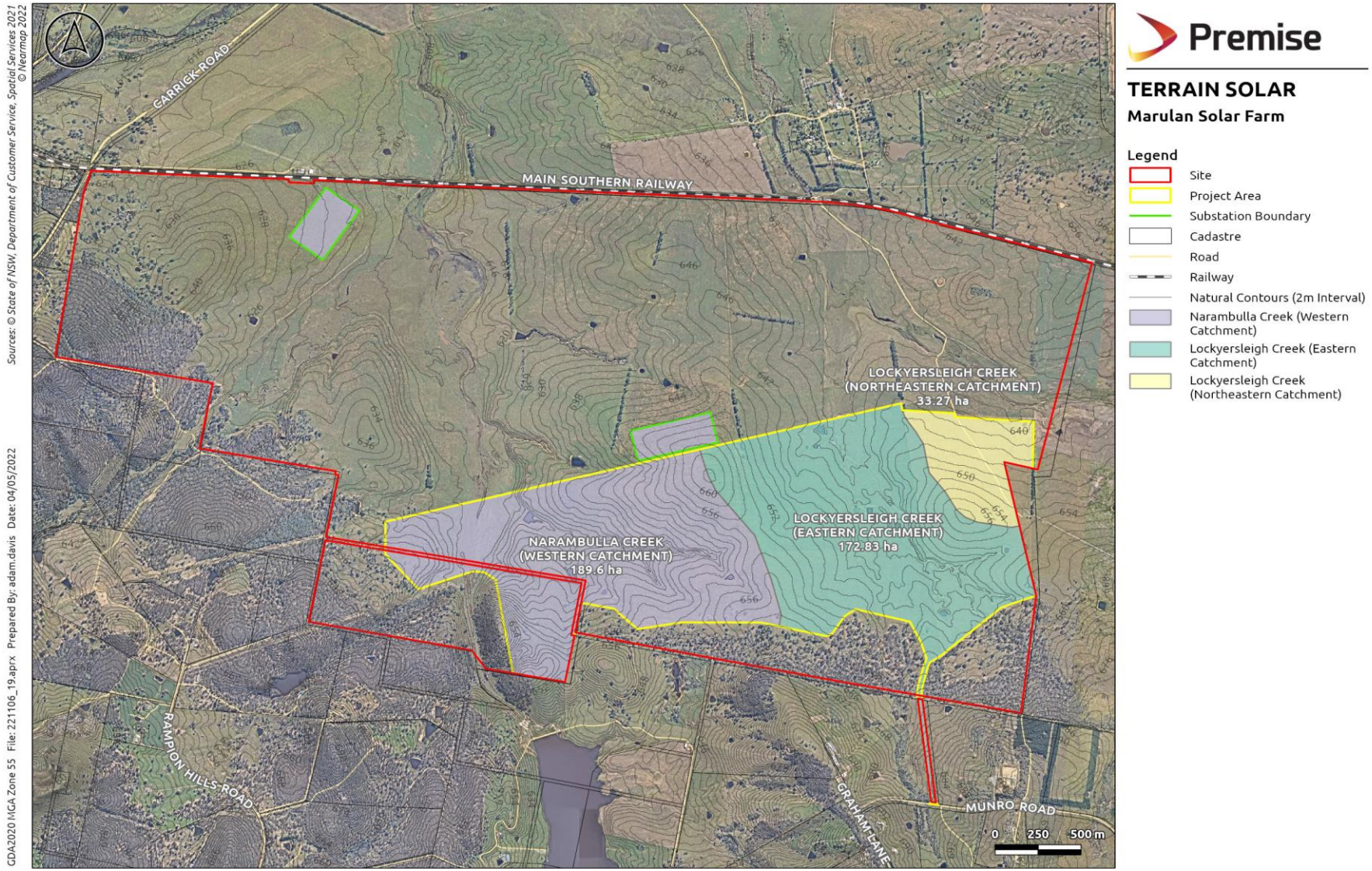
- Agricultural land use (383.27 ha);
- Eroding gully (10.83 ha);
- Rainwater tank (0.01 ha); and
- Revegetated land (1.6 ha).

Post development source nodes were identified as urban, and included the following project areas:

- Roofs (solar panels);
- Unsealed roads; and
- Sealed roads.

The assessment adopted existing treatment nodes (farm dams, vegetated swales etc), together with proposed treatment nodes (additional vegetated swales).

Figure 23 – Water Quality Assessment Catchment Areas



Two scenarios were modelled using MUSIC, described below:

- Existing – represents existing catchment conditions with existing farm dams and drainage swales; and
- Post-Development – represents the proposed solar farm development and removal of some farm dams and drainage swales, plus the addition of surface water management devices for the development.

Mean annual pollutant loads are summarised in **Table 7**. Results are expressed as the sum of the pollutant loads for the east and west catchment. NorBE criteria are achieved for all modelled pollutants.

Table 7 – MUSIC Modelling Results

Pollutant (Mean Annual Loads)	Pre-development	Post Development (with treatment)	% Reduction (Pre to Post Development with treatment)
Flow (ML/yr)	385	380	1%
Total Suspended Solids (kg/yr)	16,300	8,210	50%
Total Phosphorus (kg/yr)	75.6	56.9	25%
Total Nitrogen (kg/yr)	613	589	4%
Gross Pollutants (kg/yr)	0	0	0%

Cumulative frequency graphs for existing and post development conditions for Total Phosphorus and Total Nitrogen are provided as Figures 6-8 in **Appendix J**. These represent the results for the combined catchments. Results show:

- Phosphorus concentrations are slightly higher in the post development case, however, are lower that the pre -development case at the 98th percentile concentration.
- Nitrogen concentrations are slightly higher in the post development case, however, are lower that the pre-development case at the 98th percentile concentration.
- Total Suspended Solid concentrations are lower than the pre-development case between the 50th to 98th percentile and therefore achieve NorBE requirements.

The WCMS concludes with respect to water quality:

> *The modelled post-development total suspended solids and total phosphorus are more than 10% less than the pre-development case. Total nitrogen levels were reduced by 5% and gross pollutants remained the same.*
>
> *Nitrogen levels may require additional treatment options to satisfy a 10% reduction, which is used to account for uncertainty within MUSIC modelling. Nevertheless, Mean Annual Load reductions were achieved for all pollutants.*
>
> *The total suspended solids concentrations for the post development scenario were lower than the pre-development case between the 50th and 98th percentiles. Total phosphorus and total nitrogen concentrations for the post development scenario, however, were slightly greater that the pre-development conditions between the 50th and 98th percentiles.*
>
> *The proposed development and stormwater modelling would be subject to further detailed assessment and design during the engineering design phase. Additional treatment options to reduce phosphorus and nitrogen levels through the 50th and 98th percentiles may be required to satisfy NorBE requirements.*

6.2.3.1 Mitigation measures

Construction related soil and water impacts would be managed through the development and implementation of a Soil and Water Management Plan (SWMP) that would address:

- Staging;
- Erosion control strategies;
- Progressive rehabilitation; and
- Site management and maintenance techniques.

The SWMP would be reviewed and finalised in conjunction with the engineering design at the Construction Certificate stage to ensure that control measures can be effectively designed and located.

6.3 Other Land Resources

6.3.1 AGRICULTURE

6.3.1.1 Loss of agricultural land and productivity impacts

The proposed use of the land as a solar farm would have the following temporary impacts to agricultural land use and productivity for the life of the project:

- Potential diversification of the land use. The land could be used for both the solar farm and grazing to manage groundcover, subject to implementation of a Pasture Management Plan, as identified in the Premise (2022) LSCA.
- Prevent the use of the land for cropping in the project area, affecting the potential to generate income from that land use.
- Changing the number of livestock that can graze in the project area, affecting the income generated by livestock. This may be a positive (increase) or negative (decrease) impact, subject to determination of suitable stock rates in a Pasture Management Plan, as identified in the Premise (2022) LSCA.

The GMC LGA identifies that the Council has a land area of 322,265.3 hectares, of which 212,433 hectares (approximately 65%) is zoned for primary production (RU1, RU2, RU3 and RU6). The project area covers approximately 375.5 ha of agricultural land, or approximately 0.18% of available zoned agricultural land (noting that approximately 35.5 hectares of this area are development exclusion areas).

The development of 0.18% of agricultural land within the GMC LGA is not considered likely to significantly diminish the availability of agricultural land for primary production purposes within the LGA. The continuation of managed grazing is considered an appropriate land use to co-exist with the solar farm and is consistent with the LSC Scheme for Classes 5-7.

The solar farm will have an initial life span of approximately 30-35 years and is not anticipated to result in any permanent changes to the landscape. The project area would be returned to agricultural land use following decommissioning.

The passive nature of a solar farm is unlikely to adversely affect the agricultural capability of the land where appropriate design and management is implemented to minimise impacts to soils and manage groundcover and grazing. By reference to the Premise LSC (**Appendix G**), it is noted that:

- land capability is Class 5 (moderate – low capability land) to Class 7 (very low capability land) which is according to the NSW OEH (2012) *Land and soil capability assessment scheme* (LSC Scheme):
    - Class 5 land has severe limitations for high impact land management uses such as cropping. There are few management practices generally available to overcome these limitations…This land is

generally more suitable for grazing with some limitations or very occasional cultivation for pasture establishment.
    - Class 6 land has very severe limitations for a wide range of land uses and few management practices are available to overcome these limitations. Land generally is suitable only for grazing with limitations and is not suitable for cultivation.
    - Class 7 land has extremely severe limitations for most land uses. It is unsuitable for any type of cropping or grazing because of its limitations. Use of this land for these purposes will result in severe erosion and degradation.
- the land is not mapped as biophysical strategic agricultural land;
- the land has not been identified as regionally significant agricultural land;
- the land would be used for a non-agricultural purpose, but would not be an incompatible development on the basis that ongoing agricultural use can be supported with careful management, such as grazing of stock for groundcover and fuel load management;
- the strategic planning context for the area does not propose or identify the land for future urban development (refer **Section 2.1.3 and 2.1.4**);
- Upon cessation of the use, the land would be capable of being returned to an agricultural use in the future;
- the policy objective is not to prevent or discourage other land uses; and
- the MSF does not require any changes to an environmental planning instrument.

Whilst not located within a REZ, as outlined in **Section 2.1.2**:

- Under the *NSW Transmission Infrastructure Strategy* (DPE 2018), upgrades are planned to the 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga;
- The site is mapped under the Renewable Energy Map of New South Wales (NSW Government 2018) as receiving the same or higher level of average daily solar exposure (megajoules per square metre) as parts of the New England REZ and parts of the Hunter-Central Coast REZ; and
- There is a high density of existing and planned wind and solar energy projects in the vicinity of the site.

Similarly, as noted in **Section 2.1.3**, Direction 8 of the SETRP seeks to protect important agricultural land, including mapping this resource. At the time of writing, no mapping is known to exist to identify important agricultural land.

6.3.1.2 Impact to surrounding agricultural land use

The construction of the solar farm may result in temporary impacts to surrounding agricultural land uses, such as:

- Temporary air quality impacts
- Temporary noise impacts
- Temporary interactions with agricultural transport operations

With effective implementation of construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS, the development is not considered likely to result in significant adverse impacts to surrounding agricultural land uses.

Cumulative impacts are considered in **Section 6.17**.

6.3.1.3 Impact to agricultural support services

The NSW DPI (2013) *Agricultural Impact Statement technical notes* describes agricultural support services as input suppliers for agricultural industries and processing and other value-adding industries as those that are reliant on the outputs of affected agricultural industries.

The current agricultural operations at the project area have the following anticipated input suppliers:

- Fertiliser and soil amendment suppliers
- Stock feed suppliers
- Grain suppliers
- Farm employees

The current agricultural operations at the project area generate agricultural products for the following processing and value-adding industries:

- Livestock for livestock buyers and processors
- Stock feed / grain from crops (if sold, I suspect it is just used on site but TBC)

6.3.1.4 Impact to agricultural water use

The construction of the solar farm will require water for dust suppression, fire-fighting capacity and office/ablution facilities – refer **Section 3.2.9**.

6.3.1.5 Impacts to surrounding land uses

A Land Use Conflict Risk Assessment (LUCRA) has been completed in relation to the project (**Appendix I**) – refer **Section 6.3.3**. The LUCRA identifies a range of potential risks associated with the project however confirms that, subject to the implementation of standard measures, these risks can be reduced to a level of 10 or less. The project is therefore considered to be consistent with the objectives of the DPI LUCRA guidelines.

6.3.1.6 Mitigation measures

The following measures would be implemented to minimise or mitigate impacts to agricultural land use and productivity:

- Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS.
- Undertake consultation with the landowner of the project area to:
  - ensure agricultural considerations are incorporated into the final design.
  - negotiate arrangements for safe passage and access for their surrounding agricultural land uses and resources.
  - determine appropriate offsets for loss of income from impacts to agricultural productivity.
  - inform preparation of the Pasture Management Plan.

6.3.2 URBAN DEVELOPMENT

The site is unlikely to be used for urban purposes in the short, medium or long term because:

- The RU1 Primary Production land use zone applying to the majority of site under the GMLEP 2009 does not permit urban land uses;
- No planning proposals are known to have been submitted to GMC to seek rezoning of the site;

- The site is not identified as an "urban investigation area", "urban release area" or similar under an environmental planning policy or under any of the strategic policies considered in **Section 2.1** of this report;
- The site is substantially separated from established urban areas, meaning that any urban development would require extensive extension and augmentation of essential services; and
- The impacts of urban development are significantly greater than that of a solar farm as the former is permanent whilst the latter is to be decommissioned within 30-35 years before the land is rehabilitated to pre-development conditions.

6.3.3 LAND USE CONFLICT RISK ASSESSMENT

The Land Use Conflict Risk Assessment (LUCRA; Premise 2022) attached at **Appendix I** considers and assesses the range of potential conflicts associated with the development.

The LUCRA identified a total of 47 potential land use conflicts. The initial risk ranking identified 20 low risk and 27 moderate risk conflicts. The revised risk ranking identified 31 low risk and 6 moderate risk conflicts.

The average risk ranking of all identified conflicts was reduced from an initial risk ranking of 11.6 (moderate risk) to a revised risk ranking of 7.5 (low risk), which is consistent with the LUCRA objective to lower the revised risk ranking to 10 or below.

Revised risk rankings identified low risk conflicts mostly related to access and traffic, nuisance and competing industries.

Revised risk rankings identified moderate risk conflicts for the following:

- All land uses
  - Risk to property, including bushfire and flooding risks.
- Agricultural land use
  - Economic Interest, including impacts to insurance premiums and land values.
- Extractive industry land use
  - Environmental concerns, including the potential for cumulative impacts.
  - Health and safety, including concerns regarding the proximity of the solar farm to quarry operations.
  - Economic Interests, including impacts to insurance premiums.

6.4 Biosecurity

6.4.1 IMPACT ASSESSMENT

The primary object of the NSW *Biosecurity Act 2015* is to:

> *provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.*

GMC have a Local Weed Management Plan (GMC, 2019) which adopts the principles and priorities identified in the South East Local Land Services (2017) *South East Regional Weed Management Plan 2017 – 2022* and prioritises actions based on local risk, impact and feasibility of control. The Local Weed Management Plan specifies:

- Prohibited matters, mandatory measures and general biosecurity duties to manage weeds.
- The prevention, elimination, containment and asset protection measures for priority weeds in the GMC LGA.

- Appendices containing GMC's specific requirements for 10 weed species, specifically:
  - Serrated Tussock (*Nasella trichotoma*)
  - African Lovegrass (*Eragrostis curvula*)
  - St John's Wort (Hypericum perforatum)
  - Gorse (Ulex Europaeus)
  - Chilean Needle Grass (*Nassella neesiana*)
  - Fireweed (Senecio Madagascariensis)
  - Cape Broom (Genista monspessulana)
  - Scotch Broom (Cytisus scoparius)
  - Coolatai Grass (*Hyparrhenia hirta*)
  - Blackberry (Rubus fruticosus agg)

A weed assessment of the project area was undertaken as part of the BDAR attached at **Appendix K**. The assessment identified 11 high threat exotic weed species, including three (3) species that are Priority Weeds for the GMC LGA under the NSW *Biosecurity Act 2015* and also Weeds of National Significance as listed by the Australian Weeds Committee of the Australian Government (2012). These species are African Boxthorn, Serrated Tussock and Blackberry.

Potential biosecurity impacts include:

- Introduction and spreading of weeds or pathogens in the project area through increased movement of vehicles and people during the construction and decommissioning phases.
- Spreading of weeds or pathogens outside the project area, from tracking of materials on vehicles and people leaving the site and spread of weeds from the site onto surrounding properties via seeding events or lateral growth. It is noted that the Premise (2022) BDAR states:

  The risk of translocation of weeds and pathogens from the Subject Land to surrounding vegetation is considered to be low since the area is already highly disturbed and likely supports all of the weed and pathogen species likely to be able to establish. Nevertheless, there is a small potential for new weeds and pathogens to be introduced on vehicles and materials brought to the site from outside.
- Attracting pest animals to the project area.
- Introduction of contaminated soil into the project site during construction activities being a potential vector for disease introduction.

6.4.2 MITIGATION MEASURES

Mitigation measures include:

- Preparing a Weed Management Plan:
  - in accordance with the (GMC, 2019) Local Weed Management Plan, South East Local Land Services (2017) South East Regional Weed Management Plan 2017 – 2022 and NSW Biosecurity Act 2015; and
  - in consultation with GMC, NSW DPI and the landowner.
- If sheep grazing is undertaken during operations, a detailed protocol would be developed to ensure biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers, stock or staff.
- Restricting vehicle movements by establishing and using formed access tracks.
- Use of vehicle wash down stations to prevent the transport of weeds and pathogens to and from the project area.

- Ensure all waste containers are covered to prevent pest animal access to food waste, and ensure waste is regularly removed from the site.
- Establishing and maintaining perimeter fencing to minimise pest animal access to the project area.
- Conduct routine monitoring for pest species and implement control measures if required, and in accordance with industry best practice.
- Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS.
- Ensuring any imported fill has appropriate chains of custody and testing to limit the potential for the introduction of diseases.

Where the above mitigation measures are effectively implemented during each phase of the project, it is unlikely that the development would significantly increase biosecurity risks at the development site and surrounding properties.

6.5 Biodiversity (Flora and Fauna)

6.5.1 SUMMARY OF IMPACT ASSESSMENT

A Biodiversity Development Assessment Report (BDAR; Premise 2022) has been prepared as part of this application and is attached at **Appendix K**. The following findings are made in the BDAR (p. 2-5):

> *Sampling by Premise has identified three PCTs on the Subject Land:*
>
> - *PCT 351 - Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion*
> - *PCT 1110 - River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Bioregion*
> - *PCT 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion*
>
> *Native vegetation to be removed has been classified into nine vegetation zones. A description of each is included in Table 6 and includes the following vegetation condition zones on the Subject Land:*
>
> - *Brittle Gum – Broad-leaved Peppermint – Red Stringybark Open Forest in dense condition (PCT 351) – one patch (0.19 ha)*
> - *Brittle Gum – Broad-leaved Peppermint – Red Stringybark Open Forest in derived condition (PCT 351) – one patch (1.14 ha)*
> - *Blakely's Red Gum – Yellow Box Woodland in moderate condition (PCT 1330) – three patches (2.45 ha)*
> - *Blakely's Red Gum – Yellow Box Woodland in mod-poor condition (PCT 1330) – three patches (1.2 ha)*
> - *Derived Native Grassland in poor condition (PCT 1330) – two patches (20.43 ha)*
> - *Regeneration (PCT 1330) – one patch (0.45 ha)*

- *Plantings (PCT 1330) – one patch (1.52 ha)*
- *Exotic Grassland (PCT 1330) – one patch (309.33 ha)*
- *River Tussock – Tall Sedge – Kangaroo Grass Moist Grasslands in moderate condition – two patches (5.07 ha)*

Fauna surveys were undertaken by Biodiversity Monitoring Services (BMS) using a combination of desktop searches and targeted surveys. Targeted fauna surveys were conducted between 13-15 December 2021, 10-14th January 10th February and 22-24th February 2022 according to State and Commonwealth Guidelines (i.e. timing and duration of surveys, methods to locate species and potential habitat).

During the 2021-2022 fauna surveys, 160 invertebrate fauna species were recorded, including 106 bird (plus 4 exotic), 23 mammal (plus 10 exotic), 8 amphibian and 13 reptiles.

As a critically endangered entity, Box-Gum Woodland is considered at risk of Serious and Irreversible Impacts (SAII). Required information is provided to assist the decision-maker to determine whether the Solar Farm would constitute an SAII. The proposed activity will require the permanent removal of 5.62 hectares of Box-Gum Woodland CEEC. It is considered that the proposed activity would not contribute significantly to the risk of the CEEC becoming locally or regionally extinct and it is concluded that serious and irreversible impacts on the CEEC would not occur.

Three fauna species, the Striped Legless Lizard, Greater Glider and Koala listed as Vulnerable and Endangered (Koala) under the EPBC Act were assessed for potential impact and while the Greater Glider and Koala are considered to have a low probability of being significantly impacted by the Solar Farm, the Striped Legless Lizard may be impacted and therefore requires referral. Remnants on the Subject Land of the Commonwealth listed Box-Gum Woodland CEEC do not meet the criteria for protection under the EPBC Act. The Natural Temperate Grasslands CEEC does meet the criteria for protection under the EPBC Act and therefore will also require referral.

The Subject Land is zoned RU1 within Goulburn-Mulwaree Shire Local Government Area so that Koala management is regulated by State Environmental Planning Policy 44. One Koala feed tree listed in SEPP44 occurs on the Subject Land, Forest Red Gum (Eucalyptus tereticornis) and the area must be considered potential Koala habitat. Koala survey by BMS did not locate any Koalas or Koala signs. The site is therefore not considered Core Koala Habitat. No Koala Management Plan is necessary for the Solar Farm.

The direct impacts of the Solar Farm would be the removal of 30.93 ha of native vegetation and the removal of 16 isolated scattered trees.

The loss of 0.17 hectares of rock outcrop and 3.6 ha of exotic grassland that is potential habitat for threatened species is a prescribed biodiversity impact that cannot be avoided through planning.

Indirect impacts of the Solar Farm would include the temporary disruption to adjacent habitat during construction associated with noise, dust and light, however management measures will be put in place to mitigate this disturbance. There is also a risk of increased pressure on food and shelter resources in adjacent habitat areas as wildlife are displaced when vegetation is removed

from the Subject Land. Logs and felled trees from the Subject Land will be relocated to adjacent woodland areas as supplement habitat to minimise this indirect impact.

Terrain will satisfy the biodiversity credit requirements using offset mechanisms allowed by the NSW Biodiversity Offsets Scheme (i.e. contribution to the Biodiversity Trust Fund administered by the NSW Biodiversity Conservation Trust, purchase of existing credits on the market, funding of a biodiversity conservation action, retirement of biodiversity credits and/or mine site ecological rehabilitation).

Referral of the project to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) has occurred and DAWE have confirmed that the project does not represent a controlled action (refer correspondence at Appendix Q).

6.5.2 SUMMARY OF RECOMMENDED MITIGATION MEASURES

Recommended mitigation measures, including timing and responsibilities are provided in Table 27 of the BDAR (**Appendix K**) and reproduced in **Table 8** overleaf.

Table 8 – Avoidance and Mitigation Measures, Responsibility and Timing

Action	Impacts Mitigated	Type of Impact Addressed	Outcome	Timing	Responsibility	Performance Criteria	Method	Reporting
Pre-construction								
Planning the timing of site clearance to avoid the nesting season of threatened migratory and resident species.	Displacement of resident fauna.	Direct	Harm to breeding wildlife minimised.	Prior to clearing operations	Project management.	No disruption to wildlife breeding	Project planning meetings.	Annual Environmental Management Report (AEMR).
Undertake pre-clearing surveys to determine the presence of species that may be breeding in trees or utilising tree hollows.	Displacement of resident fauna.	Direct	Harm to tree dwelling and hollow-dwelling wildlife minimised.	Prior to clearing operations	Environmental specialists.	No disruption to wildlife breeding	Project planning meetings.	AEMR.
Planning for relocation of habitat features, such as surface rocks, fallen logs and tree trunks.	Displacement of resident fauna. Creation of more habitat opportunities in adjacent areas.	Direct Indirect	Relocation of any bush rocks, logs and felled timber into adjacent habitat areas.	Prior to clearing operations	Project management.	Habitat features established in offset areas or existing on-site rehabilitation areas.	Project planning meetings.	AEMR.
During Construction								
Protect native vegetation immediately adjoining the	Impacts on adjacent vegetation and habitat.	Indirect	No damage to trees earmarked for protection and retention.	Throughout construction phase.	Site Manager.	No damage to adjoining vegetation.	Clearly mark vegetation to prevent	AEMR.

proposed clearance area.							accidental damage.	
Inspection of felled trees for the presence of fauna by trained ecologists or licensed wildlife handlers.	Displacement of resident fauna. Creation of more habitat opportunities in adjacent areas.	Direct	Harm to hollow-dwelling wildlife minimised. Injured wildlife cared for and recovered by WIRES. Displaced wildlife released into appropriate habitat nearby.	During clearing operations.	Environmental Specialist.	All tree felling supervised. Habitat creation in adjacent areas maximised.	Experienced tree pusher supervised by experienced wildlife handler.	AEMR.
Relocate fallen timber for breeding habitat.	Displacement of resident fauna.	Direct	Felled timber to be relocated into adjacent habitat areas.	After clearing operations.	Site Manager.	All suitable timber relocated.	Fallen trees trimmed and trunks transported.	AEMR.
Relocate bush rocks. Removal of rocks supervised by a trained reptile handler, or staff member with appropriate snake-handling training	Displacement of resident fauna. Loss of rock habitat.	Direct, Prescribed	Relocation of any bush rocks into adjacent secure habitat areas.	After clearing operations.	Environmental Specialist	All surface rocks relocated.	Surface rock gathered and transported.	AEMR.
Dust suppression	Reduced photosynthesis in dust-covered vegetation.	Indirect	Watering of drill locations during installation of tracker posts and construction of roads.	During construction.	Site Manager	Negligible dust movement off site.	Spraying of water on roads and drill locations by water carts.	
Runoff prevention	Sedimentation in creeks	Indirect	Sediment control measures used on	During construction	Site Manager	Negligible sediment runoff	Sediment barriers	

			site below construction areas.			into streams on site.		
Post Construction								
Weed management.	Spread of Priority and High Threat Weeds, chemical drift	Indirect	Priority and high threat weeds controlled, chemical drift minimised.	Annual inspections and control as required.	Environmental Specialist.	Selected High Threat Exotic and Priority Weeds maintained at negligible levels, responsible chemical use.	Certified weed control contractor.	AEMR.
Pest animal management.	Increase in predation by feral predators; degradation of native vegetation by feral herbivores.	Indirect	Pest animals controlled, especially feral pigs, foxes, rabbits, wild dogs, feral cats and brown hares.	Annual inspections and control as required.	Environmental Specialist.	All pest animal species maintained at negligible levels.	Baiting, destruction of harbour and exclusion (e.g. fencing). Experienced contractor.	AEMR.
Dust suppression	Reduced photosynthesis in dust-covered vegetation.	Indirect	Watering of roads in dry weather.	Daily monitoring by staff and watering as needed.	Site Manager	Negligible dust movement off site.	Spraying of water on roads by water carts.	AEMR.
Site Closure								
Rehabilitation of roads and post hole locations	N/A	N/A	Safe landforms with no potential for livestock or wildlife injury.	Following decommission of Solar Farm.	Environmental Specialist.	Land fit for designated alternative uses.	-	AEMR.

6.6 Bushfire

The subject site is mapped as bushfire prone land as depicted in **Figure 12**.

6.6.1 MITIGATION MEASURES

Measures to be implemented to avoid, minimise and be in a position to effectively and safely manage potential risks and hazards associated with the development include consultation with both the NSW Rural Fire Service (RFS) and Fire and Rescue NSW (FRNSW):

- during detailed design;
- during construction; and
- prior to commencement of operations (ie. export of electricity into the grid);
- during operations.
- Detail on the intent, scope and outcomes of these consultations is provided in **Section 5.4**.

6.6.1.1 Detailed Design

As detailed design progresses, equipment suppliers are selected, and the solar farm infrastructure layout is refined, it is proposed to further consult with both the RFS and FRNSW. The intention of this consultation will be twofold.

1. To provide detail on the technology proposed and the proposed farm layout to allow (if necessary) design refinement to incorporate any specific requirements the RFS/FRNSW may have.
2. To provide the requisite information that will be needed to prepare an Emergency Response Plan (ERP).

In terms of design principles to minimise risk, the farm layout will be designed to:

- provide a defendable space around infrastructure;
- ensure that appropriate access, egress and manoeuvrability within the solar farm is provided for first responders;
- provide for ongoing management and maintenance of bush fire protection measures; and
- ensure that services are adequate to meet the needs of firefighters.

6.6.1.2 Construction

- Prior to construction commencing, the EPC contractor will engage with Marulan RFS local brigade and details about the construction schedule, contact numbers and site access arrangements will be shared.
- Five (5) 10 kL tanks, being Static Water Supplies dedicated exclusively for fire-fighting purposes, will be located strategically around the site and appropriately plumbed for the duration of construction.
- The fuel load over the site prior to and during construction will be monitored and reduction measures implemented as required. These measures will be restricted to mechanical slashing or stock crash grazing.
- The following work practices would be implemented throughout construction:
  - No burning of vegetation or any waste material would take place on site;
  - Fire extinguishers will be available in all vehicles;
  - During the bushfire season (October to March) the fire danger status would be monitored daily (through the RFS website *http://www.rfs.nsw.gov.au*) and communicated to personnel;
  - Total Fire Ban rules will be adhered to. That is, the EPC contractor will not:
    - (in any grass, crop or stubble land) drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter;

    - carry out Hot Works (eg. welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless the necessary exemption from the RFS Commissioner has been obtained and work complies with all requirements specified in the exemption; and
- Any fuel or flammable liquid would be stored in a designated area and will be sign posted "Fuel Storage Area."
- A register will be maintained that confirms the quantities and location of any flammable material stored on-site.

6.6.1.3 Prior to Operations

The MSF is located within an RFS Fire District. Notwithstanding, in the event of a significant fire event (either within the MSF site or in close proximity to the solar farm), FRNSW will either assist the RFS or fulfil the role of designated combat agency. Either the RFS and/or FRNSW would be first responders.

Should a fire occur during the operational life of the MSF it is recognised as important that the first responders have ready access to information which enables effective and safe control measures to be rapidly implemented.

Given the potential for electrical hazards associated with an energy generating facility, and potential risks to firefighters, both FRNSW and the RFS must be able to implement effective and appropriate risk control measures when managing an emergency incident in order to safely mitigate potential risks (including electrical hazards and venting electrolyte) to firefighters.

The detail required to prepare this plan will be contingent on the equipment proposed and the farm layout and services. These features would have been communicated to and refined in consultation with both RFS and FRNSW during detailed design. As such, the operator of the MSF will have had the information required to prepare an Emergency Response Plan (ERP) prior to commencement of operations (i.e., export of electricity into the grid).

6.6.1.4 Emergency Response Plan

The ERP will address foreseeable on-site and off-site fire events and other emergency incidents (e.g. fires involving solar farm infrastructure and equipment, bushfires in the immediate vicinity).

The ERP will detail the appropriate risk control measures that would need to be implemented in order to safely mitigate potential risks to the health and safety of firefighters, including electrical hazards. These measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, minimum evacuation zone distances and a safe method of shutting down and isolating the solar farm (either in its entirety or partially, as determined by risk assessment). The ERP would also include any other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the farm.

Two copies of the ERP would be stored in a prominent *Emergency Information Cabinet* located in a position directly adjacent to the site's main entry.

The operator of the MSF would then make contact with the relevant local emergency management committee (LEMC) and provide a copy of the ERP.

6.6.1.5 During Operations

Unmanaged grasslands can create a bushfire risk hazard. The performance measure for managing the bushfire risk will be to operate the MSF and maintain the site in such a manner that no grass fire originates from within the MSF site, and/or any approaching bushfire does not intensify as a consequence of entering the MSF site because of excessive fuel loads.

The fuel load over the MSF property will be constantly monitored and fuel load reduction measures implemented as required. These measures will be either mechanical slashing or crash grazing (sheep). Procedures for ensuring this outcome and demonstrating active management of the fuel load will be specified in the OEMP.

Hazard reduction burning is not proposed.

6.7 Access, Transport and Traffic

6.7.1 INTRODUCTION

Once built and operational the MSF would generate negligible ongoing traffic. The farm will not be permanently staffed and visitation restricted to periodic routine maintenance and infrequent plant and equipment replacements. It would be during the construction of the farm that traffic movements would be significant.

A Traffic Impact Assessment (TIA; Premise 2022) is provided at **Appendix L**. It includes an assessment of:

1. Traffic generation;
2. Traffic volume on the Hume Highway;
3. Traffic volume on Munro Road;
4. The intersection of the Hume Highway and Munro Road;
5. The intersection of Munro Road and the proposed site access road; and
6. The post-development plus 10 year scenario.

A summary of each is provided in the following sections, as well as a summary of recommended mitigations measures.

6.7.2 TRAFFIC GENERATION

The TIA includes an estimate of average and peak vehicle trip generation, reproduced in **Table 9**. The estimates are based on the estimated traffic generation for the solar farm outlined in **Table 2** and the construction scheduling for heavy vehicles outlined in **Table 3**.

Table 9 – Estimates of Average and Peak Vehicle Trip Generation

Vehicle Type	Average Vehicle Trips		Peak Vehicle Trips	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Passenger Vehicle (car/SUV)	100	20	160	35
Worker Shuttle Buses	40	5	50	8
Heavy Vehicles	13	6	28	12
Totals	153	31	238	55

6.7.3 TRAFFIC VOLUME ON THE HUME HIGHWAY

The TIA includes a summary of the peak hour vehicle trips generated north and southbound along the Hume Highway during construction of the solar farm, reproduced in **Table 10**.

Table 10 – Hume Highway Peak Vehicle Trips Generated During Construction

Road		Light Vehicles		Heavy Vehicles		All Vehicles	
		Peak Daily	Peak Hour	Peak Daily	Peak Hour	Peak Daily	Peak Hour
Hume Highway (Northbound)	Generated Trips	210	44	28	12	238	56
Hume Highway (Southbound)	Generated Trips	105	22	28	12	133	34

The above peak vehicle trip generation during construction would result in net increases in traffic volumes along the Hume Highway as set out in **Table 11**.

Table 11 – Comparison of Hume Highway Traffic Volumes and Net Increase in Trips During Construction

Road		Exiting Traffic Volume	Traffic Volume Generated	Post Development Traffic Volume	Net increase %
Hume Highway (Northbound)	AADT	10,472 veh/day	238 veh/day	10,710 veh/day	2.27%
	AM peak	1,398 veh/hour	56 veh/hour	1,454 veh/hour	4.00%
	PM peak	2,884 veh/hour	56 veh/hour	2,940 veh/hour	1.94%
Hume Highway (Southbound)	AADT	10,255 veh/day	133 veh/day	10,388 veh/day	1.29%
	AM peak	2,237 veh/hour	34 veh/hour	2,271 veh/hour	1.52%
	PM peak	2,252 veh/hour	34 veh/hour	2,286 veh/hour	1.51%

The TIA includes the following conclusion regarding the net increase in traffic volumes (p. 17):

> *The construction of the solar farm would result in a percentage increase in traffic volumes on the Hume Highway ranging from 1.51% (PM Peak on the Hume Highway southbound) to 4.00% (AM Peak on the Hume Highway northbound).*
>
> *The percentage increases in traffic volume for AADT and peak hour on the Hume Highway are not significant.*
>
> *The increase in daily traffic volume and peak hour volume generated by the construction of the solar farm would be easily absorbed into the surrounding road network with minimal impact on the capacity of the existing traffic streams using the road system.*

6.7.4 TRAFFIC VOLUME ON MUNRO ROAD

The TIA includes the following with respect to traffic volumes on Munro Road (p. 18):

> *The existing ADT on Munro Road is estimated as 54 vpd and the peak hour volume is estimated as 5 vph.*
>
> *The heavy vehicle and light vehicle construction traffic will access the development site via Munro Road.*

Based on the information presented in [**Table 9**]*, the peak daily trip generation is 238 trips per day and the peak hourly trip generation is 55 trips per hour.*

The percentage increases for the peak daily and peak hour trips are set out below:

Daily Vehicle Trip Increase:	*238 trips/54 trips x 100*	*=*	*440.7%*
Peak Hour Trip Increase:	*55 trips/5 trips x 100*	*=*	*1,100.0%*

Whilst the percentage increase in trip generation compared to existing traffic volumes appear very significant, there are two (2) factors to account for this:

The extremely low traffic volumes currently using Munro Road; and

The Operational Capacity of the roadway to cater for vehicles using the roadway post development.

The Operational Capacity is the percentage of actual volume capacity that the road is functioning at.

A comparison will be made with the post development peak hour traffic volume on the road with the actual traffic volume capacity of the road in its current configuration.

Based on the roadway capacities determined in ***Section 2.3*** *of this Report, a comparison of the post development peak hour traffic volume and the actual road capacity for Munro Road is indicated below:*

Post development peak hour trips:	*5 + 55*	*=*	*60 trips per hour*
Capacity of Munro Road at a Level of Service B:	*600 vehicles per hour*		
Operational Capacity of Munro Road:	*10%*		

Munro Road is operating at just 10% of its Operational Capacity at a Level of Service B and the impact of the additional traffic generated by the construction of the solar farm is not significant in terms of the volume of post development traffic using Munro Road.

However, the generation of 4,676 heavy vehicle trips onto Munro Road during the construction phase of the solar farm will require works to be carried out to improve the width of the roadway to accommodate the simultaneous operation (passing) of heavy vehicles along the roadway.

6.7.5 HUME HIGHWAY/MUNRO ROAD INTERSECTION

The TIA includes a summary of SIDRA modelling for the operation of the intersection during the AM and PM peak hours, pre and post-development, making the following conclusions (pp. 20-21):

A comparison of the Pre Development AM Peak Hour intersection operation … and the Post Development AM Peak Hour operation … indicates that there is very little change in the operational parameters of the intersection. For the left turn from Munro Road onto the Hume Highway, the Average Delay increases from 11.3 seconds to 12.8 seconds whilst the Level of Service remains the same at LOS B.

A comparison of the Pre Development PM Peak Hour intersection operation … and the Post Development PM Peak Hour operation … indicates that there is significant change in the operational parameters of the intersection. For the left turn from Munro Road onto the Hume Highway, the Average Delay increases from 38.9 seconds to 52.5 seconds whilst the Level of Service has changed from LOS E to a LOS F.

A comparison of the Pre Development PM Peak Hour intersection operation … and the Post Development Peak Hour with Heavy Vehicles only operation … indicates that there is an improvement in the operational parameters of the intersection. For the left turn from Munro Road onto the Hume Highway, the Average Delay decreases from 38.9 seconds to 33.4 seconds whilst the Level of Service has changed from LOS E to a LOS D.

6.7.6 MUNRO ROAD/SITE ACCESS ROAD INTERSECTION

The TIA includes a summary of SIDRA modelling for the operation of the intersection during the AM and PM peak hours, pre and post-development, making the following conclusions (pp. 22-23):

All movements [in the Post Development AM Peak Hour] *at the intersection operate at a Level of Service A and therefore the access to the solar farm will operate efficiently during the construction phase of the project.*

All movements [in the Post Development PM Peak Hour] *at the intersection operate at a Level of Service A and therefore the access to the solar farm will operate efficiently during the construction phase of the project.*

Whilst there has been a slight increase in the operation parameters for average delay, all [Post Development with Heavy Vehicles only] *movements at the intersection operate at a Level of Service A and therefore the access to the solar farm will operate efficiently during the construction phase of the project.*

6.7.7 POST-DEVELOPMENT PLUS 10 YEARS SCENARIO

The TIA includes the following with respect to the post development plus 10 years scenario (p. 24):

Whilst the traffic volumes on the surrounding roads, and in particular the Hume Highway, will increase over time, the traffic associated with the solar farm development will be restricted to the construction phase with minimal impacts during site operation.

Once the development is constructed over the anticipated 18 month period, there will be no further heavy vehicle movements to and from the site. Also, light vehicle movements would decrease and would be restricted to staff movements associated with occasional site maintenance activities.

Therefore, the assessment of the potential impacts of the post development + 10 years scenario is not warranted for the Marulan Solar Farm.

6.7.8 MITIGATION MEASURES

6.7.8.1 Munro Road Upgrade

The TIA includes the following recommended mitigation measures with respect to Munro Road (p. 27):

Whilst the majority of Munro Road has a bitumen sealed width of 7.0m, any non-compliant sections of the road should be upgraded to achieve the following criteria:

- *Minimum 3.0m wide travel lane in each direction*
- *1.0m wide gravel shoulder in each direction with 0.5m of the shoulder bitumen sealed.*

As the road currently has no line markings, the following recommendations also apply:

- *Centreline and edgeline marking*
- *Double barrier lines where minimum sight distances are not achieved.*

6.7.8.2 Hume Highway/Munro Road Intersection

The TIA includes the following recommended mitigation measures with respect to the intersection of the Hume Highway and Munro Road (p. 27):

Based on the turning path assessment, the arrival of B-Doubles turning left from the Hume Highway into Munro Road shall be managed by the operation of an accredited Traffic Controller to allow the heavy vehicle to turn into Munro Road within the bitumen sealed area at the intersection.

Appropriate "Trucks Crossing or Entering" warning signage (W5-22) should be installed on the Hume Highway on the northbound approach to the intersection with Munro Road. It is recommended that such signage is to be in place on a temporary basis whilst the construction of the solar farm is being carried out.

6.7.8.3 Drive Code of Conduct

A Driver Code of Conduct is recommended in the TIA as follows (p. 27):

- *The transport route on the Hume Highway must be identified to all heavy vehicle operators to ensure all deliveries to the site arriving from Sydney must proceed to Goulburn to turn around and then return to Munro Road to turn left from the Highway.*
- *Drivers must not use the crossover from the southbound lanes of the Hume Highway to access Munro Road and crossing the northbound lanes of the Highway.*
- *The scheduling for the arrival, and more importantly, the departure of heavy vehicles from the development site should occur off peak to the PM Peak Hour on the Hume Highway.*
- *Set up an induction process for all drivers to ensure that safety objectives are being met.*
- *Drivers are to obey all speed limits and other restrictions on the transport routes, particularly with regards to residential areas and school zones.*
- *Drivers are to demonstrate courteous behaviour to all road users and are to be aware to take additional care when travelling the transport routes between the hours of 8.00am to 9.15am and 3.00pm to 4.15pm when school buses may be operating and picking up or dropping off children.*

- *Ensure that all loads are covered.*
- *Ensure that loads do not exceed the legal limits.*
- *Ensure that vehicles are maintained and are equipped with all required safety measures.*
- *Implement a public complaints registration system to ensure effective resolution of complaints received and to take disciplinary action if necessary.*

6.7.8.4 Traffic Management Plan

A Traffic Management Plan (TMP) will be developed in consultation with the GMC and TfNSW prior to the commencement of construction. The TMP will identify and provide management strategies to manage the impacts of projected related traffic including:

- Haulage of materials to site.
- The safe transportation of construction workers to site and return. In this regard, TfNSW will require specific details on how the proponent will ensure the identified management measures employed to ensure the safety of staff travelling to and from the site each day will be controlled and enforced.

In general terms the TMP would include details on the following:

- Construction timeframe and staging of works;
- Measures to consult with other road users to minimise impacts (e.g. liaison with school bus operators).
- Confirmation of anticipated additional traffic volumes generated by the MSF;
- Confirmation of final HV and OD vehicle haulage routes to be used for all delivery vehicles;
- A process to review haulage route road conditions prior to the commencement of works;
- A process to carry out pre and post construction road dilapidation surveys to ensure Munro Road is reinstated to pre-construction conditions;
- Requirements for any additional TMP(s) required for a specific work stage/process (e.g. delivery of oversize components); and
- Qualify and identify any relevant mechanisms for OD vehicle permits and traffic management requirements.

6.8 Noise & Vibration

A Noise and Vibration Impact Assessment (NVIA; Assured Environmental 2022) is provided at **Appendix N**. It includes an assessment of:

1. Construction noise;
2. Operational noise;
3. Road traffic noise; and
4. Vibration impacts.

A summary of each is provided in the following sections, as well as a summary of recommended mitigations measures.

6.8.1 CONSTRUCTION NOISE

The NVIA includes an assessment of the construction noise impacts to 74 receptors, making the following conclusions (p. 13):

- *No receptors will experience noise levels >75 dB(A) for any stage during construction;*
- *The highest predicted noise level is 56 dB(A) at receptor R66 during months 4 to 7. This receptor is close to the Project Area boundary and the access road;*
- *Only 10 receptors (shaded on Table 4) are predicted to have noise levels >50 dB(A) during any stage of construction;*

6.8.2 OPERATIONAL NOISE

The NVIA includes an assessment of the operational noise impacts to receptors, making the following conclusions (p. 21-22):

- *For the AC coupled option, all receptors comply with the assessment criteria. The highest noise levels will be at R66, R1 and R2. Receptors R1 and R2 are associated with the project. Compliance is achieved at all other receptors.*
- *For the DC coupled option, all receptors comply with the assessment criteria.*

6.8.3 ROAD TRAFFIC NOISE

The NVIA includes an assessment of the road traffic noise impacts during the construction and operational phase, making the following conclusion (p. 24):

> *Noise impacts associated with vehicle movements during the operational phase of the MFS project are expected to be negligible as no staff will be permanently based on-site. Visitation will be limited to periodic maintenance and infrequent plant and equipment replacements. During construction and any future decommissioning of the farm however, traffic movements will be more significant.*

Accordingly, the NVIA provides an assessment of the potential noise impacts from vehicular movements on the receptors nearest to the site access from the Hume Highway via Munro Road and the proposed site access road, making the following conclusion (p. 26):

> *Review of the predicted noise level … confirms that compliance with the* [NSW Road Noise Policy] *is achieved at the closest receptors to each potential route.*

6.8.4 VIBRATION

The NVIA includes an assessment of the vibration impacts during the construction phase, making the following conclusions (p. 29):

> *The predicted vibration levels … indicate compliance with the continuous maximum vibration nuisance criteria for locations at a separation distance of 50-60 metres. Compliance with the building damage criteria is predicted at 10 metres from construction for each source. Therefore, as the closest receptor (R66) is 700m from the nearest vibration source, there will be no adverse impact*
>
> *For intermittent vibration associated with haul vehicles and press-in piling method, it is difficult to provide an appropriate comparison with the relevant criteria (which is presented as a Vibration Dose Value (VDV) in m/s1.75). The calculation of a VDV requires both the overall weighted RMS (root mean square) acceleration (m/s2) typically obtained from on-site measurements and the estimated time period for vibration events.*

It is noted, however, that the piling PPV at distances of 700 m (the distance to the nearest sensitive receptor from potential piling) is predicted to be within the maximum continuous criteria of 0.56 mm/s. This comparison with the continuous criteria (as a conservative approach) indicates that vibration levels associated with piling are not considered to be significant (which is expected given the significant separation distances).

6.8.5 MITIGATION MEASURES

As operational phase acoustic impacts, road traffic noise impacts and vibration impacts are compliant with the relevant criteria, the NVIA only includes mitigation measures for the construction phase as follows (pp. 16, 30):

- *Limiting the type and scale of concurrent activities undertaken close to sensitive receptors where possible;*
- *Using broad-band reversing alarms on all mobile plant and equipment;*
- *Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine;*
- *Operating plant in a quiet and efficient manner;*
- *Reduce throttle setting and turn off equipment when not being used; and*
- *Regularly inspect and maintain equipment to ensure it is in good working order including checking the condition of mufflers.*

…

As the design layouts are indicative, it is recommended that once the final layout is approved, noise modelling is undertaken to ensure noise mitigation discussed in this report is still applicable and that compliance with the assessment criteria is achieved.

Appendix B to the NVIA provides a draft Construction Noise Management Plan that would form the basis of a final document to be incorporated into a Construction Environmental Management Plan (CEMP) for the project.

6.9 Visual Impact

A Landscape and Visual Impact Assessment (LVIA; IRIS 2022) has been prepared as part of this application and is attached in **Appendix M**. A visual catchment is determined in the LVIA based on a digital terrain model (derived from LiDAR data flown in 2013 and 2018) and points modelled across the proposed solar farm. It does not take into consideration visual obstacles such as vegetation and buildings. Accordingly, the visual impact is ground-truthed as described in the LVIA (p. 8):

Site photographs were taken during January of 2022. These photographs were used to verify the results of a preliminary visibility analysis. From these photographs, viewpoints have been selected to represent the range of views to the project. These representative viewpoints are from key locations, road corridors and the public domain. They include views from a range of distances and orientations and focus on locations where there may be a potential visual impact. There were no scenic routes or significant vistas in the vicinity of the project.

The potential impact on each view has been assessed by identifying the sensitivity of the view and the magnitude of change that would be caused by the project. Combined, these characteristics are used to assign a level of visual impact.

Six viewpoints representative of the range of views to the project from the public domain were selected and assessed as part of the LVIA (p. 23):

1. *View north from the Hume Highway*
2. *View northeast from Rampion Hills Road*
3. *View northwest from Munro Road*
4. *View north from Munro Road*
5. *View south from Carrick Road*
6. *View southeast from Towrang Road.*

The view impact of the proposed development from each of the six locations in the public domain is determined to be negligible in all cases in the LVIA (p. 23), with the exception of the View 3 (view northwest from Munro Road) which is determined to have low impact.

Additionally, the visual impact of the proposed development as viewed from residences identified in **Figure 2** is considered as part of the LVIA (IRIS 2022), making the following findings (p. 33):

- ***Dwellings on the fields to the north*** *- There would be a* ***no visual impact*** *in views from the rural dwellings located to the north of the site, between 1.7and 6km of the site including (R1, R2, R3, R4, R5 and R6), due to intervening landform, including the embankments of the Main Southern railway and vegetation.*
- ***Dwellings to the northwest along Towrang Road*** *- In views from dwellings to the northwest of the site, on the lower slopes of the Cookbundoon Range, east and west of Towrang Road, there would be a* ***negligible visual impact****. While the proposal may be seen, it would be in the background of the view, viewed against a backdrop of existing vegetation and would remain below the height of the Marulan hills beyond. The whole site would not be visible, as the panel array areas would be visually broken up into smaller areas separated by fields maintained along the lower lying areas of the site.*
- ***Dwellings in Carrick, to the west*** *- Existing vegetation encloses views from dwellings on Carrick Road and Towrang Road in the vicinity of the township of Carrick (R37, R38, R39, R40, R41 and R42), to the west of the site and there would be a* ***low visual impact****. Over time, the proposed landscape screening would reduce this impact to* ***negligible****.*
- ***Dwellings to the west and southwest*** *- Views from most of the dwellings in this location are screened by dense vegetation. However, R43 may have views northward towards the grid connection infrastructure, including the proposed transmission line and towers, viewed together with the existing transmission line corridor, and glimpses to the solar farm array over the intervening trees. There would be a* ***low visual impact*** *from this location, that would be reduced to* ***low-negligible*** *with the establishment of screening vegetation.*

- ***Dwellings to the south near Narambulla Lake*** *- There would be low visual impact from dwellings that have a view to the short section of the southwestern edge of the solar panel array area located on the highpoint (R62, 63, 64, 74, 73). Over time, the proposed screening vegetation would reduce this impact to negligible.*

- ***Dwellings to the south near Graham Lane and Munro Road*** *- Existing vegetation to the south of the site encloses view to the site, however, there would be* ***low visual impact*** *experienced from several properties (R66, R67, R70, R71 and R72) and where the access road and northeastern portion of the panel array area would be seen above and through the existing vegetation. Over time, this would be reduced to* ***low*** *and* ***negligible visual impacts*** *where additional vegetation would provide further screening of these views.*

6.10 Glare Impact

The LVIA attached in **Appendix M** includes a glare and reflectivity assessment of the proposed development during operation, construction, from local roads and from the Southern Tablelands Gliding Club runway using the 'GlareGauge' solar Glare Hazard Analysis Tool based on the following parameters:

- Time zone: UTC +10
- Axis tracking: Single-axis rotation
- Backtracking: Shade / slope
- Tracking axis orientation: 180 degrees
- Maximum tracking angle: 60 degrees
- Resting angle: 0 degrees
- Ground coverage ratio: 0.5
- Panel material: Smooth glass with AR coating

6.10.1 GLARE DURING OPERATION

The following findings are made with respect to glare during operation (IRIS 2022, p. 40):

> *Of the 32 observer points (dwellings) considered, the GlareGauge analysis tool has identified a risk of glare for 18 dwellings. Of these, there would be eight with a potential view to the proposed solar array area.*
>
> *Further viewshed analysis was used to confirm which potentially reflecting panel array areas are out of view. Where this is the case, the predicted glare minutes have been adjusted to remove the glare minutes from non-visible areas of the proposed solar array area. There is one dwelling that has the potential for a glare effect (R43). However, due to vegetation between this building (R43) and the site, the actual visibility of the panel array areas that have the potential to produce a glare effect is likely to be limited. Regardless, at this location the predicted glare would occur for a duration of up to 20 minutes per day, which is the potential for a* ***moderate*** *glare impact. This effect would occur during sunrise, in a view towards the sun, in spring and summer. Screening vegetation proposed for the project may provide screening of the central areas of the site from this location, reducing the number of glare minutes and level of glare effect.*

6.10.2 GLARE DURING CONSTRUCTION

The following findings are made with respect to glare during construction (IRIS 2022, p. 42):

There would be some potential for a temporary glare effect during construction. This would include a glare risk from the freshly galvanised posts as they are installed, an effect that would be temporary. The galvanised array support posts would become mostly shaded and screened by the Photovoltaic modules as they are installed. The impact from the galvanised posts would therefore only be experienced for the duration between installation of the array posts, and installation of the panels.

There is also the potential for a further glare risk when the panels are installed and stowed in a fixed position, particularly if they are oriented towards a receptor. The glare from these fixed panels (i.e., before they are operational and tracking the sun) would be a temporary effect.

Overall, due to the limited visibility of this site from private dwellings there would be a low risk of this glare impact during construction. Any glare experienced during construction would be temporary and be experienced for a short duration. This would result in a ***negligible*** *visual impact.*

6.10.3 GLARE RISK FROM LOCAL ROADS

The following findings are made with respect to glare from local roads (IRIS 2022, p. 43):

There was a glare risk identified from Munro Road, however, the panel array areas identified would not be visible due to the intervening vegetation and landform. As there was no glare risk identified from the panel array areas that would be seen, there would be a negligible glare impact on amenity from Munro Road.

There was also a glare risk identified from Carrick Road. The analysis identifies the areas where this glare effect would occur, to be in the vicinity of the rail crossing. In this location there is unlikely to be a view to the panel array area due to the screening effect of intervening landform and roadside trees. There would be a ***negligible*** *glare impact on amenity expected from Carrick Road.*

6.10.4 GLARE RISK FROM THE SOUTHERN TABLELANDS GLIDING CLUB RUNWAY

The following findings are made with respect to glare from the Southern Tableland Gliding Club Runway (IRIS 2022, p. 43):

The Southern Tablelands Gliding Club uses a small turf runway about 2.5 kilometres to the northwest of the proposal site. There was no glare risk identified for the northern approach to the runway. However, there was a glare risk identified for the southern approach to the runway. This glare would occur soon after sunrise and occur for a period of up to 25 minutes per day. While there would a potential glare impact expected at the Gliding Club from the southern approach to the runway at sunrise in summer, it is unlikely that gliding would occur at this time of the day, and therefore a ***negligible*** *glare impact on amenity of users.*

6.11 Waste

6.11.1 LEGISLATIVE FRAMEWORK

The management of waste in NSW, including recycling, is via the POEO Act and the *Waste Avoidance and Resource Recovery Act 2001* (WARR). The WARR sets out a hierarchy of management, including avoidance, recovery and then disposal.

6.11.2 CONSTRUCTION WASTE

From a waste perspective, the construction program will generate a range of solid waste, including:

- Packaging materials;
- Building materials;
- Scrap metal;
- Excess soil;
- Plastic and masonry products;
- Vegetation from clearing;

Waste generated through the construction phase would be managed in accordance with an adopted waste management plan, with consumption avoidance being the first management tier, following by on site reuse/recycling where possible (ie, mulch from vegetation clearing). As a last resort, waste would be removed from the site and either recycled or disposed of at an appropriate waste disposal facility.

Effluent disposal would be limited to provision of short term services to service the construction workforce. Transportable services would be provided and emptied by suitable contractors. These would be removed at the completion of the construction period.

6.11.3 OPERATIONAL WASTE

Operational waste associated with the facility is of a limited nature, being likely limited to small amounts of packaging associated with plant maintenance/replacement and general waste from site staff.

As noted, the project proposes the use of batteries for energy storage. Noting the life of the project at 30-35 years, it is likely that batteries will require replacement 2-3 times during the life of the project.

Batteries are classed as hazardous waste and their transport for disposal or recycling is regulated under the Australian Code for the Transport of Dangerous Goods by Road and Rail. The operator will be required to ensure that all transport requirements are met for the off-site transport of batteries at their end of life. This would be managed by the operator at the time in line with the applicable hazardous materials requirements in effect at that time.

As the development of solar farms and large scale batteries increases in Australia, in response to the shifting methods of energy generation and management, together with increased uptake of electric cars, there is the likely potential for an increase in batteries requiring recycling or disposal. This will increase opportunities for on-shore recycling operations and avoid the need for export of these materials, a shift that is now increasingly evident in the domestic market.

6.11.4 WASTE DURING DECOMMISSIONING

Waste generating during the decommissioning phase would be managed in a manner consistent with the construction phase, including waste avoidance, reuse and finally disposal.

Waste expected to be generated includes:

- Solar panels and mounting systems, racking etc
- Metal (including support posts and other);
- Electrical infrastructure including batteries, inverters, transformers and other components;
- Cabling.

The majority of materials would be reused or recycled where possible. Disposal of batteries would occur in accordance with the hazardous waste policies in effect at the time of decommissioning.

Any items that cannot be reused or recycled, would be disposed of as waste at appropriate facilities in line with applicable regulations. Those on site materials that remain of use to the landowner (such as roads) or the electricity authority (such as the switching station or sub-station) would remain on site, subject to agreements with the landowner.

The majority of materials are able to reused or repurposed, and this would be the core aim of the decommissioning phase.

6.11.5 MITIGATION MEASURES

- A waste management plan would form part of the CEMP and would seek to minimise waste and maximise opportunities for recovery and reuse.

6.12 Air and Microclimate

6.12.1 EXISTING ENVIRONMENT

6.12.1.1 Air quality data

Given the rural setting of the project, air quality in the locality is expected to be reasonable and consistent with rural environments in NSW. Likely existing sources of air pollution include emissions from vehicles (including those using the Hume Highway and rural vehicles), dust from agricultural operations, dust emissions from extractive industries in the locality and, potentially, emissions from wood heaters used in residential properties.

Meteorological conditions that influence air quality include gradient wind flow regimes and local conditions typically driven by topographical features, namely drainage flows. Wind speed, wind direction and topography influence dispersion and transport of plumes.

The nearest extractive industry to the facility is the Holcim Lynwood Quarry, located approximately 1,350 metres to the east of the site. A review of the National Pollution Inventory for the 2020/2021 year records indicates fugitive air emissions were 250,000 kg for PM_{10} and 5,700 kg for $PM_{2.5}$ (NPI, 2022).

DPE provide data services which record air quality information around NSW. The nearest recording station to the project site is at Goulburn (Leggert Park, corner of Howard and McDermott Streets) at an altitude of 702 m AHD. This compares well to the subject site which is located at an average AHD of 640 m. The Goulburn air quality monitoring site has been in operation since 2009. The next closest facility with a longer reporting period is Bathurst, which was established in 2000. Given the distance between the subject site and Bathurst, it is considered the Goulburn data provides the best information for the site, albeit over a shorter timeframe.

The Goulburn site records the following air pollutants and meteorological variables:

- Fine particles as PM10
- Fine particles as PM2.5
- Ozone (O3)
- Oxides of nitrogen (NO, NO2 and NOx)
- Visibility using nephelometry
- Wind speed, wind direction and sigma theta
- Ambient temperature
- Relative humidity
- Precipitation

Pollutant measurements at the Goulburn station for June 2021 to June 2022 are outlined in **Table 12**.

Table 12 – Goulburn Pollutant Measurements

	Nitrogen dioxide (NO2)	Ozone 1hr average	Ozone 4hr average	Particles PM10	Particles PM2.5	Visibility NEPH
	pphm	pphm	pphm	µg/m^3	µg/m^3	bsp
30/06/2021	0.5	1.7	1.7	9.3	7.4	0.31
31/07/2021	0.5	1.8	1.8	9.7	7.6	0.31
31/08/2021	0.4	2	1.9	10.2	7.7	0.31
30/09/2021	0.3	2.2	2.2	8.9	5.6	0.2
31/10/2021	0.2	2.3	2.3	8.4	4.2	0.12
30/11/2021	0.2	2.2	2.2	6.8	3.4	0.1
31/12/2021	0.2	2.1	2.1	7.6	3.4	0.18
31/01/2022	0.1	2	2	8.3	3.9	0.15
28/02/2022	0.1	1.7	1.7	8.3	3.5	0.12
31/03/2022	0.1	1.7	1.7	6.1	2.7	0.1
30/04/2022	0.2	1.3	1.3	7	4.1	0.16
31/05/2022	0.3	1.6	1.6	8	5.5	0.23
30/06/2022	0.3	1.9	1.9	6.8	5	0.22

All of the above readings fall within the 'good' classification by reference to the DPE air pollutant classification ratings (the highest category) reflecting that the current environment is a good quality air environment.

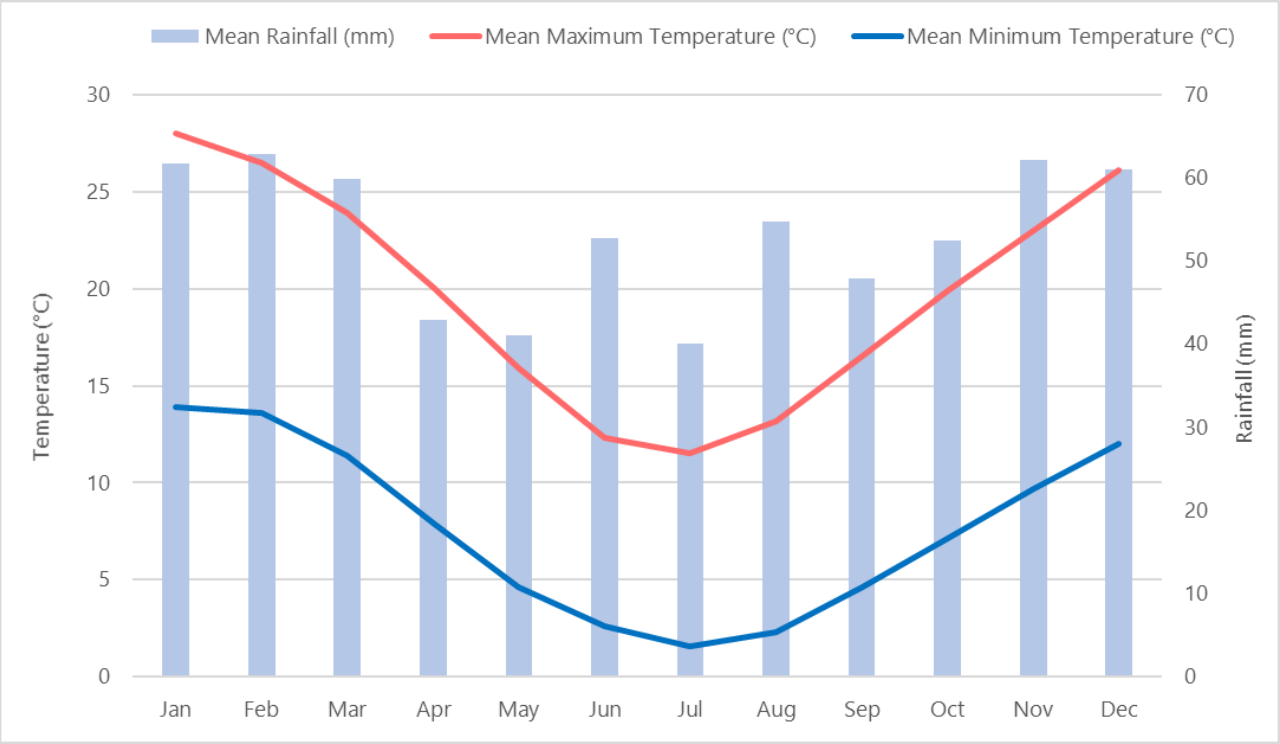
6.12.1.2 Climate

The closest Australian Bureau of Meteorology (BoM) weather station with daily weather observations is Goulburn TAFE (Station 070263), located approximately 16 km west of the site. Other BoM weather stations are closer to the site but do not provide daily data.

Summary climate statistics are provided below and depicted in **Figure 24**:

- The mean annual maximum temperature is 19.7°C and the mean annual minimum temperature is 7.6°C (BoM, 2021).
- Mean annual rainfall is 622.7 mm and records indicate monthly mean rainfall received at the site is highest in the months of November through to March (BoM, 2021).

Figure 24 – Climate statistics for the locality



Wind speeds at the recording station are generally highest in Winter and Spring and the strongest winds are generally from the west. It is noted that the subject site is well protected from westerly winds by prevailing topography.

6.12.1.3 Climate change

It is now generally accepted by the scientific community that certain emissions have a contributory impact to climate change. Emissions associated with construction and maintenance activities, such as those associated with the construction and operation of the MSF, contribute to climate change.

These limited impacts through the construction period are significantly offset by the establishment of the MSF, which displaces emissions associated with traditional forms of fossil fuel burning electricity generating stations. Impacts once operational are very low due to the generation of power by the facility, and the limited maintenance requirement, compared to coal or gas power stations.

6.12.2 POTENTIAL IMPACTS

Sensitive receivers near to the property are the primary recipient of impact as a result of potential changes in air quality as a result of the project. These impacts are expected to be largely localised (within approximately 500 metres of the project site) with respect to human and ecological receivers.

There are no receivers within 500 metres of the project boundary due to the scattered nature of development in the locality. The closest non associated receiver (R66) is located approximately 500 metres from the access handle, but over 800 metres from the closest solar infrastructure location. At this closet point, this receiver is well separated by topography and intervening vegetation.

Primary air quality impacts associated with the development relate to the construction and decommissioning phases of the solar farm, and would include dust generation resulting from excavation, earthworks and vehicle movements. Air quality impacts associated with construction and decommissioning of the development are considered manageable via the application of the mitigation measures provided in **Section 6.12.3**.

The development is not anticipated to result in any negative air quality impacts during the operational phase. Minor impacts associated with movement of maintenance vehicles would be negligible.

Via the reduction in greenhouse emissions relating to the adoption of the solar energy generating source, overall air quality impacts associated with the development would therefore be positive.

There is the potential for cumulative impacts associated with air quality during construction, primarily associated with the nearby Holcim Quarry. The short lived nature of these works, and the implementation of appropriate management/mitigation measures, ensures that these issues can be managed appropriately.

On the completion of construction, cumulative air quality impacts associated with these projects is considered to be negligible.

6.12.3 MITIGATION MEASURES

The CEMP would incorporate measures and protocols to minimise dust generation during the construction period. Specific measures would include but not be limited to:

6.12.3.1 Prior to construction

- Development of a dust management plan as a sub-plan to the site specific CEMP, including (but not limited to) measures as set out in the following sections.

6.12.3.2 During construction and decommissioning

- A water cart (truck) would be utilised routinely, wetting all access roads and exposed dusty surfaces as appropriate to the conditions of the site.
- Stockpiled topsoil and other materials that exhibit significant dust lift off would be wet down routinely and as appropriate.
- Stabilising techniques and/or environmentally acceptable dust palliatives will be utilised if the wetting down of surfaces prove to be ineffective.

6.12.3.3 During operation

- Any area that was temporarily used during construction would be restored back to original condition or re-vegetated with native plants.
- Areas that may not have been hard packed but have been disturbed in some form would be vegetated with seeds native to the area.

6.13 Safety, Security and Crime Prevention

The guidelines prepared by the NSW Department of Urban Affairs and Planning (DUAP 2001) identify four (4) Crime Prevention Through Environmental Design (CPTED) principles to be considered in a Development Application to ensure developments do not create or exacerbate crime risk. The four key principles of the guidelines include surveillance, access control, territorial reinforcement, and space management.

6.13.1 SURVEILLANCE

The attractiveness of crime targets can be reduced by providing opportunities for effective surveillance, both passive and technical. Good surveillance ensures that people can see what other people are doing. People feel safer in public areas when they can easily see and interact with others. Potential offenders are often deterred from committing crime in areas with high levels of surveillance. Deterrence can be achieved in good design via the following methods:

- Clear sightlines between public and private places;

- Effective lighting of public spaces; and
- Landscaping that makes a place attractive but does not provide offenders with opportunities for concealment to enable them to entrap victims.

The nature of the proposed use of the site for as a solar farm does not enable persistent casual surveillance of the site, surrounding properties or the public domain. Accordingly, active surveillance is to be employed in the form of monitored, motion-sensing CCTV cameras at the site entry, site boundaries and at strategic locations throughout the site.

6.13.2 ACCESS CONTROL

Physical and symbolic barriers can be used to attract, channel or restrict the movement of people. They minimise opportunities for crime and increase the effort required to commit crime.

By making it clear where people are permitted to go or not go, it becomes difficult for potential offenders to reach and victimise people and their property. Illegible boundary markers and confusing spatial definition make it easy for criminals to make excuses for being in restricted areas. However, care needs to be taken to ensure that the barriers are not tall or hostile, creating the effect of a compound.

Effective access control can be achieved by creating:

- landscapes and physical locations that channel and group pedestrians into target areas;
- public spaces which attract, rather than discourage people from gathering; and
- restricted access to internal areas or high-risk areas (like car parks or other rarely visited areas). This is often achieved through the use of physical barriers.

Access to the site is to be managed through:

- Chain-link/barbed-wire security fence up to three metres in height; and
- Controlled gates, only accessible to passholders or authorised visitors.

6.13.3 TERRITORIAL REINFORCEMENT

Community ownership of public space sends positive signals. People often feel comfortable in, and are more likely to visit, places which feel owned and cared for. Well used places also reduce opportunities for crime and increase risk to criminals.

If people feel that they have some ownership of public space, they are more likely to gather and to enjoy that space. Community ownership also increases the likelihood that people who witness crime will respond by quickly reporting it or by attempting to prevent it. Territorial reinforcement can be achieved through:

- Design that encourages people to gather in public space and to feel some responsibility for its use and condition; and
- Design with clear transitions and boundaries between public and private space clear design cues on who is to use space and what it is to be used for. Care is needed to ensure that territorial reinforcement is not achieved by making public spaces private spaces, through gates and enclosures.

Given the proposed use of the site for as a solar farm, access to unauthorised people is prohibited. Accordingly, territorial reinforcement is achieved through access control in the form of chain-link/barbed-wire security fence up to three metres in height and gates which clearly delineate the boundaries between the site, surrounding properties and the public domain.

6.13.4 SPACE MANAGEMENT

Popular public space is often attractive, well maintained and well used space. Linked to the principle of territorial reinforcement, space management ensures that space is appropriately utilised and well cared for.

Space management strategies include activity coordination, site cleanliness, rapid repair of vandalism and graffiti, replacement of burned out pedestrian and car park lighting and the removal or refurbishment of decayed physical elements.

Space management is achieved through regular maintenance of the solar farm and associated infrastructure including surrounding fences and gates, as well as management of grass through regular mowing and grazing of the property.

6.14 Technological Hazards

A Preliminary Hazard Analysis (PHA; Riskcon Engineering 2022) has been prepared as part of this application and is attached in **Appendix O**. Each of the following hazards identified in the PHA are discussed in greater detail in the following sections of this EIS:

- Li-ion battery fault, thermal runaway and fire.
- Li-ion battery fire and toxic gas dispersion.
- Electrical equipment failure and fire.
- Transformer internal arcing, oil spill, ignition and bund fire.
- Electromagnetic field Impacts.
- Gas pipeline impacts.

As a component of EIS preparation, Terrain Solar have engaged with APA via meetings and written correspondence. APA have confirmed their expectations and requirements with respect to the development and operation of the solar farm.

APA have confirmed that a Safety Management Study is not required for the design (refer **Appendix Q**), but have confirmed that the project developer must:

a. enter into a commercial agreement to cover for APA's costs when involved in this project,

b. APA to review the project design impacting the pipeline, and construction methodologies,

c. Terrain Solar to undertake an electrical hazard study (Low Frequency Induction (LFI) and Earth Potential Rise (EPR) studies in accordance with AS4853)

d. Terrain Solar must commit to covering the cost of protection works on top of the pipeline(s) for the road crossing

The above would be completed in conjunction with the carrying out of detailed design.

6.14.1 LI-ION BATTERY FAULT, THERMAL RUNAWAY AND FIRE

The following degradation mechanisms are identified in the PHA as having the potential to cause thermal runaway, notwithstanding improvements in battery technology:

- Chemical reduction of the electrolyte at the anode
- Thermal decomposition of the electrolyte
- Chemical reduction of the electrolyte at the cathode
- Thermal decomposition by the cathode and the anode
- Internal short circuit by charge effects

The PHA provides that (p. 12):

> *Given the ubiquitous nature of Li-ion batteries, thermal runaway is not considered a credible threat when used in a battery storage. In terms of physical damage, the batteries are contained within in modules which are located within a fenced area; therefore, there is a low potential for damage to occur to the batteries which may initiate an incident.*

Notwithstanding the above, detailed analysis of radiant heat impact distances is conducted as part of the PHA (Riskcon 2022) and reproduced in **Table 13**. Contour modelling conducted as part of the PHA confirms that only the 4.7 kW/m^2 contour would have offsite impacts.

Table 13 – Radiant heat from a li-ion battery fire (Riskcon 2022, Table 5-1, p. 18)

Heat Radiation (kW/m^2):	Distance (m):
35	0
23	6
12.6	6
4.7	9

The probability of a fatality occurring at the site boundary is determined in the PHA to be $4.13\times10^{-4}\times0.006\times0.03=7.4\times10^{-8}$ p.a. based on the potential for a fire to occur, the potential for personnel to be located at the boundary of the BESS and tolerance to exposure to radiant heat or toxicity.

6.14.2 LI-ION BATTERY FIRE AND TOXIC GAS DISPERSION

The following gasses are identified in the PHA as having the potential to be emitted from a lithium-ion battery in the event of a fire:

- Carbon dioxide;
- Carbon monoxide; and
- Fluorine gases.

6.14.2.1 Carbon Dioxide

Carbon dioxide emitted in the case of a fire is determined in the PHA provides that (p. 12):

> *Based upon a review of the sensitive areas, and the similar BESS fires, it is not considered that the formation of carbon dioxide in a fire would be sufficient to result in downwind impacts sufficient to cause injury or fatality. In other words, there would be insufficient production of carbon dioxide to generate a plume of sufficient concentration to displace the required oxygen for a significant downwind consequence to occur.*

Accordingly, no further assessment is required.

6.14.2.2 Carbon Monoxide

With respect to the emission of carbon monoxide from a lithium-ion battery in the case of a fire, Riskcon Engineering provides in the PHA (2022, p. 13) that:

> *…it is noted that the combustible load within the BESS which could result in the formation of carbon monoxide is relatively low compared to the available oxygen in the surrounding*

> *atmosphere. Therefore, it is considered that the formation of carbon monoxide at levels which would result in a substantial downwind impact are not considered credible.*

Accordingly, no further assessment is required.

6.14.2.3 Fluorine Gases

With respect to the emission of fluorine gases from a lithium-ion battery in the case of a fire, Riskcon Engineering provides in the PHA (2022, p. 14) that:

> *Based upon the volumes of electrolyte in the battery* cells, along with other fluorine containing compounds used within the batteries, the potential to generate HF at levels which may exceed these concentrations is considered credible.

The potential for a fatality to occur:

- Within the vicinity of the site is 4.13×10-4×0.006 = 2.48×10-6 p.a. based on the potential for a fire to occur and the probability of a person being within the immediate vicinity of the site at the same time; and
- At the nearest residential dwellings approximately 700 metres from the BESS is 4×10-4×0.3×0.001=1.2

6.14.3 ELECTRICAL EQUIPMENT FAILURE AND FIRE

Electrical equipment typically starts by smouldering before flame ignition as a consequence of overheating, arcing, etc. It may then propagate to adjacent combustible material. With respect to electrical equipment failure and fire, Riskcon Engineering provides in the PHA (2022, p. 14) that:

> *The type of equipment used within the project is ubiquitous throughout the world and across industry segments and is therefore not a unique fire scenario. Based upon fire development within switch rooms the fire would be considered to be relatively slow in growth and would be unlikely to result in substantial impacts in terms of offsite impact or incident propagation.*

Accordingly, no further assessment is required.

6.14.4 TRANSFORMER INTERNAL ARCING, OIL SPILL, IGNITION AND BUND FIRE

With respect to transformer internal arcing, oil spill, ignition and bund fire, Riskcon Engineering provides in the PHA (2022, p. 14) that:

> *Transformers contain oil which is used to cool the units during operation. If arcing occurs within the transformer (e.g. due to a low oil level), the high energy passing through the coolant vaporises the oil into light hydrocarbons (methane, ethane, acetylene, etc.) resulting in rapid pressurisation within the reservoir. To minimise the likelihood of such occurrence, transformers are fitted with a low oil pressure switches and a pressure surge switch (Buckholtz relay). These devices identify potential oil and pressure events within the transformer, isolating power and alarming operators.*
>
> *Notwithstanding the protection systems, if the pressure rise exceeds the structural integrity of the reservoir, and the installed pressure relief devices, the reservoir can rupture allowing the release of oil into the bund. The rupture also allows oxygen to enter the reservoir. The temperature of the gases is above the auto ignition point, but this does not occur until oxygen is present. When oxygen enters the reservoir, the gases auto ignite which generates sufficient heat to ignite the oil in the bund.*

Accordingly, detailed analysis of radiant heat impact distances is conducted as part of the PHA (Riskcon 2022) and reproduced in **Table 14**. Contour modelling conducted as part of the PHA confirms that radiant heat contours at 4.7 kW/m^2 do not impact over the site boundary. There is a possibility of minor impact over the site boundary in certain wind conditions and directions however that impact is minor. Accordingly, no further assessment is required.

Table 14 – Radiant heat from a transformer bund fire (Riskcon 2022, Table 5-4, p. 20)

Heat Radiation (kW/m^2):	Distance (m):
35	9
23	10
12.6	11
4.7	17

6.14.5 ELECTROMAGNETIC FIELD IMPACTS

With respect to electromagnetic field impacts, Riskcon Engineering provides in the PHA that (pp. 14-15):

> *Electric and Magnetic Fields (EMFs) are associated with a wide range of sources and occur both naturally as well as man-made. Naturally occurring EMFs, occurring during lightning storms, are generated from Earth's magnetic field. Man-made EMFs are present wherever there is electricity; hence, EMFs are present in almost all built environments where electricity is used.*
>
> *There are currently no existing standards in Australia for governing the exposure limits to ELF EMFs; however, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has provided some guidelines around exposure limits for prolonged exposure which limits the exposure to 2,000 milligauss (mG) for members of the public in a 24 hour period.*
>
> *A review of the site indicates there are no immediate residences adjacent to the area where the solar farm or BESS will be developed providing substantial distance for attenuation of EMFs. Based upon the typical levels which may be generated by transmission equipment the cumulative effect would not exceed the 2,000 mG limit for prolonged exposure. In addition, the closest residence is approximately 700 m away from the EMF generating sources at the solar farm; hence, the potential for the EMF to exceed the accepted levels is considered negligible.*

Accordingly, no further assessment is required.

6.14.6 GAS PIPELINE IMPACTS

A high-pressure gas pipeline runs east-west through the site. With respect to gas pipeline impacts, Riskcon Engineering provide in the PHA that (p. 15):

> *Based upon the hazard identification conducted, the only real threats to the gas pipeline during operation are from BESS fires which will emit radiant heat. However, as the pipeline is buried, the earth above the pipeline will provide shielding from the radiant preventing heating or thermal damage to the pipeline.*
>
> *The only other threats to the pipeline occur during the construction of the BESS and solar farm whereby any excavation works may result in the pipeline being impacted and damaged and*

subsequent loss of containment or create a point where corrosion can take hold resulting in an eventual failure as the metal pipework is corroded.

6.14.7 MITIGATION MEASURES

Notwithstanding that it is concluded in the PHA that risks at the site boundary are not considered to exceed the acceptable risk criteria, the following mitigation measures are recommended (p. 26):

- *The site induction shall include information regarding the gas pipeline including location and protections to identify the gas pipeline (i.e., marker tape, etc.).*
- *All personnel working at the site shall be inducted prior to commencing any work.*
- *An exclusion zone shall be provided along the length of the gas pipeline to minimise the potential for unauthorised works occurring within the vicinity of the gas pipeline, in conjunction with the Site Induction and relevant site-specific construction management plans.*
- *The transformers spill containment shall be designed according to the requirements of AS 2067:2016 – "Substations and high voltage installations exceeding 1 kV a.c'*
- *Battery equipment shall be located away from external site boundaries (property owner's site boundary) as much as possible to maximise distance to sensitive receptors from downwind dispersion in the event of a fire.*
- *A final hazard analysis shall be conducted once a detailed design has been completed to demonstrate the risk criteria are not exceeded.*

6.15 Rapid Social Impact Assessment

This rapid social impact assessment (SIA) has been prepared to address relevant requirements of the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project by the NSW Department of Planning and Environment. The relevant SEARs state that the EIS must address the following specific issues:

> ***Socio-Economic*** *– An assessment of the likely impacts on the local community, any demands on Council infrastructure and a consideration of the construction workforce accommodation*

This SIA aims to identify, predict, and evaluate the likely social impacts and benefits arising from the Project, and to propose appropriate responses to mitigate and manage negative impacts and enhance positive benefits.

6.15.1 THE SOCIAL LOCALITY

The proposed Project is situated in the locality of Carrick, NSW, within the Southern Tablelands region of NSW, approximately 14km east of Goulburn. Brayton, an adjacent locality, is situated approximately 3 km to the north-east of the site. It is a rural-residential locality with a small population, set within an undulating landscape. The site is within the Goulburn Mulwaree Council local government area (LGA). The city of Goulburn is the closest large regional centre for residents to access services. Towrang is a small village located approximately 3 km west of the site. The town of Marulan is located approximately 5 km east of the site.

The social locality (the 'Study Area') for this SIA has been defined as the Goulburn Mulwaree Council LGA.

The social locality has been determined with a consideration of the nature and scale of potential impacts arising from the development and after a review of the characteristics of affected communities. This included

identification of the main place-based or populated communities where people live, work and visit, as well as the existing networks of travel between them.

6.15.1.1 Socio-economic planning context

Land-use planning at the regional level is guided by the *South East and Tablelands Regional Plan 2036*. In this, agriculture and aquaculture, tourism, and the natural environment are highlighted as key assets of the region, along with its close connections and ease of access to Canberra and Sydney. Other important assets and sectors include freight and logistics, education and training, healthcare, public administration and defence, arts and culture, recreation, and renewable energy (DPE 2017). Positioning the region as a hub of renewable energy excellence is identified as a key to facilitating a growing, diversified economy in the region.

At the local level, strategic planning and decision-making are guided by the:

- Southern Tablelands Regional Economic Development Strategy 2018-2022 (AgEconPlus 2018); and
- Goulburn Mulwaree Community Strategic Plan 2042 (GMC 2022).

Both plans are anchored in the environmental, social, cultural and economic assets of the local community and area. Promoting alternate sustainable energy sources and practices, while maintaining a balance between growth, development and environmental protection is a key direction within both plans.

6.15.1.2 Methodology

The *Social Impact Assessment Guideline 2021* (DPIE 2021) has recently replaced the existing *Social Impact Assessment guideline for State significant mining, petroleum production and extractive industry development 2017* (DPE 2017).

The new guideline applies to all State Significant projects and was published in July 2021, which was after SEARs for the project were issued in February 2021.

Transitional arrangements for the application of the 2021 SIA Guideline (DPIE 2021) specify that:

> *…The proponent can apply the SIA Guideline voluntarily.*
>
> *Projects with SEARs issued prior to 1 October 2021 and submitting an EIS after 31 March 2022 would be required to comply with the new Guideline.*

In noting the above, this Rapid SIA has been prepared to comply with the new *Social Impact Assessment Guideline 2021* (DPIE 2021) *and Social Impact Assessment Guideline - Technical Supplement* (DPIE 2021).

Social impacts are identified as the consequences that people, including individuals, households, groups, communities or organisations, experience with changes resulting from the development.

The SIA process considers the findings of several other technical specialists' studies and aims to identify, predict and evaluate the likely social impacts and benefits resulting from the development. In accordance with the 2021 SIA Guideline this report has been prepared to:

- Predict and analyse the extent and nature of likely social impacts against baseline conditions using accepted social science methods
- evaluate, draw attention to and prioritise the social impacts that are important to people
- develop appropriate and justified responses (e.g., avoidance, mitigation and enhancement measures) to social impacts, and identify and explain residual social impacts
- propose arrangements to monitor and manage residual social impacts, including unanticipated impacts, over the life of the project

This SIA has been supported by stakeholder and community engagement activities (refer to **Section 5**). An overview of the key SIA stages is presented in **Figure 25** below.

Figure 25 – Overview of assessment methodology

6.15.1.3 Impact scoping

This involved an initial identification and preliminary assessment of the likely social impacts of the project. Informing this was project information, engagement findings from the Project Scoping process, comparative studies, and other relevant work completed to date.

Social impacts and opportunities were identified across the following eight domains: way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods and decision-making systems. In this, direct, indirect and cumulative impacts were accounted for.

Through this process, impact scoping set the social locality, and framed the scale and depth of the SIA. Considered judgements – based on the extent of cumulative impacts and the degree of material social impact – were then made regarding the type and level of further assessment to be undertaken for each potential impact.

The impact scoping worksheet is available in full at **Appendix P**.

6.15.1.4 Targeted SIA consultation

To inform and validate the social baseline and assessment of social impacts, NGH undertook stakeholder mapping and conducted nine targeted research telephone interviews on behalf of the Proponent with key stakeholders. The consultation was informed by a review of previous community and stakeholder engagement undertaken by the Proponent during the Scoping Report and EIS stages, and by the Social Impact Guideline (DPIE 2021).

6.15.1.5 Establishing the overview of social conditions

This overview provides a snapshot of existing social conditions within the social locality, establishing a base case against which potential impacts can be assessed.

Table 15 – Scoping activities and data sources

ACTIVITY	TASK/SOURCE
Desktop research and data collection	• Review of the Proposal's Scoping Report (Premise, Jan 2021) • Review of relevant community service providers and local community organisations websites, including City/Regional Council, local Chamber of Commerce • Social infrastructure and stakeholder mapping • Identification of relevant key projects/developments in the LGA and broader region
Data analysis	• Australian Bureau of Statistics (2016 Census and other relevant socio-economic data), including: • Population and demographic indicators • Business, industry, employment, and income indicators • Housing and accommodation characteristics • DPE population forecasts • Infrastructure, service, transport, and community features
Literature and strategic planning review	• Review of publicly available research/SIAs on comparable infrastructure projects • Review of relevant public policies, plans and strategies, including: • South East and Tablelands Regional Plan 2036 • The Tablelands Regional Community Strategic Plan 2016-2036 • Southern Tablelands Regional Economic Development Strategy 2018-2022 • Goulburn Mulwaree Community Strategic Plan 2042 • Goulburn Mulwaree Council Local Strategic Planning Statement (2020) • Goulburn Mulwaree Community Participation Plan (2019)
Stakeholder and community engagement review	• Review of previous engagement outcomes undertaken by Terrain Solar

6.15.1.6 Evaluation of social impacts

This built on the impact scoping, and involved further review of relevant inputs e.g., relevant EIS technical reports, stakeholder and community engagement findings, and comparative studies. An assessment was then carried out to determine the likely significance of each potential impact, based on its predicted magnitude and likelihood (see **Table 16** below).

Table 16 – Social impact significance matrix (DPIE, 2021a)

Magnitude level						
Likelihood level		**1**	**2**	**3**	**4**	**5**
		Minimal	**Minor**	**Moderate**	**Major**	**Transformational**
A	Almost certain	Low	Medium	High	Very high	Very high
B	Likely	Low	Medium	High	High	Very high
C	Possible	Low	Low	Medium	High	High
D	Unlikely	Low	Low	Medium	Medium	High
E	Very unlikely	Low	Low	Low	Medium	Medium

6.15.1.7 Identification of management, mitigation, and enhancement options

Measures to avoid, minimise or mitigate potential negative impacts and enhance positive benefits have been developed to address impacts identified as being of medium or higher significance. A brief assessment of residual impacts post-application of mitigation measures was then undertaken.

This SIA was informed by the principles of best practice as outlined in the *Social Impact Assessment Guideline* (DPIE, 2021), ensuring that the SIA is evidence-based, precautionary and responsive to the local context.

6.15.1.8 Targeted SIA consultation

Targeted consultation to inform the SIA consisted of:

- Review of previous stakeholder project engagement undertaken prior to the SIA, including meetings with key stakeholders (e.g., Council; neighbouring residents), online community information sessions, and online survey, as detailed in **Section 5**.
- Nine targeted phone interviews with near neighbours; local government, industry and business, and community representatives; and relevant state government agencies.

In general, stakeholders indicated support for the Project, and feedback regarding potential employment opportunities and associated benefits for local businesses, including accommodation providers, was positive. However, it was noted that as the Marulan area is the centre of many SSDs, mainly quarries, it is constantly coping with heavy vehicles, and so the community is very sensitive to cumulative impacts of haulage routes.

Marulan is also undergoing major community changes as it is becoming increasingly attractive for residents, as other areas become more expensive. Neighbouring landholders interviewed were generally supportive of renewable energy and were not opposed to the Project, however they raised specific concerns about the access route and access handle, construction traffic impacts, and visual amenity. These issues are explored in more detail in **Section 5**.

6.15.2 OVERVIEW OF SOCIAL CONDITIONS

The Goulburn Mulwaree LGA covers an area of 3,220km^2 in the Southern Tablelands region of NSW, on Wiradjuri Country. The Goulburn Mulwaree Council area is bounded by Upper Lachlan Shire in the north and west, Wingecarribee Shire and Shoalhaven City in the east, and the Queanbeyan-Palerang Regional Council area in the south. The total population of the Goulburn Mulwaree LGA in 2020 was estimated to be 31,554 people, with a median age of 41 years (ABS 2021). The area is predominantly rural, with agricultural industries including sheep and cattle grazing and boutique industries (.idcommunity 2022).

Located approximately 195km south-west of Sydney and 90km north-east of Canberra on the Wollondilly River, and accessible by the Hume and Federal Highways and rail, the city of Goulburn is the regional centre of the LGA and acts as a service centre for its surrounding areas. At the time of the 2016 Census, Goulburn had an estimated population of 22,419 people, with a median age of 40 years (ABS 2016). Other towns and localities within the LGA include Marulan, Bungonia, Towrang, Carrick, and Brayton. The population of the LGA has steadily increased since 2001, and is predicted to continue to increase from a population of 30,250 in 2016 to 33,500 in 2041, an annual growth rate of around 0.4%, driven mainly by an increase in older age groups (DPE 2019).

The largest industry of employment in the Goulburn Mulwaree LGA at the time of the 2016 Census was health care and social assistance, comprising 15% of the total workforce. The region has a large commuter population due to its proximity to Canberra.

The median rent in the Goulburn Mulwaree LGA over the quarter to 31 December 2021 was $390, an annual increase of 8.3% (FACS 2022). The rental vacancy rate in Goulburn has been below 2.5% since January 2017 (indicating a tight rental market), and in March 2022 the rate was very low at 0.9% (41 properties) (SQM Research 2022). Compounding this is that the COVID-19 pandemic has adversely impacted on renters in regional areas generally, causing declining vacancy rates and increasing median rental rates (Pawson et al., 2021) and this has been the case for the Goulburn area.

Summary demographic indicators for the Goulbourn Mulwaree LGA are presented in **Table 17** below.

Table 17 – Key demographic and industry data within the Study Area and NSW (ABS, 2016; unless otherwise indicated)

Indicator	Goulburn Mulwaree (LGA)	NSW (State)
Population (no.)*	31,554	8,167,532
Projected population 2041 (no.)**	33,500	10,572,700
Median age (years)*	41	38
Family households with children (%)	36.9	42.2
Aboriginal and Torres Strait Islander (%)	4.0	2.9
Born in Australia (%)	82.6	65.5
Households where a non-English language is spoken (%)	6.5	26.5
Top 3 industries of employment	Hospitals (4.2) Aged care residential services (2.9) Supermarket and grocery stores (2.8)	Hospitals (3.5) Cafes and restaurants (2.4) Supermarket and grocery stores (2.2)
Top 3 occupations (%)	Community and personal service workers (15.3) Technical and trades workers (14.5) Professionals (14.5)	Professionals (23.6) Clerical and administrative workers (13.8) Managers (13.5)
Median weekly household income ($)	1,196	1,486
Unemployment rate (%)	6.3	6.3
SEIFA decile***	4	n/a

* 2020 data (ABS 2021)
** NSW Population Projections (DPE 2019)

*** SEIFA Index of Relative Socio-economic Advantage and Disadvantage (ABS 2018), decile (1=greater relative disadvantage to 10=greater relative advantage)

6.15.3 IMPACT ASSESSMENT

6.15.3.1 Employment and labour impacts

Employment and labour impacts are expected to be a key benefit of this project, particularly during the construction period. To a lesser degree, there will also be employment benefits during the operational phase.

Construction is expected to extend over a period of 18 months, including a 3 month shoulder each side, and the workforce is expected to peak at 300 people. The workforce strategy is to use local contractors to deliver most of this work, where available. Complementing this, some technicians and other resources will need to be brought in to work with the specialist technologies required to construct the project.

During construction, the project will also create employment and labour opportunities across its supply chains. This may include specific opportunities for Aboriginal people, young people, apprentices and trainees. Construction of the project will lean on the local and regional trades and services sectors. The main contractor during construction will be looking to a number of different skills and suppliers, which are likely to include: earthworks and plant operators, labourers, mechanical and electrical engineers, building contractors, heavy vehicle operators, welding and fitting, accommodation, mechanics and maintenance, equipment hire, freight, fencing, and waste management.

In terms of ongoing employment during the operations phase, it is likely that there will be up to 5 full-time equivalent (FTE) jobs created, and there may also be ad-hoc casual work opportunities that arise (e.g., in weed management).

Consultation revealed that this is expected to be a key benefit of the project. However, stakeholders highlighted how important it is to the local community for them to see local people get jobs with these types of projects.

The extent to which local people, and local and regional businesses, will be able to capture the opportunities that will arise depends upon several factors; the first of which is how 'job ready' or 'project ready' they are. Local people and small businesses need to have the necessary capabilities and compliance measures in place to be able to work or sub-contract within larger construction contexts. Another key limiting factor is the shortage of skilled labour that is widely experienced within the Goulburn-Mulwaree area (RDASI, 2018).

Consultation highlighted that for businesses to effectively leverage opportunities, they need to have an early awareness about the project and about what types of work will be required. It will be important to take active steps to build this awareness within the local business community, through industry briefing sessions and notices in the local newspaper.

Responding to these issues are government funded agencies and initiatives (such as the Industry Capability Network (ICN), Training Services NSW, and Regional Development Australia Southern Inland) that are focused on developing the capabilities of local people and businesses, and on connecting local businesses to development projects.

The ICN can assist with industry briefings and introductions between proponents (i.e., head contractors) and local businesses. Once the proponent (or head contractor) can clearly articulate what skills and services they need from local industry, the ICN can create publicly available work packages accessible through their online gateway. However, consultation revealed that ensuring that there are multiple access points for this type of information is also important.

Training Services NSW partners with Registered Training Organisations and Employment Agencies to run pre-employment programs focused on upskilling local people and job readiness.

With regards to supporting local Aboriginal people to be involved with these work opportunities, the Pejar Land Council is a good point of access. Specific and active focus will be required to build a relationship with the land council, and communicate potential work opportunities to them, with enough lead time to allow for work readiness preparation.

Given the importance that government and agency stakeholders place on this benefit, this has been assessed as a high significance. The development of a Local Industry Participation Plan and a Local Procurement Policy is proposed to enhance this potential positive impact.

6.15.3.2 Increase in economic activity

An increase in economic activity within the local and regional areas is expected. The project will directly and indirectly - through its supply chains - create demand for goods and services, such as accommodation, food, construction materials, freight, and local labour. The increased income and spending of the construction workers and others across the supply chains, will also add to the stimulation of the local economies more broadly.

It is likely that local businesses will be able to supply some of these services. Consultation indicated this as a key potential benefit of the project and highlighted the importance that local people place on seeing tangible outcomes for local business, even over the short term.

Given the importance that government stakeholders place on this positive impact for the local and regional area's businesses and economies, it has been assessed as being of high significance. The development of a Local Industry Participation Plan and a Local Procurement Policy is proposed to enhance this impact.

6.15.3.3 Increased pressure on rental housing and short-term accommodation

Even with the development of a Local Industry Participation Plan, it is expected that some construction workers will come in from outside the area to work on the project. It is likely that these workers will be housed in temporary accommodation and in rental houses, in Goulburn. They may also stay in Marulan or other small surrounding towns; however, it is less likely due to their lack of facilities and services.

This use of short-term accommodation may constrain the availability of accommodation for tourism, particularly if construction coincides with peaks in tourism numbers (i.e., at times of local festivals and events). It can also place additional pressure on people experiencing insecure housing who are utilising short-term accommodation while looking for permanent housing.

The use of rental houses for construction workers amid a context of a very tight rental housing market, may further constrain the availability of affordable rental housing, for the local community. The population groups most at risk due to these impacts include low-income households, renters, or other temporary, transient or seasonal workforces, visitors and tourists.

Given the potential for cumulative impacts, and the vulnerability of the potentially affected populations, this potential negative impact has been assessed as being of high significance.

To mitigate these competing interests, it is recommended to develop and implement an Accommodation and Employment Strategy (AES), working closely with Goulburn Mulwaree Council. It is also recommended to update and extend the existing Community and Stakeholder Engagement Plan (CSEP), so that it details engagement intentions and actions in the post-exhibition period phases. As part of this, the CSEP needs to outline how the Proponent will continue to engage with Council to discuss and adaptively respond to any emerging community and business concerns.

6.15.3.4 Visual amenity, and glare and reflectivity

This project will involve a change of land use from rural, to land being used to site electricity infrastructure for the proposal site. The solar farm will be sited within a largely rural setting, in proximity to several quarries.

Consultation revealed that there are two residences that will experience the greatest degree of visual amenity impacts, as they are close to, and overlook, the development site. Concerns have been raised regarding the impact of the solar farm infrastructure on visual amenity for these residences. This has included perceptions regarding potential visual impacts of the boundary fencing along the access handle.

The Visual Impact Assessment (LVIA) states that there will be low visual impact for a small number of properties, and that over time, this would be reduced to low and negligible impacts due to additional vegetation screen. Despite this, one stakeholder stated that they believe no amount of vegetation screening will hide the view of the solar farm from their residence. Directed impacted neighbours have requested that neighbourhood agreements be negotiated for those who will be most impacted by the solar farm in terms of visual amenity.

Some residents also stated that there hasn't been enough information provided to them by the Proponent about the proposed infrastructure at the site, and about how their sight lines will be impacted from their properties. To address this, details of the proposed landscape plan have been provided to these neighbours to provide more details about how the site would be landscaped.

There has also been concern expressed about glare and reflectivity impacts. The LVIA identified risk of glare for eighteen dwellings. Of these, eight would have a potential view to the solar array and one (R43) has the potential for moderate glare impact. A negligible amenity risk was identified for both Munro and Carrick Rds.

Given the degree of concern expressed by the directly impacted neighbours (albeit a small number), visual amenity impacts have been assessed as medium significance. The glare and reflectivity impacts have also been assessed as medium significance.

To mitigate these impacts, the LVIA proposes screening vegetation be planted to screen the central areas of the site from R43, reducing the number of glare minutes and level of glare effect. The LVIA also proposes additional vegetation screening to shield views of those residences that have visual impacts.

It is also recommended to provide tailored and detailed information for each directly impacted resident, as part of ongoing stakeholder engagement throughout the pre-EIS lodgement and exhibition period phases.

6.15.3.5 Local area roads

It is likely that construction-related traffic will impact on local and major roads in the local area. This is due to both construction heavy vehicles increasing the volume of heavy vehicles on the public road network, as well as the traffic movements of the construction workforce. Consultation has revealed that this is a key issue of concern for residents along Munro Rd and the broader community.

Several options for accessing the site were explored during project planning, and this aspect of the project was refined due to community input. However, the resulting decision to access the site from Munro Rd has caused some community concern. Concerns have been expressed by residents who live on Munro Rd, as well as in Marulan, about the ability of this Council owned road to accommodate heavy vehicles and higher volumes of traffic. The neighbouring landholders interviewed suggested an upgrade of Munro Rd so that it can more effectively and safely cater to this increasing traffic load.

Concerns have also been raised about public safety related to increased truck movements on the Hume Highway and the intersection with Munro Rd.

Given the high level of expressed concern regarding this impact, it has been deemed of medium significance.

Responding to these concerns, the Traffic Impact Assessment (TIA) has identified the need for some minor upgrades to Munro Road and the Hume Highway intersection at Munro Road.

6.15.3.6 Health and wellbeing

Development projects can create stress and anxiety in people who oppose the project and/or are directly impacted.

Within the planning and engagement process for this project, evidence from the field suggests that this has been the case for a small number of directly impacted adjacent neighbours. Key sources of stress have included: uncertainties regarding elements of the access road (e.g., the type of boundary road-side fencing, the type of road surface); a disputed location of a property boundary; and concerns about adverse impacts to property values.

Regarding concern about potential adverse impacts to property values, this is a common source of tension between proponents and residents. However, changes in land and property values are complex as they are subject to a range of interplaying influences, making it near impossible to pinpoint individual causal factors. There is also no definitive research that clarifies whether the presence of large-scale renewable energy projects negatively impacts upon nearby property values.

A key Australian study examining the impacts of wind farms on property prices found there to be insufficient sales data to make definitive conclusions (Urbis, 2016) and no Australian research examining the impacts of solar farms is available. In any event, this is not a material consideration.

As there is no definitive research regarding the impacts of solar farms on nearby property values, it is not possible to make an evidence-based assessment about the impact of this project on the property values of the surrounding properties.

Given the small number of people potentially affected, these impacts are deemed to be of medium significance.

To address these impacts, it is recommended to update and extend the CSEP (as noted in the CSEP). In the pre-lodgement and exhibition period phases, this will involve targeting concerned neighbours, and providing them with clear information and documentation to directly address concerns and reduce uncertainties. Throughout construction, regular consultation with sensitive receptors is also recommended, and this should continue (albeit to a lesser extent) into the operational phase.

6.15.3.7 Amenity (noise, air quality, lighting)

During the construction period there also may be adverse amenity impacts associated with noise, air quality, and lighting for neighbours near the Project site and/or along the proposed haulage route. One stakeholder noted a particular concern regarding the potential for dust to be created along the access handle, and for this dust to flow downhill and impact on the water quality of the dams on their property. Both neighbouring landholders interviewed suggested sealing the access handle.

There is also potential for ongoing noise impacts within the operational phase of the project. However, no community concerns have been raised about these impacts for this project to date.

These potential impacts during construction are deemed to be medium significance, and the impacts during the operations phase are of low significance.

Responding to the specific concerns about dust from the access handle, the proponent will ensure ongoing stakeholder engagement with the potentially impacted neighbour.

In addition, the Noise and Vibration Impact Assessment (NIA) details mitigations of potential noise impacts. For construction, these include limiting concurrent activities undertaken close to sensitive receptors where possible; operating plant in a quiet and efficient manner; regularly inspecting and maintaining equipment to ensure it is in good working order; restricting piling activities to specific hours; and mitigating impacts from vibration from heavy vehicles.

For operations, the NIA outlines the need to ensure night-time noise levels don't exceed intrusive noise criteria for key receptors. It is also recommended to undertake noise modelling once the final layout of the development is approved to ensure the noise mitigations are still applicable and that compliance is achieved. See **Section 6.8** for more details.

The LVIA details mitigations of temporary and permanent lighting required during construction, including that lighting is designed and operated in accordance with relevant standards and control of the obtrusive effects of outdoor lighting is achieved.

6.15.3.8 Way of life for neighbouring and nearby residents

During construction, there may be adverse impacts on people's commuting or travelling time, their experience of travel, and their ability to move around freely. There may also be impacts on nearby residents' privacy, peace, and quiet enjoyment, especially if they are affected by increased noise near the Project site and/or along the proposed haulage route (particularly Munro Rd).

Munro Rd is a rural local road that connects to the Hume Highway, and then only to Graham Lane, which is a no-through road. Munro Rd is usually very quiet, as it is generally only used by the small number of local residents. More broadly however, the local area is subject to a high degree of existing heavy vehicle movement and blasting associated with several nearby quarries.

Consultation revealed concern about this increase in vehicle movements during construction, and the impacts that this will have on residents. Related to this is the concern of one neighbouring resident that over time, the access handle may be extended as a through road connecting to other roads to the north of the site, which would potentially increase the volume of traffic within the neighbourhood. However, the applicant has confirmed that this land is and will remain private, and that there is no intention, as a component of this project, to connect to roads to the north via the subject site.

During operations, there is also potential for impacts on people's experience of privacy, peace, and quiet enjoyment resulting from maintenance activities.

The potential for way of life impacts during construction are deemed to be of medium significance, and for operations, deemed to be of low significance.

The TIA outlines mitigation measures and recommends the implementation of a Driver Code of Conduct, including measures addressing courteous behaviour and safety (see **Section 6.7**). Noise impacts are addressed in the NIA, as detailed above.

Additionally, it is recommended to develop and implement a grievance and feedback mechanism, as part of an updated Community and Stakeholder Engagement Plan. Ongoing stakeholder and community engagement will also be undertaken with neighbours to address their concerns, providing them with clear information and documentation to directly address concerns and reduce uncertainties. Throughout construction, ongoing consultation with sensitive receptors is also recommended.

6.15.3.9 Decision making systems

Feedback from consultation indicated that some people within the community - including adjacent landholders, many of the non-permanent resident landholders along Munro Rd, and some of the broader community within the local district - feel that they have not been adequately informed about the project. For example, some community members did not know about the project (e.g., an adjacent landholder) or about the community consultation activities (e.g., nearby residents, people in Marulan). One stakeholder noted that these activities weren't advertised on platforms where they were likely to reach locals, nor were they scheduled at suitable times (e.g., one of the Online Community Information Sessions was held 10 days before Christmas when people can be busy or away).

Despite this, SIA and broader project engagement revealed no indication of widespread community discontent regarding the project. However, there is a sense that broader community sentiment is not being actively sought out and heard, and stakeholders generally expressed that more community engagement would be valued as the project moves into the exhibition period and beyond.

Given these factors, this impact is evaluated as being of medium significance.

It is recommended to update, extend, and implement the CSEP**,** which will involve robust community engagement. In the pre-EIS lodgment and exhibition period phases, this could involve provision to the community of clear information on all aspects of the project, and clear communications about the EIS approvals process, opportunities to make submissions, and timeframes. It could also include briefing sessions to interest groups and the broader community.

The development of a Community Benefit Sharing Scheme through a participatory approach with residents will also be considered.

6.15.3.10 Community composition and social infrastructure

Major development projects can result in demographic changes due to non-resident workers coming into areas during construction. This can change the composition of the local community, and so change the local and community feel of the towns. It can also place pressure on social infrastructure and community services.

For this project, the construction phase is of a relatively moderate scale and duration, and the workforce strategy targets local resident labour. There will be workers coming into Goulburn. However even with the potential for cumulative effects, Goulburn is a regional city and there have been several large development projects in recent years (e.g., the hospital redevelopment), so people in Goulburn would be accustomed to the presence of construction workers.

Additionally, the project will access emergency and health services when required, however the potential for undue pressure on the Goulburn area's social infrastructure is deemed unlikely to become an issue of concern. No concern about these impacts was expressed during consultation.

These potential negative impacts are evaluated as being of low significance.

Despite this, as part of the CSEP, the proponent will continue regular engagement with council, particularly during the construction phase, to discuss and adaptively respond to any emerging community and business concerns.

6.15.3.11 Landscape characteristics and values

The project will see a diversion of land use away from agricultural production (primarily grazing and some cropping) to land being used for the siting of the solar farm, during the operational phase. This will create a change to the visual and landscape character within the local area, impacting on the local scenic values as perceived by the community.

Consultation did not reveal concern about the loss of agricultural land per se. However, there was a degree of interest, particularly amongst government stakeholders, in the potential for continued agricultural use of the land, i.e., sheep grazing, through a combined agri-solar approach.

Additionally, one stakeholder stated that there has been increasing industrialisation of the local area generally and expressed concern that this project will be used as the rationale for further industrialisation across the local landscape. This stakeholder noted biodiversity concerns, stating that the area is a haven for wildlife and birds migrating in from bushfire-damaged areas, and a preference for native species plantings for site hedging and screening was stated.

The Aboriginal Cultural Heritage Assessment Report (ACHAR) noted that the area holds cultural significance and aesthetic values for community, with the connection to country and a sense of healing. Impacts to cultural heritage are further detailed in the ACHAR.

Industry is a feature of the surrounding landscape, and the decommissioning phase of this project will involve removal of all above ground infrastructure and return of the site to its potential for agricultural use. Therefore, over the longer term the project will not negatively impact on the agricultural use of the land nor have an enduring impact on the landscape.

Given these factors, and that concern regarding these sentiments were not widely expressed, the overall potential negative social impact has been evaluated as of low significance.

6.15.3.12 Safety and hazard risks

Some stakeholders expressed concern about fire hazard management and fuel load management, access, and the need for consultation with the Rural Fire Service (RFS).

Given the relatively low level of expressed concern that residents have regarding these issues, this impact is assessed as low significance.

Nonetheless, fire risks have been addressed in **Section 6.6**, which recommends the development of a Bushfire Risk Management Plan, pending bushfire assessment. The plan also requires consultation with local RFS regarding requirements for access.

6.15.3.13 Summary of potential social impacts

Table 18 – Impact Summary by Project Phase

Project phase	Potential impact	Positive / negative	Significance	Potentially affected stakeholder group/s
Planning and assessment	Health and wellbeing (stress and anxiety)	Negative	Medium	• Small number of adjacent neighbours
Planning and assessment	Decision-making systems (lack of inclusion)	Negative	Medium	• Neighbouring and nearby residents and broader local community
Construction	Employment and labour	Positive	High	• Local, regional people and businesses
Construction	General economic activity	Positive	High	• Local, regional people and businesses
Construction	Pressure on rental housing and short-term accommodation	Negative	High	• Vulnerable populations
Construction	Way of life (travel, quiet enjoyment)	Negative	Medium	• Neighbouring and nearby residents
Construction	Local area roads	Negative	Medium	• Neighbouring and nearby residents
Construction	Amenity (noise, air quality, lighting)	Negative	Medium	• Neighbouring and nearby residents
Construction	Changes in community composition	Negative	Low	• Goulburn (and surrounding towns)

Project phase	Potential impact	Positive / negative	Significance	Potentially affected stakeholder group/s
Construction	Pressure on social infrastructure	Negative	Low	• Goulburn (and surrounding towns)
Operations	Visual amenity	Negative	Medium	• Small number of adjacent neighbours
Operations	Glare and reflectivity	Negative	Medium	• Small number of adjacent neighbours
Operations	Way of life (quiet enjoyment)	Negative	Low	• Neighbouring and nearby residents
Operation	Amenity (noise, lighting)	Negative	Low	• Neighbouring and nearby residents
Operations	Safety and hazard risks	Negative	Low	• Neighbouring and nearby residents and broader local community
Operations	Landscape values (scenic and cultural values, biodiversity)	Negative	Low	• Neighbouring and nearby residents and broader local community

6.15.4 SOCIAL IMPACT ENHANCEMENT, MITIGATION, AND RESIDUAL IMPACTS

The Proponent has demonstrated an iterative approach to the development through the stakeholder engagement and consultation process to date. In this, they have made several adjustments to project design, such as agreeing to additional plantings along the access handle for screening to reduce the visual impact. The enhancement and mitigation measures outlined below directly respond to the potential positive and negative social impacts associated with the Project that were identified as being of medium or higher significance. They have been identified through consideration of Project impacts, along with stakeholder consultation.

- It is recommended to continue to implement the targeted, benefits and issues focused **CSEP** for the exhibition period as outlined in **Section 5**. In this, it is important to be aware of the potential for opposition and conflict, and ensure that it delivers:
  - specific engagement materials and activities to address issues and confirm benefits
  - continued engagement with Goulburn Mulwaree Council, to create a formal mechanism to discuss and adaptively respond to any emerging community and business concerns. During the pre-construction and construction phases this may be best facilitated through scheduled monthly meetings. This will include consideration of impacts on accommodation supply.
- The CSEP will be updated and extended so that it details engagement intentions and actions in the post-exhibition period phases. It will include details regarding an accessible complaints process with a timely response protocol. Through the CSEP, the development of a Community Benefit Sharing Scheme will also be considered.
- The Local Industry Participation Plan will focus on maximising the involvement of local people and businesses in the Project. It will include specific focus on people and businesses within the Goulburn Mulwaree LGA, but also include consideration of the wider regional area. It will consider specific opportunities for Aboriginal people and businesses, women, and young people.

  The plan should be developed in partnership with the key local economic development stakeholders in the region (e.g., the Industry Capability Network, Training Services NSW, Regional Development Australia,

Goulburn TAFE, Goulburn Mulwaree Council, Goulburn Chamber of Commerce & Industry, and Marulan Chamber of Commerce). It can also assess the feasibility to support local schools in science and engineering studies through a partnership.

The plan would outline mechanisms that will be used to ensure that local people and businesses are given full, fair, and reasonable opportunity to participate in the Project. It will also detail how the Proponent will link in at the local level with government and agency support programs that assist people and businesses improve their capability.

- The **Local Procurement Policy** will outline the Proponent's commitment to providing local and regional businesses the opportunity to supply goods and services to meet Project needs during all Project phases. This will be developed through consultation with key local economic development stakeholders (e.g., the Industry Capability Network, Regional Development Australia, Goulburn Mulwaree Council). It will give Aboriginal businesses full and fair opportunities to supply goods and services.
- The **Accommodation and Employment Strategy** will provide further detail on accommodation providers. The strategy will include engagement with accommodation providers to avoid negatively impacting on tourism opportunities and any vulnerable populations who are utilising temporary accommodation. The strategy will also include engagement with Goulburn Mulwaree Council to avoid potential negative impacts on local services and social infrastructure, and manage positive social integration with existing communities.
- The **Driver Code of Conduct** will outline provisions for the operation of construction vehicles delivering plant and materials to the solar farm to ensure that safety objectives are met and to reduce negative impacts on the local community and other road users. The Code would include a public complaints registration system to ensure effective resolution of complaints and to take disciplinary action if necessary.

Table 19 outlines a summary of enhancement and mitigation measures, along with the predicted significance of residual impacts, after the effective application of mitigation or enhancement measures. Only those impacts that have been assessed as being of medium or higher significance are addressed in the assessment of residual impacts.

Table 19 – Summary of enhancement and mitigation measures, and residual impacts

Potential impact	Significance	Mitigation / Enhancement Measures	Significance of residual impact
Health and wellbeing (stress and anxiety)	Medium	• Targeted engagement with neighbouring landholders focused on addressing issues and developing ongoing trust. • An accessible complaints process with a timely response protocol.	Low
Decision-making systems (lack of inclusion)	Medium	• Continued implementation of the CSEP • Targeted engagement with neighbouring landholders focused on addressing issues and developing ongoing trust. • Regular community updates about the progress of the Project and findings of the technical assessments. • An accessible complaints process with a timely response protocol.	Low
Employment and labour	High	• Local Industry Participation Plan • Accommodation and Employment Strategy	High
Increase in economic activity	High	• Local Industry Participation Plan	High

Potential impact	Significance	Mitigation / Enhancement Measures	Significance of residual impact
		• Local Procurement Policy	
Pressure on rental housing and short-term accommodation	High	• Accommodation and Employment Strategy • Targeted engagement with relevant stakeholders	Low
Way of life (travel, quiet enjoyment)	Medium	• Construction Traffic Management Plan (see **Section 6.7**) and Driver Code of Conduct • Noise Management Plan (see Section 6.8) • An accessible complaints process with a timely response protocol	Low
Local area roads	Medium	• Construction Traffic Management Plan (see **Section 6.7**) and Driver Code of Conduct	Low
Amenity impacts during construction (noise, air quality, lighting)	Medium	• Construction Traffic Management Plan (see **Section 6.7**) and Driver Code of Conduct • Noise Management Plan (see Section 6.8) • An accessible complaints process with a timely response protocol	Low
Visual amenity impacts during operation of the solar farm	Medium	• Measures as per Visual Impact Assessment (see **Section 6.8**), including use of vegetation screening • Targeted engagement focused on addressing issues and developing ongoing trust	Low
Glare and reflectivity impacts during operation of the solar farm	Medium	• Measures as per glare assessment (see **Section 6.10**) including use of vegetation screening • Targeted engagement focused on addressing issues and developing ongoing trust	Low

6.16 Economic Impact

6.16.1 EXISTING ENVIRONMENT

Refer **Section 6.15.2**.

6.16.2 POTENTIAL IMPACTS

6.16.2.1 Construction

Key economic impacts during construction would include:

- Increased employment;
- Investment in the local economy;
- Pressure on local services;
- Safety risks and hazards.

During the peak of construction, the project would generate around 300 jobs, which would positively contribute to the local economy. Where possible, local workers would be employed, however the nature of the some of the work, and the quantity of workers required, may result in out of area workers being employed. These would need to be accommodated. Given the small size of Marulan, it is expected that workers would reside in Goulburn and travel by bus or private car to the site each day. The potential exists to support local training and support services organisations during the construction and operation phase, and these opportunities would be explored through an Accommodation and Employment Strategy (AES).

There is also the potential for impacts to local services and employment. Mitigation measures are recommended for adoption so that any residual impacts can be managed proactively and in consultation with the local community.

The short term loss of agricultural land during construction is likely to be of limited impact given that upon commencement of operations, co-located agricultural opportunities would be investigated.

6.16.2.2 Operation

During operation the project will provide up to 5 full time jobs, together with the potential for up to 50 casual opportunities, during maintenance operations. This has a positive impact for the local economy and provides training/value add opportunities for local workers.

The change in land use from agriculture to renewable energy is likely to have a neutral economic impact given the potential exists for continued agriculture use post construction (sheep grazing) and given the land will continue to generate an income.

6.16.3 MITIGATION MEASURES

Ongoing consultation with key stakeholders is recommended to ensure that benefits of the project are maximised and residual impacts appropriately managed.

The following mitigation measures are recommended to manage residual economic impacts:

- Prepare AES incorporating ongoing liaison with local industry representatives to ensure the maximisation of the use of local contractors, manufacturing facilities, materials.
- Liaison with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.
- Liaison with local tourism industry representatives to manage potential timing conflicts with local events
- Terrain Solar or the developer will consult with local employment agencies and training organisations and, where practicable, will consider supporting training and apprenticeships.

6.17 Cumulative Impacts

6.17.1 EXISTING ENVIRONMENT

Cumulative impacts have been identified and assessed in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE, 2021).

A review of the major project website for solar farms within the Goulburn Mulwaree LGA and surrounding LGAs of Upper Lachlan Shire (North), Queanbeyan Palerang Regional (South), Shoalhaven (East), Wingecarribee (North east) and Yass Valley (West) was conducted on 02/02/2022 (refer to **Figure 26**). 9 solar farms at various stages were identified and are detailed in **Table 20**.

Table 20 – Solar Farms within Goulburn Mulwaree LGA and surrounding LGAs

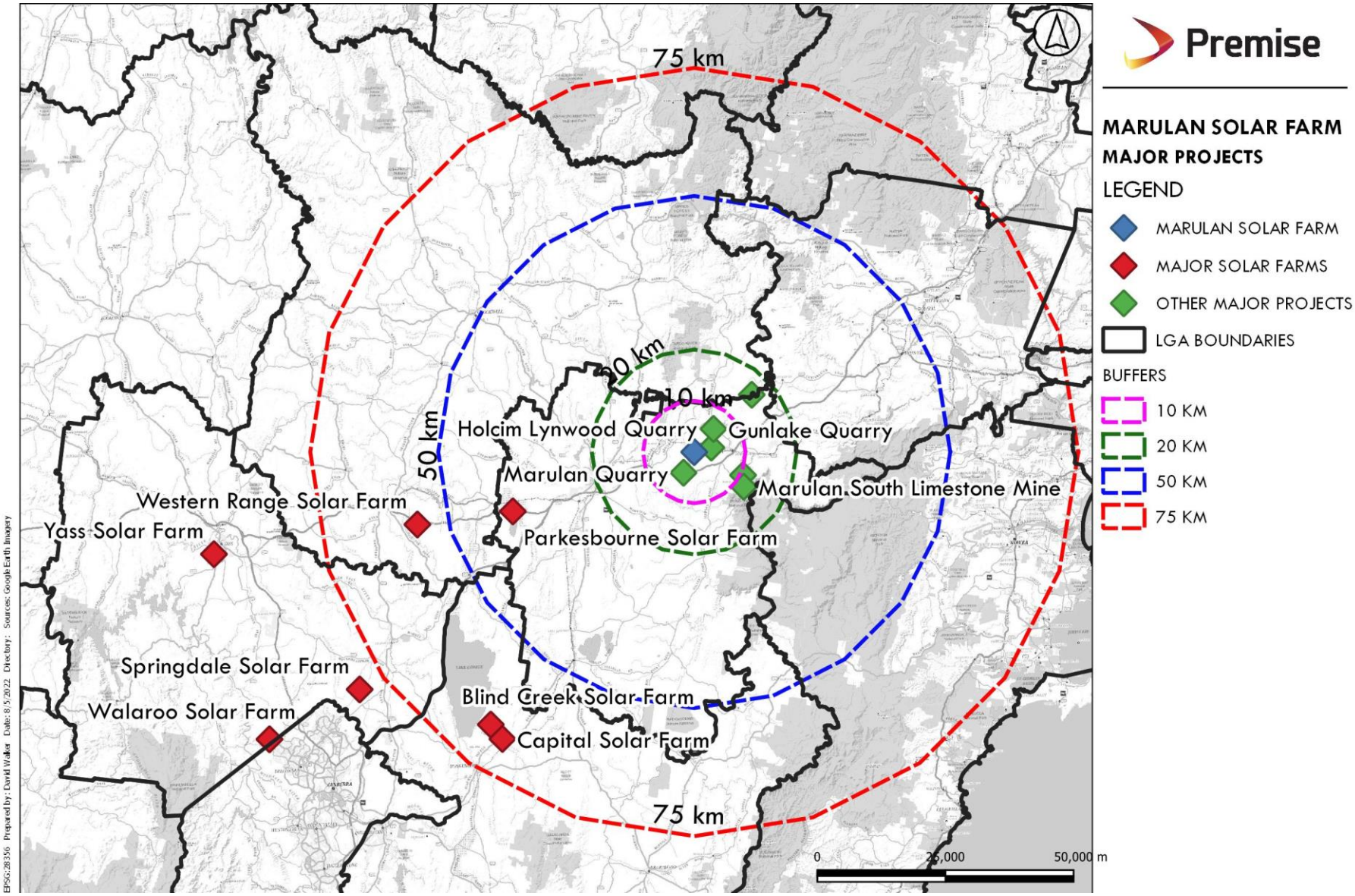
Project Name	Development Stage	Distance from Site (km)	Direction from Site	LGA
Carrick Solar Farm	Withdrawn	2	North-east	Goulburn Mulwaree
Parkesbourne Solar Farm	Prepare EIS	35	East	Goulburn Mulwaree
Western Range Solar Farm	Prepare EIS	63	South-east	Yass Valley
Capital Solar Farm	Determination (MOD 2)	64	South-east	Queanbeyan-Palerang Regional
Gunning Solar Farm	Withdrawn	66	East	Upper Lachlan Shire
Blind Creek Solar Farm	Prepare EIS	70	South-east	Queanbeyan-Palerang Regional
Springdale Solar Farm	Determination	78	South-east	Yass Valley
Yass Solar Farm	Prepare EIS	92	East	Yass Valley
Wallaroo Solar Farm	Prepare EIS	98	South-east	Yass Valley

Several other state significant major projects were identified within the locality. These are detailed within **Table 21**.

Table 21 – Other Major Projects within the Locality

Project Name	Development Stage	Distance from Site (km)	Direction from Site
Holcim Lynwood Quarry	Determination (Mod 5 and Part 4)	0.3	North-east
Gunlake Quarry	Determination (Quarry Extension and Part 3A)	2.5	North-east
Marulan Quarry	Prepare EIS	2.6	South
Peppertree Quarry	Determination	6.1	South-east
Marulan South Limestone Mine	Determination (Continued Operations and Site Verification Certificate)	7.3	South-east
Jerrara Power Energy from Waste Facility	Withdrawn	10.5	South
Marulan Gas-Fired Power Station	Determination (Mod 1 and Mod 2)	14	North-east

Figure 26 – State Significant Projects



Lynwood Quarry is a hard rock quarry operated by Holcim. The quarry is classified as state significant development and was granted development consent on 21 December 2005 via DA 128-5-2005. Construction of the quarry commenced in 2010 and the quarry was operational in late 2015. The quarry is expected to remain operational until development consent lapses on 1 January 2038. The quarry is approved via DA12-8-5-2005 to transport a maximum of 5 million tonnes per annum (Mtpa) from the site via road (restricted to 1.5 Mtpa) and rail. The original consent has been subject to five modifications including:

- MOD 1-(07/05/2009), Reduction in the western extent of the approved quarry footprint and modifying layout of site infrastructure.
- MOD 2 (22/03/2011), Site Infrastructure and Construction Route Modification including reconfiguration of proposed rail loop, layout of site infrastructure, use of fixed in-pit primary crusher, increased movement of heavy vehicles during construction and alternate construction access.
- MOD 3 (19/08/2011) Administrative Modification including changes to vary date of submission for Annual Environmental Management Report (AEMR) and date for commissioning the first Independent Environmental Audit (IEA).
- MOD 4 (18/05/2016) Construction of a new, 76-hectare, quarry pit (granite) in Lot 2 DP1107232, to the north-west of the original quarry.
- MOD 5 (29/05/2017) Administrative Modification including variation to condition for timing of Biodiversity Offsets.

Terrain Solar have ensured ongoing engagement with Holcim during project concept and assessment.

An expansion of the quarry, approved via MOD 4 in 2016, has resulted in the construction of a granite pit in close proximity to the Marulan Solar Farm site, approximately 300m to the north-east.

Biodiversity offset areas associated with the Quarry are additionally located in the southern extent of Lot 3 DP 1107232, bordering the western boundary of the Marulan Solar Farm site. No impact to these areas is anticipated as a result of the proposed development.

6.17.2 POTENTIAL IMPACTS

The construction of the project is considered unlikely to lead to cumulative impacts with other projects in the locality on the basis that:

- The proposed site access does not share an access with any other nearby major projects;
- Munro Road is not a school bus route;
- The construction period is a discrete, limited period, that would be managed with appropriate management plans and controls to limit the opportunity for cumulative impacts;
- There are no other major projects close to the project site that are considered likely to lead to cumulative traffic impacts during the construction period.

Operational cumulative impacts are considered unlikely on the basis that:

- The site is well separated from other state significant solar farms and thus is unlikely to lead to any cumulative visual or glare impacts;
- The operational noise levels are low and generally contained within or very close to the project site, without contributing to noise levels generated by adjacent and nearby major operations;
- The absence of other major projects in the immediate locality means that the likelihood of cumulative land use impacts are unlikely.

6.17.3 MITIGATION MEASURES

The following mitigation measures are recommended to limit the potential for cumulative impacts associated with the project:

- Consultation with TfNSW to identify if the construction phase of the proposal will overlap with any TfNSW Hume Highway projects. Traffic management plans would be developed to address potential traffic impacts caused by concurrent projects generating construction traffic.
- Cumulative construction noise impacts would be addressed in a Noise Management Plan. Consultation with TfNSW, and other proponents if applicable, would be completed to determine if construction activities may take place in close proximity to adjoining projects. Where possible, noise generating activities would be scheduled for different areas of the proposal site to avoid cumulative construction noise impacts. This would include periods where the nearby airstrip is in regular use.
- If there is potential for construction of multiple projects to occur in and around Goulburn/Marulan at the same time, and large workforce numbers are required, consideration would be given to alternative accommodation options such as neighbouring towns.

6.18 Environmental Management and Monitoring Framework

Throughout construction, management measures will be implemented through the adoption of a construction environmental management plan, which will consist of a range of sub-plans, including but not limited to the following:

- Traffic Management Plan
- Bushfire Management Plan
- Construction Noise and Vibration Management Plan
- Landscape Implementation Plan
- Soil and Water Management Plan
- Emergency Response Plan
- Community Engagement Plan
- Waste Management Plan
- Incident Management Procedures

Operation and monitoring of the facility would be governed by an adopted operational environmental management and monitoring plan that would clearly identify any residual matters requiring ongoing attention during operation, with particular emphasis on groundcover management, bushfire management, risk management, landscape implementation, and monitoring and ongoing noise monitoring to ensure ongoing compliance with adopted criteria.

The site is expected to operate for a period of approximately 30-35 years, after which it would be decommissioned, in accordance with the measures outlined in a decommissioning management plan.

7. JUSTIFICATION OF THE PROJECT

7.1 Need for the project

The proposed MSF provides for the delivery of a sustainable supply of power and battery storage to benefit the local and regional communities with respect to cost effective and reliable power. The project assists to deliver the objectives of the NSW Governments Electricity Strategy 2019 and is not inconsistent with the NSW Electricity Infrastructure Roadmap. Demand for renewable energy is also high from corporations striving to

reduce their electricity costs and to meet their own sustainability targets. There is also broad consensus that the electricity generation sector provides the lowest cost and easiest implemented mechanism to achieve economy wide emissions reductions.

The following is also noted with respect to the project site:

- Under the NSW Transmission Infrastructure Strategy (DPE 2018), upgrades are planned to the 330kV Bannaby to Yass line which runs approximately 27 kilometres to the north of the site to the Snowy Mountains Hydro-electric scheme, Victoria and South Australia via Wagga Wagga;
- The site is mapped under the Renewable Energy Map of New South Wales (NSW Government 2018) as receiving the same or higher level of average daily solar exposure (megajoules per square metre) as parts of the New England REZ and parts of the Hunter-Central Coast REZ; and
- There is a high density of existing and planned wind and solar energy projects in the vicinity of the site.

7.2 Justification for Undertaking the Proposal

In assessing whether the proposed community recycling centre is justified, consideration has been given to both biophysical and socio-economic factors, including the potential for residual effects on the environment and the potential benefits of the project.

7.2.1 BIOPHYSICAL

The project has been conceived to:

- Minimise the footprint of physical disturbance (such as vegetation clearance or soil and water disturbance) through the refinement of the proposed footprint;
- Minimises impacts to sensitive landforms and the local water environment through provision of high quality management measures and processes;
- Seeks to limit or avoid impacts to sites or items of Aboriginal heritage significance;
- Minimise the clearing of native vegetation, including the adoption of exclusion areas within the development footprint to minimise impacts to sensitive vegetation and habitat. Where impacts cannot be avoided or minimised, ensuring they are appropriately offset;
- Minimise the likelihood of pollution to the soil and water environment through adoption of industry standard controls;
- Ensure the project has the capacity to be designed to deliver a neutral or beneficial impact to water quality;

Despite the above, there remains some potential for residual impacts to the environment, and as such, a range of proposed safeguards and mitigations measures outlined throughout this report and summarised in the following sections.

7.2.1.1 Aboriginal and Historic Heritage

The ACHA (Premise 2022) attached at **Appendix E** concludes that whilst the development would result in impacts to identified Aboriginal objects, these have been assessed as having low to moderate scientific significance. Ongoing consultation with Registered Aboriginal Parties has ensured community awareness of the project and that local cultural knowledge is understood with respect to the land. A range of recommendations are proposed to ensure that residual impacts are appropriately managed.

The SOHI (Premise 2022) attached **Appendix F** provides an assessment of the impact of the proposed development on the locally listed Ruins of Kyle and Lockyersleigh Homestead within the site, as well as on the unlisted historical timber bridge. It concludes that the proposed development would result in moderate physical and visual impact to the heritage curtilage of the Ruins of Kyle, neutral physical impact and negligible visual impact to the Lockyersleigh Homestead and nil impact on the historical timber bridge. A number of

recommendations are made to mitigate impacts to the heritage items, including the installation of a high-visibility barriers during construction in relation to heritage items and the provision of a development buffer area around the Ruins of Kyle.

7.2.1.2 Water Quality

The Water Cycle Management Study Report (Premise 2022) attached at **Appendix J** confirms that the proposed development would can be designed to achieve a neutral or beneficial impact on water quality. The WCMSR notes with respect to water quality:

> *Results of MUSIC modelling demonstrate that post development pollutant loads are less than and/or equal to pre-development pollutant loads. While cumulative frequency graphs portray a slight increase in Phosphorus and Nitrogen levels between the 50th to 98th percentile a neutral or beneficial effect is achieved for mean annual loads within the post development model.*
>
> *The proposed development, if undertaken in accordance with the principles outlined in this assessment, would ensure that stormwater pollutants were reduced and that mean annual load reductions in Total Suspended Solids and Total Phosphorus meet NorBE. Total Nitrogen Mean annual loads may require additional treatment to satisfy NorBE requirements.*
>
> *Additional reductions to phosphorus and nitrogen levels through the 50th and 98th percentile may require the inclusion of additional treatment detailed during the engineering design phase.*
>
> *All system components would be subject to further detailed assessment and design during the engineering design phase, based on the principles outlined in this assessment.*

7.2.1.3 Hydraulic Impacts

The Hydraulic Assessment (Premise 2022) attached in **Appendix H** provides an assessment of pre and post development flood affectation within the site based on hydraulic modelling. The modelling indicates that the proposed solar farm will not cause external impacts in terms of water surface levels and peak discharges and accordingly no mitigation measures such as detention basins are required. Additionally, proposed solar panels are within the bounds of low flooding risk (depth less than 0.9 metres and velocities less than 1m/s) and other infrastructure including the substation is outside of the 1% AEP flood extent. The risk of erosion and scour is considered to be minimal.

7.2.1.4 Biodiversity

The BDAR (Premise 2022) attached at **Appendix K** provides an assessment of the loss of biodiversity as a consequence of the proposed development in accordance with the BC Act and *Biodiversity Conservation Regulation 2017* (the BC Regulation). It concludes that the prosed solar farm will result in the loss of 30.93 hectares of native vegetation and 16 isolated scattered trees, as well as 0.17 hectares of rock outcrop and 3.6 hectares of exotic grassland that is potential habitat for threatened species. The BDAR confirms that Terrain Solar will satisfy the biodiversity credit requirements using offset mechanisms allowed by the NSW Biodiversity Offsets Scheme (i.e. contribution to the Biodiversity Trust Fund administered by the NSW Biodiversity Conservation Trust, purchase of existing credits on the market, funding of a biodiversity conservation action, retirement of biodiversity credits and/or mine site ecological rehabilitation).

7.2.1.5 Traffic and Access

The TIA (Premise 2022) attached at **Appendix L** provides an assessment of the traffic generation of the proposed development, it's impact on the Hume Highway and Munro Road and the intersection of the Hume Highway and Munro Road and the intersection of Munro Road and the proposed service road. It concludes

that whilst construction traffic will have greater impact than operational traffic, traffic during the construction phase can be accommodated by the existing road network along the Hume Highway and Munro Road and associated intersections. However, the implementation of a driver code of conduct and upgrades to Munro Road and the access to Munro Road from the Hume Highway are recommended. The code of conduct ensures that, interna alia, drivers only enter and exit Munro Road via left-turn movements whilst the road upgrades to allow sufficient road width for heavy vehicles to enter Munro Road and pass in opposite directions.

7.2.1.6 Noise & Vibration

An NVIA is provided at **Appendix N**. It includes an assessment of construction noise, operational noise, road traffic noise and vibration impacts. It concludes that the proposed development will result in compliant noise impacts to nearby, non-associated sensitive receptors during the construction (both construction activities and road traffic noise) and operational phase. Additionally, it confirms that vibration impacts will not be significant. Recommended mitigations measures are limited to appropriate use, selection and maintenance of construction equipment.

7.2.1.7 Social Impacts

A Rapid Social Impact Assessment is conducted at **Section 6.15**. It concludes that the proposed development will have:

- Negative impacts with medium significance on a small number of adjacent neighbours, nearby residents and the broader local community during the planning and assessment phase;
- During the construction phase:
    - Positive impacts with high significance on employment and labour and general economic activity for local, regional people and businesses; and
    - Negative impacts with low to high significance on rental housing and short-term accommodation, way of life, local area road, amenity (noise, air quality, lighting), community composition and social infrastructure on vulnerable populations, neighbouring and nearby residents and Goulburn and surrounding towns.
- Negative impacts with low to medium significance on visual amenity, glare and reflectivity, way of life, amenity (noise, lighting), safety and hazard risks and landscape values on a small number of adjacent neighbours, neighbouring and nearby residents and the broader local community.

The following mitigation measures are recommended:

- Targeted engagement with neighbouring landholders focused on addressing issues and developing ongoing trust to mitigate health and wellbeing (stress and anxiety), decision-making systems (lack of inclusion), pressure on rental and short-term accommodation, visual amenity and glare and reflectivity;
- An accessible complaints process with a timely response protocol to mitigate health and wellbeing (stress and anxiety), decision-making systems (lack of inclusion), way of life (travel, quiet enjoyment) and amenity impacts during construction (noise, air quality, lighting);
- A Local Industry Participation Plan to mitigate employment and labour and increase in economic activity impacts;
- An Accommodation and Employment Strategy to mitigate employment and labour and pressure on rental housing and short-term accommodation impacts;
- A Construction Traffic Management Plan and Driver Code of Conduct to mitigate way of life (travel, quiet enjoyment), local area roads and amenity impacts during construction (noise, air quality, lighting);
- A Construction Environmental Management Plan to mitigate way of life (travel, quiet enjoyment) and amenity impacts during construction (noise, air quality, lighting);

- Continued implementation of the CSEP, regular community updates about the progress of the Project and findings of the technical assessments and a community benefit sharing scheme to mitigate decision-making systems (lack of inclusion) impacts;
- Local Procurement Policy to mitigate increase in economic activity impacts; and
- Measures as per the Visual Impact Assessment (see **Section 6.8**) and the glare assessment (see **Section 6.10**) to mitigate visual amenity and glare impacts during the operation of the solar farm.

7.2.1.8 Technological Hazards

Riskcon has prepared a Preliminary Hazard Analysis (PHA) in relation to the project attached as **Appendix O**. The PHA provides a comprehensive assessment of potential impacts with respect to hazard, including specifically:

- Li-ion battery fault, thermal runaway and fire.
- Li-ion battery fire and toxic gas dispersion.
- Electrical equipment failure and fire.
- Transformer internal arcing, oil spill, ignition and bund fire.
- Electromagnetic field Impacts.
- Gas pipeline impacts.

The assessments conclude that, subject to the implementation of standard mitigation measures, the proposed development is unlikely to lead to significant risk and that risks at the site boundary are not considered to exceed the acceptable risk criteria.

7.2.1.9 Land and soil

Premise has completed an LSC Assessment for the MSF project in accordance with the LSC Scheme attached at **Appendix G**. The study area is not considered highly productive agricultural land as defined in LSC Scheme.

The assessment found that overall land and soil capability for the study area ranges from Class 5 (moderate – low capability land) to Class 7 (very low capability land). The land and soil capability limitations of the study area will require careful management. Potential impacts to soil from the proposed development have been identified with appropriate mitigation measures provided for the construction, operation and decommissioning phases.

A Land Use Conflict Risk Assessment (LUCRA) prepared by Premise is attached at **Appendix I**. The LUCRA identifies a range of risks associated with the project, however through the effective implementation of management strategies, it is considered likely that potential land use conflicts can be effectively minimised.

Revised risk rankings identified moderate risk conflicts for the following:

- All land uses
  - Risk to property, including bushfire and flooding risks.
- Agricultural land use
  - Economic Interest, including impacts to insurance premiums and land values.
- Extractive industry land use
  - Environmental concerns, including the potential for cumulative impacts.
  - Health and safety, including concerns regarding the proximity of the solar farm to quarry operations
  - Economic Interests, including impacts to insurance premiums

The average revised risk ranking for all identified land use was below 10 which is consistent with the LUCRA objective to lower the risk ranking to 10 or below.

7.2.1.10 Visual impacts

Iris Visual Planning and Design has prepared a Landscape and Visual Impact Assessment (LVIA) attached at **Appendix M**. The assessment provides a comprehensive of potential visual and glare impacts, with consideration of key viewpoints and potentially visible location.

The LVIA concludes that the proposed development has a generally low level of visibility and is capable of being accommodated within the receiving environment with generally low to negligible visual and glare impacts to potentially sensitive receivers and viewpoints.

7.2.2 SOCIO-ECONOMIC EFFECTS

The project has been conceived to:

- Provide a sustainable form of energy production that provides benefit to the locality and region;
- Minimises impacts to the environment through careful consideration of site sensitivities, adoption of exclusion areas, and the implementation of appropriate mitigation and management measures.

The proposed development of the subject site is justified as it provides sustainable form of energy that contributes to the NSW Government goal of improving the efficiency and competitiveness of the NSW electricity mark and investment in new price reducing generation and energy saving technology

In summary the proposal is considered to be justified on the basis that:

- Is consistent with the zoning of the area and represents an approved use;
- Is designed and sited to minimise impacts to the local receiving environment;
- Is well separated from sensitive residential receivers to ensure minimal impacts;
- The site is suitable for the proposal; and
- Is consistent with the principles of ecologically sustainable development.

7.2.3 PUBLIC INTEREST

The public interest may be determined by consideration of relevant national, state and local government goals, as well as community priorities, which are expressed through a range of documentation. Relevant strategic documents are considered in **Section 2**.

It also requires the consideration of the principles of ecologically sustainable development, discussed in **Section 7.3**. It has been consistent held through a range of determinations in the NSW Land and Environment Court that the ESD precautionary intergenerational equity principles include considerations associated with climate change (impact of the development on climate change and impacts of climate change on development).

Mostly recently, the LEC held that the downstream impacts of mining projects, including the burning of fossil fuels for energy production, is a public interest consideration. Namely, in Gloucester Resources Limited v Minister for Planning [2019] NSWLEC 7, Preston J stated at 499:

> *Many courts have held that indirect, downstream GHG (greenhouse gas) emissions are a relevant consideration to take into account in determining applications for activities involving fossil fuel extraction or combustion or electricity generated by fossil fuel combustion.*

In summing up, Preston noted that the impacts associated with climate change, among others, were sufficient to justify refusal of the project.

It follows that a project that seeks to provide for sustainable electricity generation through the use of renewable forms of energy is in the public interest as it reduces the reliance on forms of electricity generation that rely

on the consumption and burning of fossil fuels and that negatively contribute to the impacts of climate change as a result. Adoption of forms of development that counter the need for these high impact uses is therefore positive in the context of the ESD principles and in the public interest.

The proposed development is considered to be in the public interest on the basis that it:

- Offers an opportunity for productive and sustainable economic activity within the area;
- Presents an excellent opportunity to the local region to provide local employment opportunities;
- Has been designed with appropriate to the consideration to social, environmental and sustainability interests of the community;
- Aims to minimises impacts to natural resources through development of a sustainable form of energy production;
- Assists to achieve Australia's targets with respect to provision of renewable energy resources; and
- Assists to reduce reliance on traditional, fossil fuel burning forms of electricity generation, thereby assisting in curbing the long term impacts of climate change.

It reduces the reliance of other forms of electricity generation that are reliant on the burning of fossil fuels and that negatively contribute to climate change among others.

7.3 Ecologically sustainable development

The *National Strategy for Ecological Sustainable Development* (NSESD) (Department of Environment and Heritage 1992) defines Ecologically Sustainable Development (ESD) as:

> *using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (refer website)*

The concept of ESD gives formal recognition to environmental and social considerations in decision-making to ensure the current and future generations can enjoy an environment that functions as well as or better than the environment they inherit.

The core objectives of the NSESD are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

As outlined in Clause 193 of the *Environmental Planning and Assessment Regulation 2021,* the four principles of ESC are listed below. These are discussed in the following sections.

- Precautionary principle;
- Intergenerational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation and pricing of environmental resources.

7.3.1 PRECAUTIONARY PRINCIPLE

The precautionary principle states where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a justification for not implementing mitigation measures or strategies to avoid potential impact. This has been held in various decisions in the NSW Land and

Environment Court to include considerations associated with climate change (impact of the development on climate change and impacts of climate change on development).

The potential impact from the proposal has been identified in the environmental assessment section of this report and all mitigation measures summarised in **Appendix D**.

The proposal supports the development of sustainable forms of renewable energy, and in doing so reduces reliance on traditional forms of electricity generation, including the burning of fossil fuels. This assists in reducing the long term impacts of climate change and is therefore in the public interest. The potential outcome of climate change, being higher temperatures and greater periods of sunlight, also suggests that increasing reliance of solar forms of energy generation is sustainable. This is discussed in further detail in **Section 7.2.3**.

7.3.2 INTERGENERATIONAL EQUITY

The second principle of ESD is intergenerational equity, such that the present generation should ensure the health, diversity and productivity of the environment are equal to or better for future generations.

All work would be carried out in accordance with the environmental safeguards summarised in **Appendix D** to mitigate potential impact associated with noise and vibration, socio-economic considerations, traffic and transport, drainage and water quality, air quality, greenhouse gas emissions, climate change, Aboriginal and non-Aboriginal heritage, topography, soils, waste and hazardous materials.

The proposal supports the development of sustainable forms of renewable energy, and in doing so reduces reliance on traditional forms of electricity generation, including the burning of fossil fuels. This assists in reducing the impacts of climate change and therefore assists in ensuring the health of future generations is protected; the development is therefore in the public interest. This is discussed in further detail in **Section 7.2.3**.

7.3.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

The third principle of ESD is conservation of biological diversity and ecological integrity such that ecosystems, species and genetic diversity within species are maintained.

The proposed development has been the subject of a comprehensive assessment in accordance with the provisions of the *Biodiversity Conservation Act 2016* by reference to **Appendix K**.

The mitigating measures for protecting biodiversity at the site are provided in **Section 6.5**.

7.3.4 IMPROVED VALUATION, PRICING AND INCENTIVE MECHANISMS

The final principle of ESD is improved valuation and pricing of environmental resources which establishes the need to determine economic values for services provided by the natural environment such as the atmosphere's ability to receive gaseous emissions, cultural values and visual amenity. The principle is designed to improve methods of carrying out valuation of environmental costs and benefits and use this information when making decisions.

The development of policy to guide pricing and incentive mechanisms in delivering ecologically sustainable development is the responsibility of governments and regulatory stakeholders.

7.4 Alternatives

Development options considered as part of this EIS as summarised in **Table 22**.

Table 22 – Development Options

Alternatives:	Description:

Option 1	Base Case, 'Do Nothing'	Option 1 would involve not installing and operating a solar farm and BESS at the site or elsewhere.
Option 2	Alternative Site	Option 2 would involve installing and operating the solar farm and BESS at an alternative site
Option 4	Solar Farm and BESS at subject site, in alternative portion of the site	Option 3 would involve developing the Solar Farm and BESS within an alternative area of the site
Option 4	Solar Farm and BESS at subject site, 'Preferred Option'	Option 4 would involve the installation and operation of the Solar Farm and BESS at the site as proposed.

Of the above, Option 5 is the preferred option, and this is discussed in further detail in the following sections.

7.4.1 OPTION 1 – DO NOTHING

Option 4 is preferred over Option 1 on the grounds that the latter is:

- Inconsistent with the strategic context set by State and local policy, including:
  - The NSW Electricity Strategy 2019, which is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy.
  - Objectives of the Energy Security Safeguard legislation to improve the affordability, reliability and sustainability of energy by addressing the shortfall in firm capacity during times of peak demand;
  - Actions 6.1 and 6.3 of the South East and Tablelands Regional Plan (DPE 2017) which seeks to, among other things, Identify opportunities for renewable energy industries; and
  - Planning Priority 7 of the *Goulburn Mulwaree LSPS* (GMC 2020) which seeks to support increased take up of renewable energy generation and use.
- Fails to deliver additional electricity generation and reduction in greenhouse gas emissions through generation of electricity from a sustainable, renewable source;
- Fails to enable the regulation of electricity supply, which improves its efficiency, consistency and reliability for consumers as it becomes increasingly variable due to the transition from traditional to more sustainable, renewable sources in the region;
- Fails to seize upon the social and economic benefits as a result of direct and indirect employment associated with the construction and operation of the facility, and loss of investment in the community as a result of the flow on effects of employment
- Fails to seize upon opportunities for local businesses associated with local purchasing and opportunities during construction.

7.4.2 OPTION 2 – ALTERNATIVE SITE

Option 4 is preferred over Option 2 as the latter would result in increased costs and environmental impacts associated with the acquisition of a suitable property and construction of increased lengths of connecting infrastructure (likely to include earthworks and vegetation removal), as compared to the site of the proposed development, which is proximate to the state energy grid.

The site is generally flat, capable of being developed, has minimal nearby residential receivers, and once operational, will have minimal ongoing impacts to surrounding receivers.

7.4.3 OPTION 3 – DIFFERENT AREA OF THE SUBJECT SITE

Option 4 is preferred over Option 3 as:

- Existing 132kv lines are proximate to the proposed solar farm area;

- The site is well protected from nearby residential receivers from both a visual and aural perspective; residual impacts are manageable; and
- The project footprint minimises the need to clear native vegetation and impact habitat areas.

Consideration has been given to placement of the proposed site substation either adjacent to the solar farm infrastructure, or co-located with power lines. The co-location with the solar farm is the preferred outcome as it minimises off site visual and aural impacts to receivers, through provision of greater buffer distances.

Noting the above, option 4 (the preferred option) is the preferred area for utilisation for the solar farm and BESS.

7.5 Conclusion

This EIS has been prepared pursuant to Part 5, Division 5.1, Subdivision 3 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation), *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021) and SEARs issued by DPIE on 19 February 2021 in response to the Scoping Report (refer to **Appendix A**).

The proposed MSF provides for the delivery of clean, green, and sustainable renewable energy , with associated and integrated battery storage that will allow this energy to be supplied to the grid when it is most needed, and will help to ensure the reliability and stability of the energy grid into the future. This will provide significant benefits to both local, regional, state-wide, and broader Australian communities with respect to cost effective, reliable, and carbon free power.

The project is strongly aligned with the objectives of the NSW Government's Electricity Strategy 2019 and is consistent with and will help to ensure delivery of the NSW Electricity Infrastructure Roadmap.

Recent events have strongly supported the need for delivering the renewable energy capacity required generation into the NSW and Australian grid at the earliest possible opportunity to replace expensive, unreliable, and high carbon emitting fossil fuel. A majority of proposed projects that can help to deliver the substantial scale of this required capacity will likely be delayed as a result of the need to wait for either regulatory changes, or the physical delivery of long lead time and expensive transmission infrastructure upgrades.

MSF stands out from the pack on this basis as it utilises the existing network infrastructure so it can be delivered much sooner, contributing more quickly to the new generation capacity requirements of the grid and the state of NSW.

Further, MSF limits the building of new infrastructure to the single host landholder's property, so there is no additional disruption or impact to the broader community created by the need to construct significant additional electrical infrastructure on either public or private land.

By now it is accepted truth that the cheapest source of electricity is from renewable sources. Consequently, demand for renewable energy is high from corporations striving to reduce their electricity costs and to meet their own sustainability targets.

An assessment of potential environmental impacts has identified a number of minor adverse impacts to the environment that would require the implementation of appropriate controls to ensure compliance in accordance with relevant legislation, standards and guidelines. Measures are proposed during both construction and operation to ensure impacts are appropriately managed. These measures would ensure compliance with relevant legislation and any conditions of approval.

8. REFERENCES

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APPENDIX A

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

APPENDIX B

RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Table 24 – Response to SEARs

	Details:	**Section of EIS where issue addressed:**
General Requirements	In particular, the EIS must include:	
	• a stand-alone executive summary;	Refer to Summary.
	• a full description of the development, including: – details of construction, operation and decommissioning; – a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); – a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development;	Refer to Section 3.
	• a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved solar farms, rural residential development and subdivision potential);	Refer to Section 6.18.
	• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:	
	– a description of the existing environment likely to be affected by the development;	Refer to Sections 2.3 and 2.4.
	– an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing, approved or proposed developments in the region and impacts on the site and any road upgrades, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice;	Refer to Section 5.5.
	– a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and	Refer to Section 5.5and Appendix D.
	– a description of the measures that would be implemented to monitor and report on the environmental performance of the development;	Refer to Section 3.2.11 and Appendix D.
	• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and	Refer to Appendix D.
	• the reasons why the development should be approved having regard to:	
	– relevant matters for consideration under the Environmental Planning and Assessment Act 1979, including the objects of the Act and how the principles of ecologically sustainable	Refer to Section 4.

	development have been incorporated in the design, construction and ongoing operations of the development;	
	– the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and	Refer to Section 6.18.
	– feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.	Refer to Section 6.18.
	• a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and	Refer to Section 2.1.
	• a detailed evaluation of the merits of the project as a whole.	Refer to Section 6.18.
	The EIS must also be accompanied by a report from a suitably qualified person providing: • a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; and • certification that the information provided is accurate at the date of preparation.	This has been separately provided to DPE at application lodgement phase.
	The development application must be accompanied by the consent in writing of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).	The EP&A Regulation 2000 has been repealed. The obligation for consent to be in writing no longer applies.
Key Issues	The EIS must address the following specific matters:	
	• **Biodiversity** – including: – an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCD and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values; – the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM; – an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts; and – if an offset is required, details of the measures proposed to address the offset obligation.	Refer to Section 6.5 and Appendix K.
	• **Heritage** – including an assessment of the likely impacts of the development:	
	– on historic heritage (including 'Lockyersleigh homestead and Ruins of Kyle) and a Statement of Heritage Impact	Refer to Section 6.1.2

	(SOHI), prepared by a suitably qualified heritage consultant in accordance with the guidelines in the NSW Heritage Manual; an	
	– on Aboriginal (cultural and archaeological), including a full archaeological assessment and consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents;	Refer to Section 6.1.1.
	• **Land** – including:	
	– an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:	Refer to Section 6.3 and Appendix I.
	– a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights;	Refer to Section 6.3 and Appendix I.
	– a soil survey to determine the soil characteristics and consider the potential for erosion to occur (including the identification of catchment protection scheme works); and	Refer to Section 6.2.
	– a cumulative impact assessment of nearby developments (including operating mines, extractive industries, mineral or petroleum resources),	Refer to Section 6.17.
	– an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:	Refer Section 6.3
	– consideration of the zoning provisions applying to the land, including subdivision;	Refer to Section 1.6 and Appendix I.
	– completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and	Refer to Appendix I.
	– assessment of impact on agricultural resources and agricultural production on the site and region.	Refer to Section 6.3.1.
	• **Visual** – including a detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the project (including arrays, transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas, air traffic and road corridors in the public domain and provide details of measures to mitigate and/or manage potential impacts (including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners);	Refer to Section 6.8.
	• **Noise** – including 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 (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;	Refer to Section 6.8.
	• **Transport** – including:	Refer to **Section 6.7.**

	– 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 Carrick Road, Rampion Hills Road, Munro Road, Brayton Road, Stoney Creek Road, Jerrara Road and Hume Highway), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance; – a cumulative impact assessment of traffic from nearby developments; and – provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority;	
	• **Water** – including: – an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources traversing the site and surrounding watercourses, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts; – details of water requirements and supply arrangements for construction and operation; and – an assessment of the potential impacts of the development on the Sydney drinking water catchment, including consideration of Water NSW's current recommended practices and standards, stormwater quality modelling (MUSIC), and whether the development can be constructed and operated to have a neutral or beneficial effect on water quality consistent with the provisions of State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011; – a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004);	Refer to **Section 6.2.**
	• **Hazards** – including:	
	– an assessment of potential hazards and risks including but not limited to bushfires, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields; and	**Refer to Sections 6.3.3 and 6.14**
	– a Preliminary Hazard Analysis prepared in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 –	**Refer to Appendix O.**

	Guideline for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011)	
	– a Quantitative Risk Assessment for the existing high pressure pipelines (gas and ethane) addressing risk criteria under HIPAP No. 4 and HIPAP No. 10, taking into account site specific features and potential propagation risks between pipelines, – an assessment of compliance with Australian Standard AS 2885 prepared in consultation with APA Group and including a Safety Management Study where required.	**Refer to Section 6.14 and Appendix O.**
	• **Socio-Economic** – including an assessment of the likely impacts on the local community, any demands on Council infrastructure and a consideration of the construction workforce accommodation; and	**Refer to Sections 6.15 and 6.16.**
	• **Waste** – identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.	**Refer to Section 6.11.**
Consultation	During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development, Goulburn Mulwaree Council. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	**Refer to Section 5.**
Further consultation after 2 years	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Planning Secretary in relation to the preparation of the EIS.	The development application is submitted within two years of the SEARs issue date.

APPENDIX C

COMMUNITY ENGAGEMENT REPORT

APPENDIX D

SUMMARY OF MITIGATION MEASURES

Table 25 – Mitigation Measures

Impacts:	Phase:	Mitigation Measures:
Aboriginal Heritage	Throughout	1. The development proposal should proceed, conditional upon the recommendations outlined in this report and surface collection of recorded sites within the study area … 2. Any Aboriginal object that is newly identified during the surface collection will be recorded appropriately. 3. No further Aboriginal archaeological investigations are proposed. 4. As the project is assessed as being State Significant Development (SSD), an Aboriginal Heritage Impact Permit (AHIP) is not required under Part 4.7 clause 4.41 (1)(d) of the EP&A Act. Instead, Aboriginal cultural heritage within the study area will be managed by an Aboriginal Cultural Heritage Management Plan (ACHMP) that will be developed following project approval in consultation with the RAPs and Heritage NSW. The ACHMP will contain the recommendations of this report, as well as an unanticipated finds protocol, procedures to manage unexpected discoveries of human remains, and policies on the fate of any Aboriginal objects either salvaged following project approval or from the test excavation program. 5. Site Cards for AHIMS #51-6-0736 and AHIMS #51-6-0364 will be updated to reflect the findings of the test excavation program of Locations 4 and 5. 6. Three newly recorded sites at Locations 1-3 will be uploaded to the AHIMS database: • Location 1 will be named Osborns Creek OS-1. • Location 2 will be named Narambulla Creek OS-1. • Location 3 will be renamed Lockyersleigh Creek OS-1. 7. The following AHIMS sites will be impacted: • AHIMS ID #51-6-0364 • AHIMS ID #51-6-0373 • AHIMS ID #51-6-0374 • AHIMS ID #51-6-0375 • AHIMS ID #51-6-0376 • AHIMS ID #51-6-0908 8. All Aboriginal sites that are subject to impact will be recorded on an Aboriginal Site Impact Recording form and submitted to Heritage NSW. 9. The proponent should consider avoiding the south-western portion of the study area containing AHIMS ID #51-6-0364 (test excavation Location 5) and European archaeological material. If this is possible, no further archaeological investigation at AHIMS ID #51-6-0364 will be required. 10. If Location 5 of the test excavation program is harmed, limited salvage excavations must take place prior to ground disturbance by the project. This would include the manual excavation of an additional 4 excavation squares (1 metre squared) around the three test squares recording the highest numbers of artefacts. There would be triggers for expansion but only to a maximum of 6 square metres in total. 11. Sites recorded during the test excavation program (Osborns Creek OS-1, Narambulla Creek OS-1, and Lockyersleigh Creek OS-1) are subsurface

Impacts:	Phase:	Mitigation Measures:
		manifestations only and as subsurface artefacts were recorded at a low artefact density representative of a background scatter that would be common in most landforms of the region, no further archaeological investigation is warranted at these sites. 12. Sites with a surface expression of artefacts in the study area (AHIMS ID #51-6-0373, AHIMS ID #51-6-0374, AHIMS ID #51-6-0375, AHIMS ID #51-6-0376, AHIMS ID #51-6-0908) will be salvaged through a collection of surface artefacts prior to impacts. Given that these sites are low-density artefact scatters and isolated finds, their scientific significance is low, and the recording and collection of visible artefacts is considered to be sufficient mitigation with regard to the proposed impact. Specific recommendations for AHIMS ID #51-6-0364 are provided in Recommendations 5 and 9. 13. It is proposed that Aboriginal objects recovered from the salvage surface collection together with test excavation artefacts, will be reburied within the study area, outside the proposed impact area. Terrain Solar (or proponent) would need to identify a location that will not be impacted by the proposed solar farm operation for consideration by the RAPs. Management of Aboriginal objects recovered during the salvage program and test excavation program will be discussed through consultation with RAPs during the development of the ACHMP. 14. An unexpected finds procedure would be implemented as part of the management considerations for Aboriginal Cultural Heritage. unexpected finds policy should be included as part of the proposed ACHMP. If unanticipated Aboriginal objects are uncovered during works, all work in the vicinity should cease immediately. A qualified archaeologist should be contacted to assess the find and Heritage NSW and Pejar LALC must be notified. 15. All impacts must remain within the assessed study area or further archaeological investigation may be required.
Historic Heritage	Throughout	• GMC and State Heritage Inventory to update their records to reflect consistent details for heritage item numbers associated with the Ruins of Kyle and Lockyersleigh Homestead. • Installation of a high-visibility barrier that is set at least 10 metres from heritage items during construction, not to be removed until construction is complete. • Provision of a minimum 60 metre buffer area around the Ruins of Kyle to ensure only a partial loss of views and vista occurs to the heritage item. • Heritage induction for all workers prior to works commencing, including values of the site, avoidance procedure and contacts (site manager, etc) for reporting unexpected archaeological finds, or inadvertent impacts to heritage items. • Retention of natural screening in the form of vegetation wherever possible. Where impact to vegetation cannot be avoided, planting of new vegetation is recommended.
Soils	Prior to Construction	• Ensure the detailed sign incorporates all necessary measures from a Construction Erosion and Sediment Control Plan (ESCP) and Soil and Water Management Plan (SWMP).

Impacts:	Phase:	Mitigation Measures:
		• Ensure the detailed design relies on existing internal tracks or, where not available, provides new tracks along contours to minimise disturbance. • Seek advice from the NSW Soil Conservation Service during detailed to identify the appropriate treatment and management strategies for gullies, creek beds, sand seams, pipe bedding materials and excavated soil amelioration. • Treat weeds, remove Sifton bushes and undertake application of lime and gypsum. • Establish and maintain a perennial pasture to ensure 100% groundcover.
	During Construction	• Implement all measures from ESCP and SWMP. • Minimise all ground disturbance where possible. • Minimise construction activities during wet weather conditions. • Retain, stockpile, treat for weeds and ameliorate (in accordance with advice obtained from the NSW Soil Conservation Service) all disturbed or excavated soil, with all topsoils and subsoils stockpiled separately and returned in order. • Ensure that sodic soils or intervals are clearly identified and not mixed with other soils. • Return stockpiled soil and cleared vegetation or organic matter to its original location (where possible) as soon as reasonably practicable. • Exclude livestock during construction and install fencing around existing gullies that are not being filled for the construction of the solar farm. • Undertake rehabilitation and revegetation in accordance with an appropriate landscape, revegetation or rehabilitation plan prepared by a suitably qualified professional. • Ensure rehabilitation is undertaken progressively to minimise the total disturbance area at any one time.
	During Operation	• Implement and maintain all operational requirements of the SWMP. • Prepare and implement a Pasture Management Plan. • Undertake monitoring to identify potential soil impacts requiring mitigation or remediation.
	During Decommissioning	• Prepare an appropriate decommissioning management plan that incorporates appropriate soil management to return the site to existing or improved land and soil capability. • Specific soil management practices should be determined at the time of decommissioning.
Water	Prior to and during construction	Construction related soil and water impacts would be managed through the development and implementation of a Soil and Water Management Plan (SWMP) that would address: • Staging; • Erosion control strategies; • Progressive rehabilitation; and • Site management and maintenance techniques. The SWMP would be reviewed and finalised in conjunction with the engineering design at the Construction Certificate stage to ensure that control measures can be effectively designed and located.

Impacts:	Phase:	Mitigation Measures:
Agricultural Land		• Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS. • Undertake consultation with the landowner of the project area to: – ensure agricultural considerations are incorporated into the final design. – negotiate arrangements for safe passage and access for their surrounding agricultural land uses and resources. – determine appropriate offsets for loss of income from impacts to agricultural productivity. – inform preparation of the Pasture Management Plan.
Biosecurity		• Preparing a Weed Management Plan: – in accordance with the (GMC, 2019) Local Weed Management Plan, South East Local Land Services (2017) South East Regional Weed Management Plan 2017 – 2022 and NSW Biosecurity Act 2015; and – in consultation with GMC, NSW DPI and the landowner. • If sheep grazing is undertaken during operations, a detailed protocol would be developed to ensure biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers, stock or staff. • Restricting vehicle movements by establishing and using formed access tracks. • Use of vehicle wash down stations to prevent the transport of weeds and pathogens to and from the project area. • Ensure all waste containers are covered to prevent pest animal access to food waste, and ensure waste is regularly removed from the site. • Establishing and maintaining perimeter fencing to minimise pest animal access to the project area. • Conduct routine monitoring for pest species and implement control measures if required, and in accordance with industry best practice. • Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS. • Ensuring any imported fill has appropriate chains of custody and testing to limit the potential for the introduction of diseases.
Biodiversity	Throughout	Recommended mitigation measures, including timing and responsibilities are provided in Table 27 of the BDAR (**Appendix K**) and reproduced in **Table 8** in the body of the EIS.
Bushfire	Detailed Design	As detailed design progresses, equipment suppliers are selected, and the solar farm infrastructure layout is refined, it is proposed to further consult with both the RFS and FRNSW. The intention of this consultation will be twofold. 1. To provide detail on the technology proposed and the proposed farm layout to allow (if necessary) design refinement to incorporate any specific requirements the RFS/FRNSW may have. 2. To provide the requisite information that will be needed to prepare an Emergency Response Plan (ERP).

Impacts:	Phase:	Mitigation Measures:
		In terms of design principles to minimise risk, the farm layout will be designed to: • provide a defendable space around infrastructure; • ensure that appropriate access, egress and manoeuvrability within the solar farm is provided for first responders; • provide for ongoing management and maintenance of bush fire protection measures; and • ensure that services are adequate to meet the needs of firefighters.
	Construction	• Prior to construction commencing the EPC contractor will engage with Marulan RFS local brigade and details about the construction schedule, contact numbers and site access arrangements will be shared. • Five (5) 10 kL tanks, being Static Water Supplies dedicated exclusively for fire-fighting purposes, will be located strategically around the site and appropriately plumbed for the duration of construction. • The fuel load over the site prior to and during construction will be monitored and reduction measures implemented as required. These measures will be restricted to mechanical slashing or stock crash grazing. • The following work practices would be implemented throughout construction: – No burning of vegetation or any waste material would take place on site; – Fire extinguishers will be available in all vehicles; – During the bushfire season (October to March) the fire danger status would be monitored daily (through the RFS website http://www.rfs.nsw.gov.au) and communicated to personnel; – Total Fire Ban rules will be adhered to. That is, the EPC contractor will not: – (in any grass, crop or stubble land) drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter; – carry out Hot Works (eg. welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless the necessary exemption from the RFS Commissioner has been obtained and work complies with all requirements specified in the exemption; and • Any fuel or flammable liquid would be stored in a designated area and will be sign posted “Fuel Storage Area.” • A register will be maintained that confirms the quantities and location of any flammable material stored on-site.
	Prior to Operations	The MSF is located within an RFS Fire District. Notwithstanding, in the event of a significant fire event (either within the MSF site or in close proximity to the solar farm), FRNSW will either assist the RFS or fulfil the role of designated combat agency. Either the RFS and/or FRNSW would be first responders. Should a fire occur during the operational life of the MSF it is recognised as important that the first responders have ready access to information which enables effective and safe control measures to be rapidly implemented.

Impacts:	Phase:	Mitigation Measures:
		Given the potential for electrical hazards associated with an energy generating facility, and potential risks to firefighters, both FRNSW and the RFS must be able to implement effective and appropriate risk control measures when managing an emergency incident in order to safely mitigate potential risks (including electrical hazards and venting electrolyte) to firefighters. The detail required to prepare this plan will be contingent on the equipment proposed and the farm layout and services. These features would have been communicated to and refined in consultation with both RFS and FRNSW during detailed design. As such, the operator of the MSF will have had the information required to prepare an Emergency Response Plan (ERP) prior to commencement of operations (ie. export of electricity into the grid).
	Emergency Response Plan	The ERP will address foreseeable on-site and off-site fire events and other emergency incidents (eg. fires involving solar farm infrastructure and equipment, bushfires in the immediate vicinity). The ERP will detail the appropriate risk control measures that would need to be implemented in order to safely mitigate potential risks to the health and safety of firefighters, including electrical hazards. These measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, minimum evacuation zone distances and a safe method of shutting down and isolating the solar farm (either in its entirety or partially, as determined by risk assessment). The ERP would also include any other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the farm. Two copies of the ERP would be stored in a prominent *Emergency Information Cabinet* located in a position directly adjacent to the site's main entry. The operator of the MSF would then make contact with the relevant local emergency management committee (LEMC) and provide a copy of the ERP.
	Operation	Unmanaged grasslands can create a bushfire risk hazard. The performance measure for managing the bushfire risk will be to operate the MSF and maintain the site in such a manner that no grass fire originates from within the MSF site, and/or any approaching bushfire does not intensify as a consequence of entering the MSF site because of excessive fuel loads. The fuel load over the MSF property will be constantly monitored and fuel load reduction measures implemented as required. These measures will be either mechanical slashing or crash grazing (sheep). Procedures for ensuring this outcome and demonstrating active management of the fuel load will be specified in the OEMP. Hazard reduction burning is not proposed.
Access, Transport and Traffic	Munro Road	Whilst the majority of Munro Road has a bitumen sealed width of 7.0m, any non-compliant sections of the road should be upgraded to achieve the following criteria: • Minimum 3.0m wide travel lane in each direction • 1.0m wide gravel shoulder in each direction with 0.5m of the shoulder bitumen sealed. As the road currently has no line markings, the following recommendations also apply:

Impacts:	Phase:	Mitigation Measures:
		• Centreline and edgeline marking • Double barrier lines where minimum sight distances are not achieved.
	Hume Highway/Munro Road Intersection	Based on the turning path assessment, the arrival of B-Doubles turning left from the Hume Highway into Munro Road shall be managed by the operation of an accredited Traffic Controller to allow the heavy vehicle to turn into Munro Road within the bitumen sealed area at the intersection. Appropriate "Trucks Crossing or Entering" warning signage (W5-22) should be installed on the Hume Highway on the northbound approach to the intersection with Munro Road. It is recommended that such signage is to be in place on a temporary basis whilst the construction of the solar farm is being carried out.
	Driver Code of Conduct	• The transport route on the Hume Highway must be identified to all heavy vehicle operators to ensure all deliveries to the site arriving from Sydney must proceed to Goulburn to turn around and then return to Munro Road to turn left from the Highway. • Drivers must not use the crossover from the southbound lanes of the Hume Highway to access Munro Road and crossing the northbound lanes of the Highway. • The scheduling for the arrival, and more importantly, the departure of heavy vehicles from the development site should occur off peak to the PM Peak Hour on the Hume Highway. • Set up an induction process for all drivers to ensure that safety objectives are being met. • Drivers are to obey all speed limits and other restrictions on the transport routes, particularly with regards to residential areas and school zones. • Drivers are to demonstrate courteous behaviour to all road users and are to be aware to take additional care when travelling the transport routes between the hours of 8.00am to 9.15am and 3.00pm to 4.15pm when school buses may be operating and picking up or dropping off children. • Ensure that all loads are covered. • Ensure that loads do not exceed the legal limits. • Ensure that vehicles are maintained and are equipped with all required safety measures. • Implement a public complaints registration system to ensure effective resolution of complaints received and to take disciplinary action if necessary.
	Traffic Management Plan	• Construction timeframe and staging of works, • Measures to consult with other road users to minimise impacts (eg. liaison with school bus operators). • Confirmation of anticipated additional traffic volumes generated by the MSF, • Confirmation of final HV and OD vehicle haulage routes to be used for all delivery vehicles, • A process to review haulage route road conditions prior to the commencement of works,

Impacts:	Phase:	Mitigation Measures:
		• A process to carry out pre and post construction road dilapidation surveys to ensure Munro Road is reinstated to pre-construction conditions, • Requirements for any additional TMP(s) required for a specific work stage/process (e.g. delivery of oversize components), • Qualify and identify any relevant mechanisms for OD vehicle permits and traffic management requirements.
Noise and Vibration	Throughout	• Limiting the type and scale of concurrent activities undertaken close to sensitive receptors where possible; • Using broad-band reversing alarms on all mobile plant and equipment; • Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine; • Operating plant in a quiet and efficient manner; • Reduce throttle setting and turn off equipment when not being used; and • Regularly inspect and maintain equipment to ensure it is in good working order including checking the condition of mufflers. As the design layouts are indicative, it is recommended that once the final layout is approved, noise modelling is undertaken to ensure noise mitigation discussed in this report is still applicable and that compliance with the assessment criteria is achieved.
Waste	Throughout	• A waste management plan would form part of the CEMP and would seek to minimise waste and maximise opportunities for recover and reuse. • solid, liquid and gaseous wastes and litter? • the generation, collection, storage and disposal of waste? • recycling and composting waste? • vermin controls and contaminants such as pathogens and bacteria
Air and Microclimate	Construction and Decommissioning	• A water cart (truck) would be utilised routinely, wetting all access roads and exposed dusty surfaces as appropriate to the conditions of the site. • Stockpiled topsoil and other materials that exhibit significant dust lift off would be wet down routinely and as appropriate. • Stabilising techniques and/or environmentally acceptable dust palliatives will be utilised if the wetting down of surfaces prove to be ineffective.
	Operation	• Any area that was temporarily used during construction would be restored back to original condition or re-vegetated with native plants. • Areas that may not have been hard packed but have been disturbed in some form would be vegetated with seeds native to the area.
Technological Hazards	Throughout	• The site induction shall include information regarding the gas pipeline including location and protections to identify the gas pipeline (i.e., marker tape, etc.). • All personnel working at the site shall be inducted prior to commencing any work. • An exclusion zone shall be provided along the length of the gas pipeline to minimise the potential for unauthorised works occurring within the

Impacts:	Phase:	Mitigation Measures:
		vicinity of the gas pipeline, in conjunction with the Site Induction and relevant site-specific construction management plans. • The transformers spill containment shall be designed according to the requirements of AS 2067:2016 – "Substations and high voltage installations exceeding 1 kV a.c' • Battery equipment shall be located away from external site boundaries (property owner's site boundary) as much as possible to maximise distance to sensitive receptors from downwind dispersion in the event of a fire. • A final hazard analysis shall be conducted once a detailed design has been completed to demonstrate the risk criteria are not exceeded.
Social	Throughout	• It is recommended to continue to implement the targeted, benefits and issues focused **CSEP** for the exhibition period as outlined in **Section 5**. In this, it is important to be aware of the potential for opposition and conflict, and ensure that it delivers: – specific engagement materials and activities to address issues and confirm benefits – development of a Community Benefit Sharing Scheme – continued engagement with Goulburn Mulwaree Council, to create a formal mechanism to discuss and adaptively respond to any emerging community and business concerns. During the pre-construction and construction phases this may be best facilitated through scheduled monthly meetings. This will include consideration of impacts on accommodation supply. • The CSEP will also need to be updated and extended so that it details engagement intentions and actions in the post-exhibition period phases. It will need to include details regarding an accessible complaints process with a timely response protocol. • The Local Industry Participation Plan will focus on maximising the involvement of local people and businesses in the Project. It will include specific focus on people and businesses within the Goulburn Mulwaree LGA, but also include consideration of the wider regional area. It will consider specific opportunities for Aboriginal people and businesses, women, and young people. • The plan should be developed in partnership with the key local economic development stakeholders in the region (e.g., the Industry Capability Network, Training Services NSW, Regional Development Australia, Goulburn TAFE, Goulburn Mulwaree Council, Goulburn Chamber of Commerce & Industry, and Marulan Chamber of Commerce). It can also assess the feasibility to support local schools in science and engineering studies through a partnership. • The plan would outline mechanisms that will be used to ensure that local people and businesses are given full, fair, and reasonable opportunity to participate in the Project. It will also detail how the Proponent will link in at the local level with government and agency support programs that assist people and businesses improve their capability. • The **Local Procurement Policy** will outline the Proponent's commitment to providing local and regional businesses the opportunity to supply goods and services to meet Project needs during all Project phases. This will be developed through consultation with key local

Impacts:	Phase:	Mitigation Measures:
		economic development stakeholders (e.g., the Industry Capability Network, Regional Development Australia, Goulburn Mulwaree Council). It will give Aboriginal businesses full and fair opportunities to supply goods and services. • The **Accommodation and Employment Strategy** will provide further detail on accommodation providers. The strategy will include engagement with accommodation providers to avoid negatively impacting on tourism opportunities and any vulnerable populations who are utilising temporary accommodation. The strategy will also include engagement with Goulburn Mulwaree Council to avoid potential negative impacts on local services and social infrastructure, and manage positive social integration with existing communities. • The **Driver Code of Conduct** will outline provisions for the operation of construction vehicles delivering plant and materials to the solar farm to ensure that safety objectives are met and to reduce negative impacts on the local community and other road users. The Code would include a public complaints registration system to ensure effective resolution of complaints and to take disciplinary action if necessary.
Economic	Throughout	• Prepare AES incorporating ongoing liaison with local industry representatives to ensure the maximisation of the use of local contractors, manufacturing facilities, materials. • Liaison with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services. • Liaison with local tourism industry representatives to manage potential timing conflicts with local events • Terrain Solar or the developer will consult with local employment agencies and training organisations and, where practicable, will consider supporting training and apprenticeships.
Cumulative	Throughout	• Consultation with TfNSW to identify if the construction phase of the proposal will overlap with any TfNSW Hume Highway projects. Traffic management plans would be developed to address potential traffic impacts caused by concurrent projects generating construction traffic. • Cumulative construction noise impacts would be addressed in a Noise Management Plan. Consultation with TfNSW, and other proponents if applicable, would be completed to determine if construction activities may take place in close proximity to adjoining projects. Where possible, noise generating activities would be scheduled for different areas of the proposal site to avoid cumulative construction noise impacts. This would include periods where the nearby airstrip is in regular use. • If there is potential for construction of multiple projects to occur in and around Goulburn/Marulan at the same time, and large workforce numbers are required, consideration would be given to alternative accommodation options such as neighbouring towns.

APPENDIX E

ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT

APPENDIX F

STATEMENT OF HERITAGE IMPACT

APPENDIX G

LAND AND SOIL CAPABILITY ASSESSMENT

APPENDIX H

HYDRAULIC ASSESSMENT

APPENDIX I

LAND USE CONFLICT RISK ASSESSMENT

APPENDIX J

WATER CYCLE MANAGEMENT STUDY

APPENDIX K

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

APPENDIX L

TRAFFIC IMPACT ASSESSMENT

APPENDIX M

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

APPENDIX N

NOISE AND VIBRATION COUSTIC IMPACT ASSESSMENT

APPENDIX O

PRELIMINARY HAZARD ANALYSIS

APPENDIX P

SOCIAL IMPACT SCOPING WORKSHEET

APPENDIX Q

CORRESPONDENCE

Premise