



Scoping Report

Merriwa Solar Farm

15 December 2021



Scoping Report

Merriwa Solar Farm

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Abbreviations

ABN	Australian Business Number
AC	alternating currents
Accent	Accent Environmental Pty Ltd
ACHAR	Aboriginal Cultural Heritage Assessment Report
AEP	Anderson Environment & Planning
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
BAM	Biodiversity Assessment Method
BESS	battery energy storage system
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BSAL	Biophysical Strategic Agricultural Land
BOM	Bureau of Meteorology
CEC	cation exchange capacity
CEMP	Construction Environmental Management Plan
CIC	Critical Industry Cluster
DAWE	Department of Agriculture, Water and the Environment
DC	direct current
DCP	development control plan
DECCW	Department of Environment, Climate Change and Water
°C	degrees Celsius
DPIE	Department of Planning, Industry and Environment
EIS	environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental and Planning Assessment Regulation 2000
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESDA	energy storage development agreement
ESP	exchangeable sodium percentage
GDA	Geocentric Datum of Australia
GWh	gigawatt hour
ha	hectares
HHIA	historic heritage impact assessment
IBRA	Interim Biogeographic Regionalisation of Australia

ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
Infrastructure SEPP	SEPP (Infrastructure) 2007
Km	kilometre
kV	kilovolt
LEP	local environmental plan
LGA	local government area
Liv	Liverpool Range Valleys and Foothills
Lpf	Lees Pinch Foothills
LRET	Large-scale RET
LVIA	landscape and visual impact assessment
m	metre
Maoneng	Maoneng Australia Pty Ltd
mm	millimeter
MNES	Matter of National Environmental Significance
MVA	megavolt ampere
MW	megawatt
MWh	megawatt hour
NPI	Noise Policy for Industry
NSW	New South Wales
O&M	operation and maintenance
OEH	Office of Environment and Heritage
OSOM	oversize and overmass
OzArk	Ozark Environment & Heritage
PCS	power conversion system
PCT	Plant Community Type
PHA	Preliminary Hazard Analysis
PMF	Probable Maximum Flood
PV	photovoltaic
RAPs	Registered Aboriginal Parties
RET	Renewable Energy Target
REZs	Renewable Energy Zones
RU	Rural Use Zone
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

SIA	social impact assessment
SRES	Small-Scale Renewable Energy Scheme
SSD	State Significant Development
TfNSW	Transport for NSW
UHSC	Upper Hunter Shire Council

1 Introduction

1.1 Proponent

Maoneng Australia Pty Ltd (Maoneng) is seeking to develop the Merriwa Solar Farm near Merriwa in New South Wales (NSW). Maoneng is an Australian-founded and owned company that is pioneering Australia's transition to 100% renewable energy through advanced solar, battery and other utility-scale energy projects. The company was founded in 2010 to develop renewable energy assets under the 2009 Australian Renewable Energy Target (RET) scheme.

Headquartered in Sydney, NSW, Maoneng (ABN 16 610 857 746) has a portfolio that includes nearly 300 megawatts (MW)¹ of constructed renewable power, enough to power over 50,000 homes across Australia, and is in the process of developing more than 1200 megawatt hours (MWh) of utility-scale battery projects.

Maoneng has developed, or is in the process of developing, a number of renewable energy assets in NSW, including:

- the 150 MW/300 MWh Armidale battery energy storage system (BESS) project which is currently seeking development consent
- the 200 MW/400 MWh Tamworth BESS project which is currently seeking development consent
- the 100 MW/200 MWh Lismore BESS project which is currently seeking development consent
- the utility-scale 150 MW Sunraysia Solar Farm project, near Balranald in NSW, completed in 2019.

1.2 Project description






1.2.1 Overview

The proposed Merriwa Solar Farm is located approximately 8 km southeast of the township of Merriwa (Figure 1.1). The project comprises a 550 MW utility-scale solar farm project and associated 400 MW/400 MWh BESS.

The solar farm will provide generating capacity to help replace the Liddell coal-fired power station, which is scheduled for closure in 2022-23, and the BESS will provide increased reliability and security to the network during peak periods. The solar project will produce over 1,000,000 MWh of energy annually once commissioned, which is equivalent to powering around 200,000 households.

¹ The installed capacity MW values quoted in this Scoping Report are alternating current (AC) values unless specifically designated as direct current (DC).



-  Project site
-  LGA boundary
-  Study area
-  National Park and State forest
-  Main river



AE1189. Merriwa Solar Farm and BESS

Figure 1.1. Regional context

Created: 6/12/2021

CRS: GDA 94 MGA 56

Page size: A4

Base map: ESRI World Hillshade

Additional data: NSW_LGA polygon, NSW RoadSegment, NSW Hydroline



The project is currently in the feasibility and design stage. Accordingly, the capital investment value of the project is not yet finally determined. However, the capital cost of the project will easily exceed the \$30 million threshold for it to be classified as a State significant development (SSD), as defined under the State Environmental Planning Policy (State and Regional Development) 2011 (see Section 4.2.2).

General information about the project is provided in Table 1.1. The local context for the proposed project site is shown in Figure 1.2, and sensitive receivers and topography are shown in Figure 1.3.

A new high voltage substation will be built to connect the project to the grid via the TransGrid 500 kV transmission line located immediately south of the project site (see Figure 1.2).

1.2.2 Project objectives

The objectives of the project are to construct a utility-scale solar farm, BESS and associated infrastructure that will:

- add an additional 550 MW installed capacity into the grid
- dispatch up to 400 MW of stored energy into the grid
- provide increased reliability and security during times of peak electricity demand
- support the State government objective of increasing renewable energy generation in NSW.

1.2.3 Project site

The project site is located approximately 8 km southeast of Merriwa and 273 km northwest of Sydney, within the Upper Hunter Shire Local Government Area (LGA) (see Figure 1.1).

The site is zoned as RU1 – Primary Production (Figure 1.4) and has been highly disturbed by past land clearing for agriculture. The project site is located across 19 associated lots, as listed in Table 1.1 and shown in Figure 1.3.

Flaggs Road crosses the project site from the north to southeast. Site access is expected to be off Flaggs Road at the northern end of the site, with two adjacent access points, one into the northeastern section of the site and the other into the southwestern section (see Figure 1.3).

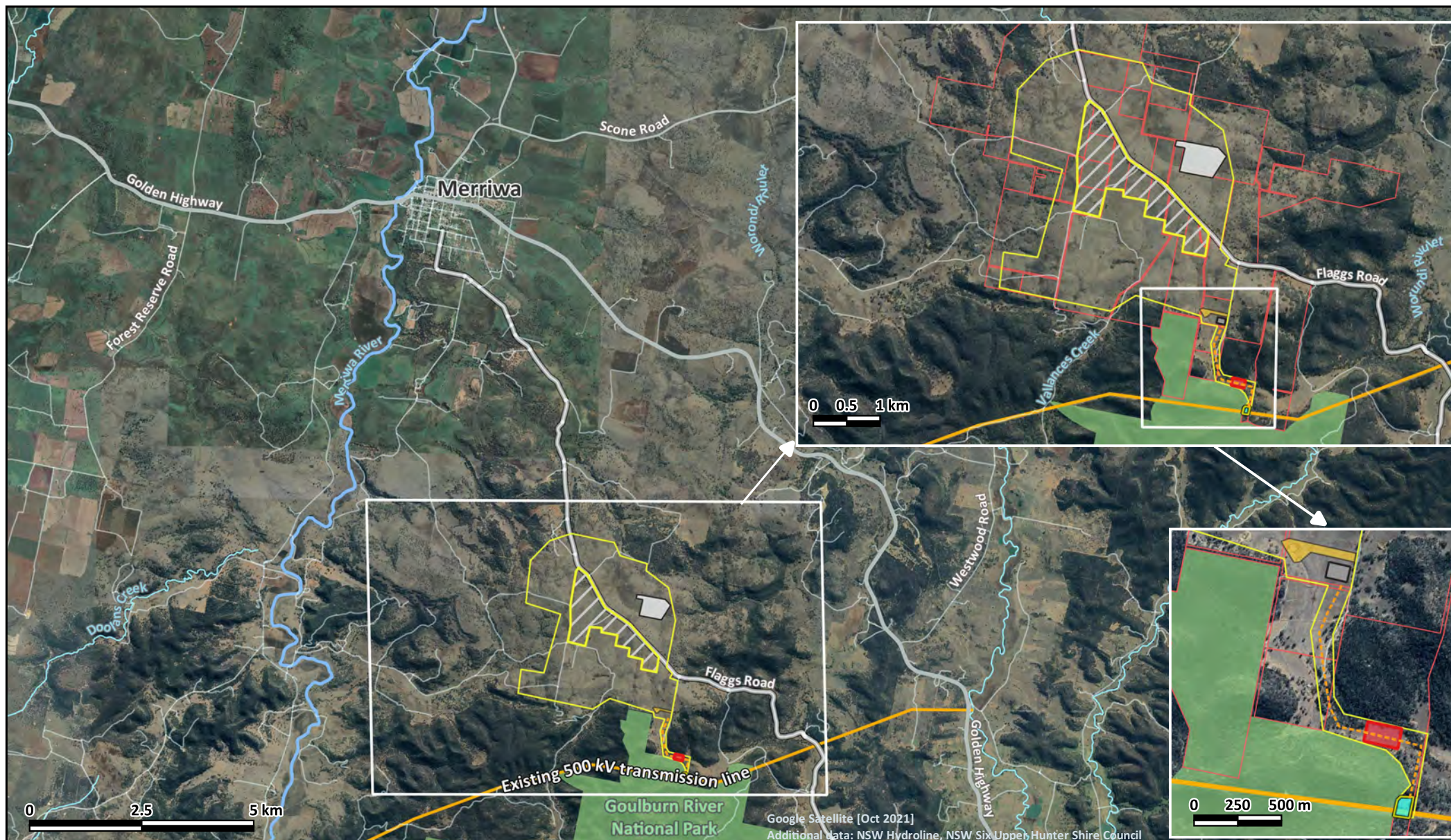
1.2.4 Related development

There have been no development approvals for the project site or immediate vicinity, other than those provided for the establishment of residential residences and associated farm infrastructure.

There are no existing or approved developments that would be incorporated into the project or operated in conjunction with the project under a separate development consent or approval.

Table 1.1 Project details

Name	Merriwa Solar Farm
Address	868-1244 Flaggs Road, Merriwa, NSW
Applicant	Maoneng Group, ABN 16 610 857 746 13/133 George Street, Sydney, 2000
Council	Upper Hunter Shire Council
Titles	39 associated lots, with the project footprint utilising the 19 listed in bold font: LOT 27 DP750967 LOT 77 DP750936 LOT 85 DP750936 LOTS 1-3 DP1101035 LOTS 1-2 DP1101036 LOT 1 DP183122 LOTS 41,65-67,75,84,97 DP750936 LOT 18 DP750967 LOT 2 DP1132979 LOT 69 DP750936 LOTS 81-82 DP750936 LOT 100 DP750936 LOT 128 DP750936 LOT 129 DP750936 LOT 1 DP1101388 LOT 47 DP750942 LOT 53,54, 57-59, 66, 99 DP750942 LOT 129 DP750942 LOT 3 DP 595399 LOTS 29, 30 DP750967 LOTS 9, 28 DP750967
Total indicative area	<ul style="list-style-type: none"> Secured land tenure: approximately 1705 ha Area required for solar farm: up to 780 ha Area required for BESS, on-site substations and grid connection: up to 20 ha
Land use and permissibility	Zone RU1, rural land use, predominantly used for grazing A solar farm is permissible on this land under State Environmental Planning Policy (Infrastructure) 2007
Capacity	550 MW solar farm, 400 MW/400 MWh BESS
Connection	Via an overhead or underground transmission line from a 33 kV/132 kilovolt (kV) on-site substation to a second on-site 132 kV/500 kV connection substation adjacent to the existing 500 kV TransGrid transmission line



- | | | | |
|--|------------------------------|--|----------------------------------|
| | Project site | | Exclusion area - biodiversity |
| | Not included in project site | | Proposed transmission line |
| | Lot boundary | | Existing 500kV transmission line |
| | BESS location | | National Park |
| | Grid connection substation | | Main river |
| | Intermediate substation | | Minor watercourse |
| | Exclusion area - bore access | | |



AE1189. Merriwa Solar Farm and BESS Figure 1.2 Site overview

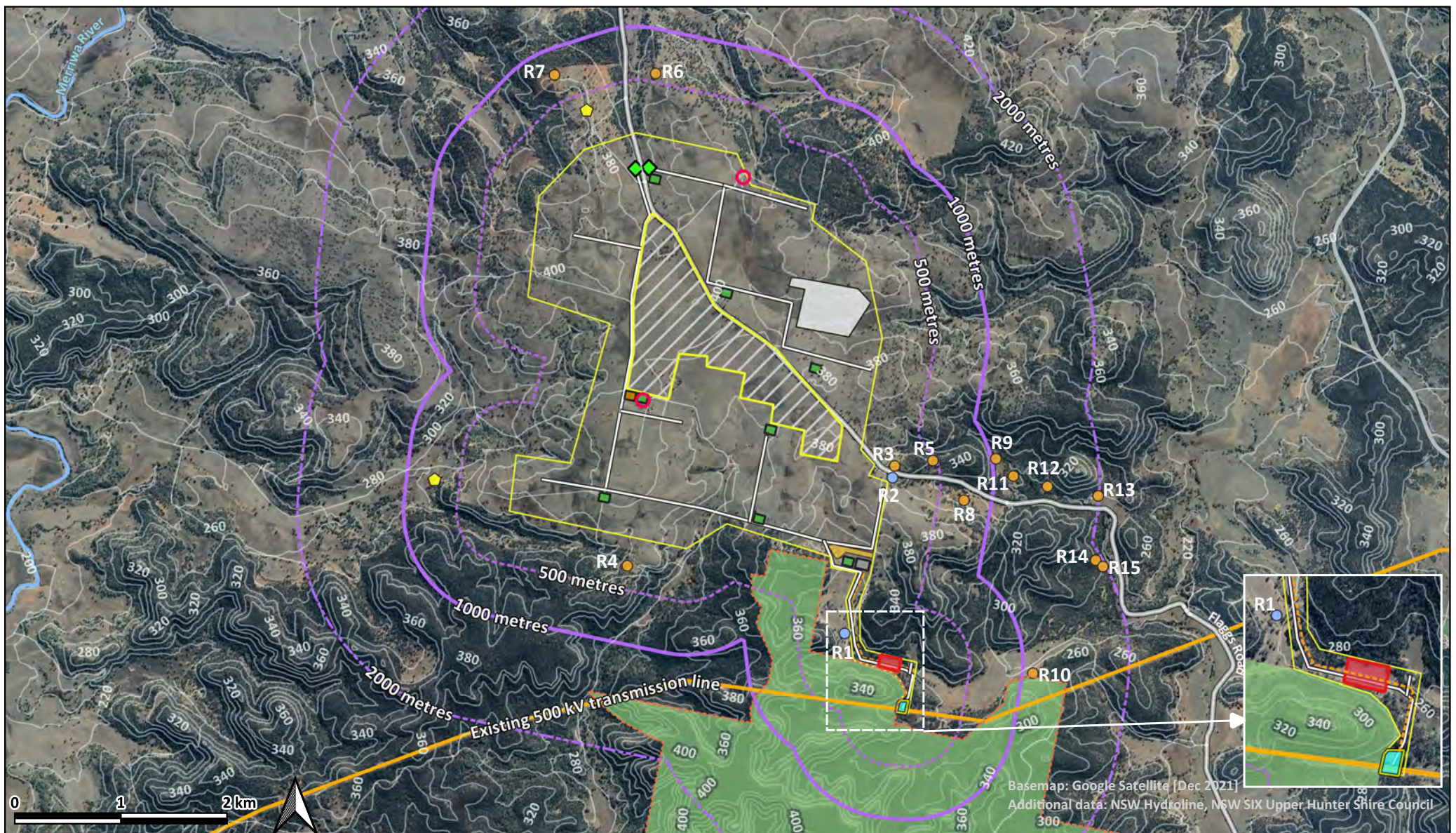
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- | | |
|---------------------------------------|--|
| Project site | Operations and maintenance and car parking |
| Not included in project site | Site road |
| Lot boundary | Site access point |
| BESS location | Associated sensitive receiver |
| Grid connection substation | Non-associated sensitive receiver |
| Intermediate substation | Residence to be owned by Maoneng |
| Exclusion area - bore access | Residence to be removed |
| Exclusion area - biodiversity | National Park |
| Temporary (construction) laydown area | Proposed transmission line |

AE1189. Merriwa Solar Farm and BESS

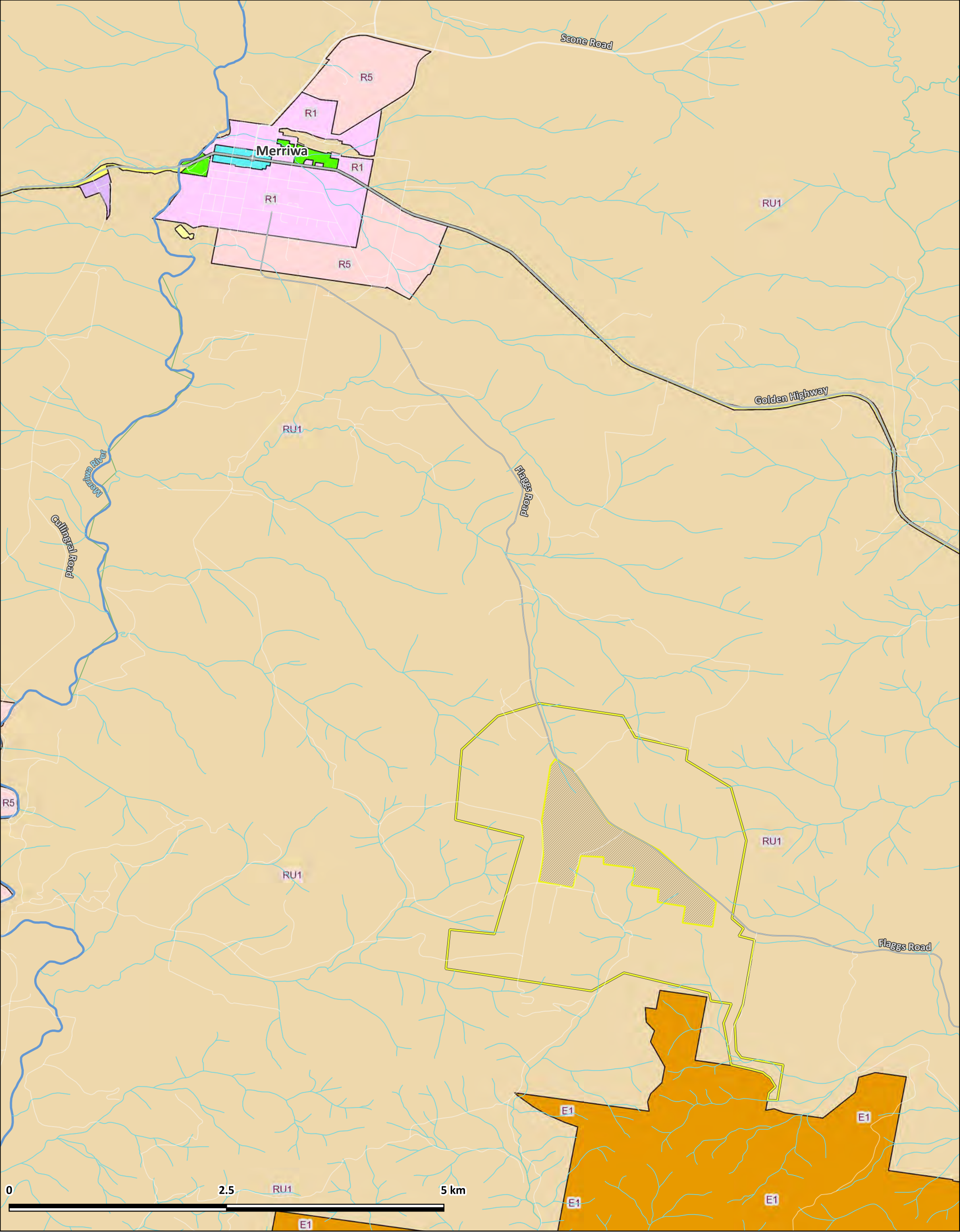
Figure 1.3 Sensitive receivers

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- | | |
|---|--------------------------|
| Project site | RE1 - Public Recreation |
| Excluded from project site | RU1 - Primary Production |
| B2 - Local Centre | SP1 - Special Activities |
| E1 - National Parks and Nature Reserves | SP2 - Infrastructure |
| R1 - General Residential | Main watercourse |
| R5 - Large Lot Residential | Tributary |

AE1189. Merriwa Solar Farm and BESS
Figure 1.4 Land zoning
Date created: 4/11/2021
CRS: GDA 1994 MGA Zone 56
Scale: 1: 30,000 @ A4
Page size: A4
Base map: Esri, NSW EPI - Land Zoning WMS
Additional data: NSW Hydroline, NSW RoadSegment



Related consents that will be required as part of the project development are expected to comprise:

- Council approval for the upgrading of sections of Flaggs Road between Merriwa and the site access points to accommodate construction-related traffic
- the grid connection agreement with TransGrid.

1.3 Project background

The project is being developed primarily in response to agreements signed between Maoneng and AGL Energy in relation to energy generation and storage.

In relation to energy generation, 200 MW of the solar farm's output would be accounted for under a solar offtake agreement between Maoneng and AGL Energy which was signed in 2017. The remaining capacity at Merriwa would be used for merchant output or additional Power Purchase Agreements.

Maoneng and AGL Energy also have an Energy Storage Development Agreement (ESDA) in place. Under this agreement, Maoneng will develop solar generation capacity and large-scale batteries to provide 200 MW/400 MWh of dispatchable capacity to AGL, spread across a number of sites, which will be operational by 2023. The ESDA has been established to help replace the Liddell coal-fired power station (scheduled for closure in 2022-23).

The Merriwa Solar Farm (and BESS), Armidale BESS project, Tamworth BESS project and Lismore BESS project are all being developed by Maoneng to meet the requirements of these agreements.

Maoneng has spent considerable time identifying land options for the proposed project in the local and regional area. The project site was selected due to its:

- location immediately next to the existing 500kV TransGrid transmission line, which was identified by Maoneng as one of the only lines with substantial capacity in the National Electricity Market
- location that is remote from population centres and has few potentially impacted neighbours
- non visually intrusive nature
- location on an extensive area of land that is mostly cleared and exclusively used for grazing
- generally low biodiversity values due to historical disturbance and agricultural activities, with ecologically significant patches of remnant vegetation able to be retained
- topography that is compatible with the technical requirements of the project
- proximity to coal generators that are planned for closure, resulting in a need for replacement generation.

1.4 This report

This Scoping Report has been prepared in accordance with the requirements of the Department of Planning, Industry and Environment (DPIE) for projects identified as SSDs and therefore requiring an Environmental Impact Statement (EIS) to be prepared under Schedule 2 of the Environmental Planning and Assessment Regulation 2000. Specifically, the report has been prepared in accordance with *State significant development guidelines – preparing a scoping report* (DPIE 2021a).

The report will support a request to DPIE from Maoneng for the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

2 Strategic context

2.1 Project justification and evaluation

Since 2001, the Commonwealth Government has mandated the use of energy from renewable resources in electricity generation. In 2009 the Renewable Energy Target (RET) scheme mandated that 20% of Australia's electricity supply was to come from renewable sources by 2020 (NSW Trade and Investment 2014).

In 2011, the RET was split into two parts comprising a large-scale RET (LRET) and a small-scale renewable energy scheme (SRES). The LRET created a financial incentive to establish and expand renewable power stations such as solar farms, wind farms and hydro-electric power stations, and deliver the majority of the 2020 target. Reforms were made to the RET in 2015 with a target for large-scale energy generation of 33,000 Gigawatt hour (GWh) by 2020 (i.e. 23.5% of Australia's electricity supply was to come from renewable sources by 2020). The annual target will remain at 33,000 GWh until the scheme ends in 2030. The LRET scheme sits within the broader context of Australia's need to reduce greenhouse gas emissions to meet its commitments under the 1997 Kyoto Protocol and the Paris Agreement.

The SRES provides an incentive for communities, including households and small businesses, to install eligible small-scale renewable energy systems including solar water heaters, photovoltaic (PV) systems, and small-scale wind systems (DoEE 2018).

At a state level, the NSW Government's Net Zero Plan Stage 1: 2020-2030 (DPIE 2020a) aims to enhance the prosperity and quality of life of the people of NSW, while helping the state to deliver a 35% cut in emissions by 2030 compared to 2005 levels. A component of the plan is to develop three Renewable Energy Zones (REZs) which are intended to play a critical role in replacing retiring generators in NSW over the next two decades and bringing up to 17,700 MW of cheaper, renewable power into the grid.

Electricity generation is a major contributor to Australia's greenhouse gas emissions and renewable sources such as solar farms assist in decarbonising emissions in this sector as traditional fossil fuel-based generators reach end of life. The proposed solar farm is close to a number of coal-fired generators in the region that are planned for closure, such as the Liddell power station.

As coal-fired energy generation decreases, there is a need to replace the lost generating capacity with alternative power sources, such as solar. In addition, due to the intermittent nature of renewable energy sources such as solar and wind, the development of energy storage systems is becoming an increasingly important component of the transition from fossil fuels to renewables.

The construction of large-scale BESSs such as Maoneng is proposing as part of the Merriwa Solar Farm is a relatively recent development but has quickly become a key focus of the renewables industry. In early 2020, to facilitate such developments in NSW, the State government passed the State Environmental Planning Policy (Infrastructure) Amendment (Energy Storage Technology) 2020 under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposed development of the Merriwa Solar Farm is therefore consistent with current national and state-level goals and targets for renewable energy generation.

Other project benefits are expected to include (DoI 2016):

- employment opportunities during construction, including engagement of local contractors and materials and service providers
- long-term local employment opportunities over the life of the project
- contributions to local infrastructure improvements
- education and training of contractors and local residents
- rent received by landowners.

The proposed project also supports a number of the objectives of the EP&A Act (see Section 4.1).

At a regional level, the proposed Merriwa Solar Farm project is consistent with the aims of the Upper Hunter Local Environment Plan (LEP) 2013 and Hunter Regional Plan 2036 (see Section 2.2, below).

2.2 Land use planning

The planning context for the project at a regional and local level is primarily set out in the Upper Hunter Local Environmental Plan (LEP) 2013, and the Hunter Regional Plan 2036 (DPIE 2016). The project is not linked to any existing planning process that has addressed the environmental impacts relevant to the project.

2.2.1 Upper Hunter LEP 2013

The proposed project site is located within the Upper Hunter Shire Council boundaries and will therefore be subject to the relevant provisions of the Upper Hunter LEP 2013.

AIMS OF UPPER HUNTER LEP

The Upper Hunter LEP aims to make local environmental planning provisions for land in the Upper Hunter in accordance with the relevant standard environmental planning instrument under Section 3.20 of the EP&A Act.

The particular aims of the plan are to:

- protect and promote the use and development of land for arts and cultural activity, including music and other performance arts
- encourage the proper management, development and conservation of natural and human-made resources in the Upper Hunter by protecting, enhancing and conserving the following:
 - important agricultural resources
 - timber, minerals, soil, water and other natural resources
 - the environmental, scenic and cultural heritage of the Upper Hunter

- protect and conserve:
 - soil stability by controlling development in accordance with land capability
 - remnant native vegetation
 - water resources, water quality and wetland areas, natural flow patterns and their catchments and buffer areas.
- establish a pattern of broad development zones as a means of:
 - separating incompatible uses
 - minimising the cost and environmental impact of a development
 - maximising efficiency in the provision of utility, transport, retail and other services.
- manage the urban areas of the Upper Hunter by strengthening retail centres and employment opportunities, promoting appropriate tourism development, guiding affordable urban form and providing for the protection of heritage items and precincts
- promote ecologically sustainable urban and rural development and control the development of flood liable land
- secure a future for agriculture by expanding the Upper Hunter's economic base and minimising the loss or fragmentation of productive agricultural land
- protect, enhance and provide for biological diversity, including native threatened species, populations and ecological communities, by long-term management and by identifying and protecting habitat corridors and links throughout the Upper Hunter.

The project is consistent with the aims of the plan, particularly in relation to protecting, enhancing or conserving natural resources (by facilitating the use of renewable energy), strengthening retail centres and employment opportunities, promoting ecologically sustainable development, and expanding the Upper Hunter's economic base.

It is anticipated that, by adopting the principles of impact avoidance and minimisation during project construction and operation and implementing effective decommissioning and rehabilitation at the end of project life, the project will also be broadly consistent with the other planning, agricultural, environmental and social aims of the LEP.

LAND ZONING

The project site is located on land zoned RU1 Primary Production. The objectives of the RU1 zone as set out in the LEP and of relevance to the project are to:

- encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- encourage diversity in primary industry enterprises and systems appropriate for the area
- minimise the fragmentation and alienation of resource lands
- minimise conflict between land uses within this zone and land uses within adjoining zones
- protect the agricultural value of rural land
- maintain the rural landscape character of the land in the long term

- ensure that development does not unreasonably increase demand for public services or public facilities.

Although not a primary industry project and a project that requires Council consent, the proposed Merriwa Solar Farm is not in direct conflict with land uses within the zone and land uses within adjoining zones. The use of the land for a solar farm is consistent with the existing use of adjacent land by the TransGrid 500 kV transmission line.

In addition, it is anticipated that the site will be able to be decommissioned and rehabilitated to return the land to its existing use at the end of its operational life. The project is therefore a sustainable use of the land that does not preclude future primary production.

The implications for project permissibility of the RU1 zoning are discussed in Section 4.3.

2.2.2 Upper Hunter Land Use Strategy 2017

The Upper Hunter Land Use Strategy (UHSC 2017) aims to provide clear direction for decisions taken by Council and NSW Government agencies relating to the future use of land within the Upper Hunter LGA to 2031. It is intended to guide the preparation of comprehensive LEP planning controls (providing regulatory land use controls). It also establishes a policy framework to facilitate opportunities as they emerge in the future.

The Strategy considers the objects of the Environmental Planning and Assessment Act 1979 in identifying proposed actions to implement the vision. This legislation provides the legal framework for the preparation of LEPs.

The community and Council vision in the strategy is *“quality rural lifestyle – in a vibrant, caring and sustainable community”*.

The strategy sets out the following land use principles of particular relevance to the project in support of the vision:

- prioritise the protection of lands and natural resources that are important to local agricultural pursuits
- support urban growth in towns and villages with existing capacity or demonstrated ability to provide suitable infrastructure
- consolidate housing, jobs and services in all established towns and villages.

The project is not inconsistent with the first principle as it will protect the land that it occupies and return it in a condition suitable for agricultural pursuits at the end of project life. The project, if planned and implemented effectively as proposed, will support urban growth and contribute to the consolidation of jobs and services.

The strategy also sets out the following operative principles of particular relevance to the project in support of the vision:

- provide appropriate opportunities for public involvement in the planning process
- adequately assess the environmental impacts of development.

The EIS process will facilitate the attainment of both these principles in relation to the project.

2.2.3 Upper Hunter Development Control Plan 2015

The Upper Hunter Development Control Plan (DCP) 2015 (UHSC 2015) provides a detailed development assessment framework for the Upper Hunter community and applies to all development that may only be carried out with consent under Part 4 of the EP&A Act 1979.

When determining a development application, the Council (or other relevant consent authority) will take into consideration the extent to which any applicable objectives or development outcomes specified by this DCP will be satisfied or achieved by the design, construction or operation of the proposal.

Part 3 of the DCP specifies outcomes, design guidelines and other requirements for the subdivision of land in both urban and rural areas and will be relevant to any Lot subdivision proposed as part of the project.

Part 7 of the DCP specifies outcomes, design guidelines and other requirements relating to development in rural areas, including on land zoned RU1 Primary Production. The compatibility of the project with the objectives of Part 7 will need to be considered in the EIS.

Other relevant sections of the DCP include:

- Part 9: Heritage conservation – matters that apply to heritage items, heritage conservation areas, and development that may affect Aboriginal cultural heritage.
- Part 10: Natural hazards – matters that apply to development likely to be affected by natural hazards, including flood risk, bushfire risk and geotechnical hazard.
- Part 11: Environment protection – matters that need to be considered to ensure adequate protection of the environment.
- Part 12: Specific infrastructure issues – including access and car parking.

2.2.4 Hunter Regional Plan 2036

The proposed Merriwa Solar Farm falls within the Hunter Region of NSW. DPIE has prepared the Hunter Regional Plan 2036 which provides a 20-year blueprint for the future of the region (DPIE 2016).

The plan sets out the NSW Government's vision for the Hunter Region, which is to be a leading regional economy in Australia, with thriving communities and a biodiversity-rich natural environment.

The Government has set four goals for the region to achieve this vision:

- a strong and dynamic regional economy
- a healthy environment with pristine waterways
- strong infrastructure and transport networks for a connected future
- attractive and thriving communities.

The development of the Merriwa Solar Farm is consistent with these objectives, particularly the development of a strong and dynamic regional economy, and strong infrastructure and transport networks.

2.3 Key features of the site

The project site is in the Upper Hunter Shire LGA within the Brigalow Belt South bioregion. Located within the eastern subhumid region of Australia, this bioregion is a subhumid climate, with no dry season and a hot summer; however, temperatures vary in relation to elevation (OEI 2003). The Bureau of Meteorology (BOM) (2021) climate records available from the nearest climate station (24 km from the project site) at Merriwa Roscommon (station 061287) since 1969 show the following:

- Mean monthly maximum temperatures range from a high of 31.7°C in January to a low of 16.2°C in July. Mean monthly minimum temperatures range from a high of 16.9°C in January to a low of 2.2°C in July.
- Mean annual rainfall is 607.2 mm. Rainfall is generally highest over summer with a maximum mean monthly rainfall of 77.2 mm in January, and lowest in winter with a minimum mean monthly rainfall of 32.3 mm in August. The mean annual number of days of rain is 62.

The project site consists of gently to moderately undulating slopes ranging from open drainage lines in the southeast portion at approximately 250 m Australian height datum (AHD) to more elevated broad crests in the northeast and northwest areas at approximately 410 m AHD (see Figure 1.3). The site drains north, south, east and west away from the central elevated plateau, but the main drainage line is Vallances Creek, an ephemeral waterway (within the site) that flows south, eventually reaching the Goulburn River approximately 13 km to the south.

Agricultural production and agricultural industries are a major employer for Merriwa and surrounding rural communities, with broadacre grain production and beef cattle being the dominant commodities (Minesoils 2021). Regional mapping by the NSW Government indicates that the project site is dominated by soils with high fertility and that a large proportion of the project site (approximately 75%) is classified as biophysical strategic agricultural land (BSAL).

The project site has been highly disturbed by past land clearing for agriculture and is now dominated by exotic pasture with isolated areas of native vegetation, particularly on some hill crests and drainage lines. Cattle grazing is the primary land use.

Although the project site is generally highly disturbed, some areas of high biodiversity value vegetation are present and several threatened species may forage or reside in areas on the site, including reptile, bird and bat species (see Section 6.2).

The Goulburn River National Park (see Figure 1.2) is located immediately south of the project site and stretches along 90 km of the Goulburn River. The National Park provides recreational opportunities including swimming, fishing, hiking and camping (NPWS 2021). The site is located away from the main camping areas and the Goulburn River.

Aboriginal sites in the region occur mainly next to watercourses and generally on elevated terraces or banks. Stone artefact sites are the most commonly recorded site types in the area. Two sites, both artefact scatters, have previously been recorded within the study area (see Section 6.3).

The nearest town to the project site is Merriwa, with a population in 2016 of 1,761 (ABS 2017). Five residences (two associated with the project and three non-associated) are located within

500 m of the project site and five residences (all non-associated) are located between 500 m and 1 km from the project site (see Figure 1.3). Two existing residences are located within the project footprint and will be demolished or relocated to make way for the solar panels. Two additional residences fall within property that will be owned by Maoneng, but outside the project footprint. A number of residences along Flaggs Road in the vicinity of the project site are holiday homes owned by people with permanent residences elsewhere.

Flaggs Road, which crosses the project site, is classified as a local road. The nearest state road is the Golden Highway which is located east of the site and then passes through Merriwa to the northwest (see Figure 1.2). Flaggs Road runs southeast from Merriwa, terminating at the Golden Highway approximately 8 km southeast of the site.

2.4 Cumulative impacts

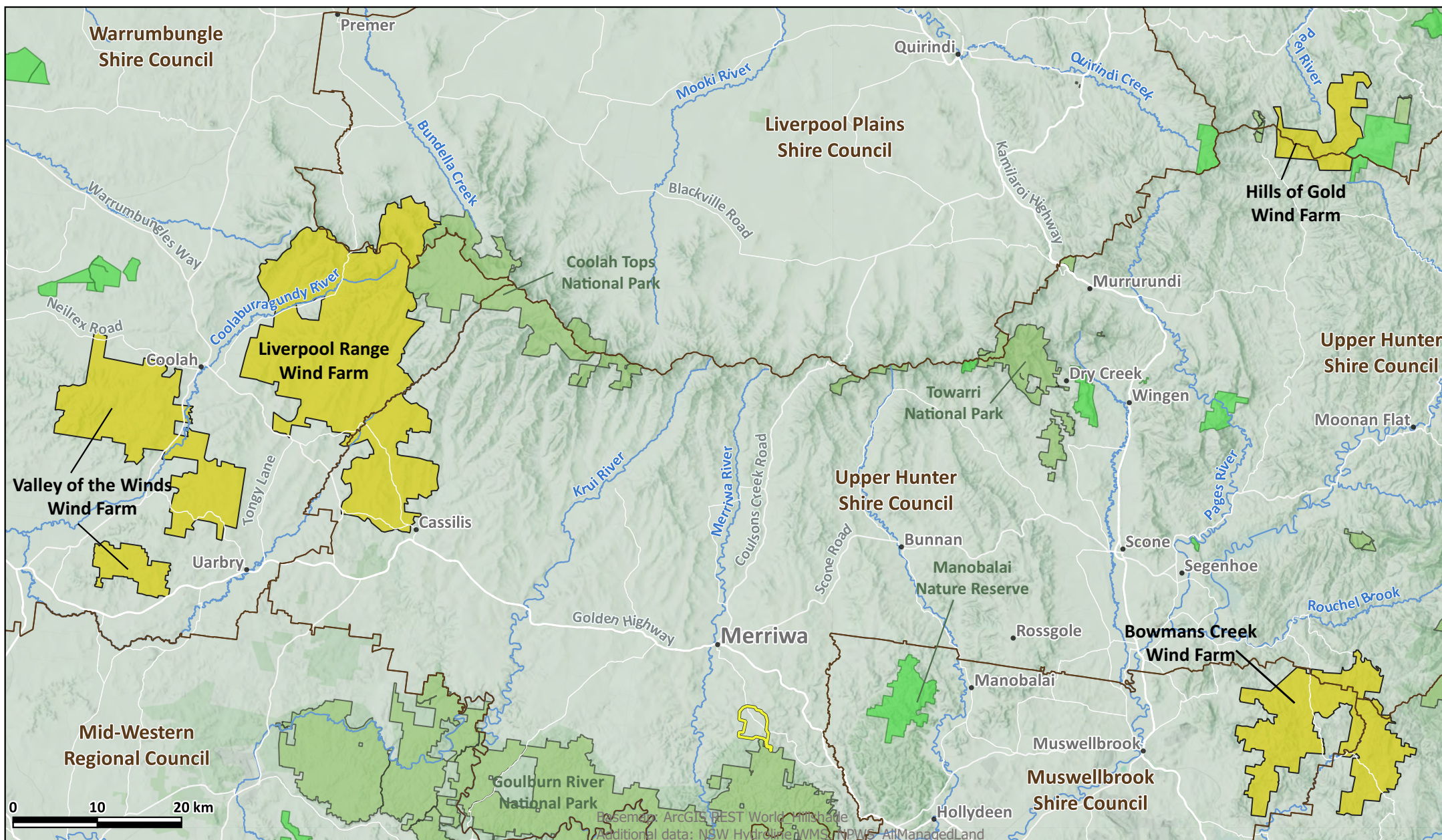
The EIS will need to assess the cumulative impacts of the proposed Merriwa Solar Farm project and existing, approved or proposed developments in the region.

There are currently four approved or proposed energy-related SSDs in the Upper Hunter Shire LGA listed on the DPIE Major Projects website in addition to the Merriwa Solar Farm. These are listed in Table 2.1 and shown in Figure 2.1. None of these SSDs are located within 30 km of the project site.

The cumulative impact assessment will consider cumulative impacts on aspects such as land use, traffic and social environment. The assessment will include a screening process to determine which aspects require more detailed consideration.

Table 2.1 Other energy-related SSDs in the Upper Hunter Shire LGA

Name	Number	Status	Distance from Merriwa Solar Farm
Bowmans Creek Farm	SSD-10315	Response to Submissions	33 km northwest
Liverpool Range Wind Farm	SSD-6696	Determination	50 km northwest
Valley of the Winds Wind Farm	SSD-10461	Prepare EIS	80 km northwest
Hills of Gold Wind Farm	SSD-9679	Response to Submissions	110 km northeast



- | | |
|-----------------------------|-------------------------|
| Project location | National Park |
| Proposed energy-related SSD | Nature Reserve |
| LGA boundary | State Conservation Area |



AE1189. Merriwa SF and BESS
Figure 2.1 Energy-related SSDs in the Upper Hunter Shire LGA

Created 4/11/2021

CRS: GDA 1994 MGA Zone 56

Scale: 1:600,000 @ A4

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2.5 Agreements with other parties

Maoneng has not entered into any agreements with other parties to mitigate or offset the impacts of the project such as voluntary planning agreements or benefit-sharing schemes. Maoneng has struck agreements with associated landholders for the use or acquisition of the land within the project site. However, the terms of these landholder agreements are not relevant to the assessment of the project impacts.

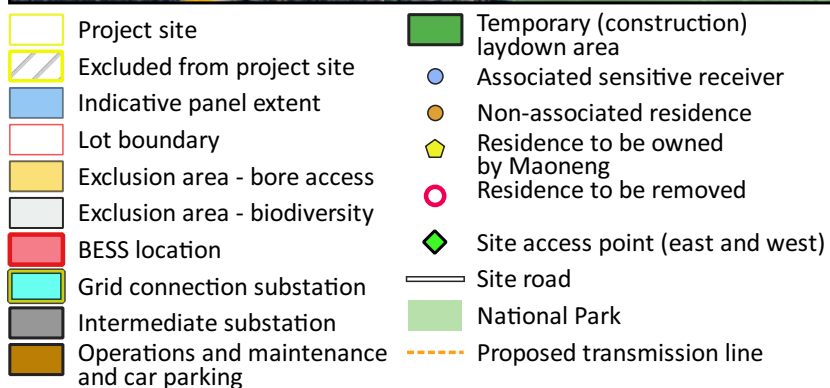
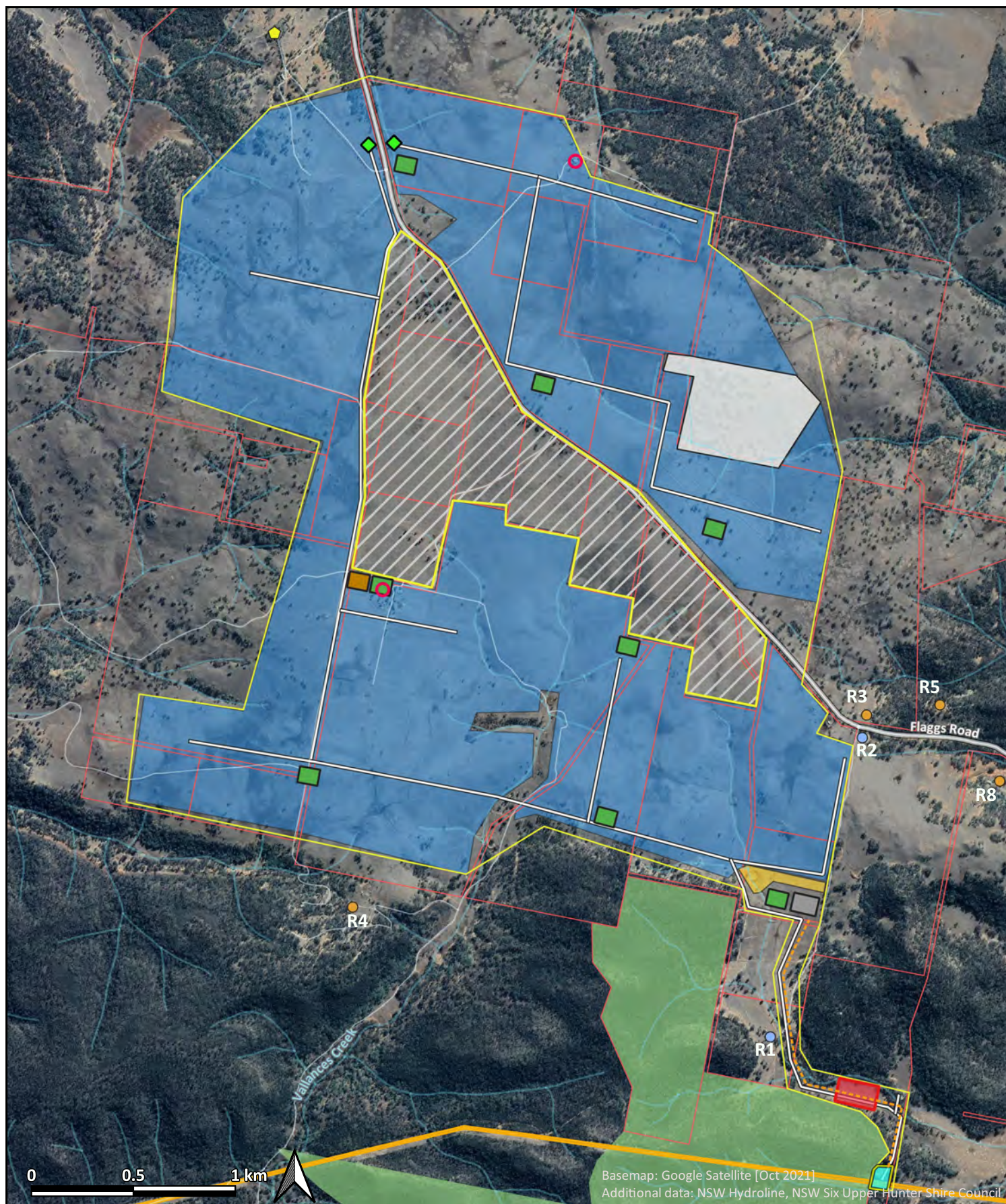
3 Project

3.1 Project area and layout

The Merriwa Solar Farm will have a maximum capacity of approximately 705 MW DC with a nameplate capacity of 550 MW. Key elements of the project will include:

- arrays of single axis tracker PV solar panels mounted on steel frames over most of the site (up to approximately 1,800,000 PV solar panels)
- electrical conduits and transformers
- 400 MW/400 MWh BESS consisting of approximately 40 skid-mounted battery modules each incorporating two battery units, two power conversion system (PCS) units (3.5 megavolt ampere (MVA)), two 2.4 MVA transformers and a 33 kV ring main unit
- an on-site substation accepting 33 kV power from the solar arrays and stepping it up to 132 kV for transmission to a second high voltage substation built adjacent to the TransGrid 500 kV transmission line for direct connection to the grid
- electrical transmission infrastructure and new overhead or underground transmission line to connect the solar arrays to the existing 500 kV transmission line, via the high voltage substation
- site office, operations and maintenance building, ablution block, parking access tracks, material laydown area (for use during construction), parking area, waste storage area and perimeter fencing
- site access to the northeastern and southwestern sections of the project site, during construction and operations, off Flaggs Road at the northern end of the site (at 868 and 929 Flaggs Road)
- internal access roads (between 4 m and 6 m wide, comprising a gravel surface) to access all other areas of the site
- upgrade to existing public roads (Flaggs Road between Merriwa and the project site) for site access points and to accommodate construction-related traffic (which will be subject to a separate consent process after the development consent for the solar farm has been obtained)
- on-site vegetative screening to soften views of the infrastructure from sensitive receivers.

An indicative site layout is presented in Figure 3.1 showing the maximum extent of the solar panels, a potential BESS location, the proposed location of the high voltage substation, and the proposed route of the new transmission line connecting the solar farm to the existing 500 kV transmission line via the high voltage substation.



AE1189. Merriwa Solar Farm and BESS

Figure 3.1 Indicative site layout

Created: 7/12/2021

CRS: GDA 1994 MGA Zone 56

Scale: 1:25,000 @ A4

Page size A4



Two key areas within the project site have been excluded from infrastructure development:

- a biodiversity exclusion zone in the northwest of the site (see Section 6.2)
- an exclusion zone in the southeast of the site to allow ongoing landholder access to a bore.

3.2 Project activities and timing

3.2.1 Construction

STAGES

Project construction will last for approximately 18 months (six quarters). Construction will involve the following activities (Figure 3.2):

- Stage 1: Site establishment, including demolition of existing farm facilities, earthworks and construction of drainage requirements, construction of concrete hardstands, civil works – approximately 6 months
- Stage 2: Delivery of solar farm infrastructure – approximately 8 months
- Stage 3: Installation of solar farm infrastructure (panels, containerised units, transformer, switchroom, control room and O&M) and electrical works – approximately 8 months
- Stage 4: Commissioning and joint testing – approximately 6 months.

Stage	Quarter																	
	1			2			3			4			5			6		
1. Site establishment																		
2. Delivery of infrastructure																		
3. Installation of structure																		
4. Commissioning and joint testing																		

Figure 3.2 Construction schedule

TRAFFIC

A breakdown of estimated vehicle trips (return trips) during peak construction is provided in Table 3.1. Peak construction occurs during the eight-month concurrent Stage 2 and Stage 3 construction phases.

Average traffic during the peak construction period is estimated to number 82 vehicles per day and 6.8 vehicles per hour. Construction traffic is expected to peak at approximately 153 vehicles per day and 12.7 vehicles per hour. Up to five daily return trips of B-double (26 m) and/or oversize and overmass (OSOM) (longest length not yet known) vehicles are expected during the peak construction period.

Table 3.1 Estimated return vehicle trips during peak construction

Vehicle category	Average return vehicle trips		Peak return vehicle trips	
	Per day	Per hour	Per day	Per hour
Light vehicle (car/4WD)	50	4.2	100	8.4
Shuttle bus	10	0.8	20	1.6
MRV/HRV ² (8-13 m long rigid vehicle)	10	0.8	20	1.6
AV ³ 19 m long semi-trailer	5	0.4	5	0.4
B-double (and OSOM)	5	0.4	5	0.4
Concrete agitator	2	0.2	3	0.3
Total	82	6.8	153	12.7

Operational traffic will be minor – a maximum of 2 return vehicle trips per day, and an average of 10 return vehicle trips per week.

EMPLOYMENT

Up to 500 jobs are expected to be created during construction. The expected average workforce during the construction period is as follows:

- Stage 1 – up to 150
- Stage 2 – up to 500
- Stage 3 – up to 500
- Stage 4 – up to 100, on- and off-site

During the concurrent Stage 2 and Stage 3 construction phases, up to 500 workers may be on site at the same time.

Construction activities will occur during standard hours for construction works (i.e. Monday to Friday 7 am to 6 pm, and Saturday 8 am to 1 pm). Any construction or commissioning activities outside of these standard working hours would require approval from relevant authorities. Any affected local residences would be informed of the timing and duration of the proposed activities, prior to the commencement of any works.

3.2.2 Operation

The expected operational life of the infrastructure is 35 years, with upgrading works after 15 years. The operational hours will be 24 hours, 7 days a week. Operation and maintenance staff will access the site as required during operations (expected to be 20 full-time equivalent jobs).

² MRV/HRV = medium rigid vehicle/heavy rigid vehicle. AV = autonomous vehicle

3.2.3 Decommissioning

At the end of the operational life of the project, all above-ground infrastructure will be removed, and the land rehabilitated to a safe, stable and non-polluting state. It is anticipated that the pre-existing land use will be re-established at the time of decommissioning, unless otherwise agreed with the landowner and/or regulatory authorities.

3.3 Alternatives considered

3.3.1 Site selection

Maoneng undertakes a constraints and opportunities analysis process to identify potential development sites for its projects. For the Merriwa Solar Farm, this process has included consideration of factors such as:

- access to existing transmission assets to accept energy from the solar farm
- access to, and capacity of, existing energy grids
- proximity to coal generators that are planned for closure and need replacement generation/storage capacity (in this case the Liddell power station)
- potential for land acquisition
- land suitability (e.g. topography, existing land use, flood risk, zoning)
- need to minimise environmental and social impacts (e.g. avoiding sensitive environments, areas of cultural heritage value, population centres).

The proposed location for the Merriwa Solar Farm emerged as a highly prospective site for the development of a solar farm, for the reasons outlined in Section 1.3, and a decision was made by Maoneng to initiate pre-development investigations and activities.

3.3.2 Project design

The design of a solar farm takes into consideration factors such as the availability and extent of land for housing solar arrays, the consequent potential capacity for generation, the capacity of the grid to receive the generated electricity, the capital and operational costs of the project, and anticipated market conditions (including in the case of the Merriwa Solar Farm, the agreement with AGL).

These design considerations have led to the proposed selection of single axis tracker PV solar panels mounted on steel frames, which are an efficient and cost-effective option for a large-scale solar farm and are considered to have greater reliability than many other current solar technologies such as concentrated solar power systems.

The inclusion of a BESS facility within the solar farm project provides the ability to store power during lower demand periods for feeding into the grid during higher demand periods (including power fed in and out of the BESS from the grid itself). The BESS provides increased reliability and security to the network during peak periods.

The sizing of the BESS will be driven by factors such as the generating capacity of the solar farm, the capital and operational costs, and the need for and economics of the grid stability

offered by a BESS. The BESS technology (e.g. containerised or modular) and manufacturer has not yet been finally chosen and will be the outcome of a post-approvals design and tendering process (as will the choice of PV panel supplier).

3.3.3 Project configuration

The design and configuration of the project will reflect the findings of EIS studies and investigations and will follow the hierarchy of impact avoidance, minimisation and mitigation. This will include consideration of environmental and social factors such as the need to:

- identify and operate within environmental constraints (such as avoiding areas within the project site that may be of conservation or cultural significance)
- minimise disruption to local landholders
- minimise amenity issues
- consider the expectations and concerns of the local community and Upper Hunter Shire Council.

These considerations will be balanced against the need to achieve design, construction and operational efficiencies to reduce projects costs and maximise solar farm and BESS efficiency.

Maoneng has already made a number of decisions regarding the layout of the site in response to environmental and other considerations. These include (see Figure 3.1):

- avoiding native vegetation clearance by:
 - restricting the extent of the disturbance footprint almost entirely to land that has been cleared for agricultural activities – for example, avoiding the forest northeast, northwest and south of the project site within the secured lots
 - excluding a woodland area within the northwest section of the site, and avoiding potential ‘island’ effects by leaving the land between the woodland and the project site boundary undisturbed
- minimising the need for vegetation clearance by the proposed routing of the transmission line connecting the solar farm to the BESS, high voltage substation and grid (while maintaining an agreed distance from the associated landholder R1 – see Figure 1.3)
- excluding an area in the south of the project site to allow ongoing landholder access to groundwater bores.

3.3.4 Restrictions or covenants

No known restrictions or covenants apply to the proposed use of the project site.

4 Statutory context

4.1 Legislation and planning overview

Key legislation, regulations and planning instruments of potential relevance to the development of the proposed Merriwa Solar Farm are listed in Table 4.1, along with an assessment of their relevance to the project. Further detail is provided in Appendix A.

Table 4.1 Legislation, regulations and planning instruments

Category	Statutory reference	Relevance to project
Commonwealth legislation	<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Relevant
	<i>Native Title Act 1993</i>	Relevant
State legislation and regulations	EP&A Act 1979 and Environmental Planning and Assessment Regulation 2000	Relevant
	<i>Roads Act 1993</i>	Relevant
	<i>Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017</i>	Relevant
	<i>Biosecurity Act 2015</i>	Relevant
	<i>National Parks and Wildlife Act 1974 and National Parks and Wildlife Regulation 2009</i>	Relevant
	<i>Heritage Act 1977</i>	Relevant
	<i>Water Management Act 2000</i>	Unlikely to be relevant
	<i>Crown Lands Management Act 2016</i>	Not relevant
	<i>Protection of the Environment Operations Act 1997</i>	Not relevant
	<i>Rural Fires Act 1997</i>	Relevant
	<i>Local Land Services Act 2013</i>	Relevant
Environmental planning instruments	State Environmental Planning Policy (State and Regional Development) 2011	Relevant
	State Environmental Planning Policy (Infrastructure) 2007	Relevant
	State Environment Planning Policy No. 33 (Hazardous and Offensive Development)	Relevant
	State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55)	Relevant

Category	Statutory reference	Relevance to project
	State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44)	Unlikely to be relevant
	Upper Hunter LEP 2013	Relevant
	Upper Hunter Land Use Strategy 2017	Relevant
Development control plans	Upper Hunter Development Control Plan 2015	Relevant
Regional strategies	Hunter Regional Plan 2036	Relevant

4.2 Power to grant consent

4.2.1 Classification of project as State Significant Development

The State Environmental Planning Policy (SEPP) (State and Regional Development) 2011 aims to identify development that is of State significance and confers functions on joint regional planning panels to determine development applications.

Under Part 2, Section 8 of the SEPP, a development is declared to be an SSD for the purposes of the EP&A Act if (among other things) the development is specified in Schedule 1 or 2 of the SEPP.

Under Schedule 1, Section 20 of the SEPP, the following is considered an SSD:

Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:

(a) has a capital investment value of more than \$30 million, or

(b) has a capital investment value of more than \$10 million and is located in an environmentally sensitive area of State significance.

The SEPP (Infrastructure) 2007 (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across the State. Division 4 of the Infrastructure SEPP defines ‘electricity generating works’ as having the same meaning as it has in the Standard Instrument.

Under the Standard Instrument:

electricity generating works means a building or place used for the purpose of—

(a) making or generating electricity, or

(b) electricity storage.

The Merriwa Solar Farm (and associated BESS) is classified as an SSD as it has a capital investment value of more than \$30 million and will be used for the purposes of both generating and storing electricity.

4.2.2 Consent for a State Significant Development

The EP&A Act, together with the Environmental and Planning Assessment Regulation 2000 (EP&A Regulation) and other regulations and instruments, provides the framework for environmental planning and assessment in NSW and is administered by DPIE.

The consent authority for an SSD is determined under Part 4, Division 4.2, Section 4.5 of the EP&A Act:

*For the purposes of this Act, the consent authority is as follows—
(a) in the case of State significant development—the Independent Planning Commission (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind)*

The Minister is therefore the consent authority for the Merriwa Solar Farm.

Consent for an SSD is granted under Part 4, Division 4.7, Section 4.38 of the EP&A Act:

*(1) The consent authority is to determine a development application in respect of State significant development by—
(a) granting consent to the application with such modifications of the proposed development or on such conditions as the consent authority may determine, or
(b) refusing consent to the application.*

Under Part 4, Division 4.3, Section 4.12 of the EP&A Act:

(8) A development application for State significant development or designated development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations.

Development of the Merriwa Solar Farm will be assessed under Part 4 ‘Development Assessment’ of the EP&A Act, the Minister for Planning and Environment will be the consent authority, and the preparation of an EIS is required to accompany the development application.

4.3 Permissibility

The project site is zoned as RU1 – Primary Production (Figure 1.4). Crown Land is not present within the project site and no Crown Land permits will be required for the project.

The Upper Hunter LEP 2013 does not specify electricity generating works within Zone RU1 land as either a land use permitted without consent, or a land use permitted with consent. Electricity generating works therefore falls under the definition of a prohibited land use.

However, Part 3, Division 4, Section 34(1) of the Infrastructure SEPP states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

Part 1, Section 8 of the Infrastructure SEPP, states that:

(1) ...if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency.

The Merriwa Solar Farm is therefore a permissible development with consent as an SSD under clauses 34(1) and 8(1) of the Infrastructure SEPP.

The Infrastructure SEPP will allow for the development of the Merriwa Solar Farm, with consent, even on land prescribed for rural use.

4.4 Other approvals

4.4.1 EPBC Act approval

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE).

Approval from the Minister for the Environment is required for proposed actions that:

- have a significant impact on a Matter of National Environmental Significance (MNES), which includes 'nationally threatened species and ecological communities'
- actions that (indirectly or directly) have a significant environmental impact on Commonwealth land
- actions carried out by Commonwealth agencies.

Such actions must be referred to DAWE to determine whether the action is a 'controlled action' requiring approval from the Minister. The assessment of the significance of the impact is based on the criteria listed in the DAWE's *Significant Impact Guidelines 1.1* (DoE 2013).

The potential presence of nationally threatened species and ecological communities within the project site has been identified during the preliminary biodiversity survey (see Section 6.2). Accordingly, it is expected that referral of the project under the EPBC Act will be required, which may result in a need for approval from the Minister for the Environment.

The referral would be submitted at the same time to DAWE and NSW DPIE. If the project needs to be assessed under both NSW and Australian Government law, the two agencies would seek to undertake the assessments under the bilateral agreement in place between the Commonwealth of Australia and the State of New South Wales.

An EPBC Act Referral is expected to be required due to the potential presence within the project site of nationally threatened species and ecological communities. This may result in a requirement to obtain Commonwealth approval for the project in addition to State approval.

4.4.2 Consistent approvals

Under Section 138 of the Roads Act, consent from the relevant roads' authority (council or Transport for NSW (TfNSW)) is required for any works or activities in a public reserve, public roadway or footpath (nature strip). Section 138 requires that all activities undertaken within council road reserves be approved by council prior to the activities being undertaken.

It is anticipated that sections of Flaggs Road will require upgrade between Merriwa and the site access points to accommodate construction traffic (see Section 6.5). Flaggs Road is classified as a local road and council consent is expected to be required for any upgrade works. Council has been engaged on the project (see Section 5) and has raised the current condition and possible upgrading of Flaggs Road as a key issue. Maoneng will undertake a traffic impact

assessment and other relevant EIS studies to gain an understanding of the need for and extent of upgrades to Flaggs Road, both in terms of transport route and site access. These reports will be prepared in consultation with Council and the road upgrades will be designed, constructed and maintained to the satisfaction of Council.

Under Part 4, Division 4.7, Section 4.2 of the EP&A Act, consent for any required road upgrades cannot be refused if it is necessary for carrying out the SSD and is to be substantially consistent with the SSD consent.

No other approvals consistent with the SSD consent are anticipated to be required.

The EIS will consider requirements for project-related use of roads and the need for road works during solar farm construction. If required, approval from Council will be sought under Section 138 of the Roads Act.

4.4.3 Additional approvals and permits

Additional approvals that are expected to be required for the Merriwa Solar Farm include:

- relevant permits under the Heavy Vehicle National Law (NSW) for the use of OSOM vehicles on the road network during the construction phase
- construction certificate from Council for the construction of certain structures
- occupation certificate from Council to allow the use of on-site buildings.

If the project were not an SSD, the following approvals may also have been required (see section 4.41 of the EP&A Act):

- an excavation permit under section 139, of the *Heritage Act 1977*
- an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*
- a bush fire safety authority under section 100B of the *Rural Fires Act 1997*
- a water management work approval under section 90 of the *Water Management Act 2000*.

4.5 Pre-conditions to consent

A number of pre-conditions to exercising the power to grant consent for the project have been identified and are listed in Appendix B. These pre-conditions may be relevant to setting the SEARs and include mandatory conditions that must be satisfied before the consent authority may grant consent.

4.6 Mandatory matters for consideration

Matters that are mandatory for the consent authority to consider in deciding whether to grant consent to the development application for the project, and that may be relevant to setting the SEARs, are listed in Appendix B.

5 Engagement

5.1 Community engagement undertaken

Maoneng has identified a range of stakeholder groups and individual stakeholders in the development of the Merriwa Solar Farm. These include regulators who have a decision-making role in project approvals, and groups or individuals who may be directly or indirectly affected by the project. Initial consultation has included formal and informal engagement with the following:

- DPIE – a scoping meeting was held with DPIE in July 2021 to present an overview of the project and discuss potential planning and approvals issues, with subsequent ongoing communication.
- Upper Hunter Shire Council – a meeting was held in May 2021 with the Upper Hunter Shire Council head officers, planners and the mayor, with subsequent ongoing communication.
- TransGrid – initial discussions have been held including a preliminary grid connection enquiry.
- Local Member of State Parliament, Mr David Layzell MP – a letter introducing Maoneng and the project has been sent, and the offer of a briefing has been made.
- Local Member of Federal Parliament, the Hon. Barnaby Joyce MP – a letter introducing Maoneng and the project has been sent, and the offer of a briefing has been made.
- Landholders – a register of potentially impacted neighbours of the project (within 2 km of the project site, including those along Flaggs Road) (see Figure 1.3) has been obtained from Council. Letters have been sent to the 49 neighbours in this vicinity providing an outline of the proposed project and the approvals process, a point of contact for any feedback or questions, and an opportunity to sign up for further information. Maoneng has also called landholders, where phone numbers were available, to discuss the project. Landholders generally expressed positivity and interest in the development and were keen to be kept informed. Some were interested in opportunities to be a part of the project with social and business opportunities. No negative responses to the project have been received to date.
- Wider community – information posts went out to some of the key sources of information for the local community, including the Merriwa Community Portal (online publication) and Merriwa Diary (news publication). These provided an outline of the proposed project and process, and a point of contact for any feedback or questions.

5.2 Key findings of community engagement

The consultation to date has provided stakeholders with opportunities to contribute to the project development process and raise any concerns and has also contributed to identification of potential impacts. Maoneng continues to expand its stakeholder database as consultation proceeds.

Key outcomes in relation to issues raised by stakeholders are shown in Table 5.1.

Table 5.1 Consultation activities and outcomes

Date	Stakeholder	Activity and purpose	Consultation issues raised / outcomes	Consideration of issues raised
January to April 2021	Flaggs Road residents	Exploration of potential solar sites, discussions with residents for both potential acquisition landowners and potential site neighbours	<ul style="list-style-type: none"> state of Flaggs Road and potential upgrades raised by stakeholders as an issue discussions helped provide stakeholders with a general understanding of project relation to transmission line upgrades discussed biodiversity and site topography issues discussed 	<ul style="list-style-type: none"> a preliminary Ecology Report was prepared to inform the site design commitment by Maoneng to ongoing consultation and updates with these residents topographical mapping was produced to inform the site design
February 2021	DPIE	A high-level briefing provided to DPIE of Maoneng's pipeline of potential projects. The prospect of a Merriwa Solar Farm project was raised, and preliminary information shared	<ul style="list-style-type: none"> briefing was noted by DPIE DPIE to await further information in formal Scoping Meeting and Scoping Report 	<ul style="list-style-type: none"> Maoneng further developed project concept issues to be considered in Scoping Report and EIS assessments
May 2021	Upper Hunter Shire Council	A preliminary briefing on the proposed Merriwa Solar Farm project provided to Council Officers	<p>Issues discussed included:</p> <ul style="list-style-type: none"> employment and investment shift to renewables from fossil fuels state of Flaggs Road and potential for upgrade site access project neighbours technology used site impacts – visual and noise 	<ul style="list-style-type: none"> commitment by Maoneng to ongoing engagement with Council provision by Maoneng of project updates and communication Council provided Maoneng with list of residences within 2 km of project for mail-out issues to be considered in Scoping Report and EIS assessments

Date	Stakeholder	Activity and purpose	Consultation issues raised / outcomes	Consideration of issues raised
June to October 2021	TransGrid	Introduction to proposed Merriwa Solar Farm project and process through to formal Preliminary Connection Enquiry	<ul style="list-style-type: none"> project introduction by Maoneng initial discussion of transmission capacity initial discussion of point of connection and line of connection discussion concerning arrangements for connection infrastructure design and ownership 	<ul style="list-style-type: none"> commitment by Maoneng to ongoing engagement and consultation with TransGrid ongoing sharing and feedback of technical information and preliminary designs Connection Enquiry formally lodged by Maoneng with TransGrid
July 2021	DPIE	Project Scoping Meeting	<p>Issues discussed included:</p> <ul style="list-style-type: none"> assessment framework neighbours and visual/ noise impact loss of strategic agricultural land road upgrade potential biodiversity clearing, potential for credits and offsetting engagement 	<ul style="list-style-type: none"> issues raised by DPIE to be considered in Scoping Report and in more detail in the EIS preliminary BSAL assessment to be included in Scoping Report early Traffic Impact Assessment to be undertaken to feed into road condition requirements commitment by Maoneng to ongoing engagement with DPIE
September 2021	Residents within 2 km of the proposed project	A mail-out to 49 residences	<p>Mail-out included:</p> <ul style="list-style-type: none"> project introduction preliminary information Project Manager introduction and details invitation to register for more information and project updates standing invitation for face-to-face meetings and updates 	<ul style="list-style-type: none"> three responses received focus of responses was on opportunities for employment, business and education access to surrounding lots raised as an issue commitment by Maoneng to ongoing engagement and provision of project information a repeat mail-out will be conducted at the release of the Scoping Report and during EIS

Date	Stakeholder	Activity and purpose	Consultation issues raised / outcomes	Consideration of issues raised
October 2021	Public notices in local publications	Adverts in the Merriwa District Diary and Merriwa Portal, reaching approximately 2,000 people in the Merriwa and surrounding areas	Adverts included: <ul style="list-style-type: none"> project introduction preliminary information and announcement of imminent Scoping Report Project Manager introduction and details invitation to register for more information and project updates standing invitation for face-to-face meetings and updates 	<ul style="list-style-type: none"> generic responses received to join project update mailing lists phone calls received to discuss project commitment by Maoneng to ongoing engagement activities and pursuing additional avenues to reach the wider community
October 2021	DPIE Biodiversity Conservation and Science Directorate (BCS)	High level discussion regarding biodiversity assessment methodology	Discussion included: <ul style="list-style-type: none"> proposed methodology of assessment potential presence of Category 1 land offset requirements and timing particulars of species and assessment timing 	<ul style="list-style-type: none"> assessment to be undertaken as per discussed methodology additional consultation proposed to refine approach, including submission to BCS of proposed assessment methodology (on 8 November) proposed assessment methodology included evidence of extent of Category 1 land on project site response received from BCS on 18 November regarding proposed tiling for legless lizards additional consultation required concerning classification of Category 1 land
November 2021	State and Federal MPs	Project introduction emails	Introductory emails included: <ul style="list-style-type: none"> project introduction 	<ul style="list-style-type: none"> briefing meetings to be set up to discuss the project

Date	Stakeholder	Activity and purpose	Consultation issues raised / outcomes	Consideration of issues raised
			<ul style="list-style-type: none"> preliminary information and announcement of imminent Scoping Report Project Manager introduction and details standing invitation for face-to-face meetings and updates 	
November 2021	Upper Hunter Shire Council	Council update – draft Scoping Report	<ul style="list-style-type: none"> Council officers were provided with draft Scoping Report for their review a presentation was given by Maoneng regarding the key project features and considerations no issues were raised by Council officers, and the planned engagement was discussed 	<ul style="list-style-type: none"> commitment by Maoneng to continued engagement with Council throughout the Scoping and EIS assessments

Common themes identified during consultation to date were for maintenance and upgrades to Flaggs Road to be carried out as part of the project, opportunities for local employment and investment, and a shift to renewables (from coal).

The Council has certain obligations under the *Local Government Act 1993* and the EP&A Act to notify owners of land whose enjoyment of that land may be affected by the proposed development. Maoneng will support the Council in this by assisting with project communication.

5.3 Future community consultation

The EIS process requires project applicants to undertake detailed consultation with affected landowners surrounding the project, the local community and local council.

A formal process of consultation will be implemented in support of the EIS process and in accordance with requirements set out in the SEARs.

In addition to those listed in Section 5.1 (above), stakeholders will include:

- local community groups
- local chambers of commerce
- Registered Aboriginal Parties (RAPs)
- DPIE
- TfNSW
- Rural Fire Service.

Maoneng has prepared a high-level community and stakeholder consultation plan to guide consultation during the EIS process and the approvals phase of the project. The plan includes various methods of information dissemination (such as letter box drops and face-to-face meetings with local landholders) and opportunities for stakeholder engagement at key milestones.

Maoneng recognises that large-scale solar farm developments are still relatively new to NSW and BESS facilities are not well understood. Accordingly, a strong emphasis needs to be placed on engagement to inform stakeholders as to the nature of such projects, to fully describe potential project impacts, to explain proposed measures for impact management and mitigation, and to provide opportunities for stakeholder input into the development process.

Maoneng plans to conduct a range of activities to allow the community to understand the project and to ensure there are opportunities to provide feedback and suggestions that will shape the project through the EIS process. These will include:

- continued presence through community updates and announcements using a variety of communication media to provide visibility on the project for the local, regional and wider community, and a chance to hear about the project and provide feedback
- establishing a project website providing project details, an opportunity to register for project updates and a form for providing feedback
- online community consultation briefings and question and answer session

- drop-in meetings conducted in Merriwa to allow community members to speak directly to Maoneng representatives and obtain project information
- One-on-one meetings with the Maoneng Project Manager upon request.

6 Proposed assessment of impacts

6.1 Project issues and risks

The proposed Merriwa Solar Farm may result in a number of potential environmental and social impacts, both positive and negative. The nature and extent of these potential impacts will be assessed during the EIS process so that effective impact avoidance, minimisation and mitigation measures can be incorporated into project design, construction, operation and eventual decommissioning.

The project is expected to be a relatively low risk development compared with many SSDs. This is due to the inherently low impact nature of solar farm construction and operation, and the location of the project in an area that has a long history of disturbance from primary production, is adjacent to existing electrical infrastructure, is remote from population centres, and has few impacted neighbours. The operation of the solar farm will require very little handling of hazardous materials and will generate very little hazardous pollution or waste, other than the eventual removal of the lithium-ion batteries from the BESS at the end of their operational life.

An initial assessment of environmental and social risks by Maoneng has identified seven higher priority areas that will require particular focus during the EIS process, as follows:

- **biodiversity** – potential impacts on ecological values such as local habitat for threatened and endangered species
- **heritage** – potential impacts on Aboriginal and historic cultural heritage
- **land capability and stability** – land use impacts including the temporary loss of high value agricultural land
- **access and traffic** – project-related traffic impacts on local roads, particularly during construction, including the potential need for road upgrade works
- **visual amenity** – impacts on visual amenity for the nearest sensitive receivers
- **noise and vibration** – impacts on the nearest sensitive receivers due to noise and vibration during construction, operation and decommissioning
- **hydrology and water quality** – risk of flood impacts, potential impacts on hydrology, and impacts on water quality
- **hazards and risks** – including hazards associated with the presence and use of lithium-ion battery units within the BESS and bushfire hazard
- **social and economic** – social and economic impacts on the local community and regionally (predominantly positive).

These higher priority impacts are assessed in Sections 6.2 to 6.10.

The initial assessment of environmental and social risks also identified a number of lower priority potential environmental or social impacts, as follows:

- waste management.
- air quality and dust
- airfield impacts
- existing site contamination

These lower priority potential impacts are considered lower risk than the nine higher priority impacts, and/or are expected to be readily manageable by implementing standard environmental management and mitigation procedures, as will be outlined in the EIS. The lower priority impacts are assessed in Section 6.11.

Issues that have been considered but do not need further assessment in the EIS are listed in Appendix C, together with the reasoning behind their exclusion.

The EIS will be prepared in accordance with the *Social Impact Assessment Guidelines – preparing an environmental impact statement* (DPIE 2021b).

6.2 Biodiversity

A preliminary biodiversity assessment report was prepared by the waterways and ecology section of Water Technology Pty Ltd based on a desktop review and initial site investigation. This assessment is provided in Appendix D. An earlier Ecology Due Diligence Report was also prepared by Anderson Environment & Planning (AEP) (AEP 2021) and is referred to in the Water Technology report.

6.2.1 Desktop assessment

ECOLOGICAL DUE DILIGENCE ASSESSMENT

The biodiversity section of Water Technology undertook a review of the AEP (2021) Ecology Due Diligence Report. The conclusions of the report can be summarised as follows:

- A Biodiversity Development Assessment Report (BDAR) would likely be required to support an EIS as the Biodiversity Values Map identified areas with high biodiversity value.
- A threatened species database search identified three threatened species that are shown on maps to have habitat on the site and are considered candidate species. They are:
 - the Regent Honeyeater *Anthochaera phrygia*
 - Large-eared Pied Bat *Chalinolobus dwyeri*
 - Eastern Cave Bat *Vespadelus troughtoni*.
- AEP estimated that 91% of the site³ could be classified as Category 1 land, exempt from Biodiversity Assessment Method (BAM) assessment.

³ Note that the AEP assessment was based on an earlier, larger footprint.

- Although the site is considered to be largely Category 1, a combination of preliminary mapping and aerial photography determined that up to 10 Plant Community Types (PCTs) may occur on the project site.
- Seasonal surveys are required to assess the presence of flora and fauna species.

BAM SITE CONTEXT

Based on desktop assessment, the key aspects of the project site can be summarised as follows in accordance with BAM requirements (DPIE 2020b):

- Interim Biogeographic Regionalisation of Australia (IBRA) region: Combination of Sydney Basin (southern part of project site) and Brigalow Belt South (northern part of project site)
- IBRA subregion: Sydney Basin IBRA region and Kerrabee IBRA subregion (southern part of project site) and Brigalow Belt South IBRA region Liverpool Range IBRA subregion (northern part of project site)
- Mitchell Landscape: Lees Pinch Foothills (Lpf) (southern part of project site) 28% cleared, and Liverpool Range Valleys and Foothills (Liv) (northern part of project site) 81% cleared
- Likely PCT: various, including PCT483 Grey Box and White Box grassy open woodland with most commonly derived grasslands (PCTs are discussed further below)
- BAM candidate species collated from a preliminary 'mock' assessment in the AEP due diligence report comprised 42 species with potential assessment requirements as follows:
 - 20 tree/plant species
 - nine bird species of which three are owls
 - four reptiles of which two are legless lizards and two are snakes
 - two frogs
 - seven mammals including two micro chiropteran (microbats) and one mega-chiropteran (megabats) bat species.

EPBC PROTECTED MATTERS SEARCH

An EPBC Protected Matters Search of a 10 km radius from the project site identified the following:

- eight Listed Threatened Ecological Communities that may occur within the site
- 33 listed threatened species, comprising 11 birds, one frog, eight mammals, two reptiles and 11 plant species
- 11 listed threatened migratory species.

The results of the Protected Matters Search are provided in Attachment A of Appendix D.

BIONET SEARCH

A BioNet search identified 135 fauna and 289 flora species that have been recorded within a 10 km radius of the site's centre over the past 30 years. Of these, threatened species recorded include: one reptile, 18 birds, nine mammals (seven are micro chiropteran bats) and no plants.

Based on the habitat on the project site, an indication of each threatened species' likelihood of occurring on site has been made (see Attachment B of Appendix D).

Existing records of threatened species in the project area and surrounds from the BioNet database are shown in Figure 6.1. There are no previous threatened species records on the project site.

SUMMARY

The likelihood of all threatened species (from multiple database searches) being present on site is discussed further in Attachment B of Appendix D).

In summary, the number of species listed in the BioNet search and the EPBC Protected Matters Search (10 km radius) is relatively low. However, 42 BAM candidate species were identified from the BAM Calculator in the due diligence report based on AEP's mock BAM assessment of the mapped PCT's. Although the project site is heavily disturbed, primarily due to agricultural practices, some habitat features for threatened species do occur, albeit scattered. Therefore, there is potential for some threatened fauna species to be present on the site in addition to those that may utilise the site during transit or when opportunistically foraging.

6.2.2 Preliminary field assessment

As part of the scoping study, a site assessment comprising broad traverses of the project site was carried out by Water Technology between 28th August and 4th September 2021.

FLORA

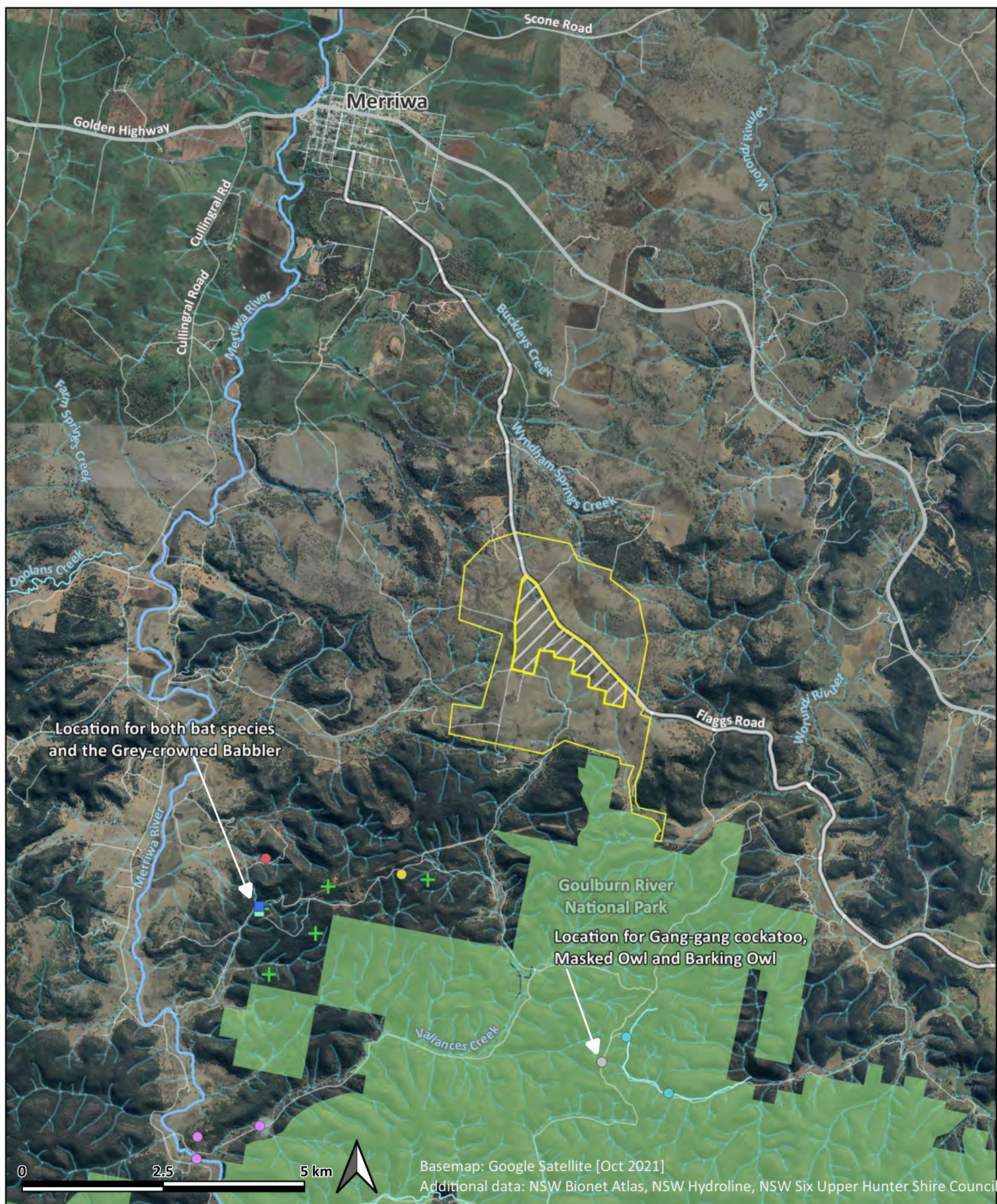
The project site is dominated by a mixture of native and exotic pasture grasses and is currently grazed by cattle, horses and a small flock of sheep. Historic aerial photography of the site shows various cropping in the 1970's and 1980's.

Large trees representative of PCT 483: 'Grey Box x White Box grassy open woodland community on basalt hills in the Merriwa region, upper Hunter Valley', are both scattered sparsely around the project site and located in small patches with modified understorey. These Grey Box trees may have once formed part of a mix of PCT 483 and PCT 1691: 'Narrow-leaved-Ironbark-Grey Box grassy woodland of the Central and Upper Hunter'. Both PCTs have associated Threatened Ecological Communities.

A large proportion of the land is either grassland or cleared agricultural land currently mapped broadly as PCT 800: 'Derived grasslands of the slopes on the Merriwa Plateau'.

Others PCTs mapped via modelling in the vicinity and periphery of the project site include:

- PCT 0: Non-native
- PCT 1691: Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- PCT1881: Western Hunter Flats Rough-barked Apple Forest
- PCT1696: Blakelys Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter



- | | |
|---|--|
| Project site | Masked Owl |
| Excluded from project site | Regent Honeyeater |
| Diamond Firetail | Barking Owl |
| Dusky Woodswallow | Yellow-bellied Sheathtail-bat |
| Gang-gang Cockatoo | Main watercourse |
| Greater Broad-nosed Bat | Tributary |
| + Grey-crowned Babbler (eastern subspecies) | Goulburn River National Park |
| Little Lorikeet | |

AE1189. Merriwa Solar Farm and BESS **Figure 6.1 Threatened species records**

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- PCT1693: Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains
- PCT 1661: Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
- PCT1656: Narrow-leaved Ironbark - Black Pine - Narrow-leaved Wattle shrub - grass open forest on sandstone slopes of the upper Hunter and Sydney Basin

Vegetation observed within the following areas within the project site is summarised below and discussed in detail in Appendix B:

- Proposed Merriwa BESS site and potential connection corridor (Photo 6.1), which comprises multiple PCTs and likely biodiversity values.
- Roadside entry points from Flaggs Road, which are infested with weeds and provide little biodiversity value but will need to be considered further during the EIS studies if tree removal is required along Flaggs Road.
- Main project site (panel footprint):
 - A large proportion of the panel footprint is comprised of grasslands with species composition (whether native or exotic) usually dominated by 1-2 species with very little species diversity (see Photo 6.2 and Photo 6.3).
 - The south-western periphery of the proposed panel footprint and some remnants within the project site contain trees and/or remnants of the high value PCT 483 (see Photo 6.4) and some potential crossover with PCT 1691.
 - Scattered trees are located within the project site but sparsely distributed. These trees are consistent with the presence of PCT 483 in the surrounding area (Photo 6.5). The Vallances Creek drainage course has remnant trees representative of PCT 1656 (Photo 6.6).



Photo 6.1 Ephemeral creek that may be impacted in some locations due to proposed alignment of powerline easement

FAUNA

There is very little vertical or horizontal physical structure over most of the proposed solar panel footprint to provide habitat for fauna, except for the Grassy Woodland community. Some of the grasslands on cracking clays also provide habitat for reptiles. Fringing vegetation on the south-western and southern outer edge of the proposed solar panel footprint, in gullies and along the proposed transmission line easement includes some treed vegetation with a defined shrub- and ground layer, providing suitable fauna habitat.



Photo 6.2 Cleared largely native grassland and Grey Box grassy woodland community in distance



Photo 6.3 Cleared mainly exotic grassland with occasional surface rock



Photo 6.4 Remnant tress on the south-western periphery of the proposed solar panel footprint



Photo 6.5 Pasture grasses and isolated tree on project site



Photo 6.6 Vallances Creek remnant vegetation

The potential presence of threatened fauna species on the project site is discussed in detail Appendix D and summarised below:

Reptiles

- Some areas of grassland, both native and non-native, contain cracking clays and/or surface basalt rocks, providing suitable reptile habitat. Agricultural practices on the site have included the historic stockpiling of basalt rocks into rockpiles. Evidence of cropping can be observed in historic aerial photography.
- A legless lizard resembling the threatened Pink-tailed Worm Skink (legless lizard) *Aprasia parapulchella* was observed beneath a rock with two small black ant species, but rapidly retreated into its burrow prior to identification. In addition, the Striped Legless Lizard *Delma impar* may also use these areas with cracking clays, tussock grass and surface rock. A Striped Legless Lizard was also potentially sighted, but rapidly retreated into its burrow (Photo 6.7 to Photo 6.10). Both legless lizard species are listed as Vulnerable under the *Biodiversity Conservation Act 2016* and the EPBC Act.



Photo 6.7 Hillside with surface rock



Photo 6.8 Surface rock rolled



Photo 6.9 Location of legless lizard and two types of ants



Photo 6.1 Legless Lizard observed beneath rock within Grassy Woodland

- Other reptiles observed opportunistically both on and off the site included Blue-bellied Black snake *Pseudechis guttatus* associated with Grey Box grassy woodland, Bearded Dragon *Pogona barbata*, and Blue-tongue Lizard *Tiliqua scincoides* located along Flaggs Road, and two Lace monitors *Varanus varius*.

Amphibians

- Amphibian habitat across the site is limited as the land is characteristically comprised of grasses and sloped with few opportunities for swamp areas. Dams across the project site are generally poorly vegetated and lacking in habitat, although turtles were observed in some dams. One dam located next to Flaggs Road outside the development footprint contains multiple species of common frogs.

Birds

- A wide variety of birds was observed across the proposed project site, usually coinciding with tree habitat associated with the vegetation inside the periphery and adjacent to the proposed solar panel footprint. Such habitat typically comprised dams, or trees in grassy woodland.
- Within the panel footprint a general lack of trees limits available habitat, but the trees that are present provide hollows and roosting locations that are well utilised. Grasslands between tree areas sometimes provide habitat for Brown Quail *Synoicus ypsilophora*.
- Ephemeral creeks and drainage lines have varying habitat but are usually dry and contained little vegetation. However, two Barking owls *Ninox connivens* were observed along an ephemeral creek running parallel with the proposed transmission line easement. In a similar location, Gang Gang Cockatoos *Callocephalon fimbriatum* were observed. Both of these species are listed as vulnerable under the *Biodiversity Conservation Act 2016*.
- Dams have generally poor habitat. However, Diamond Firetail *Stagonopleura guttata* was observed, a *Biodiversity Conservation Act 2016* listed vulnerable species.
- Much of the wooded vegetation within the project site is mapped as Important Habitat for Regent Honeyeater *Anthochaera phrygia*, including the remnant Grey Box stands. The Regent Honeyeater is listed as Critically Endangered under both the *Biodiversity Conservation Act 2016* and the EPBC Act.

Mammals

- The proposed project site consists predominantly of pasture grass with some remnant tree patches, scattered, individual trees and dams. Given that forested tree areas such as the Manobalai Nature Reserve and the Goulburn River National Park (see Figure 1.1) are nearby or adjacent to the proposed project area, there is some potential for fauna to utilise the project site for foraging.
- There is generally an absence of available habitat structure within cultivated grasslands to support small ground-dwelling mammals. Hollows are common in treed areas.
- The site is suited to large macropods such as the Eastern Grey Kangaroo *Macropus giganteus*, Red-necked Wallabies *Notamacropus rufogriseus* and Wallaroos *Osphranter*

robustus, and dens for the Bare-nosed Wombat *Vombatus ursinus* dens were regularly observed in sandy sites.

- Microbats could be expected to utilise the project site as a source of food and/or as a temporary stopping location when travelling between sites of preference and were observed during the preliminary survey. BioNet searches indicated the presence of a large number of bat species, including seven species that are threatened in NSW.
- *Common* bats that have been recorded in a 10 km radius of the project area and the Grey-headed Flying Fox *Pteropus poliocephalus* may opportunistically use the site for feeding.

6.2.3 Preliminary impact assessment and management

The construction and operation of the solar farm will be managed to minimise disturbance to biodiversity values and, where practical, larger areas of high biodiversity value vegetation will be avoided.

The construction of the solar farm may result in some impact on a PCT of high biodiversity value vegetation, i.e. PCT 483: 'Grey Box x White Box grassy open woodland community on basalt hills in the Merriwa region, upper Hunter Valley'. PCT 483 is a Threatened Ecological Community under the *Biodiversity Conservation Act 2016* where it is Listed as Critically Endangered. The PCT is also listed as Critically Endangered under the EPBC Act within the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

These areas of PCT 483 will be retained where practical and losses will be minimised. The proposed project footprint has already been reduced to avoid areas of high biodiversity value (see Figure 3.1). Complete avoidance of PCT 483 may be unachievable. However, larger more significant areas of the same PCT will be avoided and biodiversity linkages will be planted with locally represented species (NPWS 2010) to allow connectivity, particularly with large areas in the northeast of the site, and along the verge vegetation of Flaggs Road.

The installation of the transmission line between the solar panel footprint, the Merriwa BESS and the existing TransGrid powerline easement will require the removal of remnant vegetation. Removal of this and other native vegetation triggers a BDAR and the Biodiversity Offset Scheme (BOS).

Several threatened species that appeared in database searches that may forage or reside in areas on the project site have potential to be impacted by habitat loss due to the large scale of the project footprint. It is anticipated that fauna species such as microbats and legless lizards will be potentially impacted, but these are mobile and hence can disperse and/or be relocated to other adjacent undisturbed habitat-areas. Prior to approvals, habitat mapping will be required, and appropriate management plans and mitigation guidelines established for these species, should their habitat be removed. These potential impacts and their management will be analysed within the scope of the BDAR.

Loss and/or modification of habitat for reptile, bird and bat species that utilise the site is likely to occur as a result of:

- the removal of habitat including tree areas, scattered trees, grassland, rock shelters and dams

- the placement of solar panels over areas that would have otherwise been freely foraged upon, including grasses
- the loss of farms dams if dewatered to accommodate project infrastructure.

To reduce native vegetation loss, some areas of habitat will be retained allowing fauna corridors along waterways such as Vallances Creek, basalt rock refugia, derived grassland and larger areas of PCT 483 Grey Box community. In addition, considerable protected forest is located in the adjacent Goulburn River National Park.

There are a wide range of standard habitat and fauna management measures that can be implemented to help protect biodiversity values and threatened species during project construction and operation. A number of such management measures are proposed in Appendix D.

Biosecurity management will also be an important aspect of biodiversity protection (see Section 6.4).

6.2.4 Need for further assessment

A detailed assessment of biodiversity issues will be required in the form of a BDAR via application of the BAM (DPIE 2020b). Further assessment including BAM plots is required across the project site to assess areas that are proposed for removal as well as those areas that are dedicated for biodiversity conservation and preservation. Additional consultation with BCS is required regarding the presence on site of Category 1 Land.

Category 1 Land, if confirmed by BCS, will be exempt from the BDAR but must be considered in the prescribed impacts if it provides habitat for threatened species. However, as a high proportion of the proposed solar farm footprint consists of grasslands assessed as Category 1 land by AEP (2021), these need to be assessed by desktop and aerial photography to ensure grasslands do not qualify for offsetting if in natural condition.

Where not categorised as Category 1 land, it will be important to determine the quality of Derived Native Grassland which may form part of the Threatened Ecological Community and EPBC Listed communities associated with Grey Box x White Box grassy open woodland. The August/September scoping visit identified a poor-quality representation, with low species richness, but some ground truthing in November (spring grassland) assessments are required for confirmation. Uncropped drainage areas may provide some resemblance of original PCT's.

Scattered, isolated trees provide some habitat for arboreal species and stick nests were observed, indicating some use of trees for breeding. These features need to be assessed as habitat for threatened species, including dead stags. There is some potential for threatened birds and bats to use tree hollows.

Targeted species surveys are required to be undertaken for threatened species identified as having potential to use the site (see Attachment A to Appendix D). These have been identified from BioNet searches, a mock BAM candidate species report (AEP 2021) and an EPBC Protected Matters Search. This includes surveys on Category 1 land, as this may provide habitat for threatened species such as the Striped Legless lizard *Delma impar* and Pink-tailed Legless lizard *Aprasia parapulchella*. Although a large proportion of the site is heavily modified

due to agricultural use, there is potentially habitat present for threatened species that have been able to adapt to derived and agriculturally improved grasslands. By mapping habitat accurately and performing targeted species surveys, information can be collected about the presence/absence of these species and determine prescribed impacts.

Seasonal surveys for other threatened fauna will be determined by the potential presence of their habitat and associated survey requirements and seasonal timing. Threatened species surveys began in August/September 2021 and will continue until at least EIS submission. Targeted species surveys in appropriate seasons during flowering events for threatened flora are also required to determine their occurrence on the site. Multiple surveys may be necessary to cover the flowering period of threatened flora species.

The planned spring assessments of the proposed project disturbance areas will be required to meet DPIE's seasonal survey requirements. This is especially so if flora or fauna requiring offset is presumed to be present, in which case the mapping of the habitat requires polygons and shape files. Some candidate species can be assumed to be present, and this will be calculated within the BAM assessment as part of the BDAR process. Examples of species that may fall within this category are the Regent Honeyeater for which the wooded areas within the study area are mapped as Important Habitat. Polygons of species assumptions will be a requirement of the BDAR. Consideration of critical habitat requires mapping and evaluation into high-, medium- or low-quality categories prior to any works and referral.

It is expected that a referral under the EPBC Act will be required due to the presence of 'nationally threatened species and ecological communities' (an MNES) that may be impacted by the project. Referral of the project will be made as early as possible in the assessment period, but following further habitat and threatened species assessment, and potential refinement of the project configuration, when the potential for a controlled action is better understood.

6.3 Heritage

6.3.1 Aboriginal cultural heritage

EXISTING CONDITIONS

A desktop assessment of existing conditions on site has been undertaken by OzArk Environment & Heritage (OzArk) (OzArk 2021). The results of this search are summarised in Table 6.1 and shown in Figure 6.2.

As shown in Table 6.1, the project site falls within land currently subject to Native Title Claim (NC2011/006, NSD37/2019, Gomeroi People).

A search of the AHIMS database on 30 August 2021 returned 116 records for Aboriginal heritage sites within a 12 km radius of the project site (GDA Zone 56 Eastings: 242873–266675; Northings: 6419775–644373 with no buffer). Figure 6.2 shows the location of the AHIMS sites that have been recorded near and within the project site.

Table 6.1 Aboriginal cultural heritage desktop database search results

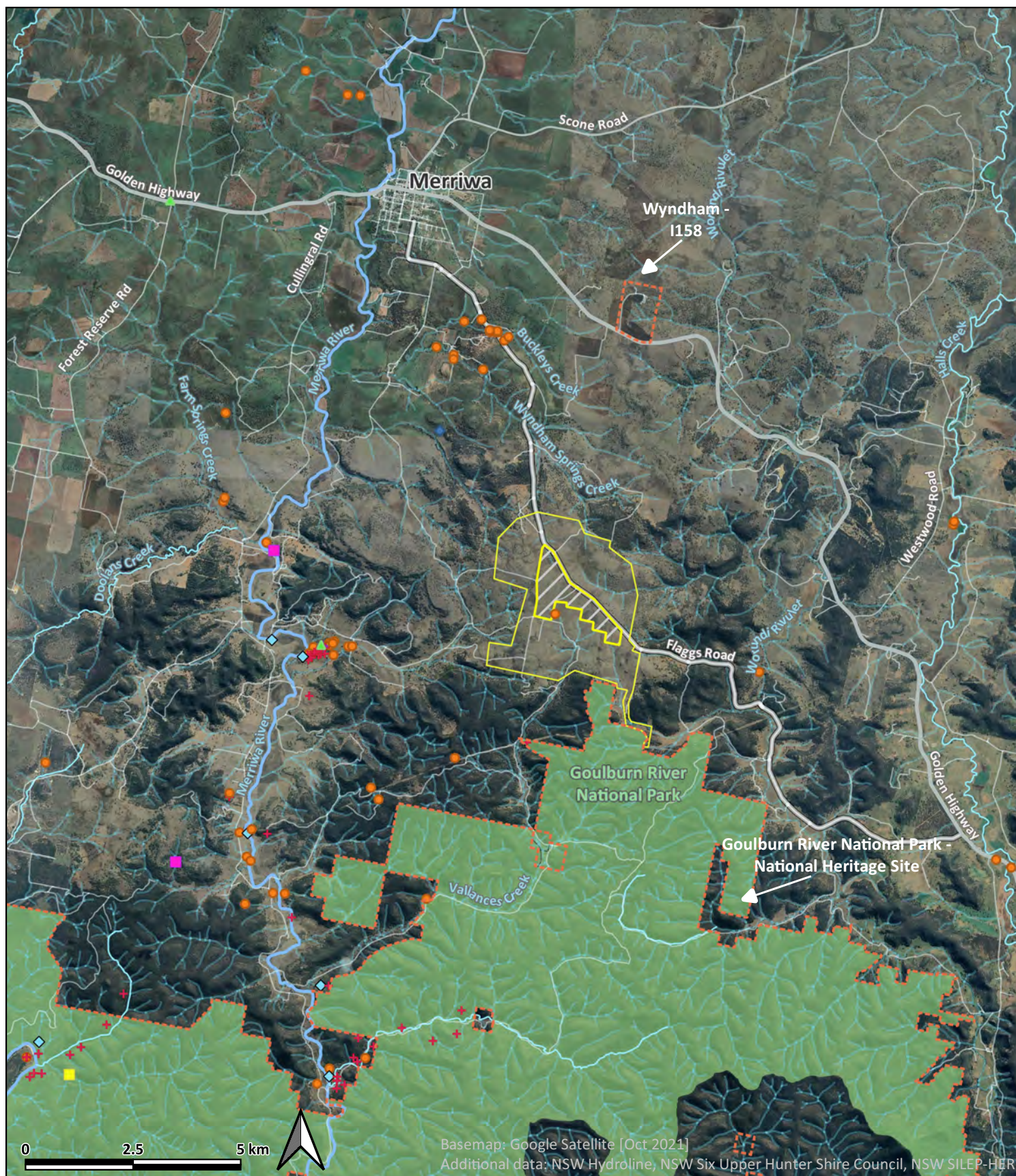
Name of database searched	Date of search	Type of search	Comment
Commonwealth Heritage Listings	31 August 2021	Upper Hunter Shire Council LGA	No Aboriginal Commonwealth Heritage Listings are within 5 km of the project site.
National Native Title Claims Search	30 August 2021	NSW	One Native Title Claim covers the project site.
Aboriginal Heritage Information Management System (AHIMS)	30 August 2021	12 x 12 km centered on the study area	116 sites returned in the designated search area. AHIMS# 37-1-0429 and AHIMS# 37-1-0430 are within the project site.
LEP	31 August 2021	Upper Hunter LEP 2013	None of the Aboriginal places noted occur near the project site.

Table 6.2 shows that the most frequent site types in the vicinity of the study area are artefact scatters (50.0%), shelters with deposit (37.9%), and axe grinding grooves (5.2%). The axe grinding groove and artefact scatter, scarred tree, and shelter with art and deposit site types each occur twice in the designated search area, while the axe grinding groove and shelter with art and deposit and burial/s site types each occur only once in the designated search area.

Table 6.2 AHIMS site types and frequencies

Site type	Number	Frequency (%)
Artefact scatter	58	50.0
Shelter with deposit	44	37.9
Axe grinding groove	6	5.2
Axe grinding groove and artefact scatter	2	1.7
Scarred tree	2	1.7
Shelter with art and deposit	2	1.7
Axe grinding groove and shelter with art and deposit	1	0.9
Burial/s	1	0.9
Total	116	100

Two previously recorded sites are within the study area: 37-1-0429 (Glenburnie 15) and 37 1-0430 (Glenburnie 14) (see Figure 6.2). Both sites are recorded as artefact scatters, although the AHIMS site cards do not provide any details concerning the number or types of artefacts present or the extent or specific location of the sites.



- | | | | |
|--|--|--|---------------------|
| | Project site | | Axe grinding groove |
| | Excluded from project site | | Burial/s |
| | Artefact scatter | | Heritage Site |
| | Axe grinding groove & artefact scatter | | National Park |
| | Scarred Tree | | Main watercourse |
| | Shelter with art and deposit | | Tributary |
| | Axe grinding groove & shelter with art and deposit | | |

AE1189. Merriwa Solar Farm and BESS **Figure 6.2 AHIMS sites in project area**

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PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

The development of the Merriwa Solar Farm has the potential to disturb Aboriginal sites located within the project footprint, particularly during construction by activities such as vegetation clearance and topsoil stripping.

OzArk predicts that isolated finds could be recorded within the project site. Artefact scatters may be present but may also have been displaced due to agricultural activities. Such isolated finds or scatters could be located within the project footprint and disturbed by project activities.

Quarry/extraction sites could be recorded within the project site if suitable rock outcroppings are available, although such outcroppings would generally be unsuitable locations for project facilities.

Rock shelters are considered unlikely to be present within the project site due to site topography and geology. The presence of burial sites is considered unlikely especially given the level of disturbance that has occurred.

Scarred trees can occur wherever appropriate mature trees are located. Due to the large-scale clearance of trees from within most of the project site, scarred trees are predicted to be very rare and are noted by OzArk to be very rare at a regional level. The possibility remains, however, that they could be present within the proposed project footprint.

The nature of solar farm construction is that direct ground disturbance is generally minimal. Where ground conditions allow, likely across most of the site, Maoneng's preferred method of panel installation is to pile drive the steel supports for the panels directly into the ground without the need for excavation for the laying of foundations.

The BESS battery modules are expected to be mounted on skids supported by concrete footings. Concrete pads will be required for the substations and may be required for site office and operations and maintenance building. Access roads will be generally levelled and gravelled, requiring some surface disturbance. However, there is potential for the locations of facilities to be altered if required to avoid any identified sites of Aboriginal cultural heritage significance.

The key to the successful management of potential impacts on Aboriginal cultural heritage will be to undertake an archaeological field survey of proposed disturbance areas in conjunction with Registered Aboriginal Parties (RAPs) to identify sites and other cultural values of significance that require avoidance or mitigation. Chance find procedures will also need to be established to enable appropriate management if artefacts are uncovered during construction activities.

NEED FOR FURTHER ASSESSMENT

To fulfil the expected requirements of the Merriwa Solar Farm EIS, a detailed assessment of the likely impacts to Aboriginal heritage from the development of the solar farm will be undertaken. This will include expanding on the desktop research carried out to date, Aboriginal community consultation and field investigations resulting in informed impact assessments. This will allow the development of tailored management and mitigation strategies in relation to any impacts as required.

The Aboriginal cultural heritage assessment of the study area will follow the Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice; DECCW 2010a). The field inspection will follow the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (the Guide, OEH 2011).

The assessment will be undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRs) (DECCW 2010b), in close consultation with the RAPs identified for the project.

The aim of any archaeological survey will not be to locate each artefact in a landscape but to undertake investigations so that the archaeological potential and archaeological characteristics of all landforms within the study area are known. Therefore, the survey will:

- inspect all landforms in the study area so that their archaeological potential can be determined
- confirm the location of sites 37-1-0429 (Glenburnie 15) and 37-1-0430 (Glenburnie 14), as well as the other site locations identified by English and Gay (1993) in the study area
- develop and validate a predictive model and develop and answer research questions in relation to the assessment
- determine if any landforms of the study area require test excavation to understand the archaeological potential at a particular location
- undertake sufficient assessment to satisfy Sections 2.2, 2.4, 2.5, 2.6, and 2.7 in the Guide
- collect sufficient data so that the results can be presented in an Aboriginal Cultural Heritage Assessment Report (ACHAR) as set out in Section 3 in the Guide
- undertake survey and record keeping satisfying Requirements 1–13 of the Code of Practice.

The primary deliverable will be the ACHAR, which will include management options and mitigation measures based on best practice heritage management with regard to practical outcomes for the project and input from Aboriginal community stakeholders.

6.3.2 Historic heritage

EXISTING CONDITIONS

A desktop search was conducted by OzArk of a number of databases to identify any heritage items previously recorded within a designated 5 km search area around the project site (OzArk 2021). The results of this search are summarised in Table 6.3 and shown in Figure 6.2.

The search of the Heritage Council of NSW administered heritage databases and the Upper Hunter LEP 2012 returned one record for historic heritage sites – Wyndham (I158) which is located approximately 4.6 km north of the project site.

One heritage site from the National Heritage List is located to the south of the project site, next to the site's southern-most boundary. This heritage site is the 'Greater Blue Mountains Area – Additional Values' (Place ID 105696) and corresponds within the search area to the boundary of the Goulburn National Park.

Table 6.3 Historic heritage desktop database search results

Name of database searched	Date of search	Type of search	Comment
Commonwealth Heritage Listings	31 August 2021	Upper Hunter Shire Council LGA	One listing is located adjacent to part of the southern boundary of project site.
National Native Title Claims Search	30 August 2021	NSW	No items are listed within 5 km of the project site.
LEP	30 August 2021	Upper Hunter LEP 2012	One item is listed within 5 km of the project site.

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

No historic heritage items are listed inside or directly next to the project site. However, it is possible that historic heritage of value may be present on the site and will require assessment and management as part of project development.

Appropriate management of heritage items is primarily based on their assessed significance as well as the likely impacts of the proposed development. In terms of best practice and desired outcomes, avoiding impact to any historical item is a preferred outcome. However, where a historical site has been assessed as having no heritage value, impact to these items does not require any legislated mitigation. If the historical site has heritage value and disturbance of the site cannot be avoided, then other measures such as official documentation of the site and salvage of items of value will be implemented.

NEED FOR FURTHER ASSESSMENT

To fulfil the expected requirements of the Merriwa Solar Farm EIS, a further, standard assessment of the likely impacts to historic heritage from the development of the solar farm will be undertaken. This will include expanding on the desktop research carried out to date, and field investigations resulting in informed impact assessments. This will allow the development of tailored management and mitigation strategies in relation to any impacts as required.

The historic heritage assessment will apply the Heritage Council's Historical Archaeology Code of Practice (Heritage Council 2006) in undertaking the assessment, including field investigations, to meet the following objectives:

- Objective One: To identify whether historical heritage items or areas are, or are likely to be, present within the study area
- Objective Two: To assess the significance of any recorded historic heritage items or areas
- Objective Three: Determine whether the proposal is likely to cause harm to recorded historic heritage items or areas
- Objective Four: Provide management recommendations and options for mitigating impacts.

An Historic Heritage Impact Assessment (HHIA) will be prepared, which will document the findings of the survey and provide preliminary heritage assessments of items with potential heritage significance.

6.4 Land capability and stability

Regional mapping indicates that the project site is dominated by soils with high fertility and that the majority of the site is classified as BSAL – i.e. land with high quality soil and water resources capable of sustaining high levels of productivity (DPIE 2020c).

Agricultural production is of great importance to Merriwa and surrounding rural communities, both economically and culturally. The exclusion of high value agricultural land from primary production for several decades for the purposes of electricity generation needs to be considered carefully to ensure that balanced land use outcomes are being achieved.

EXISTING CONDITIONS

A high-level, desktop BSAL, soils and lands assessment has been undertaken by Minesoils Pty Ltd and is presented in Appendix E. In accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH and OAS&FS 2013), the assessment included the project site and a 100 m surrounding buffer.

The project site is located on the Merriwa Plateau and consists of gently to moderately undulating slopes ranging from open drainage lines of the Beau Vale in the southeast portion of the site at approximately 250 m AHD to more elevated broad crests in the northeast and northwest areas at approximately 410 m AHD. Slope ranges from 1% to >40%, with approximately 25% of the site having slopes >10%. The Regional Surficial Geology Mapping indicates that most of the site is located on the Liverpool East Basalt unit, with a more limited area existing on minor areas of Banks Wall Sandstone.

NSW regional mapping indicates that the project site is dominated by soils (predominantly Vertosols) with high fertility (and high inherent fertility), covering approximately 68%. Minesoils considers there to be a negligible risk of acid sulfate soils being located within the PPA due to the distance of the site from the coast and its elevation (>250 m AHD) (Minesoils 2021).

Regional mapping of Land and Soil Capability (LSC) indicates that the project site is dominated by high capability land (predominantly Class 3 high capability land) covering approximately 68% of the project site.

The NSW Government's *Strategic Regional Land Use Policy* (the Policy) (NSW Government 2012) defines and identifies strategic agricultural land across NSW. Strategic agricultural land includes BSAL, and clusters of significant agricultural industries known as critical industry clusters (CICs). Regionally mapped BSAL covers the majority of the project site and is also present to the west and north of the site (Figure 6.3). BSAL is extensively distributed around the Merriwa township and over the Merriwa Plateau. No CICs are located within approximately 20 km of the project site.

Minesoils (2021) has undertaken a preliminary, desktop evaluation of the presence and extent of BSAL, following OEH and OAS&FS (2013) (see Appendix E). Based on this evaluation, it is

considered likely that regionally mapped BSAL within the project site would meet the criteria for BSAL verification. Verified BSAL is likely occur in association with the Vertosol and Dermosol soil types present on site, comprising up to approximately 75% of the project site (approximately 585 ha).

The erosion potential of the site is limited by the nature of the soils and the presence of slope angles that are predominantly ≤ 10 degrees. The Vertosol soil type that dominates the project area's gently undulating central and northern slopes has a low run-off potential and is associated with good permeability and drainage characteristics.

The main erosion risk is associated with soils on steeper slopes that will be subject to high run-off potential. In addition, Sodosols that are mapped on minor areas of the project area are defined by a sodic subsoil and exhibit high levels of risk associated with sodicity and dispersion.

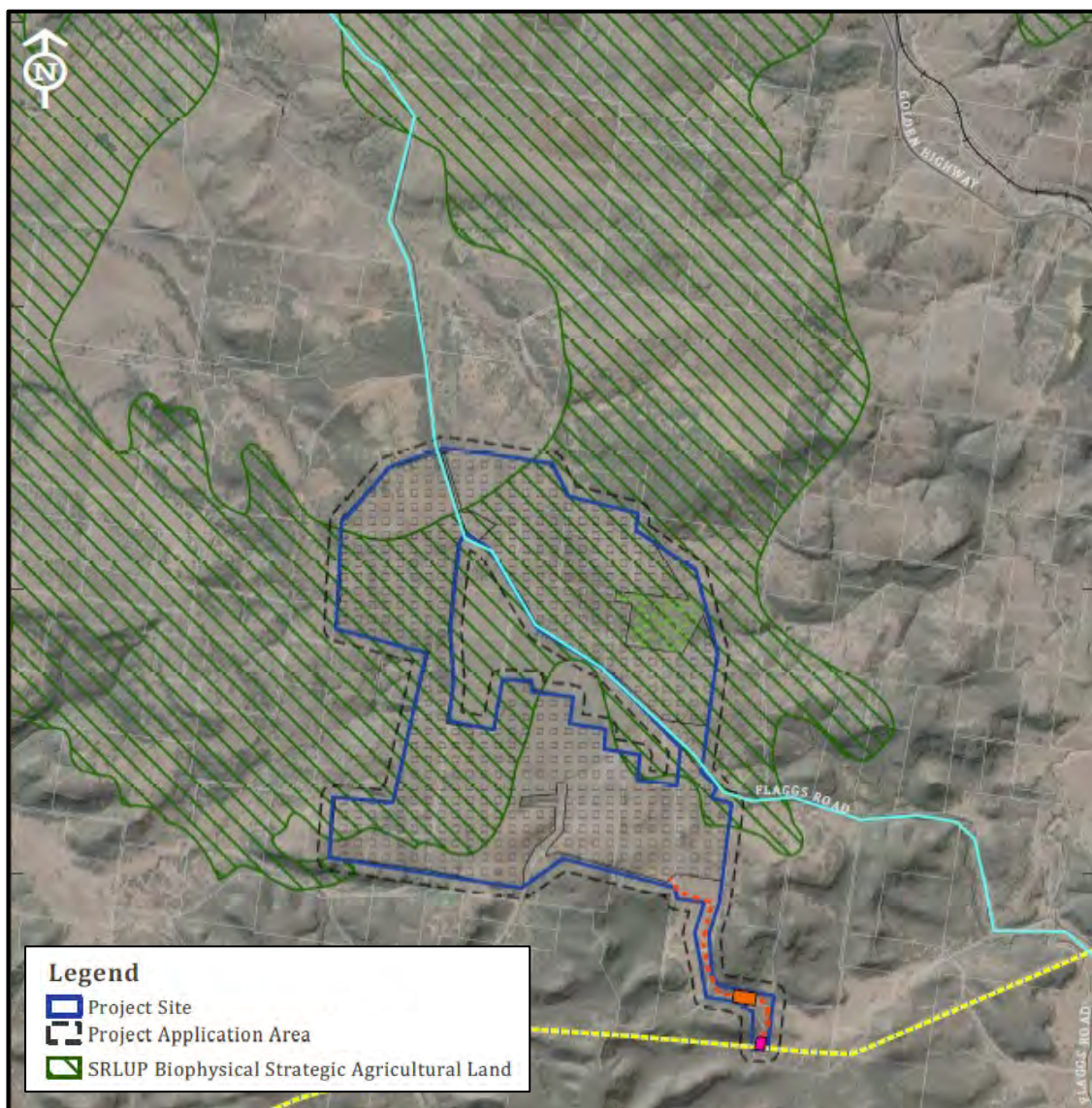


Figure 6.3 Regionally mapped BSAL across the project site and surrounds (Minesoils 2021)

A review of data on MinView did not identify any current or previous exploration or mineral titles over the project site. One unnamed construction quarry has been identified within 5 km of the site, and five quarries within 10 km of the site.

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

Land capability, as detailed in the *Land and Soil Capability Assessment Scheme; Second Approximation* (OEH 2012) (referred to as the LSC Guideline), is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources. Failure to manage land in accordance with its capability risks degradation of resources both on- and off-site, leading to a decline in natural ecosystem values, agricultural productivity and infrastructure functionality.

The temporary exclusion from agricultural use of up to 780 ha of farmland, most of it high capability, will be an outcome of the construction and operation of the Merriwa Solar Farm. However, the loss of the land for an expected period of 35 years will have an insignificant impact on the region's output from primary industry as no sensitive agricultural activities such as intensive plant or livestock agriculture, or livestock breeding, are undertaken within the project area or its immediate surrounds. In addition, regional mapping indicates that BSAL is widespread to the west and north of the site, reducing the proportionate impact of the exclusion of an area of BSAL from the local area.

Opportunities to avoid BSAL during initial site selection were constrained by the need to identify suitable land for the project in proximity to existing electrical infrastructure with available capacity (see Section 1.3). Opportunities for avoidance of the BSAL within the project site are limited as:

- The solar farm needs to be of a commercially viable size, limiting the potential for and extent of BSAL avoidance within the current footprint. In addition, depending on the outcomes of the biodiversity assessment, there may be a priority to avoid areas of habitat within the current footprint, which may or may not be located within BSAL-mapped areas.
- The only significant area of land being acquired by Maoneng that is outside the current footprint and not mapped as BSAL is located to the northwest of the site (see Figure 6.3). This land has been avoided due to the presence of native vegetation.

The construction of the solar farm and associated facilities will not require any major reshaping of landforms and only minor excavation (such as trenching for cables between inverters). It is anticipated that there will be little, or no soil stripping and stockpiling activities associated with the project site, and the project is not anticipated to result in changes to existing drainage or erosive potential.

As discussed in Section 6.3.1, the nature of solar farm construction is that direct ground disturbance is generally minimal and is primarily associated with the installation of BESS units, the substation, buildings and access roads. The solar panels will be located almost entirely within the high capability, BSAL land, and full rehabilitation and return to existing capability is expected to be readily achievable at the end of project life.

The more intensive ground disturbance associated with the construction of the proposed BESS and high voltage substation will occur away from the BSAL in an area of lower land capability.

Rehabilitation at the end of project life is also expected to be able to return this land to its pre-existing capability.

The landform and soil types within the project site represents minimal opportunity for soils to erode and be transported via sheet and/or gully erosion upon disturbance. The solar panels will be largely located on the low erosion risk Vertosol soil type.

The erosion potential risk is highest in locations where sodic subsoils and high run-off combinations occur. However, due to a general lack of exposure of subsoils during the construction and operational phases of the solar farm, the potential for soil erosion to occur is minimal.

The only overlap of the project footprint and the erosion-prone Sodosol soil type is along the easement of the proposed transmission line between the solar arrays and the proposed BESS location. However, ground disturbance along this corridor will be largely limited to the installation of poles supporting the overhead powerlines.

Impacts on land capability can also result from the introduction and/or spread of pests, weeds and pathogens. Increases in the distribution and prevalence of noxious weeds or pathogens within the project site could substantially increase the effort required at the end of project life to return the land to its pre-existing agricultural use and productivity. In addition, issues with noxious weeds or pathogens on the project site would pose a risk to adjacent farms and the Goulburn River National Park. Pest animals such as rabbits can also lead to land degradation as a result of burrowing and feeding activity.

Impacts on land capability and stability during construction and operation are expected to be readily avoided or minimised through:

- the application of standard erosion and sediment controls (particularly during construction), such as those outlined in the Landcom (2004) guidelines
- the implementation of an effective land management regime, including pest and weed control, during both construction and operation
- effective rehabilitation at the end of project life, with a detailed decommissioning and rehabilitation plan being prepared within 3-5 years of the planned closure of the project.

Overall, it is expected that there will be negligible impact on land and soil capability, and stability, during the life of the project. Therefore, once infrastructure is removed, it is anticipated that regular agricultural activities such as cattle grazing could be resumed.

The use of the project site for electricity generation and storage is therefore considered a balanced land use outcome for the region given the temporary (three decade) exclusion of the site from agricultural activity, the general absence of intensive, high-value agricultural activity currently being undertaken at the site, the remaining availability of BSAL within the area, and the importance of renewable electricity generation and storage to the region and the State.

NEED FOR FURTHER ASSESSMENT

Maoneng acknowledges that most of the project site is BSAL and has high land capability. Accordingly, it is not proposed to undertake a detailed BSAL Site Verification Assessment, such as is stipulated in the *Interim Protocol for site verification of BSAL* (OEH and OAS&FS 2013).

It is proposed that field soil data will be collected from the major soil types to further assist with the agricultural impact assessment, land and soil capability assessment and the development of erosion and sediment control plans. It is proposed that the data collected include parameters such as pH, electrical conductivity, chloride concentration, cation exchange capacity (CEC), exchangeable sodium percentage (ESP) and calcium/magnesium ratio.

The EIS will consider the compatibility of the project with adjacent land uses during operation and after decommissioning, with reference to the zoning provisions applying to the land. A land use conflict risk assessment will be undertaken in accordance with the *Land Use Conflict Risk Assessment Guideline* (DPI 2011) to assess conflicts with neighbouring land uses.

Biosecurity issues will also be addressed by the EIS, including the need for pest, weed and pathogen management measures to be implemented at the project site (particularly during construction), and the need to apply biosecurity controls to project components imported from overseas.

6.5 Access and traffic

EXISTING CONDITIONS

The main route for construction and operation traffic to the project site access points is expected to be southeast from Merriwa township along Flaggs Road, a distance by road of approximately 8.5 km (see Figure 1.2). Merriwa is located on the Golden Highway.

Access to site is also possible along Flaggs Road from the southeast, a distance of approximately 14.5 km by road from the Golden Highway. However, in addition to the greater distance along Flaggs Road, the condition of the road is poor in some sections.

Flaggs Road is a local road managed by the Upper Hunter Shire Council that is unsealed along most of its length (including through the project site), although it is sealed for several kilometres at its northwestern and southeastern ends. The Golden Highway is a sealed, dual carriageway State Road that extends approximately 120 km southeast from Merriwa before terminating at the New England Highway, which in turn continues southeast for approximately 60 km to the city of Newcastle.

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

The use of Flaggs Road southeast of Merriwa by project-related traffic, particularly during construction, may result in a number of environmental and community impacts that will require consideration in the EIS, including:

- impacts on the use of the road by other road users
- potential amenity issues for the residents of Merriwa and residents along Flaggs Road (e.g. see Section 6.7)
- disruption to road use, potential amenity impacts (e.g. see Section 6.7) and biodiversity impacts (see Section 6.2) associated with the upgrading of Flaggs Road
- the community benefits once the Flaggs Road upgrade has been completed (see Section 6.10).

The suitability of Flaggs Road as a route to site (including the proposed route to the northern end of Flaggs Road from the Golden Highway) will also need to be considered in terms of its suitability for use by B-double and OSOM vehicles.

The proposed project site access points for use during construction and operation are located at 868 and 929 Flaggs Road at the northern end of the site. The construction of these access points may result in the need for native vegetation clearance, although the preliminary biodiversity assessment indicates that vegetation quality at the access points is poor (see Section 6.2). All other areas of the site will be accessed internally through a series of gravel access roads between 4 m and 6 m wide, potentially including a crossing of Vallances Creek.

Transport impacts as a result of the proposed project will be largely limited to the construction phase and may result from factors including haulage of materials and components, and movements of workers to and from the site, and movement of trucks, vehicles and construction machinery within the site. Traffic impacts will be greatest during the peak construction period, when up to 153 return vehicle trips to site (12.7 trips per hour) are estimated to occur (see Section 3.2).

Construction will result in a major increase in traffic on the local road network. However, this will occur during the standard hours of construction and will be managed in consultation with TfNSW, local councils and landholders, where relevant, so that impacts on other road users or local residents are minimised.

Standard traffic management measures will be implemented, such as ensuring vehicle roadworthiness, enforcing speed limits, erecting signage, proper design of site access points, ensuring access roads within the site are properly engineered, and ensuring appropriate engineering and environmental design of any Vallances Creek crossing points.

NEED FOR FURTHER ASSESSMENT

The use of Flaggs Road southeast of Merriwa by project-related traffic, particularly during construction raises a number of issues that will require consideration in the EIS, including:

- The route from the Golden Highway to the northern end of Flaggs Road will need to be assessed and optimised in terms of B-double and OSOM accessibility, and to address potential amenity issues for the residents of Merriwa.
- The use of Flaggs Road by project-related traffic will need to be considered in terms of its impacts on amenity for residents along the road (e.g. see Section 6.7) and its impacts on the use of the road by other road users.

The expected upgrading of sections of Flaggs Road to accommodate construction-related traffic, although subject to a separate and subsequent consent process through Council, will need to be considered in the EIS. High level consultation with Council has occurred but further consultation will be conducted as part of the traffic impact assessment when project design is further advanced and the extent of likely road upgrades is better known.

A detailed traffic and transport assessment will be undertaken as part of the EIS process including an assessment of the site access route, site access points (including required road works) and likely transport impacts of the project on the capacity and condition of roads. Cumulative impacts will be considered by identifying other projects being developed or

proposed locally that might increase traffic along the site access routes used for the Merriwa Solar Farm.

6.6 Visual amenity

EXISTING CONDITIONS

The proposed project is located in an area distant from major population centres but will have the potential to visually impact on road users and nearby rural residents.

Two associated and seven non-associated residences are located within 1 km of the project site (see Figure 1.3). The two associated receivers are located next to the site. Three of the non-associated receivers (R3, R4 and R5) are located within 500 m of the site, with the nearest non-associated receiver (R3) located 150 m from the site, just across Flaggs Road.

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

An initial assessment of sensitivity to visual impacts indicates that the nearest non-associated receiver (R3) is the only non-associated receiver likely to experience significant visual impacts. Visual impacts may be experienced by R4, but the other non-associated receivers are all likely to have their view of the solar farm obscured by topography and/or vegetation.

The use of strategically placed landscape screening is likely to be required to minimise visual impacts on R3 and potentially R4.

Visual impacts may be greatest for road users of Flaggs Road when approaching and passing through the site, particularly along the northernmost 0.7 km where the solar farm panels are adjacent to both sides of the road. The visual impact experienced by road users is expected to be significant (but not necessarily negative) and represent a major change to the current visual character of the area.

NEED FOR FURTHER ASSESSMENT

A landscape and visual impact assessment (LVIA) will be undertaken as part of the EIS process, including an assessment of the likely visual impacts of the project (including glare, reflectivity and night lighting) on surrounding residences, road users, scenic or significant vistas and air traffic. The visual assessment will consider the guidance documents *Guidelines for Landscape and Visual Impact Assessment* (LIIEMA 2013), *Guideline for landscape character and visual impact assessment* (TfNSW 2020a) and *Beyond the Pavement 2020* (TfNSW 2020b).

The LVIA will include a draft landscaping plan for any proposed planting or other visual screening. The draft plan will be developed in consultation with affected landowners.

6.7 Noise and vibration

EXISTING CONDITIONS

Background noise levels are expected to reflect the site's location in a rural setting away from population centres. Background noise sources would include traffic, farm equipment (e.g. harvesters, boom sprayers and tractors), wind through trees, and insects.

The three non-associated residences (R3, R4 and R5) within 500 m of the site (see Figure 1.3) will be at greatest risk of noise and vibration associated with site activities. However, impacts on all potentially affected residences will need to be considered.

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

Impacts from noise during the 18-month construction period will occur mostly from construction vehicles and equipment. Standard, best practice mitigation measures will be implemented to reduce potential noise disturbance (e.g. working within standard hours or fitting vehicles with silencing devices, where appropriate).

Operational noise sources associated with the solar farm will include the solar panel tracking systems and inverters. However, the main source of noise is expected to be associated with the operation of the BESS (including associated transformers and PCS units) and the on-site substations. The nearest sensitive receiver to either the BESS or a substation is R9, which is located approximately 1 km away.

Of the non-associated residences, R3 is expected to be the most vulnerable to noise impacts due to its proximity to the site. The other non-associated residences are more distant and are expected to be at least partly shielded from noise impacts by vegetation and/or intervening topography.

It is expected that noise will be effectively managed and minimised through the adoption of standard management practices, as will be outlined in the EIS. If necessary, there may be potential to reduce noise impacts by the careful location of noise generating components within the site to increase the distance to sensitive receivers.

Vibration issues are not expected to be significant during either construction or operation due to the distance between the site and the nearest sensitive receivers, but will need to be assessed, particularly in relation to R3.

NEED FOR FURTHER ASSESSMENT

A detailed assessment of construction noise impacts will be undertaken in accordance with the Interim Construction Noise Guideline (ICNG) (DECC 2009), and operational noise impacts in accordance with the Noise Policy for Industry (NPI) (EPA 2017).

Should noise levels be likely to exceed relevant criteria, a noise management plan will be developed and included in the EIS.

6.8 Hydrology and water quality

EXISTING CONDITIONS

The project site is located within the Murray-Darling Basin, approximately 4 km east of the Merriwa River (see Figure 1.2). The site drains north, south, east and west away from the central elevated plateau. The main drainage line is Vallances Creek, which originates within the centre of the project site and flows south, eventually reaching the Goulburn River approximately 13 km away. Vallances Creek is an ephemeral waterway (within the site) that provides water to a number of farm dams.

The project site is not located within designated flood affected land according to the Upper Hunter Shire Council Online Mapping Tool (UHSC 2021a).

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

Due to the generally elevated, water-shedding nature of the site and the fact that it is not located within designated flood affected land, exposure to regional flood risk is considered minimal. It is anticipated that much of the site will exhibit only minor overland flooding due to the small catchments and distributed flow paths. However, there are several locations where flow paths are concentrated, and greater water depths and velocities are expected. One of these locations is to the south of the panel area where the BESS and high voltage substation are in the path of (or immediately next to) a water course.

Localised flood risk and the potential for the project to affect flood flows can be managed by the application of standard flood design principles (such as elevated footing) and, if required, by avoiding flood prone locations when finalising project design and configuration.

As outlined in Section 6.4, the construction of the solar farm will not require any major reshaping of landforms and only minor excavation. The project is therefore expected to result in minimal disruption to hydrology. Impacts on hydrology will also be minimised by the design of water management features such as culverts and spoon drains in accordance with current leading practice.

The main risk to water quality from the project is associated with erosion and sediment transport during construction. As outlined in Section 6.4, the potential for erosion is generally considered low and standard management measures will be applied to minimise this risk.

The risk of groundwater impacts during construction is also expected to be low as site levelling for the solar farm and substation foundations is expected to require excavation of no more than 400-600 mm, and trenches for underground cables are expected to be 1,000-1,200 mm deep.

Water use during project construction and operation will be minimal and water will be brought to site by tanker as required. No impacts are anticipated on the availability of current surface or groundwater resources used by local landholders.

NEED FOR FURTHER ASSESSMENT

Impacts to waterways and hydrology during construction and operation, including flood risk, will be assessed as part of the EIS process, including a detailed assessment of the potential impacts on:

- water movement during localised flood events
- surface water and groundwater resources, including (if identified) watercourses, wetlands, riparian land, and groundwater dependent ecosystems (including impacts from acid sulphate soil disturbance), and the associated environmental values
- adjacent licensed water users and basic landholder rights

Measures will be proposed to monitor, reduce and mitigate impacts as required.

Impacts on groundwater, water quality and water use will also be considered by the EIS, although specific studies are not expected to be required.

6.9 Hazards and risks

EXISTING CONDITIONS

The project site and surrounds are a rural landscape with the exception of the existing 500 kV transmission line immediately south of the site. The main hazards associated with the rural use of the area are expected to be the presence of farm-scale storages of fuels, hydrocarbons and chemicals such as pesticides and herbicides.

The project site is mapped as bushfire prone. The project site is next to the Goulburn River National Park and hence considered to be bushfire-prone land, according to the Rural Fire Service Online Tool. The land area is also classified as medium to high risk according to the Upper Hunter Shire Council Online Mapping Tool (UHSC 2021a).

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

Hazards associated with the project facilities include the presence of potentially flammable lithium-ion batteries in the BESS units. The design of these units includes operational controls such as ventilation and cooling systems to limit associated risks and to quickly detect and respond to issues such as over-heating. The individual, containerised solar farm units are also physically separated and configured to minimise risk. Detailed operational, maintenance and emergency response procedures will be implemented to further reduce risk.

Hazards associated with the proposed on-site substations will be managed in accordance with the standard requirements of SafeWork NSW and applicable legislation.

The solar farm and BESS units, cabling, power conversion units, transformers and substations will produce some electromagnetic emissions. However, these are expected to be below the guideline for public exposure.

Bushfire risk is a major consideration for the project, given its location. Standard bushfire prevention and management measures will be developed for the project in accordance with the NSW Rural Fire Authority.

NEED FOR FURTHER ASSESSMENT

Although the project is not expected to trigger the need for a PHA under the current wording of SEPP No. 33 – Hazardous and Offensive Development (SEPP 33 – see Section 4.1), it is anticipated that such an assessment will be required by the SEARs. It is therefore proposed that a standard Preliminary Hazard Assessment (PHA) be undertaken in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* (DoP 2011a) and *Multi-Level Risk Assessment* (DoP 2011b).

The findings of the PHA and proposed management measures will be outlined in the EIS and the PHA will be appended. The findings of the PHA will be a key focus of Maoneng's community and stakeholder engagement program (see Section 5).

The EIS process will include an assessment of potential hazards and risks associated with transmission infrastructure, BESS and substations against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* (ICNIRP 1998).

Bushfire response will be part of emergency management planning for the project. No specific investigation of bushfire risk or management is proposed as part of the EIS. However, consultation will be undertaken with the NSW Rural Fire Authority during the EIS process to determine fire risk and response requirements and to determine the scope of a subsequent bushfire management plan and/or emergency response plan to be developed during the detailed design and pre-construction phases.

6.10 Social and economic

EXISTING CONDITIONS

The Merriwa region has a population of approximately 1,761 (ABS 2016) and covers a land area of 3,500.4 km² (ABS 2006). Other town centres within the Upper Hunter LGA are Scone, Aberdeen and Murrurundi (UHSC 2021b).

Agricultural production and agricultural industries are a major employer for Merriwa and surrounding rural communities, with broadacre grain production and beef cattle being the dominant commodities (Minesoils 2021).

PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

The project is expected to result in a number of social and economic impacts for the region (both positive and negative) and for the State of NSW (positive). These include:

Construction impacts

- noise and dust impacts on local landholders
- impacts on visual amenity due to construction activities
- amenity impacts, safety risks and congestion due to the:
 - upgrade of Flaggs Road from Merriwa to site
 - use of local roads by construction-related traffic (including through Merriwa)
 - use of regional transportation routes delivering equipment and materials to site

- benefits to the local community from the upgrade of Flaggs Road from Merriwa to site
- impact of construction workers on availability of local accommodation
- impact of construction workers on availability of local services (e.g. health care)
- employment opportunities for local community
- opportunities and/or increased patronage of local businesses (e.g. quarries, suppliers, trades, food and retail outlets)
- regional (LGA) and state-wide economic stimulus
- concern by RAPs and other parties over potential disturbance of cultural heritage sites and values
- concern by interested parties over potential loss of biodiversity and other environmental values
- increased experience and improved capacity within Council to authorise construction consents and regulate construction activities in relation to renewable energy developments
- long-term change to the rural character of the area.

Operation impacts

- noise impacts on local landholders
- impacts on visual amenity due to presence of solar farm
- local community concerns over hazards and risks (e.g. EMF exposure, BESS fire)
- amenity impacts and safety risks due use of local roads by site-related traffic
- employment opportunities for local community
- opportunities for local businesses (e.g. trades)
- contribution of project to State transition away from carbon-intensive energy generation.

The project will increase local employment opportunities and help drive growth in the area, while helping NSW to sustainably meet its energy needs in the shift to renewables (from coal). The project will provide immediate social and economic benefits to the local community during construction due to local economic stimulus.

Adverse social and economic impacts can be managed by careful planning, a high level of communication and close consultation with Council. Pressure on local services including accommodation, health services and schools has the potential to increase due to the relocation of construction workers into the area. However, with sufficient warning, steps can be taken by Council and service providers to increase capacity to address the issue fully or partially.

NEED FOR FURTHER ASSESSMENT

Many of the potential social and economic impacts listed above are direct impacts associated with physical changes to the natural and built environment and are addressed by the other studies proposed for the EIS. However, the EIS will also assess the potential indirect impacts of the project on the local community, including issues such as accommodation availability, and the capacity of services to continue to cater for the local community while also servicing construction workers. Cumulative impacts will be considered by identifying other projects

being developed or proposed locally that might also increase local demand for accommodation or services.

The Social Impact Assessment (SIA) Scoping Worksheet developed by DPIE has been used to help assess the level of social impact assessment required for the EIS. Overall, it is considered that the project will result in minor and largely positive social impacts. However, impacts will be significantly greater during the 18-month construction period, particularly for Merriwa, and this will be the focus of the assessment.

6.11 Other impacts

Other potential environmental or social impacts that are lower risk than those in Sections 6.2 to 6.10 and/or are readily manageable by implementing standard environmental management and mitigation procedures (as will be outlined in the EIS) are assessed in Table 6.4.

Table 6.4 Assessment of lower priority project impacts and need for further assessment

Existing conditions	Preliminary impact assessment and management	Need for further assessment
Waste management		
The construction, operation and decommissioning of the solar farm and BESS will generate a range of waste streams that will require management in line with sustainability principles and the waste hierarchy.	For many of the waste streams generated by the project (e.g. metals and concrete), mature end markets exist allowing them to be recycled and minimising disposal to landfill. However, the rapid growth of renewable energy projects in recent years has led to the generation of wastes such as solar panels and lithium-ion batteries for which re-use and recycling options and markets are currently limited.	Waste management will be assessed by considering the nature of wastes generated during the different project phases and their management within the NSW regulatory framework. The aim will be to minimise waste generation and maximise waste re-use and recycling. No specific investigation is proposed as part of the EIS.
Air quality and dust		
Existing sources of air pollution at the project site are likely to result from vehicle emissions and dust from agriculture and may increase during the colder months from solid fuel heating and during summer periods if bushfires or dust storms occur in the region.	Construction has the potential to increase dust through movement of traffic on unsealed roads on dry days, vegetation removal and construction activities (such as access road construction). However, dust impacts are unlikely to be significant and standard dust suppression measures can be readily implemented.	Measures to manage potential air quality impacts during construction will be outlined in the EIS. No specific investigation is proposed as part of the EIS.

Existing conditions	Preliminary impact assessment and management	Need for further assessment
	Impacts to air quality during operation will be negligible.	
Airfields		
The nearest airfields are at Tamworth approximately 125 km to the north and Bathurst, approximately 155 km to the southwest, although some local properties have airstrips.	It is unlikely that air traffic will be affected from the glint or glare of the BESS's infrastructure.	Any potential affects to air traffic will be discussed in the LVIA, prepared as part of the EIS process.
Existing site contamination		
A search of NSW EPA Contaminated Land Record of Notices identified no sites within the Upper Hunter Shire Council (search undertaken 22 September 2021). In addition, a search of NSW EPA Notified contaminated sites did not identify any contaminated sites (search undertaken 24 September 2021).	Existing contamination of the project site could be present because of past fertiliser, herbicide, pesticide, and other chemical use on the land, and may be uncovered during excavation works at the site. Field visits to date have not identified any visible land contamination.	Risks associated with existing contamination are low due to the rural setting of the project and the minimal need for excavation during project construction. Standard construction procedures for the identification and management of existing contamination will be applied. However, an assessment of contamination risks consistent with the requirements of SEPP 55 (as outlined in DUAP 1998) will be undertaken as part of the EIS.

6.12 Assessment summary

A summary of the proposed assessment studies for the EIS is provided in Table 6.5. The summary sets out, for each matter to be assessed:

- the proposed level of assessment (detailed or standard) – see definitions below
- whether a consideration of cumulative impacts in relation to the matter are to be included in the CIA
- the nature of stakeholder engagement (i.e. whether specific engagement in relation to the matter will be undertaken, or whether the matter will be covered as part of general EIS engagement
- key government plans, policies and guidelines that will be considered
- cross-reference to the section of this scoping report where the matter has been discussed.

Standard and detailed assessments are defined in DPIE (2021a) as follows:

- **Detailed assessment** – The project may result in significant impacts on the matter, including cumulative impacts. The assessment of the impacts of the project on the matter will require detailed studies and investigations to be carried out by technical specialists.
- **Standard assessment** – The project is unlikely to result in significant impacts on the matter, including cumulative impacts. While the assessment of the impacts of the project on the matter will involve technical specialists, these impacts are likely to be well understood, relatively easy to predict using standard methods, and capable of being mitigated to comply with relevant standards or performance measures.

Table 6.5 Scoping summary table

Matter	Level of assessment	CIA	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Biodiversity	Detailed	No	General	<ul style="list-style-type: none"> <i>Biodiversity Assessment Method</i> (DPIE 2020b) and related BAM guidance documents and BAM Calculator <i>Matters of National Environmental Significance, Significant impact guidelines 1.1</i>, Environment Protection and Biodiversity Conservation Act 1999 (DoE 2013) 	Section 6.2
Heritage – Aboriginal and historic cultural heritage	Detailed (Aboriginal heritage) Standard (historic heritage)	No	Specific	<ul style="list-style-type: none"> <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i>, Part 6 National Parks and Wildlife Act 1974 (DECCW 2010b) <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i>, Part 6 National Parks and Wildlife Act 1974 (OEH 2011) <i>Historical Archaeology Code of Practice</i> (Heritage Council 2006) 	Sections 6.3.1 and Section 6.3.2
Land capability and stability	Detailed	Yes	General	<ul style="list-style-type: none"> <i>Strategic Regional Land Use Policy</i>. Guideline for Agricultural Impact Statements (NSW Government 2012) <i>Land Use Conflict Risk Assessment Guide</i> (DPI 2011) <i>The land and soil capability assessment scheme: second approximation – A general rural land evaluation system for NSW</i> (OEH 2012) <i>Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land</i> (OEH and OAS&FS 2013) 	Section 6.4, and Section 6.11
Traffic	Detailed	Yes	General	<ul style="list-style-type: none"> <i>AustRoads Guide to Road Design</i> (AustRoads 2017) 	Section 6.5

Matter	Level of assessment	CIA	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Visual amenity	Detailed	No	Specific	<ul style="list-style-type: none"> Guideline for landscape character and visual impact assessment (TfNSW 2020a) Beyond the Pavement 2020 (TfNSW 2020b) 	Section 6.6
Noise amenity	Detailed	No	General	<ul style="list-style-type: none"> Interim Construction Noise Guideline (DECC 2009) Noise Policy for Industry (EPA 2017) 	Section 6.7
Hydrology and water quality (including flood risk)	Detailed	No	General	<ul style="list-style-type: none"> Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) 	Section 6.8
Hazards and risks	Standard	No	General	<ul style="list-style-type: none"> Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (DoP 2011c) Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP 2011a) Non-Ionizing Radiation Protection Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (ICNIRP 1998) Multi-Level Risk Assessment. Assessment Guideline (DoP 2011b) 	Section 6.9
Social and economic	Standard	Yes	Specific	<ul style="list-style-type: none"> Social Impact Assessment Guidelines for State Significant Projects (DPIE 2021) 	Section 6.10
Waste management	Standard	No	General	<ul style="list-style-type: none"> Waste Classification Guidelines. Part 1: Classifying Waste (NSW EPA 2014) Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities (NSW EPA 2012) 	Section 6.11

Matter	Level of assessment	CIA	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Air quality and dust	Standard	No	General	<ul style="list-style-type: none"> Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) 	Section 6.10
Airfields	Standard	No	General	<ul style="list-style-type: none"> Included in visual amenity assessment (see above) 	Section 6.10
Existing site contamination	Standard	No	General	<ul style="list-style-type: none"> Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (DUAP 1998) 	Section 6.10
Cumulative impact assessment	Standard	-	General	<ul style="list-style-type: none"> Social Impact Assessment Guidelines for State Significant Projects (DPIE 2021c) 	As relevant, above

7 Conclusion

This Scoping Report has been prepared in accordance with the requirements of DPIE for projects identified as SSDs and therefore requiring an EIS to be prepared under Part 4 of the EP&A Act. Specifically, the report has been prepared in accordance with *State significant development guidelines – preparing a scoping report* (DPIE 2021a). The report will support a request to DPIE from Maoneng for the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

Potential environmental and social issues associated with the project have been identified and prioritised as either higher priority or lower priority issues. Based on a preliminary assessment of these potential issues, Maoneng has proposed environmental assessment requirements for consideration by DPIE.

Impact avoidance and minimisation has been achieved through the initial site selection and will be further considered during project design.

Strong emphasis will be placed on engagement to fully inform stakeholders as to the potential impacts of the project and proposed management measures, and to provide opportunities for stakeholder input into the development process.

The project is expected to be a relatively low risk development compared with many SSDs. This is due to the inherently low impact nature of solar farm construction and operation, and the location of the project in an area that has a long history of disturbance from primary production, is adjacent to existing electrical infrastructure, is remote from population centres, and has few impacted neighbours. The operation of the solar farm will require very little handling of hazardous materials and will generate very little hazardous pollution or waste, other than the eventual removal of the lithium-ion batteries from the BESS at the end of their operational life.

The solar farm and associated BESS are expected to result in significant benefits to the local community and State of NSW by providing generating capacity to help replace the Liddell coal-fired power station, providing increased reliability and security to the network during peak periods, and contributing to the transition to cleaner electricity generation and increased energy security.

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Appendix A:

Key legislation, regulations and planning instruments

Appendix A: Key legislation, regulations and planning instruments

Statutory reference	Description	Relevance to project
Commonwealth legislation		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE). Approval from the Minister for the Environment is required for proposed actions that:</p> <ul style="list-style-type: none"> • have a significant impact on a Matter of National Environmental Significance (MNES), which includes 'nationally threatened species and ecological communities' • actions that (indirectly or directly) have a significant environmental impact on Commonwealth land • actions carried out by Commonwealth agencies. <p>Such actions must be referred to DAWE to determine whether the action is a 'controlled action' requiring approval from the Minister. The assessment of the significance of the impact is based on the criteria listed in the DAWE's Significant Impact Guidelines 1.1.</p> <p>The potential presence of nationally threatened species and ecological communities within the project site has been identified during the preliminary biodiversity survey. Accordingly, it is expected that referral of the project under the EPBC Act will be required, which may result in a need for approval from the Minister for the Environment.</p> <p>The referral would be submitted at the same time to DAWE and NSW DPIE. If the project needs to be assessed under both NSW and Australian Government law the two agencies would seek to undertake the assessments under the bilateral agreement in place between the Commonwealth of Australia and the State of New South Wales.</p> <p>An independent statutory review of the EPBC Act was commenced in October 2019 and submitted to the Australian Government in October 2020. The Government has yet to respond to the recommendations of the review (Samuel 2020).</p>	An EPBC Act Referral is expected to be required due to the potential presence within the project site of nationally threatened species and ecological communities. This may result in a requirement to obtain Commonwealth approval for the project in addition to State approval.

Statutory reference	Description	Relevance to project
<i>Native Title Act 1993</i>	<p>The <i>Native Title Act 1993</i> provides a national framework for the recognition and protection of native title (i.e. the rights and interests, recognised by common law, possessed under traditional laws and customs of Aboriginal and Torres Strait Islander people). The Act recognises the ownership (or set of rights and interest) of land or waters by Aboriginal and Torres Strait Island groups prior to European Settlement; provides a mechanism for determining where native title exists and who holds it; and identifies compensation for actions affecting it. The Act establishes ways in which future dealings affecting native title may proceed and sets standards for those dealings.</p> <p>People who hold native title have a right to practice their traditional laws and customs, whilst respecting Australian laws, and have a right to:</p> <ul style="list-style-type: none"> • be consulted with regarding any proposed action on their land • receive compensation for that action. 	The <i>Native Title Act 1993</i> is relevant to the project as the project site falls within land currently subject to Native Title Claim by the Gomeroi People.
State legislation and regulations		
<i>Environmental Planning and Assessment Act 1979</i>	<p>The consent authority for a State Significant Development (SSD) is determined under Part 4, Division 4.2 Section 4.5 of the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act):</p> <p style="padding-left: 40px;"><i>For the purposes of this Act, the consent authority is as follows—</i> <i>(a) in the case of State significant development—the Independent Planning Commission (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind)</i></p> <p>The Minister is therefore the consent authority for the Merriwa Solar Farm.</p> <p>Consent for an SSD is granted under Part 4, Division 4.7, Section 4.38 of the EP&A Act:</p> <p style="padding-left: 40px;"><i>(1) The consent authority is to determine a development application in respect of State significant development by—</i> <i>(a) granting consent to the application with such modifications of the proposed development or on such conditions as the consent authority may determine, or</i> <i>(b) refusing consent to the application.</i></p> <p>Under Part 4, Division 4.3 Section 4.12 of the EP&A Act:</p>	Development of the Merriwa Solar Farm will be assessed under Part 4 'Development Assessment' of the EP&A Act, the Minister for Planning and Environment will be the consent authority, and the preparation of an EIS is required to accompany the development application.

Statutory reference	Description	Relevance to project
	<i>(8) A development application for State significant development or designated development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations.</i>	
Environmental Planning and Assessment Regulation 2000	<p>The Environmental Planning and assessment Regulation 2000 (EP&A Regulation) contains detail on various processes set out under the EP&A Act. Schedule 2 of the EP&A Regulation provides:</p> <ul style="list-style-type: none"> • provisions for EIS development, including EIS content • conditions for the preparation of environmental assessment requirements for a development, by the Secretary and approval bodies • timing requirements for Development Applications (DAs) • other provisions relating to state significant infrastructure • clauses 84 and 85 provide provisions relating to advertising of the development, and state the DA be placed on public exhibition for a period of no less than 30 days • Section 7 (subclause 1f) of Schedule 2 requires the EIS include justifications for the development, with regard to biophysical, economic and social considerations, including principles of ecologically sustainable development (ESD) set out in subclause 4 • Division 6 of the EP&A Regulation relates to public participation for SSDs and includes provisions for the public exhibition period, notices of application, responding to submissions and lists the documents that are to be made publicly available. 	The EIS will be prepared in accordance with the EP&A Regulation. Justifications for the development, and its incorporation of ESD principles will be provided with notices of application.
<i>Roads Act 1993</i>	<p>Under Section 138 of the <i>Roads Act 1993</i>, consent from the relevant roads authority (council or Transport for NSW (TfNSW)) is required for any works or activities in a public reserve, public roadway or footpath (nature strip). Section 138 requires that all activities undertaken within council road reserves be approved by council prior to the activities being undertaken.</p> <p>Under Part 4, Division 4.7, Section 4.2 of the EP&A Act, consent for any required road upgrades cannot be refused if it is necessary for carrying out the SSD and is to be substantially consistent with the SSD consent.</p> <p>No other approvals consistent with the SSD consent are anticipated to be required.</p>	The EIS will consider requirements for project-related use of roads and the need for road works during solar farm construction. If required, approval from council will be sought under Section 138 of the Roads Act.

Statutory reference	Description	Relevance to project
	It is anticipated that sections of Flaggs Road will require upgrade between Merriwa and the site access points to accommodate construction traffic (see Section 6.2). Flaggs Road is classified as a local road and council consent is expected to be required for any upgrade works.	
<i>Biodiversity Conservation Act 2016</i>	<p>The <i>Biodiversity Conservation Act 2016</i> (BC Act) commenced on 25 August 2017 as part of the NSW Government's new framework for the conservation of biodiversity. The BC Act governs the management and conservation of biodiversity in NSW, which includes all flora, fauna and ecological communities, consistent with the principles of ESD (as described in section 6(2) of the Protection of the Environment Administration Act 1991).</p> <p>The BC Act establishes (amongst others):</p> <ul style="list-style-type: none"> • a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity • a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values • a market-based conservation mechanism through which the biodiversity impacts of development and land use change can be offset at landscape and site scales. 	A BDAR will be prepared as part of the EIS to identify the potential impacts of the Merriwa Solar Farm project on biodiversity.
<i>Biosecurity Act 2015</i>	<p>The <i>Biosecurity Act 2015</i> (Biosecurity Act) provides a statutory framework for the management of biosecurity risks from diseases, pests (plant and animal) and contaminants that have the potential to cause harm to the environment, people and the economy.</p> <p>The Biosecurity Act aims to reduce risks by: preventing the entry of diseases, pests and contaminants into NSW; identifying, containing and eradicating new entries; and minimising potential impacts through appropriate management. The Biosecurity Act has provisions in place for: conferring a power, function or right; or imposing an obligation, for the prevention of the introduction, or control or eradication of invasive pests (such as weeds and animal pests) which threaten ecosystems, habitats or species. Under the Biosecurity Act, Local Control Authorities such as local councils may appoint authorised officers to enforce weed management and provide direction on complying with obligations under the Biosecurity Act.</p>	The potential for project-related impacts from invasive weeds and pests will be considered in the EIS.

Statutory reference	Description	Relevance to project
<i>National Parks and Wildlife Act 1974</i>	<p>The <i>National Parks and Wildlife Act 1974</i> (NPW Act) is the key legislation governing the State's care, control and management of all national parks, historic sites, nature reserves and Aboriginal areas. State conservation areas, karst conservation reserves and regional parks are also administered under the Act. Places or objects of Aboriginal cultural heritage on or in the vicinity of the site will need to be managed in accordance with this Act. Clause 86 of this Act states: a person must not harm or desecrate an object that the person knows is an Aboriginal object. Section 87 of the NPW Act establishes defences against prosecution under s.86 (1), (2) or (4) –harming or desecrating Aboriginal objects and Aboriginal places. The defences are as follows:</p> <ul style="list-style-type: none"> • An Aboriginal Heritage Impact Permit (AHIP) authorising the harm (s.87(1)). • Exercising due diligence to establish Aboriginal Objects will not be harmed (s.87(2)). <p>Due diligence may be achieved by compliance with requirements set out in the National Parks and Wildlife Regulation 2009 (the NPW Regulation) or a code of practice adopted or prescribed by the NPW Regulation (s.87(3)).</p>	<p>Under Section 89J of the EP&A Act, an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974 would not be required for an SSD, unless the requirement of an environmental planning instrument for consultation or concurrence specifies that it applies to an SSD.</p> <p>An ACHAR will be prepared for the Merriwa SF EIS, identifying some objects of Aboriginal cultural significance within the project site.</p>
<i>Heritage Act 1977</i>	<p>The <i>Heritage Act 1977</i> provides a legal framework for the management of items and places of State heritage significance, providing for their protection. The Act encourages conservation of the State's heritage and provides for the identification and registration of items of State heritage significance.</p>	<p>Under Section 89J of the EP&A Act, an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977 would not be required for an SSD.</p> <p>Any existing or unknown or other potential unknown State heritage items will be managed under the Act.</p>
<i>Water Management Act 2000</i>	<p>The objective of the <i>Water Management Act 2000</i> is to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular to:</p> <ul style="list-style-type: none"> • promote ESD • protect, enhance and restore water courses • recognise and foster social and economic benefits • recognise the role of the community • provide efficient and equitable sharing of water • manage water sources together with other aspects of the environment including native vegetation and native fauna 	<p>The project is not expected to require an aquifer interference approval under the <i>Water Management Act 2000</i>, as only limited and shallow excavation is currently proposed.</p> <p>Accordingly, consistent with section 4.41 of the EP&A Act, approvals under the <i>Water Management Act 2000</i> are not expected to be required.</p>

Statutory reference	Description	Relevance to project
	<ul style="list-style-type: none"> encourage the sharing of responsibility and efficient use of water encouraging best practice management and use of water. <p>Under section 4.41 of the EP&A Act, authorisations that are not required for an SSD include: a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the <i>Water Management Act 2000</i>.</p>	
<i>Crown Lands Management Act 2016</i>	<p>The <i>Crown Lands Act 1989</i>, administered by the Minister for Crown Lands, regulates the management of Crown land for the benefit of the people of New South Wales and in particular to provide for:</p> <ul style="list-style-type: none"> a proper assessment of Crown land, the management of Crown land having regard to the principles of Crown land management contained in this Act the proper development and conservation of Crown land having regard to those principles the regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licenced or otherwise dealt with the reservation or dedication of Crown land for public purposes and the management and use of the reserved or dedicated land, and the collection, recording and dissemination of information in relation to Crown land. <p>Under Part 3 of the Act, a land assessment is required to be undertaken for any matters affecting Crown Land.</p>	Crown Land is not present within the project site and no Crown Land permits will be required for the project.
<i>Protection of the Environment Operations Act 1997</i>	<p>The <i>Protection of the Environment Operations Act 1997</i> (POEO Act) provides the regulatory framework to protect the environment of NSW, including land, air and water. It is the key piece of environment protection legislation administered by the EPA. PA 2.49 and PA 2.50 of the Act set out obligations regarding the receiving of wastes to be stored, processed or disposed on site and the classification of those wastes. The control and mitigation measures for greenhouse gas emissions associated with the project will also be managed under this Act.</p>	Under section 48 of the POEO Act, premises-based scheduled activities, as defined in Schedule 1, require an Environmental Protection Licence (EPL). Under Clause 17 of Schedule 1, electricity generation is a scheduled activity requiring an EPL. However, solar power is not included in this definition and therefore the project is not a scheduled activity under the POEO Act and an EPL is not required (NSW Government 2017).

Statutory reference	Description	Relevance to project
<i>Rural Fires Act 1997</i>	<p>The Rural Fires Act 1997 (Rural Fires Act) provides:</p> <ul style="list-style-type: none"> • (a) for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts • (b) for the co-ordination of bush firefighting and bush fire prevention throughout the State, and • (c) for the protection of persons from injury or death, and property from damage, arising from fires, and • (c1) for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires, and • (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)-(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the Protection of the Environment Administration Act 1991. <p>Under section 4.41 of the EP&A Act, authorisations that are not required for an SSD include a bush fire safety authority under section 100B of the <i>Rural Fires Act 1997</i>.</p>	As the project is an SSD, a bush fire safety authority under section 100B of the Rural Fires Act is not required. However, Section 63 of the Rural Fires Act imposes a duty of care on land managers and landholders to take appropriate steps to prevent bush fires and Section 64 requires that during the bush fire danger period land managers and landholders take steps to extinguish fire or call the local fire authority.
<i>Local Land Services Act 2013</i>	The <i>Local Land Services Act 2013</i> (LLS Act) provides a framework for the management of local land services which include programs and advisory services relating to agricultural production, biosecurity, natural resource management (including management of native vegetation, weeds and pests) and emergency management. The LLS Act aims to ensure natural resources are managed in accordance with the principles of ESD (as described in section 6(2) of the Protection of the Environment Administration Act 1991) in the social, economic and environmental interests of the State.	The management of local land services, specifically relating to native vegetation clearance on rural land, and the management of weeds, will need to be considered in the EIS.
Environmental planning instruments		
State Environmental Planning Policy (State and Regional Development) 2011	<p>The State Environmental Planning Policy (SEPP) (State and Regional Development) 2011 aims to identify development that is of State significance and confers functions on joint regional planning panels to determine development applications.</p> <p>Under Part 2, Section 8 of the SEPP, a development is declared to be an SSD for the purposes of the EP&A Act if (amongst other things) the development is specified in Schedule 1 or 2 of the SEPP.</p> <p>Under Schedule 1, Section 20 of the SEPP, the following is considered an SSD:</p>	The Merriwa Solar Farm (and associated BESS) is classified as an SSD as it has a capital investment value of more than \$30 million and will be used for the purposes of both generating and storing electricity.

Statutory reference	Description	Relevance to project
	<p><i>Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:</i></p> <p><i>(a) has a capital investment value of more than \$30 million, or</i></p> <p><i>(b) has a capital investment value of more than \$10 million and is located in an environmentally sensitive area of State significance.</i></p>	
State Environmental Planning Policy (Infrastructure) 2007	<p>The SEPP (Infrastructure) 2007 (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across the State. Division 4 of the ISEPP defines ‘electricity generating works’ as having the same meaning as it has in the Standard Instrument. Under the Standard Instrument:</p> <p><i>electricity generating works means a building or place used for the purpose of—</i></p> <p><i>(a) making or generating electricity, or</i></p> <p><i>(b) electricity storage.</i></p> <p>Part 3, Division 4, Section 34(1) of the Infrastructure SEPP states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.</p> <p>Part 1, Section 8 of the Infrastructure SEPP, states that:</p> <p><i>(1) ...if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency.</i></p> <p>The Merriwa Solar Farm is therefore a permissible development with consent as an SSD under clauses 34(1) and 8(1) of the Infrastructure SEPP.</p>	The Infrastructure SEPP will allow for the development of the Merriwa Solar Farm, with consent, even on land prescribed for rural use.
State Environment Planning Policy No. 33 (Hazardous and Offensive Development)	<p>The SEPP No. 33 – Hazardous and Offensive Development (SEPP 33) defines and regulates the assessment and approval of potentially hazardous or offensive development. A potentially hazardous industry is defined within SEPP 33 as “<i>a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment</i>”.</p> <p>A potentially offensive development is defined within SEPP 33 as a “<i>development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on</i></p>	The project is not expected to trigger the need for a PHA under the current wording of SEPP No. 33. However, it is anticipated that an assessment under SEPP 33 will be required by the SEARs, including a Preliminary Hazard Assessment in accordance with the guidance documents <i>Hazardous Industry Planning Advisory</i>

Statutory reference	Description	Relevance to project
	<i>other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment."</i>	<i>Paper No. 6 – Guideline for Hazard Analysis and Multi-Level Risk Assessment.</i>
State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55)	SEPP No. 55 –Remediation of Land (SEPP 55) aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Under Clause 7 of SEPP 55, a consent authority must not consent to the carrying out of any development on land unless it has considered whether the land is contaminated.	Although there is no reason to suggest that contamination exists at the project site, the potential for contamination will need to be considered by the EIS.
State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44)	State Environment Planning Policy No. 44 –Koala Habitat Protection (SEPP 44) requires that for Development Applications ‘potential koala habitat’ must be determined. Such habitats are defined as having 15 per cent of trees of the species listed in the SEPP 44.	The preliminary biodiversity assessment did not identify Koala habitat on site.
Upper Hunter LEP 2013	<p>The proposed project site is located within the Upper Hunter Shire Council boundaries and will therefore be subject to the relevant provisions of the Upper Hunter LEP 2013.</p> <p>The Upper Hunter LEP aims to make local environmental planning provisions for land in the Upper Hunter in accordance with the relevant standard environmental planning instrument under Section 3.20 of the EP&A Act.</p>	<p>The Upper Hunter LEP is a key planning instrument that needs to be considered in the EIS.</p> <p>The aims of the plan and the consistency of the project with those aims is considered in the Scoping Report and will be considered further in the EIS.</p>
Upper Hunter Land Use Strategy 2017	<p>The Upper Hunter Land Use Strategy aims to provide clear direction for decisions taken by Council and NSW Government agencies relating to the future use of land within the Upper Hunter LGA for the next 14 years, to 2031. It is intended to guide the preparation of comprehensive LEP planning controls (providing regulatory land use controls). It also establishes a policy framework to facilitate opportunities as they emerge in the future.</p> <p>The Strategy takes into account the objects of the Environmental Planning and Assessment Act 1979 in identifying proposed actions to implement the vision. This legislation provides the legal framework for the preparation of LEPs.</p>	<p>The Upper Hunter Land Use Strategy is a key supporting document for the LEP.</p> <p>The objectives of the strategy and the consistency of the project with those objectives is considered in the Scoping Report and will be considered further in the EIS.</p>

Statutory reference	Description	Relevance to project
Development control plans		
Upper Hunter Development Control Plan 2015	<p>The Upper Hunter Development Control Plan (DCP) 2015 provides a detailed development assessment framework for the Upper Hunter community and applies to all development that may only be carried out with consent under Part 4 of the EP&A Act 1979.</p> <p>When determining a development application, the Council (or other relevant consent authority) will take into consideration the extent to which any applicable objectives or development outcomes specified by this DCP will be satisfied or achieved by the design, construction or operation of the proposal.</p>	<p>The Upper Hunter Development Control Plan is a key supporting document for the LEP.</p> <p>The objectives of the plan and the consistency of the project with those objectives will be considered in the EIS.</p>
Regional strategies		
Hunter Regional Plan 2036	<p>The proposed Merriwa Solar Farm falls within the Hunter Region of NSW. DPIE has prepared the Hunter Regional Plan 2036 which provides a 20-year blueprint for the future of the region (DPIE 2021).</p> <p>The plan sets out the NSW Government's vision for the Hunter Region, which is to be leading regional economy in Australia, with thriving communities and a biodiversity-rich natural environment.</p>	<p>The objectives of the Hunter Regional Plan, and the consistency of the project with those objectives is considered in the Scoping Report and will be considered further in the EIS.</p>

Appendix B:

Pre-conditions to consent and mandatory matters for consideration

Appendix B: Pre-conditions to consent and mandatory matters for consideration

Statutory reference	Pre-condition/mandatory matter	Relevance
State legislation and regulations		
<i>Environmental Planning and Assessment Act 1979</i> - Part 4, Division 4.3, Section 4.15	<p>In determining a development application, a consent authority is to take into consideration matters including (among others):</p> <ul style="list-style-type: none"> the provisions of <ul style="list-style-type: none"> any environmental planning instrument any development control plan that apply to the land to which the development application relates. the likely impacts of that 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 the public interest. 	<p>The EIS will be required to provide information in relation to relevant matters the consent authority is required to take into consideration pursuant to Section 4.15 of the EP&A Act.</p> <p>Applicable environmental planning instruments:</p> <ul style="list-style-type: none"> State Environmental Planning Policy (State and Regional Development) 2011 State Environmental Planning Policy (Infrastructure) 2007 State Environment Planning Policy No. 33 (Hazardous and Offensive Development) State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55) State Environmental Planning Policy (Rural Lands) 2008 Upper Hunter LEP 2013 Upper Hunter Land Use Strategy 2017. <p>Applicable development control plans:</p> <ul style="list-style-type: none"> Upper Hunter Development Control Plan 2015.
<i>Environmental Planning and Assessment Act 1979</i> - Part 5, Subdivision 2, Section 5.5	A determining authority, in its consideration of an activity, shall take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.	The EIS will be required to provide information in relation to matters affecting or likely to affect the environment.
<i>Biodiversity Conservation Act 2016</i> - Part 7.9	An application for development consent under Part 4 of the EP&A Act for a State significant	Due to the presence of threatened species, remnant native vegetation and scattered trees within the project site, there is

Statutory reference	Pre-condition/mandatory matter	Relevance
	development (SSD) is to be accompanied by a biodiversity development assessment report (BDAR), unless the Planning Agency Head and the Environment Agency Head have determined that the proposed development is not likely to have any significant impact on biodiversity values.	the potential for the project to have a significant impact on biodiversity values. Preparation of a BDAR will therefore be required to determine whether significant impacts are likely to occur and determine requirements for offsetting any such impacts that are unavoidable.
<i>Environmental planning instruments</i>		
State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55), Section 7(1)	A consent authority must be satisfied that the land is suitable in its contaminated state – or will be suitable, after remediation – for the purpose for which the development is proposed to be carried out.	<p>The project site is located in a rural area that is unlikely to have extensive, existing contamination. In addition, the project is expected to require only minor excavation works.</p> <p>It is possible that contamination exists within the project site and that it may be disturbed during project construction. However, due to the low risk, it is considered that this can best be managed through standard procedures for the identification and management of existing contamination during construction.</p> <p>The risk of site contamination will be considered in the EIS, but no specific investigation is considered likely to be required.</p>



Appendix C:

Issues not requiring assessment in the EIS

Appendix C: Issues not requiring assessment in the EIS

Issues that have been considered but do not need further assessment in the EIS are listed below, together with the reasoning behind their exclusion. The groupings and matters listed in the table below are from *Appendix B – Categories of assessment matters* in the SSD scoping report guidelines¹.

Group	Specific matter not considered	Reason not considered in detail
Access	Port facilities	Only relevant in relation to importation of project components during construction and associated biosecurity, which is covered in Section 6.2 (Biodiversity) of the Scoping Report.
	Road and rail facilities	Only relevant in relation to transportation of project components to site which is covered in Section 6.5 (Access and traffic) of the Scoping Report.
Air	Atmospheric emissions	The project will result in minimal atmospheric or gaseous emissions, other than dust and fumes during construction, which are covered in Section 6.11 (Other impacts) of the Scoping Report.
	Gases	
Amenity	Odour	The project will result in minimal odour emissions.
Built environment	Public land	Project disturbance will be restricted to private land, other than the potential upgrade of Flaggs Road which is covered in Section 6.5 (Access and traffic) of the Scoping Report.
Hazards and risks	Coastal hazards	Not relevant as project is located inland.
	Dams safety	Not relevant as no dams are to be constructed as part of the project and only small fam dams are present on the project site.
	Groundwater contamination	Excavation into the groundwater table will not be required. The risk of groundwater contamination from use of hydrocarbons or hazardous materials or other sources is low and is covered by standard management practices for hydrocarbons, hazardous materials and wastewater.
	Land movement	The project does not require the construction of engineered landforms (such as dams), major structures vulnerable to land movement, or major storage facilities for dangerous goods or hazardous substances. Land movement (such as associated with seismic activity) is therefore not considered a hazard requiring consideration in the EIS, although it will be accounted

¹ DPIE (2021) State significant development guidelines – preparing a scoping report Appendix A to the state significant development guidelines. Department of Planning, Industry and Environment. July 2021.

Group	Specific matter not considered	Reason not considered in detail
		for in project design in accordance with standard engineering practice.
Heritage	Natural	No sites of high natural heritage value are present within the project site. The Goulburn River National Park located to the south of the project site is not expected to be affected by the project.
Social	Culture	Project not expected to have a major impact on local culture.
	Decision-making systems	<p>Project not expected to have a major impact on decision-making systems, as:</p> <ul style="list-style-type: none"> the consent authority for the development is the the Minister for Planning and Environment supported by DPIE who have robust decision-making systems for SSDs Council decision-making systems will be applied to smaller project components such as the Flaggs Road upgrade, which are within their expertise.



Appendix D: Preliminary Biodiversity Assessment

Appendix C: Preliminary Biodiversity Assessment

Merriwa Solar Farm

Accent Environmental

31 October 2021





Document Status

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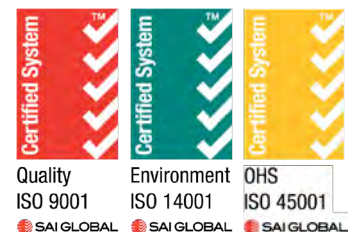


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ABBREVIATIONS

<i>BAM</i>	Biodiversity Assessment Method
<i>BDAR</i>	Biodiversity Development Assessment Report
<i>BESS</i>	battery energy storage system
<i>BOS</i>	Biodiversity Offset Scheme
<i>EIS</i>	environmental impact statement
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
<i>IBRA</i>	Interim Biogeographic Regionalisation of Australia
<i>km</i>	kilometres
<i>m</i>	metres
<i>Maoneng</i>	Maoneng Group
<i>MNES</i>	Matter of National Environmental Significance
<i>NSW</i>	New South Wales
<i>PCT</i>	Plant Community Type
<i>SAIIs</i>	Serious and Irreversible Impacts
<i>SEED</i>	Sharing and Enabling Environmental Data



1 INTRODUCTION

Maoneng Australia Pty Ltd (Maoneng) is seeking to develop the Merriwa Solar Farm in the Upper Hunter region of New South Wales (NSW). The proposed solar farm is located approximately 8 km southeast of the township of Merriwa and comprises a 550 MW utility-scale solar farm project and associated 400 MW/400 MWh BESS.

This Preliminary Biodiversity Assessment report has been prepared by the waterways and ecology section of Water Technology Pty Ltd for Accent Environmental Pty Ltd (Accent) based on a desktop review of existing information and an initial site investigation. The site investigation was undertaken by Dr Mick Aberton (BAM Accreditation: **BAAS 18181**). The report has been prepared as an appendix to the Merriwa Solar Farm Scoping Report, being prepared by Accent.



2 EXISTING CONDITIONS

2.1 Ecology Due Diligence Report

Water Technology undertook a review of the AEP (2021) Ecology Due Diligence Report prior to performing desktop analysis and a site scoping exercise. The site scoping exercise included some Targeted Species Surveys for selected species.

The AEP due diligence report was provided in February 2021. The study area was larger than the current project site, with the proposed development footprint at the time being 1048 ha.

A preliminary desktop assessment and site visit of the various lots comprising the proposed project site was carried out to determine ecological opportunities and constraints. The report discussed the approvals pathway, provided an analysis of mapped vegetation communities and threatened species, and discussed the risk of Serious and Irreversible Impacts (SIIIs), as devised under the BAM. It also discussed the EPBC Act process and provided a preliminary Biodiversity Assessment Method (BAM) candidate species report using a mock assessment and input into a BAM calculator.

The conclusions of the Due Diligence Report are summarised below:

- A Biodiversity Development Assessment Report (BDAR) would likely be required in support of an EIS as the Biodiversity Values Map identified areas with high biodiversity value associated with Valences Creek and all remnant wooded areas including paddock trees. In addition, a BDAR would be required as the area clearing threshold 1.0 ha (minimum lot size 100 ha) would not apply.
- A threatened species database search identified three threatened species that are shown on maps to have important habitat on the site and are considered candidate species. These species were selected after consideration of all remnant vegetation which include Valences Creek riparian area, and all wooded areas including paddock trees. They are:
 - the Regent Honeyeater *Anthochaera phrygia*
 - Large-eared Pied Bat *Chalinolobus dwyeri*
 - Eastern Cave Bat *Vespadelus troughtoni*.
- Category 1 land is not currently mapped on the Native Vegetation Regulatory Map, but criteria were used to identify its extent within the site. EAP classified 949 ha (91%) of the 1048 ha site as likely Category 1 land.
- Although the site is largely Category 1, a combination of preliminary mapping and aerial photography determined that up to 10 Plant Community Types (PCTs) may occur on the project site.
- A seasonal survey is required for the presence of flora and fauna species and a BAM candidate species report was generated with assumptions.

2.2 Desktop assessment

2.2.1 BAM site context

A combination of both NSW BioNET database searches, EPBC Protected Matters Search tool, Sharing and Enabling Environmental Data (SEED) vegetation mapping, AEP's outputs from the BAM Calculator, and vegetation mapping from the AEP due diligence report were used to determine the potential presence of flora, fauna and PCT's on the project site.



Based on the desktop assessment, the key aspects of the project site can be summarised as follows in accordance with BAM requirements:

- Interim Biogeographic Regionalisation of Australia (IBRA) region: Combination of Sydney Basin (southern part of project site) and Brigalow Belt South (northern part of project site)
- IBRA subregion: Sydney Basin IBRA region Kerrabee IBRA subregion (southern part of project site); Brigalow Belt South IBRA region Liverpool Range IBRA subregion (northern part of project site)
- Mitchell Landscape: Lees Pinch Foothills (Lpf) (southern part of project site) 28% cleared, and Liverpool Range Valleys and Foothills (Liv) 81% cleared (northern part of project site)
- Likely PCT: various, including PCT483 Grey Box and White Box grassy open woodland most commonly derived grasslands (PCTs are discussed further below)
- BAM candidate species collated from the initial mock assessment in the AEP due diligence report comprised 42 species with potential assessment requirements as follows:
 - 20 tree/plant species
 - nine bird species of which three are owls
 - four reptiles of which two are legless lizards and two are snakes
 - two frogs
 - seven mammals including two micro chiropteran (microbats) and one mega chiropteran (megabats) bat species.

The likelihood of all threatened species (from multiple database searches) is discussed further in Attachment A.

2.2.2 Database search results

Searches of databases of threatened species and ecological communities in the project site and the surrounding region were undertaken to identify any species or communities that may result in ecological constraints on project development. A consolidated list of threatened species known to, predicted to, or possibly occurring within the project site, along with their conservation status, a summary of their habitat preference and the likelihood of occurrence, is provided in Likelihood of Occurrence tables Attachment A. The results of the database searches are discussed below.

EPBC Protected Matters Search

An EPBC Protected Matters Search of a 10 km radius from the project site identified the following:

- Eight Listed Threatened Ecological Communities that may occur within the site:
 - Central Hunter Valley eucalypt forest and woodland (Critically Endangered Community)
 - Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered Community)
 - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered Community)
 - Hunter Valley Weeping Myall (*Acacia pendula*) Woodland (Critically Endangered Community)
 - Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Critically Endangered Community)



- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Critically Endangered Community)
- Weeping Myall Woodlands (Endangered Community)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered Community).
- 33 listed threatened species, comprising 11 birds, one frog, eight mammals, two reptiles and 11 plants:
 - there is potential for a number of the 22 fauna species to reside on the project site.
 - the 11 threatened flora species are more likely to occur south of the panel area along the proposed transmission line route to the existing TransGrid transmission line as there are fewer disturbances along this area.
- 11 listed threatened migratory species.

The results of the Protected Matters Search are provided in Attachment B.

BioNET Search

A BioNET search identified 135 fauna and 289 flora species that have been recorded within a 10 km radius of the site's centre over the past 30 years. Of these, threatened species recorded include: one reptile, 18 birds, nine mammals (seven are micro chiropteran bats) and no plants.

Based on the habitat on the project site, an indication of each threatened species' likelihood of occurring on site has been made (see Attachment A).

Other searches

- A preliminary vegetation map produced by adoption of the Upper Hunter Regional Native Vegetation Mapping (2015) using the online Sharing and Enabling Environmental Data (SEED) portal is provided in Attachment C.
- A review of the Biodiversity Values Threshold Tool Map (DPIE 2021) reveals that areas of high conservation value are associated with Vallances Creek and patches associated with remnant vegetation coinciding with the vegetation mapping (Appendix D).

Summary

In summary, the number of species listed in the BioNet search and the EPBC Protected Matters Search (10 km radius) is relatively low. However, 42 BAM candidate species were identified from the BAM Calculator in the due diligence report based on AEP's mock BAM assessment based on the mapped plant community types (PCT's). Although the project site is heavily disturbed, primarily as a result of agricultural practices, some habitat features for threatened species do occur, albeit scattered. Therefore, there is potential for some threatened fauna species to be present on the site in addition to those that may utilise the site during transit or when opportunistically foraging.

2.3 Preliminary field assessment

2.3.1 Background

As part of the scoping study, a site assessment comprising broad traverses of the project site was carried out by Water Technology between 28th August and 4th September 2021. The site is large and has up to nine different landholders with diverse management goals. However, the site is predominately heavily modified grazing land with a large number of dams and various internal fencing configurations. Fences on the northern side of Flaggs Road are arranged radially outwards from a central watering point and separated by electric



fencing to enable progressive grazing in paddocks. The southern side of Flaggs Road contains large paddocks. The project site is dominated by a mixture of native and exotic pasture grasses and is currently grazed by cattle, horses and a small flock of sheep. Historic aerial photography of the site shows various cropping in the 1970's and 1980's.

2.3.2 Flora

Large trees representative of PCT 483: 'Grey Box x White Box grassy open woodland community on basalt hills in the Merriwa region, upper Hunter Valley', are both scattered sparsely around the project site and located in small patches with modified understorey. These Grey Box trees may have once formed part of a mix of PCT 483 and PCT 1691: 'Narrow-leaved-Ironbark-Grey Box grassy woodland of the Central and Upper Hunter'. Both PCTs have associated Threatened Ecological Communities (TEC's).

A large proportion of the land is either grassland or cleared agricultural land currently mapped broadly as PCT 800: 'Derived grasslands of the slopes on the Merriwa Plateau'.

Other PCTs mapped via modelling in the vicinity and periphery of the project site include:

- PCT 0: Non-native
- PCT 1691: Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- PCT1881: Western Hunter Flats Rough-barked Apple Forest
- PCT1696: Blakelys Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter
- PCT1693: Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains
- PCT 1661: Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
- PCT1656: Narrow-leaved Ironbark - Black Pine - Narrow-leaved Wattle shrub - grass open forest on sandstone slopes of the upper Hunter and Sydney Basin



Proposed Merriwa BESS site and potential connection corridor

Within the proposed BESS site, the vegetation is comprised of multiple PCTs. The BESS site is predominantly cleared land with wombat dens and sandy soils (Photo 1).

Trees forming a small patch of PCT1696: 'Blakelys Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter' are expected to require removal for construction of either the transmission lines, the BESS or both in this location.



The connection corridor will likely traverse alongside an existing track through multiple PCT's mapped, including PCT 1661, PCT 1656 and PCT 1693 (although the latter classification is doubtful).

Photo 1 Cleared- sandy soil with wombat dens



The easement alignment had not been finally determined at the time of the preliminary ecological assessment and may subsequently impact areas that had not been traversed, including an ephemeral creek with riparian vegetation. In other locations, the clearance of the alignment is expected to have some impacts on remnant vegetation forming both PCT 1696 and PCT 1661 between the TransGrid powerlines and the creekline (Photo 2).

Photo 2 Ephemeral creek that may be impacted in some locations due to proposed alignment of powerline easement



Roadside entry points from Flaggs Road

Roadside vegetation associated with the entry points at Flaggs Road are already infested with weeds and provide little biodiversity value. Ongoing management of the road using a grader has resulted in a high level of disturbance in the vicinity of the road verge. However, these entry points need to be considered further during the EIS studies as there may need to be some degree of tree removal to allow line of sight and/or road widening operations

Proposed Project Site

A large proportion of the proposed solar panel footprint is comprised of grasslands consisting of few species and either dominated by native grasses (Photo 3), or exotics (Photo 4), or a combination of the two. The species composition was usually dominated by 1-2 species with very little species diversity.



Photo 1 Cleared largely native grassland and Grey Box grassy woodland community with occasional surface rock in distance

Photo 2 Cleared mainly exotic grassland

The south-western periphery of the proposed solar panel footprint contained trees and/or remnants of a community considered to be of high value as it was less accessible to livestock (Photo 5).



Photo 3 Remnant tress on the south-western periphery of the proposed solar panel footprint

PCT's comprising Narrow-leaved Ironbark *Eucalyptus crebra* and Blakely's Red Gum *Eucalyptus blakelyi* are the most commonly occurring across the solar panel footprint. In addition to PCT 483, there is some potential crossover with PCT 1691: 'Narrow-leaved-Ironbark-Grey Box grassy woodland of the Central and Upper Hunter'. Representatives of PCT 483 were the most frequently observed remnants within the project site.

Scattered trees are located within the proposed project site (Photo 6) but sparsely distributed. These are consistent with the presence of PCT 483 in the surrounding area. Other areas associated with road cuttings were considerably rocky or were associated with dissected drainage lines with erosional gullies potentially constraining the viability of solar panel construction.

These potential constraints will be assessed further during the EIS studies. The Vallances Creek drainage course had remnant trees representative of PCT 1656 (Photo 7).



Photo 4 Pasture grasses and isolated tree on project site



Photo 5 Vallances Creek remnant vegetation

2.3.3 Fauna

General

There is very little vertical or horizontal physical structure over most of the proposed solar panel footprint to provide habitat for fauna, except for the Grassy Woodland community. Some of the grasslands on cracking clays also provide habitat for reptiles. Fringing vegetation on the southwestern and southern outer edge of the proposed solar panel footprint, in gullies and along the proposed transmission line easement, include some treed vegetation with a defined shrub- and ground layer, providing suitable fauna habitat.

Reptiles and Amphibians

Some areas of grassland, both native and non-native, that contain cracking clays and/or surface basalt rocks, provide suitable reptile habitat. Agricultural practices have been used over a considerable area of the proposed project footprint. These practices included the historic clearing of land of trees and shrubs, stockpiling basalt rocks into rockpiles and cropping. These practices have occurred over the majority of the site and evidence of cropping can be observed in historic aerial photography.

In some locations, rocks have not been stockpiled and scattered basalt rocks remain on the ground surface, often in conjunction with grass tussocks and cracking dark basalt clay soils. An opportunistic search (rock rolling) in late August located two Legless Lizards from approximately 100 rock-turns of rocks dinner plate size. One of the legless lizards was located from beneath a rock on a hillside (Photos 8, 9 and 10) with two small black ant species, and was likely to be the threatened Pink-tailed Worm Skink (legless lizard) *Aprasia parapulchella* based on appearance. The legless lizard was not captured for full identification because it rapidly retreated into its burrow. The rock rolling searches were only opportunistic, and further searches would be

required as part of the EIS studies. The location was georeferenced for future targeted searches proposed in November, and during a cooler part of the day when the lizards are less mobile.

In addition, the Striped Legless Lizard *Delma impar* may also utilise these areas with cracking clays, tussock grass and surface rock. A rock rolling search in fringing grassy woodland community (refer Photo 11) uncovered a potential sighting of this species. However, the lizard was not captured as it rapidly retreated into its burrow. The location was georeferenced for future searches.



Photo 8 Hillside with surface rock



Photo 6 Surface rock rolled



Photo 7 location of legless lizard and two types of ants



Photo 8 Legless Lizard observed beneath rock within Grassy Woodland

It is likely that other reptiles utilise habitat near waterways and in the proposed easement between the solar panels and the proposed location of the BESS, substation and TransGrid transmission line easement (an area colloquially known as 'Death Adder Valley') (landholder *pers comm.*). Other reptiles observed opportunistically both on and off the site included Blue-bellied Black snake *Pseudechis guttatus* associated with Grey Box grassy woodland, Bearded Dragon *Pogona barbata*, and Blue-tongue Lizard *Tiliqua scincoides* located along Flaggs Road, and two Lace monitors *Varanus varius* observed within trees at either end of the project site. One of the monitors was observed feeding upon the occupants of a Galah nest. There are many isolated areas across the site where fallen tree branches, long grasses and rocky outcrops combine to provide suitable habitat for reptiles.

Amphibian habitat across the site is limited as the land is characteristically comprised of grasses and sloped with few opportunities for swamp areas. Dams across the project site were generally poorly vegetated and lacking in floating, emergent, fringing or submerged vegetation (Photo 12). On more than one occasion, unidentified turtles were observed utilising these dams. One dam located adjacent to Flaggs Road outside the



development footprint contained multiple species of common frogs and water birds and was surrounded by emergent spike rush *Eleocharis acuta*.

Birds

A wide variety of birds were observed across the proposed project site, usually coinciding with tree habitat associated with the vegetation inside the periphery and adjacent to the proposed solar panel footprint. Such habitat typically comprised dams, or trees in grassy woodland. Tree hollow size often coincided with the type of bird species present. Red-rumped parrots *Psephotus haematonotus* and Striated Pardalotes *Pardalotus striatus* were commonly observed utilising trees with small hollows and preparing for breeding.



Photo 12 Typical dam

Red-rumped Parrots were recorded in numerous pairs utilising hollows of Grey Box trees and flying to grassland to feed. Eastern Rosellas were also commonly observed or heard flying from treetop to treetop. However, larger hollows suited a larger bird type and Galahs *Eolophus roseicapilla* were commonly observed. Grasslands between tree areas sometimes provided habitat for Brown Quail *Synoicus ypsilophora* which were flushed out when disturbed.

Ephemeral creeks and drainage lines had varying habitat but were usually dry and contained little vegetation. One exception was the riparian vegetation associated with an ephemeral creek running parallel with the proposed

transmission line easement that will connect with the TransGrid transmission line. Call playback along this creek attracted the presence of two Barking owls *Ninox connivens*. In a similar location, Gang Gang Cockatoos *Callocephalon fimbriatum* were observed flying in a flock along the riparian vegetation. Both of these species are listed as vulnerable under the *Biodiversity Conservation Act 2016*. Although surveying for parrots, owls and raptors was carried out in August/September the quantity of species on site is relatively low due to a lack of suitable habitat trees. However, roosting locations with small raptors were regularly observed in scattered trees or stags. These included Nankeen Kestrel *Falco cenchroides* and Black-shouldered Kites *Elanus axillaris*.

Dams often had the presence of at least one type of common water bird, but generally habitat was poor around dam edges with a lack of aquatic emergent and fringing species. However, tree vegetation and a fence line along one of the centrally located driveways did provide habitat for a Diamond Firetail *Stagonopleura guttata*, a *Biodiversity Conservation Act 2016* listed vulnerable species. Diamond Firetails had also been observed using olive trees in another landholder's garden at the southern end of the project boundary.

Much of the wooded vegetation within the study area is mapped as Important Habitat for Regent Honeyeater *Anthochaera phrygia*, including the remnant Grey Box stands.

Mammals

The proposed project site consists predominantly of pasture grass with some remnant tree patches, scattered, individual trees and dams. Given that forested tree areas (e.g. Manobalai Nature Reserve) and the Goulburn River National Park are adjacent to the proposed project area, there is some potential for fauna to utilise the project site for foraging. The pasture grasses provide minimal habitat for mammals, although there is potential for some species utilise the site for hunting. Tree hollows are common in treed areas and spotlighting detected the Common Brush-tail possum *Trichosurus vulpecula* within trees along Flaggs Road and in forest adjacent to the proposed BESS location. The stag watching and spotlighting was performed in late winter and early



spring, so further targeted assessment during mid-late spring in warmer seasonal conditions could potentially identify a greater abundance and species richness.

The site is suited to large macropods such as the Eastern Grey Kangaroo *Macropus giganteus* and Red-necked Wallabies *Notamacropus rufogriseus* and Wallaroos *Osphranter robustus*. These species were recorded on the project site, and, in addition, many were observed during travel to and from the site. Bare-nosed Wombat *Vombatus ursinus* dens were regularly observed in sandy sites at the northern end of the site adjacent to Flags Road and both at the proposed BESS location and in sandy soil outside the project site including access roads.

Microbats could be expected to utilise the project site as a source of food and/or as a temporary stopping location when travelling between sites of preference. Microbats were observed flying in and out of fringing forest north of the project during stag watches and spotlighting around dusk. Though not prolific, there are scattered dead trees within the project site that contain hollows which may provide some nesting opportunities for microbats. BioNET searches indicated a large number of bats present, of which 10 are common and seven species are threatened in NSW. It is highly likely a good proportion of these bats utilise the site for foraging, and some may nest within hollows on the project site. The likelihood of these species will be discussed further below and in Attachment A.

Common bats that have been recorded in a 10 km radius of the project area (BioNET search results) include Gould's Wattled Bat *Chalinolobus gouldii*, Inland Broad-nosed Bat *Scotorepens balstoni* and Eastern Free-tailed Bat *Ozimops ridei*. The Grey-headed Flying Fox *Pteropus poliocephalus* has not been observed, but it may opportunistically use the site for feeding when a nectar source is available – with camps reported in both Aberdeen and Scone (Upper Hunter Shire Council 2017).

There is generally an absence of available habitat structure within cultivated grasslands to support small ground-dwelling mammals. Some small mammals would be expected to be present using hollows and/or fringing vegetation. For example; Planigales, Dunnarts and Antechinus. Pests such as European Rabbit *Oryctolagus cuniculus*, European Rat *Rattus norvegicus* and Red Fox *Vulpes* were observed. Feral Pigs *Sus scrofa* were observed in multiple locations across the project area and wild dogs *Canis lupus familiaris*, *Canis lupus dingo* x *Canis lupus familiaris* have been known in the area close to the powerline easement (landholder pers comm.).



3 PRELIMINARY IMPACT ASSESSMENT AND MANAGEMENT

The construction and operation of the solar farm will be managed to minimise disturbance to biodiversity values and where practical, significantly sized areas of high biodiversity value vegetation will be avoided.

The construction of the solar farm may result in some impact on a PCT of high biodiversity value vegetation, PCT 483: 'Grey Box x White Box grassy open woodland community on basalt hills in the Merriwa region, upper Hunter Valley'. PCT 483 is a Threatened Ecological Community under the *Biodiversity Conservation Act 2016* where it is Listed as Critically Endangered. The PCT is also Listed Critically Endangered under the EPBC Act within the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

These areas of PCT 483 will be retained where practical and losses minimised. The proposed project footprint has already been reduced in extent to avoid areas of high biodiversity value (see Figure D). Complete avoidance of PCT 483 may be unachievable. However, larger more significant areas of the same PCT will be avoided and biodiversity linkages will be planted with locally represented species, to allow connectivity, particularly with large areas in the northeast of the site, and along the verge vegetation of Flags Road.

The installation of the transmission line between the solar panel footprint, the Merriwa BESS and the existing TransGrid powerline easement will require the removal of remnant vegetation. Removal of this and other native vegetation triggers a BDAR and the Biodiversity Offset Scheme (BOS).

Several threatened species that appeared in database searches that may forage or reside in areas on the project site have potential to be impacted by habitat loss, due to the large scale of the project footprint. It is anticipated that fauna species such as microbats and legless lizards will be potentially impacted but have mobility to be dispersed and/or relocated to other adjacent undisturbed habitat-areas. Prior to approvals, habitat mapping will be required, and appropriate management plans and mitigation guidelines set in place for these species, should their habitat be removed. These potential impacts and their management will be analysed within the scope of the BDAR.

Loss and/or modification of habitat for reptile, bird and bat species that utilise the site is likely to occur as a result of:

- the removal of habitat including tree areas, scattered trees, grassland, rock shelters and dams
- the placement of solar panels over areas that would have otherwise been freely foraged upon, including grasses
- the loss of farms dams if dewatered to accommodate project infrastructure.

To reduce native vegetation loss, some areas of habitat will be retained allowing fauna corridors along waterways such as Vallances Creek, basalt rock refugia, derived grassland and larger areas of PCT 483 Grey Box community. In addition, considerable protected forest is located adjacent in the Goulburn River National Park.



4 NEED FOR FURTHER ASSESSMENT

Further detailed assessment including BAM Plots are required across the project site to assess both areas that are proposed for removal and those areas that are dedicated for biodiversity conservation and preservation. As the project necessitates the removal of native vegetation greater than 1.0 ha, it is expected that a BDAR will be required via application of the BAM.

Category 1 Land will be exempt from the BDAR but must be considered in the prescribed impacts if it provides habitat for threatened species. However, as a high proportion of the proposed solar farm footprint consists of grasslands assessed as Category 1 land within AEP (2021), these need to be assessed by desktop and aerial photography to ensure grasslands do not qualify for offsetting if in natural condition. Unless categorised as Category 1 land, Derived Native Grassland which, may form part of the Threatened Ecological Community and EPBC Listed communities associated with Grey Box x White Box grassy open woodland. The August/September scoping visit identified a poor-quality representation, with low species richness, but some ground truthing in November (spring grassland) assessments are required for confirmation. Uncropped drainage areas may provide some resemblance of original PCT's.

Scattered, isolated trees provide some habitat for arboreal species and stick nests were observed, indicating some use of trees for breeding. These features need to be assessed as habitat for threatened species, including dead stags. There is some potential for threatened birds and bats to utilise tree hollows.

Targeted species surveys are required to be undertaken for threatened species identified as having potential to utilise the site (see Attachment A). These have been identified from BioNet searches, a mock BAM candidate species report (AEP 2021) and an EPBC Protected Matters Search. This includes surveys on Category 1 land, as this may provide habitat for threatened species such as the Striped Legless lizard *Delma impar* and Pink-tailed Legless lizard *Aprasia parapulchella*. Although a large proportion of the site is heavily modified as a result of agricultural use, there is potentially habitat present for threatened species that have been able to adapt to derived and agriculturally improved grasslands. By mapping habitat accurately and performing targeted species surveys to determine their presence, information can be collected about the presence/absence of these species and determine prescribed impacts

Seasonal surveys for other threatened fauna will be determined by the potential presence of their habitat and associated survey requirements and seasonal timing. Threatened species surveys began in August/September 2021 and will continue from October 2021 until at least EIS submission. Targeted species surveys in appropriate seasons during flowering events for threatened flora are also required to be undertaken to determine their occurrence on the site. Multiple surveys may be necessary to cover the flowering period of threatened flora species. The planned spring assessments of the proposed project disturbance areas will be required to meet the seasonal survey requirements of the Department of Planning, Industry and Environment. This is especially if flora or fauna is presumed to be present, in which case the mapping of the habitat requires polygons and shape files. Some candidate species can be assumed to be present, and this will be calculated within the BAM assessment as part of the BDAR process. Examples of species that may fall within this category are the Regent Honeyeater of which the wooded areas within the study area are mapped as Important Habitat. Polygons of species assumptions will be a requirement of the BDAR. Consideration of this critical habitat requires mapping and evaluation into high, medium, or low-quality categories, prior to any works and referral.



5 MANAGEMENT RECOMMENDATIONS

5.1 Construction phase

During any habitat removal, fauna spotters will be required to carry out a pre-clearance inspection and be present on site to retrieve/relocate fauna. Tree removal (and more generally habitat removal) will occur where possible outside the spring breeding season. It is expected that most fauna species will disperse from the area during construction and require an alternative source of habitat. Therefore, consideration to relocation areas and their protection is a requirement of the mitigation of construction impacts.

There is potential also that the introduction of weed species will result from disturbances to the development area. Standard weed management practices will be adopted and will be outlined in the EIS which will recommend a pro-active weed management plan. A pest management plan is also recommended for feral animal control.

Animal strike as a result of increased traffic (particularly dusk and dawn) as workers arrive and depart during construction is another potential impact. Fauna such as Wombats, Possums, large macropods and nocturnal birds may be impacted as a result of increased vehicular movements to and from the proposed Merriwa Solar Farm development

5.2 Operational phase

The ongoing operation of the solar farm is not likely to cause a significantly greater disruption to fauna species than is already caused by the operation of the existing farming practices. However, as predatory animal and plant species (both native and pests) are at risk of increase as a result of the project, considerable effort will be required to keep pests and weeds under control. Factors such as the use of lights can attract native fauna and increase the risk of their predation. Therefore, auxiliary lighting should be minimised, and not projected onto areas of fauna habitat. Temporary artificial nest boxes are one alternative to replace hollows lost during tree removal.

In addition, the planting of screening vegetation along Flaggs Road may be beneficial in providing habitat for birds via a corridor. This could also include planting the same tree and shrub species as those to be removed (particularly Grey Box) to ensure these tree species persist on the site.

Weed and pest monitoring and control will form part of the recommendations of the weed and pest management plan.

Monitoring of any EPBC listed species populations will be a likely requirement during the operational phase to ensure populations remain stable with ongoing management requirements determined in Management Plans for these species.



6 REFERENCES

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Upper Hunter Shire Council (2017). Aberdeen Flying Fox Camp Management Plan 2017. Hunter Councils Strategic Services Australia.



ATTACHMENT A THREATENED SPECIES OCCURRENCE



Flora and fauna – Likelihood of occurrence

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Reptiles							
Pink-tailed Legless Lizard - <i>Aprasia parapulchella</i>	Vulnerable	Vulnerable	Known	Likely, under rock	No	Yes, grassland and grassy woodland	High
Striped Legless Lizard - <i>Delma impar</i>	Vulnerable	Vulnerable	Predicted	Likely	No	Yes, grassland and grassy woodland	High
Pale-headed Snake - <i>Hoplocephalus bitorquatus</i>	Vulnerable	Not listed	Predicted		No	Yes	Mod
Broad-headed Snake - <i>Hoplocephalus bungaroides</i>	Endangered	Vulnerable	Predicted		No		
Birds (including Migratory birds)							
Diamond Fire-tail - <i>Stagonopleura guttata</i>	Vulnerable	Not listed	Known	Yes, fenceline midsite	Yes	Yes	High, isolated
Red Goshawk - <i>Erythrorhynchus radiatus</i>	Critically Endangered	Vulnerable	Unknown		No	No	Low

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Australasian Bittern - <i>Botaurus poiciloptilus</i>	Endangered	Endangered	Predicted		No	Not onsite	Low
Grey Falcon - <i>Falco hypoleucos</i>	Endangered	Not listed	Unknown		No	Minimal	Low
Black Falcon - <i>Falco subniger</i>	Vulnerable	Not listed	Known		Yes	Yes	High
Regent Honeyeater - <i>Anthochaera phrygia</i>	Critically Endangered	Critically Endangered	Known		Yes	Yes	High-foraging
Brown Treecreeper - <i>Climacteris picumnus victoriae</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Speckled Warbler - <i>Chthonicola sagittata</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Little Eagle - <i>Hieraaetus morphnoides</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod-High
White-bellied Sea-eagle - <i>Haliaeetus leucogaster</i>	Vulnerable	Not listed	Known		No	No	Low, may forage

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Painted Honeyeater - <i>Grantiella picta</i>	Vulnerable	Vulnerable	Known		No	Yes Box Gum	Mod-High
Black Chinned Honeyeater - <i>Melithreptus gularis gularis</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod
White-throated Needletail - <i>Hirundapus caudacutus</i>	Not listed	Vulnerable	Known		No	Yes	Low-Mod
Australian Painted Snipe - <i>Rostratula australis</i>	Endangered	Endangered	Predicted		No	No	Low, insufficient wetland habitat
Superb Parrot - <i>Polytelis swainsonii</i>	Vulnerable	Vulnerable	Unknown (close to Known area)		No	Some	Low, not known to area
Swift Parrot - <i>Lathamus discolor</i>	Endangered	Critically Endangered	Known		No	Yes	Moderate, forage
Eastern Curlew - <i>Numenius madagascariensis</i>	Not listed	Critically Endangered	Unknown		No	No	Low

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Square-tailed Kite - <i>Lophoictinia isura</i>	Vulnerable	Not listed	Known		No	Yes	Mod-watercourse
Gang-gang Cockatoo - <i>Callocephalon fimbriatum</i>	Vulnerable	Not listed	Known	Located - creekline adjacent to powerline easement	Yes	Yes	High
Little Lorikeet - <i>Glossopsitta pusilla</i>	Vulnerable	Not listed	Known		Yes	Yes	High
Painted Honeyeater - <i>Grantiella picta</i>	Vulnerable	Vulnerable	Known		Yes	Yes	Mod
Turquoise Parrot - <i>Neophema pulchella</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Glossy-black Cockatoo - <i>Calyptorhynchus lathami</i>	Vulnerable	Not listed	Known	No TSS	Yes	Yes	Mod

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Masked Owl - <i>Tyto novaehollandiae</i>	Vulnerable	Not listed	Known	No TSS	Yes	Yes	Nest-Low, Foraging High
Powerful Owl - <i>Ninox strenua</i>	Vulnerable	Not listed	Known	No TSS	No	Yes, hunting	Mod
Barking Owl - <i>Ninox connivens</i>	Vulnerable	Not listed	Known	Located - creekline of cooks property	Yes	High, nest in trees within creek and hunt along creekline	High
Grey-crowned Babbler (eastern subspecies) - <i>Pomatostomus temporalis temporalis</i>	Vulnerable	Not listed	Known		Yes	Yes	High
Varied Sittella - <i>Daphoenositta chrysoptera</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod
Dusky Woodswallow - <i>Artamus cyanopterus</i>	Vulnerable	Not listed	Known		Yes	Yes	High

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Hooded Robin (south-eastern form) <i>Melanodryas cucullata</i> subsp. <i>Cucullata</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Scarlet Robin - <i>Petroica boodang</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Amphibians							
Booroolong Frog - <i>Litoria booroolongensis</i>	Endangered	Endangered	Outside area		No	No	Low
Giant Burrowing Frog - <i>Heleioporus australiacus</i>	Vulnerable	Vulnerable	Known		No	No	Low
Red-crowned Toadlet - <i>Pseudophryne australis</i>	Vulnerable	Not listed	Known		No	No	Low-Moderate
Mammals							
Brush-tailed Phascogale - <i>Phascogale tapoatafa</i>	Vulnerable	Not listed	Predicted		No	Some fringing	Low-Moderate

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Squirrel Glider - <i>Petaurus norfolcensis</i>	Vulnerable	Not listed	Known		No	Some fringing	Moderate
Grey-headed Flying-fox - <i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable	Known		No	No lack permanent waterway	Low, foraging only
Large-eared Pied Bat - <i>Chalinolobus dwyeri</i>	Vulnerable	Vulnerable	Known		No	Some	Mod, may forage
Corben's Long-eared Bat - <i>Nyctophilus corbeni</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod
Brush-tailed Rock-wallaby - <i>Petrogale penicillata</i>	Endangered	Vulnerable	Known		Yes	No	Low-Mod in forested area
Spotted-tailed Quoll - <i>Dasyurus maculatus</i>	Vulnerable	Endangered	Known		No	Foraging habitat	Mod-potential foraging
New Holland Mouse - <i>Pseudomys novaehollandiae</i>	Not listed	Vulnerable	Known		Yes	Yes	Mod-forested areas
Eastern Pygmy Possum - <i>Cercartetus nanus</i>	Vulnerable	Not listed	Predicted		No	Yes - grassy woodland	Low

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Koala (Breeding) - <i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable	Known		No	Yes, Box and red gums on fringes	Low
Yellow-bellied Sheathtail Bat	Vulnerable	Not listed	Known		Yes	Yes	High
Eastern False Pipistrelle - <i>Falsistrellus tasmaniensis</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-High
Greater Broad-nosed Bat - <i>Scoteanax rueppellii</i>	Vulnerable	Not listed	Known		Yes	Yes	High
Eastern Cave Bat - <i>Vespadelus trougtoni</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod-may forage
Little Bent-winged Bat - <i>Miniopterus australis</i>	Vulnerable	Not listed	Known		Yes	Yes	Mod
Large Bent-winged Bat - <i>Miniopterus orianae oceanensis</i>	Vulnerable	Not listed	Known		Yes	Yes-foraging	Mod
Flora species							
Mount Dangar Wattle - <i>Acacia dangarensis</i>	Critically Endangered	Not listed	Known		No	Yes	Mod

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Ausfeld's Wattle - <i>Acacia ausfeldii</i>	Vulnerable	Not listed	Known		No	Yes	Mod
Weeping Myall - <i>Acacia pendula</i>	Endangered Population	Not listed	Known		No	Yes	Low disturbed
Large-leaved Monotaxis - <i>Monotaxis macrophylla</i>	Endangered	Not listed	Known		No	Yes	Lack fire
<i>Commersonia procumbens</i>	Vulnerable	Vulnerable	Known		No	Yes, sandy soils	Low-Mod
<i>Commersonia rosea</i>	Endangered	Endangered	Known		No	Yes	High
Fairy Bells - <i>Homoranthus darwinoides</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod
<i>Kennedia retrorsa</i>	Vulnerable	Vulnerable	Known		No	so me-forested	Mod
<i>Lasiopetalum longistamineum</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod
<i>Ozothamnus tessellatus</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod
Bluegrass - <i>Dichanthium setosum</i>	Vulnerable	Vulnerable	Known		No	Yes, cracking black clays	Mod, not recorded there before

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
<i>Euphrasia arguta</i>	Critically Endangered	Critically Endangered	Outside area		No	No	Unlikely, out of known range
Tarengo Leek Orchid - <i>Prasophyllum petilum</i>	Endangered	Endangered	Known		No	Grasslands generally non native	Low-species lacking
Austral Toadflax - <i>Thesium australe</i>	Vulnerable	Not listed	Edge northern - Predicted		No	No	Low, lacks kangaroo grass
<i>Cymbidium canaliculatum</i>	Endangered Population	Not listed	Known		No	Yes	Mod
Scant Pomaderris	Endangered	Not listed	Known		No	No	Low-Mod
Denman Pomaderris - <i>Pomaderris reperta</i>	Critically Endangered	Critically Endangered	Known		No	Yes	Mod-High, forested easement
Silky Pomaderris - <i>Pomaderris sericea</i>	Endangered	Vulnerable	Known		No	No	Low

Common name - Scientific name	NSW status	Common-wealth status	Distribution (NSW)	Recorded during survey	Recorded within 10 km*	Potential habitat in the study area	Likelihood of occurrence within study area
Wollemi Mint-bush - <i>Prostanthera cryptandroides</i> subsp. <i>Cryptandroides</i>	Vulnerable	Vulnerable	Known		No	No	Low
<i>Prostanthera discolor</i>	Vulnerable	Vulnerable	Known	No, early Sept	No	Yes	Low-Mod, lacks creekline with habitat
Mt Vincent Mint-bush - <i>Prostanthera stricta</i>	Vulnerable	Vulnerable	Known		No	Yes	Mod-easement
Capertee Stringybark - <i>Eucalyptus cannonii</i>	Vulnerable	Not listed	Known		No	Some on fringes	Low-Mod
Pine Donkey Orchid - <i>Diuris tricolor</i>	Vulnerable	Not listed	Known	No-early Sept searches, recheck October	No	Potential, easement	Mod
<i>Senecio linearifolius</i> var. <i>dangarensis</i>	Endangered	Not listed	Known		No	No	Low

* Species recorded previously within 10 km of locality (BioNet 10 km)



ATTACHMENT B PROTECTED MATTERS SEARCH





EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/07/21 11:39:24

[Summary](#)

[Details](#)

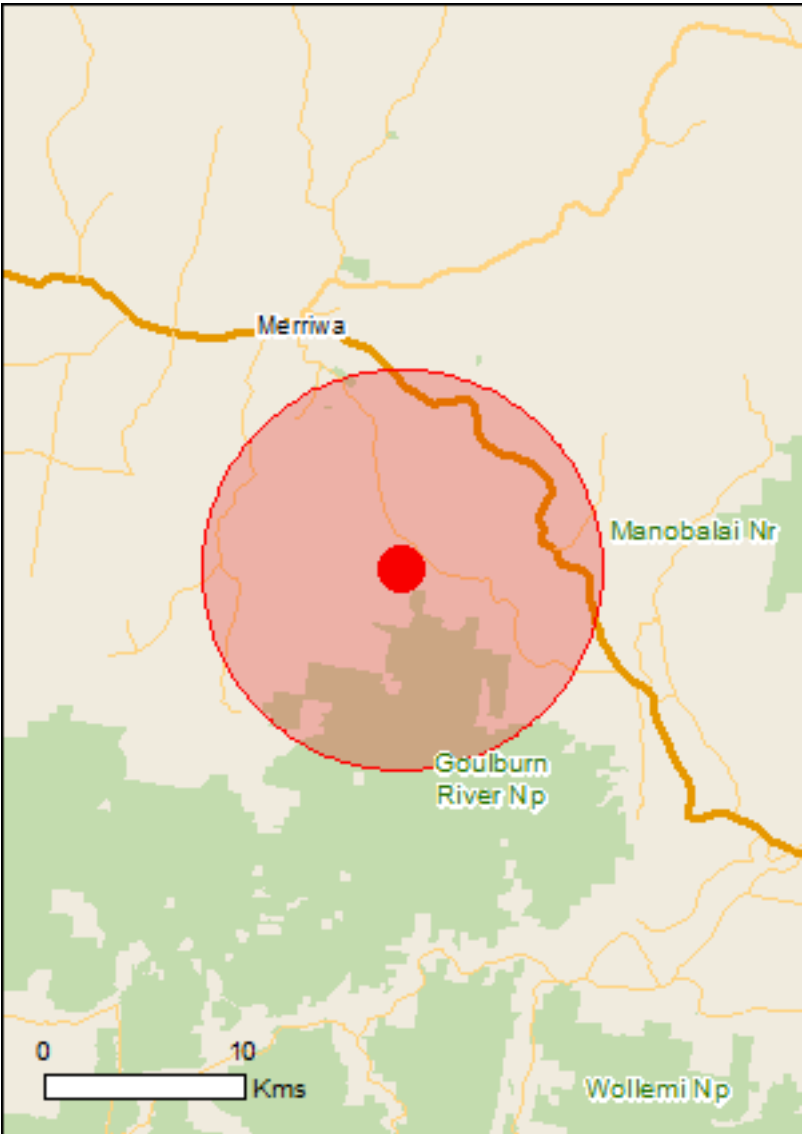
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

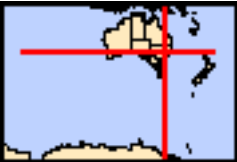
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	33
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Hunter estuary wetlands	100 - 150km upstream	

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Hunter Valley Weeping Myall (Acacia pendula) Woodland	Critically Endangered	Community may occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Frogs		
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Androcalva procumbens [87153]	Vulnerable	Species or species habitat likely to occur within area
Androcalva rosea Sandy Hollow Commersonia [86861]	Endangered	Species or species habitat may occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Homoranthus darwinioides [12974]	Vulnerable	Species or species habitat known to occur within area
Kennedia retrorsa [19716]	Vulnerable	Species or species habitat likely to occur within area
Ozothamnus tesselatus [56203]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Prostanthera cryptandroides subsp. cryptandroides Wollemi Mint-bush [68496]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]	
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]	Critically Endangered	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Vulnerable

Name	Threatened	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Goulburn River	NSW

Regional Forest Agreements	[Resource Information]
Note that all areas with completed RFAs have been included.	
Name	State
North East NSW RFA	New South Wales

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.	

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area

Name	Status	Type of Presence
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.23324 150.40071

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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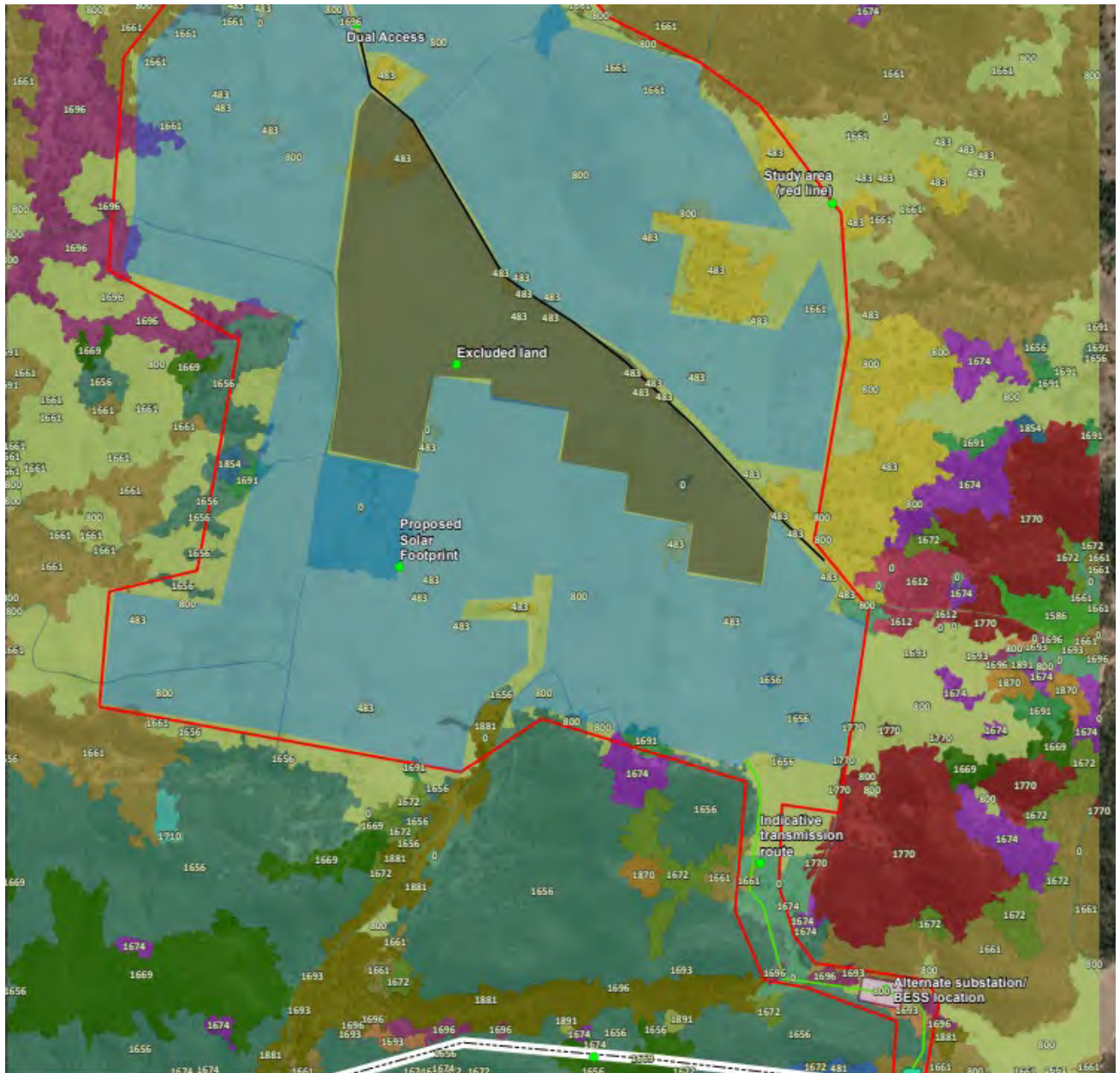
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ATTACHMENT C PRELIMINARY VEGETATION MAP





ATTACHMENT D BIODIVERSITY VALUES THRESHOLD TOOL MAP





Biodiversity Values Map and Threshold Tool

Home

Biodiversity Values Map and Threshold Tool

The Biodiversity Offsets Scheme (BOS) Threshold is used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) to assess the impacts of a proposal.

It is used for local developments (development applications submitted to councils) and native vegetation clearing not requiring development consent in urban areas and areas zoned for environmental conservation (under the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017).

The Biodiversity Conservation Regulation 2017 sets out threshold levels for when the BOS applies. The threshold has two elements:

- whether the amount of native vegetation being cleared exceeds a threshold area, or

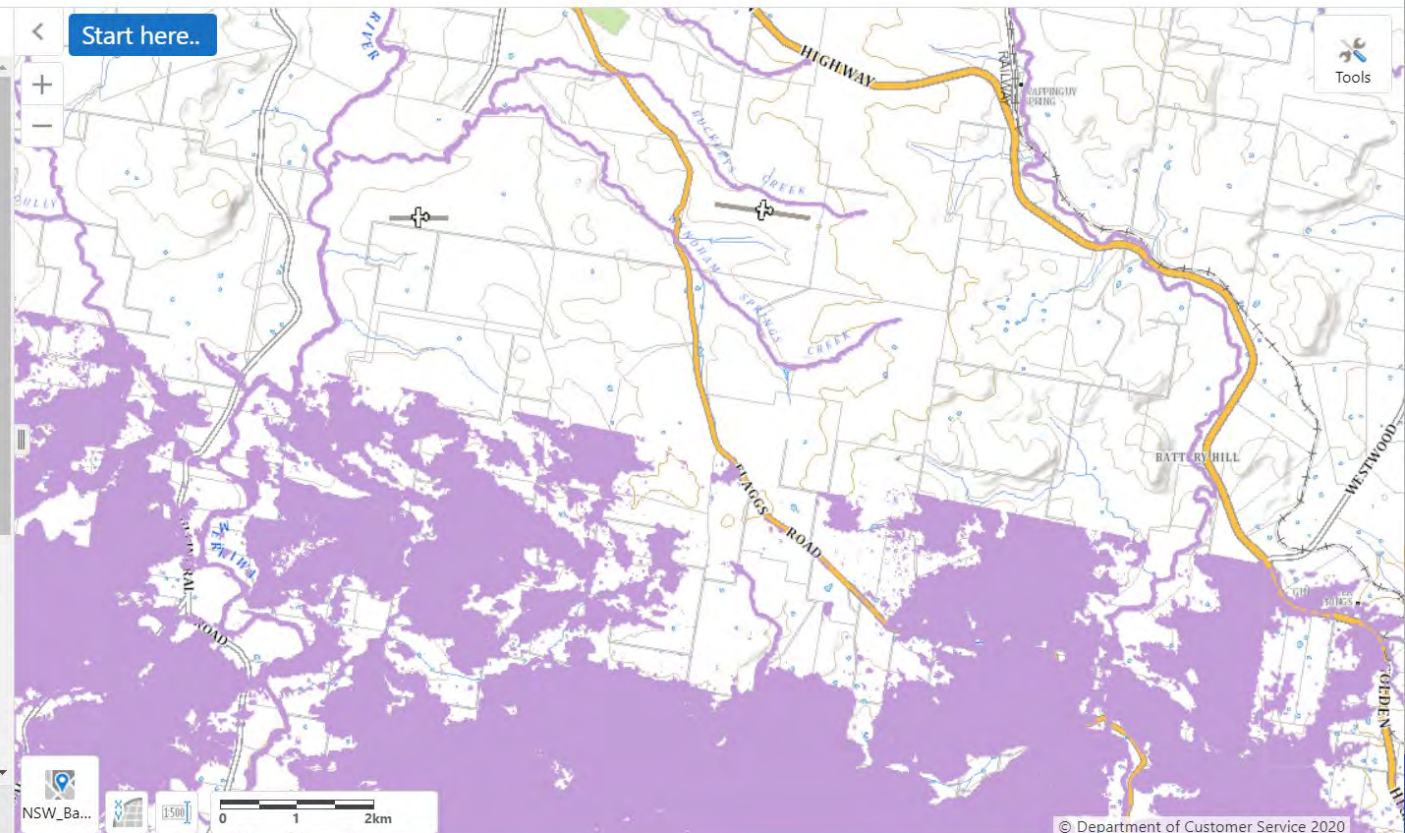
- whether the impacts occur on an area mapped on the Biodiversity Values Map.

If clearing or other impacts exceeds either trigger, the BOS applies to the proposed development.

If the BOS is not triggered, the Threatened Species Test of Significance must be used to determine if a local development is likely to significantly affect threatened species.

Proponents need to supply evidence relating to the BOS Threshold triggers and the test of significance.

Home Layers



Melbourne

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Sydney

Suite 3, Level 1, 20 Wentworth Street
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Wangaratta

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Wangaratta VIC 3677
Telephone (03) 5721 2650

Geelong

51 Little Fyans Street
Geelong VIC 3220
Telephone (03) 8526 0800

Wimmera

597 Joel South Road
Stawell VIC 3380
Telephone 0438 510 240

Gold Coast

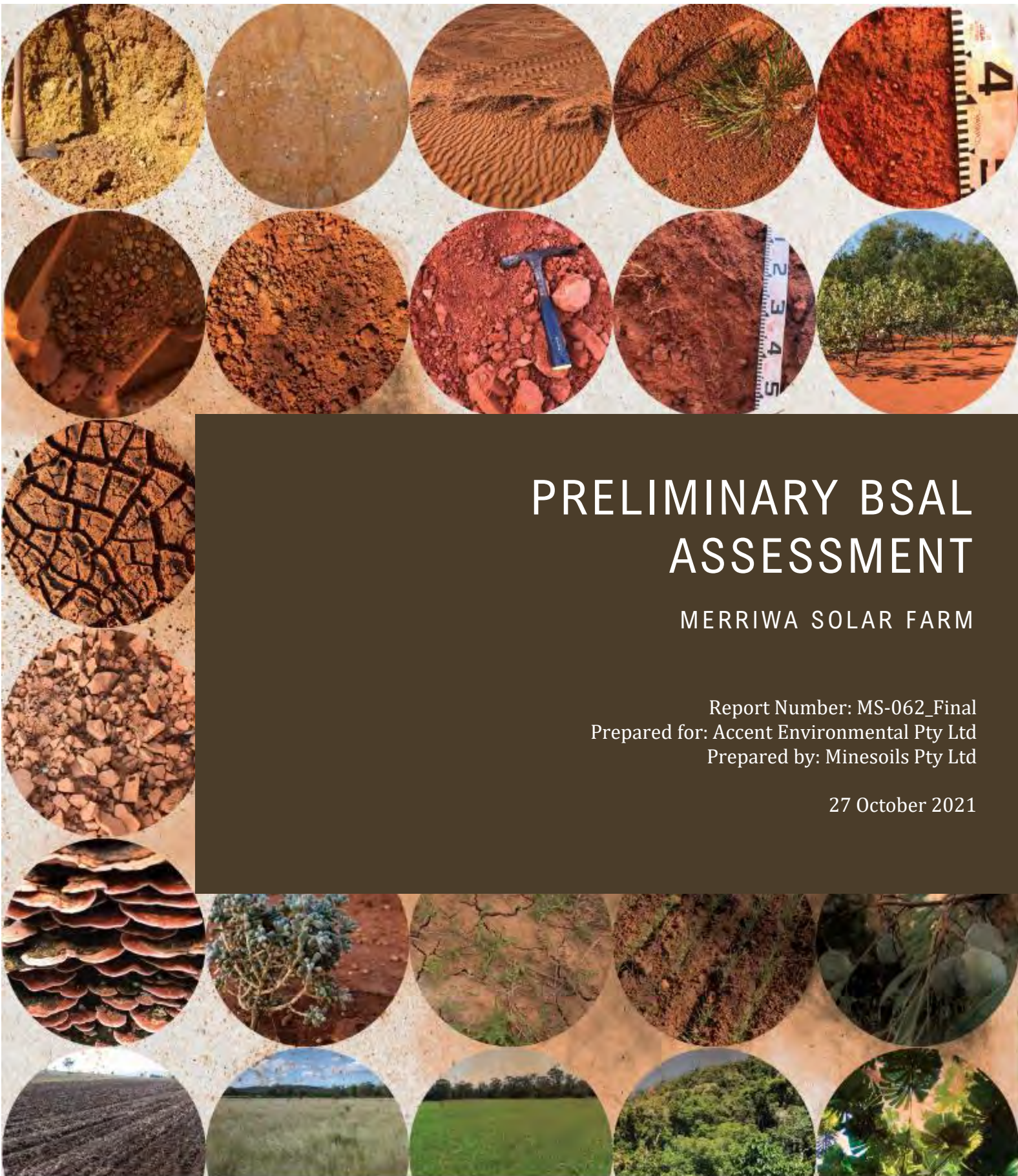
Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227
Telephone (07) 5676 7602

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Appendix E: Preliminary BSAL Assessment



PRELIMINARY BSAL ASSESSMENT

MERRIWA SOLAR FARM

Report Number: MS-062_Final
Prepared for: Accent Environmental Pty Ltd
Prepared by: Minesoils Pty Ltd

27 October 2021

PREPARED BY

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DISCLAIMER

This report has been prepared by Minesoils Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared by	Approved
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1. INTRODUCTION

1.1 PROJECT OVERVIEW

Minesoils Pty Ltd (Minesoils) was engaged by Accent Environmental Pty Ltd (Accent Environmental) to provide specialised support for environmental planning approvals for the proposed Merriwa Solar Farm (the Project) being developed by Maoneng Group Australia Pty Ltd (Maoneng). The Project will cover an area of up to 898 ha (the Project site), and is located approximately 8 km south east of Merriwa in the Upper Hunter region of NSW (refer **Figure 1**).

The Project is in the preliminary conceptual planning stage. Once operational, the Project will generate approximately 550 Megawatts (MW), with a proposed substation and possible battery energy storage system being considered in the south-eastern portion of the Project site.

In initial discussions with Maoneng, the NSW Department of Planning and Environment has indicated that assessment of the potential impacts of the development on agricultural land Biophysical Strategic Agricultural Land (BSAL) on the site will be required.

The purpose of this report is to undertake a high-level preliminary BSAL, soils and lands assessment as an input to a Scoping Report being prepared by Accent Environmental for the Project.

For the purpose of this assessment, and in accordance with the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (OEH 2013), a 100 metre buffer has been added to the Project site to take into account minor changes in design, surrounding disturbance and minor expansion. The total area subject to this assessment is the Project Application Area (PAA) and totals 1,156 ha.

1.2 REPORT OBJECTIVES

The objectives of the preliminary BSAL, soils and lands assessment undertaken by Minesoils are as follows:

Objective 1: Review existing background documentation from government sources to determine the soil landscapes within the PAA using the *Soil and Land Resources of the Hunter Region 1:100,000 Sheet* (Department of Planning, Industry and Environment (DPIE), 2020), including a description and figure showing the distribution of each soil landscape.

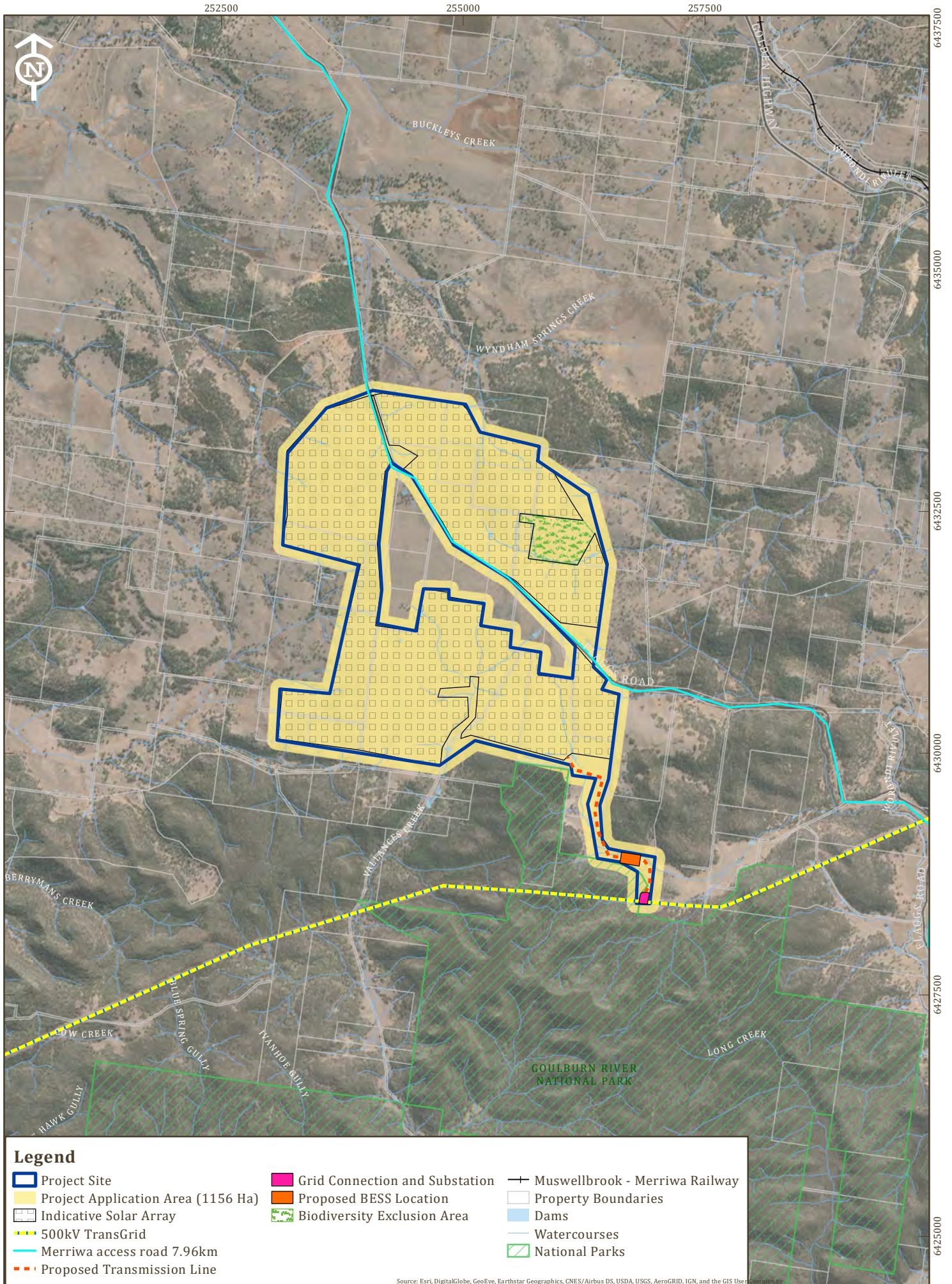
Objective 2: Review existing background documentation from government sources to determine Land and Soil Capability (LSC) for the PAA using *The Land and Soil Capability Assessment Scheme: Second Approximation* (Office of Environment and Heritage (OEH), 2013).

Objective 3: Review the existing NSW Government's Strategic Regional Land Use Policy that defines and identifies strategic agricultural land across NSW, including land with unique natural resource characteristics known as BSAL, and clusters of significant agricultural industries known as critical industry clusters (CICs).

This information is assessed in conjunction with soil and LSC findings to determine the likely presence and extent of BSAL on the PAA.

Objective 4: Identification of potential soil management issues associated with the soil types that occur on the PAA, including erosion, Acid Sulfate Soils (ASS) and remediation performance.





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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0 250 500 1,000 Meters
Scale 1:50000 at A4

Project Area

FIGURE 1

2 LAND AND SOIL INFORMATION

2.1 AGRICULTURAL CONTEXT

The Project locality maintains strong ties with agricultural production and agricultural industries remain a major employer for Merriwa and surrounding rural communities. The area was traditionally known for quality wool and lambs, with broadacre grain production and beef cattle more recently becoming dominant commodities.

The PAA has been highly disturbed in the past by land clearing for agriculture and is now dominated by exotic pasture with isolated areas of native vegetation on some hill crests and drainage lines. The PAA encompasses numerous farming lots (refer **Figure 1**), with cattle grazing as the primary land-use. General agricultural improvements including stock fences and existing access tracks are present. No sensitive agricultural activities such as intensive plant or livestock agriculture, or livestock breeding are being undertaken within the PAA or its immediate surrounds.

Despite the enduring historical and current dependence on agriculture, The Upper Hunter Land Use Strategy (Upper Hunter Shire Council 2017) acknowledges “opportunities for the development of alternative energy production (including wind and solar power generation) and marketing of the clean, green image of the LGA.”

The land is predominantly zoned as RU1 – Primary Production, with a very small portion of the PAA zoned as E1 – National Parks and Nature Reserves (12 ha) (refer **Figure 2**). Accent Environmental advises that the boundary of the project site will be amended to exclude the E1 zone.

2.2 TOPOGRAPHY AND GEOLOGY

The Hunter Valley has four landform units:

- Liverpool and Mount Royal Ranges (including Barrington Tops);
- Merriwa Plateau and Goulburn Valley;
- North Eastern Foothills; and
- Central Lowlands.

The Liverpool, Mount Royal and Barrington Tops in the north and north east of the valley form the headwaters of the Hunter River. The Merriwa Plateau is derived from weathered basalt. The Goulburn Valley to the south has softer sandstones forming broad open valleys. A sandstone escarpment and plateau forming the Wollemi National Park defines the south western part of the Upper Hunter. The north eastern part of the Upper Hunter is a hilly and low mountainous area derived from hard sedimentary rocks and lava. It extends from Mount Royal and Barrington Tops to the central part of the Valley. The Central Lowlands extends from Murrurundi to Branxton and was formed from relatively weak Permian sediments.

The PAA is located on the Merriwa Plateau and consists of gently to moderately undulating slopes ranging from open drainage lines of the Beau Vale in the south east portion of the PAA at approximately 250m AHD, to more elevated broad crests in the north east and north west areas at approximately 410m AHD, as shown on **Figure 3**. Slope ranges from 1% to >40%, with 287 ha or 25% of the PAA having slopes >10%, as shown on **Figure 4**. The Regional Surficial Geology Mapping indicates the majority of the site is located on the Liverpool East Basalt unit (GOLie), with a more limited area existing on minor areas on Banks Wall Sandstone (Tnrb), as shown on **Figure 5**.

2.3 ACID SULPHATE SOILS

The potential for acid generation from disturbed material (topsoil and subsoil) within the PAA is very low. Acid Sulphate Soils (ASS), which are the main cause of acid generation within the soil mantle, are commonly found less than five metres above sea level, particularly in low-lying coastal areas such as mangroves, salt marshes, floodplains, swamps, wetlands, estuaries, and brackish or tidal lakes. The PAA is located within the Upper Hunter region of NSW



which is approximately 150 kilometres from the coast at >250 metres AHD). There has been little history of acid generation from disturbed soil or regolith material within this region. The PAA is considered to be a negligible risk for ASS.

2.4 SOIL LANDSCAPES

The PAA lies within the *Soil and Land Resources of the Hunter Region* 1:100,000 Sheet (DPIE 2020). Four hundred and sixty soil landscape map units have been described within the Hunter Region. Each unit is an inventory of soil and landscape information with relatively uniform land management requirements, allowing major soil and landscape qualities and constraints to be identified. Many representative type profiles are supported by laboratory analysis and soils are described using the Australian Soil Classification and the Great Soil Groups systems.

The soil landscapes and their associated dominant soil types are shown on **Figure 6** and detailed below.

Bow

Landscape consists of gently undulating rises to undulating low hills including occasional gently inclined truncated footslopes and alluvial fans on Tertiary basalt in the north west of the Hunter Region. Slopes are 2 - 10%, local relief 10 - 40 (total relief <110 m), elevation 280 - 600 m. Mostly cleared woodland and open-forest.

Soils within this unit are dominated by shallow to moderately deep (25 - <100 cm), well-drained Dermosols and Ferrosols (Euchrozems and Chocolate Soils); moderately deep to very deep (50 - 500 cm), moderately well to well-drained Black Vertosols (Black Earths) and Brown Vertosols (Brown Clays); and very shallow to shallow (<25 - <50 cm), well-drained Leptic Tenosols (Lithosols).



Qualities and limitations include localised shallow soils, localised complex soils, localised rock outcrop hazard, widespread foundation hazard, localised productive arable land, localised recharge zone, localised discharge zone, localised salinity hazard, widespread gully erosion hazard, widespread sheet erosion hazard, widespread high run-on.

Lees Pinch

Landscapes consist of steep to precipitous hills on Triassic Sandstones in the south-west of the Hunter catchment. Slopes are >30%, local relief 90 - >300 m, elevation 200 - 800 m. Mostly uncleared open-forest and woodland.

Soils within this unit are dominated by very shallow to shallow (<25 - <50 cm), rapidly drained Arenic and Clastic Rudosols (Siliceous Sands) and Leptic Tenosols (Lithosols); shallow to deep (25 - <150 cm), well-drained Kandosols (Yellow Earths); and deep (100 - <150 cm), imperfectly drained Yellow Kurosols (Yellow Podzolic Soils and Soloths).



Limitations include widespread shallow soils, widespread poor moisture availability, widespread non-cohesive soils, widespread steep slopes, widespread rock outcrop hazard, widespread rockfall hazard, widespread mass movement hazard, widespread foundation hazard, widespread recharge zone, widespread sheet erosion hazard, localised high run-on, localised permanent waterlogging.

Tingaroo

Landscapes consist of rolling low hills often occurring as foothills on Triassic conglomerates and sandstones to the west and north of Denman in the upper Hunter Valley. Slopes 10 - 30%, local relief 30 - 90 m, elevation 200 - 670 m. Extensively cleared woodland and open-woodland.

Soils within this unit are dominated by very shallow (<25 cm), well-drained Clastic Rudosols (Lithosols); shallow to moderately deep (<50 - 100 cm), moderately well-drained Brown Kandosols (Brown Earths) and occasional Red Chromosols (Red Podzolic Soils); very shallow (<25 cm), imperfectly to moderately well-drained Bleached-Leptic Tenosols (Bleached Loams); and moderately deep (50 - 100 cm), moderately well-drained Black Kandosols (Brown Earths).



Qualities and limitations include localised shallow soils, localised poor moisture availability, localised non-cohesive soils, localised steep slopes, localised rock outcrop hazard, localised rockfall hazard, localised mass movement hazard, localised foundation hazard, widespread recharge zone, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on.

Wollangambe

Landscapes consist of rolling low hills to steep hills on Narrabeen Group Sandstone mainly in the north-west of the Hawkesbury Nepean Catchment but also the rugged south-west of the Hunter Region. Slopes 20 - 40%, local relief <220 m, elevation 200 - 600 m. Mostly uncleared open-forest and open-woodland.

Soils within this unit are dominated by shallow (<50 cm), rapidly drained Rudosols and Tenosols (Lithosols and Siliceous Sands); shallow to moderately deep (<50 - 100 cm), well to rapidly drained Brown Orthic Tenosols and Kandosols (Earthy Sands and Yellow Earths); moderately deep to deep (50 - 150 cm), moderately well-drained Brown Kandosols (Brown Earths) and imperfectly drained Yellow, Brown and Red Kurosols and Chromosols (Yellow, Brown and Red Podzolic Soils); and shallow to moderately deep (<50 - 100 cm), rapidly to well-drained Rudosols and Tenosols (Siliceous Sands).

Qualities and limitations include widespread shallow soils, localised non-cohesive soils, localised steep slopes, localised rock outcrop hazard, localised rockfall hazard, localised mass movement hazard, widespread foundation hazard, widespread recharge zone, widespread sheet erosion hazard.



Ant Hill

Landscapes consist of rolling hills with benched sideslopes on Tertiary Basalt of the Merriwa Plateau occurring mainly in the Hunter Region with some extending into the Central West catchment. Slopes 20 - 32%, local relief 90 - 200 m, elevation 300 - 1160 m. Extensively cleared woodland and open-woodland.

Soils within this unit are dominated by moderately deep to very deep (50 - 500 cm), moderately well to well-drained Haplic Eutrophic Black, Red and Brown Dermosols and Chromosols (Chocolate Soils and Euchrozems); shallow to very deep (25 - 500 cm), moderately well to well-drained Black Vertosols (Black Earths) and Red Vertosols and Dermosols (Red Clays); and very shallow to shallow (<25 - <50 cm), well-drained Clastic Rudosols and Tenosols (Lithosols).

Qualities and limitations include localised shallow soils, localised rock outcrop hazard, localised rockfall hazard, localised mass movement hazard, widespread foundation hazard, widespread recharge zone, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on.



Ant Hill variant A

Landscapes consist of undulating to rolling low hills on Tertiary basalts of the Merriwa Plateau. Slopes 5 - 20%, local relief 30 - 100 m, elevation 300 - 800 m. Extensively cleared open-forest and woodland.

Soils within this unit are dominated by very shallow to shallow (<25 - <50 cm), moderately well to well-drained Submelacic Lithic Leptic Tenosols (Lithosols); moderately deep to deep (50 - <150 cm), moderately well to well-drained Brown Dermosols (Chocolate Soils); very deep (150 - 500 cm), imperfectly to well-drained Self-mulching Black Vertosols (Black Earths); and Brown Vertosols (Brown Clays) and Haplic Eutrophic Red Chromosols (Chocolate Soils and Red Podzolic Soils).

Qualities and limitations include localised shallow soils, localised rock outcrop hazard, widespread foundation hazard, localised productive arable land, localised dieback, widespread recharge zone, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on.



Summerhill

Landscapes consist of undulating rises to rolling rises on Jurassic sandstone often influenced by Tertiary basalt flows in the west of the Hunter Region. Slopes 3 - 15% (typically <10%), local relief <30 m, elevation 230 - 570 m. Rock outcrop including ironstones generally <20%. Extensively cleared open-forest and woodland.

Soils within this unit are dominated by shallow (25 - <50 cm), well-drained Leptic Tenosols and Rudosols (Lithosols); moderately deep to deep (50 - <150 cm), imperfectly drained Yellow Chromosols (Yellow Podzolics Soils) and Yellow Sodosols (Solodic Soils); moderately deep (50 - <100 cm), well-drained Yellow Kandosols (Yellow Earths); very deep (150 - 500 cm), rapidly drained Brown-Orthic Tenosols (Earthy Sands); and moderately deep to deep (50 - <150 cm), moderately well-drained to well-drained Red Chromosols (Non-calcic Brown Soils).

Qualities and limitations include localised shallow soils, widespread complex soils, localised poor moisture availability, localised non-cohesive soils, localised rock outcrop hazard, widespread recharge zone, localised gully erosion hazard, widespread sheet erosion hazard.



2.5 SOIL TYPES

The NSW regional soil mapping indicates the dominant soil type within the PAA are Vertosols. Other soil types include Dermosols, Rudosols, and limited areas of Sodosols and Tenosols (**Figure 7**). An overview of these soil types are detailed below.

Vertosols

Soils characterised by a clay field texture or 35 per cent or more clay throughout the solum except for thin, surface crusty horizons 30 mm or less thick. Unless too moist, these soils have open cracks at some time in most years that are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, peaty horizon, self-mulching horizon, or thin, surface crusty horizon, with slickensides and/or lenticular peds. Vertosols cover 782 ha or 68 per cent of the PAA.

Dermosols

Soils with structured B2 horizons and lacking a strong texture-contrast between the A and B horizons. Dermosols cover 126 ha or 11 per cent of the PAA.

Rudosols

Soils with negligible (rudimentary) pedologic organisation apart from (a) minimal development of an A1 horizon or (b) the presence of less than 10% of B horizon material (including pedogenic carbonate) in fissures in the parent rock or saprolite. The soils are apedal or only weakly structured in the A1 horizon and show no pedological colour changes apart from the darkening of an A1 horizon. There is little or no texture or colour change with depth unless stratified or buried soils are present. Rudosols cover 103 ha or 9 per cent of the PAA.

Sodosols

Soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2t horizon (or the major part of the entire B2t horizon if it is less than 0.2 m thick) is sodic and not strongly acid. Hydrosols and soils with strongly subplastic upper B2t horizons are excluded. Sodosols cover 58 ha or 5 per cent of the PAA.

Kurosols

Soils with strong texture contrast between A horizons and strongly acid B horizons. Many of these soils have some unusual subsoil chemical features (high magnesium, sodium and aluminium). Kurosols cover 45 ha or 4 per cent of the PAA.

Tenosols

The Tenosols will differ from Rudosols by virtue of having either a more than weakly developed A1 horizon, an A2, or a weakly developed B horizon. Tenosols do not fit the requirements of any other soil orders and generally have one or more of the following:

- I. A peaty horizon.
- II. A humose, melacic or melanic horizon, or conspicuously bleached A2 horizon, which overlies a calcrete pan, hard unweathered rock or other hard materials; or partially weathered or decomposed rock or saprolite, or unconsolidated mineral materials.
- III. A horizons which meet all the conditions for a peaty, humose, melacic or melanic horizon except the depth requirement, and directly overlie a calcrete pan, hard unweathered rock or other hard materials; or partially weathered or decomposed rock or saprolite, or unconsolidated mineral materials.



- IV. A1 horizons which have more than a weak development of structure and directly overlie a calcrete pan, hard unweathered rock or other hard materials; or partially weathered or decomposed rock or saprolite, or unconsolidated mineral materials.
- V. An A2 horizon which overlies a calcrete pan, hard unweathered rock or other hard materials; or partially weathered or decomposed rock or saprolite, or unconsolidated mineral materials.
- VI. Either a tenic B horizon, or a B2 horizon with 15% clay (SL) or less¹, or a transitional horizon (C/B) occurring in fissures in the parent rock or saprolite which contains between 10 and 50% of B horizon material (including pedogenic carbonate).
- VII. A ferric or bauxitic horizon >0.2 m thick.
- VIII. A calcareous horizon >0.2 m thick.

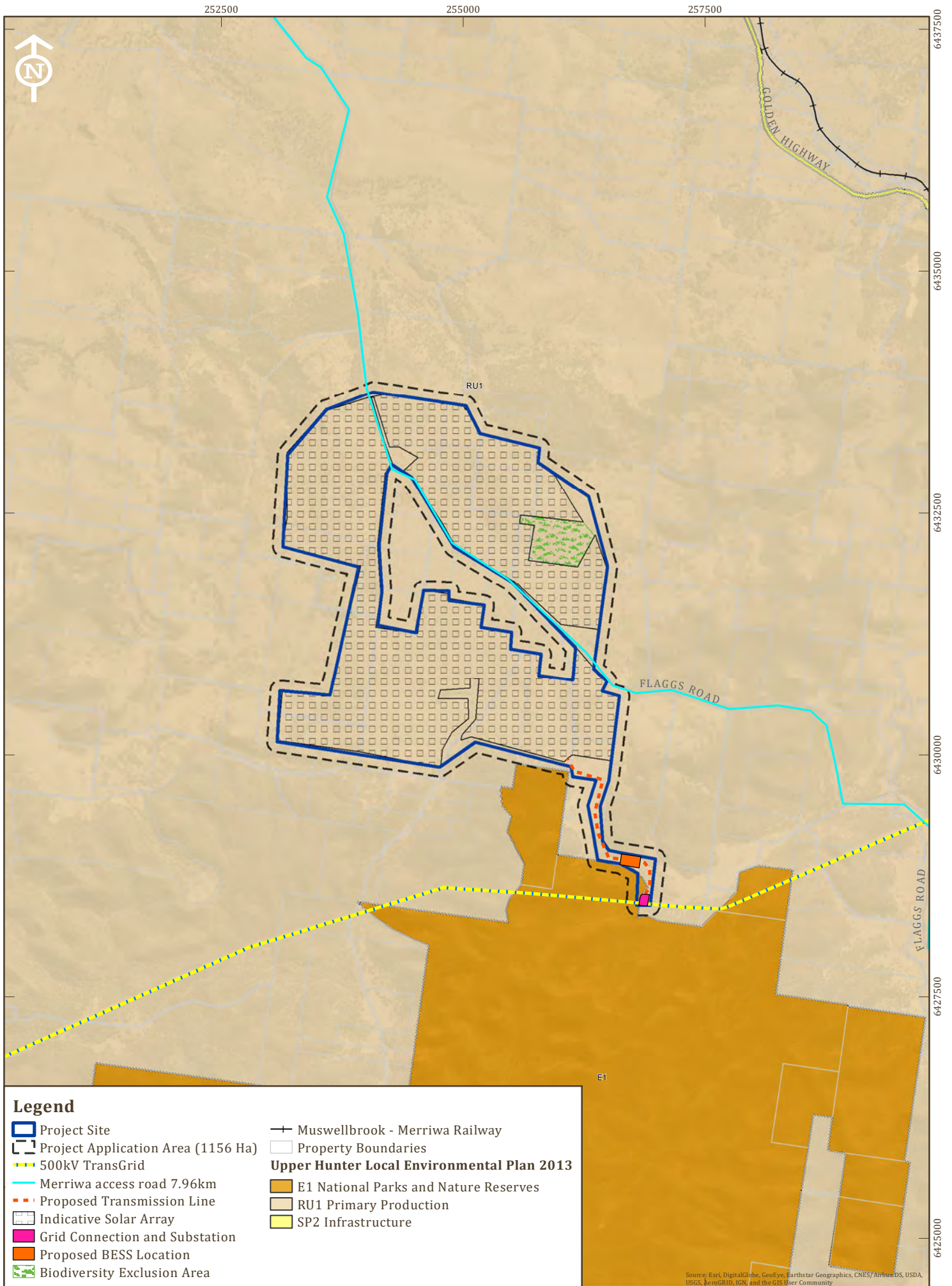
Tenosols cover 42 ha or 4 per cent of the PAA.

2.6 INHERENT SOIL FERTILITY

NSW regional mapping provides an estimation of the inherent fertility of soils in NSW. It uses the best available soils and natural resource mapping developed for the Land and Soil Capability (LSC) dataset. The mapping describes soil fertility in NSW according to a five-class system: Low (1), Moderately low (2), Moderate (3), Moderately high (4), High (5).

The PAA is dominated by soils with high fertility (5), covering an area of 782 ha or 68 per cent of the PAA. The remainder of the PAA consists of moderate fertility (3), moderately low fertility (2) and low fertility (1) (refer **Figure 8.**)





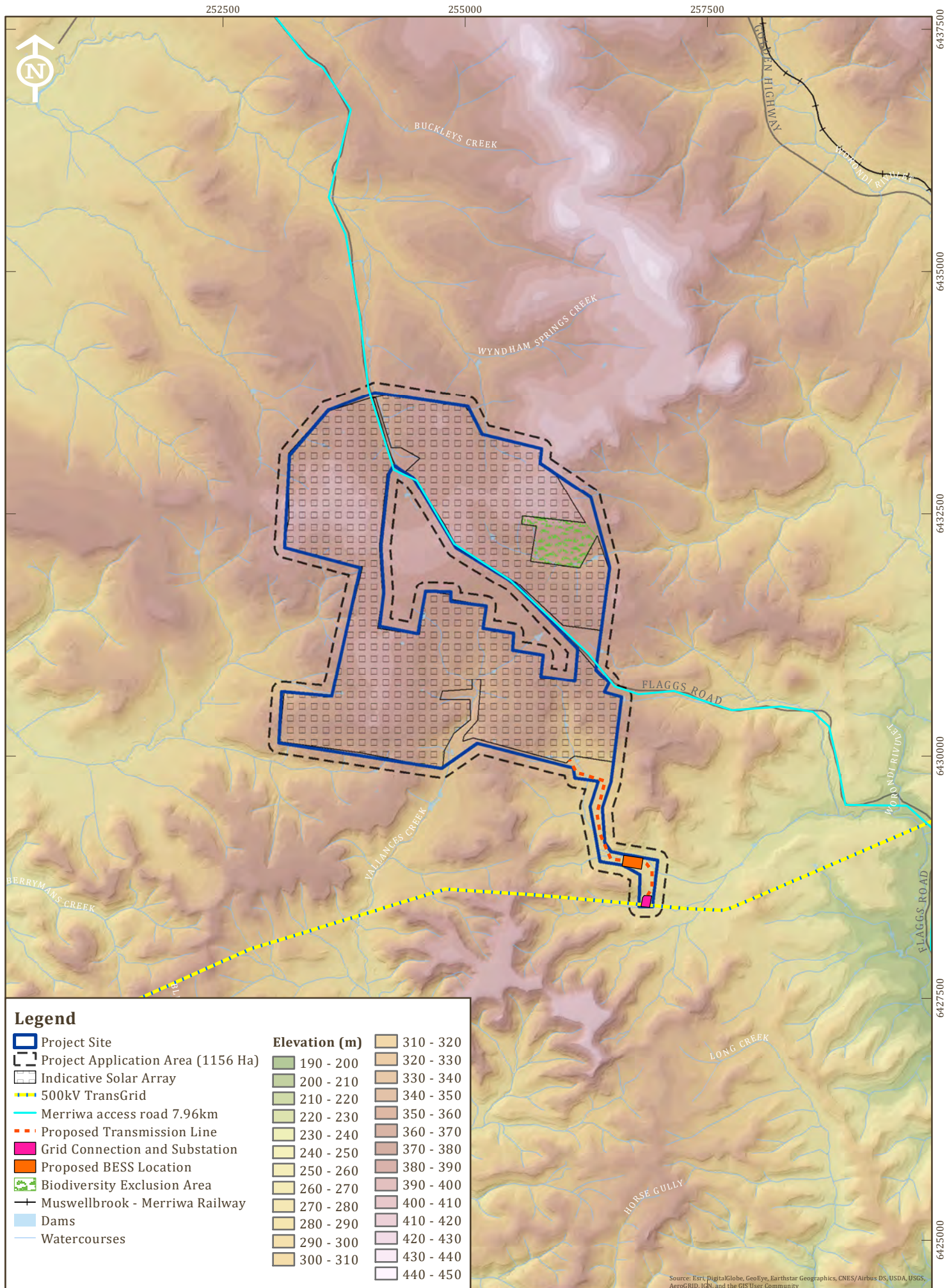
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Land Zoning

FIGURE 2



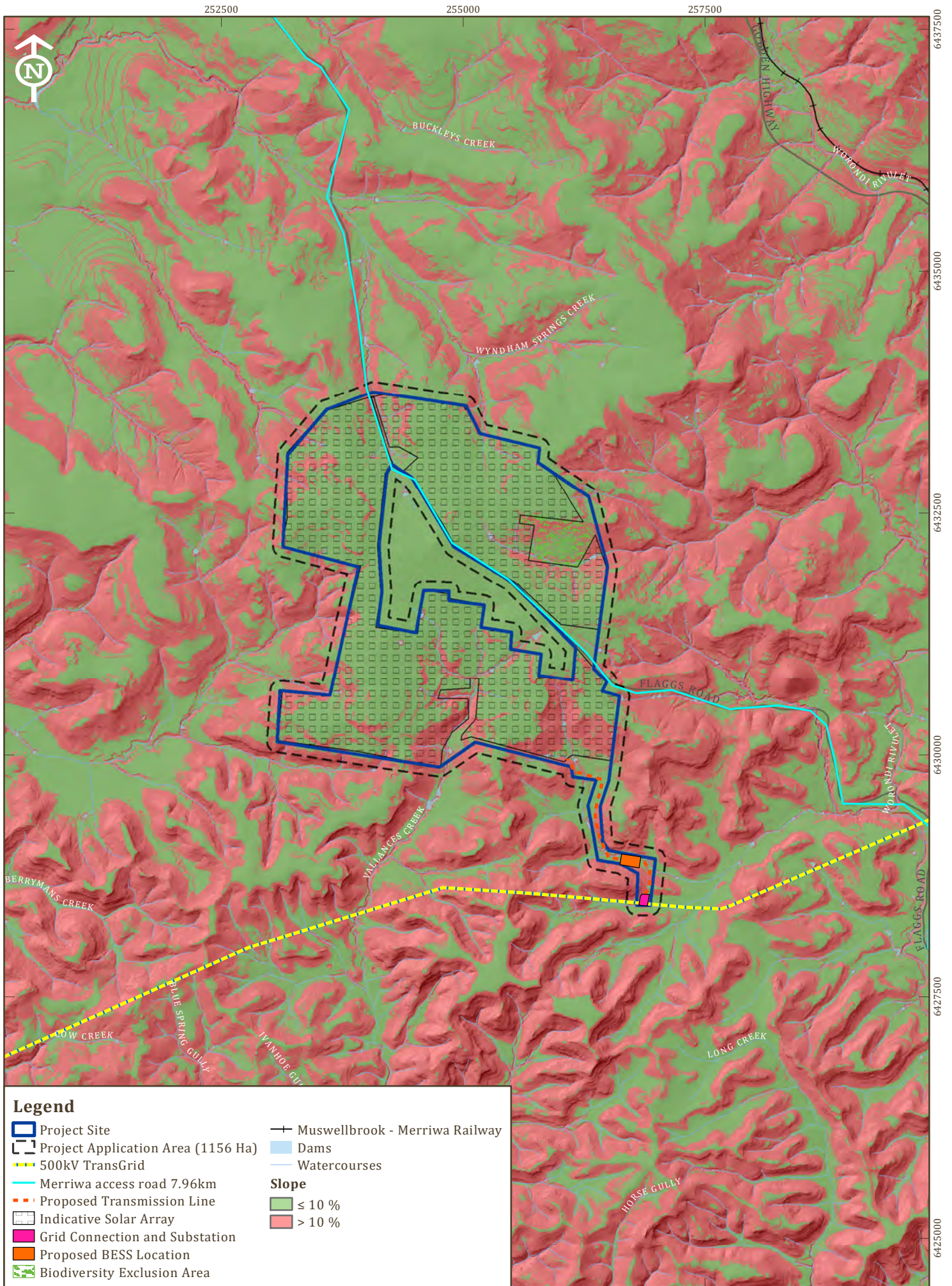
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Topography

FIGURE 3

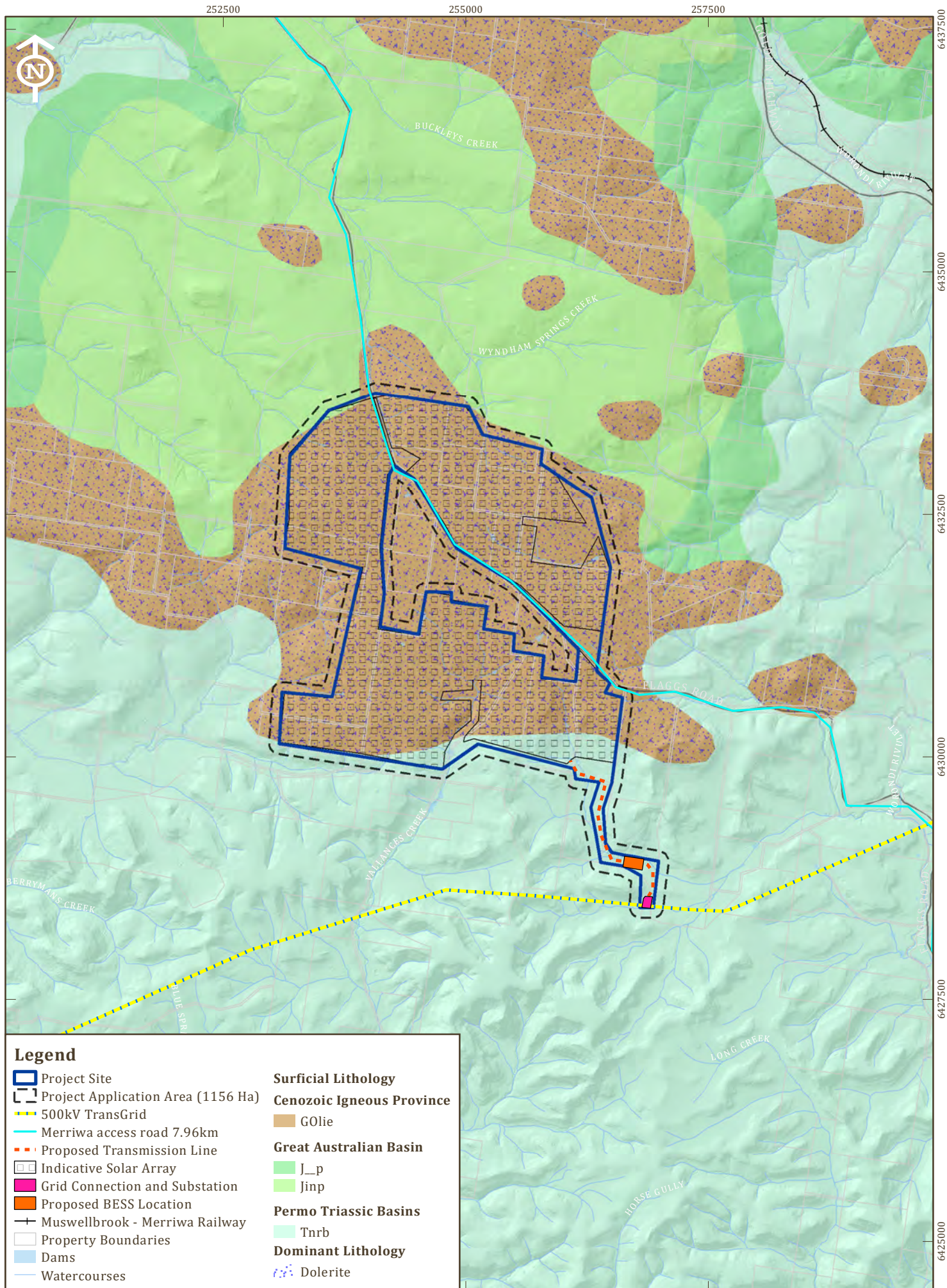


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FIGURE 4



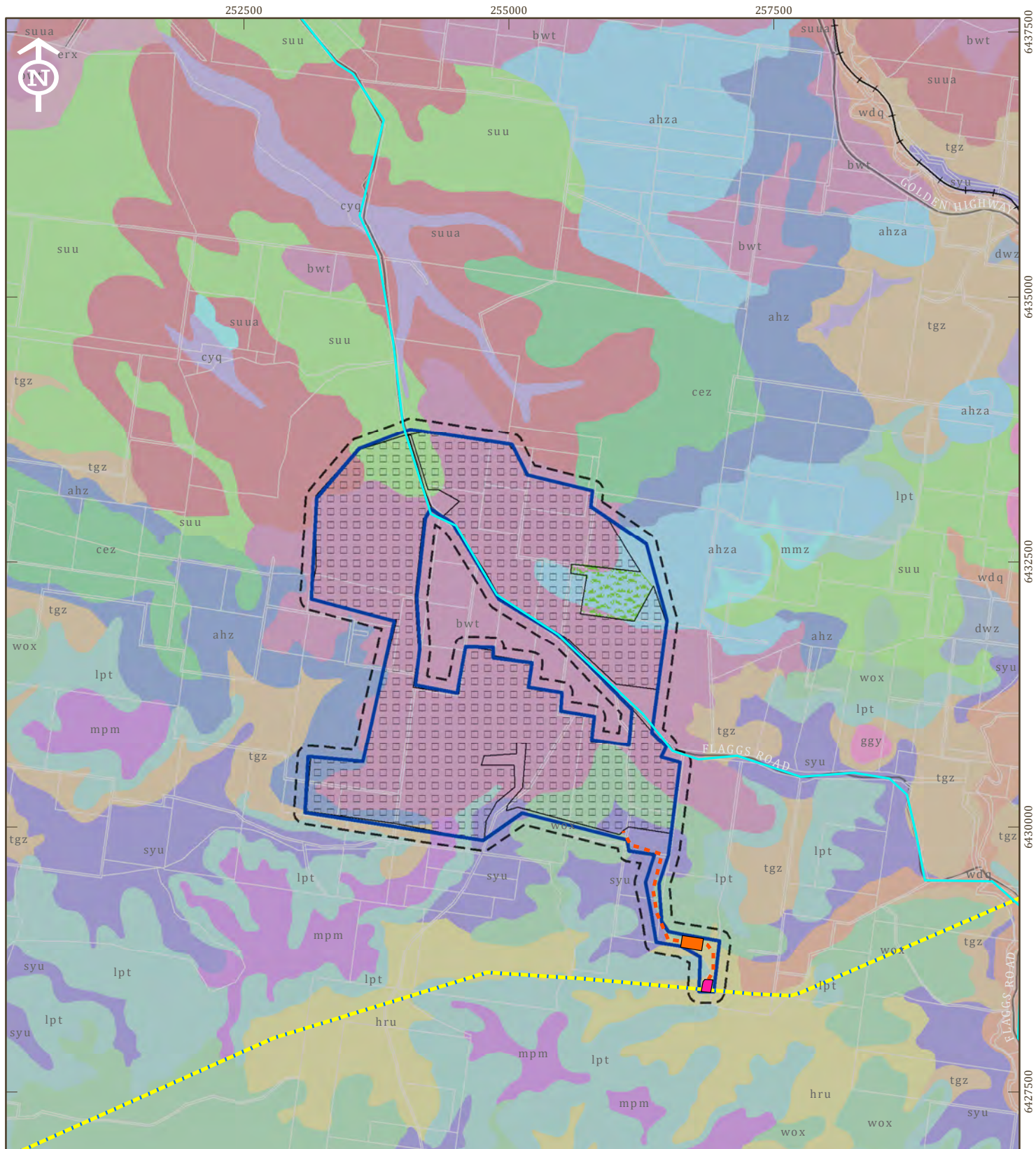
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Surface Geology

FIGURE 5



Legend

- Project Site
- Project Application Area (1156 Ha)
- 500kV TransGrid
- Merriwa access road 7.96km
- Proposed Transmission Line
- Indicative Solar Array
- Grid Connection and Substation
- Proposed BESS Location
- Biodiversity Exclusion Area

- Muswellbrook - Merriwa Railway
- Property Boundaries
- Soil & Land Resources (Hunter Region, v1.5)**
- Ant Hill (ahz)
- Ant Hill variant a (ahza)
- Bow (bwt)
- Cranbourne (cez)
- Curryall (cyq)
- Dunwell (dwz)
- Erin (erx)

- Galla Gilla (ggy)
- Hand on Rock (hru)
- Lees Pinch (lpt)
- Munghorn Plateau (mpm)
- Munmurra (mmz)
- Sandy Hollow (syu)
- Summerhill (suu)
- Summerhill variant a (suua)
- Tinagroo (tgz)
- Widden (wdq)
- Wollangambe (wox)

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Soil Landscapes

FIGURE 6

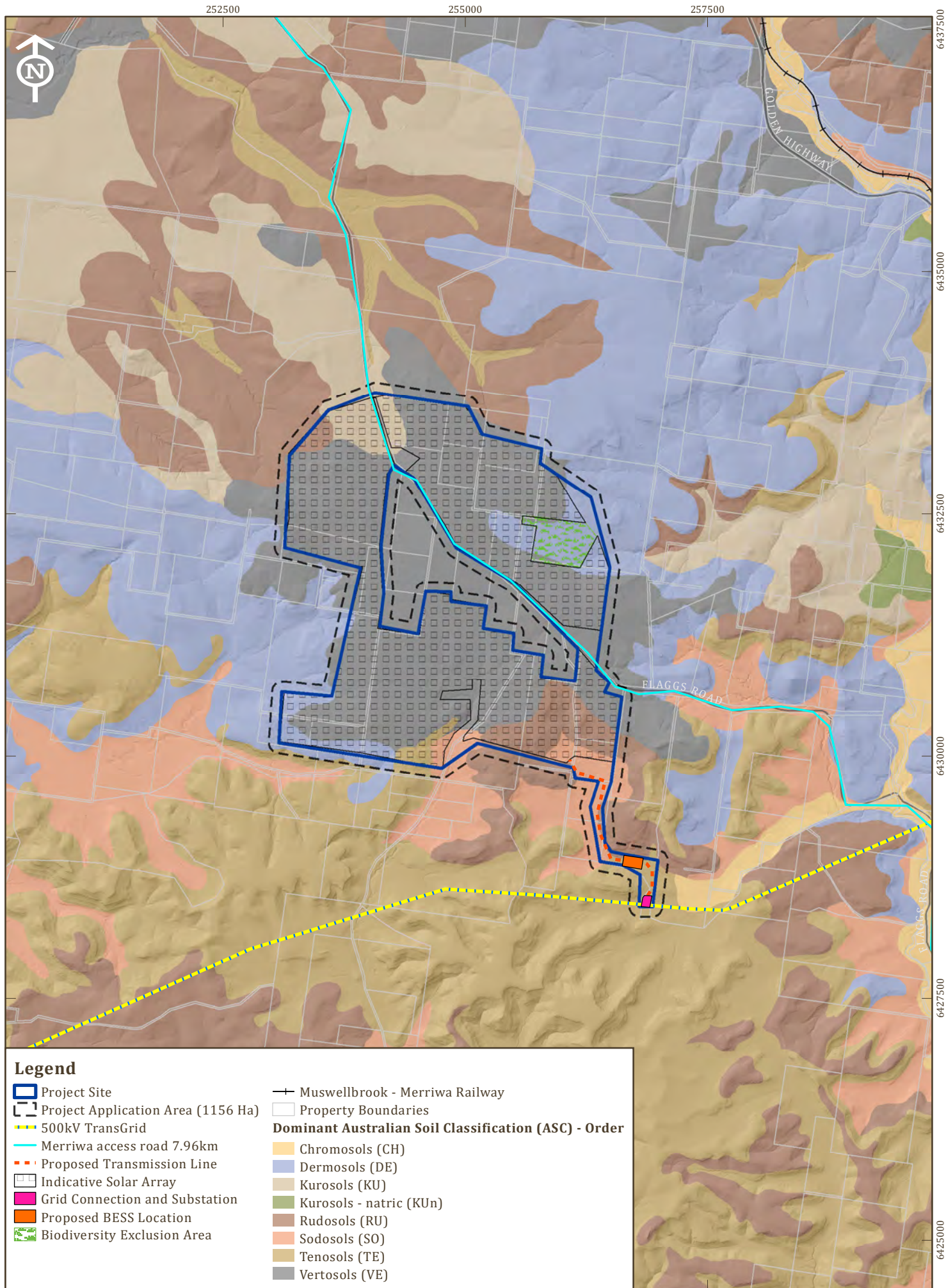
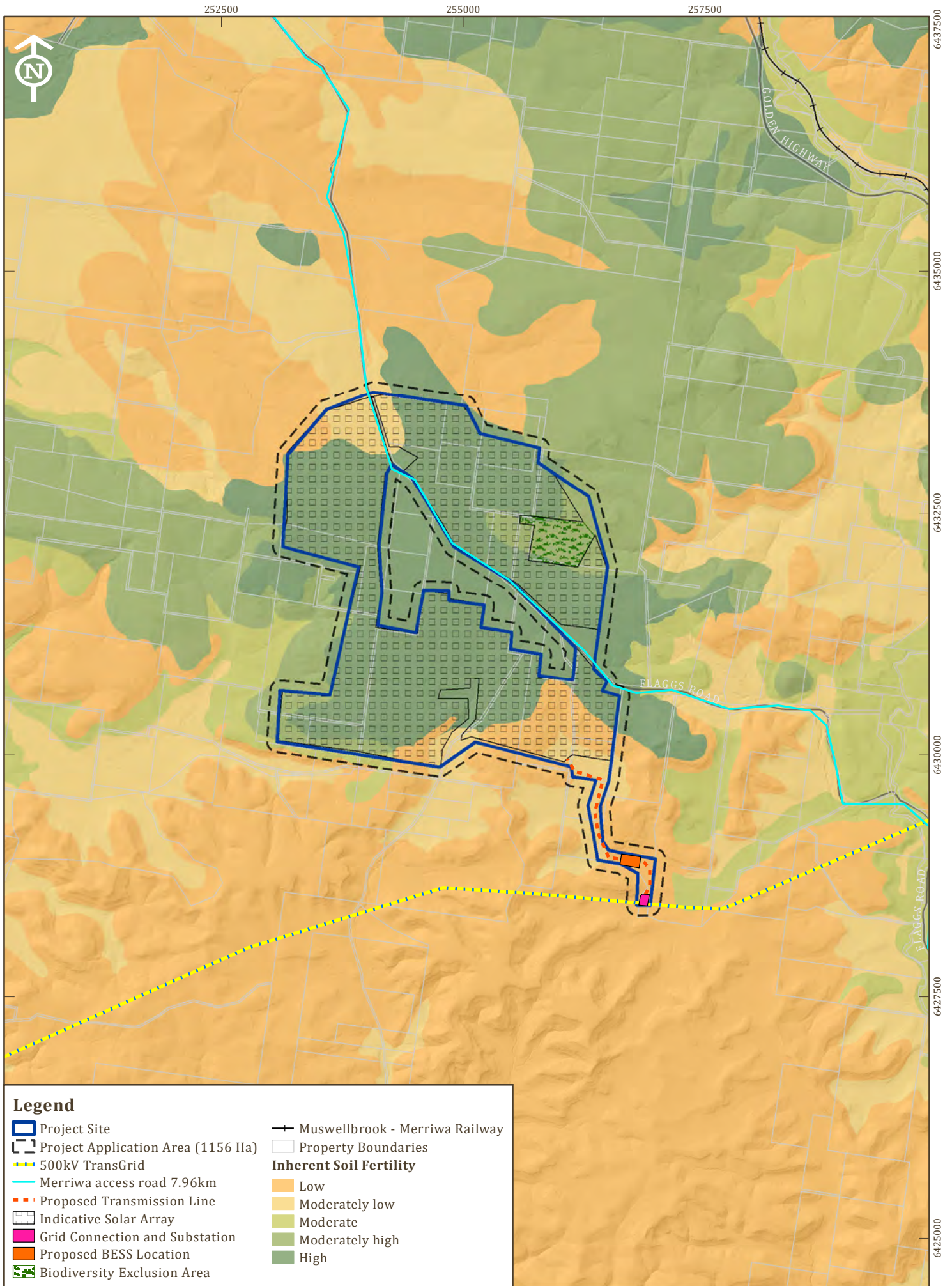


FIGURE 7



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0 250 500 1,000 Meters
Scale 1:50000 at A4

Inherent Soil Fertility

FIGURE 8

3 LAND AND SOIL CAPABILITY

Land capability, as detailed in the OEH guideline *The Land and Soil Capability Assessment Scheme; Second approximation* (OEH 2013) (referred to as the LSC Guideline), is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources. Failure to manage land in accordance with its capability risks degradation of resources both on- and off-site, leading to a decline in natural ecosystem values, agricultural productivity, and infrastructure functionality.

The scheme uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. The scheme consists of eight classes, which classify the land based on the severity of long-term limitations. The LSC classes are described in **Table 1** and their definition has been based on two considerations:

- The biophysical features of the land to derive the LSC classes associated with various hazards.
- The management of the hazards including the level of inputs, expertise and investment required to manage the land sustainably.

The biophysical features of the land that are associated with various hazards are broadly soil, climate and landform, specifically noted as slope, landform position, acidity, salinity, drainage, rockiness; and climate. The eight hazards associated with these biophysical features that are assessed by the LSC scheme are:

1. Water erosion
2. Wind erosion
3. Soil structure decline
4. Soil acidification
5. Salinity
6. Water logging
7. Shallow soils and rockiness
8. Mass movement

Each hazard is assessed against set criteria tables, as described in the LSC Guideline, with each hazard ranked from 1 through to 8 with the overall ranking of the land determined by its most significant limitation.

Table 1: Land and Soil Capability Classification

Class	Land and Soil Capability
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.



Class	Land and Soil Capability
5	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

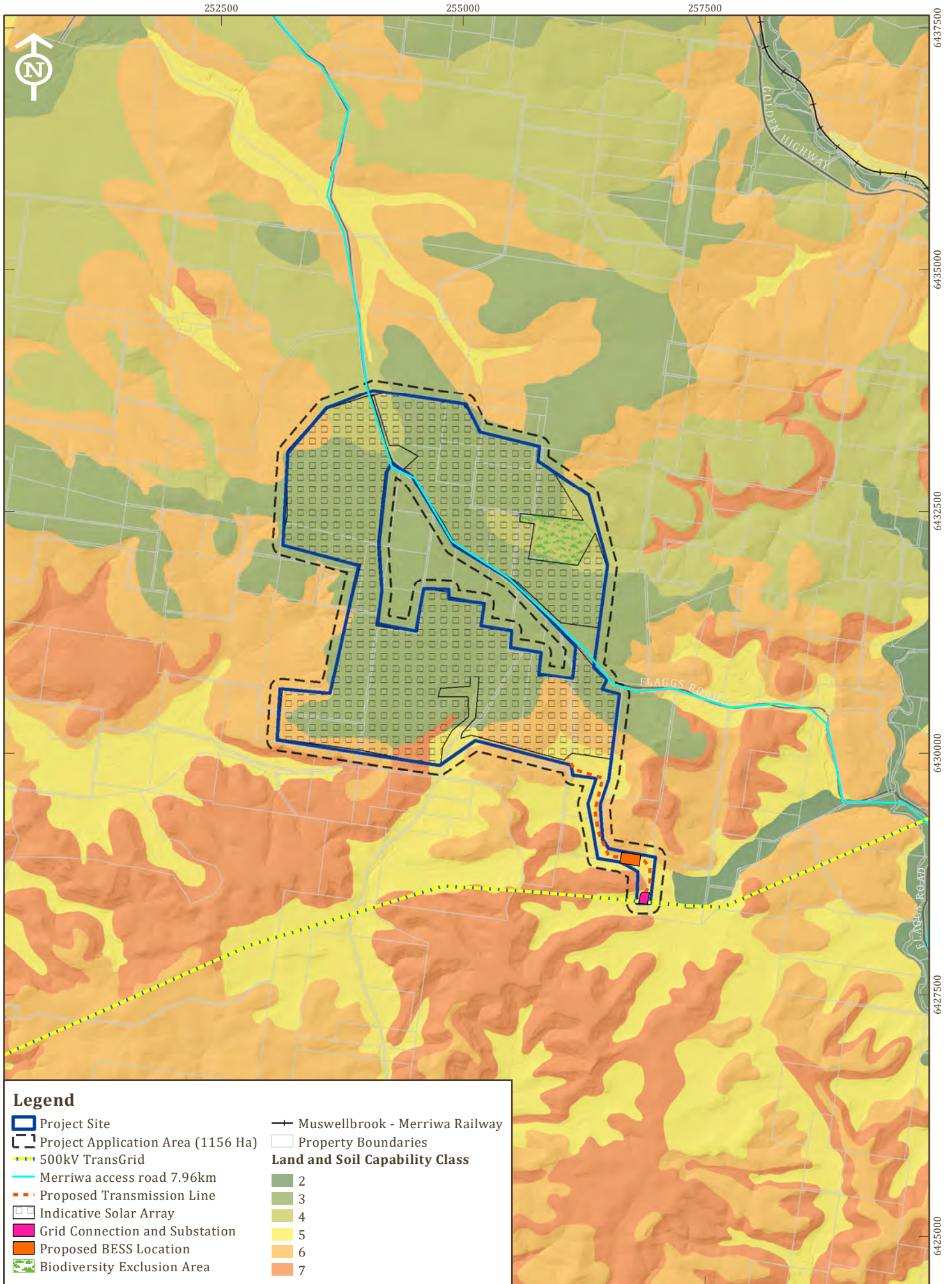
* LSC class located within the PAA.

The NSW regional based maps of Land and Soil Capability (LSC) indicate the PAA is dominated by high capability land, and characterised by the following classes:

- Class 3 land – 785 ha or 68 per cent of the PAA;
- Class 4 land – 113 ha or 10 per cent of the PAA;
- Class 5 land – 80 ha or 7 per cent of the PAA;
- Class 6 land – 158 ha or 14 per cent of the PAA; and
- Class 7 land – 20 ha or 2 per cent of the PAA;

The spatial distribution of the LSC classes are shown in **Figure 9**.





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Land and Soil Capability

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0 250 500 1,000 Meters
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FIGURE 9

4 STRATEGIC REGIONAL LAND USE PLAN

4.1 OVERVIEW

The NSW Government's Strategic Regional Land Use Policy (the Policy) defines and identifies strategic agricultural land across NSW. Strategic agricultural land includes land with unique natural resource characteristics, known as biophysical strategic agricultural land (BSAL), and clusters of significant agricultural industries known as critical industry clusters (CICs). The Policy has been developed to achieve balanced land use outcomes, particularly between mining, coal seam gas and agriculture.

4.2 REGIONAL MAPPING

The regional mapping of BSAL and CIC's has been developed in accordance with the criteria outlined in **Table 2** below. Regionally mapped BSAL covers an area of 698 ha of the PAA, as shown on **Figure 10**. Regionally mapped BSAL is present to the north of the Project locality and is extensively distributed around Merriwa township and over the Merriwa Plateau. There are no CICs mapped within the PAA or the project locality, with the nearest CIC's located approximately 20km to the southeast at Sandy Hollow.

Table 2: Regional Mapping Criteria

Mapping Unit	Criteria
BSAL	<ul style="list-style-type: none"> Land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH); and Land capability classes I, II or III under the Land and Soil Capability Mapping of NSW (OEH); and Reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L. <p>OR</p> <ul style="list-style-type: none"> Land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH); and Land capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH); and Reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.
CICs	<p>Industry clusters where:</p> <ul style="list-style-type: none"> There is a concentration of enterprises that provides clear development and marketing advantages and is based on an agricultural product; The productive industries are interrelated; It consists of a unique combination of factors such as location, infrastructure, heritage and natural resources; It is of national and/or international importance; It is an iconic industry that contributes to the region's identity; and It is potentially substantially impacted by coal seam gas or mining proposals.



4.3 BSAL SITE VERIFICATION CRITERIA

The *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (OEH 2013) details the methodology for ground truthing regionally mapping to verify the presence and extent of BSAL. This process is outlined below.

Step 1: Identify the PAA which will be assessed for BSAL

The assessment area should include the entire PAA and include at least a 100 m buffer to take into account minor changes in design, surrounding disturbance and minor expansion. If BSAL is part of a larger contiguous mass of BSAL then the boundary of this area must also be identified.

Step 2: Confirm access to a reliable water supply

BSAL lands must have access to a reliable water supply.

Step 3: Choose the appropriate approach to map the soils information

Access to the PAA will define the level of investigation that the proponent can undertake. If the proponent has access to the land then the BSAL verification requirements for on-site soils assessment as described in sections 6 and 9 of the Interim Protocol should be met. If the proponent does not have access then the proponent should develop a model of soils distribution guided by Sections 6 and 9 based on landscape characteristics using the information listed in Section 5 of the Interim Protocol.

It is important to note that for either approach, if any criteria indicate that the site is not BSAL, then no further assessment is necessary. The flow chart in Figure 3 is designed to assess the simplest criteria first, to avoid more costly assessments if the site can be easily discounted as BSAL.

Step 4: Risk assessment

The proponent should undertake a risk assessment as this will influence the density of soil sampling required. The proposed activity on parts or all of the PAA may be of low risk to agriculture and so may only require a sampling density of 1:100 000. Alternatively, other areas may be at higher risk of impact and so should have a sampling density of 1:25 000.

Step 4: Soils and landscape verification criteria

- Ten site verification criteria have been identified, as follows:
- Slope;
- Rock outcrop;
- Surface rock fragments;
- Gilgai;
- Soil fertility (soil type);
- Effective rooting depth to a physical barrier;
- Soil drainage;
- Soil pH;
- Salinity; and
- Effective rooting depth to a chemical barrier.

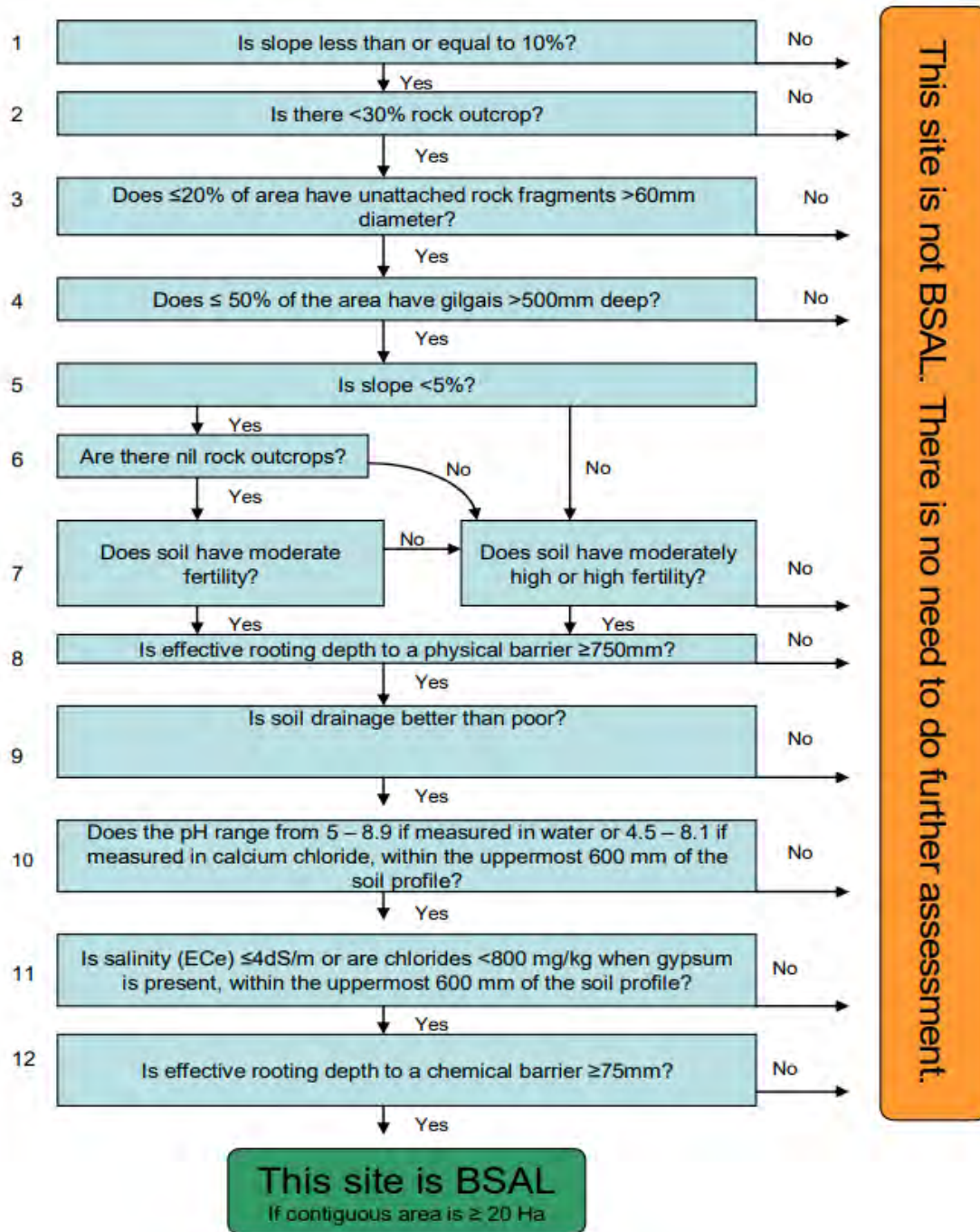
Table 3 describes the order in which the site verification criteria are assessed and the decision making to identify BSAL at each representative site. For soil to be classified as BSAL, it must meet all of the criteria. If any criteria are not met, the site is not BSAL and there is no need to continue the assessment.



The minimum area for BSAL is 20 hectares. If the area subject to assessment falls below 20 hectares at any point of the assessment because of exclusion of land that does not meet the criteria, then the land is not BSAL and there is no need to continue the assessment.

Steps 1-6 in **Table 3** can be measured with relative ease in the field or via remotely sensed data as these are basically landscape criteria that can be ascertained without soil profile information. If these landscape requirements are not met, simple observation sites called exclusion sites are used. However, Steps 7-12 in **Table 3** are determined by soil profile description and will require detailed assessment sites.

Table 3: Schematic diagram of BSAL site verification criteria



(Source: OEH 2013)

4.4 EVALUATION

Minesoils evaluated the likelihood of BSAL verification within the PAA. **Table 4** shows the estimation of soil types performance against the BSAL criteria. This desktop evaluation is for speculative purpose only using limited data and broad assumptions with a conservative approach. This is not a BSAL verification assessment.

The PAA is located within the NSW reliable rainfall zone and the high groundwater productivity zone (Water NSW (Formerly DPI Water and NSW Office of Water)) and therefore meets the criteria for reliable water supply.

Slope analysis shows that 25 per cent of the site features slopes >10 per cent. These areas would not be subject to site verification.

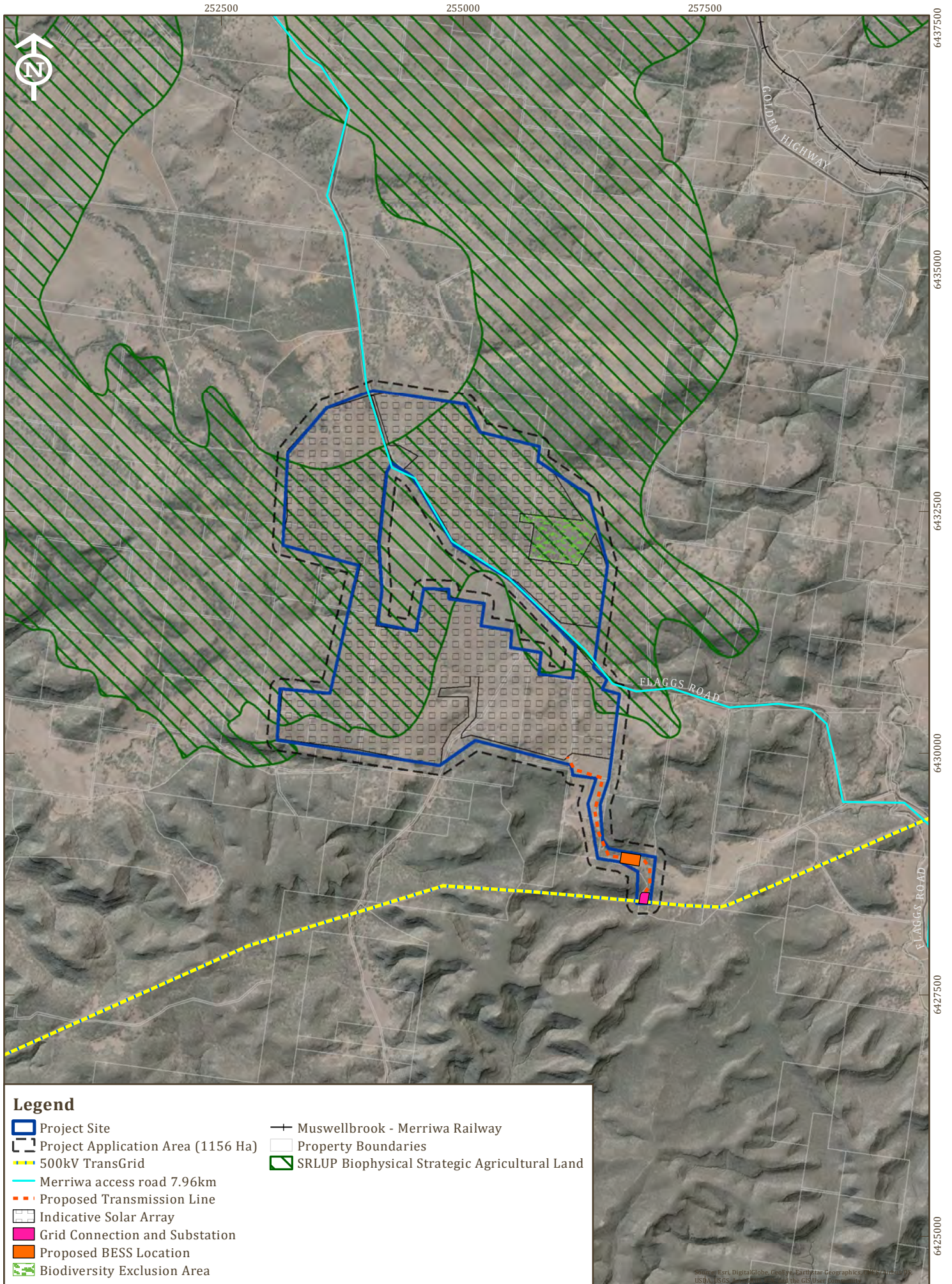
The remainder of the PAA would be subject to site assessment. For the purpose of this evaluation, the dominant soil types found onsite (refer **Figure 7**) were used as indicative units in conjunction with the soil and landform characteristics for the soil landscape units as described in the *Soil and Land Resources of the Hunter Region* 1:100,000 Sheet (DPIE 2020).

Table 4: BSAL Site Verification Estimation

Site Verification Criteria	Vertosol	Dermosol	Rudosol	Sodosol	Kurosol	Tenosol
1. Is slope < 10%?	Likely	Likely	Unlikely	Likely	Likely	Unlikely
2. Is there < 30% Rock Outcrop?	Likely	Likely	Unlikely	Likely	Likely	Likely
3. <20% unattached Rock Fragments >60mm?	Likely	Likely	Unlikely	Likely	Likely	Likely
4. Does < 50% have Gilgais >500mm deep?	Likely	Likely	Likely	Likely	Likely	Likely
5. Is Slope <5%?	Likely	Likely	Unlikely	Likely	Likely	Likely
6. Are there nil rock outcrops?	Likely	Likely	Unlikely	Likely	Likely	Likely
7a. Does Soil Have Moderate Fertility?	Likely	Likely	Unlikely	Unlikely	Likely	Unlikely
7b. Is fertility moderately high/high?	Likely	Likely	Unlikely	Unlikely	Unlikely	Unlikely
8. Is ERD to a physical barrier >750mm?	Likely	Likely	Unlikely	Likely	Likely	Likely
9. Is drainage better than poor?	Likely	Likely	Likely	Unlikely	Likely	Likely
10. Is pH between 5.0 and 8.9?	Likely	Likely	Likely	Likely	Unlikely	Likely
11. Is salinity (ECe) < 4 dS/m	Likely	Likely	Likely	Likely	Likely	Likely
12. Is ERD to a chemical barrier >750mm?	Likely	Likely	Likely	Likely	Likely	Likely
Is the land BSAL?	Likely	Likely	Unlikely	Unlikely	Unlikely	Unlikely

Based on the evaluation, it is considered likely that regionally mapped BSAL within the PAA would meet the criteria for BSAL verification. Verified BSAL is likely occur in association with the Vertosol and Dermosol soil types. As mentioned in Section 2.4, Vertosols represent the most extensive soil type mapped for the PAA and are generally not associated with slopes >10%. Therefore, it is likely that a significant portion of the PAA would meet the criteria for BSAL (up to approximately 867 ha or 75 per cent of the PAA).





Legend

- Project Site
- Project Application Area (1156 Ha)
- 500kV TransGrid
- Merriwa access road 7.96km
- Proposed Transmission Line
- Indicative Solar Array
- Grid Connection and Substation
- Proposed BESS Location
- Biodiversity Exclusion Area
- Muswellbrook - Merriwa Railway
- Property Boundaries
- SRLUP Biophysical Strategic Agricultural Land

GDA 1994 MGA Zone 56

MINESOILS 
LAND & REHABILITATION SPECIALISTS

0 250 500 1,000 Meters
Scale 1:50000 at A4

Biophysical Strategic
Agricultural Land

FIGURE 10

5 SOIL AND LAND MANAGEMENT

5.1 EROSION

The landform and soil types within the PAA represents minimal opportunity for soils to erode and be transported via sheet and/or gully erosion upon disturbance. The Vertosol soil type that dominates the PAA's gently undulating central and northern slopes experiences a low run-off potential and is associated with good permeability and drainage characteristics. Erosion risk is expected to be low in these areas.

Soils on steeper slopes will be subject to high run-off potential. In addition, Sodosols that are mapped on minor areas of the PAA are defined by a sodic subsoil and exhibit high levels of risk associated with sodicity and dispersion. Sodicity occurs when exchangeable sodium on the cation exchange complex leads to clay dispersion in the soil. In locations where sodic subsoils and high run-off combinations occur, the erosion potential risk is highest.

However, due to a general lack of exposure of subsoils during the construction and operational phases of solar farm projects, the potential for soil erosion to occur is usually minimal.

The Project is not anticipated to result in changes to existing drainage or erosive potential within the PAA. Nonetheless, measures for effective erosion and sediment control should be undertaken where soil surface disturbance occurs. These will include approaches for the construction and operational phases, as outlined below.

Construction Phase

- Construction should proceed in stages, and within each stage the construction activities will be sequenced, such that the construction zone at any one time will only be a small proportion of the overall PAA;
- The Project should utilise the existing landform and not endeavour to undertake broad-scale re-contouring of the existing ground levels without soil and land resource assessments and erosion and sediment control implementation. As a result, the existing vegetative cover and soil structure will be maintained intact across much of the PAA;
- Solar arrays are typically pole mounted, with the poles being supported on a driven or screw pile, so that there is no excavation required other than for electrical cabling;
- Construction areas will be progressively revegetated with grass and pasture species as installation of solar panels proceeds across the site;
- At locations where earthworks are necessary, such as for construction of sub-station pads, or site facilities, localised erosion and sediment controls will be placed in accordance with the Landcom (2004) guidelines;
- Preservation and stabilisation of drainageways and minimisation of the extent and duration of any surface disturbance will be prioritised during construction.
- If sodic subsoils are inadvertently exposed, it is recommended to apply gypsum as an ameliorant to displace the sodium and provide the soil with a stronger aggregate and hold structure when wet.

Operational Phase

- Soil disturbance during operation of the Project should be minimal and limited to maintenance activities, involving very small, localised disturbance areas on an infrequent basis.
- Standard erosion and sediment control measures should be implemented to minimise the potential for sediment export within areas to be disturbed during operations. These measures would be developed on a case-by-case basis and are likely to include measures such as sediment fencing, localised sediment traps, and progressive stabilisation with vegetation.



- During operation, mounted solar panels should change orientation during the day, with any rainfall runoff being distributed in the area around each panel, and not drained permanently to a single point on the ground.
- Measures to manage any bare areas and erosion that develop beneath the solar arrays over time should be included in a land or groundcover management plan for implementation during ongoing operation of the proposal.
- An effective management tool for maintaining adequate low grass cover is to use livestock (sheep) grazing throughout the solar farm. This provides an opportunity to keep grasses low and therefore encouraged to spread sideways to provide a greater and more effective ground cover, as well as adding nutrients via manure back into the soil.

Prior to Project approval, fieldwork investigations can provide specific soil management recommendations tailored to the physical and chemical characteristic of soil types within the PAA.

5.2 REHABILITATION

A detailed decommissioning and rehabilitation plan should be prepared within 5 years of the planned closure of the Project. This plan will detail all aspects of decommissioning and removal of all infrastructure unwanted for post project land use (some infrastructure may remain for post Project land use purposes i.e., constructed internal roads may be kept as part of the agricultural infrastructure).

Upon decommissioning and rehabilitation of the PAA, final land use of agriculture would be consistent with pre-development land use. It is expected there would be negligible impact on land and soil capability for the overall project and therefore once infrastructure is removed, regular agricultural activities, such as cattle grazing, would be resumed.

During decommissioning, where potential erosive impacts have been identified due to the disturbance of sodic topsoil or subsoil, gypsum will be applied for any remediation earthworks where sodic soils are present. Standard temporary erosion and sediment control measures are to be put in place for high disturbance areas.

It is anticipated there will be minimal or no soil stripping and stockpiling activities associated with the Project. Where stripping activities are required, soil should be stripped in a slightly moist condition, where possible. Material should not be stripped in either an excessively dry or wet condition to avoid pulverisation and compaction impacts on the soil. If soil is required to be stockpiled, the stockpile height should not exceed 2m.

All areas disturbed during construction, operations or decommissioning that are not in active use for over 3 months, should be sown with grass and pasture species with starter fertiliser to provide stabilising ground cover and a healthy topsoil to provide long term protection against erosion.



6 SUMMARY

This Preliminary BSAL Assessment has been conducted based on the findings of a desktop review and evaluation of reference information. Key findings include:

- The NSW regional soil mapping indicates the dominant soil type within the PAA are Vertosols. Other soil types include Dermosols, Rudosols, and limited areas of Sodosols, Kurosols and Tenosols.
- The NSW regional mapping for estimating inherent fertility indicates the PAA is dominated by soils with high fertility, with some areas of low to moderate fertility.
- The NSW regional based maps of LSC indicate the PAA is dominated by Class 3 land, with minor areas of Class 4, 5, 6 and 7 land. Class 3 land is defined as high capability land.
- Regionally mapped BSAL covers an area of 698 ha of the PAA.
- It is considered likely that regionally mapped BSAL within the PAA would meet the criteria for BSAL site verification.

Management recommendations based on these findings are provided as a guide to mitigating the potential soil and land resource impacts associated the Project.



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