SPARK RENEWABLES

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Environmental & Social Consultants

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM

Environmental Impact Statement

SSD-63345458

FINAL
March 2025

CLEAN ENERGY COUNCIL MEMBER

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM

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Prepared by Umwelt (Australia) Pty Limited
on behalf of Spark Renewables Pty Ltd
Project Director: Paul Douglass
Project Manager Penelope Williams
Report No.: 22492/R17
Date: March 2025

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Front Cover Artwork

Created for Spark Renewables by Wodi Wodi and Walbunja artist Lauren Henry and Biripi artist Brittany Cochrane. Artwork copyright by Yirra Miya.

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SPARK RENEWABLES

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM

Summary

WHAT IS THE PROJECT?

Spark Renewables is proposing to develop the Wattle Creek Battery Energy Storage System (BESS) Project on the University's Arthursleigh property held by the University of Sydney, east of Big Hill, situated in the Upper Lachlan Shire Council Local Government Area (LGA) in NSW, approximately 15 kilometres (km) northwest of Marulan. The location is adjacent to the Wingecarribee Shire LGA (to the east) and Goulburn Mulwaree Council LGA (to the south).

Spark Renewables was selected by the University of Sydney to investigate and develop a hybrid renewable energy facility on the University's property which includes:

- A hybrid solar farm with generation capacity of up to 265 megawatt (MW) combined with a 100 MW battery energy storage system (BESS).
- A standalone BESS with 350 MW capacity

Each of the two components are being assessed under separate approval processes but will share infrastructure and a proposed research test bed facility.

The Project responds directly to the energy policy of the Commonwealth and NSW governments, moving toward net zero energy generation and supporting the increased development and utilisation of renewable energy. As a large-scale energy storage system, the Project will also deliver direct benefits to the electricity grid, improving system strength and reliability.

Battery Energy Storage System (BESS)

CHEMISTRY

Lithium-ion or similar.

DIMENSIONS

Either 40-foot containers in a purpose-built compound or smaller DC coupled units distributed within the wind farm.

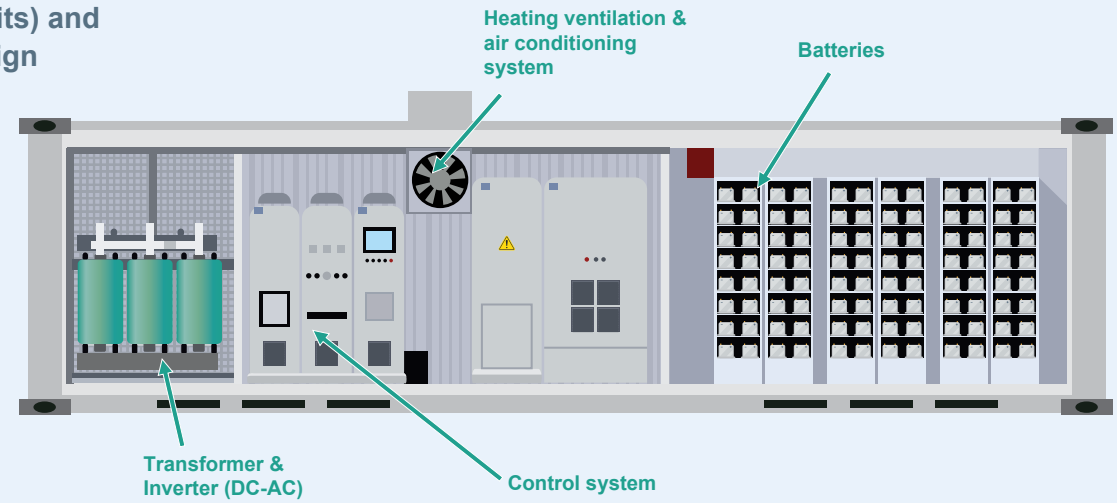
PURPOSE

- Provides firm generation 'on demand' for the electricity grid, aswell as a range of network services such as voltage support.
- Store excess electricity from the solar panels when the wind is blowing and then would distribute to the electricity grid when demand is at its highest.

Battery packs (smaller units) and containerised battery design

FIRE HAZARDS & RISK MITIGATION

Integrated within the battery design will be an Asset Protection Zone serving as a fire break, as well as a heating, ventilation and air conditioning system.



Key project components

A BESS with 350 MW capacity electrically isolated with its own transformers and metering infrastructure. The BESS is comprised of lithium-ion batteries containerised with bi-directional inverters and transformers installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant. Each container that makes up the BESS contains heating ventilation & air conditioning systems and integrated within the battery design will be an Asset Protection Zone serving as a fire break.

On-site collector substation to connect the BESS to the electricity transmission network via Marulan Substation.

Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. One transmission option will be constructed for each component, (i.e. one transmission option for the standalone BESS project and separate transmission option for the solar farm project, being considered in the separate development application), however, optionality to connect to the substation via one transmission line only is also being investigated therefore the two options are assessed separately.

A research Test-Bed Facility – comprising of a 2 ha hard stand area, demountable buildings, security fencing, parking, 200 kilovolt (kVa) power supply and 100kVa dummy load (simulated electrical load for testing purposes).

If approved, the Wattle Creek BESS could store up to 350 MW of electricity and contribute to and support the National Energy Market (NEM) by providing renewable energy storage capacity and improving the security, stability, and resilience of the NEM with the ability to respond quickly to fluctuations in grid frequency.

Legend

- Project Area
- Local Government Area
- Roads
- Watercourses
- Access Road Works
- Access Point
- Existing Substation
- Marulan Gas Fired Power Station Project Area

Existing Transmission Lines

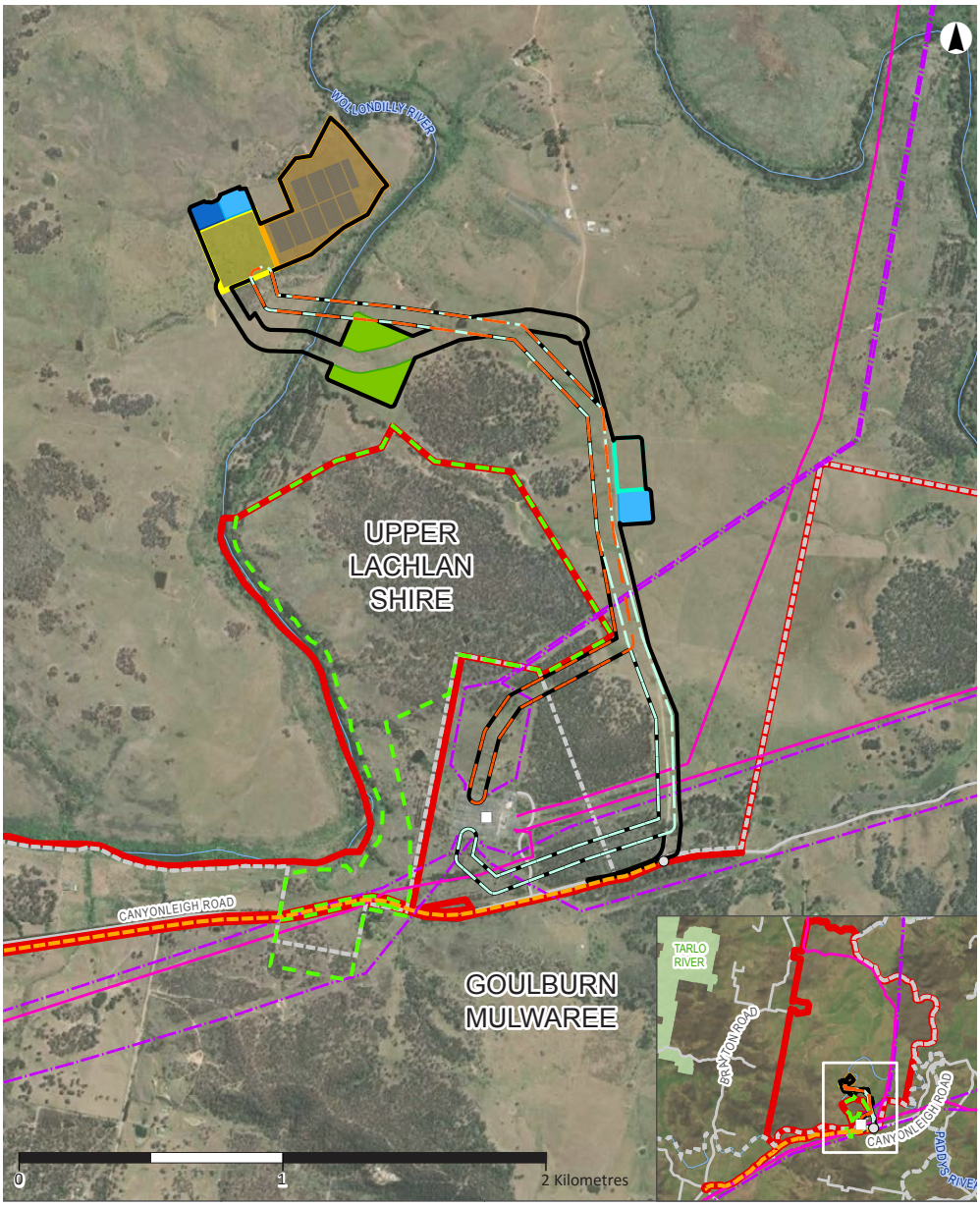
- 330kV
- 132kV

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

BESS

- Development Footprint – BESS
- BESS Site
- BESS Layout
- BESS Substation
- Test Bed Area
- Construction Compound
- O&M Facility
- Laydown Area



WHY IS THE PROJECT NEEDED?

The NSW Government is actively seeking investment in renewable energy generation and storage as part of its strategic initiatives to facilitate a systematic shift from coal fired energy production. The goal is to reduce the emissions associated with the electricity generation sector This efficient transition is essential for delivering electricity across NSW at a cost-effective rate to consumers.

Various government strategies, plans and policies such as the NSW Transmission Infrastructure Strategy and NSW Electricity Infrastructure Roadmap, identify the importance of renewable energy technology in providing an effective and economical way to deliver affordable, clean energy to NSW energy consumers.

NSW has a strong pipeline of renewable energy projects which have the potential to contribute to achieving the current transition targets. However, significant investment is required from the private sector to achieve sufficient renewable energy supply to support NSW's transition to renewable energy and the retirement of the existing fossil fuel generated supply.

The Project aligns with local and regional strategies to deliver diversification in local economies, yield supplementary income for associated landowners, develop employment opportunities across both construction and operational phases, contribute to regional investment, offer indirect employment to local service providers throughout the Project's lifecycle, and offer benefits to the local community through the execution of a community benefit fund (or similar). Furthermore, the Project prioritises the preservation of areas with high environmental value, a focal point of the local strategic framework for development across the region. Spark Renewables have sought such relationships throughout the design process to align the Project with community priorities and local strategic plans.

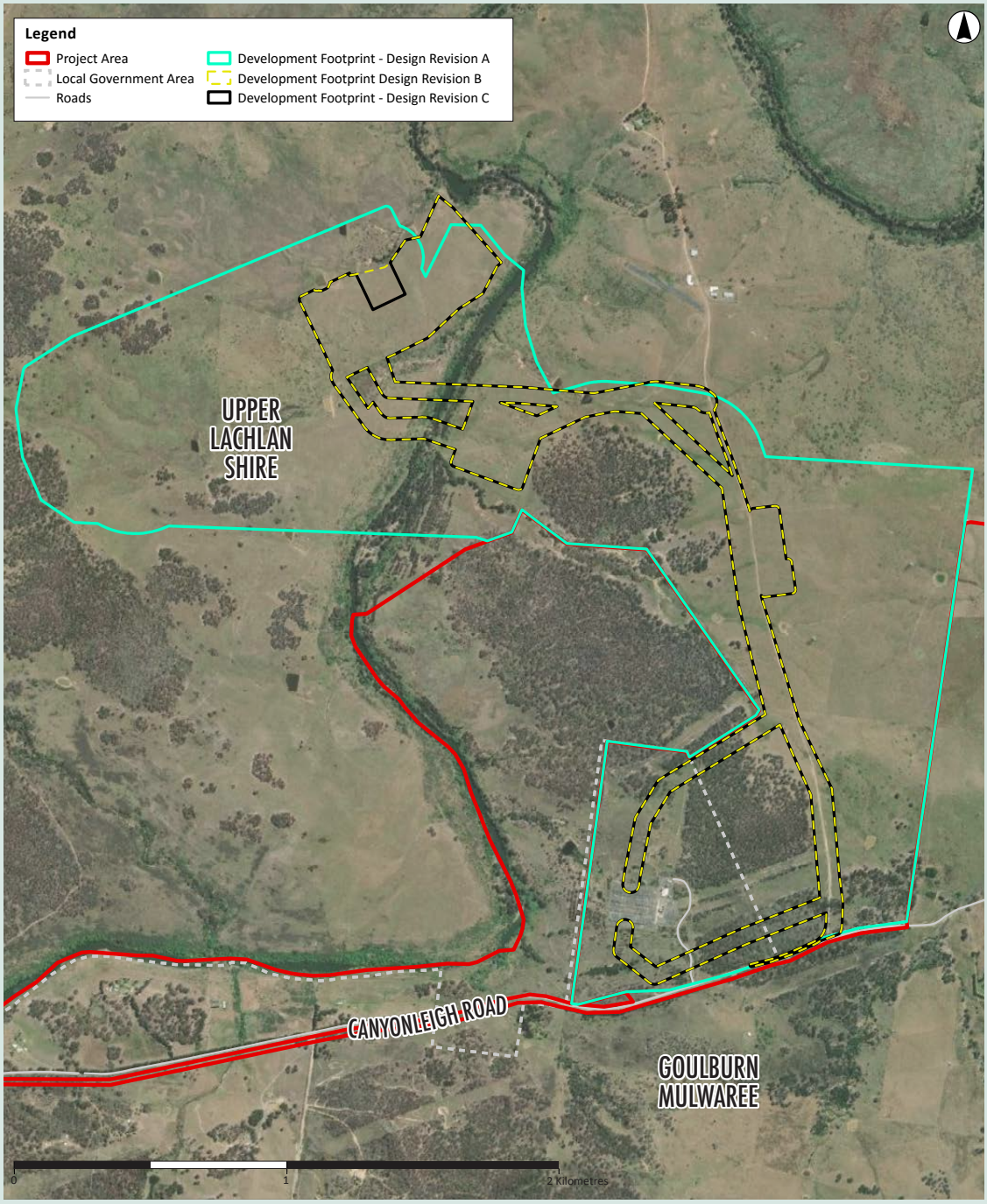
BENEFITS OF THE PROJECT INCLUDE

- Contribute to and support the National Energy Market (NEM) by providing renewable energy storage capacity and improving the security, stability, and resilience of the NEM.
- Provide energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.
- Supporting local businesses, regional and Australian economy as part of the energy transition.
- Creating generational employment and training opportunities for those currently active in workforce and those emerging.
- Indirect benefits to local services through the construction and operation phases.

WHAT PROJECT ALTERNATIVES WERE INVESTIGATED?

Spark Renewables initially (prior to submission of the Scoping Report) investigated the inclusion of a wind farm component within the Project Area. Spark Renewables is not proceeding with the wind farm component following detailed on site wind monitoring and initial community engagement and is focused on developing the solar and BESS components only.

Spark Renewables has taken the approach of avoid in the first instance, and if that is not possible, seek to reduce, offset or mitigate the impacts.The Project has been continuously refined during development as preliminary findings, were made available through the technical assessments, allowing for Project design modifications to mitigate identified constraints.



Refinements to the conceptual design of the Project have sought to:

Refine the extent of the Development Footprint to maximise the utilisation of previously cleared land, reducing additional impact to vegetation and/or impact habitat for flora and fauna species.

Avoid impacts to Aboriginal Heritage and sensitive landforms where possible.

Place siting the proposed infrastructure in proximity to the existing electricity transmission infrastructure to reduce impact associated with transmission easements as far as practicable.

Application of minimum 10 metre separation between proposed infrastructure and vegetation to minimise potential of bushfire risk.

Minimise infrastructure and assets within flood prone land.

Maintain a minimum setback of 30 m from the high bank of the Wollondilly River.

PLANNING AND APPROVALS PROCESS

The components of the Wattle Creek BESS Project and the Wattle Creek Solar Farm Project are being assessed under two separate approval processes but will share project related infrastructure including the switching site substation, overhead high voltage transmission line, internal electrical reticulation, temporary construction facilities, permanent operation facilities, project access and a research test bed facility.

The Project requires approval under the NSW environmental and planning legislation. Under NSW Planning legislation, the Project is State Significant Development and requires approval under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The EIS prepared for the Project describes the Project, its impacts (both positive and negative), how the impacts are proposed to be managed, mitigated and offset, the benefits and the justification.

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the primary environmental and planning regulatory instrument relevant to the Project at the Commonwealth level. Under the EPBC Act, approval from the Commonwealth Minister for the Environment and Water is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES).

The Project was referred under the EPBC Act to the Minister via the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) and was determined to be a controlled action. The Project is to be assessed under the Assessment Bilateral Agreement between the Commonwealth and NSW Governments.

Environmental Impact Assessment Phase	Social Impact Assessment Activities and Outputs
SCOPING	
PRE-LODGEMENT: Preliminary assessment studies commence	Engagement with local landholders and key stakeholders
PRE-LODGEMENT: Scoping Report lodged with NSW Department of Planning, Housing and Infrastructure	
PRE-LODGEMENT: NSW Department of Planning, Housing and Infrastructure issues project specific Environmental Assessment Requirements (SEARs)	
EIS PREPARATION	
APPLICATION: Refinement of plans and preparation of assessment studies	Continue engagement with local landholders and key stakeholders
APPLICATION: Lodgement of DA supported by the EIS including SIA **WE ARE HERE**	Preparation of Social Impact Assessment
PUBLIC EXHIBITION	
APPLICATION: NSW Department of Planning, Housing and Infrastructure places EIS on public exhibition	
RESPONDING TO SUBMISSIONS	
APPLICATION: Preparation of Submissions Report that explains how submissions have been addressed	
ASSESSMENT	
APPLICATION: NSW Department of Planning, Housing and Infrastructure assesses the Project and provides its findings to the consent authority	
DETERMINATION	
APPLICATION: Consent authority decides whether to approve or refuse the Project, including conditions of consent if approved	
POST APPROVAL	
NSW Department of Planning, Housing and Infrastructure regulates Project to ensure compliance with the conditions of consent **Implementation of mitigation and enhancement measures and monitoring and management framework**	

ENGAGEMENT WITH POTENTIALLY AFFECTED PEOPLE AND OTHER INTERESTED PARTIES

STAKEHOLDER ENGAGEMENT

Spark Renewables is committed to engagement with all relevant stakeholders and to undertaking genuine and meaningful engagement with the community as part of planning and assessing the Project. This includes a focus on developing long-term relationships and maintaining open lines of communication. Since March 2023, Spark Renewables has met with landholders, community groups, service providers, Aboriginal groups, local councils, and government agencies to build relationships with the local and broader community and to understand stakeholder needs.

A community and stakeholder engagement program (CSEP) was implemented for the Project to gain input from the community and other stakeholders and understand their perspectives on the Project.

Engagement mechanisms such as community newsletters, drop-in sessions, personal meetings or interviews, online surveys and a website were used to provide opportunities provided to engage with the community.

This ongoing engagement has resulted in changes to the Project design and has assisted in development of management and mitigation measures proposed for the Project. This engagement has further informed the design of the Project and has been ongoing throughout the assessment process, and if the Project is approved, the engagement will be ongoing during the life of the Project.

ASSESSMENT OF IMPACTS

The Project has been designed through a comprehensive process that incorporated the findings of environmental studies, community and stakeholder feedback and engineering design considerations. Spark Renewables has engaged with stakeholders throughout the Project planning and assessment process and has designed the Project to avoid impact as far as practicable.

NOISE AND VIBRATION

Noise and vibration associated with both the construction and operation of the Project has been assessed as part of the EIS.

The noise modelling results indicate that noise mitigation measures will be required to minimise the potential construction noise impacts at residences surrounding the Project Area. No receivers were predicted to be highly noise affected.

Operational noise levels are predicted to comply with the relevant criteria at all residential receivers surrounding the Project Area

Increased traffic noise during construction may be noticeable for nearest receivers along Canyonleigh Road. Whereas noise mitigation options for traffic impacts are limited, Spark Renewables will offer Disruption Payments to residents located between the Brayton Road and the Project Area entrance along Canyonleigh Road during construction to address traffic and noise disruptions.

Spark Renewables has committed to the development and implementation of appropriate noise and vibration management, mitigation and monitoring measures.

BIODIVERSITY

The disturbance area associated with the Project largely comprises areas that have previously been disturbed and historically cleared for agricultural purposes.

Overall, the Project area features a mix of exotic pasture, native grasslands, scattered paddock trees, and intact woodland. Over half of the Development Footprint is comprised of land which has minimal biodiversity value and is unlikely to provide suitable habitat for threatened flora and fauna species. This land has no native over storey or mid storey cover (uppermost and middle layers of vegetation, consisting of the tallest and median height trees forming a canopy) and met the definition of non-native vegetation.

One Threatened Ecological Community (TEC) being White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community, was recorded in the development footprint and two threatened flora, and four threatened fauna species were recorded within the Project Area during surveys. The Project will not fragment any areas of high-quality TEC, due to the existing fragmentation of remnant vegetation from historical and current agricultural land use in the Project Area and surrounds. Any fragmentation associated with the Project will occur through the removal of areas of highly degraded native pasture vegetation and scattered trees. The retained areas will remain connected to other vegetation communities, both within the Project Area and the adjoining landscape.

Spark Renewables has committed to the development and implementation of biodiversity management measures which will include pre-clearance and tree-felling procedures, non-inhibiting fauna fencing, traffic control, weed management, fencing and access control, erosion and sediment control, and workforce education and training. Where impacts to biodiversity cannot be avoided, the NSW Biodiversity Assessment Process requires use of the NSW Government online credit calculator to generate the associated biodiversity credits, informed by the results of the biodiversity survey and associated area of impact.

The credits need to be offset by Spark Renewables prior to construction commencing. Spark Renewables is currently proposing to utilise a combination of different options to secure the biodiversity credits required to offset the residual impacts of the Project on biodiversity including utilising intact areas of native vegetation in the Project Area for offsetting.

ABORIGINAL CULTURAL HERITAGE

The Project Area is on the Gundungurra Nation within the Pejar Local Aboriginal Land Council (PLALC) and Gundungurra (LALC). An Aboriginal Cultural Heritage Assessment (ACHA) was undertaken to assess the potential impact of the Project on Aboriginal cultural heritage in consultation with the Broken Hill Local Aboriginal Land Council and other Registered Aboriginal Parties. The ACHA included field survey and a test excavation program.

Survey and test excavation results:

A total of 30 newly recorded cultural heritage sites were identified within the Project Area during the surveys including 5 artefact scatters, 12 isolated artefacts and one scarred tree.

A total of 79 test pits were excavated across seven test zones within four landforms during the test excavation program. 25 stone artefacts were recovered from 13 test pits.

The Project Area is part of a broader landscape of cultural significance utilised for foraging activities, however following European settlement the use within the Project Area has mostly orientated toward agricultural practices. The Project Area contains archaeological sites that establish a link to traditional cultural activities.

In total 8 Aboriginal archaeological sites would be impacted by the Project, however all sites are assessed as being of low archaeological significance. For the sites within the transmission line easement, as much of the easement will remain undisturbed, there will only be partial impacts to many of these sites. These impacts will be primarily related to pole construction and access tracks which will only impact discrete areas.

Based on the synthesis of the evidence collected during field survey and test excavation, the ACHA recommends a program of staged salvage prior to construction impacts, with surface salvage occurring for artefacts within the Development Footprint. Spark Renewables will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with the RAPs and relevant government agencies, to manage Aboriginal cultural heritage values during construction and operation of the Project.

HISTORIC HERITAGE

The Project Area is comprised of the property known as the Arthursleigh Farm purchased by Thomas Holt in 1853 and remained in the family until acquired by the University of Sydney in 1979. The current use for the estate is as a working farm and research facility by the University of Sydney. Several historic buildings are located within the Project Area that appear on the non-statutory National Trust Register. This group of buildings are referred to as the Arthursleigh Group and include the Homestead, Woolshed, Shearers Quarters, and Former Staff Quarters.

The Historic Heritage Assessment included a review of the documented heritage values for the area and survey of the Project Area to assess the likelihood, extent and nature of potential impacts on identified listed or unlisted items of heritage significance within the Project Area.

No heritage items or places listed on the Commonwealth, National or State Heritage lists are located within the Project Area as confirmed by the visual field inspection of the Project Area. Furthermore, no items listed on any Heritage and Conservation Registers (NSW State agency heritage registers) of a Local Environmental Plan are located within the Project Area. The historic buildings associated with the Project Area were assessed as having moderate to high historic significance however; due to the distance from these buildings the Development Footprint and work will not have a detrimental impact on the identified heritage items.

The statement of significance and description for the Arthursleigh heritage sites does not identify any associated significant view, and it is unlikely that any views of the Project from the homestead building would contribute to the overall significance of the item. Whilst the Project would be visible from this heritage item, it would not change, or degrade, any identified significant views or vistas. Additionally, the immediate setting of this heritage item would not be subject to change as part of the Project and any visual impacts are likely to be minor and would not result in an adverse impact to the overall significance of the heritage item.

The Historic Heritage Assessment concluded that the Project would not have a significant impact on the heritage values of the Arthursleigh property associated with the Project Area, however Spark Renewables is committed to continue to implementing management and mitigation measures to ensure that historic values of the Project Area are retained.

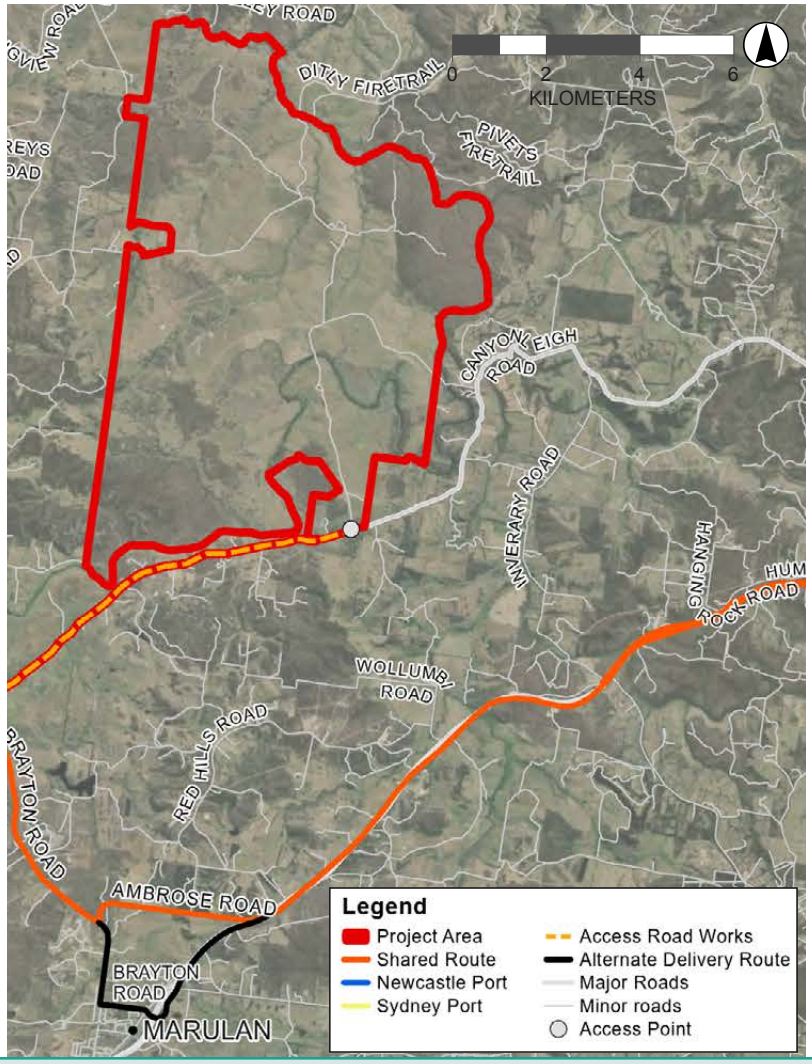
TRAFFIC AND TRANSPORT

The Project Area will be accessed from Canyonleigh Road. Two transport route options from the Hume Highway to the Project Area have been considered (Red Hills Road/ Ambrose Road/Brayton Road or Brayton Road only). The main access to the Project Area is located on the southern boundary via Canyonleigh Road. A secondary access is also located on the eastern side of the Project Area via the existing access at Arthursleigh Road. This access would be utilised for emergency access/egress and alternate flood free access during construction and operation (if required).

The majority of components to construct the Project from either Port Botany in Sydney (approximately 128 km northeast of the Project Area) or Port Kembla south of Wollongong (approximately 76 km northeast of the Project Area) and transported to the Project Area by truck via the Hume Highway.

The Traffic Impact Assessment found that the existing road network and key intersections have high levels of service and significant spare capacity. Based on the low background volumes on Canyonleigh Road in the vicinity of the access to the Project Area, it is proposed that the access be upgraded generally in accordance with Council's rural access standard.

Spark Renewables has committed to the development and implementation of a detailed Traffic Management Plan which will address the required management and mitigation of potential traffic related impacts.



WATER RESOURCES

The potential for the Project to impact on both surface water and groundwater was assessed as part of the EIS. This included consideration of water supply, flooding and flows, water quality and interaction with groundwater.

The majority of water required to meet Project water demands would be imported and would most likely be sourced through a commercial arrangement with local suppliers.

Water supply:

Construction – Total water usage is estimate to be 10.7 megalitres (ML) over the 13 month construction period with an average daily demand of 30 kilo litres (kl) per day of raw water with 20 kilo Litres per day of potable water for construction personnel.

Operation – Minimal water demand would be required for ongoing maintenance activities, amenities, and potable purposes by operational staff as well as for stock. Operational water will be stored on site, separate to water supplies for the purposes of firefighting.

Potable water demands, will be minor and supplied by a small purification system or water tanker.

Throughout the construction phase, appropriate erosion and sediment controls will be implemented and maintained. The Project Area is associated with a very low erosion hazard however, a detailed Erosion and Sediment Control plan will be developed and included in a Construction Environmental Management Plan which will specify the locations of all necessary Erosion and Sediment Controls to achieve key principles of site management.

As the Project is located within the Sydney drinking water catchment and it must have a Neutral or Beneficial Effects (NorBE) rating water quality. The water quality modelling indicates that NorBE criteria is achieved for all water quality characteristics, with the exception of mean annual total nitrogen concentrations. The impacts to receiving water quality downstream of the Project are expected to be negligible provided effective rehabilitation of Project Area disturbance is undertaken post-construction. However, refinement of the water quality model will be undertaken during the detailed design phase of the Project to ensure the model reflects the detailed design and to optimise the operational Project stormwater treatment train. Through detailed design and implementation of management measures, water quality impacts during the operational phase are expected to be negligible.

The flooding within the Project Area poses a relatively low risk to both infrastructure and human safety. Due to the minimal change to existing flood conditions as a result of the Project, specific flood management measures have been recommended to consider the results of the flood modelling conducted.

A groundwater risk assessment was undertaken for potential impacts to groundwater associated with the construction, operation and decommissioning phases of the Project. Generally, impacts to groundwater resources are not expected given the groundwater table is unlikely to be intercepted during Project construction. Further, the anticipated depth to groundwater within the Project Area means that any hydrocarbon/chemical spills are unlikely to infiltrate to the groundwater table, noting that appropriate spill management measures will be implemented during all phases of the Project.

SOIL AND AGRICULTURAL LAND USE

New land use of energy generation within the Project Area will co-exist with agricultural activities currently undertaken, and support future “agrisolar” activities. A new Test Bed for research programs in collaboration with the University of Sydney is also proposed to be part of the Project.

A land use conflict risk assessment (LUCRA) identified the following key potential land use conflict risks:

- traffic (during construction and decommissioning)
- land use change and
- biosecurity.

These issues have been subject to assessment as part of the EIS and Spark Renewables has committed to implement appropriate management and mitigation measures as part of the Project. With the implementation of these measures, the LUCRA found that these risks will be mitigated to low risks and that the potential impact of the Project on the surrounding land and land users will be minimal.

The temporary impacts on agriculture are considered a negligible impact in the context of the gross commodity values and land use coverage of the agricultural industries operating within the Upper Lachlan Shire LGA. Further, at the scale of the enterprises operating within the Project Area, impacts are considered offset as involved landowners would be financially compensated.

Electromagnetic Fields and Health

Electromagnetic fields (EMF) occurs wherever electricity is produced, transmitted or used, and is commonly found in everyday life in household electrical devices. In Australia, electrical devices and infrastructure such as transmission lines and substations, operate at a frequency of 50 Hz which falls within the Extremely Low Frequency (ELF) range of EMF (between 0 and 300 Hz).

EMF modelling completed for the Project transmission infrastructure showed that, in each scenario, magnetic field strength will be at least five times lower than the recommended upper safe limit for human exposure.

Bushfire Assessment

Bushfire risk can be appropriately managed through the implementation of a bushfire emergency management plan including Asset Projection Zones, access, water supply, construction management practices and evacuation procedures.

Preliminary Hazard Analysis

The Preliminary Hazard Analysis concluded that the Project is not considered to exceed the acceptable risk criteria; hence, the Project would only be classified as potentially hazardous as defined under the State Environmental Planning Policy (Resilience and Hazards) 2021and would be permitted within the current land zoning for the Project Area. The risk assessment undertaken to inform the Preliminary Hazard Analysis identified a number of hazard events involving Lithium-Ion Batteries (LIBs) and electrical transformers with the potential for harmful off-site impacts. Due to the central location of the proposed infrastructure and separation distances to surrounding residential receivers, the assessment indicates there would be no impact offsite. A range of technical and non-technical risk mitigation and management measures including rigorous design standards and maintenance practices are proposed to be implemented by Spark Renewables to manage and mitigate potential risk associated with the Project.

Contamination

An assessment was conducted to evaluate potential risks of contamination caused by the Project. The greatest risk of a contamination event within the Development Footprint is during the construction phase. Activities such as increased vehicle movements, improper waste handling, equipment installation, and soil disturbance could lead to potential spills or contamination involving hazardous materials. With mitigation measures in place contamination risks are considered minor and with the implementation of erosion and sediment control measures, impacts are anticipated to be effectively managed and kept to a minimal level.

ECONOMIC

The Economic Impact Assessment concludes the Project will provide the following:

- Support approximately $405 million in capital investment during the construction phase, of which approximately $61 million (or 15%) is anticipated to be retained in the local LGAs.
- Inject approximately $3.3 million in new spending into the economy over the construction phase from construction workers relocating to the region.
- Approximately 185 FTE positions would be supported in the national economy over the 18-month construction period (71 Direct FTE jobs and 114 Indirect FTE jobs). Once operational, approximately 60 FTE jobs will be supported by the Project (15 Direct FTE jobs and 45 Indirect FTE jobs).

AIR QUALITY

During construction, temporary dust particles and emissions may arise from activities like ground disturbance, civil construction, and plant or vehicle exhausts. These emissions will be localised and minor in the context of the overall Project Area. Appropriate dust reduction measures will be implemented to mitigate any potential air quality impacts.

SOCIAL

"Spark Renewables believe that the community has the right to question and critique incoming projects. It is the developers' responsibility to create robust risk management plans to address these concerns. The insights and local knowledge of the council and community are invaluable contributions to this process."

A Social Impact Assessment (SIA) was undertaken to assess the likely social consequences of the Project and work with Spark Renewables to develop options to improve outcomes for people.

SIA involves understanding impacts from the perspectives of those involved in a personal, community, social or cultural sense through the engagement process.

During engagement stakeholders were most concerned about:

- The loss of environmental values associated with the site
- Potential decline in property values
- Decreased social amenity as a result of visual impacts and noise impacts

Positive impacts associated with the Project included:

- Economy activity and employment opportunities during construction
- Employment opportunities and supporting local businesses during operation of the Project

As a result of the potential impacts on the local community, Spark Renewables has committed to the development and implementation of:

- Community and Stakeholder Engagement Strategy
- Indigenous Participation Plan
- Accommodation and Employment Strategy

The SIA concludes that the identified negative social impacts of the Project can be reasonably mitigated or managed to reduce their significance, with positive impacts having the potential to be enhanced if appropriate strategies are put in place.

WASTE

Waste management as part of the Project will be carried out in accordance with relevant legislation and guidelines and based on the principles of the waste hierarchy (prevent, reduce, reuse, recycle, recover, dispose). Spark Renewables will develop and implement a waste management plan to guide management of waste.

CUMULATIVE IMPACTS

When viewed separately, the environmental, social, and economic effects associated with a Project may be limited or minor. However, when the impacts of numerous projects on the same recipients, communities, and surroundings are taken into account the significance of the impacts may change (both positive and negative). Cumulative impacts also provide opportunities for greater collaboration and innovation to manage and mitigate.

A review of the nearby projects with the potential to result in cumulative impacts with, or as a result of, the Project was conducted along with input from the specialist assessments undertaken. Cumulative impacts related to social and economic impacts, visual, noise, land use and agriculture, water, biodiversity and Aboriginal cultural and non-Aboriginal Heritage. These were considered in the assessment and identified to be minimal when appropriate management and mitigation measures identified in the specialist assessments were implemented.

VISUAL

Potential landscape and visual impact associated with the Project has been assessed as part of the EIS.

The assessment found that the dominate landscape character of the area includes modified pastures predominately used for grazing with large areas of retained vegetation, interspersed vegetated hills and ridgelines. As a result of this vegetation and undulated topography, views towards the Project are limited.

The proposed BESS will not be visible from surrounding residences. The proposed transmission line will be visible from public viewpoints outside of the Project Area. The assessment indicates the transmission lines will integrate with the existing landscape and is unlikely to alter or diminish the visual quality of key landscape features within the area.

Mitigation including the retention of vegetation surrounding the proposed infrastructure, consideration of project design (including colour and height) and controlled lighting will be implemented to integrate the Project into the surrounding landscape.

JUSTIFICATION FOR THE PROJECT

Potential Justifications of public interest:

The Project can use existing transmission lines to transport electricity to the grid, reducing the need for new infrastructure and minimising associated construction and disturbances.

Positive economic outcomes and socio-cultural impacts without significant biophysical harm.

Creation of employment opportunities and benefits to the local and regional economy.

Spark Renewables has first and foremost sought to avoid impact, then reduce, manage and mitigate impacts.

The Project has been assessed and determined to be consistent with the principles of Ecologically Sustainable Development, which indicates that while the Project, would have some impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant economic and environment benefits in the form job creation and production of renewable energy for the National Electricity Market.

The Project would provide long-term, strategic benefits to the State of NSW, including:

Contribute to and support the National Energy Market (NEM) by providing renewable energy generation and storage capacity and improving the security, stability, and resilience of the NEM.

Support the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy.

Employment generation creating on average 71 direct jobs during the construction phase and 15 direct jobs nationally during the operational phase.

Indirect benefits to local businesses through the construction and operation phases.

Abbreviations

Term	Abbreviation
ABS	Australian Bureau of Statistics
AC	Alternating Current
AEMO	Australian Energy Market Operator
AHD	Australian Height Datum
APZ	Asset Protection Zone
BESS	Battery Energy Storage System
CBF	Community Benefit Scheme
CEC	Clean Energy Council
CEMP	Construction Environmental Management Plan
CIA	Cumulative Impact Assessment
DA	Development Application
DC	Direct Current
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment [former]
DPHI	NSW Department of Planning, Housing and Infrastructure [current]
DPIE	NSW Government Planning, Industry and Environment
DREMP	Decommissioning and Rehabilitation Environmental Management Plan
EDC	Estimated Development Cost
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
Energy Co NSW	NSW Government Energy Corporation
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
FTE	Full-Time Equivalent
GHG	Greenhouse Gas
GSV	Ground Surface Visibility
GW	Gigawatt
ha	Hectares
IPC	Independent Planning Commission
kV	Kilovolt
LCZ	Landscape Character Zone
LEP	Local Environmental Plan
LDS	Long Duration Storage
LGA	Local Government Area
LLS Act	NSW *Land Services Act 2013*

Term	Abbreviation
LSPS	The Upper Lachlan Shire Local Strategic Planning Statement
LSC	Land and Soil Capability
LSSE	Large-Scale Solar Energy
LTESA	Long-Term Energy Service Agreement
LUCRA	Land Use Conflict Risk Analysis
mm	Millimetres
MNES	Matters of National Environmental Significance
MW	Megawatt
NDC	Nationally Determined Contribution
NEM	National Electricity Market
Non-Associated Dwelling	A dwelling owned by a non-associated landholder
NSW	New South Wales
OECC	NSW Government Office of Energy and Climate Change
OECD	Organisation for Economic Cooperation and Development
OEMP	Organisational Environmental Management Plan
O&M	Operation and Maintenance
OS/OM	Oversize/Overmass
PCT's	Plant Community Types
PCUs	Power Conversion Units
PV	Photovoltaic
RET	The Commonwealth Renewable Energy Target Scheme
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SETRP	The Southeast Tablelands Regional Plan
SISD	Safe Intersection Site Distance
SLAIA	Soil, Land Use and Agricultural Impact Assessment
SoHI	Statement of Heritage Impacts
Southern Tablelands REDS	The Southern Tablelands Regional Economic Development Strategy 2018–2022
SSAL	State Significant Agricultural Land
SSD	State Significant Development
SU	Survey Unit
Tablelands Regional CSP	The Tablelands Regional Community Strategic Plan
UNSDG	United Nations Sustainability Development Goals
WM Act	NSW *Water Management Act 2000*

Key Terms

Term	Definition
Common Ancillary Infrastructure	The Common Ancillary Infrastructure refers to all shared infrastructure necessary for the construction and operation of both the Wattle Creek Solar Farm Project and Wattle Creek BESS Project including but not limited to; substations, switching substations, permanent offices, underground cabling between proposed infrastructure and the site substation, overhead electricity transmission lines, communication cables (includes control cables and earthing), water storage tanks, hardstands and internal roads. The Common Ancillary Infrastructure is included within the Development Footprint of both the Wattle Creek Solar Farm (SSD-63344210) and the Wattle Creek BESS (SSD-63345458) Project applications and assessed separately. This approach provides for flexibility during the detailed design phase and for the separate developments to progress individually if required.
BESS	The entire battery system comprising of battery containers and power conversion systems (inverters). The BESS has a power capacity of 350 MW, housed in a series of outdoor containers, aggregated in one central location adjacent to the substation infrastructure (including the switching substation).
Solar Hybrid BESS	The Solar Hybrid BESS refers to the small BESS proposed with the Wattle Creek Solar Farm Project to allow for a storage capacity of 100 MW (approximately 2 hours). The Solar Hybrid BESS is not included in the assessment of the Wattle Creek BESS Project and is only assessed in the separate project application for the Wattle Creek Solar Farm.
Development Consent	State significant development consent to carry out the Project granted by the consent authority under the NSW *Environmental Planning and Assessment Act 1979*.
Development Footprint	The total area of ground disturbance including earthworks associated with permanent infrastructure, temporary facilities and road upgrades within the Project Area. The Development Footprint assessed in this EIS includes the total area of disturbance required for the Wattle Creek BESS and the Common Ancillary Infrastructure.
OSOM	Over size, over mass vehicle; vehicle configuration which requires a permit from the National Heavy Vehicle Regulator.
Project	The Wattle Creek BESS described in **Section 3.0** of this EIS.
Project Area	The total area investigated during various specialist studies and the broader property the Development Footprint will be located on. The Project Area covers approximately 6,350 ha and includes the entire Arthursleigh Property and the length of Canyonleigh Road between the Project Area access point and the Brayton Road/Canyonleigh Road Intersection.
Road Upgrades	External road upgrades proposed to the external road network including: • Canyonleigh Road - Works are to be contained within the existing road carriageway and include no additional road widening. • Brayton Road / Canyonleigh Road / Carrick Road / Bulls Pit Road intersection. Works are to be contained within the existing road carriageway and include no additional road widening.

EIS Declaration

Project Details

Project Name	Application Number	Address of the land in respect of which the development application is made
Wattle Creek Battery Energy Storage System	SSD-63345458	Refer to Schedule of Lands in **Appendix 2.**

Applicant Details

Required Information	Details
Applicant Name	Wattle Creek Energy Hub Pty Ltd
Applicant Address	Level 40, Tower One, International Towers Sydney, 100 Barangaroo Avenue, Barangaroo NSW 2000

Details of Person by Whom this EIS was prepared

Name	Address	Personal Qualifications
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Declaration by Registered Environmental Assessment Practitioner

Required Information	Details
Name	Paul Douglass
Registration Number	#9060
Organisation registered with	PIA
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates • does not contain information that is false or misleading • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the Project • identifies and addresses the relevant statutory requirements for the Project, including any relevant matters for consideration in environmental planning instruments • has been prepared having regard to the Department's State Significant Development Guidelines – Preparing an Environmental Impact Statement • contains a simple and easy to understand summary of the Project as a whole, having regard to the economic, environmental and social impacts of the Project and the principles of ecologically sustainable development

Required Information	Details
	• contains a consolidated description of the project in a single chapter of the EIS • contains an accurate summary of the findings of any community engagement • contains an accurate summary of the detailed technical assessment of the impacts of the Project as a whole.
Signature	
Date	18/03/2025

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1.0 Introduction

Spark Renewables propose to develop the Wattle Creek Battery Energy Storage System (BESS) Project (the Project) to provide a reliable and affordable source of energy for the people of NSW and contribute to reducing greenhouse gas (GHG) emissions associated with energy generation and to enhance national energy security.

The Project is located on Arthursleigh Farm (Lot 3 of DP 1120270) referred to as the Project Area, approximately 80 kilometres (km) west of Wollongong and 15 km northwest of Marulan within the Upper Lachlan Shire Council Local Government Area (LGA) and abuts the Wingecarribee Shire LGA to the east, and Goulburn Mulwaree Shire Council LGA to the south, refer to **Figure 1.1**. The Project includes a standalone BESS with 350 MW capacity (AC or DC coupled) and project-related infrastructure, refer to **Figure 1.2**.

The Project is State significant Development (SSD) as defined under State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) and requires development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Environmental Impact Statement (EIS) provides an assessment of the environmental, social and economic impacts of the Project. This document is intended to assist the community, Councils, government agencies and other stakeholders to understand the Project and its benefits and impacts. This EIS is also intended to provide the necessary information to the consent authority to make an informed decision on the overall merits of the Project.

1.1 Background

Spark Renewables was selected by the University of Sydney (UoS) to investigate and develop a hybrid renewable energy facility on the University's Arthursleigh property. As part of this selection process, a high-level investigation area focusing on the cleared low agricultural productivity areas of the Project Area, was initially identified in 2021 to inform the preliminary design. Several studies were undertaken within this investigation area to assess the feasibility of the of renewable energy development and identify key environmental constraints, including biodiversity and heritage.

Preliminary biodiversity assessments commenced in March 2021, which identified key biodiversity constraints within the investigation area. Following a decision to proceed with the Project in February 2023, Spark Renewables signed an agreement with UoS to secure the land tenure. Spark Renewables publicly announced the plans to develop the Project in February 2023. Community consultation commenced following the public announcement, with drop-in sessions occurring on 9 and 23 March 2023.

The Project Area is approximately 6,350 hectares (ha), the Development Footprint is approximately 75 ha and represents the total disturbance area associated with the Project. This includes the impacts associated with the BESS infrastructure (13.4 ha), the ancillary infrastructure including the two transmission line easements (Transmission line option 1 (6.1 ha) and Transmission line option 2 (8.5 ha) and ancillary areas (47.6 ha), refer to **Figure 1.2**.

The Project was created with early consideration of environmental and social matters and was revised during the Scoping phase to incorporate community and stakeholder feedback towards maximising positive social, economic, and environmental outcomes and minimising adverse impacts. The Project initially (prior to submission of the Scoping Report) included a wind farm component. Spark Renewables is not proceeding with the wind farm component and is instead focused on developing the Project and the Wattle Creek Solar Farm (subject to separate assessment process – (SSD-63344210)) components only. The Wattle Creek Solar Farm project would be located within the Project Area and would share common ancillary infrastructure with the Project including the transmission line easements and ancillary areas where the development footprint and the Wattle Creek Solar Farm development footprint overlap, refer to **Figure 1.3**.

Since submission of the Scoping Report in October 2023, detailed technical assessments and ongoing consultation with stakeholders and government agencies have also led to design refinements allowing for Project design modifications to mitigate identified constraints and reduce impact areas. Details of the impact avoidance measures undertaken are discussed in **Section 1.5**.

1.2 The Proponent

Spark Renewables is owned by Tenaga Nasional Berhad, a Malaysian utility. Spark Renewables is a leading developer, long-term owner, and operator of renewable energy projects. The company's portfolio comprises the Bomen Solar Farm, operational since 2020, and Spark Renewables is currently developing more than 7 GW of solar, wind, and renewable storage projects across the NEM, including the Dinawan Energy Hub and Mallee Wind Farm, within NSW.

Spark Renewables is committed to supporting the communities in which they develop, operate and focus on providing employment opportunities for local residents as much as possible. Spark Renewables gives back to the local community by establishing community funds that seek to provide a long-term benefit to the community. Spark Renewables is also a member of the Clean Energy Council (CEC) and a signatory to the CEC Best Practice Charter for Renewable Developments (Clean Energy Council (CEC), 2021), and as such is committed to:

- Engaging respectfully with the communities in which it plans and operates projects.
- Being sensitive to the environment and cultural values in developing projects.
- Making positive contributions to the local and broader communities and regions in which Spark Renewables operates.

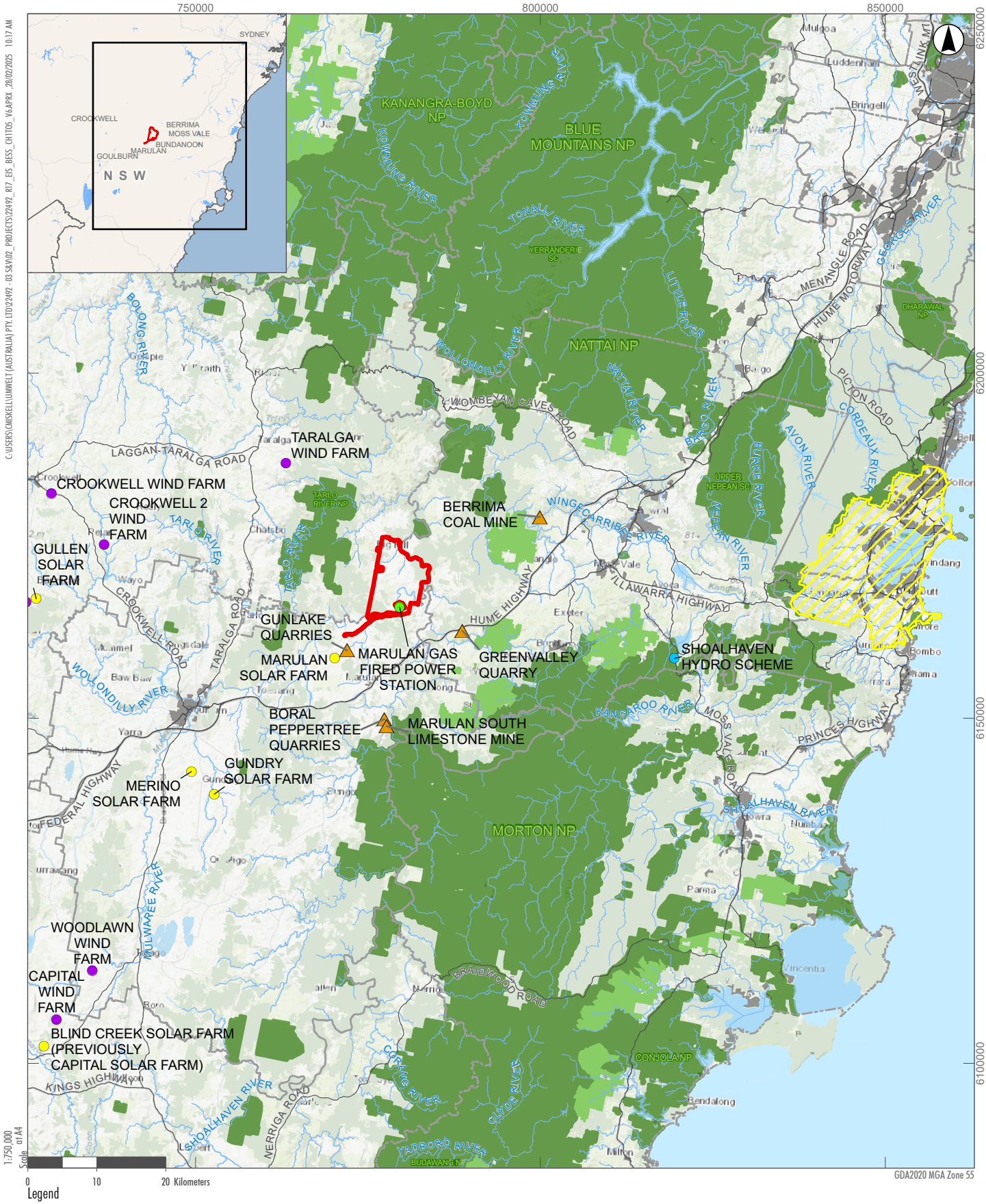
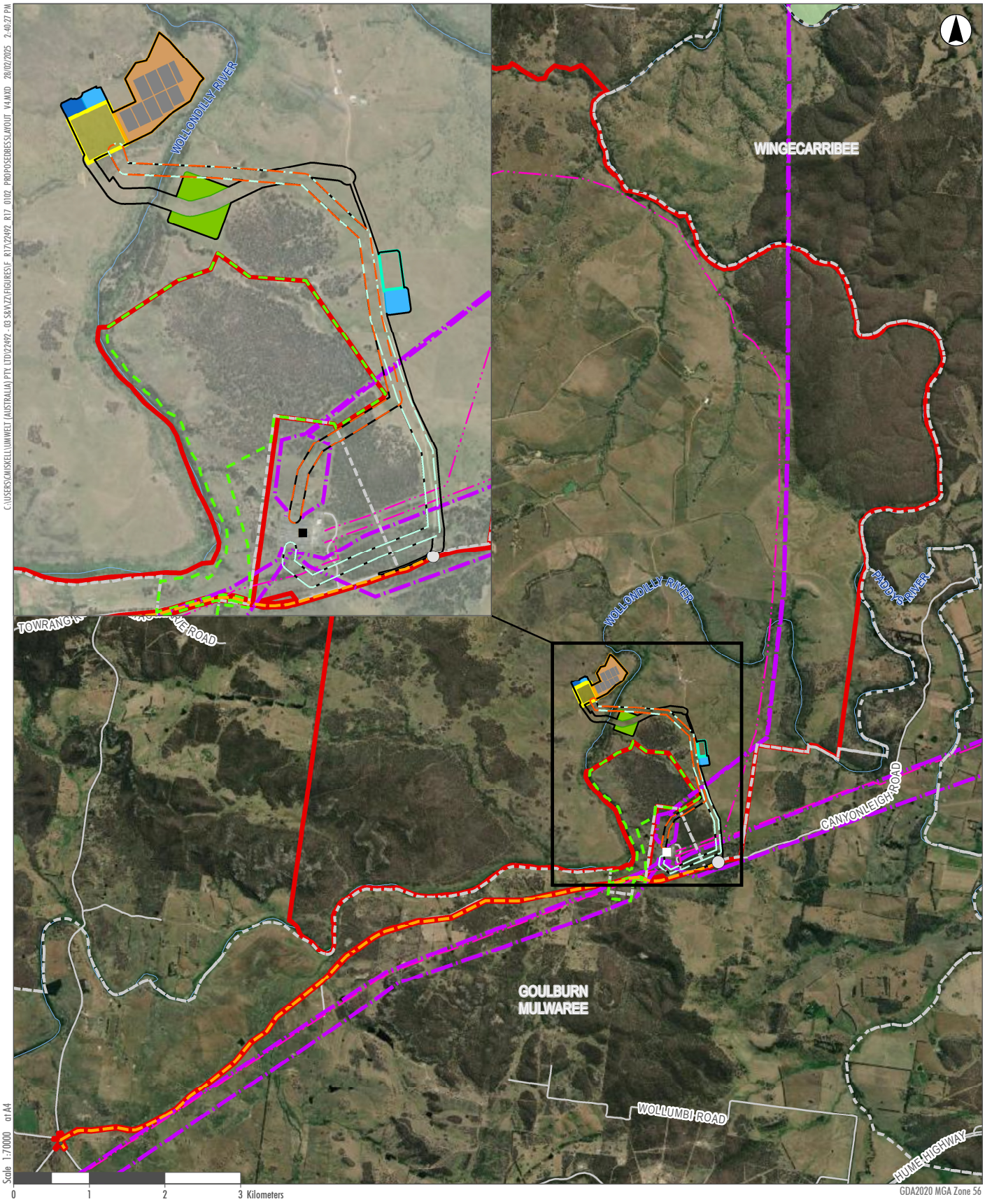


FIGURE 1.1

Project Locality

Image Source: ESRI Basemap (2022) Data source: NSW LPI (2021), NSW DFSI (2021), NPWS Estate (2019), VIC DVC (2021), Forestry Corporation of VIC (2019)



Legend

- Project Area
- Local Government Area
- NPWS Estate
- Roads
- Watercourses
- Marulan Gas Fired Power Station Project Area
- Existing Substation

Existing Transmission Lines

- 330kV
- 132kV

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

BESS

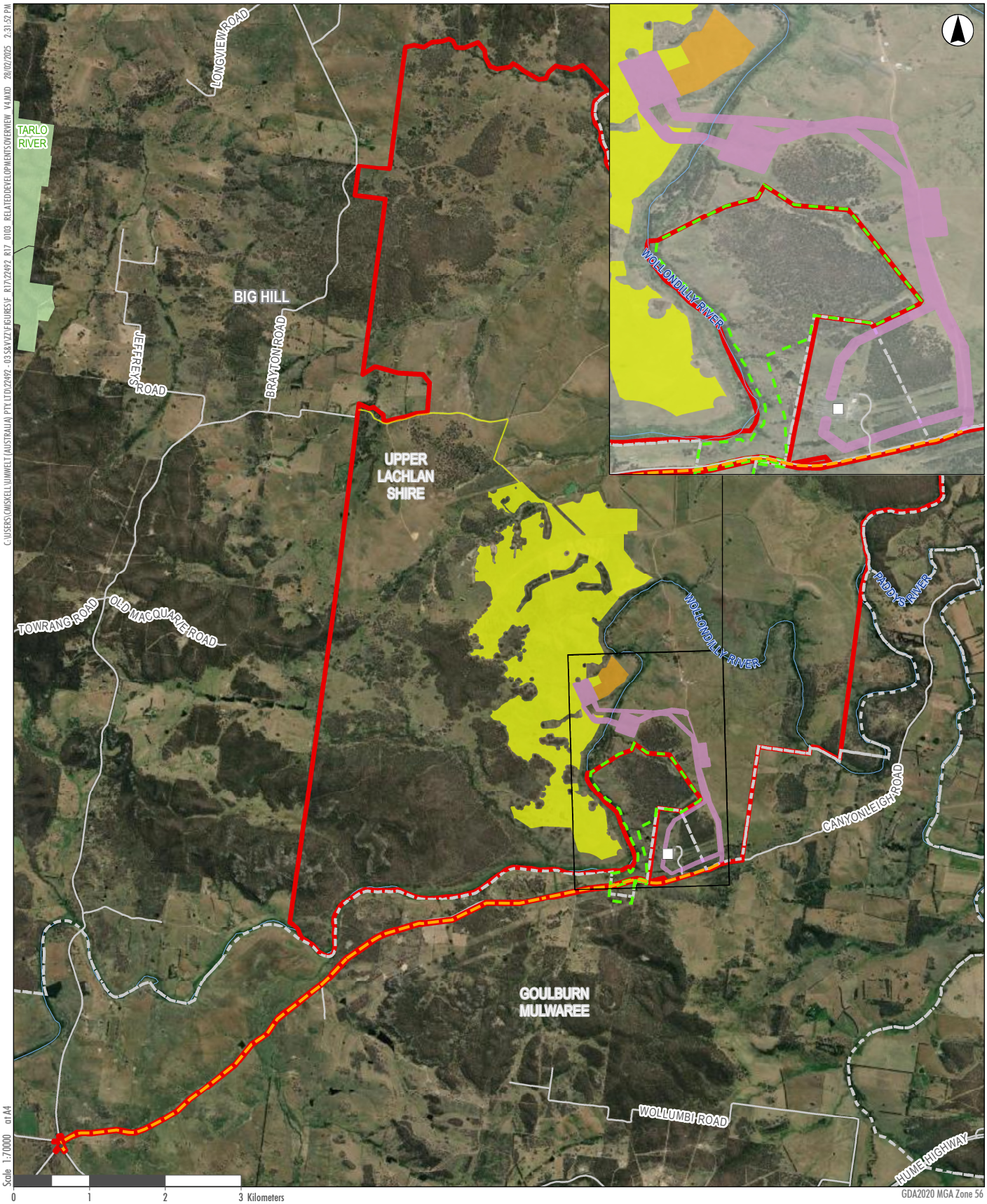
- Development Footprint
- BESS Site
- BESS Layout
- BESS Substation
- Test Bed Area
- Construction Compound
- O&M Facility
- Laydown Area

- Access Road Works
- Access Point

FIGURE 1.2

Wattle Creek Battery Energy Storage System

Image Source: ESRI Basemap 2020 Data source: NSW DFSI(2020)



Legend

- Project Area
- Local Government Area
- NPWS Estate
- Roads
- Watercourses
- Marulan Gas Fired Power Station Project Area
- Access Road Works
- Existing Substation
- Solar Farm
- BESS
- Common Ancillary Features

FIGURE 1.3

Related Developments Overview

Image Source: ESRI Basemap 2023 Data source: NSW DFSI(2023)

1.3 Overview of the Project

The Project includes the installation, operation, maintenance and decommissioning of a large-scale BESS, ancillary infrastructure and temporary facilities associated with the construction of the Project. The current Spark Renewables development design will have a capacity of up to approximately 350 MW (AC or DC coupled) and will have provision for up to four (4) hours of storage (1400 MWh), with the aim of providing both storage as well as firming capacity to the NEM and assisting in grid stability by providing frequency control ancillary services. The Project design will allow for the storage and exportation of renewable energy within the network so that it can be used during times of peak demand (see **Figure 1.2**).

The key components of the Project would include, but not be limited to:

- Batteries – most likely a lithium-ion technology.
- Inverters – bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity).
- Transformers – skid-mounted transformers will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.
- Substation and transmission connection – on-site collector substation and overhead powerlines to connect the Project to the electricity transmission network via Marulan Substation.
- A substation communication mast of up to 80 m in height is also included at the substation location.
- A research Test-Bed Facility – comprising of a 2-ha hardstand area, demountable buildings, security fencing, parking, 200 kVa power supply and 100 kVA dummy load (simulated electrical load for testing purposes).
- Electrical connections – a combination of underground cables and overhead powerlines connecting BESS facility to the on-site collector substation.
- Operations and maintenance (O&M) facility – including control rooms, O&M buildings, amenities, equipment sheds, storage, a hardstand and bench, and parking areas.
- Minor upgrades to the existing site access point from Canyonleigh Road and internal access roads.
- Targeted road network upgrades to facilitate delivery of Project components to the Project Area as required.
- Temporary construction infrastructure – to facilitate construction and likely to include laydown and storage areas and site offices.
- Security fencing – to prevent unauthorised access to the Project infrastructure and guard high voltage or dangerous equipment.
- Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission option will be constructed, the two options are being assessed separately.

The Project is a State Significant Development (SSD) under State Environmental Planning Policy (Planning Systems) 2021 (NSW) (Planning Systems SEPP) as the Project is a development for the purposes of electricity generating works and the estimated development cost (EDC) of the Project is over $30 million. A development Application (DA) for the Project is required to be submitted under Part 4.12(8) of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and in accordance with Part 8, Division 5 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

On 26 November 2024, a delegate for the Commonwealth Minister for the Environment determined that the Project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) due to the potential for significant environmental impacts on matters of national environmental significance (MNES), specifically listed threatened species and communities. The Project is to be assessed under the Assessment Bilateral Agreement between the Commonwealth and NSW Governments. This agreement allows the NSW State Government to conduct a single environmental assessment process for matters of both State and Commonwealth importance, including MNES.

This Environmental Impact Statement (EIS) has been prepared in line with the State Significant Development Guidelines – Preparing an Environmental Impact Statement (DPE, 2022a), and Cumulative Impact Assessment Guidelines (DPE, 2022b) and assesses the potential impacts associated with the Project in accordance with the Secretary's Environmental Assessment Requirements (SEARs), issued on 22 December 2023.

1.4 Project Objectives

The key objectives of the Project are as follows:

- Contribute to and support the National Energy Market (NEM) by providing renewable energy storage capacity and improving the security, stability, and resilience of the NEM.
- Provide energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.
- Make efficient use of existing transmission electrical infrastructure, notably the capacity of Marulan substation to support to new connections.
- Establish a strong network of positive and long-term relationships within the local community and contribute to economic and social growth within the Upper Lachlan Shire Council LGA and surrounds.
- Provide direct and indirect financial benefits to the regional and local community, including employment generation creating approximately 185 Full Time Equivalent (FTE) positions in the national economy over the 18-month construction period (71 Direct FTE jobs and 114 Indirect FTE jobs). Once operational, approximately 60 FTE jobs will be supported by the Project (15 Direct FTE jobs and 45 Indirect FTE jobs).
- Support approximately $405 million in capital investment during the construction phase, of which approximately $61 million (or 15%) is anticipated to be retained in the surrounding LGAs being the Upper Lachlan Shire, Goulburn Mulwaree, and Wingecarribee.
- Flow on economic benefits to local services through the construction and operation phases.

- Economic empowerment of First Nations people from implementation of an Aboriginal participation Plan that will be developed following the NSW Electricity Infrastructure Roadmap First Nations Guidelines (NSW Government Office of Energy and Climate Change (OECC), 2022).
- Enabling continued research on new and emerging technologies in partnership with UoS, through the establishment of a dedicated onsite testbed facility.

1.5 Impact Avoidance and Mitigation

This EIS has adopted a comprehensive risk-based approach to understand the existing environment within the Project Area and surrounding environments, to identify and assess the economic, environmental, and social impacts of the Project and to develop mitigation measures to avoid, minimise and manage those potential impacts.

Detailed technical assessment has been undertaken to inform the development of this EIS. The findings of these assessments have been summarised in **Section 6.0**. Where possible, the Project was refined as the primary course of action to avoid and minimise impact and/or the need for mitigation. The Project has been continuously refined during development as preliminary findings, were made available through the technical assessments, allowing for Project design modifications to mitigate identified constraints.

Refinements to the Project's design have sought to:

- Refine the extent of the Development Footprint to maximise the degree to which the Project utilises previously cleared land, thus reducing the requirement to clear additional vegetation and/or impact habitat for flora and fauna species.
- Avoid impacts on Aboriginal Heritage through refinement of the Development Footprint to avoid sensitive landforms where possible.
- Siting the proposed infrastructure in proximity to the existing electricity transmission infrastructure to reduce impact associated with transmission easements as far as practicable.
- Siting the proposed infrastructure in proximity to the existing electricity transmission infrastructure to reduce impact associated with transmission easements as far as practicable.
- Maintain a minimum distance of 10 m between Project infrastructure to nearby vegetation through the implementation of Asset Protection Zones (APZ's) to minimise potential of bushfire risk.
- Improve the safety and functions of key road links for construction vehicles and the community through resurfacing works to Canyonleigh Road which provides the main access to the Project Area.
- Minimise infrastructure and assets within flood prone land across the Development Footprint.
- Maintain a minimum setback of 30 m from the high bank of the Wollondilly River.

Where further changes in the Project design were not feasible to avoid or minimise potential impacts, mitigation measures were adopted to reduce and manage any potential impacts. Any proposed management and mitigation measures required for the Project have been developed in each of the technical assessments and are outlined in their respective sub-sections in **Section 6.0** and summarised in **Appendix 4**.

1.6 Structure of this Report

This EIS has been prepared in accordance with the SEARs, issued on 22 December 2023. **Appendix 1** provides the SEARs and where these have been addressed in the EIS.

This report has the following sections:

- **Section 1.0** introduces the Project, the Proponent, defines the objectives of the Project, and provides an outline of the structure of the document.
- **Section 2.0** outlines the strategic context for the Project, including the justification for the Project, a summary of the state and regional planning context, an overview of the locality in which the Project is situated, a description of the Project related agreements and benefit sharing and an overview of the Project alternatives.
- **Section 3.0** contains a description of the Project.
- **Section 4.0** summarises the relevant State and Commonwealth statutory context applicable to the approval process for the Project.
- **Section 5.0** describes the stakeholder and community engagement program for the Project and identifies the environmental and social matters identified during consultation for the EIS.
- **Section 6.0** contains the assessment of environmental and social matters relevant to the Project and provides a summary of the proposed environmental management and mitigation measures.
- **Section 7.0** provides a justification and conclusion.
- **Section 8.0** contains the references.

The EIS contains a number of appendices that provide detailed technical assessments of the key environmental and social issues related to the Project (refer to **Table 1.1**). The key outcomes of these studies are summarised in **Section 6.0**.

Table 1.1 Overview of Appendices to the EIS

Appendix	Content
Appendix 1	SEARs Table and Checklist
Appendix 2	Schedule of Lands
Appendix 3	Statutory Requirements
Appendix 4	Summary of Management and Mitigation Measures
Appendix 5	Landscape and Visual Assessment
Appendix 6	Noise and Vibration Assessment
Appendix 7	Biodiversity Development Assessment Report
Appendix 8	Aboriginal Cultural Heritage Assessment
Appendix 9	Historic Heritage Assessment
Appendix 10	Traffic and Transport Assessment
Appendix 11	Water Resources Impact Assessment
Appendix 12	Bushfire Threat Assessment

Appendix	Content
Appendix 13	Agricultural Impact Assessment
Appendix 14	EMF Assessment
Appendix 15	Preliminary Hazard Analysis
Appendix 16	Social Impact Assessment
Appendix 17	Economic Assessment
Appendix 18	Cumulative Impact Scoping Summary

2.0 Strategic Context

2.1 Strategic Justification

The NSW Government is actively seeking investment in renewable energy generation as part of its strategic initiatives to facilitate a systematic shift from coal fired energy production. The goal is to reduce the emissions associated with the electricity generation sector (NSW Government Energy Corporation (Energy Co), 2024). This efficient transition is essential for delivering electricity across NSW at a cost-effective rate to consumers.

The decommissioning of the State's five coal-fired power stations began in 2023, ahead of the initially projected timeline. There are currently four remaining coal-fired power stations in NSW including Bayswater, Eraring, Mount Piper and Vales Point power stations after the closure of the Liddell Power Station in April 2023. Eraring is proposed to be closed in 2027. These closures are driven by the objectives to reduce greenhouse gas emissions (GHGs) by government and communities, the increasing energy efficiency of renewable energy as well as increasing plant and equipment maintenance resulting in a reduction in the financial and social incentives for coal power stations across NSW (Australian Energy Market Operator (AEMO), 2022).

Various government strategies, plans and policies such as the NSW Transmission Infrastructure Strategy (NSW Government Department of Planning and Environment (DPE), 2018) and NSW Electricity Infrastructure Roadmap (Energy Co, 2024) identify the importance of renewable energy technology in providing an effective and economical way to deliver affordable, clean energy to NSW energy consumers.

Australia's electricity generation is the largest source of emissions accounting for a third of emissions for the year ending September 2023 (DCCEEW, 2023). Emissions from this sector peaked in 2009 and for the year ending December 2022 have declined by 28.3% since this high. Between September 2022 and September 2023, the continuous replacement of fossil fuel-based power sources with renewable energy led to a 4.9% reduction in emissions from electricity from the previous year. Specifically, fugitive emissions from coal generation witnessed a decline of 4.1% compared to the previous year, while the generation from renewable sources saw a significant increase of 15.4% (DCCEEW, 2023).

NSW has a strong pipeline of renewable energy projects which have the potential to contribute to achieving the current transition targets. However, significant investment is required from the private sector to achieve sufficient renewable energy supply to support NSW's transition to renewable energy and the retirement of the existing fossil fuel generated supply.

The Project aligns with local and regional strategies to deliver diversification in local economies, yield supplementary income for associated landowners, develop employment opportunities across both construction and operational phases, contribute to regional investment, offer indirect employment to local service providers throughout the Project's lifecycle, and offer benefits to the local community through the execution of a community benefit fund (or similar). Furthermore, the Project prioritises the preservation of areas with high environmental value, a focal point of the local strategic framework for development across the region. Spark Renewables have sought such relationships throughout the design process to align the Project with community priorities and local strategic plans.

2.2 Commonwealth Renewable Energy Policy

2.2.1 United Nations Paris Climate Change Agreement

Australia has made commitments alongside 193 Parties under the United Nations Paris Climate Change Agreement (The Paris Agreement) which seeks to:

- Hold the increase in the global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- Increase the ability (of nations) to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production.
- Make finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development.

The Paris Agreement seeks to meet its objectives by developing programs and mechanisms that:

- Require participating Parties to prepare and communicate greenhouse gas mitigation contributions. Parties were expected to set mitigation targets for 2020, and then develop new targets every five years. Each successive target is expected to represent a larger mitigation effort than the previous target.
- Promote climate change resilience and adaptation.
- Provide mitigation and adaptation funding to developing countries.
- Foster mitigation and adaptation technology transfer between Parties.
- Require participating Parties to report progress towards their mitigation contributions on an annual basis.

Among various sectors, electricity generation is the largest contributor to greenhouse gas emissions in Australia, accounting for 32.3% of emissions in the year to September 2023 (DCCEEW, 2023).

Australia, in its commitment to the Paris Agreement, signed the agreement on 22 April 2016. The nation pledged to reduce greenhouse gas emissions by 26–28% below 2005 levels by 2030. While there is ongoing debate about Australia's progress in meeting its Nationally Determined Contribution (NDC), some authorities recommend a more ambitious target of 40–60% below 2000 levels by 2030. In response to these obligations, Australia has implemented policies targeting emissions from energy use, industrial processes, agriculture, land-use, land-use change and forestry, and waste.

In alignment with its commitments under the Paris Agreement, the Australian government has identified renewable energy projects as a key method to mitigating greenhouse gas emissions. The Project, being storage of renewable-sourced electricity, would support this commitment, aligning with both national goals and broader international emission reduction objectives.

To reinforce its efforts in reducing greenhouse gas emissions, Australia implemented the Renewable Energy Target (RET) in 2009. This initiative aimed to encourage electricity generation from renewable resources. The RET has proven successful, with the current target of 33,000 gigawatt-hours (GWh) being achieved

ahead of schedule in September 2019. Under the scheme, liable commercial entities are required to source a certain percentage of their electricity from renewable sources. Although the target was met in 2019, the scheme will continue to require high energy users to meet their energy obligations until the scheme ends in 2030. By aligning national policies with international accords and actively promoting renewable energy, Australia is actively contributing to the collective efforts to limit global temperature increases and phase out reliance on fossil fuels.

The Project, for storage and distribution of renewable electricity, aims to support Australia's commitment under the Agreement.

2.2.2 Commonwealth Renewable Energy Target Scheme

The Commonwealth Renewable Energy Target (RET) Scheme has legislated objectives that include encouraging additional electricity generation from renewable sources, reducing greenhouse gas emissions in the electricity sector, and ensuring the use of ecologically sustainable renewable energy sources. The RET operates by creating a market for renewable energy certificates, which promotes investment in the renewable energy sector.

The RET provides the opportunity to both major power stations and owners of smaller systems to generate certificates for each megawatt hour of power they produce. These certificates come in two types: largescale generation certificates and small-scale technology certificates. Electricity retailers, responsible for supplying power to households and businesses, purchase these certificates and present them to the Clean Energy Regulator. As a result, a market is established, offering financial incentives to both large-scale renewable energy power stations and owners of small-scale renewable energy systems.

The RET aimed to achieve a large-scale renewable generation of 33,000 GWh in 2020, accounting for approximately 23.5% of Australia's total electricity generation at the time. This target was met in January of 2021 and will remain at 33,000 GWh until 2030.

The Project will support the transition to renewable energy and is aligned with the objectives of the scheme as a storage system for renewable energy.

2.3 NSW Renewable Energy Policy and Commitments

2.3.1 Net Zero Plan Stage 1: 2020–2030

The Net Zero Plan Stage 1: 2020–2030 establishes the NSW Government’s delivery plan toward its objective of achieving net zero emissions by 2050. The Plan represents the overarching strategy to mitigate emissions and address the impacts of climate change (NSW Government Planning, Industry, and Environment (DPIE), 2020).

The Plan outlines how the NSW Government will grow the economy while delivering a reduction in carbon emissions of 35% compared to 2005 levels. The Plan estimates that it will attract investments of $11.6 billion (with two thirds going to regional Australia) and supporting over 2400 employment opportunities (DPIE, 2020). The Project supports Priority 1 of the Plan: “Drive uptake of proven emissions reduction technologies”. To achieve this objective, the NSW government aimed to reduce barriers to approval and to advance the approval of suitable projects across the state. The Project would represent another step toward building the states portfolio of low emissions technology.

2.3.2 NSW Climate Change Policy Framework

The NSW Climate Change Policy Framework aims to enhance the economic, social, and environmental well-being of New South Wales in the face of a changing climate and evolving national and international policies on climate change (OEH, 2016). The framework aligns with the global Paris Agreement targets and sets ambitious long-term goals, including achieving net-zero emissions by 2050 and building greater resilience to climate change in NSW

To implement the framework, various strategies are employed, focusing on both emission reduction and adaptation. These strategies include the development of an advanced energy action plan, a new energy efficiency plan, and a climate change adaptation action plan.

The Project will contribute to the goals established in the NSW Climate Change Policy Framework by building increased security into the regional electricity network. The framework has a focus on resilience for communities and economies in the face of a changing climate and the Project will offer this resilience through network stability.

2.3.3 NSW Electricity Strategy

The NSW Electricity Strategy outlines the NSW Government's vision for an electricity future that is dependable, cost-effective, and sustainable (DPIE, 2019). Its implementation is anticipated to lead to a $40 annual reduction in electricity bills, attract $8 billion in private investments and generate a minimum of 1,200 employment opportunities.

To achieve these goals, the strategy is supported by three key initiatives overseen by the NSW Government. Firstly, the government will facilitate the market to ensure the delivery of reliable electricity at the most affordable rates, while also prioritising environmental protection. Secondly, an Energy Security Target will be established to guarantee that the State possesses sufficient power generation capacity to handle unforeseen generator failures during high-demand periods like heatwaves. Lastly, the NSW Government will ensure it possesses the necessary authority to address any potential electricity emergencies.

The strategy acknowledges that wind and solar energy are the most cost-effective options for new electricity production. Utilising energy storage systems like batteries enables consistent electricity supply, even during periods of low sun and wind. Additionally, these renewable sources present the most economical solution for replacing phased-out power stations.

The Project will contribute to the NSW Electricity Strategy by offering additional storage and distribution of renewable energy to the NEM and reduce electricity prices by bolstering the regions energy supply.

2.3.4 NSW Electricity Infrastructure Roadmap

The NSW Electricity Infrastructure Roadmap represents the strategic vision of the NSW Government to transform the electricity sector and capitalise on emerging renewable energy technologies (Energy Co, 2024). The plan aims to bring increased investment in regional communities, build more dynamic and resilient economies and enhanced quality of life for all NSW citizens by offering a guideline for achieving secure and reliable energy infrastructure. The roadmap outlines five foundational pillars to build a modern electricity system.

Firstly, the roadmap emphasises driving investment in regional NSW, recognising these regions as the economic and energy powerhouse of the state. It underscores the importance of supporting stable, long-term energy storage through the delivery of energy storage infrastructure. The roadmap aims to empower new and revitalized industries by harnessing opportunities for industry with cheap, reliable, and low emission electricity.

Secondly, the roadmap adopts a proactive approach to new generation, transmission, long-duration storage and firming technology, thereby laying the groundwork for a modern electricity system. By aligning with global trends, it positions NSW industries competitively, with electricity prices forecasted to be among the lowest 10 per cent of the Organisation for Economic Cooperation and Development (OECD).
This initiative is expected to benefit businesses of all scales, saving the average small business an estimated $430 annually and contributing to an estimated $130 annual savings for the average household electricity bill.

The NSW Electricity Infrastructure Roadmap is a pivotal plan that sets the state apart as a global leader in delivering the necessary electricity infrastructure to support a growing, modern economy. It is positioned as a coordinated framework, with the goal of making electricity generation in the state low cost, clean, and supported by 24-hour power sources. The roadmap's success relies on creating the right investment settings for the private sector to compete and deliver the required infrastructure at the lowest cost.

2.3.5 Network Infrastructure Strategy

The NSW Network Infrastructure Strategy is a plan aimed at enhancing network infrastructure in NSW with a primary focus on supporting renewable energy projects in the state's five REZs (Energy Co, 2023). Although the Project will not fall within one of the states REZs, other aspects of the strategy relate to the infrastructure and energy contribution the Project offers. For example, the Project will utilise existing capacity in the network without relying on additional infrastructure to be built. This option requires less environmental impact than if additional infrastructure was required and is a cost-effective method for building regional renewable energy capacity.

The strategy proposes network infrastructure options with a total capacity of 14 GW to be implemented by 2033, with further options considered for the future. The strategy considers scenarios such as a central power system development, transmission delays in large projects, and an accelerated coal exit by 2030 with strong electrification. Principles agreed upon with stakeholders through the strategies development process including affordability, reliability, and community support. The plan explores emerging technologies and future scenarios, emphasising a 20-year development pathway for NSW's electricity infrastructure.

Implementation involves the categorisation of projects based on their urgency, with a focus on adding between 14 GW and 24 GW of network capacity over the next two decades. Overall, the strategy represents about 5% of wholesale electricity costs over the next 20 years, through energy generation, storage, and firming infrastructure for the benefit of electricity consumers and the community.

The Project aligns with the strategies principles developed through stakeholder consultation. It will contribute to affordable energy generated and provided to the NEM that will increase the networks security and reliability.

2.4 Regional and Local Renewable Energy Context

2.4.1 South East and Tablelands Regional Plan 2036

The South East and Tablelands Regional Plan 2036 (SETRP 2036) is the NSW Government's strategy for guiding land use planning decisions over the next 14 years. The vision of the SETRP 2036 is to create 'a borderless region in Australia's most geographically diverse natural environment with the nation's capital at its heart' (DPE, 2017). The supporting goals of the SETRP 2036 are to create:

- A connected and prosperous economy.
- A diverse environment interconnected by biodiversity corridors.
- Healthy and connected communities.
- Environmentally sustainable housing choices.

The SETRP 2036 promotes the development of renewable energy across the region through Direction 6, being 'Position the region as a hub of renewable energy excellence'. The region is identified as having significant potential for renewable energy industries with vast open spaces and higher altitude tablelands with natural advantages for wind, hydro and solar energy generation. The SETRP 2036 indicates that renewable energy generation will also create a more sustainable energy future for the region.

The Project is considered to be consistent with the vision and values of the SETRP 2036, particularly in relation to the expansion of renewable industries. In particular, the SETRP 2036 recognises the opportunities that renewable energy offers to the local workforce and communities, while supporting the state's transition to an electricity grid primarily serviced by renewable energy generation and storage.

2.4.2 Draft South East and Tablelands Regional Plan 2041

The SETRP 2036 (discussed above) is undergoing its first five-year review to reset its priorities and extend its reach to 2041, in the form of a revised regional plan for the South East and Tablelands region. The Draft South East and Tablelands Regional Plan 2041 (Draft SETRP 2041) (DPE, 2022d)is the revised regional plan which will supersede the existing SETRP 2036, once finalised.

The vision of the Draft SETRP 2041 is 'By 2041, the South East and Tablelands will be recognised as a region of collaboration and innovation, demonstrated through increased investment in tourism, renewable energy generation, sustainable agriculture and smart manufacturing.' This vision is underpinned by five key themes, each containing specific strategies and goals to achieve the overarching vision of the plan. The five key themes are summarised below:

1. Recognising Country, people, and place.
2. Enhancing sustainable and resilient environments.
3. Leveraging diverse economic identities.
4. Planning for fit for purpose housing and services.
5. Supporting a connected and active region.

Development and investment in renewable energy generation is incorporated into numerous themes of the Draft SETRP 2041. Specifically, Part 2, Objective 8 which relates to the role renewable energy development will play in achieving net zero by 2050, stating '*Plan for a net zero region by 2050*'. Further, Part 2 Objective 12 '*Realise economic benefits from a connected regional economy'* aims to build the economic potential of renewable energy throughout the region.

A key objective for the Project is the storage of renewable energy to assist in achieving NSW renewable energy targets whilst promoting economic growth for the region. This key objective demonstrates the Projects alignment with the objectives of the Draft SETRP 2041. The Project supports the region's commitment to advancing sustainable energy and exemplifies the collaborative spirit emphasised by actively seeking social approval and engaging with communities. In doing so, the Project strengthens the South East and Tablelands' position as a leader in renewable energy development.

2.4.3 The Tablelands Regional Community Strategic Plan 2016–2036

The Tablelands Regional Community Strategic Plan 2016–2036 (Tablelands Regional CSP) (Goulburn Mulwaree Council, Upper Lachlan Shire Council, Yass Valley Council, 2016) consolidates councils' existing CSPs and pulls together common visions and strategies, whilst recognising the unique characteristics and challenges belonging to each individual Council. All three councils share a similar vision centred around balancing future growth with the need to protect and enhance social and environmental values, a vision which is upheld by five key pillars, including:

- Community (life and welfare in the community).
- Environment (conditions and influences in the area and sustainability).
- Economy (generation, distribution, use of income, and business development).
- Infrastructure (facilities, transport, and systems serving the area).
- Civic Leadership (system of government or management).

Each pillar includes a range of goals and specific strategies to be implemented by the three local councils with the aim of achieving the overarching vision of the Tablelands Regional CSP. Specifically, Strategy EN5 is '*To investigate and implement approaches to reduce our carbon footprint*', which sees councils in the region '*support the development of renewable energy facilities where appropriate in the region*'.

The Project is consistent with the goals, strategies, and overarching vision of the Tablelands Regional CSP. The overarching intent of the five key pillars have all been addressed through the considered design of the Project to avoid and minimise impacts while also contributing to the region's sustainability goals and reduces reliance on energy generated by fossil fuels.

2.4.4 Upper Lachlan Community Strategic Plan 2042

The Upper Lachlan Community Strategic Plan 2042 (Upper Lachlan CSP) (Upper Lachlan Shire Council, 2021) is the shared vision for the future of the Upper Lachlan community. Informed by community input, it sets out a long-term vision for the region to 2042. The Upper Lachlan CSP shares the same strategic priorities of the Tablelands Regional CSP in **Section 2.4.3** above and aims to achieve the same overarching goals at a community level.

The Upper Lachlan CSP includes strategic objectives against each key themes above, with the aim to achieve a desired outcome in line with the overarching vision of the plan. Strategy C.6 of the Upper Lachlan CSP is to '*Maintain a balance between growth, development, environmental protection and agriculture through sensible planning*', which is of particular relevance to the Project.

The plan also refers to the United Nations Sustainable Development Goals (UNSDGs) which were considered during preparation of the plan in relation to each key theme above. The plan notes the importance of SDG #7 'Clean Energy' under the Environment theme, which specifically relates to the generation of energy through renewable sources.

As stated above, the Project has been considerably considered designed to avoid and minimise impacts while also contributing to the region's sustainability goals.

2.4.5 Southern Tablelands Regional Economic Development Strategy

The Southern Tablelands Regional Economic Development Strategy 2018–2022 (Southern Tablelands REDS) (NSW Government, 2018) sets out a long-term economic vision and associated strategy for the three LGAs in the Southern Tablelands region, including Goulburn-Mulwaree, Upper Lachlan Shire and Yass Valley. The overarching vision of the Southern Tablelands REDS is '*To grow the region's core strengths in agriculture, energy, extractive industries, aged care, transport, and tourism and deliver a highly liveable community which attracts and rewards residents and visitors*'.

The second key element of the Southern Tablelands REDS is to '*Build on the Region's core strength in energy generation and natural resource extraction*'. The region is noted as a powerhouse for renewable energy generation in the 21st century, including large scale and commercial energy projects.

Building on the regions strengths in energy generation can be achieved through the development of the Project, which will assist with achieving the overarching vision of the Southern Tablelands REDS.

2.4.6 Upper Lachlan Shire Local Strategic Planning Statement

The Upper Lachlan Shire Local Strategic Planning Statement (LSPS) (Upper Lachlan Shire Council, 2020) is a 20-year vision for land use planning for Upper Lachlan area and provides an overarching strategic direction for future land use planning in the Upper Lachlan Shire LGA.

Planning priorities and principles of the Upper Lachlan Shire LSPS relate to business development, growth and sustainability, as well as productivity and collaborative diversity. Specifically, Upper Lachlan Shire Council aims to utilise the natural topography of the region, combined with increased investment in renewable energy (including wind, solar, hydro, geothermal) to bring new economic opportunities to the Upper Lachlan region.

As such, the Project is consistent with the priorities and principles of the Upper Lachlan Shire LSPS, assisting with developing renewable energy storage and increasing economic and business development in the region.

2.4.7 Draft Upper Lachlan Shire Council Energy Masterplan

The Energy Masterplan aims to increase the proportion of Council's energy supplied from renewables and energy efficiency, through the development of a strategic plan that is aligned with Upper Lachlan's Community Strategic Plan and capable of being integrated into future Delivery Program and Operational Plans.

The Project aligns with the findings of the Energy Masterplan through increasing renewable energy storage contributing to the regions efforts to mitigate the effects of climate change, in line with the broader Upper Lachlan CSP and Tablelands Regional CSP.

2.5 Environmental and Social Context

2.5.1 Local and Regional Community

As outlined in **Section 1.0**, the Project is located on Arthursleigh Farm, approximately 80 km west of Wollongong and 15 km northwest of Marulan within the Upper Lachlan Shire Council LGA and abuts the Wingecarribee Shire LGA to the east, and Goulburn Mulwaree Shire Council LGA to the south. The nearest town in the Upper Lachlan Shire LGA to the Project Area is the township of Big Hill (78) which is directly north-west of the Project Area (see **Figure 1.1**). The township of Marulan (population 819) is the next nearest population centre to the Project Area. The town is home to the Marulan Spring Festival, self-guided historic tours, gourmet coffee, food and boutique shops (Goulburn Australia, n.d.).

The land surrounding the Project is largely used for agricultural purposes and historically, the largest employing industries in the Southern Tablelands have been Agriculture and Forestry. The location of the Upper Lachlan Shire, along key transport infrastructure and its proximity to regional cities of Goulburn and Bathurst, as well as both Canberra (~160 km) and Sydney (~150 km north-east), has provided the regions agricultural industry access to important trading hubs.

The Project is located across two freehold cadastral lots (Lot 3 of DP 1120270 and Lot 2341 of DP622834) (**Figure 1.2**) refer to **Appendix 2**. There are approximately 47 non-associated dwellings within 4 km of the Project Area located primarily to the east, south and west of the Project Area. The Project Area is accessed directly from Canyonleigh Road (via Red Hills Road, Ambrose Road and Brayton Road) which deviates from the Hume Highway approximately 6 km south of the Project Area.

The Project Area is currently operated commercially and is used for a range of research initiatives including agricultural science and pasture agronomy with a large portion of the land historically being cleared for this land use. The Project Area is zoned as RU2 Rural Landscape within the Upper Lachlan Local Environmental Plan 2010 (LEP), see **Figure 2.2**.

2.5.2 Natural, Cultural and Built Features

2.5.2.1 Natural Features

The Project Area is located in the Southern Highlands region situated on the plateau of the Great Dividing Range. The surrounding land parcels typically include modified land that support agricultural activities such as grazing over modified and native pastures. Hills with patchy vegetation that are predominantly used for grazing are visible to the north, east and west of the Project Area.

The Project is located in the Southern Tablelands climate zone with an annual average rainfall around the Goulburn and south-west sloped at approximately 600–800 mm (AdaptNSW, 2014). Summer rainfall averages around 61–67 mm and Autumn rainfall is generally less reliable with approximately 41–61 mm, and winter rainfall is not consistent and can average as low as 39 mm in the coldest month of July (BOM, 2024).

The closest weather station is at Marulan, 20 km south of the Project Area, and records an annual average rainfall of 675 mm, with the highest rainfall historically occurring in February and lowest in September. This weather station shows the region experiences an annual average maximum temperature of 19.8°C and a minimum of 6.1°C. January has the highest average maximum temperature (28.0°C), while July has the lowest (11.9°C).

The Project Area is located within the Hawkesbury River basin, situated within the localised catchment of the Wollondilly River. The Project Area is located on undulating terrain, with the natural surface drainage generally from west to east across the Project Area through well-defined watercourses and drainage lines. Flow is conveyed towards the Wollondilly River, which flows along the eastern and southern Project Area boundary. The lowest elevation of the Project Area is along the north-eastern boundary, at approximately 520 m AHD.

The Project is primarily situated in a rural area with the Tarlo River National Park as the closest national park which is approximately 3 km to the west of the Project Area and the Kerrawary Nature Reserve is also located approximately 2.5 km to the north of the Project Area. The Project Area and surrounding lands are comprised of predominantly agricultural land, including cropping land and grazed land, as well as uncleared remnant vegetation. The remnant vegetation within the Project Area is predominantly comprised of grassy woodland communities, with smaller patches of shrubby open forest and riparian forests along the waterways.

The topography across the Project Area includes valley floor, hillslopes, and ridges. The topography of the Project Area ranges from between 520–720 m Australian Height Datum (AHD). The Project Area is dissected by a number of larger waterways including Dead Mans, Wattle and Sandy Creeks in the north, Island Creek in the centre, and the Wollondilly River in the south (**Figure 2.3**).

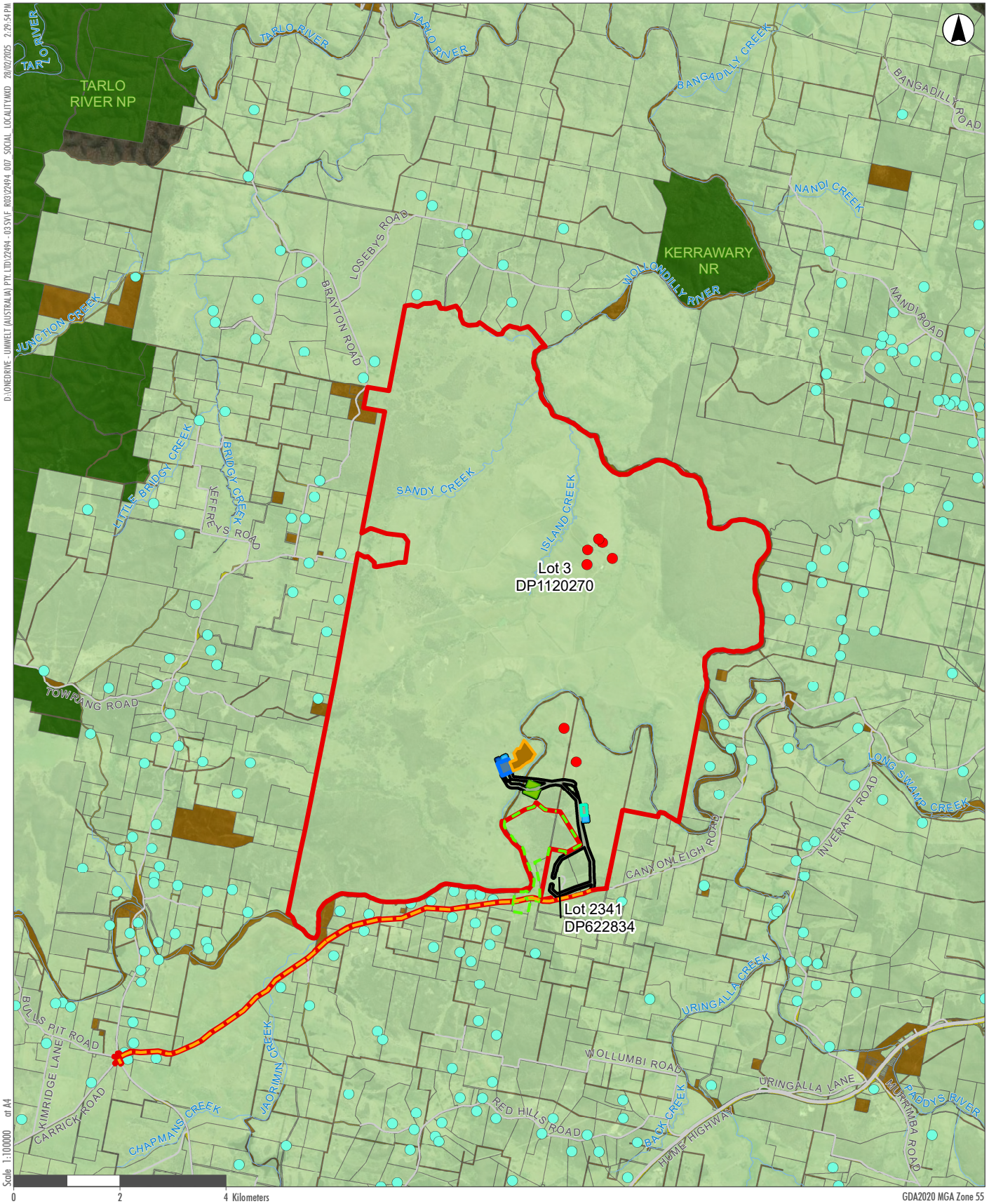
The Project Area lies within the Soil and Land Resources of Central and Eastern NSW (NSW Office of Environment and Heritage (OEH), 2018), characterised by soil landscapes with uniform land management requirements. As shown in **Figure 2.4**, the six soil landscapes within the Project Area include:

- the Marulan soil landscape, comprising rises and low hills, features soils like Paralithic Leptic Rudosols and Red Kurosols, which are prone to gully erosion due to dispersive subsoils
- the Marulan Variant A soil landscape, with low hills includes soils such as Kandosols and Yellow Kurosols, susceptible to sheet and gully erosion
- the Jaqua soil landscape is characterised by foot slopes with Yellow/Brown Kurosols, facing issues like scald erosion and salinisation
- the Jaqua Variant A soil landscape includes drainage depressions with Grey sodosols, prone to salinity and gully erosion

- the Wollondilly River soil landscape consists of alluvial plains and terraces with soils like Fluvic Clastic Rudosols, which experience minor erosion but have high enough sediment and nutrient delivery potential
- the Wollondilly River Variant A landscape, characterised by poorer soils, such as Brown Chromosols, and is rarely improved or cropped.

The Land and Soil Capability (LSC) Scheme provides a framework to assess the inherent capacity of land to sustain various land uses without causing long-term degradation to soil, land, air and water resources. This assessment considers biophysical features such as slope, salinity, drainage and climate, classifying land into eight categories based on the severity of limitations these features impose. The Project Area encompasses land within LSC classes 4, 5, 6 and 7, which range from moderate to very low capability (**Figure 2.5**). The Development Footprint predominantly occurs on moderately low to very low capability (LSC classes 5 and 6).

In addition to LSC classification, the NSW Government's Strategic Regional Land Use Policy aims to balance agricultural and industrial land use, identifying strategic agricultural lands such as biophysical strategic agricultural land (BSAL) and critical industry clusters (CICs). However, no BSAL or CICs are mapped within the Project Area or its locality, with the nearest BSAL located approximately 10 km to the west.
The mapping of State Significant Agricultural Land (SSAL) is also ongoing, although SSAL is not present within the Project Area. A small area to the east is designated as SSAL, but there is currently no established framework for verifying or assessing SSAL under current guidelines.



Legend

- Project Area
- Marulan Gas Fired Power Station Project Area
- Access Road Works
- host dwellings
- non-associated dwellings
- Disturbance Area
- BESS Site
- BESS Substation
- Test Bed Area
- Construction Compound
- Laydown Area
- O&M Facility

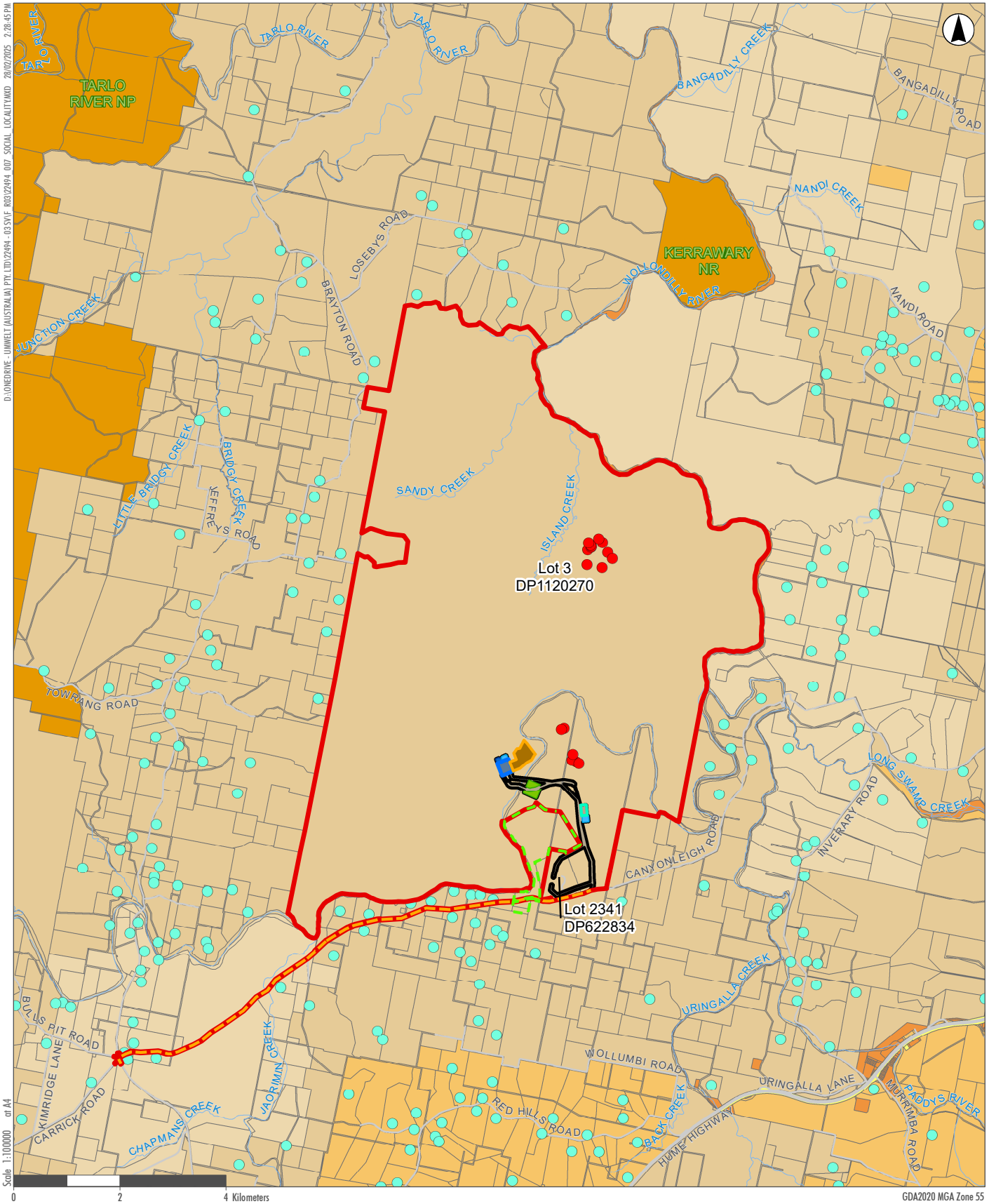
Land Tenure

- UNKNOWN
- FREEHOLD
- CROWN
- LOCAL GOVERNMENT AUTHORITY
- SHARED CROWN / COUNCIL
- NSW GOVERNMENMT

FIGURE 2.1

Landownership

Image Source: ESRI Basemap (2022) Data source: NSW LPI (2021), NSW DFSI (2021), NPWS Estate (2019), VIC DVC (2021), Forestry Corporation of VIC (2019)



Legend

- Project Area
- Marulan Gas Fired Power Station Project Area
- Lot
- Access Road Works
- Major Roads
- Watercourses
- host dwellings
- non-associated dwellings
- Disturbance Area
- BESS Site
- BESS Substation
- Test Bed Area
- Construction Compound
- Laydown Area
- O&M Facility

Land Zoning

- C1 - National Parks and Nature Reserves
- C2 - Environmental Conservation & Management
- C3 - Environmental Management
- RU1 - Primary Production
- RU2 - Rural Landscape
- SP2 - Infrastructure

FIGURE 2.2

Land Use and Zoning

Image Source: ESRI Basemap (2022) Data source: NSW LPI (2021), NSW DFSI (2021), NPWS Estate (2019), VIC DVC (2021), Forestry Corporation of VIC (2019)

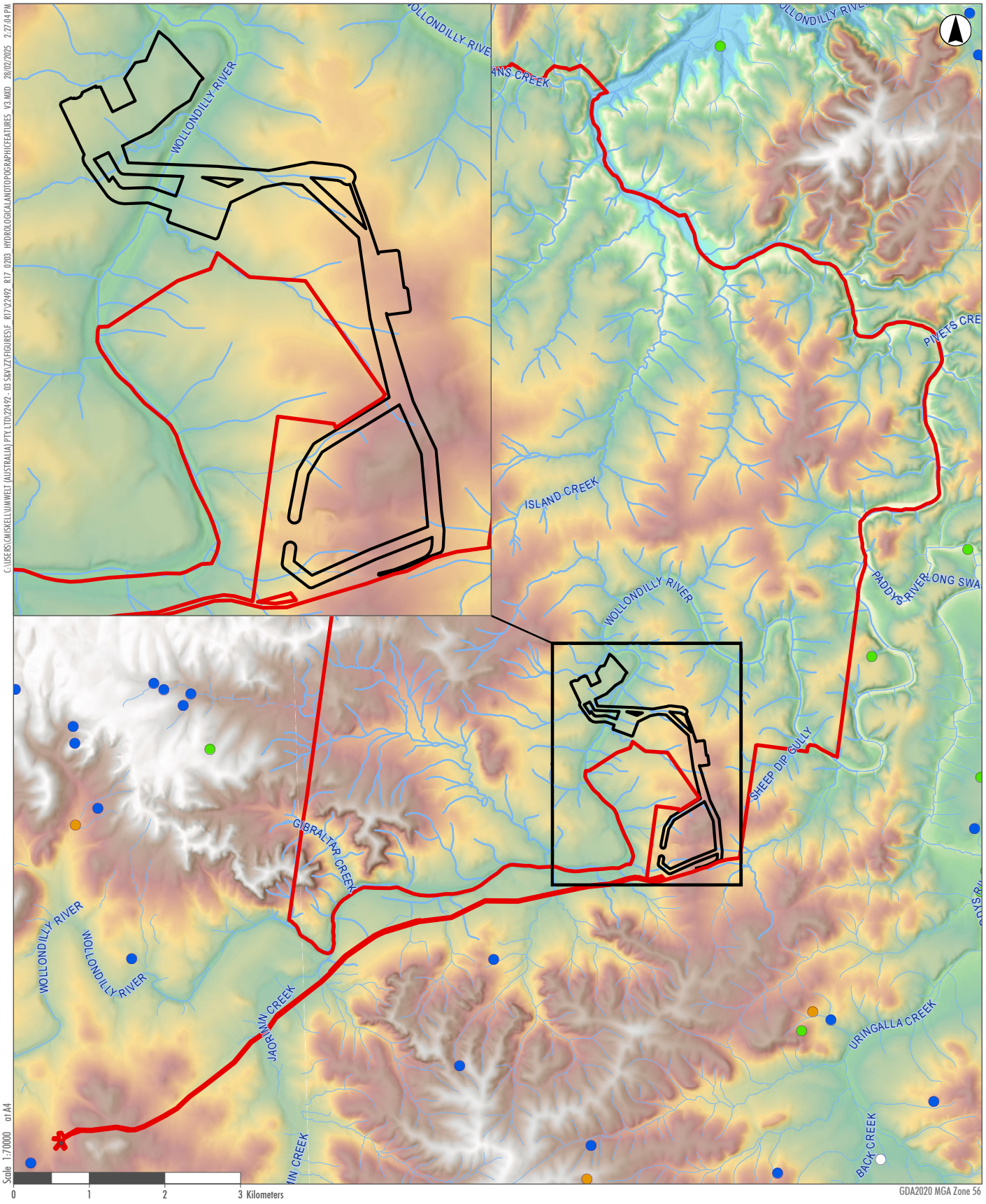
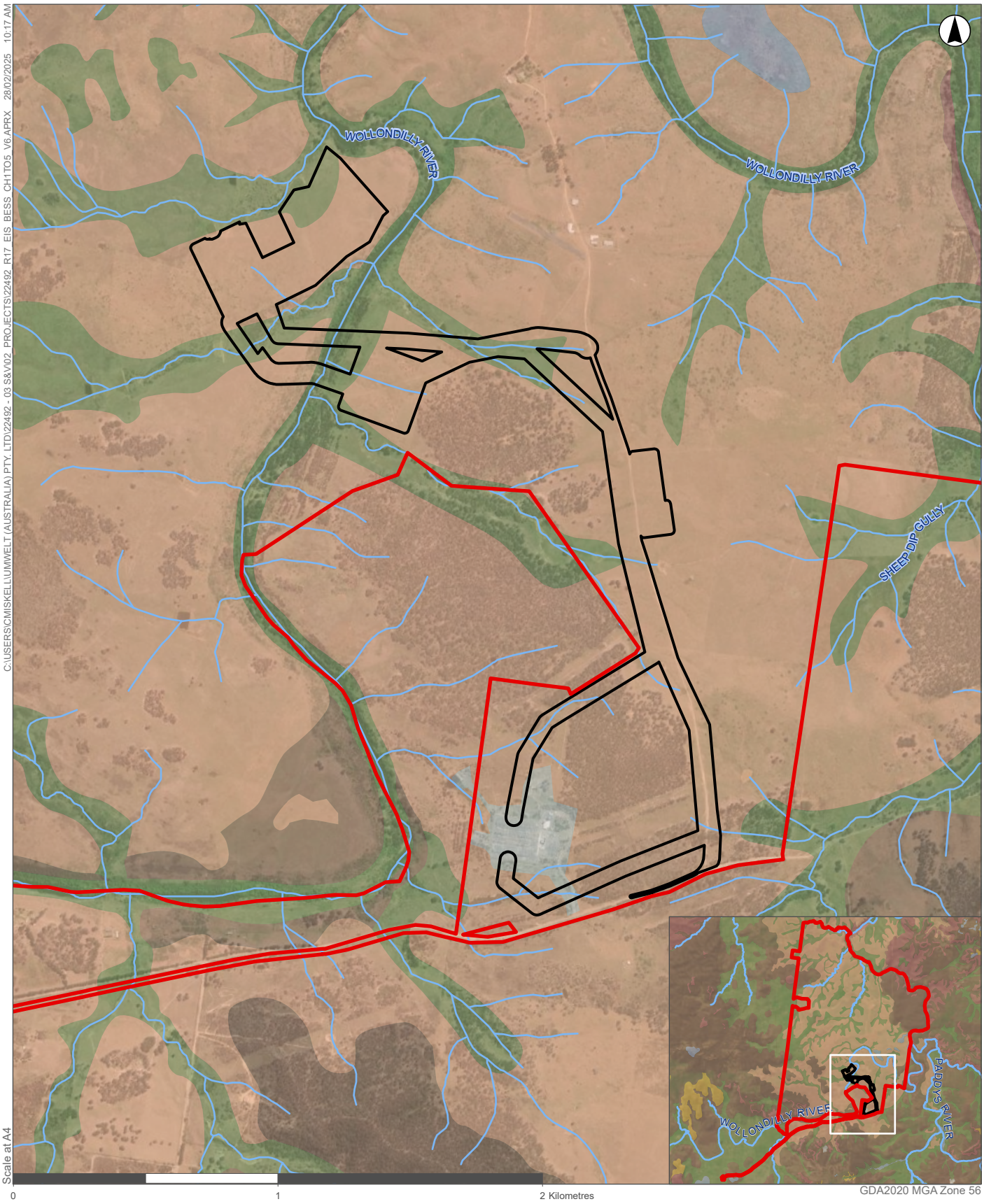


FIGURE 2.3

Topography and Drainage

Image Source: ESRI Basemap 2020 Data source: NSW DFSI(2020)



Legend

- Project Area
- Development Footprint – BESS
- Watercourses

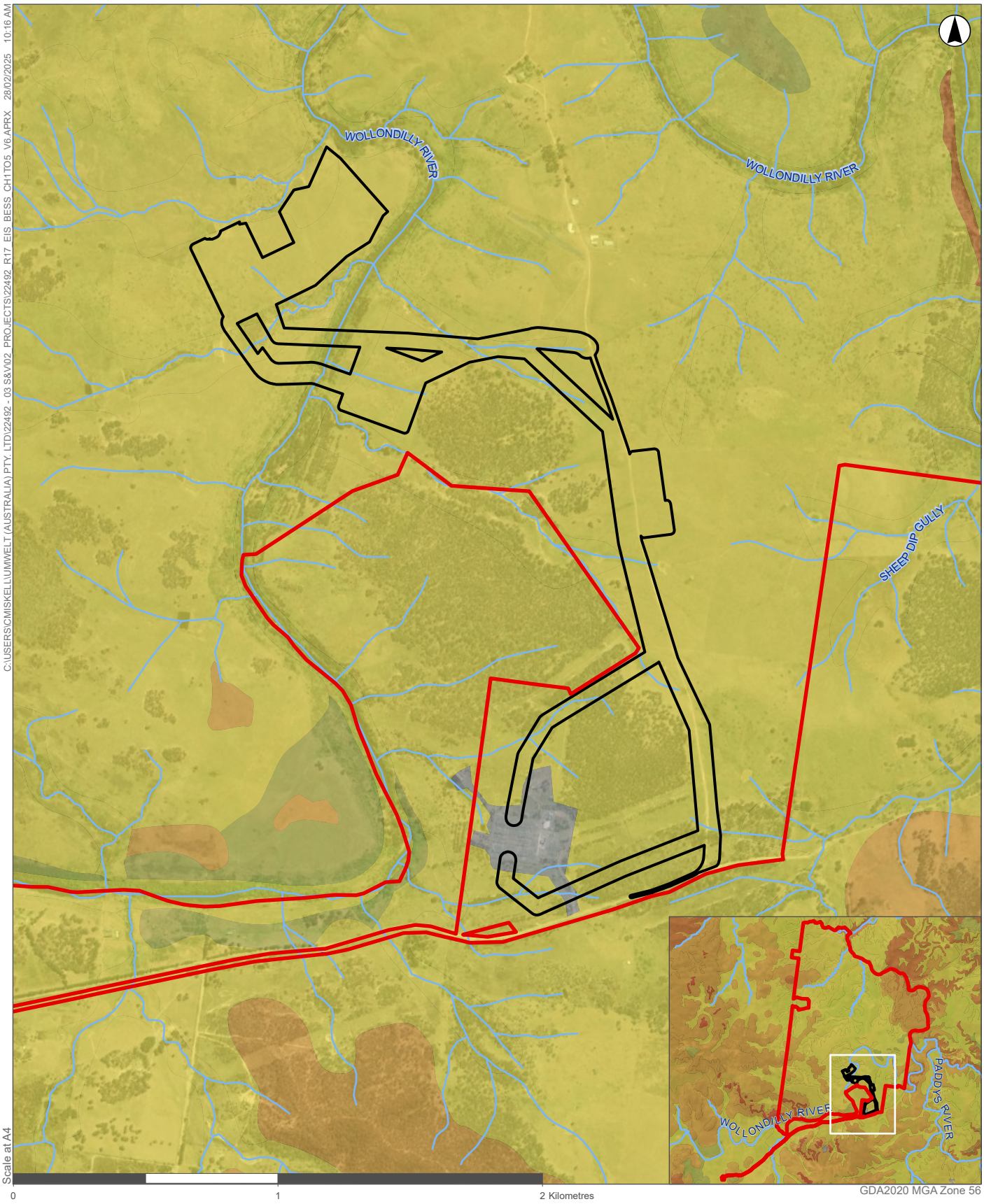
Australian Soil Classification (ASC) soil type map of NSW

- Dermosols (DE)
- Kurosols (KU)
- Kurosols - natric (KUn)
- Rudosols (RU)
- Sodosols (SO)
- Not assessed

FIGURE 2.4

Regional Soil Landscapes

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Development Footprint – BESS
- Watercourses

Land and Soil Capability Mapping for NSW

- 4 - Moderate to severe limitations
- 5 - Severe limitations
- 6 - Very severe limitations
- 7 - Extremely severe limitations
- Not assessed (98)

FIGURE 2.5

Land and Soil Capability

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

2.5.2.2 Built Features

An existing 330 kV/132 kV transmission line crosses the Project Area from north to south connecting to the existing TransGrid Marulan 330 kV/132 kV Substation and Switchyard located within the southern area of the Project Area. There is also two 330 kV transmission lines and a 132 kV transmission line which run from east to west and intercept the Project Area in the south to also connect to the existing TransGrid Marulan 330 kV/132 kV Substation and Switchyard.

The approved (but not constructed) Marulan Gas-Fired Power Station is located between the southern boundary of the Project Area and the Marulan Substation. This development received planning approval in 2009, and construction has not yet commenced.

Other built features within the Project Area include several buildings including a homestead, woolshed and shearer's quarters associated with the Arthursleigh estate, and the heritage significance of these built features is discussed in **Section 6.7** and **Appendix 9**. Of these buildings, one is the permanent residence of the on-site farm manager and owned by UoS and another is used infrequently as temporary accommodation by research staff and students of the University. Other minor sheds and infrastructure is also located within the Project Area but outside the Development Footprint.

The Project Area is accessed directly from Canyonleigh Road (via Red Hills Road, Ambrose Road and Brayton Road) which deviates from the Hume Highway approximately 6 km south of the Project Area. The Hume Highway acts as primary connection between Sydney and the Tablelands region and would facilitate the transportation of project components to the Project Area.

2.5.3 Key Risks or Hazards

The iterative design process and various technical assessments conducted for this EIS have aided in shaping the Project's design to reduce, as much as feasible, potential risks, impacts and hazards through avoidance and mitigation measures (refer **Section 1.5**). However, given the nature of the Project, comprising a large scale BESS and associated infrastructure, certain risks, impacts or hazards may persist despite avoidance through design, management, or mitigation efforts. The Project Area:

- has not been identified as containing contaminated land
- is not located within land considered to be prone to mine subsidence
- is not located within a coastal zone.

The Project Area has been assessed to generally be of a low flood hazard with minimal risk of changes in internal or external waterway flows. The Project has been designed to address this associated flood risk, this is discussed further in **Section 6.9** and **Appendix 11**.

The Project Area is also located within a bushfire prone area. Although portions of the Project Area have been subject to extensive clearing associated with agricultural land use, there are areas of remnant vegetation throughout, which form fuel load capable of sustaining and spreading bushfire. Areas of vegetation within the Project Area also represent a potential linkage between vegetated areas within and adjoining the Project Area, with the potential to support the spread of bushfire. Key Project components have been designed considering the vegetation classification to minimise the risk of bushfire impacting the Project and originating from the Project, see **Section 6.11.2** and **Appendix 12** for further detail.

A consideration of land use conflict between the Project and adjacent land uses has informed the Project design process. Design measures have been intentionally implemented to reduce the potential for land use conflict and there are no identified high-risk activities associated with the Project that will infringe upon the rights or impact the values or amenity of adjacent landholders. Relevant risks and hazards, as well as the associated management and mitigation measures, have been considered and are described in detail in **Section 6.11** and **Appendix 4.**

Relevant hazards and potentially hazardous Project components have been addressed in accordance with the SEARs. All reasonable and feasible management and mitigation measures are proposed to mitigate the potential hazard risk associated with the Project as detailed in **Appendix 4.**

2.6 Cumulative Impacts

The Cumulative Impact Assessment (CIA) Guidelines for State Significant Projects (NSW Government Department of Planning and Environment (DPE), 2022c) require the consideration of a project together with the impacts of other relevant future and existing projects in order to determine the potential cumulative impacts. A detailed review of potential cumulative impacts has been conducted for the Project, refer to **Appendix 18**. The Project is located outside of the NSW REZs and as such will have considerably less cumulative impacts associated with it than comparable renewable energy projects within these zones. The nearest REZ is the Illawarra REZ, located approximately 100 km east of the Project Area.

As shown in **Figure 1.1**, an illustration of the project locality highlights the surrounding projects that are either in the planning or operational stages that may contribute to cumulative impacts associated with the Project. Each impact was assessed for its potential to contribute to cumulative impacts alongside nearby development. In particular, traffic, noise, social, visual, biodiversity and waste impacts were assessed in detail throughout **Section 6.0** with an overview of these key cumulative impacts in **Section 6.16**. Furthermore**, Table 2.1** details the cumulative impacts from projects surrounding the development, highlighting the comparative impact profile.

Table 2.1 Cumulative Impact Considerations

Project	Status	Distance & Direction from the Project	Generation Capacity (MW)	Potential Cumulative Impact
Wattle Creek Solar Farm Project	Proposed	Within Project Area (less than 1 km away)	265	Biodiversity Waste Social/ Economic Noise Visual Aboriginal Heritage Historic Heritage Transport
Marulan Gas Fired Power Station	Approved, Pre-construction	Adjacent to Project Area (less than 1 km away)	350	Biodiversity Waste Social/ Economic Noise Visual Bushfire Aboriginal Heritage Historic Heritage Hazards and Risk

Project	Status	Distance & Direction from the Project	Generation Capacity (MW)	Potential Cumulative Impact
				Land Use Transport
Gunlake Quarry	Operational	5 km southwest	-	Traffic and transport
Green Valley Quarry	Operational	6 km southeast	-	Unlikely to result in cumulative impact
Berrima Coal Mine	Operational	12 km northeast	-	Unlikely to result in cumulative impact
Lynwood Quarry	Operational	16 km south	-	Unlikely to result in cumulative impact
Marulan South Limestone Mine	Operational	16 km south	-	Unlikely to result in cumulative impact
Peppertree Quarry	Operational	16 km south	-	Unlikely to result in cumulative impact
Marulan Solar Farm	Approved, Pre-construction	16 km southwest	152	Traffic and transport Socio-economic
Crookwell 2 Wind Farm	Operation	25 km west	110	Unlikely to result in cumulative impact
Taralga Wind Farm	Operation	30 km northwest	124	Unlikely to result in cumulative impact
Crookwell 3 Wind Farm	Approved, Pre-construction	32 km west	58	Unlikely to result in cumulative impact
Hume Link	Proposed	32 km south	-	Traffic and transport Socio-economic
Gundary Solar Farm	Proposed	40 km southwest	400	Traffic and transport Socio-economic
Merino Solar Farm	Proposed	40 km southwest	450	Traffic and transport Socio-economic
Goulburn Base Hospital Redevelopment	Proposed	40 km southwest	-	Unlikely to result in cumulative impact
Shoalhaven Hydro Scheme	Proposed	41 km east	235	Unlikely to result in cumulative impact
Gullen Range Wind Farm	Operation	50 km west	278	Unlikely to result in cumulative impact
Gullen Solar Farm	Operational	50 km west	11	Unlikely to result in cumulative impact
Woodlawn Advanced Energy Recovery Centre	Proposed	66 km south	240,000	Unlikely to result in cumulative impact
Woodlawn Wind Farm	Operational	69 km southwest	50	Unlikely to result in cumulative impact
Capital Wind Farm	Operational	81 km southwest	46	Unlikely to result in cumulative impact
Blind Creek Solar Farm (previously Capital Solar Farm)	Operational	85 km southwest	30	Unlikely to result in cumulative impact

2.7 Project Related Agreements and Benefit Sharing

Through the Project design and stakeholder engagement process, Spark Renewables has proposed and developed several Project related agreements. Agreements are in the process of being finalised between Spark Renewables and Project stakeholders and will be finalised prior to the commencement of construction.

2.7.1 Host Agreements

Spark Renewables have a long-term lease and private agreement with the UoS to host the Project on the Arthursleigh Property.

2.7.2 Neighbour Agreements

Neighbour Agreements will be offered to three neighbouring properties located to the south of the Project Area. Additionally, construction disruption payments will be offered to residents living along Canyonleigh Road who may be affected by construction transport movements. These agreements are currently being discussed with the relevant landowners.

2.8 Alternatives

2.8.1 'Do Nothing' Option

The Project Area is currently used for livestock grazing and limited fodder cropping. The 'do nothing option' would allow for the continued use of the Project Area solely for agricultural purposes. The 'do nothing option' would also imply that the Project is not developed and would therefore forego the Project's identified benefits, namely:

- Contribute to and support the National Energy Market (NEM) by providing renewable energy generation and storage capacity and improving the security, stability, and resilience of the NEM.
- Facilitate the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy (with a storage capacity of up to 350 MW or 1,600 MWh over 4 hours).
- Provide direct and indirect financial benefits to the regional and local community, including employment generation during the construction and operation phase.
- The 'do nothing option' would avoid the environmental and social impacts associated with the construction, operation, and decommissioning of the Project, such as biodiversity impacts, construction noise, traffic and dust, social amenity impacts and visual impacts. However, these impacts are manageable through the implementation of the management and mitigation measures outlined throughout **Section 6.0** and provided in **Appendix 4** and would not result in a significant impact to the environment and local communities.

The 'do nothing option' also risks a smooth transition away from coal-based generation sources in the future as generators such as Eraring and Bayswater reduce their output and close over the coming years. The Project will inject large quantities of renewable energy into the NEM within the timeframe of these large generators downscaling and closures, further alleviating the stability of the power system.

Considering the benefits of the Project, the 'do nothing option' is not considered to be a preferred option.

2.8.2 Alternative Project Technologies

Spark Renewables initially investigated developing a wind energy project within the Project Area, however decided not to proceed with the wind farm component, choosing instead to focus on developing the Project and the Wattle Creek Solar Farm project only. The Wind Farm component was no longer pursued after detailed on site wind monitoring and initial community concern specifically in relation to the wind component.

Additionally, the option to pursue only the Project or the Wattle Creek Solar Farm Project was also investigated. However, as with the 'do-nothing' approach this option would not fully utilise the renewable energy resources available and would result in a less desirable energy generation profile than the preferred option. This approach would still meet Spark Renewables strategic and commercial objectives but to a lesser extent.

2.8.3 Alternative Project Layout

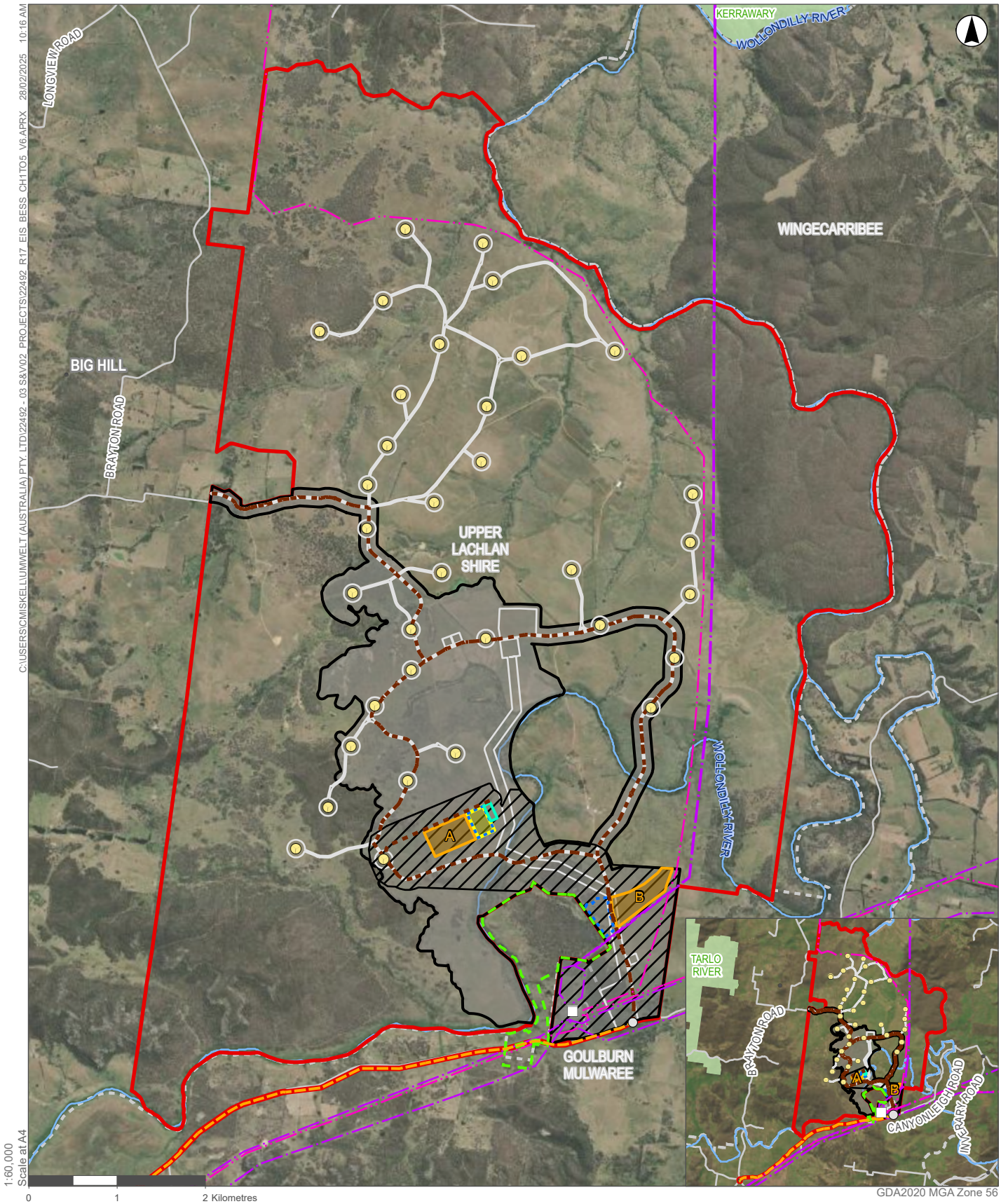
An iterative approach has been taken to the development of the Development Footprint, which has been designed to avoid and minimise environmental and social impacts and address engineering requirements to fulfil the objectives of the Project.

The design refinements that have been incorporated into the Project since the scoping phase are detailed below in **Table 2.2**.

Changes to the Development Footprint and internal Project layout have been undertaken as a direct response to address concern from the community and advice from technical specialists based on the assessment results. The original layout as proposed in the Scoping Report is outlined in **Figure 2.6**, key design refinements are depicted in **Figure 2.7** and include:

- Significant reduction of the Development Footprint to:
    - optimise the conceptual layout and remove infrastructure no longer required following removal of wind component
    - reduction of the Development Footprint to address environmental constraints including relocation of BESS location
    - revised transmission alignment to provide flexibility during the assessment process
    - refinement of Project and removal of second optional location for BESS infrastructure

The constraints as identified above to be avoided are shown in **Figure 2.8**.



Legend

- Project Area
- Local Government Area
- NPWS Estate
- Marulan Gas Fired Power Station Project Area
- Watercourses
- Roads
- Access Road Works
- Access Point
- WTG (Preliminary layout 20/02/2023)
- Proposed Wind Farm Development Footprint

Existing Transmission Lines

- 330kV
- 132kV
- Existing Substation

Solar Farm

- Proposed Solar Development Footprint
- Proposed Internal Tracks
- Test Bed Area
- Solar Farm Substation

BESS

- Proposed BESS Development Footprint
- BESS Site Option
- BESS Substations

FIGURE 2.6

Original (pre-scoping) Wattle Creek Energy Hub Layout

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

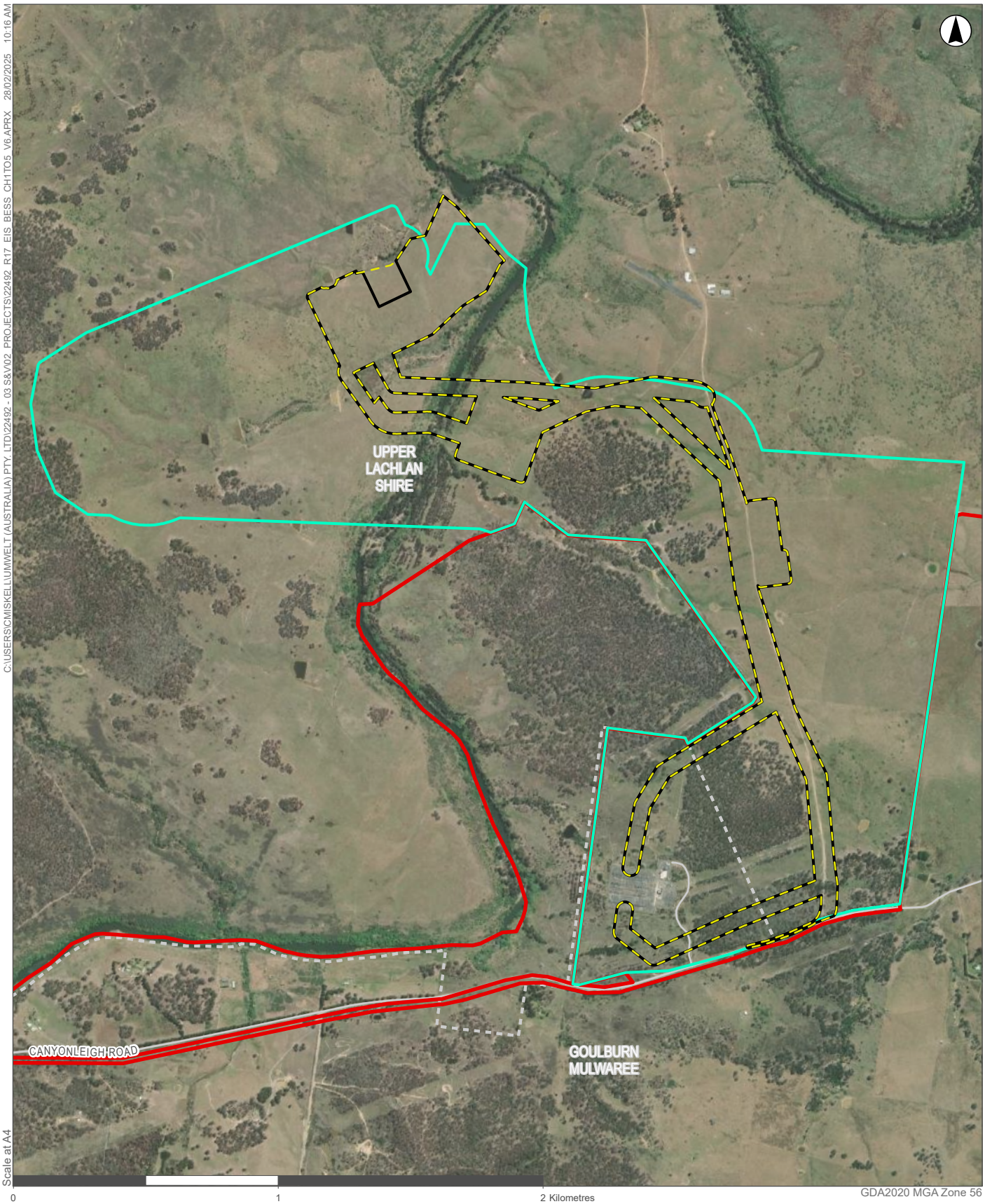
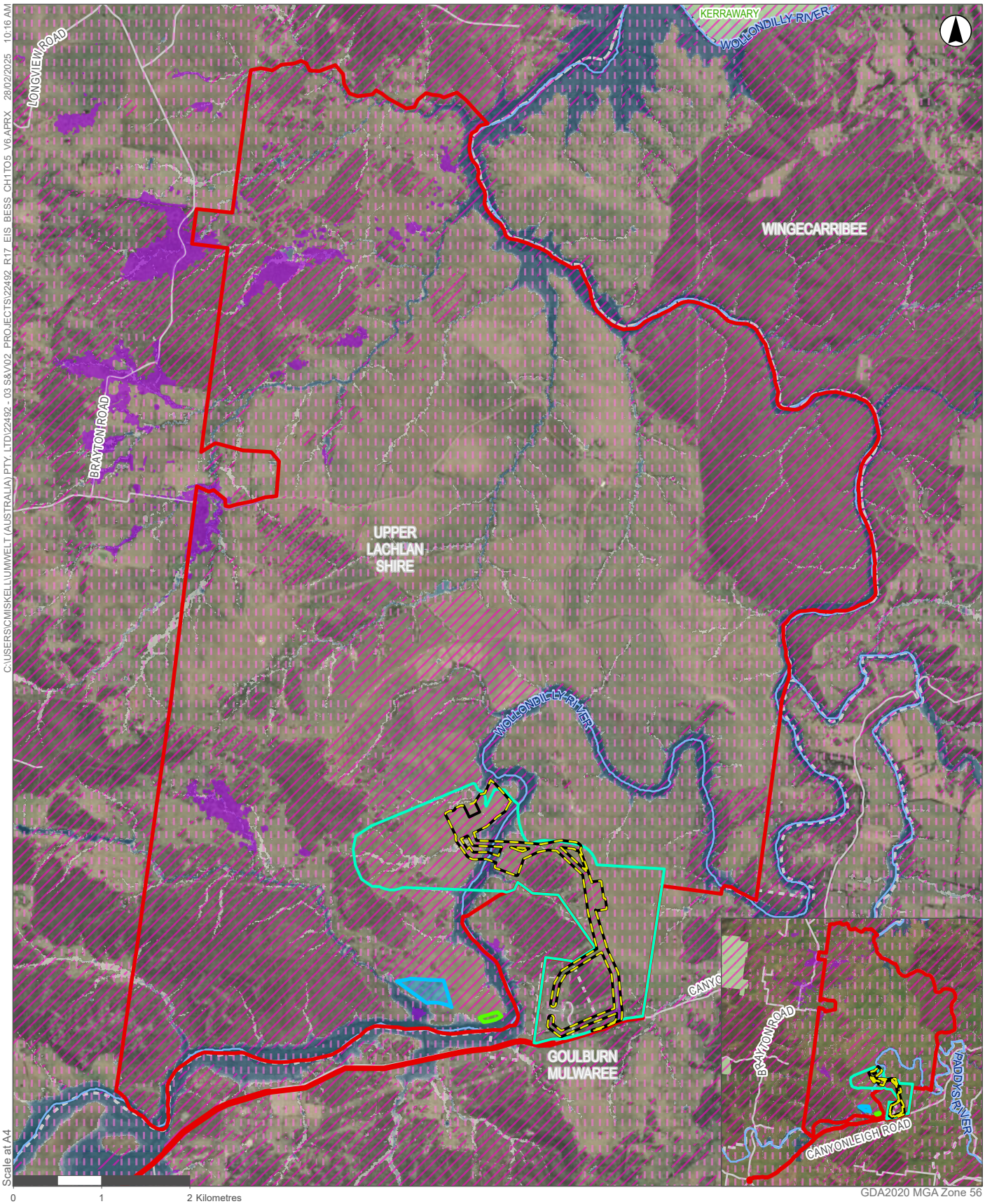


FIGURE 2.7

Key BESS Development Footprint Design Refinements

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Development Footprint - Design Revision A
- Development Footprint Design Revision B
- Development Footprint - Design Revision C
- Local Government Area
- Roads

Biodiversity Constraints

- High
- Moderate
- Low

1% AEP Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

- Aboriginal Heritage Avoidance Area
- Visual Impact Minimisation Area

FIGURE 2.8

Constraints Avoidance and Minimisation of Development Footprint

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), WRM (2024), Umwelt (2024)

Table 2.2 Design Refinements

Project Component	Scoping Phase (October 2023)	Revision A (February 2024)	Final Design (July 2024)	Key Changes Since Scoping
Project Area	6,200 ha	No Change	6,350	• Project Area amended to capture external road works (Canyonleigh Road)
BESS Development Footprint	390 ha	77 ha	75 ha	• 315 ha reduction (~80%) from original scoping layout (390 ha reduced to 75 ha).
BESS Capacity and Layout	Up to 800 MW capacity. (AC or DC coupled) and up to two (2) hours of storage (1600 MWh). Approximately 3.85 MWh per container.	Up to 350 MW (AC or DC coupled) and up to four (4) hours of storage (1400 MWh). No change in container capacity.	Refinement to the Development Footprints associated with project design changes.	• Increased storage capacity. • Reduced Development Footprint and refined BESS location to allow for solar hybrid BESS.
Grid Connection	A single transmission easement corridor forms approximately 200 ha, to the southern boundary of Lot 3 of DP 1120270.	A reduction to the transmission easement corridor to two proposed transmission line easements being 6.11 ha and 8.49 ha connecting from ancillary infrastructure to the Project (47.61 ha).	No Change.	• A reduction to the transmission easement corridor of approximately 140 ha. • Investigation of two transmission line options to allow for optionality during the assessment process and greater flexibility in the connection design.
BESS Substation	Substation dimensions 6 ha. Located in the Development Footprint neighbouring the onsite maintenance facilities and test bed area.	Substation moved to neighbour the proposed BESS Area and the onsite maintenance facilities and a construction compound as the test bed has moved.	No Change.	• Separation of the test bed area from the proposed site substation for safety. • No change to the substation size or location.

3.0 Project Description

This section describes the layout, location, and function of all proposed infrastructure to be constructed and operated as part of the Project. It includes descriptions of the Project's construction, operation and decommissioning phases, along with the necessary services and utilities needed to execute and sustain the Project. Additionally, this section provides information regarding the timing of each phase of the Project.

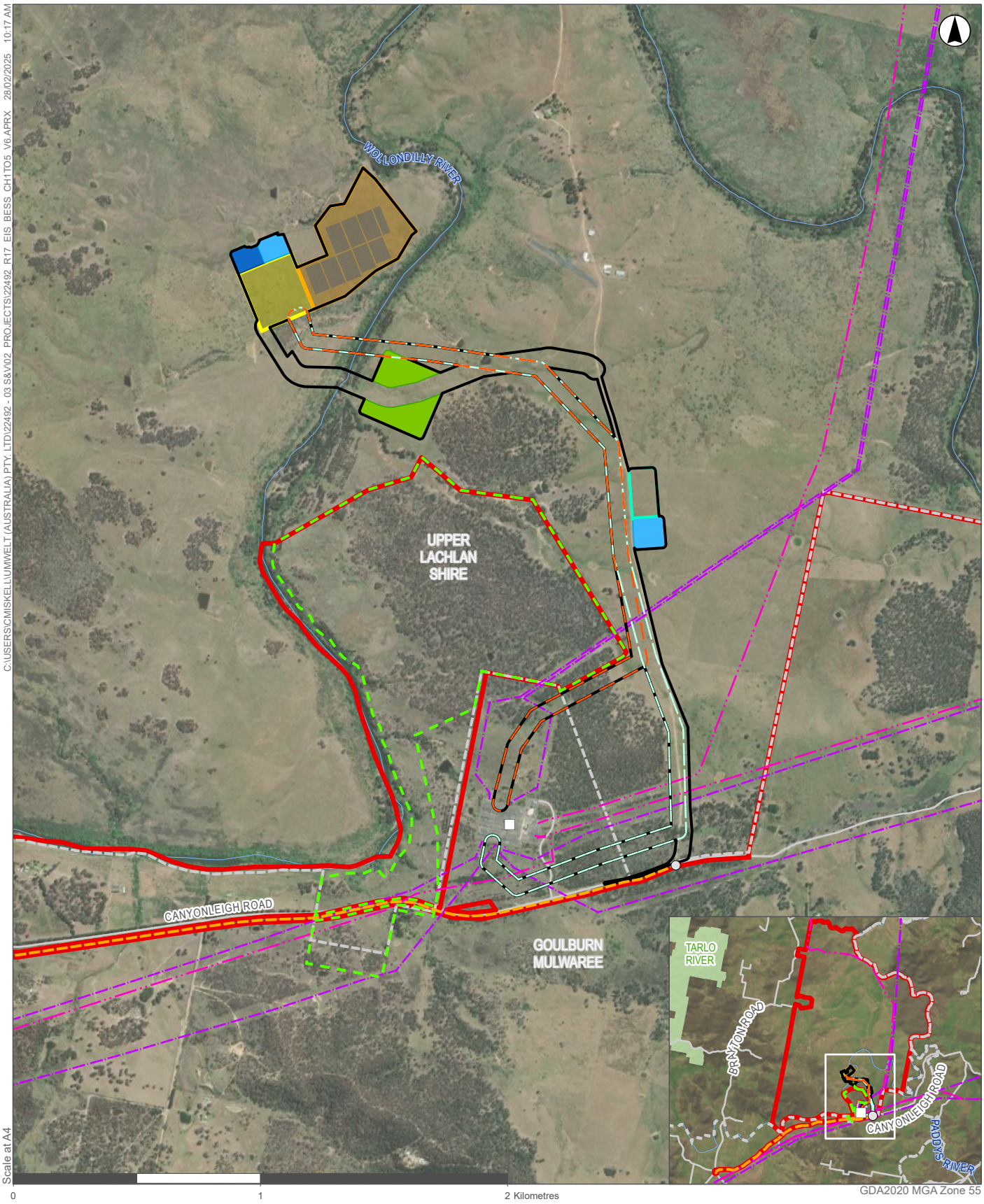
3.1 Project Summary

The Project comprises a large-scale BESS supported by Ancillary Infrastructure. The Project will have a capacity of up to approximately 350 MW (AC or DC coupled) and will have provision for up to four (4) hours of storage (1,400 MWh) and include the key components outlines in **Table 3.1**.

Table 3.1 Project Summary

Project Element	Summary of the Project
Project Application Number	SSD-63344210
Project Address	1001 Canyonleigh Road Brayton NSW 2579
Project Area	Approximately 6,350 ha encompassing the property known as Arthursleigh and the length of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection.
BESS and Associated Infrastructure Development Footprint	Approximately 75 ha.
BESS Footprint	Approximately 13.4 ha.
BESS	The Project will have a capacity of up to approximately 350 MW (AC or DC coupled) and will have provision for up to four (4) hours of storage (1,400 MWh), with the aim of providing both storage as well as firming capacity to the NEM and assisting in grid stability by providing frequency control ancillary services. The design of the Project will allow for the storage and exportation of renewable energy within the network so that it can be used during times of peak demand. Approximately 656, 3.85 MWh per containers.
Switching Site Substation	Area of 6 ha. Voltage step up of 33 kV electricity to 132 kV or 330 kV. An 80 m communication mast is also included at the proposed substation location. No subdivision of the existing land lots is proposed.
Inverters and Medium Voltage Transformers	248, 4,200 kVA inverters, with one medium voltage per transformer (subject to final inverter selection).
High Voltage Transformers	3 skid-mounted transformers (300 megavolt amperes (MVA) high voltage transformer within substation) will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.
Overhead High Voltage Transmission Line	Up to 7 km of internal overhead cables i.e. high voltage transmission lines from the Project to the grid connection point. Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission option will be constructed the two options are assessed separately.

Project Element	Summary of the Project
Electrical Reticulation	Approximately 5 km of internal underground electrical reticulation network, i.e., electrical connections between the proposed panels and collector substation consisting of a combination of underground cables and overhead powerlines.
Temporary Construction Facilities	Up to 3 construction site compounds/laydown areas with dimensions of 100 m x 100 m. Including site office building(s), on-site concrete batching plants for use during the construction phase, potential construction material areas such as borrow pits, and rock crushing facilities, laydown areas used for installation and storage of BESS components.
Permanent Operation Facilities	An operation and maintenance (O&M) facility including a site office, O&M buildings, amenities, equipment sheds, storage, and parking areas 100 m x 80 m. Approximately 0.8 ha in dimension.
Project Access	Primary access point off Canyonleigh Road subject to detailed design and will include site entrance signage.
Internal access tracks	Approximately 5 km of new access tracks and upgrades to existing access tracks
Perimeter Fencing and Security	Security fencing will be installed around the perimeter of the site office and O&M buildings, as well as around BESS and high voltage electrical equipment including the collector substation. The access point will be gated and secured, and appropriate warning signs erected.
Test Bed Facility	A research test bed facility is proposed comprising of a 2-ha hard stand area, demountable buildings, security fencing, parking, 200 kVa power supply and 100 kVA dummy load (simulated electrical load for testing purposes).
APZ	Asset protection zones (APZ) between Project Infrastructure and vegetation will be maintained to a minimum of 10 m and up to 25 m around critical infrastructure.
Workforce	Approximately average of 71 FTE workers during the 18-month construction period with peak construction up to 102 FTE. 5 FTE direct jobs during operation.
Construction Hours	• 7:00 am to 6:00 pm – Monday to Friday • 8:00 am to 1:00 pm – Saturday • Sunday and Public Holidays – no works to be completed.
Operational Hours	24 hours across 7 days
Construction Period	Up to 13 months
Operational Period	Up to 35 years
EDC	Approximately $405 million



Legend

- Project Area
- Local Government Area
- Roads
- Watercourses
- Access Road Works
- Access Point
- Existing Substation
- Marulan Gas Fired Power Station Project Area

Existing Transmission Lines

- 330kV
- 132kV

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

BESS

- Development Footprint – BESS
- BESS Site
- BESS Layout
- BESS Substation
- Test Bed Area
- Construction Compound
- O&M Facility
- Laydown Area

FIGURE 3.1

Proposed Wattle Creek Energy Hub BESS Layout

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

3.2 Project Area

The Project Area is 6,350 ha situated entirely within the Upper Lachlan LGA (refer to **Figure 1.1**). The Project Area encompasses all aspects of the Project including the entire Arthursleigh Property and the length of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection, the off-site transport route has been excluded. Within the Project Area a maximum Development Footprint (area of disturbance associated with the Project) of 75 ha is proposed, shown in **Figure 3.1**. The Project Area comprises two cadastral lots, which are listed in **Table 3.2** and shown in **Figure 2.1** and the existing Canyonleigh Road alignment which falls within the road reserve. The BESS and associated infrastructure would be entirely contained within the Lot 3 DP1120270 with transmission infrastructure associated with the Project connection located in Lot 2341 DP622834. No subdivision of the existing lots is proposed.

Table 3.2 Cadastral Lots of the Project Area

Lot	Deposited Plan
3	DP1120270
2341	DP622834

3.3 Project Layout and Design

3.3.1 Temporary Construction Facilities and Activities

To facilitate construction of the Project, a range of temporary buildings and facilities will be required within the development footprint. These temporary construction facilities are described in the following subsections.

All temporary use sites that are not required for the ongoing operation of the Project will be rehabilitated once they are no longer required. The sites will either be rehabilitated to pre-disturbance conditions as guided by the Construction Environmental Management Plan (CEMP).

3.3.1.1 Site Offices and Compounds

Temporary staff amenities would be designed to service the number of workers at the peak of construction period, and include:

- car parking
- staff offices
- control room
- lunchroom and first aid room
- toilet and shower facilities
- water tanks
- covered walkways

- covered storage area
- associated data, water, and electrical reticulation.

Arrangements will be made for power and communications connections to the site offices during the construction period. During construction, sewage and waste will be transported offsite. This arrangement will be managed through a waste plan and sewage plan developed in consultation with Council.

Temporary construction compounds will be typical of that used at construction sites; noting they will not include accommodation facilities. Indicative locations for construction compounds have been identified in **Figure 3.1**. The final locations will be determined in accordance with the development consent conditions and will be within the Development Footprint.

3.3.1.2 Stockpiles and Temporary Laydown Areas

Stockpiling of materials will be undertaken to maximise construction efficiencies and minimise waste being exported from the Project Area. Stockpiles will be established across the Development Footprint as required.

Temporary rock crushing facilities, concrete batching plants, temporary laydown areas and minor construction access roads are also proposed. All temporary facility sites will be rehabilitated once they are no longer required.

Six temporary laydown areas will be distributed across the Project Area to minimise the transportation of materials and machinery during construction. Fuel and any other chemicals stored in laydown areas will be stored in appropriately designed, bunded storage facilities and trucked to plant in the field. If additional locations are required during the construction phase they would be contained to within the Development Footprint.

3.3.2 Research Test Bed Facility

The Project includes the establishment of a Research Test-Bed Facility. The proposed Facility will be approximately 2 ha in size comprised of the following elements:

- A hard standing area.
- Parking.
- 200 kVa power supply and 100 kVA dummy load (to simulate electrical load).

Operation of the test bed facility is discussed in **Section 3.5.2**.

The proposed Research Test Bed facility will enable UoS to undertake research on new and emerging technologies, including further testing of innovative battery systems developed by Gelion, a company spun out from UoS in 2015. The hard standing area is proposed as a platform for conducting rigorous, transparent, and replicable testing of scientific theories, computing tools, and new technologies related to Gelion's innovative battery technologies. No hazardous materials are proposed to be used within the Facility.

3.3.3 Battery Energy Storage System

The BESS will consist of a lithium-iron phosphate battery system (subject to final provider selection) to be housed in a series of outdoor containers, aggregated in one central location. These containers will be located adjacent to the proposed on-site substation, positioned within the central area of the Project Area (on the northern side of the development footprint). The BESS will include three 300 MVA high voltage transformers within the substation and 248 inverters rated at 4200 kVA, each paired with a medium voltage transformer. Perimeter fencing, at least 2.1 m high, will be installed around the BESS facility to ensure the security and safety of the site.

The BESS containerised system includes an APZ integrated within the battery design serving as a fire break, as well as a heating, ventilation and air conditioning system, as shown in **Figure 3.2.**

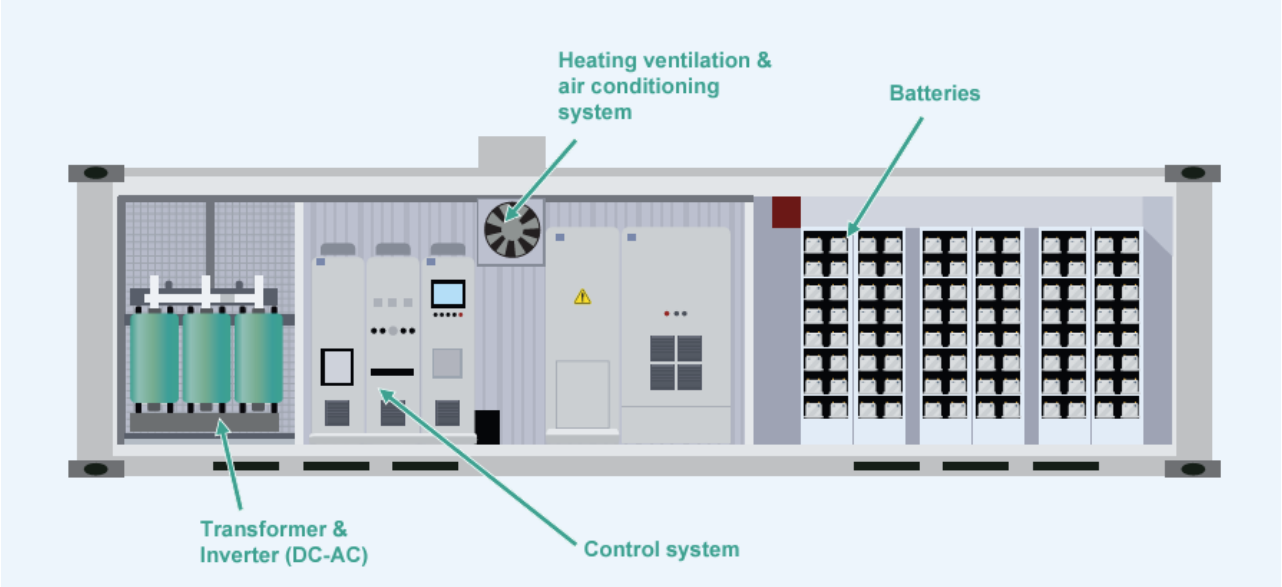


Figure 3.2 Example of BESS Container Internal Systems

3.3.4 Internal Electrical Collection System and Substation

Power, earthing, and communications cables will also be installed across the Development Footprint between electrical devices. Cabling may be underground or above ground depending on geotechnical conditions.

3.3.5 Overhead Transmission Line Infrastructure

The onsite collector substation will be constructed within the Development Footprint to convert the on-site AC reticulated 33 kV electricity to 132 kV or 330 kV for export to the grid via an overhead line network connection to the existing Marulan Substation. The electrical infrastructure components within the Development Footprint are generally expected to be between 5–10 m tall, with the exception of the 132 kV or 300 kV line to connect the Project to the Marulan Substation and associated lightning protection, gantries and an 80 m communication mast at the on-site substation.

3.3.6 Transmission Connection Works

In order to facilitate the connection of the Project to the existing Marulan Substation, ancillary works will be required within the substation compound (refer to **Figure 3.3**). These works will include installation of connection infrastructure and associated hardstand, electrical re-configuration, connection, testing and commissioning works. Access to the substation to undertake these works will be provided via the existing access road to the Marulan Substation from Canyonleigh Road. Detailed design in relation to the connection works will be undertaken once the transmission line options are determined.

3.3.7 Ancillary Infrastructure

Ancillary infrastructure required to support the construction and operation of the Project is presented in **Table 3.1** and includes, but is not limited to:

- onsite collector substation
- underground and overhead transmission lines at varying voltages (i.e., high, medium, and low)
- temporary and permanent offices and site compounds
- O&M facility
- permanent communication mast
- communication cables (includes control cables and earthing)
- water storage tanks
- hardstands
- signage at site entrance
- internal access tracks, river crossing, and primary and secondary site access points.

Security fencing will be installed around the perimeter of the site office and O&M buildings, as well as around high voltage electrical equipment including the collector substation. Signage will be clearly displayed identifying hazards present within the Development Footprint. Lighting, security cameras and fencing will be installed where necessary for safety, maintenance, and security purposes.

Legend

- Project Area
- Local Government Area
- Roads
- Watercourses
- Existing Substation Compound
- Existing Substation Access Road
- Access Road Works

Existing Transmission Lines

- 330kV
- 132kV

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

BESS

- Development Footprint – BESS

FIGURE 3.3

Existing Marulan Substation

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

3.3.8 Site Access and Transportation

The transport route to the Project Area for oversize/overmass (OSOM) movements along the Hume Highway from both Port Kembla and Port Botany are being considered. Subject to detailed design, internal access tracks will also be established to connect the BESS, on-site collector substations, and other infrastructure areas to the public road network. All internal access tracks will be constructed to provide all weather access for servicing and maintaining Project infrastructure, as well as access and egress during emergencies.

Access to the Project Area via heavy vehicle will be via Red Hills Road, Ambrose Road, Brayton Road and Canyonleigh Road, as shown in **Figure 3.5**. Arthursleigh Road to the east of the Project Area will not be used during construction, except in the event the access route via Canyonleigh road is not possible (i.e. in the event of flood or fire etc). Canyonleigh Road between the entrance to the Project Area and the Brayton Road/Canyonleigh Road intersection will be resurfaced as required prior to the Project construction phase.

Minor works will also be undertaken at the Brayton Road / Canyonleigh Road intersection to incorporate a basic right (BAR) turn treatments on the southern Brayton Road approach to the current configuration of the intersection. The proposed works will utilise the existing width provided by the wide shoulder on the western side of the southern Brayton Road approach to the intersection, detailed design will be subject to further consultation with Council.

Figure 3.1 depicts the indicative location of the existing access point to the site which will be subject to minor upgrade works to facilitate the construction of the Project, the access point will be gated and secured, and appropriate warning signs erected. Further information is provided by the Traffic Impact Assessment summarised in **Section 6.8** and provided in **Appendix 10**.

The Project will seek to allow heavy and light vehicles to use other public roads not discussed above to:

- Undertake pre-construction minor works.
- Utilise the secondary intersections and cross overs identified above to facilitate construction and operational vehicles.
- Procure resources from licensed operators which are located along these roads.

3.4 Construction

3.4.1 Construction Timeframe

Construction works will facilitate land clearing and road upgrades and construction of the Project will take place as detailed in the following sections and operations will involve ongoing maintenance, monitoring, and performance optimisation as outlined in **Section 3.5**. Decommissioning of the Project will take place as detailed in **Section 3.6**.

Construction activities for the Project will be limited to the Standard Construction Hours of 7:00 am – 6:00 pm Monday–Friday and Saturday 8:00 am to 1:00 pm. Construction activities will not take place on Sunday or public holidays unless unexpected risks to the Project and personnel are required to be resolved during these days.

As shown in **Figure 3.4** below, the construction timeframe is expected to be 13 months.

SITE ACTIVITY	CONSTRUCTION MONTH																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Construction Workforce	15	40	63	72	65	69	82	92	98	101	102	102	97	88	69	64	41	18
Light Vehicles Daily Movements	4	10	16	18	16	17	21	23	25	25	26	26	24	22	17	16	10	5
Heavy Vehicles Daily Movements	12	34	28	28	28	9	9	9	9	9	9	9	9	9	6	10	9	3
OSOM Monthly Movements	0	0	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	0

Figure 3.4 Construction Workforce and Traffic Movements

3.4.2 Site Preparation and Earthworks

Site preparation and earthworks will include:

- Ongoing geotechnical investigations to confirm the ground conditions.
- Appropriate weed suppression methods will be used during the initial stages of construction.
- Vegetation removal.
- Construction of internal roads for access from the local road network and car parking.
- Installation of temporary construction fencing around work areas and boundary fencing.
- Establishment of temporary construction compounds, Project facilities and laydown areas for construction materials and equipment.
- Preliminary earthworks and installation of environmental controls including erosion and sediment control structures. Earthworks will be most significant at the location of the BESS and substation.
- Identification and establishment of no-go zones around sensitive biodiversity and heritage features as required.

3.4.3 Construction Activities

The construction and commissioning phase of the Project is anticipated to involve the following:

- installation of BESS Components
- installation of permanent fencing and security
- preparation of foundations for the permanent buildings, BESS and on-site substation
- installation of underground cabling (trenching and installation of power conversion stations)
- construction of O&M facility

- construction of the onsite substation and associated grid connection infrastructure
- removal of temporary construction facilities.

3.4.4 Vegetation

Vegetation removal will be required throughout the Development Footprint to enable the construction of the Project and all associated infrastructure. This includes removal of single standing trees and exotic pasture within the Development Footprint. Areas of vegetation that have been assessed as moderate to high biodiversity value have been avoided as far as reasonably practicable.

An assessment of biodiversity impacts has been conducted to identify the extent of vegetation removal required for the Project and identify management and mitigation measures to avoid and minimise impacts to vegetation that is of high value. Further information regarding the biodiversity impacts can be found in **Section 6.5** and **Appendix 7**.

3.4.5 Construction Workforce

The Project would generate an average of 71 FTE over the expected 18-month construction period with 102 peak construction FTE. Onsite workforce numbers would vary month to month, depending on the intensity of the proposed works at the time. The workforce would include licensed electrical trade personnel, mechanical and electrical trade assistants, machinery operators, riggers and labourers.

3.4.6 Vehicle Movements

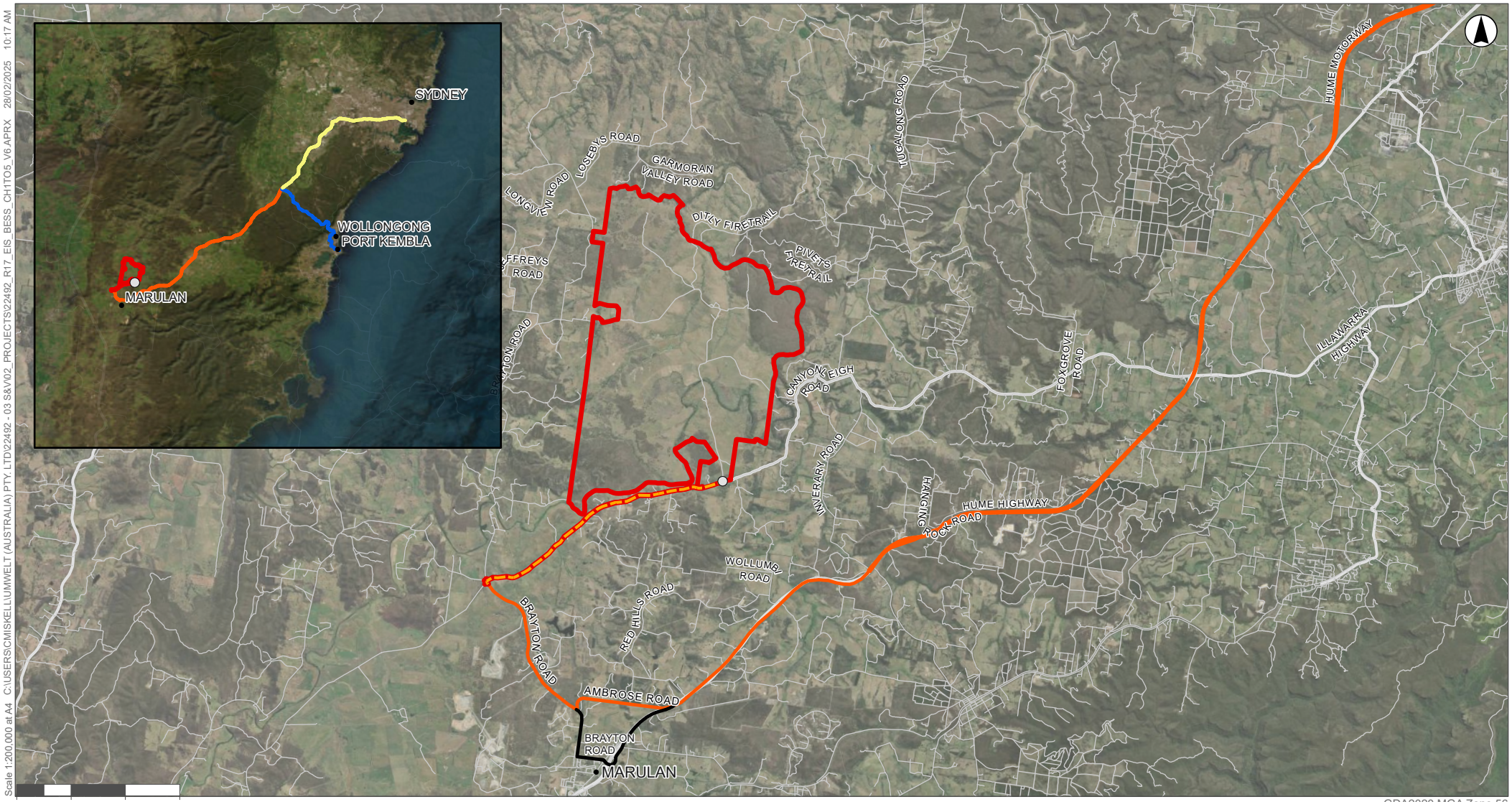
During the construction period, personnel would access the Project Area via the main access point on Canyonleigh Road. Personnel are anticipated to travel from nearby population centres including Marulan and Goulburn. Further information about the distribution of local employment is provided in **Section 6.12**.

Major Project components would be delivered to either the Port of Newcastle or Port Kembla and transported to the Project Area by truck via Motorway/Highway including the Hume Highway, and Red Hill Road, Ambrose Road, Brayton Road to Canyonleigh Road, and access the Project via the central access point off Canyonleigh Road (refer to **Figure 3.5**). Further information regarding the heavy vehicle transport route can be found in **Section 6.8**. Estimated peak daily vehicle movements during construction are detailed below in **Table 3.3** and shown across the construction timeframe in **Figure 3.4**.

Table 3.3 Construction Vehicle Movements to/from the Project Area (daily)

Vehicle	Movements During Construction
Light	26 movements
Heavy	34 movements
OSOM	1 movement

During Project decommissioning, the Project generated peak daily traffic movements will be similar to those generated during the construction phase but for a shorter duration. During Project operations, the Project will generate minimal vehicle movements.



Legend

- Project Area
- Shared Route
- Newcastle Port
- Sydney Port
- Access Road Works
- Alternate Delivery Route
- Major Roads
- Minor roads
- Access Point

FIGURE 3.5

Heavy Vehicle Transport Route

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024)

3.5 Operation and Maintenance

Once fully operational, activities will include the following:

- generation and storage of electricity and provision to the broader electricity grid as required to meet the strategic objectives of the Project
- repair and maintenance of Project infrastructure such as battery enclosures, inverters, transformers and cables
- routine visual inspections, general maintenance and cleaning operations of the BESS and substation, as required
- vegetation management including potential use of seeding or armouring (i.e. jute mesh) to avoid erosion
- 24-hour security response
- replacement of equipment and infrastructure, as required
- pest and vermin control.

Site maintenance activities will include management of internal roads, drainage, fencing and vegetation (and management of sheep grazing under panels). Additional maintenance of key infrastructure will also be required and will include service, repair or replacement of inverters, transformers, substation, or switchyard. The remainder of the Project Area will continue to be used for agricultural purposes throughout operations.

During the operational phase of the Project, it is anticipated that 15 direct FTE personnel would be required. Traffic movements would consist primarily of light vehicles for routine operations and maintenance.

3.5.1 Hours of Operation

The Project would operate continuously, 24/7 with a mix of remote and onsite monitoring and maintenance activities.

Associated works by onsite staff would be undertaken during the standard working hours of:

- Monday to Friday: 7:00 am – 6:00 pm
- Saturday: 8:00 am – 1:00 pm.

No activities would occur on Sundays or public holidays, however, in cases of emergencies, major asset inspection or maintenance programs may be undertaken outside standard hours. Council and surrounding landholders would be notified of any works outside standard work hours that may be expected to cause noise exceedance.

3.5.2 Research Test Bed Facility

The facility will be used in the development and research of novel clean energy technologies, such as innovative battery systems developed by Gelion, a company started by researchers from the University in 2015. The research facility will contribute to the research objectives of the Research and Development Roadmap by the NSW Chief Scientist & Engineering (2022). The location of this facility is shown on **Figure 3.1**.

All activities within the test bed facility will be conducted in accordance with the UoS environmental and research ethics policies. Prior to authorisation, all research activities will undergo thorough evaluation to ensure they do not result in adverse environmental impacts.

3.5.3 Environmental Management

Spark Renewables would develop and implement an Environmental Management Strategy (EMS) post approval as part of the Project to provide the strategic framework for environmental management. The EMS would:

- Incorporate a CEMP, Operational Environmental Management Plan (OEMP) and Decommissioning and Rehabilitation Management Framework (DRMFP), including all required sub-plans and protocols such as the Accommodation and Engagement Strategy (AES). Aboriginal Cultural Heritage Management Plan (ACHMP) and Emergency Response Protocol (ERP), and management and mitigation measures proposed in this EIS provided in **Section 6.0**.
- Identify all relevant statutory approvals.
- Establish roles, responsibilities, authority and accountability of all key personnel involved in the environmental management of the Project.
- Establish procedures for consulting with the local community and relevant agencies about the construction, operation and environmental performance of the Project.
- Establish procedures for handling of complaints, disputes, non-compliances and emergency response.

Appendix 4 provides a consolidated summary of the management measures that will be implemented during the construction and operation of the Project to manage, mitigate and/or monitor potential impacts identified within this EIS.

3.6 Decommissioning

The Project is expected to operate for 35 years. After the initial operating period, the Project would either be decommissioned, removing all infrastructure, and returning the Project Area to pre-existing land use as far as practicable unless otherwise agreed with landowners and regulators.

Decommissioning would involve the mobilisation of a workforce and additional temporary facilities, and the subsequent removal of equipment and infrastructure. All infrastructure will be removed during decommissioning except for the transmission lines and substation unless stated otherwise in the development consent conditions. At this time, it is expected that significant movements of light vehicles and trucks for transporting waste would occur comparable to but less than the peak traffic volumes required during construction. The decommissioning phase would be expected to last 12 months.

3.7 Services and Utility Supply

3.7.1 Water

The Project would require a water supply during the construction, operation and decommissioning phases. Total anticipated water demands are approximately 10.7 ML of non-potable and 0.95 ML of potable for the construction and decommissioning periods with an average daily demand of 30 kL per day of non-potable water and 20 kL per day of potable water.

During construction, water would primarily be used for concrete production to establish hard-stand areas and dust suppression. Water for construction would be sourced from commercial suppliers in the region (via water trucks) or via private agreement with local suppliers. Water sources would be determined prior to the commencement of construction in consultation with suppliers and landholders. Town water supplies will be generally avoided for use in construction but may be used where appropriate and if available.

During operations, other water would be required for ongoing maintenance activities such as amenities and potable purposes by operational staff, and equipment washing down, if required. A static water supply, with the capacity to be determined during the detailed design phase, would also be established and maintained for fire protection.

3.7.2 Electricity

Access to electricity during operational activities would be via a dedicated low voltage feeder from the site substation or other auxiliary supply, with battery backup is provided for essential services at the O&M Facility. During construction electricity access would be via the local distribution network or alternatively a diesel generator when required.

Electricity requirements during operation would include lighting at ancillary infrastructure (office, workshop, amenities, and parking), power for internal office facilities and appliances, and onsite security systems. Electricity stored by the BESS would be used for most activities during operations via a dedicated low voltage feeder from the substation or other auxiliary supply, except for maintenance of the inverters during the night which would involve a small amount of auxiliary load being supplied from the grid.

3.7.3 Sewer

There is no sewer access in the Project Area. Therefore, construction amenity facilities would be pumped out via tanker and delivered to the nearest sewage treatment facility, or as agreed with Council during construction.

A septic system would be installed for the operational amenities and function of the O&M facility. This would be constructed and managed in accordance with the relevant council requirements.

4.0 Statutory Context

This section provides an overview of the statutory context for the Project and discusses the application of key legislation and planning provisions to the Project. The Project requires approval under both NSW and Commonwealth environmental and planning legislation.

4.1 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary environmental and planning regulatory instrument relevant to the Project at the Commonwealth level (Commonwealth of Australia Department of Climate Change, 1999). Under the EPBC Act, approval from the Commonwealth Minister for the Environment and Water is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES). If an 'activity' is likely to have a significant impact on a MNES then it may be a 'controlled action' and require approval from the Commonwealth Minister for the Environment and Water. To obtain approval from the Minister, a proposed action must be referred to the Minister via the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). The purpose of a referral is to enable the Minister to decide whether the proposed action will need assessment and approval under the EPBC Act.

On 26 November 2024, the Project was determined to be a Controlled Action requiring approval under the EPBC Act from the Commonwealth Minister for the Environment due to its potential impact on listed threatened species and communities. The assessment pathway for the Project is under the bilateral agreement between the Commonwealth and NSW Governments and DCCEEW has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Appendix 1**). This EIS addresses the assessment requirements, with a summary of the assessment findings related to MNES included in **Section 6.5** and **Appendix 7**. Further details regarding the Commonwealth statutory context are provided in **Table 4.1** and **Appendix 3**.

4.2 NSW

The NSW EP&A Act is the primary instrument which regulates the environmental impact assessment and approval process for development in NSW.

The Project will be assessed under Part 4 of the EP&A Act.

Further details regarding NSW statutory context are provided in **Table 4.1** and **Appendix 3**.

4.3 Summary of Requirements

The key statutory provisions applying to the Project with respect to environmental assessment and planning approval at Commonwealth, State and local level, as well as the roles that these play in the Project's assessment and determination are outlined in **Table 4.1**.

This also serves as a summary of legislative compliance requirements relevant to the Project in accordance with the SSD EIS Guideline (NSW Government Department of Planning and Environment (DPE), 2022a). In addition, details of the relevant statutory requirements for the Project and where these have been addressed in the EIS are provided in **Appendix 3**.

Table 4.1 Statutory Requirement Summary

Category	Comment
Power to Grant Approval – *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP)	The Project will require development consent under Part 4 of the EP&A Act. Section 4.36 of the EP&A Act provides for the declaration of a project as State Significant Development (SSD). Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a SEPP or by the Minister for Planning and Public Spaces. Clause 20 of Schedule 1 of the Planning Systems SEPP prescribes that development for the purpose of 'electricity generating works' that has a capital investment value of more than $30 million is SSD. The Project has an EDC of greater than $30 million. Therefore, the Project is declared as SSD and the development application for the Project will be subject to the requirements of Division 4.7 of the EP&A Act. The development application will be lodged with the Planning Secretary of the DPHI. The Minister for Planning and Public Spaces is the consent authority for SSD projects. Section 4.5(a) of the EP&A Act also provides that the Independent Planning Commission (IPC) is the consent authority for SSD where it is declared to be the consent authority under an Environmental Planning Instrument (EPI). The Minister for Planning and Public Spaces has issued a general delegation of the consent authority function for SSD projects to the IPC in instances where 50 or more public objections are received on the application, where the applicant has made a reportable political donations disclosure and/or where the local Council objects to the Project. Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments (EPIs), proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the site, any submissions received and the public interest.
Permissibility – *Upper Lachlan LEP 2010*	The Project is located within the Upper Lachlan Shire LGA and wholly located within land zoned as RU2 Rural Landscape as illustrated in **Figure 2.2**. Electricity generating works are permitted with consent in this zone. Consideration of the LEP zoning provisions applying to the land are discussed in **Appendix 3**.
Permissibility – *State Environmental Planning Policy (Transport and Infrastructure) 2021*	The Project is also permissible under Clause 2.36(1)(b) of the Transport and Infrastructure SEPP which 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. **Appendix 3** provides further consideration of other relevant EPIs and how these have been considered in this EIS.
Commonwealth Approvals – *Environment Protection and Biodiversity Conservation Act 1999*	Under the EPBC Act, a referral is required to be submitted to DCCEEW for any 'action' that is considered likely to have a significant impact on any Matter of National Environmental Significance (MNES). A referral was submitted to DCCEEW on 5 September 2023. The controlling provisions were listed threatened species and communities. On 26 November 2024, the Project was determined to be a Controlled Action requiring approval under the EPBC Act from the Commonwealth Minister for the Environment and Water.

Category	Comment
	The Project will be assessed under the Assessment Bilateral Agreement currently in place between the NSW and Commonwealth Governments, which allows assessment processes under the EP&A Act for certain developments, including SSD, to form the assessment for the EPBC Act to avoid duplication. Supplementary SEARs in relation to MNES identified in the Commonwealth Minister's 'controlled action' decision have been addressed in this EIS. A copy of the supplementary SEARs and where these have been addressed in the EIS and included in **Appendix 1**. A decision whether to approve the Project for the purposes of the EPBC Act will be made, based on this assessment documentation, by the Commonwealth Minister for the Environment and Water or their authorised delegate.
Native Title Act 1993	Searches of the National Native Title Register, the Register of Native Title Claims, and Native Title Applications Registration Decisions and Determinations found that no Native Title Claims cover the Project Area.
Heavy Vehicle National Law	Approvals are required for the transport of equipment and infrastructure by OSOM vehicles. The requirements for such OSOM transport have been assessed via a route analysis study as part of the EIS (see **Section 6.8**).
Other State Approvals – Approvals that are not required	Section 4.41 of the EP&A Act specifies authorisations which are not required for approved SSD. Those are listed below: • *Fisheries Management Act 1994* – a permit under section 201, 205 or 219. • *Heritage Act 1977* – an approval under Part 4, or an excavation permit under section 139. • *National Parks and Wildlife Act 1974* – an Aboriginal heritage impact permit under section 90. • *Rural Fires Act 1997* – a bushfire safety authority under section 100B. • *Water Management Act 2000* (WM Act)– 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.
Consistent approvals (section 4.42 of the EP&A Act) – Roads Act 1993	Consent is required under section 138 of the Roads Act for works or structures that disturb the surface of a public road or connect a road to a classified road. However, section 4.42(f) of the EP&A Act applies to SSD projects and requires that consent must not be refused if the works are necessary for carrying out an approved project. The Project will require intersection upgrade work on Canyonleigh Road to provide access to the Project Area and targeted road upgrades between the site entrance and the intersection with Brayton Road, hence a permit under section 138 of the Roads Act will be required.
Pre-Conditions – *Biodiversity Conservation Act 2016* (BC Act)	Under the *Biodiversity Conservation Act 2016* (BC Act), biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any SSD project. A BDAR has been prepared for the Project in accordance with the BAM (refer to **Section 6.5** and **Appendix 7**).

Category	Comment
Pre-conditions – *State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection*	Chapter 3 of the Biodiversity and Conservation SEPP applies to the extent that the Project Area is located within an LGA to which Chapter 3 of the SEPP applies. The consent authority is restricted from granting development consent for proposals on land identified as core koala habitat without the preparation of a plan of management. Potential impacts on koala habitat have been assessed in the BDAR (refer to **Section 6.5** and **Appendix 7**). Consultation with the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) – Conservation Programs, Heritage and Regulation (CPHR); formerly 'Biodiversity Conservation Science Group' (BCS))has also been undertaken during the preparation of the EIS, refer to **Section 5.0**.
Pre-conditions – *State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 8 Sydney drinking water catchment*	This guideline provides a framework for addressing the requirement under the Biodiversity and Conservation SEPP for all development in the Sydney drinking water catchment to have a neutral or beneficial effect (NorBE) on water quality, requiring the use of the NorBE Tool. A Water Resources Impact Assessment (WRIA) has been prepared including a NorBE assessment on water quality, refer to **Appendix 11** and **Section 6.9**. Consultation with Water NSW has also been undertaken, refer to **Section 5.0**.
Pre-conditions – *State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 3 Hazardous and Offensive Development*	The Resilience and Hazards SEPP requires a consent authority to consider whether an industrial development is a potentially hazardous or potentially offensive industry. A hazard assessment is completed for potentially hazardous developments to assist the consent authority to determine acceptability. A preliminary hazard analysis (PHA) has been prepared for the Project (refer to Section **6.11.2** and **Appendix 15**). Consultation with DPHI Hazards has been undertaken during the preparation of the EIS, refer to **Section 5.0**. The Resilience and Hazards SEPP also requires consideration of whether land is contaminated and that the land is suitable for the proposed development. The previous agricultural use of the Project Area presents potential contamination sources however investigation across the Project Area including detailed soil analysis has not indicated any existing contamination. Additionally, the proposed industrial use of the site is considered a suitable use with consideration of previous agricultural land use. A CEMP is proposed which will include unexpected finds procedures and standard contamination management should any contamination be detected during construction works associated with the Project. Any potential contamination sources associated with the Project have also been considered and appropriate management and mitigation measures will be implemented, refer to **Section 6.11**.
Mandatory Matters for Consideration	Section 1.3 of the EP&A Act (refer to **Section 7.0**). Section 4.15(1) of the EP&A Act (refer to **Appendix 3**). Section 192 of the EP&A Regulation (refer to **Appendix 3**).
Other relevant NSW legislation	*Aboriginal Land Rights Act 1983* *Biosecurity Act 2015* *Contaminated Land Management Act 1997* *Local Land Service Act 2013* *Waste Avoidance and Resource Recovery Act 2001* Refer to **Appendix 3** for further detail.

5.0 Engagement

Spark Renewables appreciates the importance of engaging, listening to and involving community members and other local stakeholders throughout the project's development, and ensuring that local priorities and concerns are considered. Spark Renewables' approach to consultation has been carried out in accordance with the International Association for Public Participation's (IAP2) Core (International Association for Public Participation 2 (IAP2), 2024).

Spark Renewables is also signatory to the Clean Energy Council's Best Practice Charter for Renewable Energy Projects (CEC, 2021), a voluntary commitment to engage respectfully with communities, be sensitive to environmental and cultural values, and make a positive contribution to the regions in which they operate. Spark Renewables prepared a Community and Stakeholder Engagement Plan (CSEP) in accordance with the above principles which has been, and will continue to be, used to guide community and stakeholder engagement throughout the project lifecycle.

Engagement has been conducted in compliance with the principles and requirements of the Undertaking Engagement Guidelines for State Significant Projects (NSW Government Department of Planning, Housing and Infrastructure (DPHI), 2024) and the requirements of the Project's SEARs as outlined in **Appendix 1**. The SEARS require:

- an assessment of the social impacts accordance with the Social Impact Assessment Guideline (NSW Government Department of Planning and Environment (DPE), 2023a), any benefits of the project for the region and the State as a whole, including consideration of any increase in demand for community infrastructure services, consideration of construction workforce accommodation, assessment of impact on agricultural resources and agricultural production on the site and region.

Spark Renewables has been engaging with the local and broader community since March 2023, seeking to build relationships and understand stakeholder perspectives and needs in the region through meetings with proximal and neighbouring landholders, community / interest groups, service providers, Aboriginal stakeholder groups, Upper Lachlan Shire Council and Goulburn-Mulwaree Council, and relevant local, state and Federal government agencies. This ongoing engagement has resulted in changes to the Project design (refer to **Section 1.5**) and has assisted in development of management and mitigation measures proposed for the Project. In addition, engagement has been undertaken with the broader community, neighbouring Councils, functional stakeholders (e.g. accommodation and employment providers), businesses and various non-government organisations and interest groups. This engagement has further informed the design of the Project and has been ongoing throughout the assessment process, and if the Project is approved, the engagement will be ongoing during the life of the Project.

Engagement has been undertaken as part of the Social Impact Assessment (SIA) undertaken by Umwelt for the Project following the requirements of the NSW Government guidelines and assessment standards including, but not limited to, the NSW Social Impact Assessment Guideline for State Significant Projects (2023) (SIA Guidelines), the Undertaking Engagement Guidelines for State Significant Projects (Engagement Guidelines) (DPHI, 2024) and the SEARs. The stakeholder engagement process has therefore afforded opportunities for Spark Renewables to effectively assess and integrate social outcomes within the Project planning, design and assessment phases.

5.1 Community Stakeholder Engagement Plan (CSEP)

To identify key stakeholders, Spark Renewables undertook a stakeholder identification process to inform the development of the Project's Community and Stakeholder Engagement Plan (CSEP). This process involved identifying stakeholders with an interest in the Project, or those that may be directly and/or indirectly affected, including any potentially vulnerable or marginalised groups. Umwelt reviewed the CSEP and provided guidance on additional stakeholder groups to consider, with these incorporated into the plan **Appendix 17**.

Spark Renewables has focused on providing opportunities for interested community members and stakeholders to participate, and maximising opportunities for the local community to benefit from the Project in meaningful ways. This is demonstrated through the use of a variety of engagement methods undertaken during the EIS and the progression of discussions with community and Council regarding a Community Benefit Fund. Benefits of the Project include local employment opportunities (**Section 6.13.3**), increased business for downstream service providers (**Section 6.13.3**) and upgrades to the local road network (**Section 6.8.3**).

A coordinated approach to community and stakeholder engagement for the Project across all components including both the Project and the Wattle Creek Solar Farm project, was adopted that intended to streamline the consultation programs and integrate a common approach, aiming to:

- ensure the development and implementation of engagement that is transparent and provides clear and consistent information on all Project components
- reduce social risks associated with either Project, including stakeholder confusion with regards to what each of these include
- establish and develop trust with key stakeholders
- afford the opportunity for meaningful participation in the assessment phases for both Project components
- avoid engagement fatigue, particularly for stakeholders potentially affected, or with an interest, across both Project components.

The goals for the community consultation were guided by the IAP2 Core Values for Public Participation. Spark Renewables' goals for community engagement alongside the associated IAP2 level of participation are detailed below in **Table 5.1**.

Table 5.1 Goals for Community Participation Informed by the IAP2 Federation's Levels of Engagement

IAP2 Level of Participation	Spark Renewables Goal for Community Participation
Inform	Ensuring the community members are well informed and kept up to date on project status and developments.
Consult	Obtaining feedback and providing opportunities for community members to communicate their views, concerns and aspirations for the project.
Involve	Addressing any community member's issues or concerns promptly.
Collaborate	Working to avoid and minimise the impacts and maximise the benefits of the project for the local community.

5.1.1 Stakeholder Identification

As part of the development of the CSEP, Spark Renewables undertook a stakeholder identification process which involved identifying stakeholders with an interest in the Project, or those that may be directly and/or indirectly affected. This included potentially vulnerable or marginalised groups.

Additional stakeholders were identified for consideration upon review of the CSEP and during the SIA and EIS engagement process.

Key stakeholder groups consulted or engaged during the SIA are outlined in **Table 5.2**. Engagement with NSW Government agencies was also undertaken in the development of the EIS and is summarised in **Section 5.2**.

Table 5.2 Stakeholders Engaged in Scoping and EIS Phase

Stakeholder group	Stakeholders
Local Government	Upper Lachlan Shire Goulburn-Mulwaree Wingecarribee Shire
Broader community	Residents of Canyonleigh, Big Hill, Marulan.
Proximal landholders and residents	~130
Community environmental and special interest groups	Marulan Progress Association Marulan & District Historical Society Marulan CWA Marulan Lions Club Community Voice for Hume Canyonleigh Community Association The Goulburn Group Jerrara Action Group Bannaby Resident Action Group Upper Lachlan Landcare Upper Lachlan Foundation
Emergency service providers	Big Hill RFS Marulan RFS
Accommodation providers	Briars Country Lodge – Moss Vale The Argyle Hotel – Moss Vale Moss Manor Hotel – Moss Vale Marulan Motor Inn – Marulan Tattersalls Hotel – Goulburn Mercure Goulburn – Goulburn Astor Hotel – Goulburn Best Western Plus Goulburn – Goulburn
Industry and business	Regional Development Australia – Southern Inland Marulan Region Chamber of Commerce APM Employment Services – Goulburn / Moss Vale Sureway Employment and Training Goulburn Think Recruitment Moss Vale

Stakeholder group	Stakeholders
	Highland Recruitment TAFE NSW – Moss Vale
Aboriginal stakeholders	Pejar LALC Gundungurra Aboriginal Group Sonione Wakabut Rangers The Burra Burra Corporation

5.1.2 Engagement Undertaken

The engagement program has covered both the Project and the Wattle Creek Solar Farm project. The engagement program was implemented in two phases, with the initial round of engagement during early to mid-2022 while the Scoping Report was developed, and the second round during late 2022 to early 2024 while the technical assessments for the EIS were underway. This allowed for community engagement to be undertaken during two key stages of the assessment process; during the Project design phase to allow for scoping of key concerns and impacts, and during the draft environmental assessment to inform the technical studies and appropriate strategies to seek to further avoid or minimise / manage the environment and community impacts.

Spark Renewables has also extensively consulted with Government agencies throughout the EIS process, as outlined in this section, to understand and meet their assessment requirements. Consultation included Project briefings, discussion of the scope of the specialist assessments and SEARs requirements and reporting of results of the specialist assessments.

A summary of the consultation activities undertaken during the stakeholder engagement program is presented in **Table 5.3**, with key community concerns and where these have been addressed in this EIS outlined in **Section 5.3**.

Table 5.3 Communication and Engagement Mechanisms

Mechanism	Target Stakeholder	Engagement Objective	Description	First Round of Consultation	Second Round of Consultation
Website	Host landholders Local businesses and service providers Community groups Traditional Owners Broader community Local media	Inform	A website dedicated to the Project including a description and overview of the Project, development application process, company information, responses to key concerns, risk management plans, maps, media releases and contact; and subscription information.	A Project-dedicated website and email address were established in February 2023 introducing the Project. Updates have been made throughout the preparation period.	Website updated when required to reflect the most up to date information throughout the planning process. The email address has also been monitored throughout the process.
Media Release	Local Government Traditional Owners Host landholders Neighbouring/ proximal landholders Community groups Wider community Local businesses and service providers Local media	Inform	To introduce the Project to the broader community through local and regional media channels.	Advertising in the Goulburn Post and media features on ABC radio stations in March 2023 to advise of upcoming consultation opportunities and provide Project updates.	Notification of survey seeking input on the community benefit sharing program shared on community Facebook groups, Project Facebook channel, and the local media.
Community Newsletters	Broader community	Inform	Project information sheets to distribute information about the Project to the broader community and targeted stakeholders.	No. 1 – Project overview and invitation to drop-in session was hand delivered in March 2023 immediate project neighbours within 3 km of proposed infrastructure. No. 2 – Provided to proximal landholders in October 2023 to provide an update on the status of the Project and provide feedback received from the community during the scoping phase.	No. 3 – Invitation to attend community drop in session distributed in May 2024 distributed to residences within 4 km of the Project Area by Australia Post. No. 4 – Will provide a Project update and present the draft findings of EIS & SIA and inform the community of the exhibition process.

Mechanism	Target Stakeholder	Engagement Objective	Description	First Round of Consultation	Second Round of Consultation
Drop-in Session	Broader community Community groups Local businesses and service providers	Consult	Multi-hour time periods when stakeholders can drop in to speak to the Project team and experts, view documents and plans and ask questions of the Project team.	One drop-in session held on 9 March 2023 at the Marulan War Memorial Hall.	Two drop-in sessions held: • 31 May, Marulan War Memorial Hall • 1 June, Canyonleigh Community Hall. The session summarised the draft results available draft technical studies and were used to gain feedback for the SIA.
Online Survey	Broader community	Consult	Online or offline surveys to obtain input and feedback on Project decision-making, as well as specific information about the needs, desires and impacts on stakeholders related to the Project.	Established in Mach 2023, with all feedback until 28 April, to be considered in this SISR. A link to the survey was made available on newsletter no. 1 and at the drop-in session.	The survey was updated and distributed in the second phase to provide opportunity for the community to provide further feedback and validate impacts from the scoping phase. The survey was also utilised to understand potential mitigation and enhancement measures. A link to the survey was made available on newsletter No. 3 and at the drop-in sessions.
Personal Meetings or Interviews	Proximal landholders Local Government Community groups Traditional Owners	Involve	Introductions to the Project, semi-structured interview discussions to listen to individual concerns, interests, and issues to gather preliminary feedback, including sensitivities, understanding of information needs; and future engagement preferences.	One-on-one meetings held throughout the months of March and April 2023, with members of the Spark Renewables Project team.	Follow up interviews and meetings with proximal landholders and community groups. Interviews held with local businesses and services providers to understand existing capacity and constraints.
Project Briefings	State Government Local Government Traditional Owners Community groups	Involve	Formal briefings to key stakeholders and government agencies, with Project Information Sheets and/or slide decks, to formally introduce the Projects.	Initial Project briefings undertaken in March and April 2023. Included a briefing at the Canyonleigh Community Association meeting on 22 March 2023.	Project briefing undertaken in May 2024.

Table 5.4 provides a breakdown of the stakeholder and community groups that have participated in the Project's planning and assessment process to date through the engagement mechanisms outlined in **Table 5.3**, and whose feedback and input has informed the SIA and EIS processes.

Quantitative and qualitative information collected through consultation and engagement activities has been analysed to inform the identification and analysis of social impacts associated with the Project, as outlined in **Section 5.3** and **Appendix 16**.

Table 5.4 Stakeholders Consulted by Phase

Stakeholder Group	Mechanism	Phase 1 – Scoping: No. of stakeholders contacted	Phase 1 – Scoping: Number Participants Engaged	Phase 2 – SIA/EIS: No. of stakeholders contacted	Phase 2 – SIA/EIS: Number Participants Engaged
Aboriginal stakeholders and Traditional Owners	Project briefing and interview	2	1	4	4[1]
Proximal landholders	Personal meetings	113	26[2]	130	35[3]
Proximal landholders	SIA phone / online survey	-	-	29	21
Proximal landholders	Newsletter	113	NA	110	NA
Broader Community	Project website (new users visiting the website for the first time)	NA	249 new users (1 Apr – 16 Aug 2023)	NA	573 new users (1 Jan – 1 Oct 2024)
Broader Community	Community drop-in session (Marulan)	NA	42[4]	NA	12
Broader Community	Community drop-in session (Canyonleigh)	-	-	NA	18
Broader Community	Canyonleigh community meeting briefing	NA	56[5]	-	-
Broader Community	Online survey	NA	19	NA	10
Local Government	Project briefing and interview	3	2[6]	3	2
Local community, environmental and special interest Groups	Project briefing and interview	2	1	3	2[7]
Local Businesses and Service providers	Phone interviews	-	-	7	4
Accommodation Service Providers	Phone interviews	-	-	8	4
Emergency Service Providers	Project briefing	2	2	-	-

Notes:

[1] Refers to the number of groups engaged.

[2] Meetings were held by Spark Renewables.

[3] Meetings held by Spark Renewables, often with multiple landholders in attendance.

[4] Some attendees at the drop-in session were also engaged by alternate methods, such as personal meetings and online surveys.

[5] Some attendees at the community meeting were also engaged by alternate methods. 6 Refers to number of Councils, rather than number of meetings.

[7] Refers to number of Councils, rather than number of meetings.

5.2 Aboriginal Community Engagement

Aboriginal community consultation was undertaken with the Project's Registered Aboriginal Parties (RAPs) as part of the Aboriginal Cultural Heritage Assessment (ACHA).

This consultation aided in the identification and assessment of the significance of Aboriginal objects and/or places present within the ACHA Study Area and provided insight to help inform mitigation and management measures. The ACHA was heavily guided by the idea that Aboriginal people are the primary determinants of what is defined as the 'cultural significance' of their heritage.

A detailed summary of this consultation can be found in **Section 6.6**. A full documentation of the consultation process can be found in Appendix A of the ACHA (see **Appendix 8**).

5.3 Agency Consultation Outcomes

Spark Renewables has undertaken ongoing engagement with local, State and Commonwealth government representatives throughout the planning and environmental assessment process for the Project.
A summary of ongoing government consultation undertaken is provided in **Table 5.5** below.

Table 5.5 Summary of Agency Engagement during EIS Phase

Agency	Date and Purpose	Key Discussion Points	Section Addressed within EIS
Department of Climate Change, Energy, the Environment and Water (DCCEEW – Commonwealth)	30/01/2024 Pre-referral meeting	DCCEEW advised to be clear in assessment of overlapping development footprint and Referral Areas – ensure no double counting of biodiversity impact. Separate referral and assessment of the project components was acceptable. Discussion regarding habitat and presence of hollow bearing trees – this information was to be provided in the assessment.	**Section 6.5**
Department of Climate Change, Energy, the Environment and Water (DCCEEW – Commonwealth)	17/10/2024 Referral meeting	Meeting requested by DCCEEW to discuss Referral and required updates relating to additional figures and description of common ancillary infrastructure and overlapping development corridors associated with Wattle Creek Solar Farm project.	**Section 3.0**
Department of Planning, Housing and Infrastructure (DPHI)	20/08/2024 Project update meeting	Meeting to provide project update	**Appendix 1**
NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) – Conservation Programs, Heritage and Regulation (CPHR)	02/10/2024 Project meeting	Meeting to provide project update prior to lodgement of the EIS and BDAR to DPHI. The meeting detailed the assessment approach undertaken for the BDAR, the survey methods and results, the measures to avoid and minimise impacts, and the proposed mitigation measures to be considered for the Project. BSC advised that the clearing of hollow bearing trees and Gang Gang Cockatoo habitat needed to be conducted outside of breeding time. This mitigation measure has been included in the BDAR and EIS.	**Section 6.5**
Water NSW	11/09/2024 Project meeting	Water NSW provided advice on NorBE requirements and MUSIC model inputs Proposed water management and minimisation strategies/treatments to be implemented across the site. Onsite effluent/contamination treatment including: • Historic contamination. • Erosion and sediment control. • Bunding for BESS areas. • Spill management.	**Section 6.9** **Section 6.11.4**

Agency	Date and Purpose	Key Discussion Points	Section Addressed within EIS
Department of Primary Industries and Regional Development – Agriculture (DPI – Agriculture)	30/08/24 Email correspondence	DPI – Agriculture advised they would be happy to meet however generally did not require anything further that already outlined in the SEARs.	**Section 6.10**
Department of Climate Change, Energy, the Environment and Water (NSW) – Water (DCCEEW – Water)	21/08/2024 Email correspondence	In response to the offer of a project briefing DCCEEW – Water advised they wait for lodgement off the EIS before commencing their assessment or providing any comment. No further consultation was undertaken.	**Section 6.9**
NSW Fire and Rescue	20/08/2024 Email correspondence	Offer made via email for project briefing – no response received.	**Section 6.11.2**
NSW Rural Fire Service	20/08/2024 Email correspondence	Offer made via email for project briefing – no response received.	**Section 6.11.2**
Upper Lachlan Shire Council	Ongoing email and Project meeting consultation throughout 2023–2024	Determined Council's position and requirements for the road upgrades. Council expressed their interest in using a Community Benefit Sharing Program (CBSP) to be set up with a Community Benefit Sharing Fund (CBSF) as the mechanism for the benefits sharing for the project. Ongoing discussions have occurred to finalise the agreement.	**Section 6.8**
Goulburn Mulwaree Council	Ongoing email and Project meeting consultation throughout 2023–2024	Determined Council's position and requirements for the road upgrades. This included any required road resurfacing and potential bus stop relocation at the junction of Canyonleigh Road and Brayton Road. Council advised that any road upgrades can be addressed through the implementation of a Traffic Management Plan and the Section 138 process (under the *Roads Act 1993*). Council also advised they will review the requirement for any road upgrade works and other transport related issues following their review of the EIS during the exhibition phase. Council expressed their interest in using a CBSF as the mechanism for the benefits sharing for the project. Ongoing discussions have occurred to finalise the agreement.	**Section 6.8**

5.4 Community Views

Quantitative and qualitative data gathered during the scoping and EIS phase engagement activities were analysed to identify potential social impacts associated with the Project, as perceived by affected parties, and to conduct an initial assessment of these impacts. The Social Scoping Worksheet (DPE, 2023) served as a tool for decision-making, helping to assess the social impacts and demonstrate how issues identified during scoping influenced the assessment level for each impact.

In accordance with the DPE EIS Guideline, community views on the Project have been considered in the following categories:

- the strategic context, including identifying the key natural and built features that are valued in the area and could be affected by the Project
- the design of the Project and any alternatives considered
- any relevant statutory issues
- community engagement (e.g. the level or quality of engagement carried out during the preparation of the EIS, the community engagement that should be carried out if the Project is approved)
- the economic, environmental and social impacts of the Project
- the justification and evaluation of the Project as a whole (e.g. consistency of project with Government plans, policies or guidelines; merits of the Project)
- issues that are either beyond the scope of the Project (e.g. broader policy issues) or not relevant to the Project.

As previously discussed, the engagement program has covered both the Project and the Wattle Creek Solar Farm project. Majority of the issues raised were common to both components, however where issues related to a specific component have been identified and discussed separately. Issues raised during the engagement process have been recorded and have informed investigations undertaken as part of this EIS and the ongoing development of the Project. Community data obtained indicates that the level of acceptance of the Project, and of renewable energy projects in general was seen to be relatively low, resulting in rankings of 2.9 out of 10, and 4.0 out of 10 respectively.

When considering the potential impacts of the Project (prompted), stakeholders who completed a community survey were particularly concerned about the loss of environmental values associated with the site, potential decline in property values and decreased social amenity as a result of visual impacts and noise impacts associated with the Project, with average rankings of 6.8 out of 10 respectively. Other impacts related to increased travel times and public safety on local roads, a change in sense of place due to visual impacts, property damage and safety related to fire risk, and general social amenity impacts relating to construction.

Benefits of the project that obtained more positive rankings included investment in community benefit sharing programs (average rating of 3.2 out of 7), provision of local employment opportunities during construction (2.9), and procurement of local suppliers, contractors and services (2.7) and employment opportunities during operations of the Arthursleigh Farm and the Project.

The SIA (refer to **Appendix 16** and **Section 6.12**) expands on the perceived positive and negative impacts raised during consultation and through assessment of the Project, linking them to the social impact categories of livelihoods, accessibility, way of life, surroundings, social amenity, engagement and decision making, community, health and well-being and culture outlined in the SIA Guidelines.

Based on community surveys undertaken for the SIA, the key themes in community views centre around the environmental and social impacts/benefits of the Project.

Stakeholders were most concerned about:

- Impacts to the economic, environmental and social impacts of the project including impacts to:
    - biodiversity
    - hazards and risk (fire and bushfire)
    - social amenity due to noise and vibration from the Project
    - Impacts to road safety due to increased traffic.

Key positive impacts associated with the Project included:

- Investment through a community benefit sharing fund.
- Opportunities for local employment and procurement of businesses/services.
- Use of the site for ongoing research.

Table 5.6 summarises where these key community views have been addressed in EIS.

Table 5.6 Perceived Community Concerns and Benefits

Category	Concerns	Section Addressed	Benefits	Section Addressed
Strategic Context and Surroundings	• Change in the rural landscape resulting in impacts on visual amenity.	**Section 2.5.2** and **Section 6.3**	-	
Justification and Evaluation of the Project	-	**Section 2.0** and **Section 7.0**	Intergenerational equity given emphasis on renewable energy production and reduction of carbon emissions.	**Section 2.0** and **Section 7.0**
Community Engagement	• Perceived inability to influence planning and decision-making in relation to the Project.	This Section and **Section 6.12**	-	**This Section** and **Section 6.12**
Economic, environmental and social impacts of the Project	• Impacts to important environmental values including flora and fauna. • Impacts to social amenity due to noise and vibration from the Project. • Impacts to road safety due to increased traffic. • Impacts from heightened risk of bushfire. • Visual amenity impacts to rural landscape. • Impacts to Aboriginal and non-Aboriginal heritage cultural values within Project Area. • Potential for reduced environmental value and degradation associated with decommissioning (e.g., removal of waste, recycling, site remediation) of Project Infrastructure. • Potential for environmental degradation associated with ineffective weed management.	**Section 6.5** **Section 6.4** **Section 6.8** **Section 6.11.2** **Section 6.3** **Section 6.6** **Section 6.0** **Section 6.5**	• Investment through a community benefit fund. • Opportunities for training and education. • Indirect and direct economic benefit through local spending and service procurement. • Opportunity for local employment and procurement of businesses/services.	**Section 6.12** and **Section 6.13**
Project Design	• Traffic disruption due to construction activities. • Perceived safety concerns with project technology and increased risk of hazards including bushfire.	**Section 6.8** **Section 6.11**	Use of the site for ongoing research and education associated with renewable energy	**Section 3.0** and **Section 6.0**
Issues beyond the scope of the Project	• Lack of trust in proponent and landholder.	-	-	-

5.5 Ongoing Engagement

Throughout the assessment, construction, operation and decommissioning phases of the Project, Spark Renewables will continue to engage with community stakeholders according to the Engagement Guidelines (DPHI, 2024). Stakeholders will include all relevant groups and individuals outlined in **Section 5.1.1**, plus any additional stakeholders identified during the development process with an interest in the Project.

Engagement activities will include:

- Regular updates to the Project website.
- Distribution of information sheets, fact sheets and/or FAQs to the local community.
- Face-to-face meetings and Project briefings.
- Regular community surveys.
- Operation of a community enquiry line/complaints line and the provision of timely responses to feedback, enquiries and complaints by Spark Renewables.

Community and stakeholder concerns and appropriate mitigation and management measures are addressed in further detail in **Section 6.12**.

6.0 Assessment of Impacts

This section provides a description of the key environmental, social, and economic impacts associated with the Project and presents a detailed summary of the results from the specialist assessments. Furthermore, it describes the proposed measures to be implemented as part of the Project to manage and minimise these impacts.

6.1 Key Environmental Impacts and Community Issues

The key environmental, social, and economic impacts associated with the Project requiring detailed investigation as part of the EIS were identified through consideration of:

- The strategic, environmental and social context for the locality (refer to **Section 1.0** and **Section 2.0**).
- Project SEARs dated 22 December 2023, Supplementary SEARs issued 12 December 2024 and supporting Agency advice (refer to **Appendix 1**).
- The preliminary risk assessment of potential environmental and social impacts associated with the Project as prepared for the Scoping Report (refer to **Section 6.2**).
- Specialist studies completed as part of the preparation of the EIS (refer to **Section 6.3** to **Section 6.16**).
- The community and stakeholder issues associated with the Project (based on the SIA and agency consultation) and where they are addressed in the EIS are provided in **Section 5.0**.

6.2 Preliminary Environmental Risk Analysis

A review of the relevant environmental, social and economic matters was conducted as part of the Scoping Report prepared for the Project (Umwelt, 2023), which identified issues to be assessed as part of the EIS and the level of assessment required. The preliminary environmental, social and economic assessment identified a range of issues that required detailed assessment as part of the EIS. Based on the preliminary assessment, the potential issues included:

- Visual amenity –potential for the Project to change the visual amenity of nearby residents and road users (refer to **Section 6.3**).
- Noise amenity – impacts associated with noise amenity during the construction, operation and decommissioning phases (refer to **Section 6.4**).
- Biodiversity – the Project has the potential to impact threatened and endangered species (refer to **Section 6.5**).
- Aboriginal Heritage – impacts to Aboriginal heritage would result if Aboriginal sites were identified within the Project Area (refer to **Section 6.6**).
- Historic Heritage - impacts to European heritage would result if heritage items were identified within the Project Area (refer to **Section 6.7**).

- Traffic impacts – traffic impacts, primarily associated with the construction phase, including OSOM vehicles would result from the Project (refer to **Section 6.8**).
- Water and Flooding – groundwater impacts are unlikely however, due to the proximity of Wollondilly River, preliminary investigations determined flooding occurs in the region and that surface water impacts could result from the Project (refer to **Section 6.9**).
- Soils and Agricultural Land use – potential impacts to surrounding land uses and agricultural operations within the Project Area (refer to **Section 6.10**).
- Hazards – Hazardous Development, Aviation, EMF, Fire and Bushfire were risks associated with the Project (refer to **Section 6.11**).
- Social impacts – the Project has the potential to result in both positive and negative social impacts (refer to **Section 6.12**).
- Economic Impacts - the Project would result in both positive and negative economic impacts for the local and regional community and business sector (refer to **Section 6.13**).
- Waste – the construction and decommissioning phases would generate quantities of waste requiring management (refer to **Section 6.14**).
- Air Quality – impacts arising from dust generation and vehicle emissions would occur primarily during construction and decommissioning of the Project (refer to **Section 6.15**).
- Cumulative impacts –the construction and operation of the Project have the potential to result in cumulative impacts associated with other developments within the region (refer to **Section 6.16**).

6.3 Landscape and Visual

During consultation, the community raised concern in relation to the potential visual impacts of the Project. The rural vegetated landscape is valued by the community, and some indicated the industrial nature of the Project was unsuitable for the site.

A Landscape and Visual Impact Assessment (LVIA) (see **Appendix 5**) was undertaken by Moir Landscape Architecture Pty Ltd (Moir, 2024) to assess potential landscape and visual impacts associated with the Project. This section outlines potential visual impacts, the key findings of the LVIA and proposed mitigation and management measures.

The LVIA was prepared in accordance with the requirements of the Project's SEARs (**Appendix 1**), which require:

- a detailed assessment of the likely visual impacts of all components of the project (including transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas and road corridors in the public domain and provide details of measures to mitigate and/or manage potential impacts.

6.3.1 Existing Visual Environment

The LVIA includes a desktop analysis including a review of the physical influences, ecological characteristics, key landscape features and aesthetics, landscape condition and zoning in order to establish a baseline for the assessment. This information is then used to identify the relevant Landscape Character Zones (LCZ) within the region surrounding the Project Area. The Landscape Character Zones should divide the landscape based on common distinguishing visual characteristics such as vegetation, water bodies, landforms and land use, from which key landscape features can also be identified. To determine the impact of the Project on the LCZs, the sensitivity of the landscape and the magnitude of the Project were used to produce an overall landscape character impact rating.

A total of three LCZs were identified within the Study Area (within 5 km of the Project Area) as outlined in **Table 6.1**.

Table 6.1 Landscape Character Zones

LCZ	Detail	Scenic Quality
LCZ01 – National Parks & Vegetated Hills	Endemic vegetation communities characterise this LCZ on higher elevations. This character exists in Tarlo River National Park, with twelve vegetation communities previously mapped. Kerrawary and Cookbundoon Nature Reserve also contain important vegetation collections specific to the area.	Moderate
LCZ02 – Rivers	The Wollondilly River, Tarlo River and Paddys River snake through the landscape in and around the Study Area. Both steep and gradual topographical rises surround these waterways, which are lined with riparian vegetation that differs from the character of LCZ01.	Moderate
LCZ03 – Grazing, Pastures & Rural Properties	Grazing, clearing pastures, farming infrastructure, and rural properties. The human modification experienced within this LCZ allows it to absorb the potential change envisaged by the Project.	Low

6.3.2 Visual Impact Assessment

The visual impact assessment comprised of two key stages:

- Preliminary assessment aimed to identify viewpoints in both the public and private domain with dwelling entitlement and determine which required more detailed assessment.
- Detailed assessment:
    - All viewpoints identified in the preliminary assessment were refined and classified into private and public receptors.
    - Visual magnitude was calculated for each private and public receptor by producing a wireframe for each private receptor and public receptor. The visual sensitivity of each receptor was also determined.
    - The overall visual impact for each receptor was then determined by combining the visual sensitivity and magnitude ratings.

- All receptors were assessed against the specific 'performance objectives' (as outlined in the Technical Supplement) for their specific determined overall visual impact rating which informed required mitigation.

- Furthermore, the LVIA also assessed:
  - The potential impact of Project Infrastructure on existing visual landscape of the LVIA study area.
  - Potential visual impacts of the Project on heritage listed items. A low potential visual impact was determined for all heritage items. A detailed discussion of the assessment and its findings can be found in **Section 6.7** "Historic Heritage" of the EIS.
  - Potential night lighting sources impacts associated with the Project and consideration of the DPE's *Dark Sky Planning Guidelines 2023*.

The LVIA also undertook a cumulative impact assessment of nearby renewable energy projects within 8 km of the Project Area and in accordance with the DPE's *Cumulative Impact Assessment Guidelines 2023,* refer to **Section 6.16.3.3** for further detail.

Moir attended the Project Area in March 2024 to assess and identify the existing landscape character of the LVIA Study Area as part of the Preliminary Assessment, undertake ground-truthing works to assess potential visibility from key viewpoints and confirm any existing screening structures. Moir also undertook a photographic survey.

6.3.2.1 Preliminary Assessment

A total of ten (10) viewpoints were selected from publicly accessible locations to represent a range of views surrounding the Project Area (see **Figure 6.1**). The visual impact rating was very low for 9 viewpoints and low for one viewpoint (VP08).

An initial visibility assessment was undertaken utilising Zone of Visual Influence (ZVI) mapping. This tool assists in defining the 'Visual Catchment' for the Project (refer to **Figure 6.2**) The ZVI presents a bare ground scenario – i.e. a landscape without screening, structures or vegetation, and is usually presented on a base map. It is also referred to as a zone of theoretical visibility. The ZVI indicates:

- The location of the Project is central to the Project Area, therefore, majority of visibility is contained within the constraints of the Project Area with the exception of Canyonleigh Road and land associated with Marulan Substation and the proposed Marulan Gas Fired Power Station to the south.
- Land to the immediate south and southeast of the Project Area may have potential views of the whole Project.
- The lower elevation decreases potential visibility along the Wollondilly River compared to the adjoining pastures.
- There will be no visibility of the Project along the majority of Canyonleigh Road, except a section of Canyonleigh Road to the south of Marulan Substation.
- The undulating topography within the Study Area contains many areas where the Project is not visible outside the Project Area's extent. No non-associated dwellings were identified as having visibility of the Project.

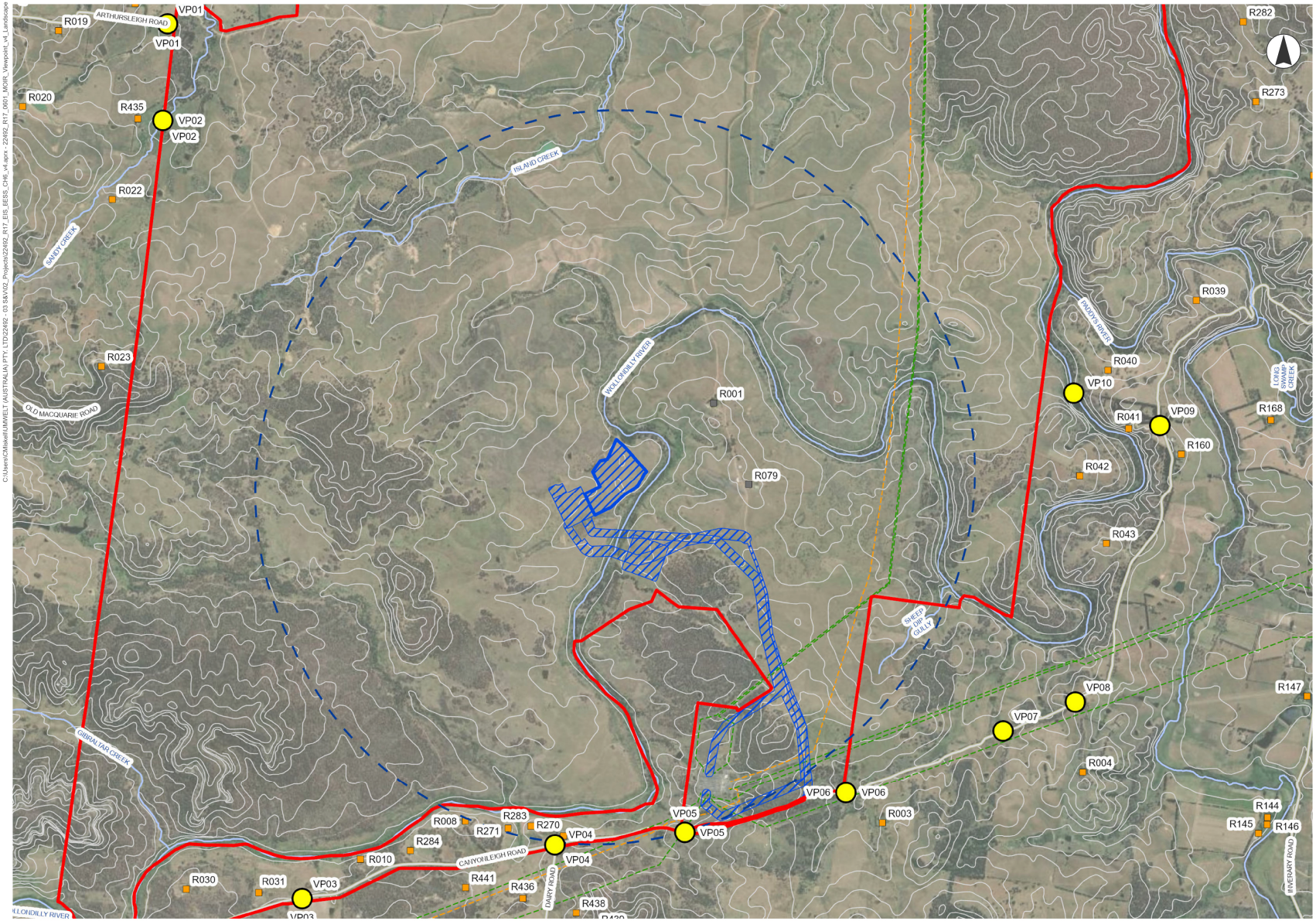


FIGURE 6.1

Viewpoint Locations

LEGEND

- Public Viewpoint Locations Requiring Preliminary Assessment
- Dwelling (Associated)
- Dwellings (Non-Associated)
- Project Area
- BESS Development Footprint
- BESS Area
- Study Area (2.5 km from BESS Area)
- Existing Transmission Lines (Transgrid)
- Existing Transmission Lines (Non Transgrid)
- Watercourse
- Roads
- Contour

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6.3.2.2 Detailed Assessment

Of the ten (10) viewpoints from public roads and rail lines within 2.5 km with a line of sight to the Project Area, 9 were rated 'very low", and one (1) rated 'low'. Four (4) non-associated dwellings, identified as R008, R270, R271 and R283 were identified for detailed assessment in the Study Area. The ZVI confirms that the BESS infrastructure is not visible from these non-associated dwellings. The ZVI does suggest visibility of the transmission line component of the Project. However, it is likely that the construction and operation of the overhead transmission lines will integrate with the existing landscape and is unlikely to alter or diminish the visual quality of key landscape features within the Study Area, detailed assessment potential visual impact rating is low.

As shown in the cumulative viewshed (**Figure 6.3**), there are limited opportunities to view both the Project and Wattle Creek Solar Farm project outside the Project Area. Dense vegetation between Canyonleigh Road and the Project Area will likely screen a clear view of the Project and will not increase the occupied cell out or overall visual impact from this location.

Associated Project Infrastructure

Due to the topography and elevation of the Project, the LVIA determined that the associated Project infrastructure (**Figure 3.1**) is unlikely to alter the existing visual landscape of the Project Area outside of its immediate vicinity. The LVIA notes impacts from associated infrastructure are all anticipated to be very low or negligible.

Transmission infrastructure is an existing element within the LVIA Study Area and forms part of the visual character of the area. The proposed transmission infrastructure is likely to be higher than those that are currently within the LVIA Study Area. The proposed transmission infrastructure is likely to be visible, though will not dominate the surrounding visual landscape. Therefore, the potential visual impacts are likely to be very low.

Night lighting

The LVIA concluded it is likely there would be limited to no impact on the existing night landscape resulting from the Projects night lighting of ancillary infrastructure.

The LVIA Project Area is relatively isolated and existing lighting is largely associated with existing dwellings and motor vehicles. The Project would only require the use of night lighting for security lighting to the substation, within the O&M facility and light sources would be limited to low-level lighting for security as well as night-time maintenance and cases of emergency.

The Project is located approximately 380 km south east of Siding Spring Observatory, and no impacts from the Project are anticipated. However, several recommendations were made with a consideration of the principles outlined in the DPE's *Dark Sky Planning Guidelines 2023* and *National Light Pollution Guidelines for Wildlife 2023* which are outlined below in **Section 6.3.3**.

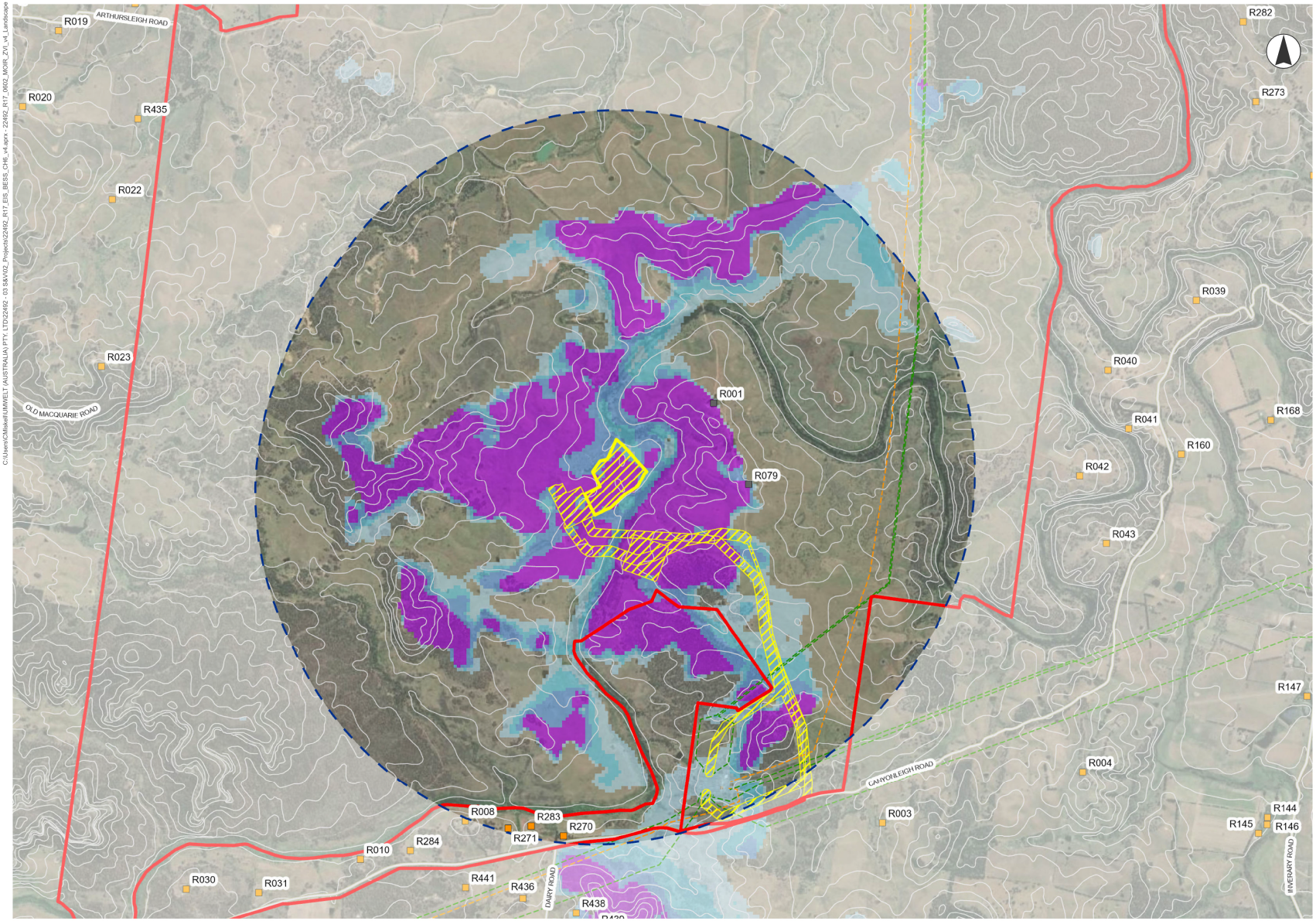

FIGURE 6.2

Zone of Visual Influence

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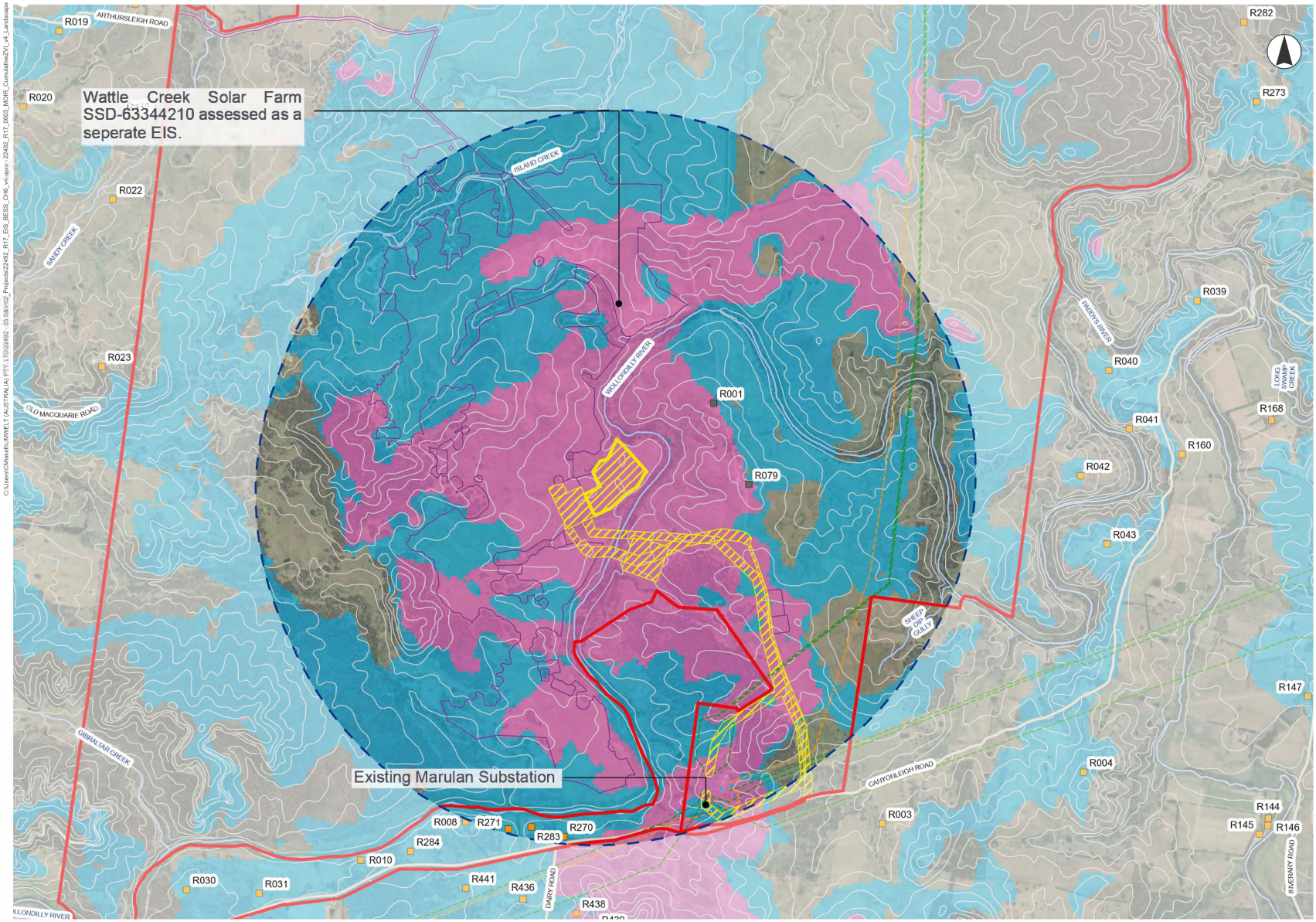
FIGURE 6.3

Cumulative Zone of Visual Influence



LEGEND

- Dwelling (Associated)
- Dwellings (Non-Associated)
- Project Area
- BESS Development Footprint
- BESS Area
- Study Area (2.5 km from BESS Area)
- Existing Transmission Lines (Transgrid)
- Existing Transmission Lines (Non Transgrid)
- Watercourse
- Solar Disturbance Area (SSD-63344210 assessed separately)
- Roads
- Contour

VISIBILITY

- Wattle Creek Solar Farm
- Wattle Creek Solar Farm & Wattle Creek BESS
- Wattle Creek BESS

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6.3.3 Mitigation Measures

Whilst no specific mitigation is required based of the limited opportunities to view the Project, the following range of mitigation and management strategies summarised below in **Table 6.2** aims to integrate the Project into the surrounding landscape further and reduce any potential visual impact.

Table 6.2 Landscape and Visual Mitigation and Management Measures

ID	Management and Mitigation Measures	Phase
LV-01	Retain and protect existing vegetation within and surrounding the Project infrastructure.	Construction
LV-02	Consideration should be given to the colours and height of the ancillary infrastructure to ensure minimal contrast and to help blend into the surrounding landscape to the extent practicable.	Construction
LV-03	Lighting will be installed in accordance with *AS4228-1997 – Control of Obtrusive Effects of Outdoor Lighting*. During construction appropriate mitigation will be applied to lighting (including directional lighting and light shields) to reduce any associated impact.	Construction

6.4 Noise and Vibration

A Noise and Vibration Impact Assessment (NVIA) (see **Appendix 6**) was undertaken by Marshall Day Acoustics (2024) to assess the potential noise and vibration impacts associated with the Project. This section outlines the key findings of the NVIA, the potential noise and vibration impacts of the Project and proposed mitigation and management measures.

Potential noise impacts associated with the Project were a key concern raised by nearby residents during the stakeholder engagement process (**Section 5.0**). Concern focused on construction noise affecting amenity and causing disruption, as well as operational noise from the BESS infrastructure and on-site substation, potentially disturbing sleep and daily enjoyment of properties.

The NVIA was prepared in accordance with the requirements of the Project's SEARs (see **Appendix 1**), which require:

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

The NVIA was also undertaken in accordance with the applicable legislative requirements and industry standards, including:

- Noise Policy for Industry (NPfI), NSW Environment Protection Authority (EPA), 2017
- Interim Construction Noise Guideline (ICNG), NSW Department of Environment and Climate Change (DECC), 2009
- NSW Road Noise Policy (RNP), Department Environment, Climate Change and Water (DECCW), 2011

- Assessing Vibration: A Technical Guideline (the Vibration Guideline), Department of Environment and Conservation (DEC), 2006
- German Institute for Standardisation DIN 4150-3:1999-02 Structural vibration – Effects of vibration on structures (DIN4150) (the German Standard)
- Construction Noise and Vibration Guideline (CNVG), Transport for NSW (TfNSW), 2023.

6.4.1 Existing Environment

6.4.1.1 Sensitive Noise Receivers

The Project Area is located within a rural environment with typically low background noise levels, consisting primarily of rural residential land. There are approximately 5 non-associated dwellings (i.e., sensitive receivers) (R008, R270, R271, R283, R284) within 3 km of the proposed noise generating infrastructure located to the south of the Project Area. No other sensitive land use (such as schools or places of worship) is located within or surrounding the Project Area. Refer to **Figure 6.4** and **Appendix 6** for further detail of all residential receivers considered in the NVIA.

6.4.2 Noise and Vibration Criteria

6.4.2.1 Construction Noise and Vibration

Assessment levels for noise from construction activities, excluding noise from construction-related traffic on public roads, are defined in the ICNG. The assessment levels are intended to guide the need for and the selection of feasible and reasonable work practices to minimise construction noise impacts.

Table 6.3 presents the ICNG Construction Noise Management Levels for representative receivers surrounding the Project Area.

Table 6.3 INCG Construction Noise Management Levels, dB (A)

Land Use	Construction Time	Noise Management Level Laeq (15 min)
Residential	**Recommended Standard Hours** Monday to Friday – 7:00 am to 6:00 pm Saturday – 8:00 am to 1:00 pm No work on Sundays or Public Holidays	Noise affected: RBL + 10 dB(A)
Residential	**Recommended Standard Hours** Monday to Friday – 7:00 am to 6:00 pm Saturday – 8:00 am to 1:00 pm No work on Sundays or Public Holidays	Highly noise affected: 75 dB(A)
Residential	**Outside Recommended Standard Hours**	Noise affected: RBL + 5 dB(A)

Construction Noise Management Levels and adopted RBLs for the Project's sensitive receivers are outlined in **Section 6.4.2.1**.

Recommended safe working distances for vibration-generating equipment from sensitive receivers (i.e., the receiver building or its occupants) based on Table 2 from the CNVG (TfNSW, 2023) which are reproduced in **Table 6.4**.

Table 6.4 Recommended Minimum Working Distances (m) for Vibration Intensive Plant from Sensitive Receivers

Continuous Vibration	Impulsive Vibration	Intermittent Vibration
Vibratory roller	< 50 kN (Typically 1–2 t)	15–20
Vibratory roller	< 100 kN (Typically 2–4 t)	20
Vibratory roller	< 200 kN (Typically 4–6 t)	40
Vibratory roller	< 300 kN (Typically 7–13 t)	100
Vibratory roller	> 300 kN (Typically 13–18 t)	100
Vibratory roller	> 300 kN (> 18 t)	100
Small hydraulic hammer	300 kg – 5 to 12 t excavator	7
Medium hydraulic hammer	900 kg – 12 to 18 t excavator	23
Large hydraulic hammer	1600 kg – 18 to 34 t excavator	73
Vibratory pile driver	Sheet piles	20
Pile boring	≤ 800 mm	4
Jackhammer	Handheld	2

6.4.2.2 Operational Noise

The operational noise criteria applicable to the Project have been derived in accordance with NPfI (EPA, 2017).

The NPfI sets out two noise criteria to assess the potential noise impacts resulting from industrial activity. The first is used to control short-term intrusive noise and its impacts on residences (Project Intrusiveness Noise Level (PINL)) whilst the second is used to protect against cumulative noise impacts and maintain noise level amenity for particular land uses including residential receivers (Project Amenity Noise Level (PANL)).

The Project Noise Trigger Levels (PNTLs) derived in accordance with the NPfI are the lower (that is, the more stringent) values of the PINL and PANL in terms of LAeq (15 min) noise levels. Applying the more stringent of the two ensures that intrusive noise is limited, and amenity is protected and that no single industry can unacceptably change the noise level of an area.

The PNTLs provide a benchmark or objective for assessing a proposal or site. They are not intended for use as a mandatory requirement. The PNTL is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response; for example, further investigation of mitigation measures.

The PNTL, feasible and reasonable mitigation, and consideration of residual noise impacts are used together to assess noise impact and manage the noise from a proposal or site. The PNTLs for the Project are shown in **Table 6.5**.

Table 6.5 Project Noise Trigger Levels – Residential Receivers, $LA_{eq\ (15\ minute)}$, dB

Receiver	Time of Day	PINL	PANL	PNTL
Residential	Day	40	48	40
Residential	Evening	35	43	35
Residential	Night	35	38	35

6.4.2.3 Road Traffic Noise Criteria

The RNP (DECCW, 2011) sets out criteria for road traffic noise through the provision of a framework that addresses traffic noise issues associated with new developments, new or upgraded road developments, or planned building developments. Under the road category definitions provided in the RNP, the proposed transport route is classified as a sub-arterial road, with assessment criteria for existing residential land uses on the route being $L_{Aeq\ (15\ hour)}$ 60 dB(A) in the day time (7:00 am to 10:00 pm) and $L_{Aeq\ (9\ hour)}$ 55 dB(A) in the night time (10:00 pm to 7:00 am).

6.4.3 Methodology

Construction noise levels have been predicted in accordance with Australian Standard 2436:2010 (AS 2436), which provides guidance on noise and vibration control for construction, demolition, and maintenance sites. This method predicts noise propagation over hard or soft ground but does not account for mixed ground conditions with varied soil types.

AS 2436 advises caution when considering noise levels at distances beyond 100 m. Therefore, predicted noise levels have been calculated as the arithmetic average of both hard and soft ground methods. This approach is consistent with British Standard 5228-1:2009 (BS 5228), ensuring a conservative margin for the ground conditions typically found between construction activities and nearby sensitive receivers.

Construction noise impacts were predicted based on eight construction activity scenarios and associated plant and equipment. Noting that it is likely that some of these activities may occur simultaneously through the progression of the construction program. The scenarios modelled were:

- Scenario 1 – Battery installation.
- Scenario 2 – Civil Earthworks.
- Scenario 3 – Component delivery.
- Scenario 4 – Site establishment, clearing and fencing.
- Scenario 5 – Substation construction.

Operational noise levels associated with the Project were predicted using a design concept of the permanent noise generating infrastructure that is proposed to be developed as part of the Project including:

- 164 inverters
- 656 battery units
- 164 MV transformers.

Other proposed permanent ancillary infrastructure e.g. switchyard and O&M facility, do not typically include significant sources of operational noise and are not considered further.

The ISO 9613-2: 1996 Acoustics Standard, which specifies the environmental sound propagation method, accounting for multiple sound transmission paths, including reflected and screened paths. This standard assumes meteorological conditions that favour noise propagation, such as slight wind or a moderate ground-based temperature inversion

Operational noise levels for the Project are predicted using noise emission data for equipment and a 3D model created with SoundPLANnoise v9.0 software, following the ISO 9613-2: 1996 Acoustics Standard. The model includes elevation data and treats equipment as omnidirectional noise sources.
Ground attenuation varies, with G = 0.1 for the Project footprint (hard ground) and G = 0.5 for the surrounding mixed ground.

For all calculations and assessment, the following time periods were assumed:

- Day periods – 7:00 am – 6:00 pm.
- Evening periods – 6:00 pm – 10:00 pm.
- Night periods – 10:00 pm – 7:00 am.

Further details for all modelling scenarios, including indicative equipment quantities and sound power levels are provided in the NVIA refer to **Appendix 6**.

6.4.4 Assessment of Impacts

6.4.4.1 Onsite Construction Nosie

Construction noise levels were predicted for five indicative construction scenarios (see **Section 6.4.3**) in accordance with the NPfI (refer to the NVIA in **Appendix 6** for detailed equipment schedules).
The predicted noise levels are presented without any mitigation controls applied and represent a conservative worst-case scenario assuming all equipment associated with each scenario is operating simultaneously for the 15 minute duration at the closest point within the Development Footprint to the respective residential receiver location. In reality, a residential receiver would experience a range of construction noise, dependent upon the number of plant items operating at any one time and their precise location within the Development Footprint.

Given that the precise equipment selections and construction methods would be determined once a main contractor is appointed, and that the noise associated with construction plant and activity varies significantly, the predicted noise levels are provided in **Table 6.6** as an indicative range of levels which may occur in practice. Additionally, the results presented in the NVIA have been provided separately for host and non-associated residential receivers. **Table 6.6** provides only the non-associated residential receivers. Host receivers will be managed under the existing agreement Spark has with the UoS.

The construction noise predictions (refer to **Table 6.6**) indicate that:

- Construction noise levels are predicted to be above the noise affected management levels at some residential receivers during several of the assessed construction tasks.
- Construction noise levels are predicted to be below the highly noise affected management levels at all residential receivers during all assessed construction tasks.

Table 6.6 Indicative Range of Construction Noise Predictions at Residential Receivers (Not Including Host Landowner Receivers), dB $L_{Aeq,\ 15\ min}$

Construction Phase	Nearest Receiver (Distance, m)	Predicted Level Range	Noise Affected Management Level	Exceedance
Battery installation	R283 (2,400)	25–30	45	-
Civil earthworks	R003 (550)	50–55	45	5-10
Component delivery	R283 (2,400)	30–35	45	-
Site establishment, clearing and fencing	R283 (2,400)	35–40	45	-
Substation construction	R283 (2,300)	20–25	45	-

6.4.4.2 Offsite Construction

An assessment of potential noise impacts associated with the proposed re-surfacing works along Canyonleigh Road between the Project Area access point and the Brayton Road Intersection has been undertaken.

At this stage of the Project, definitive construction processes and associated plant and equipment items related to these works have not been confirmed. For the purposes of the assessment, an appropriate scenario has been applied based on plant/equipment likely to be used, the number of each plant/equipment likely to be operating concurrently in a worst case 15-minute period, and the percentage of time the plant/equipment is likely to operate within a worst case 15-minute period. A combined sound power level in the order of 110 dB L_{WA} has been adopted and a setback distance of approximately 400 m has been established.

The receivers located within the 400m setback from Canyonleigh Road have therefore been identified as being at risk of construction noise levels above the noise affected management level (this includes receiver R108, R268, R270, R267, R269, R031, R284, R142, R441, R107, R114, R010, R283, R271, R129, R436, R008, R030).

Noise levels above the noise affected management levels are characteristic of most assessments of noise associated with works on public roads. This is due to both the typically high source noise associated with construction plant and equipment and the location of dwellings immediately adjacent to transport routes. As part of the development of the CEMP appropriate noise management and mitigation applicable to these works will be developed and implemented. The identified receivers will also be consulted regarding the scheduling of the proposed resurfacing works and will be offered construction disruption payments during the construction period to compensate for disruption caused by traffic and associated noise impacts.

6.4.4.3 Construction Vibration

Vibration generating activities would occur during the construction phase. There are no vibration generating activities expected during the operational phase.

Construction vibration impacts have been assessed with reference to the criteria provided in **Table 6.4,** and using the recommended safe working distances provided in Table 2 of the CVNG (TfNSW, 2023) as a guide.

Due to the separation distances between the Project Area boundary and the nearest sensitive receivers (approximately 300 m), vibration impacts from construction activities are anticipated to be negligible.

6.4.4.4 Operational Noise Assessment

Operational noise sources considered for the Project are presented in detail in **Appendix 6**. In accordance with the NPfI, for a conservative assessment against the night-time noise goal, it was assumed that all plant and equipment would be operating concurrently at 100% capacity.

Results of the modelling indicate that all project noise trigger levels can be met for day, evening and night-time periods, with all residential receivers experiencing noise levels of 35 dB or lower, as illustrated on **Figure 6.4**. Results of the modelling are presented in Table 11 of the NVIA (refer to **Appendix 6**). No operational management and mitigation strategies are required.

Project equipment, utilisation, quantities and sound power levels are summarised in Table 28 of the NVIA. The predicted operational noise levels at the Projects sensitive receivers are presented in **Table 6.7** and shown graphically as noise contours in **Figure 6.4**.

The results of operational noise levels demonstrate that predicted noise levels are below the 35 dB LAeq, $_{15\ min}$ night-time project noise trigger level at all receivers, by a minimum margin of 3 dB. Operational noise from the Project is therefore predicted to be below the most stringent project noise trigger level applicable under the NPfI.

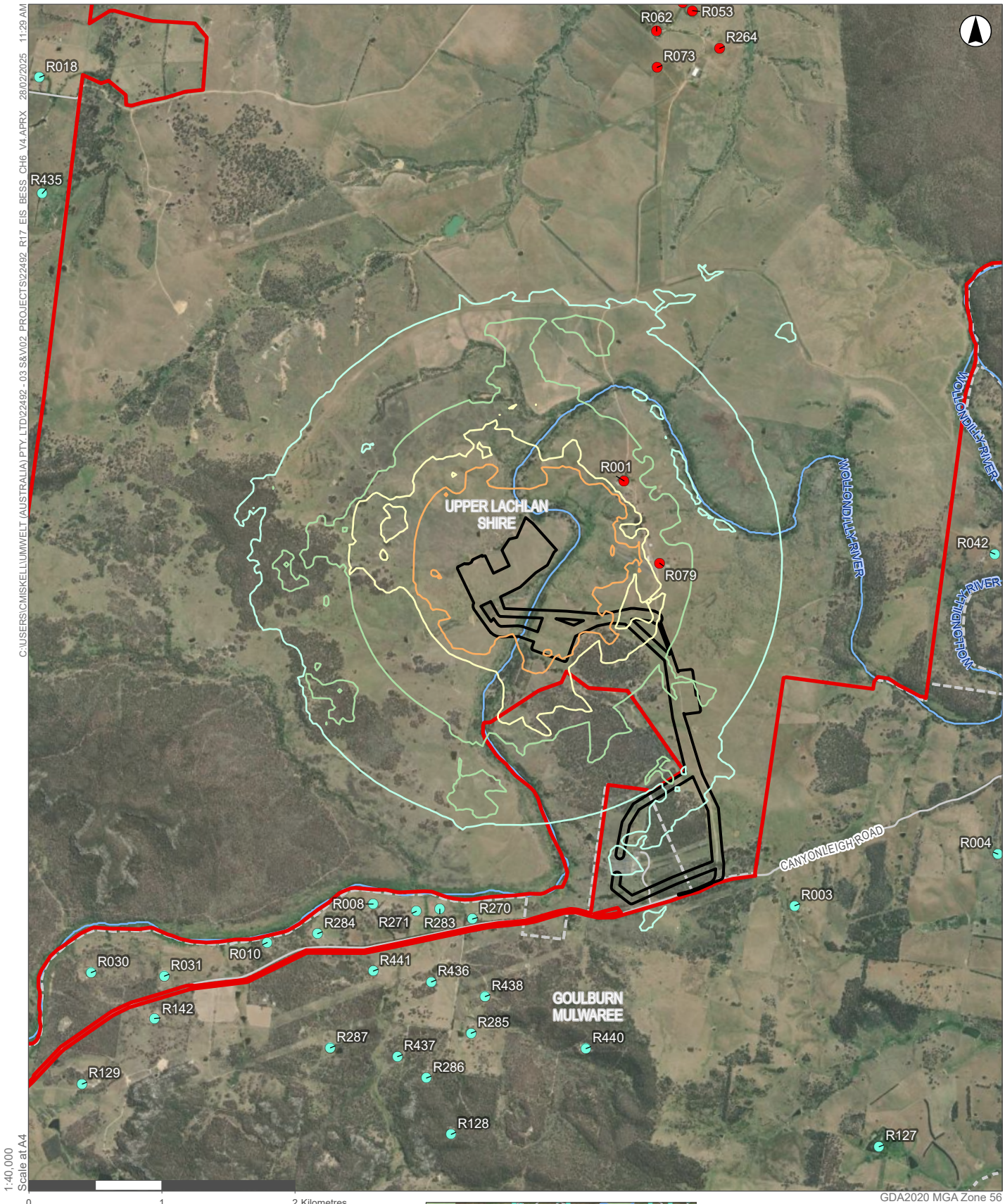
Table 6.7 Predicted Operational Noise Levels, $L_{Aeq,\ 15minute}$ dB(A)

Rec ID	Structure	PNTL, D/E/N	Predicted Operational Noise
R001	Landowner	-	38
R079	Landowner	-	37
R283	Residential	40/35/35	26
R270	Residential	40/35/35	26
R271	Residential	40/35/35	26
R008	Residential	40/35/35	26
R286	Residential	40/35/35	26
R284	Residential	40/35/35	24
R436	Residential	40/35/35	24
R438	Residential	40/35/35	23
R441	Residential	40/35/35	23
R003	Residential	40/35/35	23
R010	Residential	40/35/35	23
R285	Residential	40/35/35	22
R440	Residential	40/35/35	22
R437	Residential	40/35/35	21
R073	Landowner	-	21
R287	Residential	40/35/35	21
R128	Residential	40/35/35	21
R023	Residential	40/35/35	21
R031	Residential	40/35/35	20

The dwelling entitlements (Lots 1–5) have been reviewed, and the assessment confirms that compliance with relevant noise limits is anticipated for all these entitlements. The predicted noise level indicate that the operational noise will be within acceptable thresholds, with a predicted margin of compliance of at least 6 dB (see **Table 6.8**). Therefore, no further noise mitigation measures are expected to be necessary for the protection of these dwelling entitlements. Predicted results have been limited to only include receivers with a level of 20 dB or above.

Table 6.8 Predicted Operational Noise Levels at Dwelling Entitlements, $L_{Aeq, 15minute}$ dB(A)

Receiver	Predicted Operational Noise Level
Lot 5	29
Lot 3	26
Lot 2	25
Lot 4	24



Legend

- Project Area
- Development Footprint
- Local Government Area
- Watercourses
- Roads
- host dwellings
- non-associated dwellings

Noise Contour (dB)

- 30
- 35
- 40
- 45

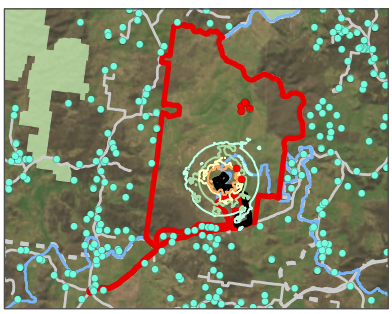


FIGURE 6.4

Predicted Noise Contours

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), MDA (2024), Umwelt (2024)

6.4.4.5 Decommissioning Noise

The decommissioning of the Project would involve undertaking the construction activities in reverse. From a noise and vibration generating perspective, the decommissioning activities are not as intensive as with construction. The reason being that no piling or other noise intensive activities are involved. Noise emissions during decommissioning activities are therefore expected to be less than the construction activities and comply with the nominated noise management levels.

6.4.4.6 Road Traffic Noise

Noise Sources and Assumptions

Traffic volumes and trip distribution on the road network is discussed in **Section 6.8** of this EIS. The NVIA has reviewed traffic data provided in the TIA and has assumed:

- Traffic speed set to 100 km/h (this will be conservative for receivers close to intersections).
- Roads assessed as local roads as defined in the RNP.
- Predicted noise levels include an additional +2.5 dB correction for facade reflection as required by the RNP.
- LAeq, 1h levels are calculated as CoRTN LA10(1hr) - 3 dB, per TfNSW practice.
- Grass or cultivated fields assumed between the road and receivers.

Noise impacts related to construction traffic along the Hume Highway, from the Hume Highway/Brayton Road and Hume Highway/Ambrose Road intersections to the Brayton Road/Canyonleigh Road intersection, and then to the proposed Project Area access point on Canyonleigh Road have been assessed. Based on the results of the assessment the relative traffic noise level increase due to the proposed construction activities is predicted to be:

- Below the 2 dB threshold on all freeway/arterial/sub-arterial roads, as well as one local road section – Brayton Road (Nth Canyonleigh Road).
- Above the 2 dB threshold on 2 local road sections – Canyonleigh Road and Brayton Road (Sth Canyonleigh Road).

On this basis, the detailed assessment documented in the NVIA only considered construction traffic noise along Canyonleigh Road and Brayton Road (South of Canyonleigh Road). Indicative construction-related traffic volumes adopted for the noise assessment are presented in Table 17 of the NVIA (refer to **Appendix 6**).

Assessment of Road Traffic Impacts

Three (R108, R268, R270) receivers along Canyonleigh Road are located within the predicted RNP setback zone. All are within or close to both day and night setback zones R108 and R268 are within approximately 45 m and, R270 is approximately 50 m of Canyonleigh Road.

Though noise predictions are compliant, the NVIA notes that increased traffic noise during construction may be noticeable. The NVIA notes that noise mitigation options relating to traffic are limited, however suggest community consultation and reducing construction traffic speed.

Spark Renewables are offering construction disruption payments to residential receivers located along Canyonleigh Road (between Brayton Road and the Project Area entrance) during the construction period to compensate for disruption caused by traffic and associated noise impacts.

Operational Traffic

Operational traffic movements are expected to be in very minimal and therefore road traffic noise from operational traffic is anticipated to be negligible. No management and mitigation measures are recommended.

6.4.4.7 Cumulative Impacts

The following developments have been considered:

- The existing Transgrid Marulan Substation (TMS) (located to the south-east of the Project Infrastructure).
- The proposed Marulan Gas Fired Power Station (MGFPS) (located to the east of the Project Infrastructure).
- The proposed Wattle Creek Solar Farm project, (located within the Project Area).

The NVIA includes a high level prediction of noise at the nearest receiver common to the TMS and the Project Infrastructure (R270). Predicted noise levels are in the order of 23 dB $L_{Aeq\ 15\ min}$. Predicted noise levels at residential receivers further away will be lower.

Noise level contributions from any future variation of the MGFPS project are not known at this stage but the NVIA assumes levels to be no more than 35 dB $L_{Aeq\ 15\ min}$ at the nearest residential receiver. This is based on the legacy noise assessments, and the expectation that the MGFPS project will be required to comply with the equivalent contemporary NPfI project noise trigger level of 35 dB $L_{Aeq\ 15\ min}$. Expected noise levels at other receivers further from the MGFPS have been calculated considering simple distance attenuation.

Operational noise associated with the Wattle Creek Solar Farm project has been taken from the noise assessment conducted for that project.

Section 2.4 of the NPfI sets out methods and guidelines for the development of amenity noise levels and project amenity noise levels. The recommended amenity noise levels (set out in Table 2.2 of the NPfI) represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.
The assessment finds that contributions from all individual industry at the receivers is 38 dB $L_{Aeq\ 15\ min}$ or less which meets complies with the recommended amenity noise levels for the receiver categories, and therefore the overall intent of the NPfI with respect to cumulative industrial noise is satisfied.

6.4.5 Mitigation and Management Measures

6.4.5.1 General Noise Controls

A range of mitigation and management strategies in response to the identified noise and vibration impacts of the project were identified in the NVIA and are summarised below in **Table 6.9**. A Construction Noise and Vibration Management Plan (CNVMP) will be included for the Project Area once a more detailed schedule of equipment and plant items, construction method and work areas are known.

Table 6.9 Noise and Vibration Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
NV-01	The CEMP will include all relevant feasible and reasonable construction noise and vibration management and mitigation measures including: • universal work practices • consultation and notification (including complaint/enquiry handling process including maintenance of a 24-hour community contact line) • plant and equipment, e.g. utilising bored piling in lieu or impact or vibratory piling • on-site controls • work scheduling • transmission path and at-receiver considerations.	Detailed Design (prior to commencement of Construction)
NV-02	The predicted noise levels for all components of the operational noise assessment will be updated during the detailed design phase once the Project configuration and equipment selections are confirmed, in order to verify compliance with the project noise trigger levels prior to the commencement of construction.	Detailed Design (prior to commencement of Construction)
NV-03	Ongoing noise monitoring will be conducted to ensure compliance during operation of the Project.	Operation

6.5 Biodiversity

A Biodiversity Development Assessment Report (BDAR) (2024) (**Appendix 7**) was undertaken by Umwelt to assess potential impacts of the Project on biodiversity. This section outlines the key findings of the BDAR, the potential impacts of the Project on biodiversity and proposed mitigation and management measures.

Spark Renewables has sought to avoid and minimise biodiversity impacts from an early stage and has preferentially sited the Project's Development Footprint within areas of 'Category 1 – Exempt Land' to avoid impacting areas of remnant vegetation where possible. Category 1 – Exempt Land includes rural land where native vegetation clearing can occur without clearing approval and the provision of biodiversity offsets, in accordance with the NSW *Land Services Act 2013* (LLS Act).

Spark Renewables is committed to managing biodiversity impacts during the construction and operation phase of the Project, through the implementation of management and mitigation that will include controls to minimise impacts on biodiversity. Additionally, through the application of an avoidance strategy outlined in **Section 6.5.3.5**, of the Development Footprint has reduced from 390 ha (presented in the scoping report) to 75.70 ha. Whilst Spark Renewables has strived to avoid and minimise impacts on biodiversity through the design process, not all impact could be avoided.

The BDAR was prepared in accordance with the requirements of the Project's SEARs (see **Appendix 1**), which require the following:

- an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW)(BC Act), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any

residual impacts of the development in accordance with the BC Act, unless BCD and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values;

- an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts
- the BDAR must document the application of the avoid, minimise and offset framework in accordance with the BAM
- if an offset is required, details of the measures proposed to address the offset obligation.

The Project meets the criteria for a State Significant Development (SSD) and therefore the Biodiversity Offset Scheme (BOS) is triggered, and a BDAR is required to be prepared by an accredited assessor under the *Biodiversity Conservation Act 2016* (NSW) (BC Act).

6.5.1 Existing Biodiversity Values

The BDAR focuses on the assessment of the Development Footprint (75.70 ha). The Project Area features a mix of exotic pasture, native grasslands, scattered paddock trees, and intact woodland. Several natural waterways, including Island Creek, Wattle Creek, and the Wollondilly River, traverse the Project Area. The Development Footprint occurs within the South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) Region and the Bungonia IBRA sub-region.

Further details on waterway conditions are included in **Section 6.9**, no areas of the Development Footprint are mapped as wetlands in the Directory of Important Wetlands of Australia. Kerrawary Nature Reserve, Belanglo State Forest, Bangadilly National Park are located approximately two, six and ten kilometres to the north and northeast, respectively.

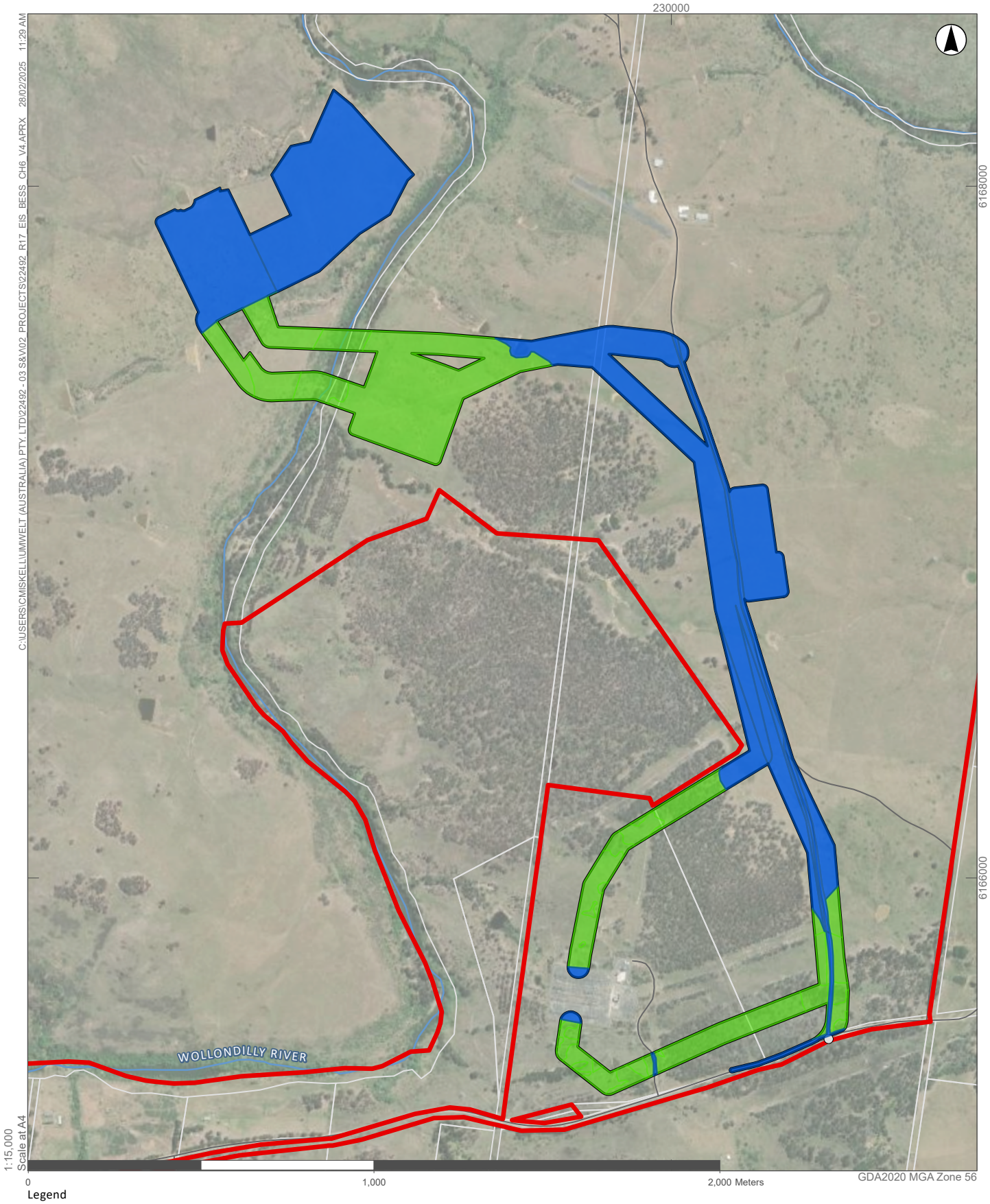
Under the BC Act, Category 1-exempt land is defined as land where native vegetation can be cleared without approval from Local Land Services NSW. Category 2-regulated land is land that is not Vulnerable or Sensitive regulated land however authorisation from Local Land Services may be required to clear native vegetation. Native Vegetation Regulatory (NVR) and land category mapping (obtained during consultation with DCCEEW) was used as the primary determinant to determine the land categories of the Development Footprint. Historical imagery, Plant Community Type mapping and field validation were compared with the NVR map to determine the extent of the Development Footprint subject to assessment under the BAM and BC Act. Areas identified as non-native vegetation or Category 1-exempt land by Umwelt are shown on **Figure 6.5**.

The Development Footprint comprises approximately 46.86 ha of land mapped as exotic or low condition grassland, of which is 2.73 ha is vehicle tracks, 42.95 ha mapped as Category 1 Land, and 0.004 ha mapped as waterbodies associated with farm dams. The 42.95 ha of Category 1 land has minimal biodiversity value and is unlikely to provide suitable habitat for threatened flora and fauna species. This land has no native over storey or mid storey cover (uppermost and middle layers of vegetation, consisting of the tallest and median height trees forming a canopy) and met the definition of non-native vegetation and Category 1-exempt land.

Areas not shown as native vegetation cover within **Figure 6.5**, and which do not provide habitat for threatened species were not included for further assessment in the BDAR. In accordance with section 6.8(3) of the BC Act, because the BDAR has conducted assessment in accordance with the BAM, it has excluded assessment of the impacts of clearing of native vegetation on Category 1-exempt land. Non-native vegetation which does provide habitat for threatened species was assessed in the BDAR.

The BDAR Development Footprint totals 75.70 ha of vegetation comprising of 28.84 ha of native vegetation, and 42.95 ha of Category 1-exempt land. Native vegetation within the Development Footprint is comprised of forested wetlands and grassy woodlands that occur in varying conditions due to historical disturbances such as clearing of overstory and midstory forest species due to agricultural clearing.

No Areas of Outstanding Biodiversity Value (AOBV) have been declared within the Development Footprint. Additionally, the Development Footprint is not within any Mapped Important Area for relevant species.



Legend

- Project Area
- Development Footprint
- Property Boundaries
- Category 1 - Exempt Land
- Native Vegetation
- Watercourse
- Existing Roads and Tracks
- Access Points

FIGURE 6.5

Native Vegetation Extent

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPIE (2024), Umwelt (2024)

6.5.2 Methodology

The BDAR was prepared in accordance with the Biodiversity Assessment Method (BAM) to assess the biodiversity values in the Project Area:

- Desktop review of a search area of 10 km surrounding the Project Area was undertaken of: the BAM calculator (BAM-C) relevant databases, spatial data, datasets, literature review and various previous Project reports was undertaken to inform the context of the Project Area and to inform survey methods for the field surveys.
- The Development Footprint was surveyed in accordance with BAM and involved:
    - Targeted flora and fauna surveys.
    - The identification and mapping of PCTs according to the structural definitions held in the BioNet Vegetation Classification database.
    - Undertaking floristic BAM plots within each vegetation zone considering varying condition states and avoidance of ecotones, areas of disturbance, and edges. Locations of floristic BAM plots surveyed are shown on Table 6.21 of the BDAR.
    - The identification of native and exotic plant species.
    - Identification of previous and current factors threatening the ecological function and survival of native vegetation within and adjacent to the Project Area.
    - An assessment of the natural resilience of the vegetation within the Project Area.
    - Identifying and mapping fauna habitats (e.g., hollow-bearing trees, rock outcropping etc.), assessing their condition and value to threatened fauna species, and considering threatened species' habitat constraints.
    - Observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches, fur, feathers and diggings).
- Opportunistic and rapid assessment surveys of vegetation and habitat were conducted to inform the Project Area Biodiversity Constraints and Opportunities Assessment (COA) (Umwelt, 2024) which supported the referral of the Project under the EPBC Act.
- Systematic biodiversity assessment comprising targeted flora and fauna surveys were then conducted during:
    - October 2022 – BBUS, Diurnal Bird Surveys, flora survey
    - November 2022 – BBUS, Diurnal Bird Surveys, BAM plots
    - January 2023 – Diurnal habitat assessment, active searches and diurnal Bird Surveys
    - February 2023 – BBUS, diurnal bird surveys, Koala Spot Assessment Technique (SATs), flora survey
    - August 2023 – Diurnal habitat assessment, active searches and diurnal bird surveys, BAM plots
    - October 2023 – Diurnal habitat assessment, active searches and diurnal bird surveys, koala SATs, flora survey, BAM plots

- December 2023 – BAM plots
- February 2024 – Diurnal habitat assessment, flora survey
- September 2024 – BAM plots.

- Analysis of the field survey results and mapping to identify potential impacts of the Project on biodiversity including:
  - Direct – Direct habitat loss due to Project infrastructure, removal of flora/native vegetation.
  - Indirect – Dust impacts from construction, noise, etc.
  - Prescribed – Impacts prescribed to be assessed under the biodiversity offset scheme as dictated under Section 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation) (NSW).
  - Serious and irreversible – In accordance with Clause 6.7 of the BC Regulation an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of the principles.
  - Cumulative – An assessment of proposed and current renewable and other projects within similar PCTs, habitats and sited in the broader locality in conjunction with the predicted impacts of the Project.
- Describe the offset obligations required to compensate for any unavoidable biodiversity impacts resulting from the Project. The Project's offset obligations were determined by entering ecological field data into the BAM-C.
- Identify measures to avoid, mitigate and offset impacts, with the objective of achieving an overall 'improve or maintain' environmental outcome for the Project.
- Assess the Project against relevant legislation such as the EPBC Act, EP&A Act and BC Act.

6.5.3 Biodiversity Assessment Results

Following the application of BAM and a consideration of the findings from the field investigation, the following direct, indirect and prescribed impacts associated with the construction and operation of the Project were identified in the BDAR.

6.5.3.1 Excluded Impacts

Section 6.8 (3) of the BC Act specifies that the BAM is to exclude the assessment of impacts due to any clearing of native vegetation and loss of habitat on Category 1 – Exempt Land (as defined in Part 5A of the LLS ACT), other than prescribed impacts (as defined in Section 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation)).

The BDAR determined the presence of 42.95 ha of Category 1 – Exempt Land within the Development Footprint, as shown in **Figure 6.5**. The areas assessed as Category 1 – Exempt Land contain highly disturbed due to historical disturbances such as clearing of overstory and midstory forest species due to agricultural clearing.

6.5.3.2 Native Vegetation

The Development Footprint contains 72.97 ha of native vegetation made up of three PCTs and areas of planted native trees, as identified in **Table 6.10** and illustrated on **Figure 6.6**.

Table 6.10 PCTs within the Development Footprint

PCT ID	PCT Name	Area within the Development Footprint (ha)
4063	Central and Southern Tableland River Oak Forest	2.05
3374	Goulburn Tableland Peppermint Grassy Forest	68.8
3376	Southern Tableland Grassy Box Woodland	2.12

Two planted threatened flora species were recorded in the Project Area but will not be directly impacted by the Project. These were:

- *Eucalyptus nicholii* (narrow-leaved black peppermint)
- Eucalyptus macarthurii (Paddy's river box).

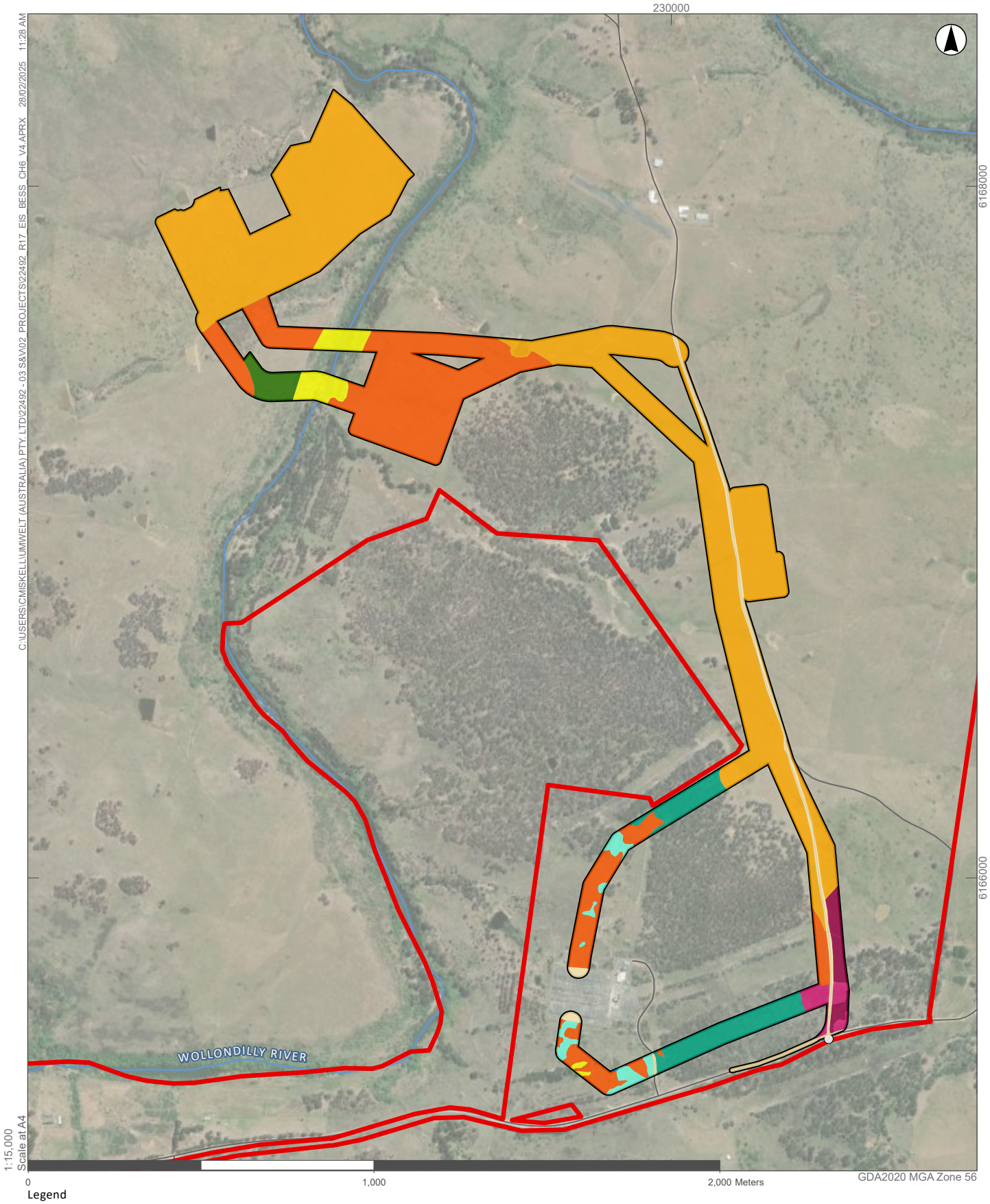
Planted trees and shrubs are generally immature individuals with no evidence of nests or hollows. No evidence of use by species credit species was observed during any survey periods. Mitigation is proposed to minimise any potential impacts resulting from the removal of planted vegetation.

PCT 3376 is commensurate with White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC), listed under the BC Act and the EPBC Act and is identified under the NSW Biodiversity Offset Scheme (BOS) as an entity with the potential for serious and irreversible impact (SAII). The EPBC Act listing for this CEEC includes the following condition zones:

- PCT 3376 Southern Tableland Grassy Box Woodland – Good/Moderate
- PCT 3376 Southern Tableland Grassy Box Woodland – Moderate/degraded.

The details of the threatened ecological communities identified within the Development Footprint are listed in **Table 6.11** and the extent of each TEC is mapped in **Figure 6.7**.

A comparison of the vegetation zones recorded in the Development Footprint with the key diagnostics and condition thresholds in the recently released approved conservation advice (DCCEEW 2023a) was undertaken to confirm the extent of the TEC in the Development Footprint (refer to Section 4.3 of the BDAR). The areas of CEEC in the Development Footprint are shown in **Table 6.11**.



Legend

- Project Area
- Development Footprint
- Existing Roads and Tracks
- Watercourse
- Access Points

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Planted/Regen
- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate
- Moderate/Degraded

PCT 3347 - Southern tableland Creekflat Ribbon Gum Forest

- Moderate/Degraded

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

FIGURE 6.6

Plant Community Type Mapping

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

Table 6.11 TECs within the Development Footprint

PCT ID	TEC Name	TBCD Profile ID	Act and Listing Status	Associated Vegetation Zone	Area (ha)
PCT-3376	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	10837	Critically Endangered Ecological Community Listed under the BC Act	DNG	Total of 1.23 ha in common ancillary features.
PCT-3376	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	10837	Critically Endangered Ecological Community Listed under the BC Act	Good /Moderate	Total of 0.89 ha with: • 0.44 ha in the common ancillary features • 0.45 ha in the transmission line option 2.
PCT-3376	White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	20392	Critically Endangered Ecological Community Listed under the EPBC Act	Good /Moderate	Total of 0.89 ha with: • 0.44 ha in the common ancillary features • 0.45 ha in the transmission line option 2.

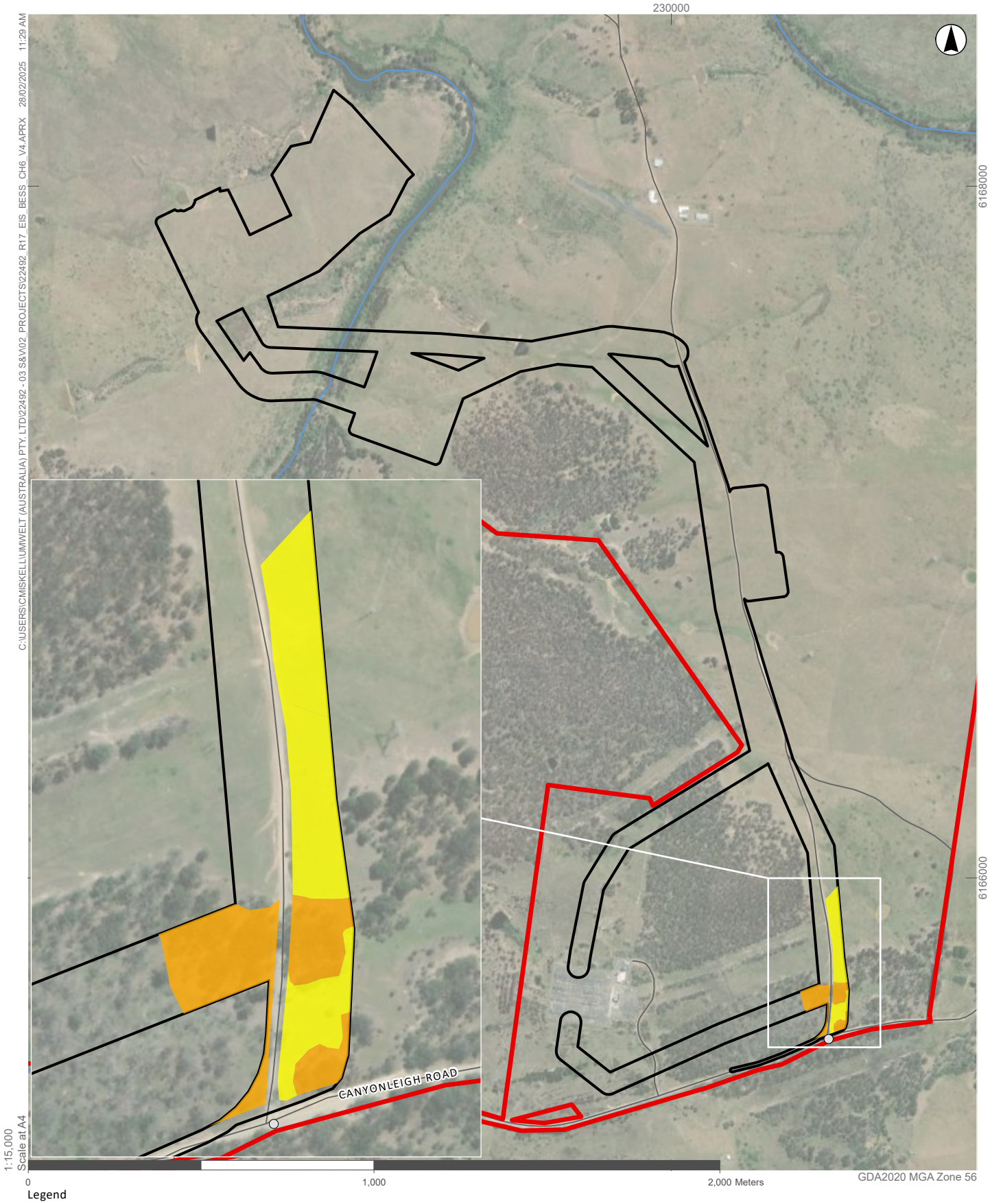


FIGURE 6.7

Threatened Ecological Communities

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

6.5.3.3 Threatened Species

The NSW BAM categorises threatened species as either 'ecosystem-credit' species or 'species-credit' species. Credits are required for impacts on species-credit species, but not for ecosystem-credit species as they are considered to be already covered by credits generated for impacts on native vegetation. The BAM calculator used for the BDAR predicts the species-credit species that may occur and requires consideration of these species in the assessment.

A full list of the ecosystem-credit species and the species-credit species predicted to occur by the BAM Calculator and/or the literature review and consideration of their likelihood of occurrence in the vegetation zones within the Project Area is provided in the BDAR (refer to **Appendix 7**). Targeted surveys were undertaken for all candidate threatened flora and fauna species across the Project Area.

The biodiversity field surveys undertaken as part of the BDAR identified two threatened flora species were observed within the Project Area (Paddys River Box (*Eucalyptus macarthurii*) and Narrow-leaved Peppermint (*Eucalyptus nicholii*)). The Development Footprint has been designed to avoid impacts to the species. Three threatened fauna species have been identified within the Development Footprint, which are identified in **Table 6.12**. Species polygons and credits have been generated to offset impacts to species identified in within the Development Footprint (refer to **Figure 6.8**).

Table 6.12 Threatened Species within the Development Footprint

Species Type	Species Name	BC Act Listing	EPBC Act Listing
Fauna	Gang-gang cockatoo (*Callocephalon fimbriatum*)	Endangered	Endangered
Fauna	South-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	Vulnerable	Vulnerable
Fauna	Large-eared pied bat (*Chalinolobus dwyeri*)	Vulnerable	Vulnerable
Fauna	Squirrel Glider (*Petaurus norfolcensis*)	Vulnerable	-

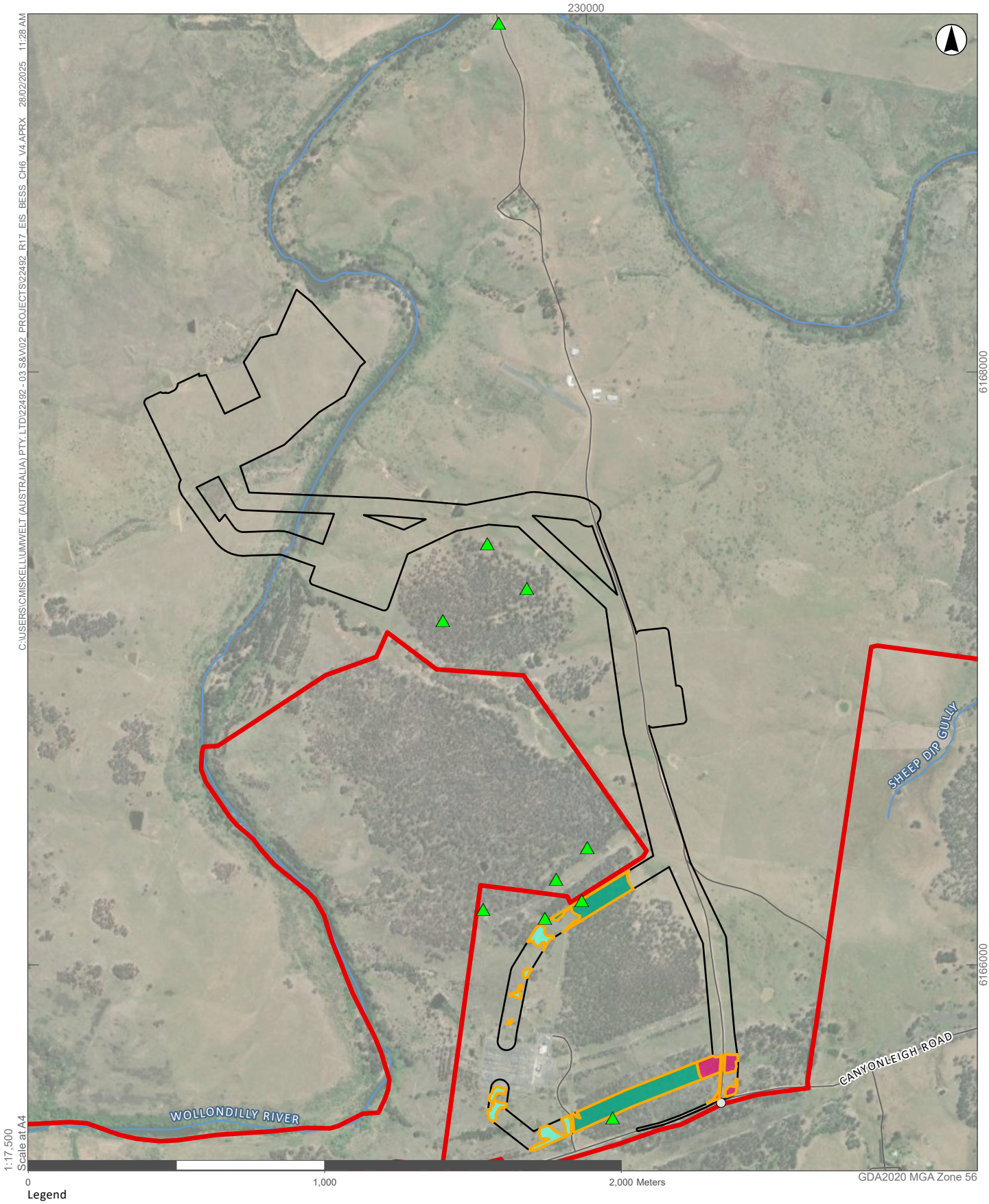
6.5.3.4 Aquatic Habitat

A number of ephemeral first and second order watercourses are present within the Development Footprint and will be impacted by the Project. Impacts to formalised and permanent watercourses have been avoided during the design process with the exception of river and creek crossings. One small farm dam will also be filled to facilitate the Project. Approximately 40 m portion of the Wollondilly River will be impacted directly and indirectly by the proposed works to upgrade of the existing waterway crossing. The existing condition of watercourses traversing through Project Area are further discussed in **Section 6.9.1**.

With the exception of the Wollondilly River, all waterways within the Development Footprint are ephemeral and habitats within these watercourses were considered marginal for locally occurring fish species. Access within the Project Area requires upgrade of an existing shallow crossing of the Wollondilly River. The Wollondilly River is classified as a Type 1, Class 1 major key fish habitat permanently flowing waterway. While threatened fish species have not been predicted to occur in this reach of the river, the river provides habitat for protected fish species. It is classed as 'very poor habitat' from the Fisheries NSW Spatial Data Portal (DPI, 2024).

According to the Groundwater Dependent Ecosystem (GDE) Atlas (BOM, 2017), the Project Area is mapped as containing GDEs (see **Figure 6.9**). Aquatic GDEs are mapped within Wollondilly River and recorded as high potential from a national assessment (DPE, 2012). Terrestrial GDEs mapped within the southern region of the Project Area. Majority of the terrestrial GDEs are considered to have a low potential of occurrence in the south-west, south-east and central west regions of the Project Area. High and moderate potential GDEs are mapped within the south-west and south-east regions, as well as along the Wollondilly River.

Of the PCT's identified within the Development Footprint (listed in **Section 6.5.3.2**), none are considered to be GDEs, such that they would be placed at risk of extinction should water levels fluctuate within the creeks, tributaries and drainage lines in the Development Footprint.



Legend

- Project Area
- Development Footprint
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Gang-gang Cockatoo
- Gang-gang Cockatoo Species Polygon

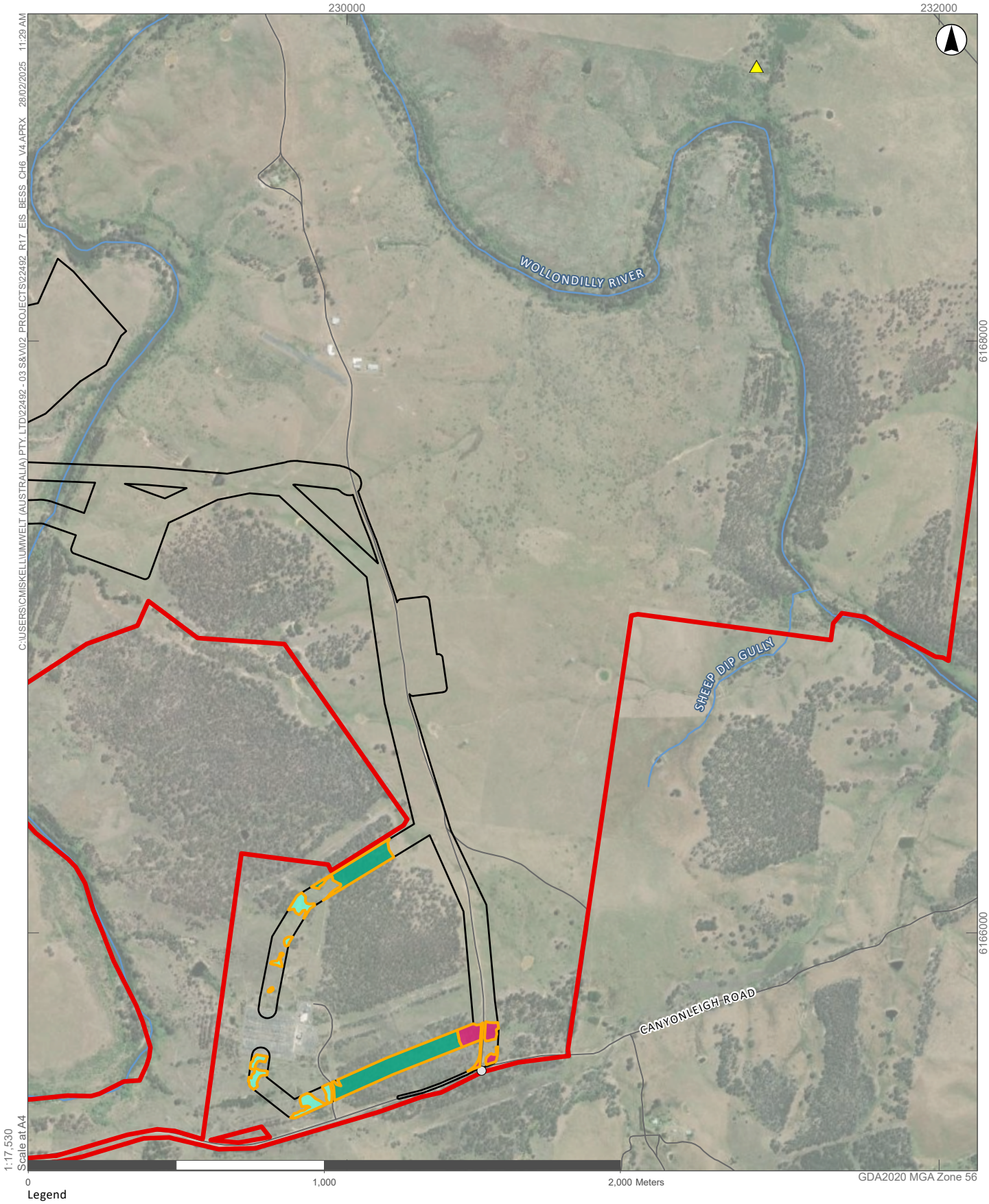
Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate

FIGURE 6.8A

Gang gang cockatoo species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)



Legend

- Project Area
- Development Footprint
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Glossy black Cockatoo
- Glossy-black Cockatoo Species Polygon

Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate

FIGURE 6.8B

Glossy black cockatoo species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

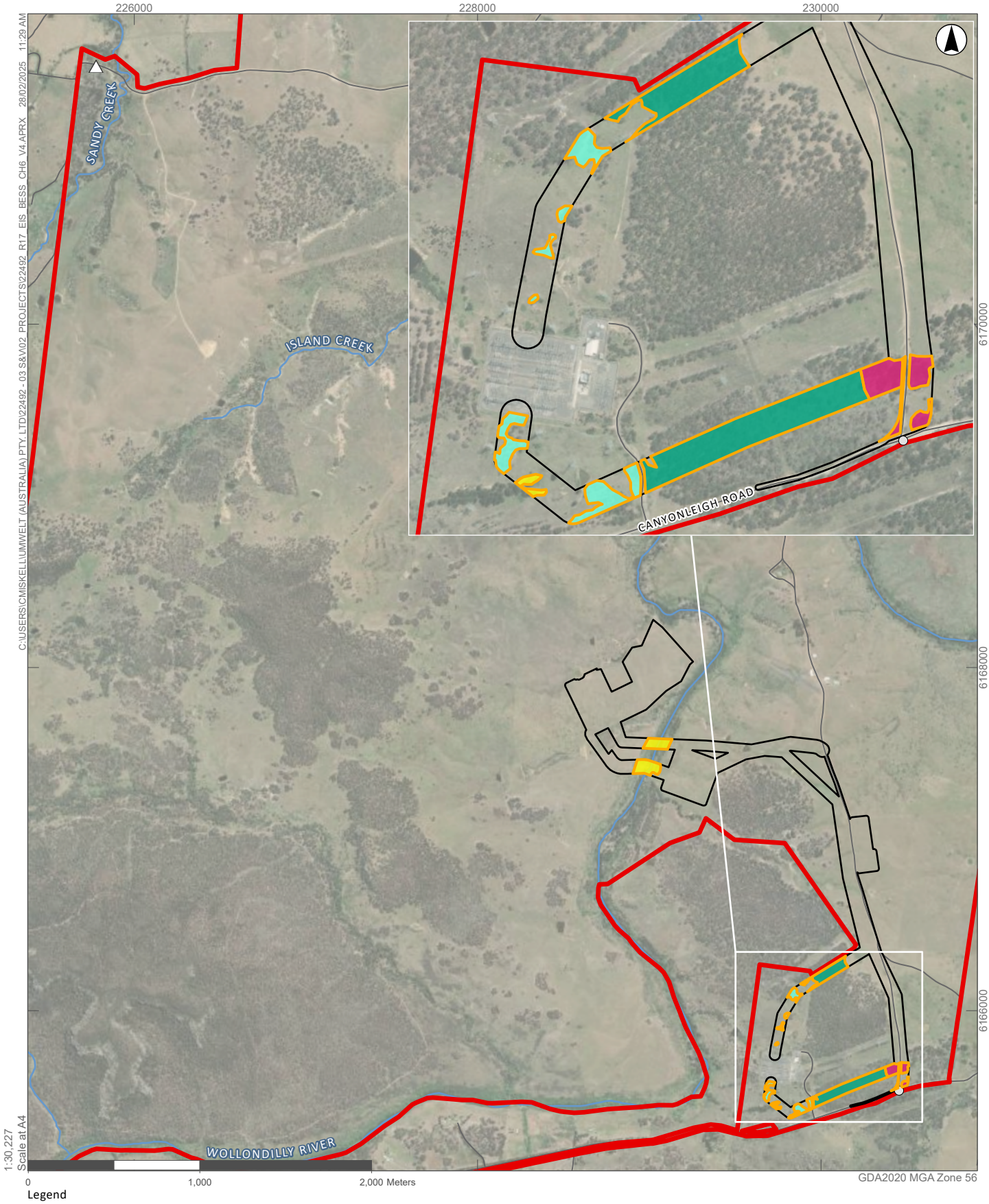
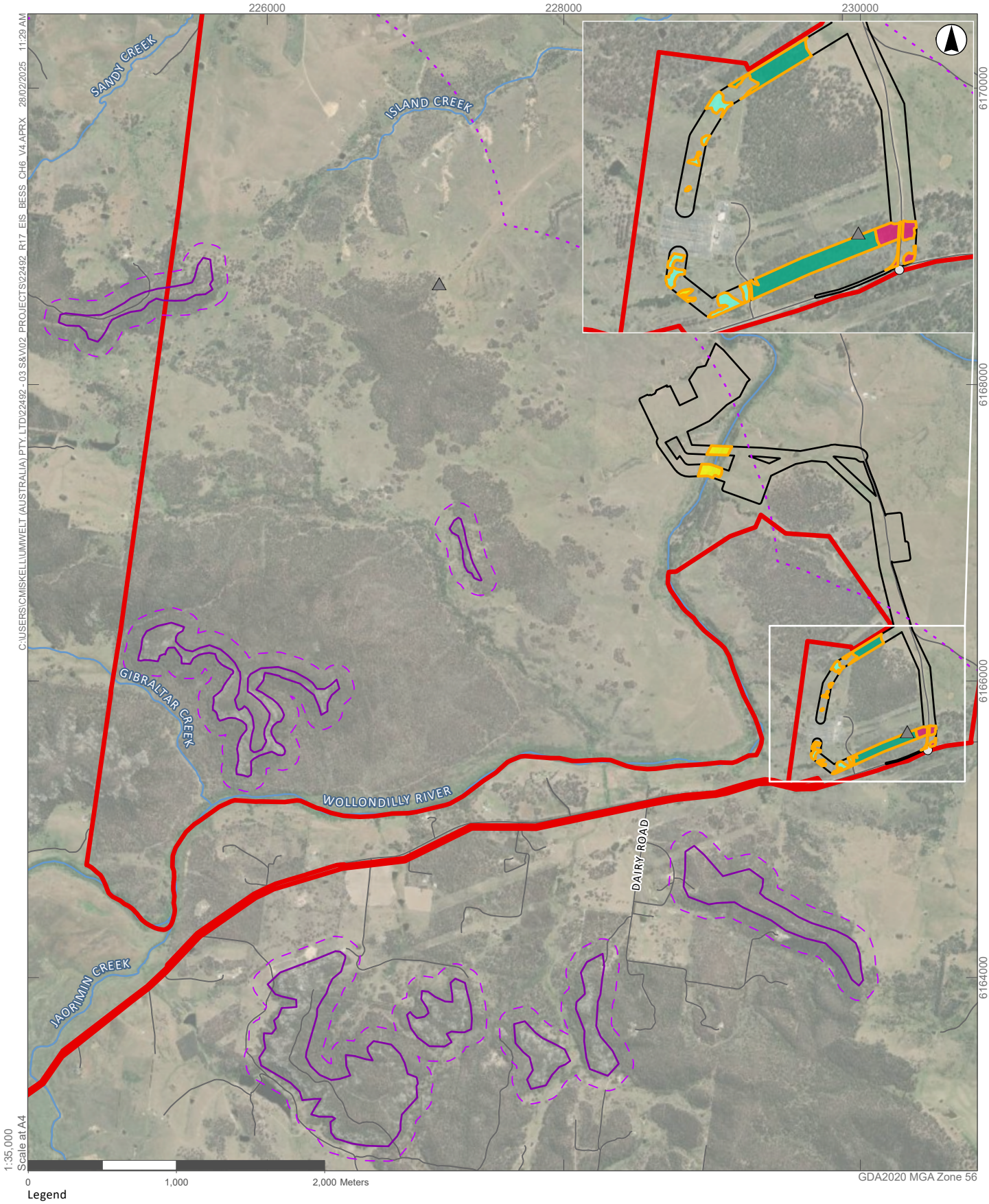


FIGURE 6.8C

Squirrel glider species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)



Legend

- Project Area
- Development Footprint
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Large-eared pied-bat
- Large-eared pied bat- potential foraging habitat 2km buffer
- Large-eared pied bat- potential breeding habitat 100m buffer
- Large-eared pied bat - potential breeding habitat
- Large-eared pied bat Species Polygon

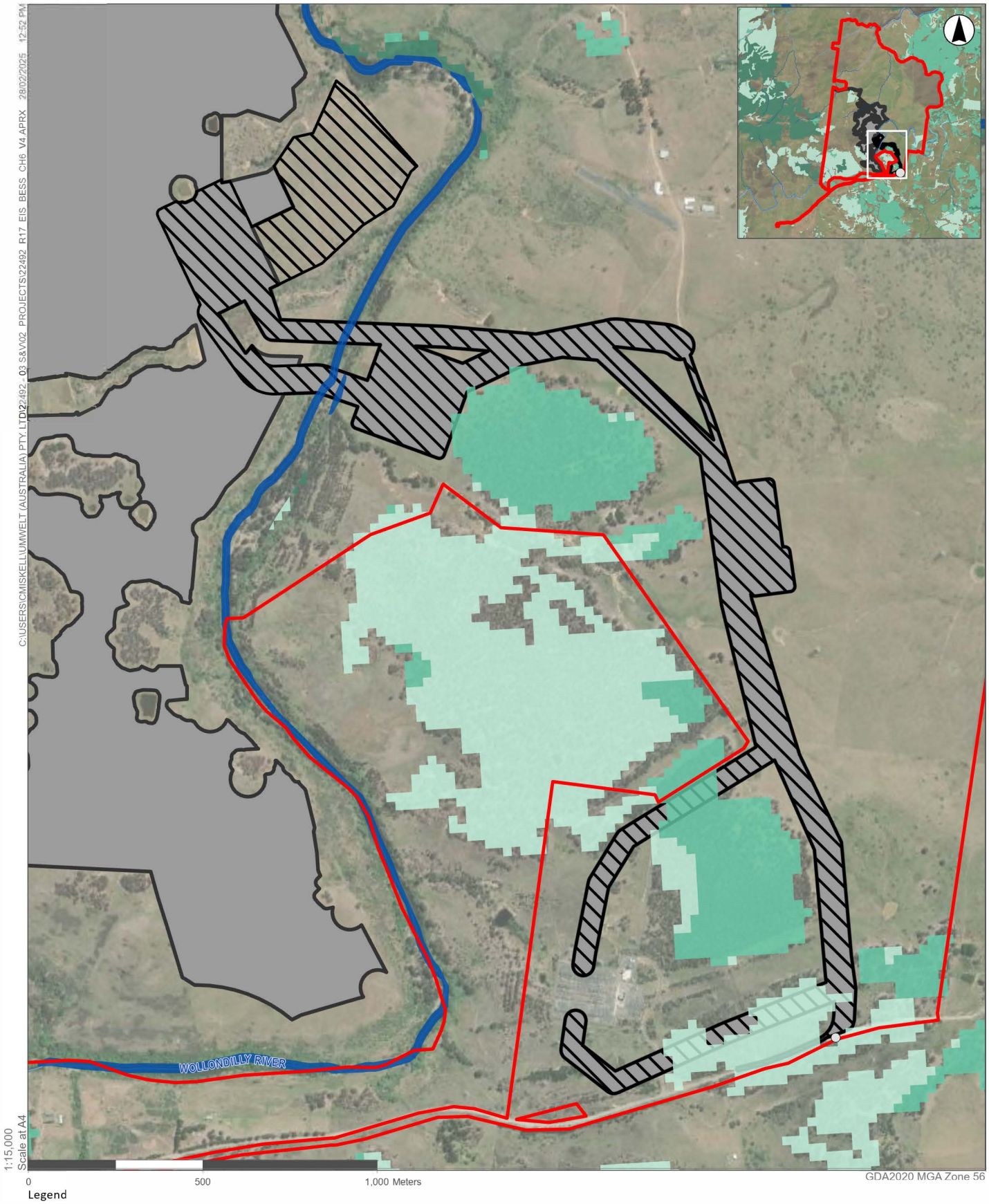
Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate
- PCT 4063 - Central and Southern Tableland River Oak Forest - Moderate/Degraded

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

FIGURE 6.8D

Large-eared pied bat species polygon



Legend

- Project Area
- Solar Development Footprint
- BESS Development Footprint
- Access Points

Aquatic GDE

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment

Terrestrial GDE

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

FIGURE 6.9

Groundwater Dependent Ecosystems

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), BoM (2024)

6.5.3.5 Avoidance and Minimisation of Impacts

The principal approach to amending Project design to reduce impacts on biodiversity values has been to avoid any impact, minimise the removal of native vegetation and fauna habitat and mitigate and manage the residual impacts (see **Section 6.5.6**).

The Project Area has been selected based on previous disturbance within the Development Footprint and surrounding landscape, which is subject to agricultural processes such as livestock grazing as well as some cropping and cultivation.

The Development Footprint has been refined throughout the lifecycle of the Project informed by the findings of the COA and BDAR and other specialist technical investigations. This process led to a Development Footprint largely comprising Category 1 Land.

Key impact avoidance and mitigation measures have been applied to the development of the Project Area as a whole, and specifically to the Project. This included:

- Reduction in the development footprint from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout). There was also an overall reduction in from the area originally investigated for the overall development of the Project Area from 1,838.09 ha (original survey area) to 656.32 (580.62 ha (Wattle Creek Solar farm project) and 75.70 ha (the Project)) of the Project Area.

- Early site investigations included a potential wind farm component within the broader Project Area. However, the wind component was not pursued which has resulted in considerable reduction of impacts to native vegetation, TECs and threatened fauna populations. Specifically, the potential for turbine strike has been avoided for the known populations of gang-gang cockatoo, south-eastern glossy black-cockatoo, large-eared pied bat and diamond firetail.

- The BESS has been located in the areas of degraded grassland within negligible biodiversity value. Ancillary facilities, access tracks and transmission lines have been located in existing cleared land and minimised impacts to TECs, intact woodland and habitat for threatened species were practicable.

- Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.

- Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo, south-eastern glossy black-cockatoo, squirrel glider, diamond firetail, dusky woodswallow, scarlet robin, speckled warbler, spotted harrier and varied sittella.

- Alteration of the Development Footprint to avoid impact to individuals of Paddys River box (*Eucalyptus macarthurii*) and narrow-leaved peppermint (*Eucalyptus nicholii*).

- Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act).

- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.

Impacts which cannot be avoided or minimised will be managed in the following ways:

- The preparation and implantation of a Construction Environmental Management Plan (CEMP) and Vegetation Management Plan (VMP). The plans will be prepared in consultation with relevant government agencies.
- Education and training for construction and operation staff.
- Establishing vegetation protection zones for retained areas.
- Pre-clearance surveys and ecologist supervision, enabling rescue of native fauna as well as salvaging habitat features (such as hollows or selective felled timber) for relocation into adjacent retained areas.
- Erosion and sediment control.
- Weed management.

For a full list of biodiversity values avoided/minimised see Section 7.0 of the BDAR in **Appendix 7.**

6.5.4 Assessment of Impacts

6.5.4.1 Residual Direct Impacts

While the Project has been designed to avoid areas of biodiversity value, there will be residual direct impacts to biodiversity.

As a result of clearing works during construction, the Project would directly impact PCTs and threatened entities observed or assumed to be present on the Development Footprint. The extent of impact is detailed in **Table 6.13** and **Table 6.14**.

Direct impacts include vegetation clearing calculated from the area of proposed lot boundaries, roads and easements for service infrastructure. These impacts will be permanent and occur during the construction phase of the Project. Mitigation and Management Measures are proposed to minimise these impacts (see **Section 6.5.6**).

Table 6.13 Direct Impacts to Remnant Native Vegetation

Direct Impact	BC Act Status	EPBC Act Status	Impact Extent (ha)	Percent of Impact in Project Area
PCT 3374 - Goulburn Tableland Peppermint Grassy Forest	-	-	PCT 3374 DNG (Moderate/Degraded) = 19.25 ha PCT 3374 DNG (Exotic dominated) = 42.95 ha PCT 3374 DNG (Low condition) = 1.18 ha PCT 3374 (Moderate/Degraded) = 1.3 ha PCT 3374 (Good/Moderate) = 4.12 ha Total = 68.8 ha	Approximately 90.90% of the total PCT presence in the Project Area.
PCT 3376 Southern Tableland Grassy Box Woodland	CEEC	CEEC	PCT 3376 DNG = 1.23 ha PCT 3376 Good/Moderate = 0.89 ha Total = 2.12 ha	Approximately 2.80% of the total PCT presence in the Project Area.
PCT 4063 Central and Southern Tableland River Oak Forest	-	-	Total = 2.05 ha	Approximately 2.71% of the total PCT presence in the Project Area.

Table 6.14 Direct Impacts to Threatened Species Habitat

Direct Impact	Impact Extant (ha) of Habitat Removal	Percentage of Impact in Development Footprint
Gang-Gang Cockatoo Habitat	6.31	Comprising approximately 8.33 % of the Development Footprint
Squirrel Glider Habitat	8.63	Comprising approximately 11.40% of the Development Footprint
South-easter Glossy Black Cockatoo	6.31	Comprising approximately 8.33 % of the Development Footprint
Large-eared Pied Bat	8.63	Comprising approximately 11.40 % of the Development Footprint

The Project will not fragment any areas of high-quality TEC, due to the existing fragmentation of remnant vegetation from historical and current agricultural land use in the Project Area and surrounds.
Any fragmentation associated with the Project will occur through the removal of areas of highly degraded native pasture vegetation and scattered trees. The retained areas will remain connected to other vegetation communities, both within the Project Area and the adjoining landscape.

6.5.4.2 Indirect Impacts

Indirect impacts may occur outside the Development Footprint but within the Project Area. According to the BAM, project proponents can retire credits to offset unavoidable indirect impacts. For this Project, all indirect impacts will be mitigated through the implementation of biodiversity management and mitigation measures included in the CEMP and Vegetation Management Plan (VMP) using active management and improve-ad-maintain principles. Potential indirect impacts are summarised in **Table 6.15**.

Table 6.15 Assessment of Indirect Impacts

Indirect Impact	Extant	Likelihood/consequence
Reduced viability of adjacent habitat due to edge effects	316.86 ha	**Minor/** Earthworks, foot traffic, plant or vehicle movements may lead to introduction or spread of weed species that would reduce the quality and integrity of adjacent native vegetation and habitat. Edge effects may result in increased competition between native fauna species for resources and displacement of native fauna species.
Reduced viability of adjacent habitat due to noise, dust or light spill	316.86 ha	**Minor/** Noise, light and dust will be managed during construction to relevant standards. There is potential for retained areas of habitat in close proximity to construction works to be affected by noise, dust and light spill as follows: Noise and light spill may lead to altered behaviour in fauna species. Increased dust may result in health impacts to fauna and reduced photosynthetic capacity for flora. Any residual noise, light and dust is likely to have negligible impacts on threatened and non-threatened fauna species.
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	**Moderate/** Given the extent of serrated tussock infestations it is likely that earthworks may result in the movement of weeds across the site and into adjacent vegetation. Vehicle movement may lead to weeds being spread across the site or lead to the introduction of weed species to the site. Increased weed and pathogens may reduce the quality of native vegetation and habitat for native fauna species.
Increased risk of starvation or exposure, and loss of shade or shelter	Unknown	**Minor/** Loss of vegetation may increase the risk of exposure. The removal of foraging habitat may increase competition between native fauna species for remaining resources. Loss of sheltering or breeding habitat may lead to increased competition for remaining resources.
Loss of breeding Habitat	316.86 ha	**Moderate/** Removal of breeding habitat may disrupt the breeding cycle of species, and potentially lead to displacement of affected species.
Rubbish dumping	316.86 ha	**Minor/** The dumping of rubbish may reduce the quality of native vegetation. May result in injury or mortality to native fauna species.
Wood collection	Unknown	**Minor/** Unlawful harvesting of timber and fallen logs may reduce quality of native vegetation and the amount of habitat available for native species. Injury or mortality of native fauna species as a result of the removal.

Indirect Impact	Extant	Likelihood/consequence
Removal and disturbance of rocks, including bush rock	Unknown	**Insignificant/** Reduced availability of habitat or shelter for ground-dwelling native fauna. Injury or mortality of native fauna species as a result of removal or disturbance.
Increase in predatory and pest species populations	Unknown	**Minor/** Increased human presence, and therefore increased presence of rubbish/food, may result in an increase in the presence of pest species, including predators, in the area. Clearing of vegetation causing a reduction in the area available for fauna species to occupy, resulting in an increased concentration of pest species in an area. Increased injury or morality of native fauna species as a result of increased competition and predation with pest species.
Increased fire risk	Unknown	**Moderate/** The use of machinery, particularly in summer, can increase the risk of fire. Storage and utilisation of flammable materials on site can increase fire risk. Human-caused fires may be detrimental to native vegetation and cause injury or mortality to native fauna species.
Pollutant spills	Unknown	**Minor/** Pollutant spill may contaminate and change the composition of soils, resulting in detrimental impacts to native vegetation.

6.5.4.3 Prescribed Impacts

Prescribed impacts include impacts on biodiversity values which are not related to native vegetation clearing and habitat loss. All prescribed impacts have been assessed for the Project, as listed within the BC Regulation.

The prescribed impacts considered relevant to the Project are associated with non-native vegetation, loss of habitat connectivity, waterbodies and vehicle strike. Prescribed impacts to these features are expected to be minimal and are shown in **Table 6.16**.

Table 6.16 Identification of Prescribed Impacts

Prescribe	Threatened Species Likely to Use Habitat	Importance of Habitat Feature to Impacted Species
Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance	N/A	**Negligible**/ The Project is not likely to impact caves, crevices, cliffs or geological features of significance. No threatened species have been recorded utilising these habitats and no significant consequences are predicted to occur.
Occurrences of human-made structures and non-native vegetation	N/A	**Negligible**/ No human made structures will be impacted by the proposed works.
Corridors or other areas of connectivity linking habitat for threatened entities	N/A	**Negligible**/ During construction 28.84 ha of native vegetation will be permanently removed from the Development Footprint with a one-off clearance. The Project is unlikely to have any substantive impacts to connectivity as the vegetation within the Development Footprint comprises cleared and/or degraded vegetation subject to agricultural management.

Prescribe	Threatened Species Likely to Use Habitat	Importance of Habitat Feature to Impacted Species
Water bodies or any hydrological processes that sustain threatened entities	N/A	**Negligible**/ The impacts associated with waterbodies and watercourses include reduced availability of habitat for aquatic species, altered hydrology and increased erosion and sedimentation within the Development Footprint.
Where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community	diamond firetail squirrel glider dusky woodswallow gang-gang cockatoo glossy black-cockatoo scarlet robin speckled warbler spotted harrier varied sittella	**Low**/ The current speed limits along public roads would be adhered to by the construction and operations workforce and it is likely that most of the travel would occur during daylight hours reducing the likelihood of vehicle strike. Although increased traffic along public road, may result in increased rates of vehicle strike it is unlikely that these impacts would result in a significant impact to any threatened fauna species.

6.5.4.4 Serious and Irreversible Impacts

In accordance with Clause 6.7 of the BC Regulation an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

- Principle 1: The impact will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Principle 2: the impact it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- Principle 3: it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- Principle 4: the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

One species; Large-eared pied bat (*Chalinolobus dwyeri*) was found to meet one of these principles and was recorded within the Project Area. However, no breeding habitat for this species defined in the TBDC were found in the Development Footprint or surrounding locality. Therefore, the Project will not result in impacts to breeding habitat and no further assessment is required.

6.5.4.5 Aquatic Impacts

A watercourse crossing is proposed through the Wollondilly River which is a permanently flowing freshwater waterway to facilitate access through the Project Area. The watercourse crossing will be designed to minimise impacts on stream stability and fish passage and will be designed with reference to the following documents in addition to the NSW Guidelines for Controlled Activities on Waterfront Land:

- Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.

- Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management.

Other aquatic habitats within the Project Area that have potential to be impacted by the Project include Island Creek, Sandy Creek and other unnamed watercourses and tributaries of Wollondilly River.

These creek lines are degraded as a result of the historical and current agricultural practices. Under the fish habitat classes and types in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management, the habitat associated with these creek lines have been assessed as Type 3, Class 4 (unlikely key fish habitat) due to being ephemeral tributaries with intermittent flow and sporadic refuge for aquatic fauna.

Considering the above, it is expected that the Project would not impact the passage of fish nor obstruct the movement of fish or other aquatic species over the long term.

Furthermore, the Project layout incorporates riparian buffers of approximately 20 m to 40 m around all second order and higher watercourses to avoid and minimise impacts to riparian zone and limit water quality impacts to aquatic habitats within and near the Project Area. The surface water and groundwater impacts associated with the Project (refer to **Section 6.9**) are not expected to result in an adverse impact on threatened aquatic species, endangered populations or ecological communities listed under the FM Act.

In addition to impact avoidance by design, Spark Renewables is committed to implementing measures outlined in **Section 6.5.7** to further mitigate and manage any impacts to aquatic habitats, including aquatic fauna and flora.

6.5.5 Impacts to Matters of National Environmental Significance

MNES listed under the EPBC Act, that are known or with potential to occur within the Development Footprint, were assessed in accordance with the EPBC Act Significant Impact Guidelines (DoE 2013) and any applicable recovery plans or EPBC Act policy statements This assessment is included in detail in the BDAR, refer to **Appendix 7**.

In summary:

- One TEC, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, listed under the EPBC Act was recorded in the Development Footprint.
- Four threatened fauna species listed under the EPBC Act were recorded within the Development Footprint. These were:
    - gang-gang cockatoo (Callocephalon fimbriatum)
    - south-eastern glossy black cockatoo (*Calyptorhynchus lathami lathami*)
    - large-eared pied bat (*Chalinolobus dwyeri*)
    - diamond firetail (Stagonopleura guttata).
- Two planted threatened flora species were recorded in the Project Area, but will not be directly impacted by the Project. These were:
    - *Eucalyptus nicholii* (narrow-leaved black peppermint)

- Eucalyptus macarthurii (Paddy's river box).

- An additional eight species that were not recorded during surveys have potential to use habitat within the Development Footprint and have potential to be impacted by the Project during construction and operational phases.

The assessments undertaken have identified that the Project is considered likely to result in significant impacts under the EPBC Act to the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and the gang-gang cockatoo (*Callocephalon fimbriatum*) due to the potential removal of breeding habitat for the species, assessed in a Matters of National Significance Assessment Report (Umwelt 2024b). Impacts to the south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), large-eared pied bat (*Chalinolobus dwyeri*) and diamond firetail (*Stagonopleura guttata*), were considered not likely to result in a significant impact.

Offsets in the form of species credits for the south-eastern glossy black-cockatoo, large-eared pied bat and gang-gang cockatoo and ecosystem credits for the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and diamond firetail are proposed under the NSW Biodiversity Offset Scheme in keeping with the Bilateral Agreement.

6.5.6 Biodiversity Credit Impact Summary

The Project would directly impact up to 28.84 ha of native vegetation requiring offset (8.63 ha of woodland vegetation and 20.48 ha of native grassland) within the Development Footprint.

Additionally, the impacts will be finalised following the completion of the detailed design and micro-siting of infrastructure (within the development footprint). In doing so, Spark Renewables will seek to further minimise impacts to biodiversity values. A range of impact mitigation strategies have been implemented and are proposed to minimise the impact on ecological values prior to the consideration of offsetting requirements. Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM calculations for ecosystem credits and species credit species credits.

Following the application of impact avoidance, minimisation and management measures, the credits documented in **Table 6.17**, **Table 6.18**, **Table 6.19**, **Table 6.20**, **Table 6.21**, **Table 6.22** and **Table 6.23** would be required to offset the residual impacts of the Project.

Table 6.17 Ecosystem Credit Requirements BESS

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	13.42	0

Table 6.18 Ecosystem Credit Requirements – Common Ancillary Infrastructure

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	1.94	23
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	14.81	98
5	3374	Goulburn Tableland Peppermint Grassy Forest	DNG-low condition	2.7	1.18	0
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	25.64	0
9	3376	Southern Tableland Grassy Box Woodland	DNG	26.2	1.23	16
10	3376	Southern Tableland Grassy Box Woodland	Good/Moderate	76.9	0.44	17
-	0	Non-Native	Non-Native	-	2.42	0

Table 6.19 Ecosystem Credit Requirements – Transmission Line Option 1

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	2.54	17
8	3374	Goulburn Tableland Peppermint Grassy Forest	Good/Moderate	76	1.39	40
7	3374	Goulburn Tableland Peppermint Grassy Forest	Moderate/Degraded	69.7	0.46	12
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	1.60	0
-	0	Non-Native	Non-Native	-	0.13	0

Table 6.20 Ecosystem Credit Requirements – Transmission Line Option 2

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	0.11	1
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	1.90	13
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	2.29	0
8	3374	Goulburn Tableland Peppermint Grassy Forest	Good/Moderate	76	2.73	78
7	3374	Goulburn Tableland Peppermint Grassy Forest	Moderate/Degraded	69.7	0.84	22
10	3376	Southern Tableland Grassy Box Woodland	Good/Moderate	76.9	0.45	17
-	0	Non-Native	Non-Native	-	0.18	0

Table 6.21 Species Credit Requirements – Common Ancillary Infrastructure

Species Name	Impact Area (ha)	Credits Required
gang-gang cockatoo (*Callocephalon fimbriatum*)	0.44	17
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	0.44	17
large-eared pied bat (*Chalinolobus dwyeri*)	2.38	81
squirrel glider (*Petaurus norfolcensis*)	2.38	55

Table 6.22 Species Credit Requirements – Transmission Line Option 1

Species Name	Impact Area (ha)	Credits Required
gang-gang cockatoo (*Callocephalon fimbriatum*)	1.85	69
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	1.85	69
large-eared pied bat (*Chalinolobus dwyeri*)	1.85	103
squirrel glider (*Petaurus norfolcensis*)	1.85	69

Table 6.23 Species Credit Requirements – Transmission Line Option 2

Species Name	Impact Area (ha)	Credits Required
gang-gang cockatoo (*Callocephalon fimbriatum*)	4.02	150
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	4.02	150
large-eared pied bat (*Chalinolobus dwyeri*)	4.13	229
squirrel glider (*Petaurus norfolcensis*)	4.13	152

No species credits were generated for the BESS Development Footprint.

6.5.7 Mitigation and Management Measures

The following range of mitigation and management strategies summarised below in **Table 6.24** aims to mitigate the residual impacts (direct, indirect and prescribed) associated with the Project.

The CEMP and OEMP will include appropriate biodiversity management and mitigation measures. Suitable biodiversity management planning documentation would be determined, as part of overall decommissioning works plans for the Project, and will include aspects of the CEMP and VMP, where relevant.

Table 6.24 Biodiversity Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
B-01	Native vegetation removal will be minimised during detailed design. The Development Footprint has been placed in non-native and lower-quality native vegetation, avoiding high-quality areas where possible. Existing tracks, paddocks, and cleared areas have been used to reduce further clearing.	Pre-Construction
B-02	Buffer mapping for habitats aid in providing the construction and maintenance teams with the information necessary for OEMP and the CEMP.	Pre-Construction
B-03	Threatened fauna habitat removal will be minimised through detailed design.	Pre-Construction
B-04	The preparation and approval of a CEMP prior to construction which will be prepared by a qualified ecologist with CPHR consultation. Prior to clearing, the operational management component will be approved with CPHR consultation. The BMP will include but not limited to: • Implementing mitigation measures. • Evaluating mitigation measures. • Objectives for monitoring. • Performance of proposed measures. • Informing an adaptive management method for additional offsets which further impacts are identified. • Remedial action.	Pre-Construction Construction Operation
B-05	If any unexpected threatened species (flora or fauna) are found during construction, work should be halted immediately in the vicinity of the discovery, and the onsite manager should be notified.	Pre-Construction Construction Operation
B-06	Barbed wire will be avoided for fencing where practicable to avoid entrapment of fauna on fences. Fences will be designed to ensure that fauna are not funnelled toward dead ends or to create barriers between areas of habitat across the Project Area.	Pre-Construction
B-07	The CEMP will outline measures for threatened hollow-dependent fauna, including mapping hollow-bearing trees at least one month before removal. A qualified ecologist will conduct fauna rescue during pre-clearing surveys, with protocols established for removing hollow-bearing trees and stick nests to protect threatened species and their habitats.	Pre-Construction
B-08	A qualified ecologist will perform daily wildlife surveys before vegetation clearance, with a handler on-site for rescues. Representatives will deter fauna by driving through the area. If an animal or threatened species is found during construction, work will stop, and the Project Management Site Representative and Delivery Manager will follow CEMP procedures.	Construction

ID	Mitigation and Management Measures	Phase
B-09	Exclusion zones within the Development Footprint will be marked by a qualified surveyor, defining clearing limits and including specific zones for known threatened flora and fauna habitats.	Pre-Construction Construction Operation
B-10	To mitigate impacts on retained native vegetation and habitat, a qualified ecologist will conduct pre-clearance inspections before vegetation removal. Wherever possible, vegetation will be trimmed instead of cleared, tree roots will be retained, and dead trees and trunks will be preserved when feasible.	Construction
B-11	A Rehabilitation Plan (RP) will be developed in consultation with CPHR before clearing. The RP will outline rehabilitation measures for the Development Footprint, including areas needing rehabilitation and those requiring no maintenance. It will address soil erosion prevention, re-establishment of local PCTs, restoration of native flora and habitats, and remedial actions via a Trigger Action Response Plan (TARP). The plan will include native species for landscaping, stabilization of exposed surfaces, and ongoing maintenance for weed and pathogen management. Topsoil and subsoil generated during construction will be stored on-site for rehabilitation.	Pre-Construction Construction
B-12	Weed monitoring and control programs will be included in the CEMP and OEMP, in consultation with CPHR. Any deviations must be approved. Additional monitoring for introduced plants will occur around sediment control structures, with adaptive management for priority weeds during construction and early operation.	Pre-Construction Construction Operation
B-13	All priority weeds, as listed on the DPI NSW WeedWise website https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=137 for the SouthEast LLS Region are to be managed and controlled.	Pre-Construction Construction Operation
B-14	A vehicle and machinery hygiene strategy will be included in the CEMP and implemented during construction and operation, detailing methods for removing soil and plant matter from vehicles and machinery.	Pre-Construction Construction Operation
B-15	Weeds will be disposed and managed appropriately during clearing works, to stop the spread of invasive weed species.	Pre-Construction Construction Operation
B-16	Wash down stations will be constructed at suitable locations to clean vehicles and employee shoes, preventing the spread of weeds, pathogens (including *Phytophthora cinnamomi* and amphibian *chytrid fungus*), and the introduction of new species to the site.	Pre-Construction Construction Operation

ID	Mitigation and Management Measures	Phase
B-17	Refuse and personal waste generated during construction and operation will be stored in bins and disposed of in a suitable waste facility.	Construction Operation
B-18	A monitoring program for feral animals will be implemented, with performance triggers for adaptive management. Increased predator activity will initiate a control program, as detailed in the CEMP, in consultation with host landowners.	Construction Operation
B-19	Clearing/works will be contained within approved areas.	Construction
B-20	Enforce a 40 km/h speed limit on new access tracks to reduce vehicle strikes to fauna near water bodies and farm dams, especially after wet weather.	Pre-Construction Construction Decommissioning
B-21	Appropriate erosion and sediment control measures will be included in the CEMP, including procedures to minimise erosion and sediment transport, prepare an Erosion and Sediment Control Plan (ESCP), manage spills and acid sulfate soils per NSW guidelines, control tannin leachate, manage stockpiles, and monitor surface water quality. Design will minimise river disturbance and prevent fish passage blockage, implementing environmental controls to protect downstream environments according to the Policy and Guidelines for Fish Friendly Waterway Crossings (DPI,2003).	Pre-Construction Construction Decommissioning
B-22	To protect threatened species and water quality, minimise bare earth exposure, implement rehabilitation strategies to reduce dust and erosion, and rehabilitate all areas not planned for future disturbance after construction and during decommissioning.	Construction Decommissioning
B-23	A surface water monitoring program will be developed and implemented as part of the CEMP and OEMP before, during, and after construction and decommissioning.	Pre-Construction Construction Decommissioning
B-24	Within the detailed design, if the Project excavation exceeds the proposed maximum depth below ground level, potential impacts to GDEs will need to be re-assessed by a qualified hydrogeologist.	Pre-Construction Construction
B-25	Exclusion zones will be set up at the limit of clearing.	Construction

6.6 Aboriginal Cultural Heritage

An Aboriginal Cultural Heritage Assessment (ACHA) (**Appendix 8**) was undertaken by Austral Archaeology to assess potential impacts of the Project on Aboriginal cultural heritage. This section outlines the key findings of the ACHA, the potential impacts of the Project on identified Aboriginal cultural heritage values and proposed mitigation and management measures. In line with the commitment to avoid and mitigate impacts on Aboriginal Cultural Heritage (see **Section 1.5**) the Project's Development Footprint was refined to reduce potential impacts on areas of archaeological significance (see **Figure 2.8**). The Development Footprint now wholly excludes 13 Aboriginal cultural heritage sites, 2 of which were identified to have moderate significance.

The ACHA was prepared in accordance with the requirements of the Projects SEARs (**Appendix 1**) which require:

- an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of archaeological test excavations (if required);
- evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010);

The ACHA was prepared in accordance with the following guidelines:

- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (Department of Environment, Climate Change and Water, 2010) (DECCW)
- the Guide to Investigating, assessing and Reporting on Aboriginal Cultural Heritage in NSW (Office of Environment and Heritage 2011) (OEH)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Consultation Requirements) (Department of Environment, Climate Change and Water 2010) (DECCW).

6.6.1 Aboriginal Cultural Heritage Context

The people of the Gundungurra Nation are recognised as the Traditional custodians of the Project Area. The sedimentary geology and fertile soils of the region, along with the presence of readily available water (particularly the Wollondilly River) and the wetlands provide a diverse range of landscape resources to be utilised. Given the location and accessibility to numerous freshwater sources, the Project Area is ideally situated for occupation. There are also a number of unnamed first, second and third order streams also within the project area that feed directly into the Wollondilly River. A number of these streams have been dammed for agricultural purposes and are fed by intermittent springs.

The unique ecological communities of the South Eastern Highlands, while today quite fragmented, support a diverse range of flora and fauna as it would have done in the past. Flora not only provided a food source in the form of seeds, fruits, vegetables and tubers but other material as well fibrous plants used for clothing and bark and wood used for weapons and tools.

Most of the geology within the Project Area is of the Devonian age, with alluvial and residual deposits developing during the Quaternary period. The Project Area contains a number of small outcrops of sandstone, siltstone, granite and volcanic bedrock. Some geological groups also contain quartz and siliceous deposits which may have provided areas suitable for shelter, art, quarries and grinding as well as material for lithic production.

The combination of mild temperatures, and reasonable annual rainfall would suggest that the Southern Eastern Highlands make a suitable area for human occupation for much of the year, with the exception of the winter months experiencing temperatures below 0°Celcius.

Over the past 100 years, the Project Area has been subject to prolonged disturbance associated with agricultural activities including extensive clearing, ploughing, the construction of dams, and pasture improvements. These are likely to have impacted archaeological materials on the surface and in the top 200-300 millimetres of soil. Most notably, ploughing has been recognised as affecting archaeological deposits by displacing them horizontally and vertically in the soil profiles. Both clearing and grazing activities also impact archaeological deposits, as they reduce the ground cover, making it easier for cultural deposits to be exposed due to soil deflations. Clearing also removes mature trees from the regions, having a direct impact on the survivability of culturally modified trees. Though the presence of hoofed animals does have some impact on surface deposits, the impact is highly dependent on other variables, such as ground cover, topography and the density in which stock is grazed.

The erosion identified in the Project Area is severe in some places and has the potential impact of exposing subsurface cultural sites. The other forms of disturbance that have been identified in the project area, such as outbuildings and roads, would have a high impact on surface and subsurface archaeological deposits in a defined area.

6.6.2 Aboriginal Community Consultation

Aboriginal consultation was undertaken with the Project's Registered Aboriginal Parties (RAPs) to identify and assess the significance of Aboriginal objects and/or places present within the Project Area. The ACHA is guided by Aboriginal people being the primary determinants of what is defined as the 'cultural significance' of their heritage. As such, the RAPs also provided insight to inform mitigation and management measures.

Aboriginal consultation was undertaken in accordance with the Consultation Requirements, which outlines the following four-step process:

- **Stage 1 – Notification and Registration of Interest –** In accordance with consultation requirements, Several government agencies were contacted including Heritage NSW, Pejar Local Aboriginal Land Council (PLALC), Office of the Registrar – *Aboriginal Land Rights Act 1983*, National Native Title Tribunal (NTSCORP), Gundungurra Local Aboriginal Land Council and the Upper Lachlan Shire Council. Umwelt sent expression of interest to several Aboriginal parties inviting them to become RAPs for the Project. A notification was placed in the Goulburn Post newspaper detailing Project information and a request for Aboriginal knowledge holders to express their interest in the Project. As a result of the expression of interest and public notice, Nine RAPs registered interest in being consulted for the Project (One request for details to not be disclosed – Anonymous 1)
    - Sonione Wakabut Rogers
    - Wingarra Wilay Aboriginal

- Anonymous 1
- Kazan
- Yurwang Gundana
- Burra Burra Aboriginal Corporation
- Thomas Dhalstrom
- Thunderstone Aboriginal Cultural and Land Management Services Aboriginal Corp
- PLALC.

- **Stage 2/3 – Presentation of Information (stage 2) and gathering cultural information (stage 3) –** Umwelt issued a letter to the RAPs outlining key information and the proposed methodology for the ACHA for their feedback. No responses were received relating to the proposed ACHA methodology, however, several RAPs expressed interest in being involved in the field survey for the ACHA (see **Section 6.6.4.2**).

- **Stage 4 – Review of the Draft ACHA –** A draft version of the ACHA inclusive of background Project information, results of the desktop assessment and field survey and draft significance and mitigation/management recommendations were issued to the RAPs for review and comment on 26 August 2024. Three responses were received from RAPs and addressed in the final version of the ACHA.

6.6.3 Assessment Overview

The ACHA aims to identify Aboriginal cultural heritage values relevant to the Project including Aboriginal objects and sites, Aboriginal social-cultural or historical values (which might not be related to Aboriginal objects) and/or areas of archaeological sensitivity.

The methodology included the identification and assessment of potential impacts of the Project's construction and operation on Aboriginal cultural heritage values. Additionally, the assessment identifies appropriate Aboriginal Cultural Heritage mitigation and management measures.

Information produced within the archaeological and environmental context in the ACHA have been employed to formulate a board predictive model that identifies the type and character of Aboriginal cultural heritage sites that may be present within the Project Area.

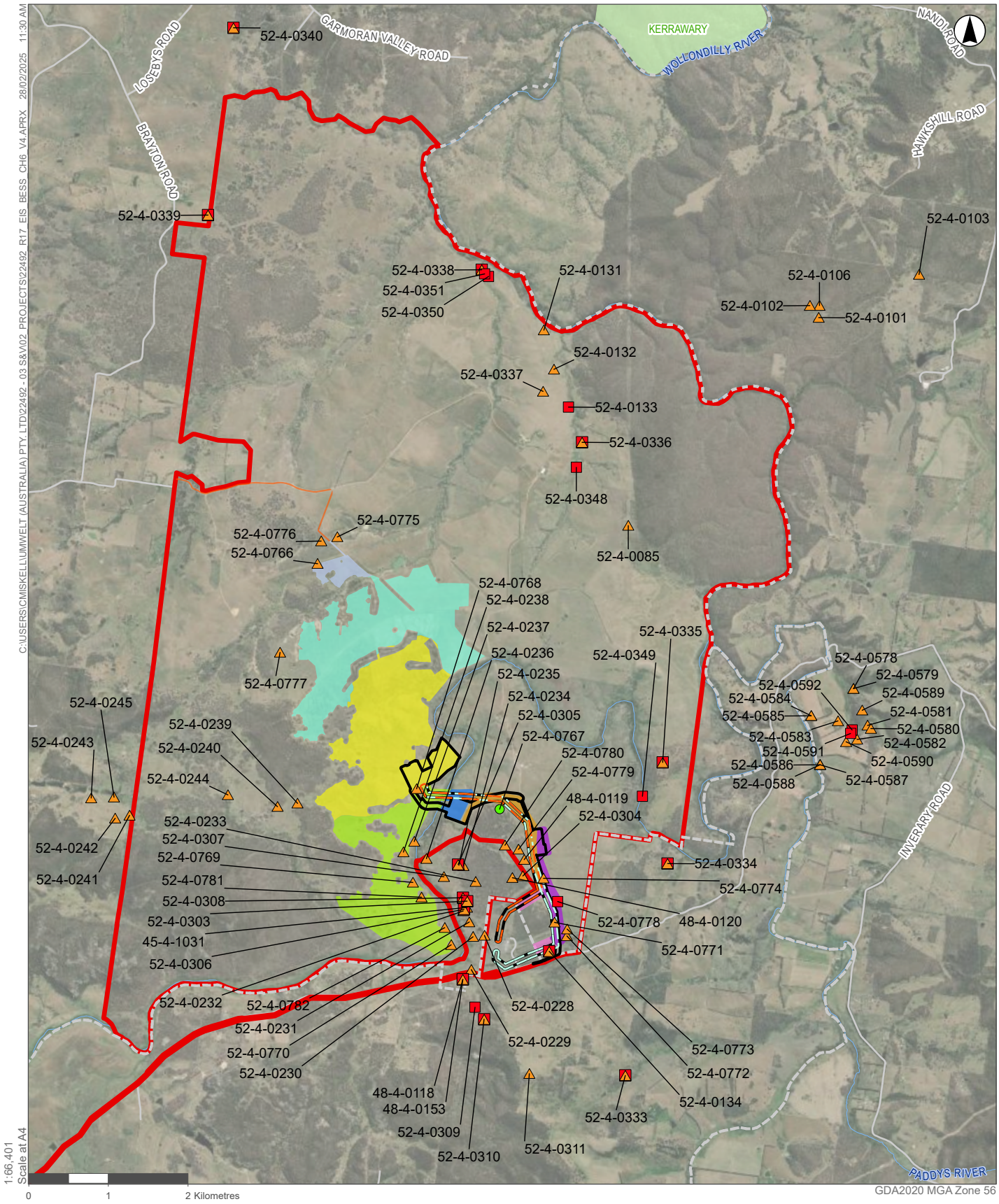
The predictive model aims to identify the landforms within the Project most likely to feature areas of Aboriginal cultural heritage significance.

An archaeological field survey (the field survey) was conducted between 22 and 25 January 2024 and attended by representatives of the Registered Aboriginal Parties (RAPs), a supplementary field survey in Survey Area 9 was conducted on 10 April 2024, also attended by RAPs.

The field survey aimed to:

- Complete a systematic survey that target areas that have been identified as having the potential to contain Aboriginal heritage values.

- Identify and record Aboriginal archaeological sites visible on the ground surface and areas of PAD.
- Categorise the Study Area into landform units. Sampling extent of each unit was determined by their predicted levels of archaeological sensitivity.
- Re-identify any previously recorded Aboriginal archaeological sites within the Project Area.



Legend

- Project Area
- Development Footprint – BESS
- Local Government Area
- NPWS Estate
- Roads
- Watercourses

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

Survey Unit

- Survey Unit 1
- Survey Unit 2
- Survey Unit 3
- Survey Unit 4
- Survey Unit 5
- Survey Unit 6
- Survey Unit 7
- Survey Unit 8
- Survey Unit 9

AHIMS Search Results

- Artefact
- Artefact, PAD
- Modified Tree (Carved or Scarred)
- Potential Archaeological Deposit (PAD)

FIGURE 6.10

AHIMs Sites and Survey Units

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Austral Archaeology (2024), AWS (2024)

6.6.4 Results

6.6.4.1 Desktop Assessment

The Project Area contains important features that would have been invaluable to Aboriginal daily lives as well as cultural practices, including the provided resources from the Wollondilly River and Mount Pleasant. With many sites being located in vicinity to nearby permanent water sources, the slopes above the rivers and creeks may have been the preferred location for the long-term aboriginal habitation. The ACHA found the Development Footprint is not located within a particularly sensitive archaeological landscape. Areas of high fluvial activity, such as those associated with the banks and lower terraces of the Wollondilly River, are likely to have low archaeological potential. Furthermore, previous archaeological investigations undertaken in the region have confirmed similar landscapes were unsuitable for Aboriginal habitation.

An AHIMS search was completed on 28 March 2024, and identified 85 previously recorded sites within a 20-kilometre radius of the Project Area. The search indicates that sites containing only artefacts are the predominant site type with over 70% (n=60) of known sites belonging to this category, followed by artefact; PAD sites (17.65%, n=15) and PAD sites (10.59%, n=9). A single modified tree was also identified and accounted for 1.17% of known sites.

The vast majority of sites are located in association with waterways, with many being located on the slopes above the rivers and creeks. The modified tree is located in the remnant of woodland that is also located above the river but has more association with an ephemeral creek line

6.6.4.2 Field Survey

The Development Footprint was divided into nine Survey Units (SU) which focused on the identified landforms. Survey Units 3 and 4 occur within the northern portion of the Project Area and do not fall within the Development Corridor and therefore excluded from the assessment. Following a general summary of the conditions observed during the survey, the results of the survey in each survey unit relevant to the Project are presented separately in **Table 6.25**.

Table 6.25 Survey Units within Project Area

Survey Unit (SU)	Description of Survey Area	Findings
SU1	SU1 is located in the Project Area's south-eastern portion. SU1 comprises an undulating hill landform with a moderate north-west to south-east slope scoured with minor drainage lines leading into an unnamed watercourse. Ground Surface Visibility (GSV) within SU1 ranges from 5–10%, whilst exposures averaged 5% and were associated with water erosion and some rabbit and wombat burrows.	Four Aboriginal sites were initially identified (AHMS #52-4-0771, AHIMS # 52-4-0774, AHIMS #52-4-0772 and AHIMS #52-4-0773), however due to a change in Development Footprint they are now located outside of SU1 and Development Footprint.
SU2	SU2 is located in the Development Footprint's southern portion. SU2 comprises a river terrace and riverbank landform with lower moderate slopes running north-south adjacent to the Wollondilly River. The most significant disturbances in SU2 were from the instillation of a concrete spillway and associated earthworks on each side and the historic clearing of vegetation for grazing.	No Aboriginal Heritage sites were identified within SU2.

Survey Unit (SU)	Description of Survey Area	Findings
	GSV within SU2 ranges from 5–10%, whilst exposures averaged 5% and were associated with water erosion and some rabbit and wombat burrows.	
SU5	SU5 is located in the Development Footprint's southern portion. SU5 comprises an undulating hill and elevated flat landform with gentle east-west and west-east slopes towards the Wollondilly River. Several dams are also present within SU5. GSV within SU5 was generally low, ranging from 5–15%, whilst exposures averaged 5–10% and were associated with water erosion, access tracks, scrapes near earth levies and some animal pads.	Four Aboriginal sites were initially identified (AHIMS #52-4-0769, AHIMS #52-4-0770, AHIMS #52-4-0782 and AHIMS #52-4-0781), however are not located within the Development Footprint.
SU6	Survey unit 6 (SU6) is located in the Development Footprint's central portion. SU6 comprises an undulating hill and crest landform with a moderate to gentle northwest-southeast slope scoured with minor drainage lines leading into the Wollondilly River. Several dams are also present within SU6. GSV within SU6 was generally low, ranging from 0–10%, whilst exposures averaged 5% and were associated with access tracks, animal pads, the base of trees and burrows.	One new Aboriginal site was identified within SU6; (AHIMS #52-4-0768).
SU7	Survey unit 7 (SU7) is located in the Development Footprint's southeastern portion. SU7 comprises an undulating hill crest landform with moderate to gentle east-west slopes scoured with minor drainage/gully lines leading into an unnamed watercourse. The watercourse joins the Wollondilly River approximately 880 metres to the northwest, inside of the Project Area. Several dams are also present within SU7. GSV within SU7 was generally low, ranging from 0–10%, whilst exposures averaged 0–10% and were associated with water erosion, the base of trees, fences, animal pads, and wombat burrows.	Three Aboriginal sites were initially identified (AHIMS #52-4-0767, AHIMS #52-4-0780 and AHIMS #52-4-0779), however due to a change in Development Footprint they are now located outside of SU7 and Development Footprint.
SU8	Survey unit 8 (SU8) is located in the Development Footprint's northern portion. SU8 comprises of undulating hills and flat landforms with moderate to gentle north-south slopes on either side of the access track into the property. Several dams are also present within SU8. GSV within SU8 was generally low, ranging from 0%–10%, whilst exposures ranged from 10%–20% and was associated with access tracks, and the base of trees.	Two Aboriginal sites were initially identified (AHIMS #52-4-0075 and AHIMS #52-4-0776), however due to a change in Development Footprint they are now located outside of SU8 and Development Footprint.
SU9	Survey unit 9 (SU9) comprises two rectangular areas measuring approximately 300 metres by 150 metres located in the Development Footprint's southern portion, and one 400 metres by 10 metre corridor that extends beyond the property boundary southwest along Canyonleigh Road. SU9 comprises an undulating hill landform with a moderate north-west to south-east slope scoured with minor drainage lines and gullies. One dam is also present within SU9. GSV within SU9 was generally low to moderate, ranging from 5–40%, whilst exposures averaged 5%. Exposures were associated with road shoulders, around access tracks, water erosion, scours around the base of trees, some rabbit and wombat burrows.	Two new Aboriginal heritage sites comprising isolated quartz artefacts were identified within SU9; (AHIM TBC and AHIMS TBC).

A total of 32 sites were identified during survey and test excavation across all survey units. 18 cultural heritage sites were identified during the surveys including 5 artefact scatters, 12 isolated artefacts and one scarred tree. A further 12 sites were identified during the test program as described in **Section 6.6.4.3**.

Twenty of the sites (66.6%) occurred on slope landforms, including mid and lower slopes, while six (20%) occurred on elevated flats. As mentioned above, landforms with steep gradients and higher elevations, such as ridgelines, spurs and crests located more than 200 metres from water sources possessed low archaeological potential. Few surface artefacts were identified on these landforms.

Eight (8) identified Aboriginal sites are located within the Development Footprint and will be impacted by the construction of the Project.

6.6.4.3 Test Excavation

Austral completed archaeological test excavations within the Development Footprint within areas of moderate archaeological potential. This consisted of seven archaeological testing locations over four main landforms, including a crest, elevated flats, lowers slopes, and spurs, refer to **Table 6.26**. Test Area 3 and Test Area 5 were located outside of the Development Footprint and have therefore been excluded.

Table 6.26 Test Areas within the Development Footprint

Test Area #	Description of Testing Area	Findings
1	Located along a ridge crest running east to west. The area was tested using two transects, A and B, separated by approximately 50 m, with each transects test pits spaced 20 m apart. Transect A focused on the northern portion of the ridge crest, while Transect B targeted a terrace just below the crest's northern side. Transect A has a dark reddish-brown clayey loamy sand A horizon with a clear transition to compact reddish-brown clay. Transect B lacks an A2 horizon in its shallower pits.	A single quartz distal fragment found in Transect A, test pit 2, spit 2, accounting for 4% of total assemblage across all tested area.
2	Located southeast of the Wollondilly River on a spur crest landform with two spurs extending south and west. Three transects, A, B, and C, were spaced 100 m apart, with 11 test pits distributed 20 m apart. Transect A had 5 pits, while Transects B and C had 3 each. Transects A and B have a dark reddish-brown A horizon gradually transitioning to pink mottled clay. Transect C features a yellowish-brown compact sandy clay.	A single red silcrete proximal fragment was recovered from Transect B, test pit 3, spit 2, accounting for 4% of total assemblage across all tested area.
4	Located adjacent to Wollondilly River and involved testing across three transects (A, B, and C), spaced 150 to 200 m apart and running southeast to northwest. Transect A included 7 test pits, with 2 additional pits as an extension of test pit 3. Transect B had 5 test pits, and Transect C had 1 test pit. The testing occurred under extremely wet conditions. Area 4 consisted of fine-grained, friable sandy silt transitioning to a clayey sandy silt, with a clay layer underneath. All test pits contained gravel and river pebbles.	Nine artefacts were recovered accounting for 36% of the total assemblage across all tested area. Transect A had 6 artefacts, including quartzite tools and fragments. Transect B had a red silcrete scraper, and Transect C had a quartz scraper and red silcrete debitage.

Test Area #	Description of Testing Area	Findings
6	Located adjacent to the Wollondilly River, Area 6 involved testing across three transects (A, B, and C), spaced approximately 200 m apart and running northwest to southeast. Each transect contained 4 test pits, with test pit 4 in each transect closest to the river. Testing was conducted under wet conditions. Area 6 comprised slopes, hollows, spurs, and valley landforms. Transect A's test pits 1, 2, and 3 were in a hollow, while test pit 4 was in a valley. Transect B was located on a slope, and Transect C spanned a slope and a spur. Soils featured a friable silty topsoil transitioning to a firm silty clayey sandy layer with a clay base, including roots, rocks, gravel, and river pebbles increasing with depth.	Nine artifacts were recovered from Area 6, accounting for 36% of total assemblage across all tested area. Transect A yielded 6 artifacts, including silcrete and quartz scrapers and fragments. Transect B had a quartz Bondi point and a distal fragment, while Transect C had a silcrete thumbnail scraper.
7	Located adjacent to the Wollondilly River, Area 7 involved testing along a single transect with 5 test pits, running southeast to northwest parallel to the river. Testing occurred under wet conditions. Area 7 featured a raised alluvial flat ending in an eastward slope near the river. Soils consisted of a pebbly layer over a clay base.	A single quartz flake piece was recovered from Transect A, test pit 5, spit 1, accounting for 4% of total assemblage across all tested area.

6.6.5 Assessment of Significance and Impact

Aboriginal cultural heritage sites are assessed under the following categories of significance, derived from the International Council on Monuments and Sites (ICOMOS) Burra Charter (ICOMOS, 2013):

- social or cultural value to contemporary Aboriginal people
- historical value
- scientific/archaeological value
- aesthetic value.

There are several topographic features located within the Project Area that contribute to the aesthetic value such as the Wollondilly River and Mt Pleasant. In the past, these areas would have been utilised by Aboriginal people, particularly due to the close water source, the elevated areas providing focal viewpoints and the low-lying areas to protect from weather. Following European settlement the use of the Project Area has mostly orientated toward agricultural practices which have negatively impacted the aesthetic value of the Project Area. More recently, rocket testing and the construction of a runway have also negatively impacted the aesthetic of the Project Area, reducing the overall significance. Based on this assessment, the Project Area is considered to have moderate aesthetic significance values.

The Project Area is considered to have moderate historic significance values as the Project Area is located near Mt Pleasant and the Wollondilly River (traditional name ‘Wundjigaribay’ meaning ‘white Waratah’), which are both associated with tangible and intangible cultural heritage. Historically, the presence of a permanent freshwater resource and diverse topographical features would have resulted in the Project Area being part of a beneficial location for daily life and cultural practice. Although there are no known Aboriginal individuals associated with the Project Area, the presence of these features would likely have been present in oral stories and part of Dreamings.

As social and spiritual significance are interdependent, Austral has undertaken a combined assessment of these values. The Consultation Requirements specify that the social or cultural values of a place can only be identified through consultation with Aboriginal people. The following submissions were received from RAPs during the completion of the project:

The assessed scientific values for the identified sites located within the Project Area have been determined on the basis of the sites' rarity, representativeness, and archaeological potential. To summarise, of the 48 sites identified within the Project Area the assessment of scientific significance identified two aboriginal sites as having moderate scientific significance which will not be impacted as they are outside the Development Footprint.

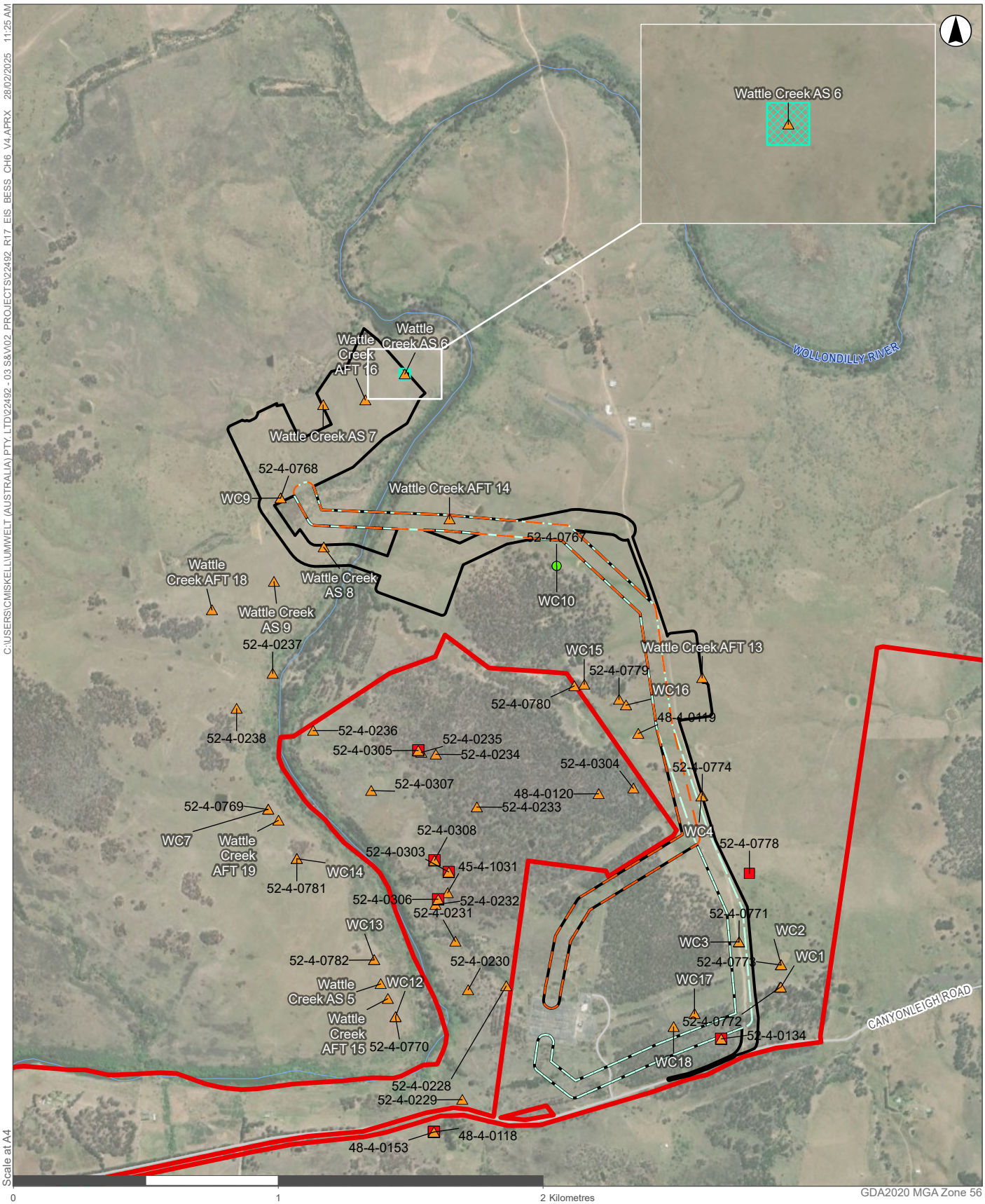
A total of eight Aboriginal archaeological sites would be impacted by the Project (see **Table 6.27**) and these sites are of low archaeological significance. For the sites within the transmission line easement, as much of the easement will be undisturbed, there will only be partial impacts to many of these sites. These impacts will be primarily related to pole construction and access tracks which will only impact discrete areas, however, have been considered as being totally impacted by the Project in **Table 6.27** as a worst-case scenario.

Strategies to further manage and mitigate the extent of impact to these sites are proposed in **Section 6.6.6** and include community collection of sites within the Development Footprint.

Table 6.27 Overview of Sites Being Impacted by the Project

Name of site / AHIMS Number	Type of Harm	Degree of Harm	Consequence of Harm
Wattle Creek 3 / #52-4-0771	Direct	Total	Total loss of value
Wattle Creek 4 / #52-4-0774	Direct	Total	Total loss of value
Wattle Creek 9 / #52-4-0768	Direct	Total	Total loss of value
Wattle Creek AFT 13 / AHIMS # Pending	Direct	Total	Total loss of value
Wattle Creek AFT 18 / AHIMS # Pending	Direct	Total	Total loss of value
Wattle Creek AS 9 / AHIMS # Pending	Direct	Total	Total loss of value
Wattle Creek AFT 16 / AHIMS # Pending	Direct	Total	Total loss of value
Wattle Creek AS 7 / AHIMS # Pending	Direct	Total	Total loss of value

As discussed in **Section 3.0**, construction related disturbance will be contained within the proposed Development Footprint, with the potential for further impact avoidance to be reviewed as part of the detailed design process, providing further avoidance of Aboriginal Heritage, as far as practicable.



Legend

- Project Area
- Development Footprint – BESS
- Roads
- Watercourses

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

Identified Sites

- Artefact
- Artefact, PAD
- Modified Tree (Carved or Scarred)
- Potential Archaeological Deposit (PAD)
- Site Extent

FIGURE 6.11

Recorded Sites

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Austral Archaeology (2024), AWS (2024)

6.6.6 Mitigation and Management Measures

As identified above, Aboriginal sites located within the Development Footprint have been assessed as possessing low archaeological significance and works may proceed with caution in these locations within the implementation of appropriate mitigation and management measures. The mitigation and management measures in **Table 6.28** have been developed based on the findings of the ACHA and the consultation process with the RAPs.

Table 6.28 Aboriginal Cultural Heritage Mitigation and Management Measures

AHIMS #	Mitigation and Management Methods	Phase
AH-01	Before any works occur, Spark Renewables will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) to mitigate and manage impacts to all Aboriginal heritage sites within and directly adjacent to the Project Area. These sites are protected under Section 90 of the NSW *National Parks and Wildlife Act 1974*. The ACHMP should apply to the construction, operational and decommissioning phases of the Project.	Construction Operation Decommissioning
AH-02	It is recommended that the ACHMP contains the following management and mitigation conditions: • A methodology for the community collection of isolated artefacts Wattle Creek 3 (AHIMS # Pending), located within the Development Footprint that will be harmed by the proposed development. • A strategy for the long-term management of all Aboriginal objects collected during the community collection and test excavation program. The strategy should include provisions for reburial at a location nominated by Registered Aboriginal Parties adjacent to the Development Footprint. The strategy must be developed in consultation with Registered Aboriginal Parties. • Provisions for protecting Aboriginal heritage items outside the Development Footprint. • Include protocols for managing the discovery of human remains and previously unidentified heritage items within and adjacent to the Development Footprint. • Contain a contingency plan and reporting procedure if Aboriginal heritage items within or outside the Development Footprint are damaged. • Include protocols for conducting further archaeological and heritage assessment in any Development Footprints where this assessment has not already been carried out. • Ensuring any workers on-site receive suitable heritage inductions prior to carrying out any work on site. • Maintain and manage reasonable access for Aboriginal stakeholders to heritage items on site. • Provide for ongoing consultation with Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage on site. • Contain a program to monitor and report on the effectiveness of these measures and any heritage impacts of the Project.	Construction Operation Decommissioning

AHIMS #	Mitigation and Management Methods	Phase
AH-03	In the event that unexpected finds occur during any activity within the Project Area, all works in the vicinity must cease immediately. The find must be left in place and protected from any further harm. Depending on the nature of the find, the following processes must be followed: • If while undertaking the activity, an Aboriginal object is identified, it is a legal requirement under Section 89A of the NPW Act to notify Heritage NSW, as soon as possible. • If human skeletal remains are encountered, all work must cease immediately and NSW Police must be contacted, they will then notify the Coroner's Office. Following this, if the remains are believed to be of Aboriginal origin, then the Aboriginal stakeholders and Heritage NSW must be notified.	Construction Operation Decommissioning
AH-04	It is recommended that Spark Renewables continues to inform Aboriginal stakeholders about the management of Aboriginal cultural heritage within the Project Area throughout the life of the Project. The consultation outlined as part of this ACHA is valid for a period of 6 months and must be maintained after this by the Proponent for it to remain continuous and comply with Consultation Requirements (DECCW 2010b).	Construction Operation Decommissioning
AH-05	A copy of the ACHA should be forwarded to all Aboriginal stakeholder groups who have registered an interest in the Project.	Pre-construction

6.7 Historic Heritage

A Statement of Heritage Impact (SoHI) (see **Appendix 9**) was undertaken by Austral Archaeology (2024) to assess the impact of the Project on any listed and/or unlisted items of historic heritage significance located within or in Proximity to the Project. This section outlines the key findings of the HHIA, the potential impacts of the Project on historic heritage and proposed mitigation and management measures.

The SoHI was prepared in accordance with the requirements of the Project's SEARs (see **Appendix 1**), which require:

- assess the impact to historic heritage having regard to the NSW Heritage Manual and comments from Upper Lachlan Shire Council.

The SoHI was also prepared with consideration of the best practice principles contained in the:

- The Australia ICOMOS Charter for Places of Cultural Significance 2013 (the Burra Charter) (Australia ICOMOS, 2013)
- Assessing Significance for Historical Archaeological Sites and 'Relics' (NSW Environment and Heritage, 2009)
- The Historical Archaeology Code of Practice (Department of Planning, 2006)
- Part 4 of the EP&A Act
- Upper Lachlan Local Environmental Plan 2010
- Upper Lachlan Development Control Plan 2010.

6.7.1 Existing Heritage Environment

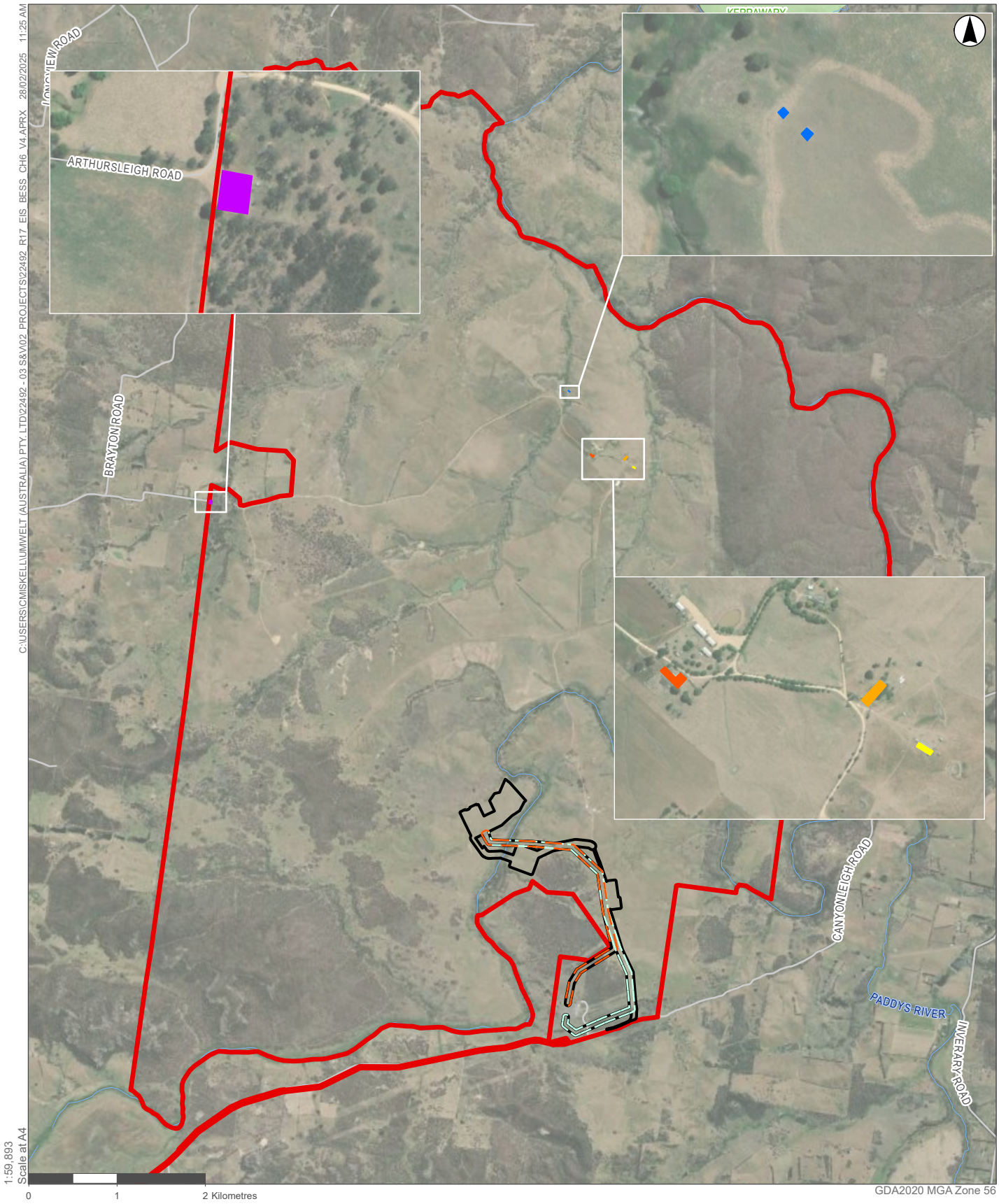
The Project is located in a landscape of gently undulating hills rising to a crest in the north and is characterised by low lying, predominantly cleared agricultural land. The Project Area comprises numerous open grassed paddocks with some areas of mature tree stands. Due to its relatively flat terrain, the Project Area has largely limited views. Several historic buildings are located within the subject site appear on the non-statutory National Trust Register. This group of buildings are referred to as the Arthursleigh Group (#R3967) and include:

- Homestead.
- Woolshed.
- Shearers Quarters.
- Former Staff Quarters.

The Project Area has significant connection to early European settlement and was established by Hannibal Macarthur when he was granted 1,000 acres in 1819. During Macarther's ownership, the property reached 19,780 acres including several buildings such as the homestead, shearer's quarters and, woolshed, making them some of the oldest structures in the region.

The identified heritage items within the Project Area comprise a homestead, shearers' quarters, convict-built woolshed, cemetery, and the uniting church (see **Figure 6.12**). The homestead was built in the 1820s followed by the granite woolshed in the 1830s and the uniting church having been constructed in 1879. All the heritage items are still extant within the parts of the Project Area where they were originally constructed. The identified heritage items within the Project Area related to the Arthursleigh property are exceptional examples of housing, farming infrastructure, and a religious building from this era. The items are associated with the emergence of the wool industry within NSW, as well as having a strong association with early pioneers including Hannibal Hawkins Macarthur and Thomas Holt. The Project Area also represents continuous use for farming for over 200 years and since the 1970s has been an important research facility for the UoS. It has also provided the Uniting Church with a regional place of worship and a place of burial for the local community.

Thomas Holt purchased the Arthursleigh estate in 1853 and remained in the family until acquired by UoS in 1979. The current use for the estate of 17,720 acres is as a working farm and research facility by the UoS.



Legend

- Project Area
- Development Footprint – BESS
- NPWS Estate
- Roads
- Watercourses

Proposed Transmission Line

- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement

Identified Heritage

- Church and Cemetary
- Graves
- Homestead
- Shearer's Quarters
- Woolshed

FIGURE 6.12

Identified Heritage Sites

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Austral Archaeology (2024), AWS (2024)

6.7.2 Methodology

The following approach was utilised to assess the impacts of the Project on any listed and/or unlisted items of historic heritage significance located within or in proximity to the Project and to identify appropriate mitigation and/or management measures.

Desktop assessment of all relevant historical heritage databases was undertaken to identify any listed heritage items located within or in 5 km proximity to the Project Area. This included searches of:

- The Commonwealth and National Heritage Lists (established under the EPBC Act).
- The State Heritage Register (established under the *Heritage Act 1977* (NSW).
- Section 170 Heritage and Conservation Register (where publicly accessible) (NSW State agency heritage registers).
- Relevant Local Environmental Plans (LEPs).

Additionally, two visual field inspections of the Project Area were undertaken by Austral in May 2024 and June 2024 to confirm the setting and context of the Project Area, and to identify if any unlisted items of heritage significance were located within the Project Area. Furthermore, any areas of historical archaeological potential were identified within the Project Area. Archaeological potential of the Project Area was informed by the extent of disturbance present in the Project Area which was determined by a desktop review of relevant land use history.

The following was undertaken:

- An assessment of likelihood, extent and nature of potential impacts on identified listed or unlisted items of heritage significance was undertaken using the heritage impact gradings included at and Table 2.4 of the SoHI. The impact ratings were developed in accordance with Heritage NSW guidelines and the Burra Charter.
- The SoHI then outlined appropriate measures to avoid, manage and/or mitigate any identified impacts.

6.7.3 Assessment of Significance and Impact

No heritage items or places listed on the Commonwealth, National or State Heritage lists are located within the Project Area (see **Figure 6.12**), as confirmed by the visual field inspection of the Project Area. Furthermore, no items listed on any s170 Heritage and Conservation Registers (NSW State agency heritage registers) or Schedule 5 of an LEP are located within the Project Area.

There is only one Statement of Significance for the Project Area which was completed in 1987 by the National Trust of NSW. However, this assessment excludes the church and two cemeteries. A revised Statement of Significance was conducted and has been summarised below.

None of the identified heritage sites are located within the Development Footprint.

6.7.3.1 Comparative Analysis

A comparative analysis was undertaken on the following comparable proven historically significant items:

- Bannaby Woolshed and Rix Grave Site located 20 km from the Project Area.
- Vineyard Cottage located nearby Parramatta NSW.
- Elizabeth Farm located nearby Parramatta NSW.

The comparative analysis concluded that Arthursleigh contains the oldest known intact woolshed in the surrounding regions, and possibly one of the oldest in Australia. In addition, the homestead's construction in 1820 makes it one of the oldest examples of farm dwellings in the region. Arthursleigh therefore represents a number of significant rarities in the region, and even from across NSW with examples of early 19th century farming infrastructure, including evidence of convict construction, an identified private cemetery with graves from at least 1830 and an intact agricultural layout that is easy to interpret.

It also identified that Arthursleigh is a rare example of an intact agricultural layout that is easy to interpret and has an intact dwelling (with modifications), woolshed, shearer's quarters and private cemetery. The existence of an intact and well managed Uniting Church and graveyard extends the rareness of the site considerably. In addition, the public significance of two of the owners, Hannibal Hawkins Macarthur and Thomas Holt, as well as the construction of the woolshed being convict-led creates an even higher rarity for the site especially given the aforementioned intactness.

6.7.3.2 Assessment Against NSW State Heritage Register Criteria

An assessment was conducted on the Arthursleigh complex (including the homestead, woolshed, shearer's quarters and private cemetery) and the Big Hill Uniting Church against the NSW State Heritage Register Assessment Criteria. The assessment found that Arthursleigh meets the definition for 5 of the 7 SHR Criterion and demonstrates heritage significance at a state level, the 5 criteria met were:

- Criterion (a) Historic significance.
- Criterion (b) Historical association.
- Criterion (c) Aesthetic/creative/technical achievement.
- Criterion (e) Research potential.
- Criterion (f) Rare.

However, the Big Hill Uniting Church only met the definition for 2 of the 7 SHR Criterion (Criterion (d) Social, cultural and spiritual, and Criterion (g) Representative) and demonstrates heritage significance at a local level.

Arthursleigh contains several heritage items that likely meet the threshold for state significance, and each has been graded from moderate to exceptional in heritage significance, refer to **Table 6.29**. While the Project Area contains items of heritage significance, the Development Footprint and associated works will not have a detrimental impact on the identified heritage items. The Development Footprint is located a minimum of 1.8 km south of the identified heritage items and wholly in an area with restricted visibility from the heritage items, due to this the Project is acceptable from a heritage impact viewpoint.

Table 6.29 Grading of Significance of Components within Arthursleigh

Heritage component	Grading	Justification
Homestead	Exceptional	While the homestead at Arthursleigh has had modifications from its original design, these additions are in keeping with the original style and show the changing needs of farming families from 1820 through to the middle of the 20th century. The homestead directly relates to the agricultural elements of the site and is a key component to the operation and overseeing of the property. As it was originally constructed in 1820 by convict labour, and served as the residence of both Hannibal Hawkins Macarthur and Thomas Holt when they attended the property, the homestead is a significant item within the cultural history of NSW.
Woolshed	Exceptional	The woolshed at Arthursleigh is dated at c1830 which may make it the oldest intact woolshed in NSW, and certainly one of the oldest in the nation. The intricate stonework in the front portion of the building as well as the roof structure adds to the aesthetic significance of the item. In addition, the woolshed was constructed using convict labour which contributes greatly to its significance as an example of the contributions made through the convict assignment programs.
Shearer's Quarters	Moderate	There is no construction date for the shearer's quarters within the historic record; however, due to the style of the building it is considered to be from the early 20th century. Worker's accommodations are not rare, and the style of the structure is common for the type of on-farm accommodation. The significance of this component is that it completes the agricultural precinct and would have been an integral part of wool production at the site.
Private cemetery	Exceptional	Currently, there are only 2 known grave sites at Arthursleigh, those of Donald Bain and John Morrison. The oral history suggesting there are "many" unmarked graves, of which it is believed were mostly convict, makes this component exceptionally significant, especially given the research potential to locate unmarked graves.
Big Hill Uniting Church and cemetery	High	Local churches in the Victorian Gothic style from the late 1800s are not unique in rural areas, however the association with Thomas Holt and the 999 year lease of the land from such a significant farm as Arthursleigh as well as the intactness of the church makes the significance grading high.

In addition to the above Statement of Significance, viewlines from these individual components are provided in **Photo 6.1** and **Photo 6.2**.

Photo 6.1 Viewline to the south of the woolshed showing undulation of the Project Area, facing Development Footprint

Photo 6.2 Viewline to the south of the shearer's quarters, towards the Development Footprint showing undulation of the Project Area

6.7.3.3 Direct Impact(s)

The Project would not result in a direct physical impact on any listed heritage items as no listed or non-listed heritage items or areas of historical archaeological potential were identified within the Development Footprint.

No works to the significant fabric of the Arthursleigh Group in the vicinity of the Development Footprint would occur. The Project would therefore not result in any direct physical impact to any of the above listed heritage items.

6.7.3.4 Indirect Impact(s)

The Project will introduce infrastructure into the landscape of the Project Area which is currently dominated by sparse rural dwellings, remnant vegetation and ancillary structures. This will change the setting and views across the Project Area and reduce inherent landscape characteristics of the broader landscape. However, the predominant areas of change are located away from the local and state listed heritage items as discussed in **Section 6.7.3** and the broader landscape character in the vicinity of these heritage items would not be affected by the Project.

6.7.4 Mitigation Measures

The assessment indicates the Project can proceed, and no further investigation or assessment is required in terms of heritage. A range of mitigation strategies are proposed to avoid impact to any on historic heritage as summarised in **Table 6.30**.

Table 6.30 Historic Heritage Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
HH-01	If historical archaeological relics not assessed or anticipated by this report are found during undertaking of the works, all works in the immediate vicinity are to cease immediately and Heritage NSW be notified. A qualified archaeologist is to be contacted to assess the situation and consult with Heritage NSW regarding the most appropriate course of action.	Construction
HH-02	Should the actual development be altered significantly from the proposed design, then a reassessment of the heritage impact will be required. This includes any impacts not explicitly stated in Section 4 of the SoHI and the installation of any subsurface services.	All Phases
HH-03	If Aboriginal archaeological material is found during earthworks, work must stop immediately for an archaeologist to assess the find. The archaeologist may consult Heritage NSW and relevant Aboriginal stakeholders, and Heritage NSW must be notified within a reasonable time per Section 89A of the *National Parks & Wildlife Act 1974*.	Construction Operation Decommissioning
HH-04	A copy of this assessment should be lodged by the proponent in the local history section of the local library, and in the library maintained by the Heritage NSW.	Pre-Construction

6.8 Traffic and Transport

Concerns regarding traffic impacts were identified by the community during the stakeholder consultation process (refer to **Section 5.0**). In particular, the increase in traffic volumes on local roads (such as Canyonleigh Road), road safety, safety of children waiting for school bus, and the condition of local roads were identified. A Transport Impact Assessment (TIA) (refer to **Appendix 10**) has been prepared for the Project by Access Traffic Consulting (Access Traffic) to assess the existing transport network conditions and the anticipated Project impacts during construction, operation and decommissioning.

The TIA was prepared in accordance with the requirements of the SEARs (**Appendix 1**), which require:

- an assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail
- an assessment of the likely transport impacts to the site access route(s), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance
- a cumulative impact assessment of traffic from nearby developments
- provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority
- an assessment of impacts of all proposed road works, including heritage, noise, and biodiversity impacts.

The TIA also addresses the additional requirements of Upper Lachlan Shire Council (Council) and Transport for NSW (TfNSW), as detailed in **Appendix 10**. Key outcomes of the TIA in relation to the Project are summarised below, with cumulative traffic impacts discussed in **Section 6.16**.

6.8.1 Existing Transport Network

6.8.1.1 Roads

The Project Area is accessed directly from Canyonleigh Road. BESS components would be delivered to either Port Botany in Sydney (approximately 128 km northeast of the Project Area) or Port Kembla south of Wollongong (approximately 76 km northeast of the Project Area) and transported to the Project Area by truck via the Hume Highway.

Two transport route options from the Hume Highway to the Project Area (refer **Figure 3.5**) have been considered (Red Hills Road/Ambrose Road/Brayton Road or Brayton Road only). The main access to the Project Area is located on the southern boundary via Canyonleigh Road.

A description of the key Project Area Road links providing access to the Project Area is provided in **Table 6.31**.

Table 6.31 Key Project Road Links and Intersection

Road or Intersection Name	Description
The Hume Highway	• A State controlled major inter-city national highway (M31), running between Melbourne in the southwest and Sydney in the northeast. • Two-lane, undivided sealed road with varying shoulder widths and formations. • Posted speed limit of 110 km/h. • Approved B-double route and OSOM Load Carrying Vehicle Network. • Connects to the M5/M7 Interchange at Prestons and the Illawarra Highway (A48).
Brayton Road	• A rural collector road under the jurisdiction of Goulburn Mulwaree Council. • Two – way sealed local road with a single travel lane in each direction. • Posted speed limit of 80 km/h. • Approved B-Double route.
Ambrose Road	• A rural collector road under the jurisdiction of Goulburn Mulwaree Council. • Two – way sealed local road with a single travel lane in each direction. • Posted speed limit of 80 km/h. • Approved B-Double route.
Red Hills Road	• A rural collector road under the jurisdiction of Goulburn Mulwaree Council. • Two – way sealed local road with a single travel lane in each direction. • Posted speed limit of 80 km/h. • Approved B-double route.
Canyonleigh Road	• A rural access road under the jurisdiction of Goulburn Mulwaree Council. • Two-way unsealed local road, traverses the southern boundary of the Project Area in an east to west direction.

6.8.1.2 Traffic Flow Along Canyonleigh Road

Current traffic flows on road network were recorded using automatic tube counts and documented in the TIA refer to **Appendix 10**. The results indicate that Hume Highway bi-direction daily movements are 22,257 per day, Hume Highway/Red Hills Road/Ambrose Road are 433 per day, Brayton Road/Ambrose Road are 843 per day, Canyon Leight Road are 120 per day. Current volumes on the relevant sections of the identified roads were all within the generally accepted capacities for a multilane motorway / highway Existing Traffic Volumes (>60,000 vpd – Hume Highway), and sealed rural collector roads (1,500–3,000 vpd – Red Hills Road, Ambrose Road and Brayton Road).

6.8.1.3 Intersections

The following intersections along the proposed transport route for the Project were assessed in the TIA:

- Hume Highway/Red Hills Road/Ambrose Road
- Ambrose Road/Brayton Road
- Brayton Road/Canyonleigh Road.

6.8.1.4 Road Safety

Historic crash data was sourced from the TfNSW Centre for Road Safety for the period between January 2018 to December 2022, in the vicinity of the Project Area including the proposed Project access on Canyonleigh Road. The historic crash data showed three crashes in the assessed period near the Project Area. None of the crashes involved a fatality or a serious injury.

6.8.1.5 Public Transport and Active Transport

Public transport services within the immediate vicinity of the Project Area are limited. There is a designated school bus stop located at the Brayton Road/Canyonleigh Road intersection.

6.8.1.6 Project Vehicle Types

Heavy vehicles (non-OSOM) to be utilised during the construction period would include the following type of vehicles:

- Semi-trailers (19 m) for the delivery of battery components within shipping containers.
- Heavy Rigid Vehicles (HRV 12.5 m) or truck and dogs for delivery of building materials such gravel and building materials.
- Agitators (concrete trucks).
- Vans and utilities.
- OSOM vehicles will be used to transport large electrical infrastructure including transformers, switchgear and operation/maintenance buildings to the Project Area. this will include low loader trailers with an overall length ranging between 30 m to 50 m.
- Construction workforce vehicles will include light vehicles.

6.8.2 Methodology

The assessment approach for the TIA involved:

- Review of background information (refer to **Section 6.8.1** and **Appendix 10**).
- Consultation with TfNSW and Council (refer to **Appendix 10**).
- Inspections of the Project Area and surrounding road network, specifically inspections of the proposed transport route for travel between the Hume Highway and the Project Area access.
- Traffic surveys (2024) and SIDRA modelling of key intersections along the transport route (refer to **Section 6.8.3** and **Appendix 10**).
- Estimating traffic generation and distribution of Project related traffic for construction, operation and decommissioning phases of the Project (refer to **Section 6.8.3** and **Appendix 10**).
- Assessment of the potential traffic impacts, including cumulative impacts, to the surrounding road network associated with the Project and identification of measures to mitigate impacts (refer to **Section 6.8.3**, **Section 6.8.4** and **Section 6.16** and **Appendix 10**).

6.8.3 Assessment of Impacts

6.8.3.1 Road Link Volume

The peak traffic generation for the Project is expected to occur during the peak period for construction (2026). The peak project traffic construction heavy vehicle volumes are provided in **Table 6.32** with further detail outlined in detail in the TIA (refer to Appendix 10) with a summary of the forecast Project volumes during this period, as well as the subsequent operations phase (10-year design horizon from end of construction – 2037) and decommissioning phase (2057).

Construction staff commuting from these local residential areas are expected to travel using private vehicles (light vehicles and 4WDs), with an average capacity of one staff member per vehicle. Maximum (peak) construction workforce will comprise approximately 102 staff, while outside of the peak construction period the daily staff numbers associated with the Project are expected to be significantly less (i.e. average 50–60 staff).

Table 6.32 Project Construction Heavy Vehicle Volume

Construction Phase	Duration	Total Vehicles	Type of Vehicles	Max Vehicles per Day
Site Establishment, Clearing and Fencing	2 months	553 vehicles	Semi-Trailer/ Low Loader Truck and Dog Combination	12 vehicles / day
Civil Earthworks	4 months	3,377 vehicles	Water Truck Truck and Dog Combination	36 vehicles / day
Component Delivery	12 months	940 vehicles	Semi-Trailer	4 vehicles / day
Battery Installation	14 months	163 vehicles	Semi-Trailer Water Tanker Truck and Dog Combination	1 vehicle / day
Substation Construction	12 months	763 vehicles	Semi-Trailer Special Transport Vehicles (Permit) Truck and Dog Combination	3 vehicles / day
O&M Building Construction	2 months	231 vehicles	Water Tanker Truck and Dog Combination	5 vehicles / day
Other – Site Water / Fuel & Waste Removal)	13 months	556 vehicles	Water Trucks Fuel Tanker Semi-trailer	2 vehicles / day

OSOM deliveries are proposed to be transported to the site from either Port Kembla or from a transformer manufacturer in Glen Waverly, Victoria. The Project will require three (3) OSOM component deliveries, including one (1) transformer, one (1) switchgear and (1) operation and control building to be delivered during the 18-month construction period.

Traffic and transport impacts associated with the Project would primarily occur during the construction phase as a result of the increase in traffic movements associated with workforce mobilisation and delivery of materials and equipment. Impacts during the operational and decommissioning phases would be significantly lower compared to the construction phase.

Based on the forecast Project volumes, the forecast traffic volumes on the relevant sections of the external road network were established for both with and without Project scenarios. These volumes were developed at the relevant design horizons for each phase of the Project (i.e. operations – 10-year design horizon 2037 and decommissioning 30-year Project life – 2057).

Based on the low background volumes on Canyonleigh Road in the vicinity of the access to the Project Area, it is proposed that the access be upgraded generally in accordance with the arrangement identified in Council's rural access standard drawing (SD-R 08A) (refer to **Appendix 10** for further detail).

6.8.3.2 Intersection Volumes

SIDRA analysis was also undertaken to establish the operational performance of existing configuration of the key Brayton Road / Ambrose Road and Brayton Road / Canyonleigh Road intersections for the relevant traffic scenarios for the construction, operation and decommissioning phases of the Project, considering the AM and PM peak periods (both Project and Network) at the critical design horizons for each phase.

The results indicate that the existing configuration of the Brayton Road / Ambrose Road intersection is expected to operate satisfactorily during all Project traffic scenarios identified for the Project (including cumulative assessments), with all values for intersection average delay times and vehicle queue lengths being well within acceptable limits of operation for a priority-controlled (give-way) intersection.

The results indicate that the Brayton Road / Canyonleigh Road / Carrick Road / Bulls Pit Road intersection is expected to operate satisfactorily (with upgrade works to (BAR) configuration) during all Project traffic scenarios (including potential cumulative traffic), with all values for intersection average delay times and vehicle queue lengths being well within acceptable limits of operation for a priority-controlled (give-way) intersection.

Based on these results, it is determined that the existing configuration of the intersections will be adequate to cater for the additional traffic volumes generated by the peak construction, operations and decommissioning phases of the Project.

6.8.3.3 Project Area Access and Frontage Impact

As identified in above, the Project includes a direct vehicular access points to the Project Area from Canyonleigh Road.

Based on the low background volumes on Canyonleigh Road in the vicinity of the proposed site access, it is proposed that the accesses be constructed generally in accordance with the arrangement identified in Council's rural access standard drawing (SD-R 08A).

Further to this, it is noted that additional hardstand area is required at the site access location to accommodate the swept paths of the OSOM transport vehicles, with the exact extents of these additional areas to be confirmed in subsequent detailed design phases of the Project once the final configuration of the transformer and associated transport vehicles are provided. The development footprint allows for the disturbance associated with the establishment of the required additional hardstand.

6.8.3.4 Road Link Capacity

In addition to the analysis of the proposed site access and the key intersections an assessment of the impact of the additional traffic generated by the various phases of the Project on the operation of the relevant road links within the external road network has also been completed.

This assessment identifies the expected increase in daily traffic volumes on the external road network during the critical peak construction, operation and decommissioning phases of the Project, and comments on the level of impact the forecast increase in traffic is anticipated to have on the operation of the identified road links.

The assessment concludes that the addition of the expected construction, operations and decommissioning phase traffic volumes from the Project will result in minor increases to the various sections of the state controlled Hume Highway, with larger increases identified on the local road links of Red Hills Road (25%), Ambrose Road (25%), Brayton Road (27% south of quarry access / 61% north of quarry access) and Canyonleigh Road (194%), noting that the higher percentage increases observed are generally as a result of the low background volumes on these local road links.

Further to this, it was noted that the cumulative addition of traffic from the Project and other adjacent SSD projects lead to minimal increase in daily traffic volumes on the relevant sections of the state controlled Hume Highway, with higher increases than for the Project only scenario on the relevant local road links including Red Hills Road (118%), Ambrose Road (118%), Brayton Road (113% south of quarry access / 264% north of quarry access) and Canyonleigh Road (845%), noting that the majority of the increases are as a result of the high traffic volumes identified to be associated with the construction phase of the proposed (but not constructed) Marulan Gas Fired Power Station project.

Notwithstanding this, it is noted that the post development or “with Project” volumes identified for the various Project traffic scenarios the total volumes on the relevant sections of the identified roads were all still within the generally accepted capacities for a multilane motorway / highway (>60,000 vpd – Hume Highway), and sealed rural collector roads (1,500–3,000 vpd – Red Hills Road, Ambrose Road and Brayton Road. As such it can be considered that the existing configurations of these roads provide adequate capacity to cater for the additional traffic volumes generated by the Project.

The TIA also notes that the upgrade works proposed to the relevant sections of Canyonleigh Road are expected to provide suitable capacity to accommodate the additional traffic volumes generated by all identified stages of the Project.

6.8.3.5 OSOM Transport Routes

The OSOM vehicle movements for the larger electrical infrastructure will be required to be undertaken under permit.

As such it is not anticipated that the relatively small number of OSOM movements (approximately 3 total over the construction period) will have a significant ongoing impact on the operation or capacity of the roads forming the proposed transport routes.

A detailed Traffic Management Plan (TMP) is proposed to be prepared during the detailed design phase once the exact configuration of the large electrical infrastructure and the associated transformer configurations and associated OSOM transport vehicles are confirmed. This TMP will be developed in consultation with local Council and TfNSW.

6.8.3.6 Road Safety

Under the safe systems approach road safety is generally improved by focussing on Safe Roads, Safe People, Safe Vehicles and Speed Management. Safe Road Use can be achieved by education of workers and communicating policies of the work site. Worker site induction should include driver education of the local road conditions and an adoption of a "drivers code of conduct", including:

- Driving to the conditions on unsealed roads.
- Avoid speeding and other dangerous behaviour.
- Identification and communication of known road crash cluster locations.
- Identification and warning of when roads may be affected by black ice, road damage (potholes) and incidents.
- A drug and alcohol policy to reduce incidents of drunk and drug driving.
- Additional caution of wildlife when driving at dawn and dusk.
- Measures to reduce the risk of workers driving while tired.
- Training drivers to respect private property and farm gates.

It is recognised that the Project may have an impact on sensitive land uses such as schools and residential precincts within townships along the identified OSOM haulage and material delivery routes. To minimise the impacts on schools it is recommended that temporary road closures for OSOM movements should be avoided during school peaks. To this end vehicle layovers should be identified along the proposed haulage routes to allow vehicles to wait until appropriate times for travel.

Speed reductions, use of fog lights during periods of low visibility, cessation of work and site shutdowns will be implemented as required during periods of adverse weather.

6.8.4 Mitigation and Management Measures

Through the implementation of management and mitigation measures and road network works as part of the Project, the potential traffic impacts of the construction, operation and decommissioning phases of the Project can be appropriately managed, with minimal traffic impacts anticipated on the relevant sections of the local government and state-controlled road networks.

The proposed traffic and transport management and mitigation measures associated with the Project are summarised below in **Table 6.33**.

Table 6.33 Traffic and Transport Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase

TT-01	A detailed Traffic Management Plan (TMP) will be developed in consultation with Local Council and DPHI for the Project as part of the CEMP and the decommissioning management plan. The TMP will provide details of all traffic management and mitigation measures, including but not be limited to:
	• Procedures for escort of OSOM vehicles.
	• Traffic control plans for temporary road closures to allow vehicles to cross to the other side of the carriageway where required.
	• Traffic speed reduction.
	• Safe work methods and strategies for working on roadways.
	• Indicative OSOM haulage schedule, including dates and times for transporting loads.
	• Location of suitable rest stops and vehicle layover areas along the proposed transport routes.
	• Driver Code of Conduct.
	• Communication strategy to affected communities.
	• Notification and consultation of key stakeholders including:
	  ○ police and emergency services
	  ○ local Councils along the route
	  ○ public and school bus operators that may be affected.
	• Advertising in local newspaper and media releases.
	• Contact details of foreman or project manager throughout operations to be shared with emergency services and road authorities.
	• Timing of operations and measures to avoid commuter peaks and school peaks through populated areas where practicable.
	• Consideration of cumulative impacts of other projects along the route, based on updated information that is available at that time.
	• Identification of layby areas for driver breaks and co-ordination of OSOM on site arrivals.
		Pre-construction
		Construction
		Decommissioning

TT-02	Implementation of community information and awareness program. Undertaken prior to construction commencing and then at regular intervals during the construction period.	Pre-Construction Construction

ID	Mitigation and Management Measures	Phase
TT-03	The following management and mitigation measures will also be implemented for the on-site, internal vehicle circulation facilities. Such measures could include: • On-site speed limits / restrictions along internal access tracks. • Appropriate dust suppression measures. • Implementation of condition inspection and maintenance program for on-site access tracks to ensure safe for use by project traffic. • Completion of all loading and unloading movements to occur within the designated work areas. No access track area or external streets or roads are to be used for material storage at any time. • Sufficient car parking is to be provided on-site to ensure vehicles do not park on the surrounding road network. • All car parking and loading areas to be designed in accordance with the relevant Australian Standard (2890 series) and Council requirements.	Construction
TT-04	Implementation of a safe systems approach within the Driver's Code of Conduct including: • Contractors are to ensure that all vehicles used are road worthy and in good working condition with lights, brakes, tire pressure etc. • Driving to the conditions on unsealed roads. • Avoid speeding and other dangerous behaviour. • Identification and communication of known road crash cluster locations. • Identification and warning of when roads may be affected by black ice, road damage (potholes) and incidents. • A drug and alcohol policy to reduce incidents of drunk and drug driving. • Additional caution of wildlife when driving at dawn and dusk. • Measures to reduce the risk of workers driving while tired. • Training drivers to respect private property and farm gates. • To minimise the impacts on schools it is recommended that temporary road closures for OSOM movements should be avoided during school peaks. To this end vehicle layovers should be identified along the proposed haulage routes to allow vehicles to wait until appropriate times for travel. • Speed reductions, use of fog lights during periods of low visibility, cessation of work and site shutdowns will be implemented as required during periods of adverse weather.	Pre-Construction

ID	Mitigation and Management Measures	Phase
TT-05	Design and implementation of Project Area access point on Canyonleigh Road in accordance with Council's standard rural access arrangement/configuration as per standard drawing SD-R 08 A.	Pre-Construction
TT-06	Provision of the following upgrade works: • Minor works to the Brayton Road / Canyonleigh Road / Carrick Road / Bulls Pit Road intersection to incorporate basic right (BAR) turn treatments on the southern Brayton Road approach to the intersection, generally in accordance with Figure 7.1 (rural BAR) of Part 4A of Austroads Guide to Road Design. The existing wide shoulder would be used to provide the intersection configuration and as part of these works, relocation of the existing school bus stop at the intersection may be required, subject to further consultation with Council to be undertaken to establish the most suitable location and intersection configuration. • Installation of advisory "truck turning" signage on the Brayton Road approaches to the intersection with the Canyonleigh Road / Carrick Road / Bulls Pit Road, to highlight to motorists the presence of the intersection and the increased potential for turning heavy vehicles to/from Canyonleigh Road. • Provision of resurfacing works to the existing carriageway of Canyonleigh Road in accordance with relevant standards. The design of these resurfacing works developed in consultation with Goulburn Mulwaree Council as part of the future detailed design phase of the Project. Completion of pre and post construction phase dilapidation inspections on the relevant sections of Brayton Road (Quarry Access to Canyonleigh Road) and Canyonleigh Road (Brayton Road to Site Access). The pre construction inspection is to be undertaken upon the completion of the proposed upgrade works and is to establish the pre-construction road condition, with the post construction dilapidation survey then used to identify rehabilitation works required to be completed by the Project to bring road conditions / standards on the relevant sections of these links back to the recorded pre construction condition.	Pre-Construction

6.9 Water Resources

A Water Resource Impact Assessment (WRIA) of the potential impacts of the Project on surface water supply, groundwater and hydrology was undertaken by WRM Water & Environment Pty Ltd (WRM) (September 2024) and is provided in **Appendix 11**. This section outlines potential water and flooding impacts, the key findings of the WRIA and proposed mitigation and management measures.

This WRIA was prepared in accordance with the requirements of the Project's SEARs (**Appendix 1**), which require:

- a detailed and consolidated site water balance and an assessment of the likely impacts of the development (including flooding) on surrounding watercourses (including their Strahler Stream Order) and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts including water management issues;
- details of water requirements and supply arrangements for construction and operation;
- a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004);
- assessing the impacts of the development, including any changes to flood risk and overland flows on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required;
- where the project involves works within 40 metres of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land (2018) and (if necessary) Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI 2003), and Policy & Guidelines for Fish Habitat Conservation & Management (DPE, 2013); and
- an assessment of the potential impacts of the development on the Sydney drinking water catchment, including consideration of Water NSW's current recommended practices and standards, a Water Cycle Management Study, stormwater quality modelling (MUSIC), and whether the development can be constructed and operated to have a neutral or beneficial effect on water quality consistent with the provisions of State Environmental Planning Policy (Biodiversity and Conservation) 2021.

The WRIA has been prepared with regard to the following guidelines and legislative framework specifically including:

- DPI Guidelines for Controlled Activities on Waterfront land (2018)
- Why Do Fish Need to Cross the Road? Fish Passage Requirements for Water Crossings (NSW Department of Primary Industries (DPI, 2003)
- Policy & Guidelines for Fish Habitat Conservation & Management (DPI, 2003)
- Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change, 2008)

- NSW State Groundwater Policy Framework Document and component policies (Department of Planning, Industry and Environment)
- NSW Aquifer Interference Policy 2012 (Department of Primary Industries Office of Water)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC).
- Australian Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia, 2018) (ANZG, 2018)
- Storing and Handling Liquids: Environmental Protection – Participants Handbook (Department of Environment and Climate Change, 2007.

6.9.1 Existing Environment

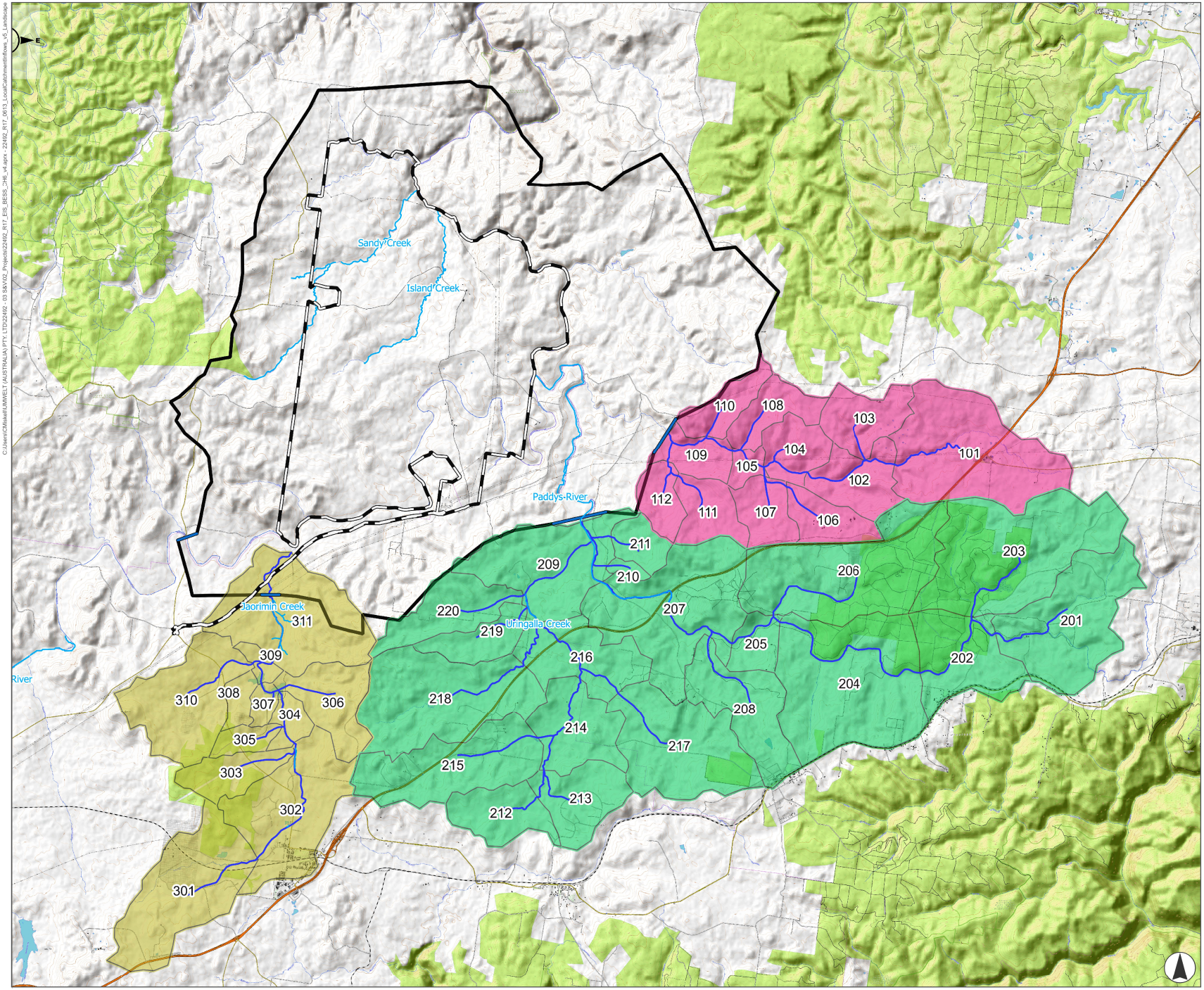
The Project Area is located in the Hawksbury-Nepean River catchment, Sandy and Island Creeks flow through the Project Area from the south-west to the north-east and into the Wollondilly River. Several other unnamed perennial creeks and drainage lines traverse the Project Area. The Wollondilly River ultimately drains into Lake Burragorang (Warragamba Dam), which is part of the Sydney drinking water catchment.

The majority of the hydro lines in the Project Area are 1st and 2nd order Strahler streams, with two mapped 4th order Strahler streams intersecting the southern portion of the Project Area, traversing west to south through the Development Footprint.

The Project Area is potentially subject to flooding from three primary sources: site runoff from short, intense rainfall events; local catchment flooding caused by medium-duration rainfall; and regional flooding due to long-duration rainfall affecting upstream catchments such as the Wollondilly River, Jaorimin Creek, Paddys River, and Long Swamp Creek (refer to **Figure 6.13**).

FIGURE 6.13

Local Catchment Inflows



Legend

- Project Area
- TUFLOW domain
- TUFLOW inflow
- Watercourse

URBS model

- Jaorimin Creek
- Long Swamp Creek
- Paddy's River
- URBS routing

0 1 2 3 km

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Image Source: ESRI Basemap (2024) | **Data Source:** NSW DFSI (2024), WRM (2024)

Groundwater within the Project Area is managed under the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023. A search of publicly available bore data from the Australian Groundwater Explorer (BOM, 2024) identified no registered groundwater bores located within the Project Area. The drilled depth of water supply and stock and domestic bores shown on **Figure 2.3** is reported at the adjacent ranges between 36 m and 120 m.

According to the Groundwater Dependent Ecosystem (GDE) Atlas (BOM, 2017), the Project Area is identified as containing GDEs (refer to **Figure 6.9**). These GDE's are mapped along the Wollondilly River, which runs through the Project Area. The GDEs in the area are classified as aquatic and have been assessed as having high potential in a national assessment (DPE, 2012).

The NSW Government (2023) describes groundwater vulnerability as the risk of aquifers being contaminated, influenced by factors like water table depth and soil type. A review of mapping provided by the NSW Government shows no groundwater vulnerability areas within the Project Area (DPE, 2014).

The Project Area does not contain nationally important wetlands. The Project Area lies approximately 118 km to the South-West of the Ramsar wetland Towra Point Nature Reserve.

No historical flooding has been recorded within the Project Area, and there is no available water level data or anecdotal evidence, such as debris marks, to inform this assessment. Additionally, existing flood studies for the Goulburn Local Government Area do not extend into the Project Area, though nearby studies have contributed to understanding potential flood risks.

6.9.2 Methodology

The WRIA provides an assessment of the potential impacts of the Project on the water resources in the vicinity of the Project Area. The assessment considers surface water, groundwater, water quality and hydrology impacts associated with the construction, operation and decommissioning of the Project and includes the following scope:

Assessment of the potential impacts on:

- flooding for the 10%, 1%, 0.5%, 0.2% Annual Exceedance Probability (AEP) events and the Probable Maximum Flood (PMF) for the current climate
- future 1% AEP flood risk under a changing climate projected over 30 years depending on the actual emissions trajectory is likely to be between the bookends of:
    - 0.5% AEP current climate as a proxy for SSP1: very-low emissions
    - 0.2% AEP current climate as a proxy for SSP5: high emissions.
- Probable Maximum Flood (PMF), which was modelled using the Probable Maximum Precipitation (PMP) depths to determine the extreme flood event
- erosion and sedimentation
- surface water and groundwater quality
- water users and supply

- confirming the environmental values and water quality objectives associated with surface water resources
- describing appropriate mitigation measures to manage the potential impacts.

6.9.3 Assessment of Impacts

6.9.3.1 Surface Water Quality

Water quality impacts are most likely to occur during the construction and decommissioning phases of the Project, when activities such as vegetation removal, excavation, and material stockpiling could disturb soils, potentially leading to sediment or pollutant runoff into nearby waterways and drainage lines. Weather events, particularly major storms during critical phases of construction, are expected to be a key factor influencing the extent of sediment runoff and stormwater pollution. However, with the implementation of erosion and sediment control measures (outlined in **Table 6.34**), these impacts are expected to be effectively managed and remain minimal.

Water quality impacts during the operational phase are anticipated to be minimal, as activities will primarily involve routine maintenance and monitoring. However, there is potential for stormwater runoff from impervious surfaces, accidental spills, or discharge from chemical use and storage, such as fuel, as well as herbicide use for vegetation control. With the operational management measures outlined in **Table 6.34**, water quality impacts during operation are expected to be negligible.

Minor road upgrades along Canyonleigh Road are expected to have minimal impacts during construction through the implementation of erosion and sediment control measures. Additionally, the upgrades will be designed with appropriate erosion and scour protection to minimise construction-related erosion and sedimentation impacts. These works will also include the installation of cross drainage for waterway crossings, considering flood conditions in the streams to meet flood immunity requirements for access roads and internal tracks. Measures include the provision of adequately sized pipe drainage or floodway to manage overland flow, erosion protection downstream of crossings, and energy dissipators to prevent erosion of pipes and batters. Planned works will be scheduled during forecasted dry weather periods to further reduce potential impacts. With the implementation of management measures outlined in **Table 6.34,** water quality impacts from the road upgrades are expected to be minimal.

As the Project Area is located within the Sydney Drinking Water Catchment, the consent authority must be satisfied that the development would have a neutral or beneficial effect (NorBE) on water quality. Neutral or Beneficial Effect on Water Quality Assessment Guideline (WaterNSW, 2022) indicates that a development is considered to have a NorBE on water quality if the development:

- has no identifiable potential impact on water quality, or
- will contain any water quality impact on the development site and prevent it from reaching any watercourse, waterbody or drainage depression on the site, or
- will transfer any water quality impact outside the site where it is treated and disposed of, to a standard approved by the consent authority.

- Water quality modelling was undertaken to estimate pre- and post-development stormwater discharge concentrations and loads for the purpose of determining whether the Project will have a NorBE on water quality. The modelling results indicated that:

- post-development mean annual total suspended solids (TSS), total phosphorus (TP) and Gross Pollutant loads discharged in stormwater would be lower than the pre-development loads. The predicted reductions are greater than 10% and are therefore NorBE compliant.

- post-development mean annual for total nitrogen (TN) loads discharge in stormwater are predicted to increase. This does not achieve WaterNSW NorBE criteria.

- TSS and TP concentrations achieve the NorBE criteria as concentrations are equal or better for the post-development scenario between the between the 50th and 98th percentiles. It is noted that TSS is better between the 5th and 98th percentiles.

- Post-development TN concentrations do not achieve the NorBE criteria of being better than the pre-development scenario between the 50th and 98th percentiles. TN concentrations are better for the post-development scenario above the 75th percentile result.

- While the water quality modelling indicates that WaterNSW NorBE criteria is achieved for all water quality characteristics, with the exception of mean annual TN concentrations. The impacts to receiving water quality downstream of the Project Area are expected to be negligible provided effective rehabilitation of the disturbance area is undertaken post-construction. However, refinement of the MUSIC water quality model will be undertaken during the detailed design phase of the Project to ensure the model reflects the detailed design and to optimise the operational stormwater treatment train. Based on this, and with the implementation of management measures outlined in **Section 6.9.5**, water quality impacts during the operational phase are expected to be negligible.

6.9.3.2 Impact on Stream Stability and Waterfront Land

There are several ephemeral and perennial hydro lines that traverse the Development Footprint as detailed in **Figure 2.3**. Additional investigation of these hydro lines during site inspections undertaken by numerous specialists supporting the EIS and analysis of aerial imagery determined that many of the mapped hydro lines presented do not have a defined bed or bank.

6.9.3.3 Water Supply Impacts

Water for construction would be sourced from commercial suppliers in the region (via water trucks). Farm dams within the Development Footprint will be removed and the water will be used for earthworks during the site preparation phase of construction. Water sources would be determined prior to the commencement of construction in consultation with suppliers and landholders, subject to availability. A water sourcing strategy would be developed to ensure there are no water supply impacts to adjacent landowners or other stakeholders.

As detailed in **Section 3.7.1**, total anticipated water demands are approximately 10.7 ML of non-potable and 0.95 ML of potable for the construction and decommissioning periods. Due to the low volumes of water required it is anticipated that the Project would not have a negative impact on water supply in the region.

During operations, minimal water demand would be required for ongoing maintenance activities, amenities, and potable purposes by operational staff as well as for stock. Operational water will be stored on site, separate to water supplies for the purposes of firefighting. Potable water demands for both the construction and operational phases of the Project will be primarily sourced from rainfall stored in on-site water tanks at the O&M facility and augmented by water trucks if required.

6.9.3.4 Groundwater Impacts

It is anticipated that the Project will have negligible interaction with groundwater based on the extent of ground disturbance and the features of the existing environment including the depth of nearby boreholes.

As detailed in **Section 6.9.1**, groundwater was identified at a depth of between 36 m and 120 m through identified surrounding stock and domestic bores. Additional assessment will be undertaken prior to construction noting any potential interactions with groundwater can be managed through the measures proposed in **Table 6.34**. Groundwater is not proposed to be used to supply water to the Project and the depth to groundwater within the Project Area (based on available information) means that groundwater quality impacts are also unlikely. Additionally, given the depth to groundwater within the Project Area, hydrocarbon/chemical spills are unlikely to infiltrate to the groundwater table.

Assessment of the potential for the Project Area to support GDEs was undertaken using the Australian Government's Bureau of Meteorology Groundwater Dependant Ecosystems Atlas (BOM 2019). There are aquatic Groundwater Dependant Ecosystems (GDEs) within the Project Area, including various high potential terrestrial GDEs within the portion of Wollondilly River that flows through the Development Footprint.

Should the final Project design identify that construction activities will result in the interception of groundwater, further assessment will be undertaken in accordance with the NSW Aquifer Interference Policy (NSW Government, 2012) and appropriate management measures developed to mitigate any potential impacts.

There will be no impacts to groundwater resources, including GDEs and bore users, during operation on the basis that the groundwater table will not be intercepted.

6.9.4 Flooding

Flood modelling was undertaken aimed to assess the current climate flood behaviour and conditions within the Project Area by developing hydrological and hydraulic models using publicly available data. These models were used to estimate flood inundation extents, levels, depths and velocities to assess flood risk and flood impacts for the Project and guide the development planning.

Flood modelling has used a range of publicly available data to develop an understanding of the existing environment and as inputs into the models. This has included gauge rainfall and flow data and flood frequency estimates as detailed below.

The nearest open Bureau of Meteorology (BOM) daily rainfall gauge to the Project Area is at Marulan (George St gauge 0700635), 20 km south of the Project Area. Given the proximity of the gauge to the Project Area, the recorded data is considered representative of the local region rainfall patterns. The period of record for the observation covers 112 years from 1894 to 1923 and then 1941 until 2024.

Design flows in the Wollondilly River at the upstream inflow boundary were estimated by applying the 1% flood frequency analysis derived and provided by GRC Hydro (2022) for the Murrays Flat gauge. The flow rate of 1550 m^3/s estimated for the Wollondilly River was applied as a constant inflow boundary.

Due to the size of the Wollondilly River catchment (2106 km^2) reaching the Project Area and the preliminary nature of this study, a hydrological model of the Wollondilly River catchment was not developed. Instead, representative flow data for the Wollondilly River was sourced from the regional Goulburn Mulwaree flood study report (GRC Hydro, 2022), which included a flood frequency analysis of Wollondilly River flows at Murry Flat (1606 km^2).

A two-dimensional (2D) TUFLOW flood model was was used to simulate the flow behaviour in the vicinity of the Project Area. Modelling was undertaken for 10%, 1%, 0.5%, and 0.2% Annual Exceedance Probability (AEP) events and the Probable Maximum Flood (PMF) as required in the SEARs and to identify the impacts associated with a broad range of rainfall events from highly improbable storms to probable events across the Project life. AEP is a measure of the likelihood a flood level or flow will be equalled or exceeded in any given year. The PMF is the largest flood that could be conceivably expected to occur at a particular location. Climate change modelling was also undertaken using the 1% AEP plus climate change in addition to the SEARs requirement to assess via proxy using the 0.5% and 0.2% AEP year flood events. This broad range of modelling aimed to assess the Project Areas sensitivity to an increase in rainfall intensity of flood-producing rainfall events due to climate change.

Further information regarding the development of the hydraulic model and the assumptions used is outlined in **Appendix 11**.

The modelling outputs for the Preliminary Design were used to define flood risk across the Project Area and inform the final design and layout of infrastructure within the Development Footprint. Hazards associated with flood model outputs were classified according to 6 classes of hazards in the Flood Hazard Categorisation.

Subsequently, the model was run with the Final Design to identify changes to flood extent, levels, depths and velocities as a result of the Project and any required mitigation and management measures. A blockage assessment in accordance with Australian Rainfall and Runoff 2019 methodology was undertaken.
A blockage assessment considered the perimeter fencing surrounding the Development Footprint and identifies the potential for floating, non-floating, and 'urban' debris to change the flood dynamics of the Project.

Further information regarding the methodology and assumptions and limitations applied to the assessment is provided in **Appendix 11**.

6.9.4.1 Assessment of Flood Impacts

The 10 %, 1 %, 0.5 %, 0.2 % AEP and PMF events were assessed to quantify flood depth, velocity, and hazard levels. Modelling has shown the Project Area to generally be of a low flood hazard with minimal risk of changes in internal or external waterway flows.

Flood risk and hazard was assessed across the Project Area and identified that:

- The 1% AEP identified the Project Area as Generally safe (H1).

- Isolated pockets of H2 (unsafe for small vehicles) and H3 (unsafe for vehicles, children, and older people) hazard exist where water accumulates. Peak stormwater discharges from the Project Area for impervious areas may increase slightly through the creation of compacted gravel roads and some small operational buildings.
- The Project Area (and Development Footprint) exhibited varying flood risk, however the majority of critical infrastructure was located outside the flood extent.
- Potential impact to drainage features and downstream watercourses are considered to be minimal due to the relative size of the Project Area in relation to the size of the receiving catchments, and the distributed nature of minor impacts. The total new impervious area for the Project is estimated to be minimal within the Development Footprint comprising:
    - Footings for transmission lines, substations and switchyards.
    - Roof areas relating to operation and maintenance buildings.
    - Access and hardstand area.

This total impervious area represents less than 1% of the total Project Area. Drainage from these impervious areas will not be directly connected, providing opportunity for distribution and infiltration of stormwater between the impervious area and receiving watercourse. Consequently, the hydrologic impacts of the Project at the catchment scale are likely to be undetectable. Minimal changes to the land topography, impervious fraction and therefore runoff and groundwater infiltration are expected due to the nature and extent of proposed infrastructure. Summary observations about flood behaviour are as follows:

- Results show that 10% AEP water is confined to watercourses within the Project Area. Water depths within the Project Area's watercourses reach up to 1.2 m, while depths in the Wollondilly River exceed 2.5 m.
- Within the Project Area, 1% AEP flood inundation extents, depths, velocities, and hazards have increased from the 10% AEP event. The Wollondilly River's flooding has risen at the riverbank but remains confined with no breakout flow paths. Flood depths near natural depressions and farm dams have reached around one meter, though overall flood hazard remains low across the Project Area.
- 0.5% AEP and 0.2% AEP: The flood depths are much more significant within the Wollondilly River. Flows are encroaching and breaking out of the riverbanks, particularly in the vicinity of the BESS infrastructure. Substantial flood hazards exist around areas adjacent to the Wollondilly River. The watercourses throughout the Project Area are beginning to fill and pose a flood hazard. Where flows are generated from rainfall occurring within the Project Area, flood hazards remain confined to watercourses. This indicates that the inundation impact due to climate change is not anticipated to be a significant issue for Project Area that is away from the banks of the Wollondilly River.
- Assessing the PMF of any site adjacent to a catchment as large as the Wollondilly River is difficult. The PMF is the largest flood that could conceivably occur at a particular location. While the PMF defines the extent of flood-prone land, that is, the floodplain. It is understood to be 'generally, it is not physically or economically possible to provide complete protection against this event'. As the PMF is the worst flood possible, and there are numerous dams on the Mulwaree and Wollondilly Rivers upstream of the Project Area, their releases, survival and arrival at the Project Area is difficult to determine. Estimated flood flows at Goulburn are an order of magnitude higher than the 1 in 500 AEP. Flooding can be expected to be extensive and devastating.

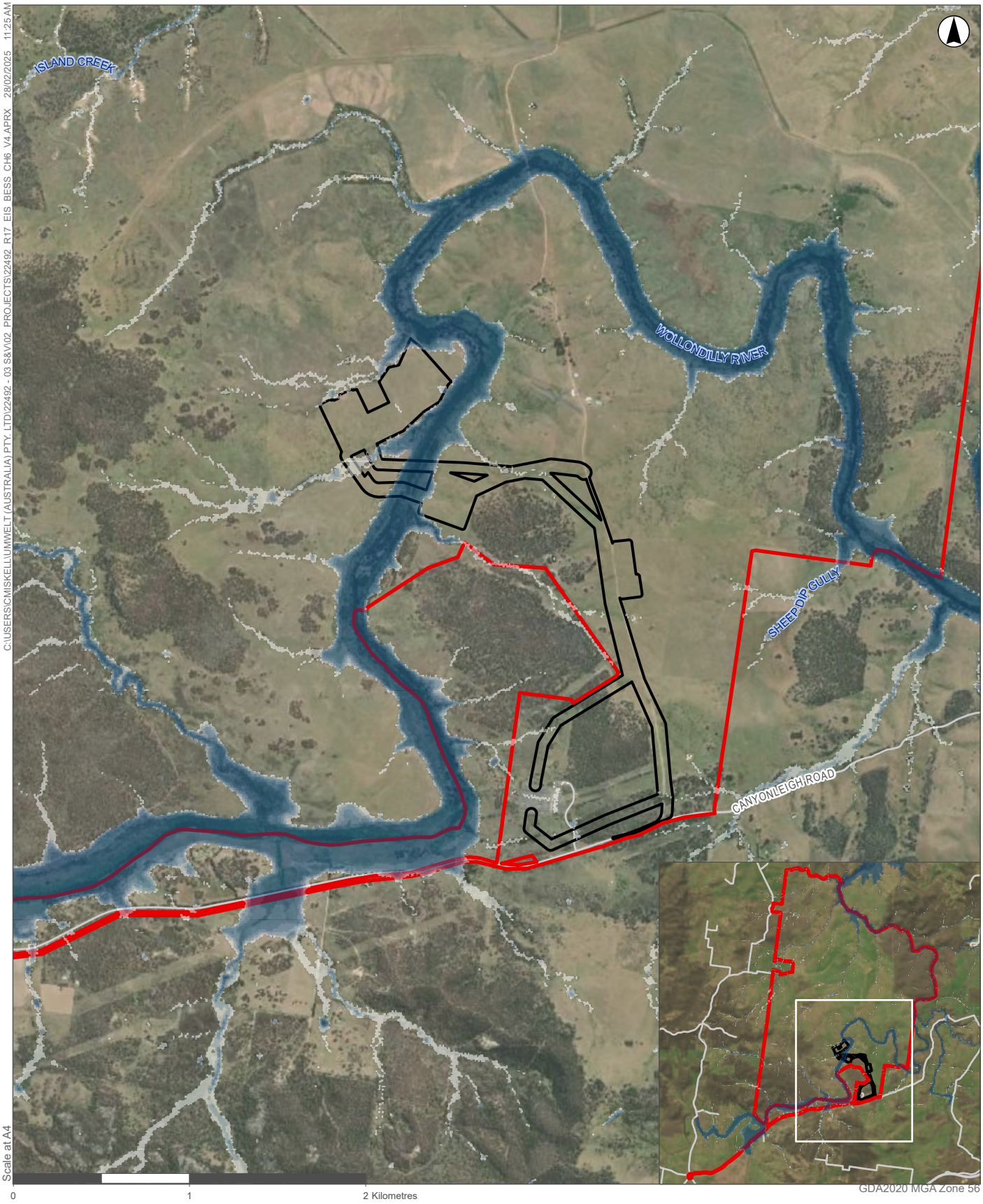


FIGURE 6.14

1% AEP Flood Event (Hazard)

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), WRIA (2024)

6.9.5 Mitigation and Management Measures

The following mitigation and management measures are recommended to minimise flood impacts during the construction and/or operation of the Project (**Table 6.34**).

Table 6.34 Water Resource Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
WR-01	Drainage flow paths will be preserved where possible. Internal access roads crossing watercourses will be designed for 10% AEP flow, using compacted rock causeways for low-maintenance access with minimal impact.	Pre-Construction Construction
WR-02	Waterway tracks, cable crossings, and internal tracks crossing watercourses within the development footprint will be designed and constructed in accordance with the relevant guidelines for controlled activities on waterfront land.	Pre-Construction Construction
WR-03	The CEMP will outline measures to manage soil and water impacts associated with the construction and decommissioning works.	Pre-Construction
WR-04	Creation of catch/diversion drains and sediment fences at the downstream boundary of construction activities where practicable to support containment of sediment-laden runoff.	Pre-Construction
WR-05	Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 and Volume 2D of Blue Book.	Pre-Construction
WR-06	Measures to minimise/manage erosion and sediment transport both within the construction footprint and offsite including requirements for the preparation of an Erosion and Sediment Control Plan (ESCP) for all progressive stages of construction.	Pre-Construction
WR-07	The best practice principles for stormwater and sediment control outlined in the Managing Urban Stormwater Blue Book guidelines will be incorporated into the design, construction and operation phases as part of the CEMP.	Construction Operation
WR-08	BESS components will be located on hardstand areas and will be aligned with local overland flow paths to prevent flows being redirected which could lead to localised increased in flood level and higher risk of scour and erosion.	Operation
WR-09	Inspection and monitoring requirements including receiving water quality monitoring.	Operation
WR-10	Maintenance of stormwater infrastructure including any stormwater treatment devices (e.g. bioretention basins and culverts (e.g. clearing debris).	Operation
WR-11	Maintenance of suitable ground cover and grassed table drains near access tracks to minimise the potential for erosion and export of sediment.	Operation
WR-12	Construction design will consider flood risk by reviewing temporary infrastructure layouts to a) avoid/minimize obstruction of overland flow, b) limit flow diversion, c) implement stormwater controls, and d) mitigate changes to local runoff conditions from site activities.	Construction
WR-13	During construction, design stockpiles would be located outside areas anticipated to flood and experience velocities above 0.5 m/s. Where reasonable/feasible located outside the mapped 10% AEP flood extents.	Construction
WR-14	Construction facilities will be located outside areas expected to flood beyond 250 mm during a 1% AEP event. This will be maintained through all design revisions.	Construction

ID	Mitigation and Management Measures	Phase
WR-15	Flood management measures will be included in the CEMP. Construction staff will monitor weather using Bureau of Meteorology resources to stay informed of potential flooding and road closures.	Construction
WR-16	Flood emergency management measures including evacuation routes will be included in the ERP. Operations staff will monitor weather using Bureau of Meteorology resources (e.g., MetEye, RSS feeds) and provide updates on potential flooding and road closures.	Construction and Operation
WR-17	Flood behaviour, including climate change impacts, will be assessed during detailed design. Foundations for the BESS and transmission lines will be placed away from areas with flood depths over 0.3 m and flow velocities exceeding 1.5 m/s, in line with the 1% AEP scenario.	Pre-Construction
WR-18	Infrastructure at risk of polluting waterways, such as inverters and battery storage, will be located with a minimum 300 mm freeboard above the maximum 1% AEP flood level. The shallow depths in the Project Area make adverse offsite impacts unlikely.	Pre-Construction
WR-19	No sensitive infrastructure (e.g., substation, BESS) will be placed within 20 m of any Strahler 3 or above order streams. Sensitive infrastructure will be placed outside the 0.2% AEP flood extent with a minimum 500 mm freeboard to the 1% AEP flood level.	Pre-Construction
WR-20	Controls for receiving waterways which may include designation of 'no go' zones for construction plant and equipment.	Pre-Construction
WR-21	A water sourcing and monitoring strategy to manage potential availability impacts on downstream water users and ensure compliance with legislation relating to water extraction.	Pre-Construction

6.10 Soils and Agricultural Land Use

A Soil, Land Use and Agricultural Impact Assessment (SLAIA) (**Appendix 13**) including a detailed Land Use Conflict Risk Analysis (LUCRA) was prepared by Minesoils Pty Ltd (Minesoil, 2024) to assess potential soils, land use and agricultural impacts associated with the Project. This section outlines the key findings of the SLAIA and the LUCRA, the key land use risks of the Project Area and proposed mitigation and management measures.

The SLAIA was prepared in accordance with the requirements of the Project's SEARs (**Appendix 1**), which require:

- a detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, land contamination, permissibility, strategic context and existing site constraints
- an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:
    - agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights
    - a soil survey to determine the soil characteristics and consider the potential for salinity, acid sulfate soils and erosion to occur
    - a cumulative impact assessment of nearby developments.

- an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:
    - consideration of the zoning provisions applying to the land, including subdivision (if required)
    - completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide
    - assessment of impact on agricultural resources and agricultural production on the site and region.

The SLAIA was also prepared in accordance with:

- Land and Soil Capability Assessment Scheme (OHE, 2012).

6.10.1 Existing Environment

The Project Area features undulating hills, slopes, crests and broad ridges and some narrow lying alluvial gullies and colluvial flats. To the south of the Development Footprint the lowest elevation is approximately 560 m on very gently undulating lower slop/flats associated with Wollondilly River and rises along the western boarder to 660 m. The Project Area has historically been used for Agricultural practices such as livestock grazing as well as some cropping and cultivation, with evidence of native vegetation modification due to extensive clearing.

The underlaying geology of the region has a general north-west trend, streams tend to either follow the general north-west trend or cut sharply across it. The Project Area lies within the broader region known as the Southern Tablelands within the southern portion of the Lachlan Fold Belt. Ordovician rocks are the oldest and most extensive and are usually tightly folded metasediments. The Project Area also features sandstones, quartzites, rhyolites, tuffs and alluvium. The NSW regional soil mapping, as discussed in **Section 2.5**, indicates the dominant soil types within the Development Footprint are Sodosols and Natric Kurosols as per Australian Soil Classification (ASC) (refer **Figure 2.4**).

Land capability, as detailed in LSC Scheme and further explained in **Section 2.5**, 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. 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 NSW regional based maps of LSC indicate the Development footprint consists of LSC class 5: moderately low capability land (refer **Figure 2.5**).

Neighbouring properties are primarily used for livestock grazing with some isolated broadacre cropping and cultivation also being undertaken within the broader locality. No sensitive agricultural activities such as intensive plant or livestock agriculture is undertaken within the Project Area and immediate surrounds. The annual productivity of the agricultural land within the Project Area is estimated to be $240,616 based on modelling productivity estimates. The model assumes a combination of cropping and grazing, with the land allocation for each type of agriculture determined at the time of inspection.

6.10.2 Methodology

The assessment includes a soil survey and verification of land and soil capability (LSC) in accordance with Land and Soil Capability Assessment Scheme (LSC Scheme) (Office of Environment and Heritage (OEH), 2012). The assessment approach included the following with full details of the assessment approach and methodology provided in **Appendix 13**:

- Desktop review of NSW state government regional mapping data for soil landscapes, soil types, inherent soil fertility and LSC as applied to the Project Area and Development Footprint.
- Soil profiles were assessed in accordance with the 'Australian Soil and Land Survey Field Handbook soil classification procedures' (NSCT, 2009).
- Soil profile logging was undertaken in the field using Minesoils' soil data sheets, including GPS recordings and photographs of the landforms and soil profiles.
- Soil samples were collected at each of the assessment site's soil horizons to a depth of 1 m, with a total of 98 samples collected. Of the 98 samples collected, 48 were considered representative and subject to laboratory testing.
- Survey programming to satisfy the field assessment, sampling and testing requirements related to soil and land resources of the LSSE Guideline.
- Soil survey mapping at a 1:25,000 survey intensity (1 site every 25 ha), including collection of landform pattern element information, soil profile data, and taxonomic parameters to distinguish soil units according to the Australian Soil Classification criteria, within the Project.
- LSC verification through desktop assessment and survey verification. The LSC system required data on biophysical features from in situ measurements and regional mapping
- Soil qualities and risks recorded during survey to determine potential Acis Sulphate Soils (ASS), soil salinity and erosive soils including tunnelling, rill, gully and sheet erosion, which may require specific handling and management techniques during construction or operational activities.

6.10.3 Assessment of Potential Land Use Impacts

6.10.3.1 Impacts on Agricultural Land

The Development Footprint forms approximately 75 ha of agricultural land. This is considered negligible impact in the context of the agricultural industry gross value of the Upper Lachlan LGA (<0.2%).

After decommissioning and rehabilitation there will be no permanent decrease in land restored for agricultural use. Reduction in land and soil capability are considered negligible as all land will be returned to agricultural use after the operational life of the Project.

The temporary impact on productivity during the Projects duration is estimated at $28,800 per year, with no permanent impact to land and soil capability following the life of the Project. Across the Upper Lachlan LGA, agricultural enterprises for 2020–2021 was $153 million including activities such as livestock slaughter and wool and milk products. Both are considered negligible compared to overall agricultural industry gross value in the area.

The Project will not affect agricultural productivity outside the Development Footprint and will have a negligible impact on local and regional agricultural support services. It is expected that changes in these services will be driven more by broader social and market trends rather than the Project. Overall, the Project will not impact critical mass threshold of agricultural activity due to the established agricultural industries in the region and state.

6.10.3.2 Soil Disturbance

Three predominant soil mapping units were identified within the Project Area but only two were identified within the Development Footprint as shown on **Figure 6.15**.

Soil disturbances will vary across the Development Footprint depending on the infrastructure and activity taking place. For example, establishment of access tracks, cabling initialisation and rehabilitation will result in relatively minor soil disturbance. Soil disturbance as part of the construction of the substation, BESS, transmission network and O&M facility includes a small portion of the Development Footprint although these areas will be subject to higher impact disturbance.

If ground cover degrades during the operational phase or as a result of improper maintenance of topsoils during construction, soil may be temporarily sterilised and will require additional efforts at the time of site decommissioning to restore the soil to a level of productivity equivalent to pre-disturbance conditions.

Impacts to soil as a result of direct disturbance is anticipated to be minimal and temporary. The exception is the substation which will be permanent.

Soil erosion as a result of direct disturbance is anticipated although appropriate controls outlined in **Section 6.10.4** will reduce potential impacts to surface soils and waterways.

6.10.3.3 Land and Soil Capability

A Land and Soil Capability (LSC) Assessment was undertaken to verify the results of the desktop analysis of the NSW regional based maps of LSC. The Development Footprint consists of LSC class 5 and Class 6.

The extent of each verified LSC class is shown in **Figure 6.15** and a description of the LSC classes verified within the Development Footprint is provided below:

- Class 5 land has severe limitations for high impact land management uses such as cropping. These limitations will largely restrict lade use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation. The defining constraints to this land class within the Project Area are wind erosion and soil acidity.
- Class 6 land has very high limitations for high-impact land uses. Land use is 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. The defining constraints to this land class within the Project are wind erosion and soil depth.

Due to the minor surface works across the Development Footprint, the Project will have minor impacts to LSC. Following decommissioning of the Project, stockpiles of topsoil would be respread over disturbed areas (if required) and rehabilitated with either native vegetation or improved pastures depending on the intended future land use. It is anticipated that there will be no permanent impacts to LSC within the Project Area.

6.10.3.4 Agricultural Infrastructure

The Project will have a negligible impact on local and regional agricultural infrastructure. There will be negligible impacts on the road and rail network that connects the agricultural industry to markets, services and suppliers.

If dams within the Project Area are decommissioned during construction, they will be reconstructed during the decommissioning phase of the Project. Adequate paddock fencing will be reinstated to suit post-Project land use. Upgrades to access tracks throughout the Project Area will benefit post-Project agricultural land uses and is considered a positive impact.

6.10.3.5 Biosecurity, Weeds and Pest Species

Biosecurity, weeds and pests are an existing component of agricultural land use. It is not expected that the change in land use will increase the potential for these impacts.

With appropriate mitigation measures in place, there is low potential for weeds and invasive pests to spread or impact neighbouring land.

As detailed in **Section 6.10.4**, Spark Renewables will prepare and implement a CEMP and OEMP which would outline appropriate measures to manage biosecurity, weeds and pest species.

6.10.3.6 Air Quality and Dust

Air quality and dust issues associated with the Project may be caused by increased traffic movements, vegetation removal, and localised dust emissions generated by land disturbance. Construction and decommissioning activities that would involve dust and air borne particles include traffic assessing the Project Area from Canyonleigh Road and other construction activities including road repairs, site preparations and decommissioning as well as plant and equipment exhaust emissions. These dust and emission sources are temporary in nature as the road repairs and upgrades will occur as the first stage of construction.

Air quality and dust issues will be managed through appropriate controls and specified in the CEMP and OEMP as detailed in **Section 6.10.4**.

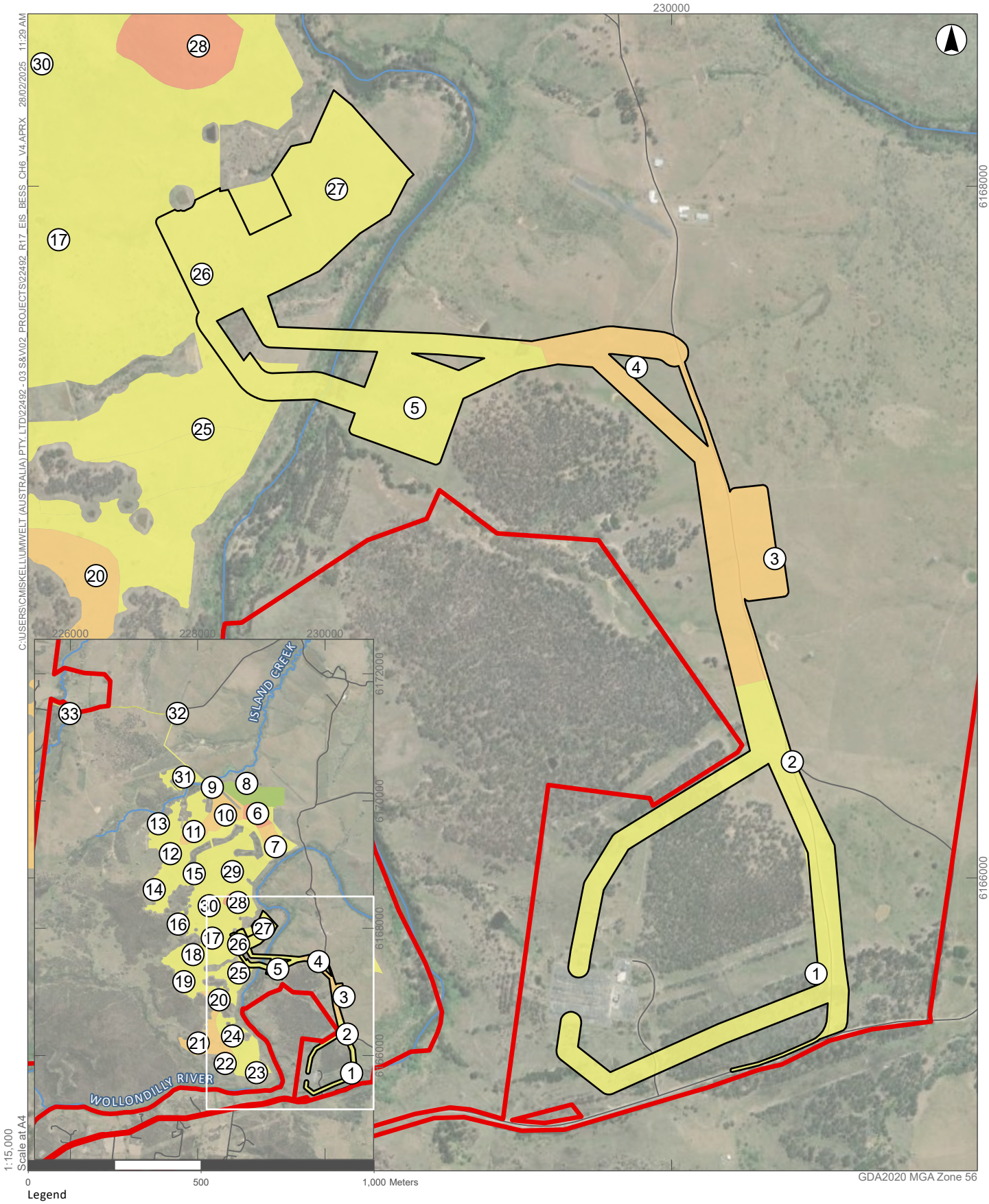


FIGURE 6.15

Verified Land and Soil Capability

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPIE (2024), MINESOILS (2024)

6.10.3.7 Land Use Conflict

A risk identification and ranking process has been undertaken as part of the LUCRA in accordance with Land Use Conflict Assessment Guide (DPI, 2011) and presented in the SLAIA, refer to **Appendix 13**.

Methodology

The LUCRA evaluates the Project in relation to neighbouring land uses and activities to identify any potential conflicts or incompatibilities. This assessment is informed by the risks and impacts outlined in the SLAIA, as well as the proposed mitigation measures and controls detailed in **Section 6.10.4**. Each potential conflict between the Project and surrounding land has been subject to thorough evaluation, with risk rankings assigned based on the likelihood and severity of consequences, as delineated in the SLAIA.

Results

Of the 32 risk items that were considered as part of the LUCRA, 23 were considered minor once mitigation measures and controls were implemented as detailed in **Section 6.10.4**. Once mitigation and management measures are implemented, the 23 minor risks are considered manageable within normal operations.

Key risks identified during this process include traffic impacts during construction and decommissioning, rehabilitation amenity impacts, weed/plant/disease management, bushfires spreading offsite into nearby vegetation, property valuation, increasing insurance premiums and the long-term viability of agricultural and environmental assets.

With the implementation of measures outlined in **Section 6.10.4** the potential impact of change in land use on the surrounding land and land users will be manageable and moderate to minor. Additionally, once decommissioned, the Development Footprint will be remediated to enable agricultural production including cropping and grazing to resume at the previous capacity.

6.10.3.8 State Significant Agricultural Land

State Significant Agricultural Land (SSAL) is not mapped within the Project Area. A limited area immediate to the east of the Project Area is mapped as SSAL. There is presently no method to verify SSAL, nor is there a contextual framework for how SSAL should be considered and assessed.

6.10.3.9 Cumulative Impacts

In the context of agriculture, increased cumulative impacts including changes to land used for agriculture, localised productivity, secondary productivity and some agricultural support services are likely to be experienced. This will be a result of agriculture land use being inhibited by landform modification and infrastructure, such as the development footprints for renewable energy projects. However, given the nature and scale of the established agricultural industries within the region that interfaces with renewable energy and other proposed projects (that is, predominantly livestock grazing with some broadacre cropping), significant impacts to agriculture are unlikely to occur in the foreseeable future.

6.10.4 Mitigation and Management Measures

Management and mitigation measures will be implemented to address key land use issues associated with the Projects as detailed in **Table 6.35** and listed below, including a description and approximation of their coverage.

Table 6.35 Soils and Agricultural Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
SL-02	Agriculture land use will be re-established over the entire Development Footprint and will be returned to an equivalent agricultural productivity following the Project at the completion of decommissioning (unless otherwise agreed with the landowner and/or regulatory authorities).	Decommissioning
SL-03	All soil that is proposed to be disturbed during the Project will be stripped and re-used in construction and/or stockpiled for use in rehabilitation. Channelised drainage patterns should be minimised, and the Project should limit hard engineering solutions for erosion control and preference soft, vegetated structures. All soil resources are to be managed throughout construction, operation and decommissioning phases of the Project in accordance with a site soil management plan prepared for the Project.	Construction Operation Decommissioning
SL-04	Return disturbed land to an equivalent LSC class following the end of life for the Project, through site rehabilitation and good soil management practices in accordance with measures included in a site soil management plan prepared for the Project.	Construction Operation Decommissioning
SL-05	Suitable erosion and sedimentation controls will be implemented through the CEMP and OEMP prepared for the Project.	Construction Operation Decommissioning
SL-07	Pest species will be managed in accordance with measures outlined in a CEMP prepared for the Project.	Construction Operation Decommissioning
SL-08	Biosecurity will be managed in accordance with measures outlined in a CEMP prepared for the Project.	Construction Operation Decommissioning
SL-09	Develop and implement a Decommissioning and Rehabilitation Plan for the Project, two years prior to closure, to ensure that agriculture, land and soil are returned to an approximate pre-disturbance condition.	Decommissioning

6.11 Hazard and Risks

Hazards and risks associated with the Project were an identified concern by the community during the stakeholder engagement process, particularly fire hazard and potential increase in bushfire risk and management. The interaction between the fire risk and fire ignition associated with the Project and interaction with bushfire risk has been addressed in the relevant assessments and appropriate management of fire risk and bushfire has been considered in both Project design and development of the management and mitigation measures proposed to appropriately mitigate hazard risk associated with the Project. In response to the concerns from the community Spark Renewables have applied the following hazard prevention measures to the Project:

- Designed the Project in accordance with relevant design guidelines and minimise risk of battery fault.
- Design the BESS Layout as compartments to avoid propagation of fire.
- Locate the Project in a central location to increase the distance from residential receivers.

The batteries proposed to be used as part of this Project use battery chemistry of Lithium-Ion phosphate (LiFePO4, or simply LFP) which are considered to be one of the safest battery chemistries within the industry. The Project will be continually monitored by operational staff and has been designed with consideration of the separation distance considering fire safety, and operation and maintenance. Operational and maintenance staff will also be responsible for managing vegetation and ensuring that vegetation distanced from the Project to protect infrastructure from bushfire located outside of the Project Area and also prevent resulting bushfire spreading should a fire occur within the proposed infrastructure.

The SEARs for the Project (**Appendix 1**) require:

- a preliminary risk screening completed in accordance with the State Environmental Planning Policy (Resilience and Hazards) and Applying SEPP 33 (DoP, 2011);
- a Preliminary Hazard Analysis (PHA) prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011); and
- an assessment of potential hazards and risks including but not limited to assessment of bushfire risk against the RFS Planning for Bushfire Protection 2019, electromagnetic fields (EMF) or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.

6.11.1 EMF and Health

An assessment of EMF was undertaken by Riskcon Engineering to assess the potential risks associated with electrical infrastructure associated with the Project (refer to **Appendix 14**). This section outlines the key findings of the EMF assessment, the potential EMF hazards associated with the Project and proposed mitigation and management measures.

The assessment of EMF was prepared in accordance with the requirements of the Projects SEARs (see **Appendix 1**) and:

- DPE's LSSE Guideline (NSW Department of Planning and Environment (DPE), 2022d).
- The International Commission on Non-Ionizing Radiation Protection (ICNIRP) published Guidelines for limiting exposure to time-varying electric, magnetic and EMFs (up to 300 GHz).

6.11.1.1 Background and Guidelines

EMF occurs whenever electricity is produced, transmitted or used, and so are found commonly in everyday life. The associated infrastructure required to connect the Project to the grid, including power conversion (inverters) units, substations and transmission lines inherently produce varying levels of EMF emissions.

EMF are only present once the inverted stations convert the electricity produced into an alternating current (AC). In Australia, electrical devices and infrastructure such as transmission lines and substations, operate at a frequency of 50 Hz which falls within the Extremely Low Frequency (ELF) range between 0 and 300 Hz.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Commonwealth Government's primary authority on radiation protection and nuclear safety. The ARPANSA website notes that "exposure to ELM EMF at high levels can affect the functioning of the nervous system" but that "*most of the research indicates that ELF EMF exposure normally encountered in the environment, including in the vicinity of powerlines, does not pose a risk to human health*". Generally, disturbances beyond 50 m from a high voltage powerline are not expected to have higher that typical EMF and for substations EMF levels at distances of 5 m – 10 m away are no higher than background levels in a typical home.

The ICNIRP published Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) in 1998. The guidelines were updated in 2010, specific to the low frequency range of the electromagnetic spectrum, i.e. from 1 Hz to 100 kHz with the objective of establishing guidelines for limiting EMF exposure that would provide protection against known adverse health effects.

To prevent health-related interactions with ELF EMF, ICNIRP recommends limiting exposure so that the threshold at which adverse effects due to interactions between the body and the external EMF is never reached. The reference levels for occupational and general public exposure for EMF at 50 Hz are shown in **Table 6.36**. The guidelines adopt more stringent exposure restrictions for the general public compared to occupational exposures, recognising that in many cases the general public are unaware of their exposure to EMF.

Table 6.36 ICNIRP EMF Reference Levels at 50 Hz

Exposure Characteristics	Electric Field strength kilovolts per meter (kV/m)	Magnetic flux density microteslas (μT)
Occupational	10	1,000
General Public	5	200

6.11.1.2 EMF Sources

EMF would potentially be generated from a number of EMF sources including inverters, overhead transmissions lines and substation as well as cabling (underground) and collection circuits. Potential EMF produced by these components is discussed further below.

BESS

EMF is considered in the safety design process for any BESS. The EMF associated with a BESS will vary depending on several factors including configuration, capacity and type of housing. When there is no current flowing, there is no EMF generated, meaning that for the BESS, EMF will only be generated during the charging or discharging cycle. The BESS will be designed in accordance with electrical safety standards and codes and as such the general public would be excluded from any exposures from these sources.

The Project will include a higher capacity BESS than equivalent solar projects in NSW. This increased storage capacity does not present an increased EMF risk as the storage of electricity does not generate EMF. The anticipated storage capacity and EMF associated with the BESS would not exceed the ICNIRP occupational exposure reference levels due to the rapid attenuation of EMF with distance.

Overhead Transmission Lines

The EMF from transmission lines varies with configuration, phasing and load, however typical EMF near high voltage overhead transmission lines are estimated by ARPANSA to be between 1 µT and 20 µT (directly underneath) and 0.2 µT and 5 µT (at the edge of easement). A microteslas (µT) is the unit of measurement for the magnetic field which passes through a given area. The natural magnetic field of the earth varies from approximately 30 µT to 70 µT (Finlay, 2010).

Substation

The substation is the interface between the transmission network and the Project. The highest sources of EMFs associated with a large transmission substation would generally occur at the boundary from the incoming and outgoing transmission lines. Generally, the application of electrical safety standards and codes (e.g. fence, enclosure, distance) will result in exclusion of general public exposures from these sources. The typical measurement of EMF at the boundary from the incoming and outgoing transmission lines reported by ARPANSA is between 1 µT and 8 µT.

Underground cabling networks typically have no EMFs as these are screened by ground cover.

6.11.1.3 Impact Assessment

The International Commission on Non-Ionising Radiation Protection (ICNIRP) has set the threshold for protecting human health:

- Magnetic field strength at 200 µT, a level exceeding all calculated magnetic field strength scenarios.
- Electric field strength at 5 kV/m for general public and 10 kV/m for occupational personal, a level exceeding the worst anticipated electric field strength scenario (330 kV transmission line at 8 m height).

The findings of the EMF Assessment (**Appendix 14**) indicate that the risk to human health due to emitted (EMF) are within safe exposure limits if the lowest sag of the 330 kV overhead transmission line conductor is at least 8 m above ground level.

The actual conductor arrangements are likely to differ from the proposed modelled scenario. However, the difference is likely to be minimal, and any corresponding variance in the calculated magnetic field strength are expected to be within 20% of the design tolerance.

6.11.1.4 Mitigation and Management Measures

The Project layout has been designed to ensure adequate separation between EMF sources and sensitive receivers, road users, and the public. Electrical equipment will be designed, selected, and procured in accordance with relevant international and Australian EMF standards.

A range of mitigation and management strategies in response to the identified EMF impacts and are summarised below in **Table 6.37**.

Table 6.37 EMF and Health Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
EMF-01	All project infrastructure will be designed, installed and maintained in accordance with relevant industry standards.	Pre-Construction
EMF-02	All relevant procedures in relation to a high voltage installation will be adhered to throughout the life of the Project.	Pre-Construction Construction Operation Decommissioning
EMF-03	Public access will be restricted to the Project Area.	Pre-Construction Construction Operation Decommissioning

6.11.2 Bushfire

A Bushfire Threat Assessment (BTA) (see **Appendix 12**) was undertaken by Umwelt (2024) to describe the bushfire risks associated with the Project. This section outlines the key findings of the BTA including the potential bushfire risks of the Project and proposed mitigation and mitigation measures.

The BTA was prepared in accordance with the requirements of the Project's SEARs which require an assessment of the potential hazards and risks including an assessment of bushfire risk against the RFS Planning for Bushfire Protection, 2019 (**Appendix 1**). The BTA was also prepared in accordance with:

- NSW Rural Fire Service (RFS) document Planning for Bushfire Protection (PBP, 2019)
- Standards for Asset Protection Zones (APZ) NSW Rural Fire Service (2006)
- ISSC 20 – Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure (2012).

6.11.2.1 Methodology

The assessment includes a strategic bushfire study of the Project Area has been prepared taking into account the relevant statutory provisions applying to the assessment and management of bushfire in NSW and the aim and objectives of PBP 2019. Chapter 8.3.9 (hazardous industry) of PBP 2019 is also relevant to the Project. PBP states that some developments are considered hazardous due to their ability to start bushfire and susceptibility to bushfire impacts. The PHA prepared for the Project concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria. This resulted in the Project being classified as only potentially hazardous and would be permitted within the current land zoning for the site. The PHA indicates that through the implementation of appropriate bushfire management measures and appropriate design measures to prevent fire ignition and propagation, bushfire risk associated with the Project can be appropriately managed. Full details of the assessment approach and methodology provided in **Appendix 12**.

The Project Area sits within the Southern Tablelands Bushfire Management Committee Zone, which includes the Yass Valley, Upper Lachlan and Goulburn/Mulwaree LGA's. The Southern Tablelands Zone is subject to the Southern Tablelands Bushfire Risk Management Plan (BRMP, 2019) (Southern Tablelands Bushfire Management Committee, 2019). The BRMP is a strategic document that identifies community assets and sets out a program of treatment to reduce the risk of bushfire to the assets. These treatments may include hazard reduction burning, grazing, community education, fire trail maintenance and establishing community fireguard groups. The BRMP also includes zone wide treatments which are included to reduce the overall bushfire risk within the RBMP area. The zone wide treatments provided in the BRMP were applied to the Bushfire Strategic Study assessed in **Section 6.11.2.2** below.

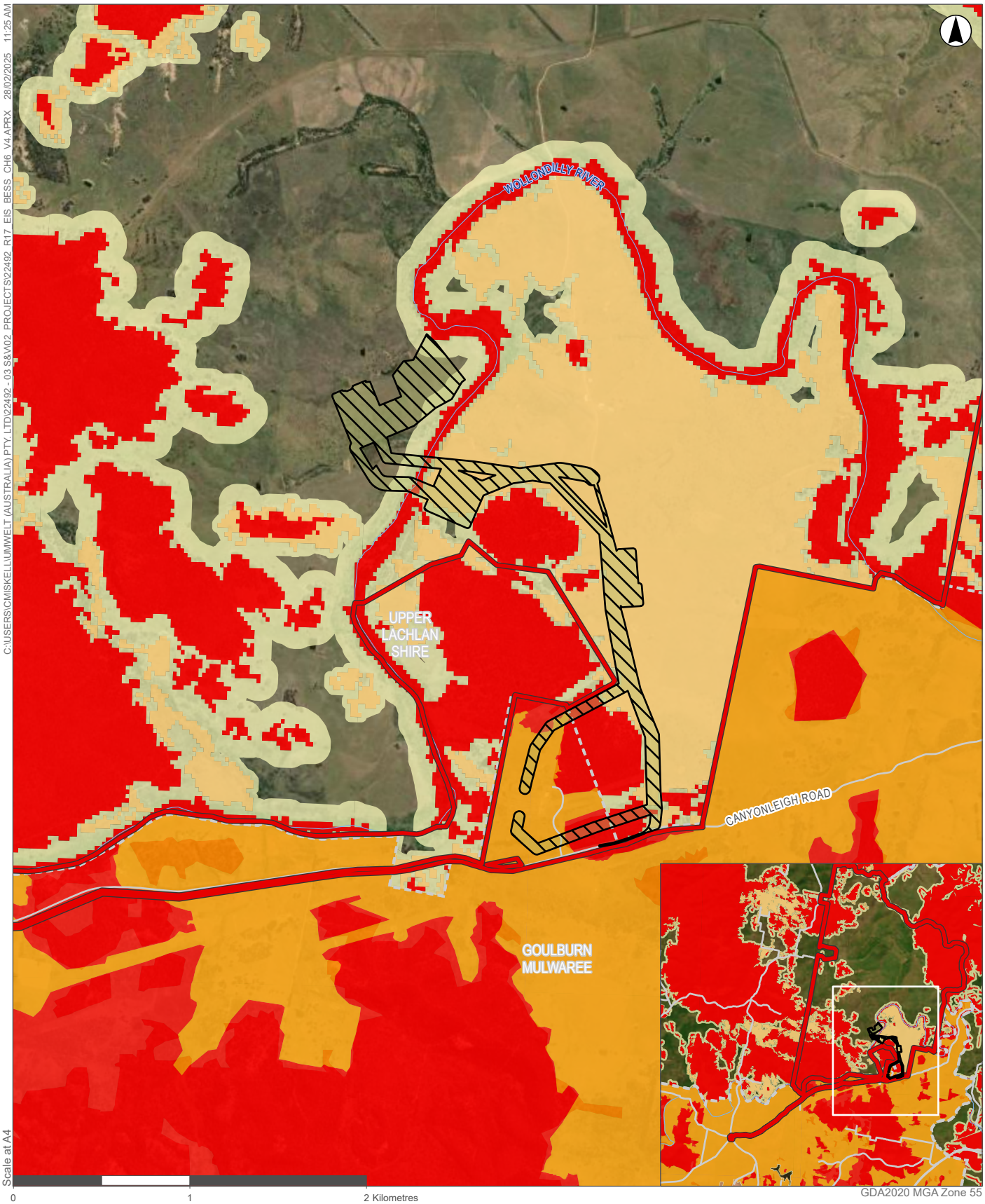
6.11.2.2 Bushfire Strategic Study

The climate of the southern tablelands is generally temperate to cool, with hot summers and cool winters. Peak rainfall typically occurs in winter and spring (BRMP, 2019). The region experiences an average annual rainfall of 790.2 mm, distributed over about 86 rainy days. February typically sees the highest rainfall, while September has the lowest (BOM, 2024). The average maximum temperature recorded at the site is 19.0°C annually, with an average minimum temperature of 8.2°C. January is the warmest month, with an average maximum of 26.1°C, while July is the coldest, with an average maximum of 12.0°C (BOM, 2024).

The topography of the Project Area includes valley floor, hillslopes, and ridges ranging from between 520 mAHD and 720 mAHD. The proposed infrastructure is located centrally within the Project Area predominantly across lower areas ranging in slope from 0–5 degrees, except for areas of steeper slope associated with drainage lines. Steeper slopes extend to the west and northeast of the proposed Development Footprint associated with higher landforms of the Project Area with remaining areas generally undulating and ranging from 0–10 degrees.

The BRMP 2019 states that the Southern Tablelands zone has on average 265 bush fires per year, of which 5 could be considered to be large fires. The frequency of significant or major fires has varied between the districts, Goulburn/Mulwaree has a history of major fires occurring in a cycle of 5 to 7 years, whereas Upper Lachlan has an approximately 7 to 10 year cycle. Lightning is the greatest source of ignition within the area and is mainly during late spring and summer thunderstorm activity which is normally (but not always) accompanied by some rainfall. Escape from legal (and illegal) burning, mainly in rural areas, are also a large source of ignition.

The Project and surrounding land are identified as bushfire prone land by the NSW Rural Fire Service (RFS) bushfire prone land mapping shown in **Figure 6.16**. Land within the Project Area is mapped as Category 1 vegetation associated with areas of forest vegetation with high fuel loads and Category 2 vegetation associated with isolated woodland and forest vegetation areas. The Sharing and Enabling Environmental Data in NSW (SEED) Fire Extent and Severity Mapping (FESM) (Department of Planning and Environment, 2023), indicates the Project Area and surrounding land has not been subject to recorded bushfire. Land within surrounding region has been subject to bushfire, the Crookbundoon Nature Reserve to the west of the Project Area was subject to bushfire during the 2017–2018 bushfire season and large areas within the Morton National Park to the south east of Marulan were burnt during the 2019–2020 bushfire season.



Legend

- Project Area
- Local Government Area
- Development Footprint – BESS
- Roads
- Watercourses

NSW Bush Fire Prone Lands

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3
- Vegetation Buffer

FIGURE 6.16

Bushfire Prone Land

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

The Project Area largely comprises land that has previously been disturbed and historically cleared for agricultural purposes, including cropping land and grazed land. These areas are considered Managed land (reduced vegetation areas). The remaining remnant vegetation within the Project Area is predominantly comprised of woodland vegetation, with smaller patches of forest and riparian forests along the waterways.

Larger areas of vegetation are mapped west of the proposed Development Footprint, with Plant Community Types (PCTs) corresponding to forest vegetation, interspersed with grassland. This vegetation in the western portion of the Project connects to Tarlo River National Park and extends northwest, linking with Bangadilly National Park. Additionally, the forested vegetation south of the Project boundary represents the most significant fuel load in the vicinity, posing the greatest bushfire risk to any development.

The region surrounding the Project Area has an average annual accumulated Fire Danger Index (FDI) rating of 100 (RFS, 2024). This rating is derived from the daily Forest Fire Danger Index, which combines factors such as vegetation dryness, air temperature, wind speed, and humidity. The daily values are aggregated over the year to determine the annual accumulated rating. The FDI measures fire danger within the relevant vegetation, with ratings of 50, 80, and 100 representing increasing levels of fire risk, with 100 being the highest.

The main access to the Project Area is from the south directly off Canyonleigh Road. The Project Area is also accessible from the west via Arthursleigh Road at Big Hill. The Project Area contains an internal access track network utilised for the current agricultural land use. The Project Area is accessible from the west and east along Canyonleigh Road. Noting Spark Renewables have committed to only utlising the western end of Canyonleigh Road for access (with the exception of emergency situations). The proposed Project layout includes an internal all-weather road network providing access through the proposed infrastructure and access/egress to the south through the Project Area.

The region is supported by existing emergency services. The RFS Fire Control Centre and NSW Fire and Rescue is located in Goulburn approximately 30 km south west of the Project Area. Local Fire Brigades are also located at Canyonleigh, Marulan and Goulburn.

Based on the existing environment the potential bushfire hazards, risk of ignition associated with both the construction and operation of the Project include:

- Vegetation fuel loads to the west and south.
- Construction activities (earth moving equipment, power tools (particularly grinders and welders)).
- Operational phase (transmission/BESS failure or overheating, ignition from vehicles or machinery).
- Lighting strike.
- Accidental ignition (smoking etc.).
- Poor site bushfire management and preparedness.
- Arson.

The Southern Tablelands BRMP (2019) identifies community assets and sets out a program of treatment to reduce the risk of bushfire to those assets. The BRMP includes a risk rating based on the Australia/New Zealand Standard AS/NZS 4360: 2004 Risk Management matrix, to determine the level of bushfire risk to the infrastructure and land management measures required.

The potentially hazardous nature of the proposed infrastructure, particularly the BESS is assessed in **Section 6.11.3** and provides specific controls required to mitigate any potential hazards associated with the operation of the Project. This includes design requirements and management and mitigation to prevent and contain fire. The proposed transmission line infrastructure will be designed in accordance with relevant guidelines and regulations including Electricity Supply (Safety and Network Management) Regulation 2014 and *Utilities (Technical Regulation) Act 2014* – Technical Code and will be subject to monitoring and maintenance.

Existing infrastructure within the Project Area and surrounding land is not identified in the BRMP 2019. Applying the same principles of risk to the proposed infrastructure, the bushfire (un-mitigated) risk profile is moderate to high. This is based on the vegetation, slope, fire history and land use. However, it is noted that extensive cleared areas within the Project Area are not identified as bushfire prone land. Additionally, the Project Area and large areas surrounding the Project Area are subject to existing land management practices and the proposed BESS infrastructure has been strategically located to maximise the benefit of these cleared areas and the separation distances to vegetation. The moderate rating applies to the proposed infrastructure areas to the north and east, which will adjoin land that supports large areas of cleared grazing land and significant separation distances to vegetation.

The BRMP 2019 requires a program of land management treatment to reduce the risk of bushfire to any assets where medium to high bushfire risk is identified. Similarly, appropriate bushfire protection measures in accordance with PBP 2019 will be required as part of the construction and operation of the Project to appropriately manage and mitigate the risk of bushfire to the Project and are summarised in **Table 6.38** and provided in **Appendix 4.**

6.11.2.3 Bushfire Assessment

The review of the Project against the bushfire protection measures required under chapter 8.3.5 of PBP is outlined in the following sections.

Emergency Response Plan

An Emergency Response Plan will be developed for the Project, in consultation with the RFS and NSW Fire and Rescue, to outline the response to all potential hazard scenarios associated with both construction and operation. The Emergency Response Plan will outline the response required based on the level of applicable bushfire threat. This will include (but is not limited to):

- Developing specific management actions based on potential level of bushfire threat.
- Assigning responsibility for management actions.
- Identifying the relevant contact details (RFS, FRNSW etc) who should be contacted and when.
- Development of appropriate triggers for the implementation of management actions and/or evacuation of the Project based on the applicable fire danger rating and level of risk.

- Identification of emergency assembly points on site and appropriate safety procedures.
- Identification of safe assembly points offsite and relevant routes.

Asset Protection Zones

PBP 2019 requires adequate clearances to combustible vegetation. At a minimum, a 10 m Asset Protection Zone (APZ) will be applied to all proposed infrastructure (with the APZ being maintained to the standard of an Inner Protection Area (IPA)) for the life of the development, as outlined in Appendix 4 of PBP 2019.

The IPA provides a defendable space within which firefighting efforts can be safely undertaken to defend structures before and after the passage of bushfire. Vegetation within the IPA is required to be well maintained and kept to a minimum level (disconnected vegetation including tree canopies and shrubs, mown grass, ground free of leaves and debris).

Construction Standards

There are no specific bushfire protection requirements for Class 5-8 and Class 10 buildings and the proposed renewable energy infrastructure. However, majority of the ancillary infrastructure associated with the Project are industrial in nature and are designed and constructed from fire resistant materials. Additionally, detailed design of the Project considers housing of equipment (BESS, substation, operation and maintenance buildings etc) to mitigate the risk of fire ignition and the spread of bushfire. Construction of these elements should consider the objectives of the AS3959-2018 Construction of Buildings in Bushfire Prone Areas, to assist with reducing bushfire risk.

This is particularly relevant to the BESS, substation infrastructure and the operations and maintenance buildings. The BTA recommended that any buildings at a minimum be constructed to Building Attack Level (BAL) 12.5 construction standards. BAL-12.5 includes building treatments to provide for ember protection and to prevent the accumulation of debris which may contribute to sustaining and spreading bushfire.

Access

Access to the Project Area will be provided via Canyonleigh Road on the southern boundary and Arthursleigh Road on the western boundary. Internal access tracks will provide for appropriate all-weather access around the site. The existing Wollondilly River Crossing will be upgraded and fitted with depth indicators. Internal access roads will be designed in accordance with the relevant requirements outlined in Chapter 5 of PBP, 2019 during the detailed design phase.

Water Supply

The Project Area does not have a reticulated water supply, a dedicated minimum 40,000 litre water supply will be provided on site (to be implemented during the construction phase). The water supply will be strategically located within the Project Area to provide adequate accessibility during firefighting. Water tanks will be constructed from either concrete or steel and provide connection suitable for firefighting purposes (65 mm Storz). The infrastructure fire hydrant/hose reel systems and all firefighting equipment installed and maintained in accordance with relevant Australian Standards.

6.11.2.4 Mitigation and Management Measures

A range of mitigation and management strategies in response to the identified Bushfire threat, as summarised in **Table 6.38**.

Table 6.38 Bushfire Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
B-01	An ERP will be developed prior to the commencement of construction and will contain measures to manage bushfire risk in accordance with the NSW Rural Fire Service Guide to Developing a Bushfire Emergency Management Plan (NSW RFS, 2014). The plan will include (but not limited to): • Developing specific management actions based on potential level of bushfire threat. • Assigning responsibility for management actions. • Identifying the relevant contact details (RFS, FRNSW etc) who should be contacted and when. • Development of appropriate triggers for the implementation of management actions and/or evacuation of the Project based on the applicable fire danger rating and level of risk. • Identification of emergency assembly points on site and appropriate safety procedures. • Identification of safe assembly points offsite and relevant routes.	Pre-Construction
B-02	Bushfire protection measures for construction and operation will be detailed in the CEMP and OEMP, developed in consultation with the RFS per Section 8.3.5 of PBP 2019. These measures will include (but not limited to): • Implementation and maintenance of APZ's (minimum 10 m to all proposed infrastructure maintained as IPA). • Design, implementation and maintenance of site access in accordance with Chapter 5 of PBP 2019 (internal all-weather access tracks will be provided, and the Wollondilly River Crossing will be upgraded with depth indicators). • Details of measures to prevent or mitigate fires igniting. • Description of work that should not be carried out during total fire bans. • Notification process to the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate. • Details of the availability of fire-suppression equipment (minimum 40,000 L water supply). Water tanks will be constructed from concrete or steel with 65 mm Storz connections and positioned for optimal firefighting access. All firefighting equipment and hydrant/hose reel systems will comply with relevant Australian Standards. • Details of storage and maintenance of fuels and other flammable materials. • Notification process to the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate. • Monitoring and reporting requirements.	Construction Operation
B-03	Equipment (e.g., BESS, substation, operation and maintenance buildings) should be designed and housed to minimise fire risk and meet the objectives of AS3959-2018 Construction of Buildings in Bushfire Prone Areas. At a minimum, buildings should be constructed to BAL-12.5 standards to ensure ember protection and prevent debris accumulation that could contribute to bushfire spread.	Construction

6.11.3 Preliminary Hazard Analysis

A Preliminary Hazard Analysis (PHA) was undertaken by Riskcon (2024) (provided in **Appendix 15**) to assess the potential risks associated with hazardous materials and activities associated with the Project. This section outlines the key findings of the PHA, the potential hazards associated with the Project and proposed mitigation and management measures.

The PHA was prepared in accordance with the requirements of the Project's SEARs as outlined in **Appendix 1**. It was also prepared in accordance with:

- DPE's LSSE Guidelines (2022)
- Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning
- Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (HIPAP 6) (DoP, 2011d)
- Multi-level Risk Assessment (MLRA) (DoP, 2011d).

6.11.3.1 Existing Environment

The Project Area is located in a rural residential area surrounded by Rural residential land to the North, South and East and Rural farmland to the West. Residential receivers are located primarily to the east, south and west of the Project Area. The nearest non-associated residential receiver is 2.4 km away from the BESS infrastructure.

6.11.3.2 Assessment Methodology

The PHA considered the hazards and risks posed to off-site residential receivers and host dwellings associated with the transport, storage and use of hazardous materials for the Project and has been prepared generally in accordance with:

- Resilience and Hazards SEPP
- Applying SEPP 33: Hazardous and Offensive Development Application Guidelines (NSW Department of Planning, 2011)
- Multi-Level Risk Assessment (NSW Department of Planning, 2011)
- Hazardous Industry Planning and Advisory Paper 4 – Risk Criteria for Land Use Safety Planning (HIPAP 4) (NSW Department of Planning, 2011)
- Hazardous Industry Planning and Advisory Paper 6 – Risk Criteria for Land Use Safety Planning (HIPAP 6) (NSW Department of Planning, 2011)
- Manual for Classification of Risks due to Major Accidents in Process and Related Industries (International Atomic Energy Agency, 1996).

The detailed methodology and calculations used to identify and assess the potential hazards and respective failure scenarios that have the potential for off-site impact is outlined in **Appendix 15** with results summarised in the following sections.

6.11.3.3 Preliminary Risk Screening

The hazardous materials required for the Project are detailed in **Table 6.39**.

Table 6.39 Storage Quantities of Hazardous Material

Hazardous Material	Quantity	Classification	Screening Threshold
BESS – Lithium-Ion Batteries (LIB)	5,125 T	Class 9 miscellaneous dangerous goods	N/A
PCU Transformer – Transformer Oils	150,000 L	Class 2	N/A
Substation Transformer – Transformer Oils	20,000 L	Class 2	N/A
Control Room Generator – Diesel	100,000 L	Class 1 – Combustible Liquid	N/A

The storage of diesel will be undertaken in accordance with the relevant Australian Standards. The proposed 100,000 L of diesel storage would not be considered potentially hazardous provided it is stored away from flammable materials and within a separate bund.

Neither LIBs nor the transformer oils have a relevant screening threshold in the Resilience and Hazards SEPP. However, with the rapid proliferation of LIBs in portable devices, electric vehicles, energy storage systems and a range of other applications in recent years, the potential hazards associated with LIBs have become evident. It is known that LIBs may present fire, explosion and toxic gas release hazards as a result of manufacturing faults or a range of battery abuse scenarios. Therefore, given the large scale of the Project, the limited global experience with large capacity grid connected LIB BESSs, and to maintain a conservative approach with respect to the assessment of hazards and risk, further assessment was considered appropriate.

Based on the very low frequency of transport LIBs, transformer insulating oil, LPG and petrol to the Project Area following the completion of construction, no further assessment of transport risks (e.g., a transport route analysis) was considered necessary.

6.11.3.4 Risk Assessment

The risk assessment undertaken to inform the PHA identified a number of hazard events involving Lithium-Ion Batteries (LIBs) and electrical transformers with the potential for harmful off-site impacts. The following criteria from HIPAP 4 has been applied as shown in **Table 6.40** to determine acceptable impact criteria for incidents that would not be considered for further analysis, due to limited impact offsite.

Table 6.40 Hazards Not Requiring Further Assessment

Hazard	Description of Criteria	Assessment of Risk
Fire Impacts	Criterion is provided for the maximum permissible heat radiation at the site boundary (4.7 kW/m^2) above which the risk of injury may occur and therefore the risk must be assessed. HIPAP 4 also indicates that values of heat radiation of 4.7 kW/m^2 should not exceed 50 chances per million per year at sensitive land uses (e.g. residential).	The closest residential receiver is associated with the Project and is more than 0.5 km from the BESS, hence, by selecting 4.7 kW/m^2 as the consequence impact criteria the assessment is considered conservative.

Hazard	Description of Criteria	Assessment of Risk
Explosion	Criterion is provided for the maximum permissible explosion over pressure at the site boundary (7 kPa) above which the risk of injury may occur and therefore the risk must be assessed.	As above, the closest residential (associated) receiver is more than 0.5 km from the BESS, hence, by selecting the 7 kPa value listed in HIPAP No. 4 as the consequence impact criteria the assessment is considered conservative.
Toxicity	Toxic by-products of combustion may be generated by a BESS fire.	Toxicity has been further assessed.
Property Damage and Accident Propagation	Criterion is provided for the maximum permissible heat radiation/explosion overpressure at the site boundary (23 kW/m^2/14 kPa) above which the risk of property damage and accident propagation to neighbouring sites must be assessed.	Incidents that result in a heat radiation heat radiation less than 23 kW/m^2 and explosion over pressure less than 14 kPa, at the site boundary, are screened from further assessment. Those incidents exceeding 23 kW/m^2 at the site boundary are carried forward for further assessment with respect to incident propagation (i.e. frequency and risk).
Societal Risk	Where a development proposal involves a significant intensification of population, in the vicinity of such a project, the change in societal risk needs to be taken into account. In the case of the project.	There is currently no significant intensification of population around the proposed Project Area; hence, societal risk has not been considered in this assessment.

The Level 1 qualitative risk analysis determined that an explosion event with the Project Area does not pose a significant off-site risk as such incidents are expected to be relatively near field (i.e. less than 100 m from the proposed infrastructure). Additionally, the potential offsite thermal radiation impacts were not considered credible due to the proposed construction specifications of the BESS units and the distance to the nearest vegetation and offsite residential receiver.

It was determined using the Multi-level Risk Assessment (2011) risk classification and prioritisation process that a Level 2 semi-quantitative risk assessment would be required to demonstrate that the Project can comply with relevant criteria. The assessment identified the potential release of toxic gas associated with a thermal runaway event in LIB. A semi-quantitative consequence analysis modelled a toxic gas release event of hydrogen fluoride (HF) to determine the minimum required distance that LIB units should be setback from the nearest residential receivers to ensure the risk criteria provided in HIPAP 4 are met.

The semi quantitative analysis undertaken estimated that the worst-case scenario of a toxic gas release resulting from a LIB thermal runaway at the BESS is not considered likely to extend to the nearest off-site residential receiver. The maximum distance at which an individual exposed to HF emissions from a battery storage facility toxic release event could experience an injury is 57 m. The dwelling nearest to the proposed BESS infrastructure is located approximately 660 m to the south-southeast from the closest proposed BESS unit.

6.11.3.5 Risk Mitigation and Management

A range of technical and non-technical risk mitigation and management measures including rigorous design standards and maintenance practices. An overview of the mitigation and management strategies in response to the identified hazards associated with the Project are summarised below in **Table 6.41**.

Table 6.41 Preliminary Hazard Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
H-01	Before construction, detailed design mut be undertaken to validate the BESS and confirm the Project can be installed in the project area whilst meeting the recommended clearances.	Pre-Construction
H-02	A final hazard analysis (FHA) will be completed for the Project when the Project design has achieved an adequate level of detail (i.e. specific BESS technology has been selected and layout has been confirmed).	Pre- Construction
H-03	BESS must be tested and installed in accordance with UL9540A, and report recommended clearances based on testing.	Pre-Construction
H-04	BESS to be installed with fire protection systems specified by the manufacturer and UL9540A report.	Pre-Construction
H-05	The vent covers of the BESS shall be constructed of non-combustible material and shall not be located above battery packs within the BESS container.	Pre-Construction and Operation

6.11.4 Contamination

An assessment of contamination risk was undertaken by Umwelt to assess the potential risks associated with contaminated land and potential contamination sources associated with the Project. This section outlines the key findings of the contamination assessment and proposed mitigation and management measures.

The assessment of contamination was prepared in accordance with the requirements of the Project's SEARs (see **Appendix 1**).

6.11.4.1 Potential Sources of Contamination

As detailed in **Table 6.39**, hazardous materials including LIB, electrical transformer insulating oil, LPG, petrol and diesel will be stored within the Development Footprint. These materials have the potential to cause a contamination event if not stored or handled in accordance with the relevant Australian Standards.

A search of the contaminated land record of notices was completed for Upper Lachlan Shire LGA and the surrounding LGAs, including Goulburn Mulwaree, Wingecarribee, and Yass Valley. The search results indicated that the Upper Lachlan Shire LGA had no recorded sites in the Contaminated Land Register. In contrast, the Goulburn Mulwaree LGA had five sites listed, Wingecarribee LGA had four sites, and Yass Valley LGA had two sites. These sites are located over 20 km of the Project Area and associated with localised contamination from industries including service stations and depots.

6.11.4.2 Assessment of Impacts

The greatest risk of a contamination event within the Development Footprint is during the construction phase. Activities such as increased vehicle movements, improper waste handling, equipment installation, and soil disturbance could lead to potential spills or contamination involving hazardous materials outlined in **Table 6.39**.

The Project is expected to have minimal interaction with groundwater due to the depth of the water table and limited ground disturbance (refer to **Section 6.9.3**). Project infrastructure is positioned beyond flood-prone areas and above the groundwater level, reducing the risk of contamination. Construction activities in the Development Footprint have minimal potential to impact groundwater. With mitigation measures in place (refer to **Table 6.42**), potential risk of groundwater contamination risks are considered negligible.

Contamination risk during operation are minimal, due to associated low vehicle activity and maintenance activities. The likelihood of hazardous chemicals from the proposed infrastructure causing contamination, even during events like fire or earthquakes, is low due to proposed management and mitigation measures.

Waste generation will primarily occur during construction and decommissioning, with minor amounts during regular operations. If not properly managed, it could impact aesthetics, pollute watercourses, pose safety risks, and reduce land capability. Council confirmed local facilities has capacity to handle the expected waste volumes, with excess managed through additional services. Green waste will be processed at the Marulan Waste Management Centre or Resource Recovery Centre.

Weather events, especially major storms during critical construction phases, are expected to be a primary factor affecting sediment runoff and stormwater pollution. However, with the implementation of erosion and sediment control measures as detailed in **Table 6.42**, these impacts are anticipated to be effectively managed and kept to a minimal level.

6.11.4.3 Mitigation and Management Measures

Table 6.42 Contamination Mitigation and Management Measures

ID	Mitigation and Management Measure	Phase
C-01	The CEMP will include an appropriate Spill and Contamination Response Plan to prevent contaminants affecting adjacent surrounding environments. The plan would include measures to: • Respond to unexpected finds (e.g., pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements. • Requirement to notify the EPA for incidents that cause material harm to the environment (refer s147–153 of the POEO Act). • Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals including emergency response and the EPA notification procedures. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Prevent contaminants affecting adjacent pastures, dams, water courses and native vegetation. • Monitor and maintain spill equipment. • Induct and train all site staff.	Pre-Construction Construction Operation Decommission
C-02	A Waste management Plan (WMP) will be prepared including a detailed breakdown of the waste types and quantities in accordance with relevant legislation and guidelines. The WMP will include the following measures: • A summary of the waste types, classification and estimated annual quantities of wastes produced during the construction of the Project. • Measures to manage waste disposal in accordance with the principles of the waste hierarchy, with emphasis on reducing, reusing and recycling wastes prior to disposal. • The procedure for assessing, classifying and storing waste in accordance with EPA guidelines. Procedures for storage, transport and disposal of waste. Monitoring, record keeping and reporting, including the use of waste tracking data to demonstrate the lawful disposal of contaminated products, waste or residues generated by the Project (if any).	Pre-construction

6.12 Social

A Social Impact Assessment (SIA) (refer to **Appendix 16**) was prepared for the Project by Umwelt in accordance with the Social Impact Assessment Guideline (SIA Guidelines) (DPE, 2023a), the Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2024) and the Project SEARs. In particular, the SEARs (see **Appendix 1**) required the EIS to include:

- an assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPE, 2023a), any benefits of the project for the region and the State as a whole, including consideration of any increase in demand for community infrastructure services, consideration of construction workforce accommodation, assessment of impact on agricultural resources and agricultural production on the site and region

The SIA aimed to identify, predict and evaluate likely social impacts arising from the Project and proposed responses to reduce negative impacts and enhance positive impacts. A full copy of the SIA is provided in **Appendix 16** and a summary of methodology and assessment outcomes is provided below.

The SIA was prepared in accordance with the relevant requirements and guidelines including:

- NSW Government's Social Impact Assessment Guidelines for State Significant Projects (SIA Guidelines) (DPE, 2023a)
- Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2024).

6.12.1 Methodology

Consistent with the SIA Guideline requirements, the SIA process involves three key phases, as illustrated in **Figure 6.17** below.

Figure 6.17 SIA Program Phases

SIA involves understanding impacts from the perspectives of those involved in a personal, community, social or cultural sense, therefore engagement is a key component of the SIA program. As discussed in **Section 5.0**, Spark Renewables has been engaging with the local and broader community since early 2023, seeking to build relationships and understand stakeholder perspectives and needs in the region through meetings with proximal and neighbouring landholders, community/interest groups, service providers, Aboriginal stakeholder groups, Upper Lachlan Shire and Goulburn-Mulwaree Council and relevant local, State and Commonwealth government agencies. Concerns and feedback identified throughout the engagement process were considered by Spark Renewables and used to inform the refinement of the Project design and the development of this EIS, including the proposed management and mitigation measures.

The SIA process continued this consultation with a focus on sharing information about the Project and planning process, gathering insights into the social impacts of the Project from the perspectives of those likely to be affected, and gathering community feedback on potential management measures (mitigation and enhancement) to address these social impacts. The SIA provides a consolidation of community consultation outcomes which have informed the assessment and evaluation of Project-related social impacts and opportunities, and social impact management planning.

6.12.2 Social Locality and Social Baseline Profile

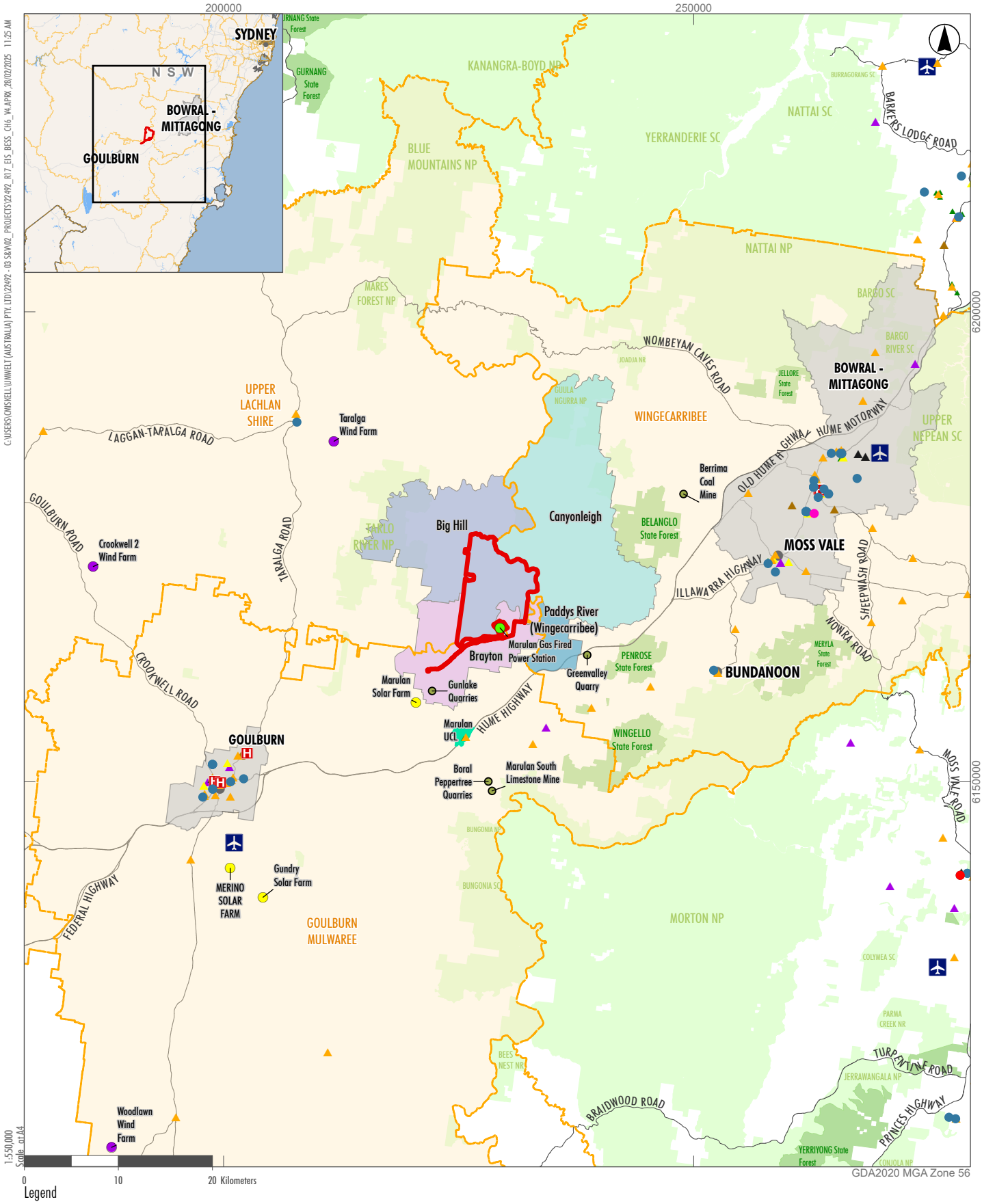
The social locality for the Project has been defined to reflect a variety of geographies and communities of interest where social impacts from the Project may be experienced. In defining the social locality, statistical areas prescribed by the Australian Bureau of Statistics (ABS), land uses and transport routes and the land tenure composition of properties in, or nearby, the Project Area were used. The social baseline profile is a foundational component of SIA, as it provides the basis from which social impacts associated with the Project may be predicted. The social profile developed for the SIA has defined the challenges and opportunities of the community across seven key areas (or capitals) – natural, human, social, economic, physical, cultural and political, a summary of which is provided in **Table 6.43**.

The primary communities of interest that comprise the social locality are identified in **Figure 6.18**, which also illustrates the extent of the social locality related to the Project.

Table 6.43 Local Challenges and Opportunities

Challenge	Capital	Opportunity
• Opposition to utilisation of farming land for renewable energy in the region.	**Natural**	• History of agriculture and grazing. • A large land use of national parks and conservation areas which bring natural beauty to the areas which are highly valued by locals and tourists. • Ongoing capitalisation of natural resources (local quarrying industry).
• Upper Lachlan and Goulburn-Mulwaree experiences low median household incomes. • Low access to economic resources, particularly in Goulburn-Mulwaree. • Upper Lachlan Shire more susceptible to fluctuations in labour and market demands. • Potential for labour force competition due to low unemployment rates across the three LGAs.	**Economic**	• Diverse local economies. • Strong industry presence in agriculture, forestry and fishing and construction. • Employment across a wide range of industry sectors within the locality. • High growth in the value of properties across the three LGAs. • High rates of home ownership within the social locality. • Low rates of mortgage stress in Upper Lachlan and Goulburn-Mulwaree.
• High rates of socio-economic disadvantage in Goulburn-Mulwaree suggesting residents are more vulnerable to change. • History of strong community opposition to renewable energy development in the region.	**Social**	• Strong community and social relationships, characterised by high volunteering, and low mobility rates.

Challenge	Capital	Opportunity
• Aging population leading to less potential workforces from the areas. • Low rates of university level education. • Lower health and wellbeing when compared to the State.	**Human**	• Higher rates of certificate attainment. • Continued sustained population growth in the social locality. • High proportion of Aboriginal and Torres Strait Islander People.
• Limited cultural diversity, with high reported rates of Australian ancestry.	**Cultural**	• Rich intangible and tangible Aboriginal cultural heritage suggesting a strong connection to Country. • Strong cultural heritage, pride in the landscape and built heritage which contributes to local tourism sector. • Strong European and mining history in the region.
• Public inquiry into local council suggests a level of distrust in Council function. • Opposition from State and Federal parliament members (both seats currently held by Liberal Party) to renewable energy projects in the locality.	**Political**	• Active community associations, and a number of community groups formed in relation to renewable energy development in the locality, suggesting a politically involved and mobile community.
• Lower access to educational facilities Educational facilities desired for agricultural learning. • Need for local road and highway upgrades. • Low access to accommodation in Goulburn-Mulwaree and Upper Lachlan Shire. • Strain on current social infrastructure due to a number of other major developments occurring in the LGAs. • Low access to hospitals and specialist practitioners. • Increasing demand for properties in the area with varied rental vacancy rates.	**Physical**	• High rates of available housing due to unoccupied dwellings. • Well-connected LGAs via Hume Highway. • High availability of accommodation across study areas particularly in Wingecarribee. • Hospital redevelopment at Goulburn Base Hospital.



Legend

- Project Area
- Local Government Area
- Significant Urban Area
- Marulan UCL
- State Forest
- NPWS Estate
- Hydro Areas
- Major Roads
- Watercourses
- Airport

Suburb & Locality

- Big Hill
- Brayton
- Canyonleigh
- Paddys River (Wingecarribee)

Health Facility Type

- Hospital
- Aged Care Facility
- Disability Support Service
- Indigenous Health Centre

Education Facility Type

- Childcare Centre/ PreSchool
- Tertiary Institution
- High School
- Primary And Secondary School
- Primary School
- Special Needs School

- Solar Farm
- Marulan Gas Fired Power Station
- Wind Farms
- Mines & Quarries

FIGURE 6.18

Social Locality

Image Source: ESRI Basemap (2024) Data source: ABS (2021), NSW LPI (2021), NSW DFSI (2021), NPWS Estate (2019), Geoscience Australia (2024)

6.12.3 Assessment of Impacts

'Social impacts' generally refer to the consequences experienced by people when a new project brings change. Information collected through consultation activities was collated and analysed to inform the identification of potential social impacts, from the perspectives of affected stakeholders.

Social impacts were assessed and evaluated in relation to the likelihood and magnitude of the social impact occurring, considering the outcomes of engagement with key stakeholders, social research and expert assessment, and a review of outcomes of relevant technical studies. A social significance matrix was used to evaluate both the positive and negative impacts of the Project through the combination of likelihood and magnitude to produce an overall impact rating as 'low', 'medium', high' or 'very high', with positive ratings are identified with (+ve) as described in the SIA Guidelines. Proposed mitigation and enhancement strategies were also considered in determining the residual social impact.

Table 6.44 presents a summary of the social impact evaluation. The highest potential negative impacts prior to implementation of mitigation and management measures were assessed to be:

- Change in the rural landscape resulting in impacts on visual amenity.
- Loss of important environmental values on the site e.g. flora and fauna due to site clearing.
- Perceived inequitable distribution of costs and benefits associated with the project.
- Increased travel time and safety issues associated with deterioration of local roads as a result of increased project-related traffic.

Impact on Aboriginal cultural values due to land clearing associated with development of project infrastructure. Following the implementation of the proposed management and mitigation measures and refinements to the Project's design, these impacts are reduced to a low or medium residual impact.
The impact evaluation undertaken shows that the proposed management and mitigation measures are appropriate for addressing negative impacts and enhancing opportunities.

Social impact management planning is a key consideration of SIA and ensures that the impacts identified through the SIA process, and through community consultation activities, are managed effectively across the life cycle of the development. The selection of strategies has considered those proposed by the community and identified through consultation; industry benchmarking; strategies proposed in the environmental technical studies; and through the social team's experience and expertise in undertaking SIAs for similar projects across Australia. The following proposed strategies will make up the Social Impact Management Framework for the Project and aim to manage the social impacts associated with the Project:

- An Accommodation and Employment Strategy (AES) to outline the measures to ensure that there is sufficient accommodation available for the construction and operational workforces associated with the Project, while managing the potential effects of workforce influx on the local community. Further detail on the AES is provided in **Section 6.12.3.1**.
- Neighbourhood Agreements to provide benefits to immediate neighbours within 5 km of the Development Footprint based on proximity and potential visual and construction related impacts.

- A Community and Stakeholder Engagement Plan (CSEP) to outline how proximal neighbour and community members are to be engaged throughout the Project's planning, pre-construction, construction, and operations to appropriately mitigate and enhance impacts, developing strong local partnerships and achieving successful, and sustainable Project outcomes.

- An Industry and Aboriginal Participation Plan (IAPP) developed in consultation and collaboration with local groups, Traditional Owners, Aboriginal representative organisations, industry and Council. Spark Renewables will seek to develop a Memorandum of Understanding (MoU) with the relevant Aboriginal stakeholders to formalise their collaboration on maximising Aboriginal participation in the Project, in line with their practice on other Spark Renewables projects.

The SIA provided in **Appendix 16** provides further details on the social impact management strategies proposed above, further detailing timeframes, and responsibilities. **Table 6.44** provides the social impacts that would be addressed though the implementation of these strategies.

Table 6.44 Summary of Social Impact Assessment and Management Measures

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
Way of life / Livelihoods	Livelihood impacts associated with potential property devaluation	Proximal Landholders	High	Medium	Provision of Neighbour Agreements with landholders with potential visual and construction related impacts. Active community engagement throughout the lifecycle of the Project, providing clear information on next steps of Project development.	Medium
Livelihoods	Loss of income for tourist operators, due to change in sense of place	Tourism operators	High	Low	Active community engagement throughout the lifecycle of the Project, providing clear information on next steps of Project development.	Low
Livelihoods	Provision of local employment opportunities during construction	Broader Community Local businesses and service providers	Medium (+ve)	Medium (+ve)	Implementation of the AES. Implementation of an IAPP.	High (+ve)
Livelihoods	Provision of local employment opportunities during operations	Broader Community Local businesses and service providers	Medium (+ve)	Low (+ve)	Implementation of the AES. Implementation of IAPP.	Low (+ve)
Livelihoods	Opportunity for the Project to increase training and skills of local residents	Broader Community Education providers	Low (+ve)	Medium (+ve)	Implementation of the AES.	High (+ve)
Livelihoods	Procurement of local suppliers, services and contractors	Broader Community, Local service providers and businesses	Medium (+ve)	Medium (+ve)	Implementation of the AES. Implementation of IAPP. Coordinate efforts and liaise with key stakeholders to coordinate provision of accommodation and other services or suppliers giving preference to local contractors and services.	High (+ve)
Livelihoods	Perceived inequitable distribution of costs and benefits associated with the project	Proximal Landholders	High	High	Implementation of CBSF & Neighbour Agreements.	Medium

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
Livelihoods	Perceived inequitable distribution of costs and benefits associated with the project	Broader community	Medium	Medium	Implementation of CBSF & Neighbour Agreements.	Low
Livelihoods	Investment in community benefit sharing programs	Broader community Community groups Local government	Medium (+ve)	High (+ve)	Implementation of CBSF to meet local needs and priorities. Ongoing collaboration with local community and Council to understand community needs and potential funding initiatives.	High (+ve)
Livelihoods	Use of the site for ongoing research and education associated with renewable energy	UoS Industry Government	High (+ve)	High (+ve)	Research on the site undertaken on an ongoing basis throughout the lifecycle of the Project.	High (+ve)
Surroundings	Intergenerational equity given emphasis on renewable energy production and reduction in carbon emissions.	Broader community	Low (+ve)	Medium (+ve)	Sharing of research undertaken on site within the industry to advance renewable energy technology.	Medium (+ve)
Surroundings / Way of Life	Change in the rural landscape resulting in impacts on visual amenity	Proximal landholders	High	High	Project design changes (i.e. reduction in development footprint) and location of proposed infrastructure central to the Project Area has reduced visual impacts on adjoining properties. Implementation of Neighbour Agreements.	Medium
Surroundings	Social amenity impacts due to noise and vibration associated with construction activities	Proximal landholders	High	Medium	Implementation of CEMP. Ongoing communication and transparency of Project information, including construction timing and works required.	Low
Surroundings	Social amenity impacts due to noise associated with the BESS	Proximal landholders	High	Low	Implementation of OEMP.	Low

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
Surroundings	Social amenity impacts due to dust associated with construction activities	Proximal landholders	High	Medium	Implementation of CEMP.	Low
Surroundings	Loss of important environmental values on the site e.g. flora and fauna due to site clearing	Broader Community Proximal landholders Environmental groups	High	High	Project design changes including the reduction of the Development Footprint has ensured the avoidance of areas of high biodiversity value. Implementation of biodiversity management and mitigation measures. Ecosystem credits will be retired in accordance with the BAM as part of a biodiversity offset plan to offset the loss of biodiversity as a result of the Project. Ongoing communication around the implementation of mitigation measures to protect biodiversity.	Medium
Accessibility / Surroundings	Increased travel time and safety issues associated with deterioration of local roads as a result of increased project-related traffic	Proximal Landholders	High	High	Undertake targeted road and intersection upgrades to facilitate the safe movement of vehicles. Implementation of a TMP including a Driver Code of Conduct. Consultation and notification to residents along the Local Transport Route and other road users.	Medium
Accessibility / Surroundings	Increased travel time and safety issues associated with deterioration of local roads as a result of increased project-related traffic	Users of Brayton and Canyonleigh Roads	High	Medium	Undertake targeted public road and intersection upgrades to facilitate the safe movement of vehicles. Implementation of a TMP including a Driver Code of Conduct. Consultation and notification to residents along the Local Transport Route and other road users.	Medium
Accessibility / Surroundings	Decreased pedestrian and road user safety due to increased traffic during construction	Proximal landholders Road users	High	Medium	Undertake targeted public road and intersection upgrades to facilitate the safe movement of vehicles. Implementation of a TMP including a Driver Code of Conduct. Consultation and notification to residents along the Local Transport Route and other road users.	Low

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
Surroundings	Potential personal safety concerns due to heightened bushfire risk associated with presence of BESS infrastructure	Proximal landholders	High	Medium	Implementation of an ERP and Bushfire Protection Measures (in consultation with the RFS and NSW Fire and Rescue).	Low
Livelihoods / Surroundings / Accessibility	Livelihood impacts associated with property damage due to heightened bushfire risk	Host and proximal landholders, including for ancillary infrastructure	High	Medium	Implementation of an ERP and Bushfire Protection Measures (in consultation with the RFS and NSW Fire and Rescue). Active community engagement throughout the lifecycle of the Project, providing clear information on next steps of Project development.	Low
Accessibility	Reduced access to the project site for emergency services e.g. RFS and subsequent safety impacts	Emergency service providers Proximal landholders	Medium	Medium	Implementation of an ERP and Bushfire Protection Measures (in consultation with the RFS and NSW Fire and Rescue).	Low
Surroundings	Potential for reduced environmental value and degradation associated with decommissioning (e.g., removal of waste, recycling, site remediation) of Project Infrastructure	Proximal landholder Environmental groups	Medium	Medium	Implementation of a DRMF prior to commencement of decommissioning.	Low
Surroundings	Potential for environmental degradation associated with ineffective weed management	Proximal landholder and broader Community	Medium	Medium	The CEMP and OEMP will include appropriate weed monitoring and control programs including vehicle hygiene strategy, implementation of washdown stations and appropriate weed disposal procedures.	Low
Decision-Making Systems	Perceived inability to influence planning and decision-making in relation to the Project	Community and stakeholder engagement activities	High	Medium	Active community engagement throughout the lifecycle of the Project, providing clear information on next steps of Project development.	Low

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
Decision Making Systems	Lack of trust in the company and the landholder (University of Sydney) due to a perceived lack of information provision and transparency around bequeathment of the property	Community and stakeholder engagement activities	Medium	Medium	Ongoing communication and transparency of Project information. Active community engagement throughout the lifecycle of the Project, providing clear information on next steps of Project development.	Low
Accessibility / Livelihoods / Way of Life / Community	Reduced access to housing and accommodation due to influx of cumulative workforces	Broader Community, Service Providers,	Low	Low	Develop and implement AES prior construction and operation.	Low
Accessibility / Livelihoods / Way of Life / Community	Reduced access to housing and accommodation due to influx of cumulative workforces	Vulnerable groups	Unknown	Medium	Develop and implement AES prior to construction and operation.	Low
Accessibility	Reduced access to health and emergency services due to cumulative workforce project influx	Broader Community, Service Providers,	Low	Low	Implement an onsite first aid post and ensure it is appropriately stocked and staffed. ERP to detail emergency response protocols. Liaise with local service providers to develop a strategy for addressing increasing demand on services e.g., health, recreation etc. Ensure access to local emergency department and collaborate with local hospital to ensure there is no additional strain placed.	Low
Accessibility	Reduced access to health and emergency services due to cumulative workforce project influx	Health service	Unknown	Medium	Implement an onsite first aid post and ensure it is appropriately stocked and staffed. ERP to detail onsite emergency response protocols.	Low

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
					Liaise with local service providers to develop a strategy for addressing increasing demand on services e.g., health, recreation etc. Ensure access to local emergency department and collaborate with local hospital to ensure there is no additional strain placed.	
Accessibility	Loss of access and connectivity to telecommunications (i.e television, internet and phone) due to operation of project infrastructure	Proximal landholder Broader Community	Low	Low	Demonstrate proactive, thorough and transparent community engagement, throughout the lifespan of the Project. Ongoing collaboration with local government to understand investment opportunities.	Low
Health and Wellbeing	Increased stress and anxiety due to uncertainty associated with project development and changes to way of life	Proximal Landholders	High	Medium	Demonstrate proactive, thorough and transparent community engagement, throughout the lifespan of the Project. Targeting CBSP to initiatives that focus on community wellbeing and participation, in consultation with local stakeholders.	Low
Community	Reduced community cohesion due to differing attitudes towards renewable energy development in the local community and broader region	Proximal landholders Broader community	Medium	Medium	Demonstrate proactive, thorough and transparent community engagement, throughout the lifespan of the Project. Targeting CBSP on impacted communities.	Low
Community	Reduced community cohesion due to incoming workforce resulting in changed community characteristics and composition	Broader community Proximal landholders	Medium	Medium	On-going liaison with local councils and police to ensure open communication and identification of emerging issues. Demonstrate proactive, thorough and transparent community engagement, throughout the lifespan of the Project.	Low

Social Impact Category	Social Impact	Affected Stakeholders	Perceived Significance	Significance Rating Pre-Mitigation	Refinements, Mitigation or Enhancement Measures	Residual Significance Rating
					Targeting CBSP to initiatives that focus on community wellbeing and participation, in consultation with local stakeholders.	
Culture	Impact on Aboriginal cultural values due to land clearing associated with development of project infrastructure	Aboriginal stakeholders	Unknown	High	Project design changes have resulted in reduced impact to Aboriginal archaeology. Implementation of ACHMP. Archaeological surface salvage will be conducted within the Development Footprint prior to construction commencing. Implementation of unexpected finds protocol. Ongoing consultation with Indigenous groups and RAPs, providing clear information on next steps of Project construction and commissioning, and management of Aboriginal cultural heritage.	Low
Culture	Impacts to European cultural values due to land clearing associated with the development of project infrastructure	Special interest groups	Low	Low	Implementation of unexpected finds protocol.	Low

6.12.3.1 Accommodation and Employment Strategy

The main objective of the AES for the Project is to outline the measures to ensure that there is sufficient accommodation available for the construction and operational workforce associated with the Project, while managing the potential effects of workforce influx on the local community. The AES will build on the assessment summarised in **Section 6.12.3** and undertaken to inform the SIA, refer to **Appendix 16**.

The AES should also consider measures to maximise benefits to the local economy and business community, whilst also considering the potential cumulative impacts associated with concurrent developments in the social locality. Building on the consultation and assessment outlined in **Section 6.12.3**.

The AES will be developed in consultation with key stakeholders including Upper Lachlan Shire Council, Goulburn-Mulwaree Council, Wingecarribee Shire Council, Chamber of Commerce, Destination NSW and tourism associations and employment and accommodation providers. The AES will consider:

- Maximising employment of local residents, with a focus on those with the requisite skills that are currently unemployed and requiring skills development.
- Providing education and training opportunities such as sponsoring positions at TAFE Moss Vale and UoS; working with Training NSW, NSW Skills Board, Regional NSW Council and Regional Development Australia to identify and maximise training opportunities; and ongoing sponsorship of university internships for undergraduates, and scholarships for First Nations tertiary education.
- Consideration of partnerships with existing accommodation providers, including temporary accommodation providers.
- Early engagement with the proposed Engineering, Procurement, and Construction (EPC) contractor to allow planning to occur across various projects to maximise local employment.
- Liaise and collaborate with other renewable energy proponents in the region to:
    - Identify relevant training opportunities that could be realised within the community across multiple projects.
    - Identify relevant accommodation options and reduce cumulative impacts associated with an influx of construction workforces within the region.
- In the selection of accommodation options, ensure as far as practicable that other industry sectors e.g., tourism are not disadvantaged by the use of existing accommodation options in the region e.g., hotel/motel accommodation.
- Avoiding the use of additional accommodation during peak periods associated with community and tourism events.
- Consultation with housing providers to further understand how an incoming workforce may impact vulnerable groups (i.e. Aboriginal and Torres Strait Islander people, elderly residents and users of short-term accommodation).

6.12.4 Management and Mitigation Measures

Management and mitigation measures will be implemented to address key social issues associated with the Project. **Table 6.45** provides a summary of the social impact management strategies proposed in **Appendix 16**.

Table 6.45 Social Impact Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
SI-01	An AES will be developed in consultation with key stakeholders to: • Outline measures to ensure sufficient accommodation is available for construction and operational workforces. • Consider measures to maximise benefits to the local economy and business community.	Prior to construction
SI-03	Spark Renewables has developed a Community and Stakeholder Plan (CSEP) in the early stages of the EIS process. The CSEP will be updated annually in accordance with relevant government standards and frameworks.	Ongoing throughout construction and operation (annually)
SI-04	Spark Renewables will develop an IAPP in line with the requirements of the Australian Energy Market Operator's NSW Electricity Infrastructure Tenders Guidelines (AEMO, 2023). The IAPP will: • Be developed in collaboration with relevant Aboriginal stakeholders. • Ensure ongoing education and training opportunities for First Nations people. • Facilitate procurement of Indigenous owned businesses.	Prior to construction

6.13 Economic

An Economic Impact Assessment (EIA) (refer to **Appendix 17**) was undertaken by Ethos Urban Pty Ltd (Ethos Urban, 2024) to assess the economic impact and benefit of the Project. This section outlines the key findings of the EIA, the potential economic impacts of the Project and proposed mitigation and management measures.

The EIA was prepared in accordance with the requirements of the Project SEARs (**Appendix 1**), which require:

- any benefits of the project for the region and the State as a whole, including consideration of any increase in demand for community infrastructure services, consideration of construction workforce accommodation, assessment of impact on agricultural resources and agricultural production on the site and region.

6.13.1 Methodology

The EIA undertook a baseline analysis of population, labour markets and occupational and business structures for the EIA Project Area and NSW to allow an assessment of the:

- Capacity and opportunities of townships in the EIA Project Area to participate and service the Project.
- Potential for retention of Project investment in the EIA Project Area.

- Direct and indirect Project employment.
- Business and industry participation opportunities, with reference to baseline analysis outcomes regarding workforce size and skills composition and procurement activities.
- Agricultural impacts including employment and production impacts through land consumption and disruption to activities, and benefits to host landowners from new incomes and improved on-site infrastructure.
- Accommodation and housing impacts with reference to the baseline analysis and the estimated number of construction workers that may require accommodation at the Project's peak.
- Cumulative impacts relating to the potential concurrent construction of major infrastructure projects within 50 km of the Project Area.
- Estimates of economic stimulus impacts (construction and operation phases) including project wages and spending, and host landowner payments. Construction stimulus is expressed in 2024 dollars (and calculated over 13 months), while operational stimulus is calculated over 30 years using 2024 dollars but indexed to 3.0% CPI annually.

Based on this assessment, mitigation measures relating to accommodation, workforce and procurement and community benefit sharing were proposed (**Table 6.48**).

6.13.2 Existing Environment

The EIA Study Area represents the likely labour force, accommodation and supply chain linkages that support and will be impacted by the Project. The host and surrounding LGAs included in the EIA Study Area are aligned with the SIA and include:

- Goulburn Mulwaree
- Wingecarribee
- Upper Lachlan Shire.

The main regional cities/townships/settlements in the EIA Study Area are located within a 60-minute drive from the Project Area. These townships include Goulburn, Marulan, Moss Vale, Bowral and Mittagong.

6.13.2.1 Population

The population of the EIA Study Area totalled 94,530 persons as of 2023 (ABS Estimated Resident Population, 2023). Over the period 2023–2041, annual population growth in the EIA Study Area is expected to be Approx +1.456% pa (or +1,376.66 persons per annum over 18 years). The majority of this forecast growth is projected to occur in Wingecarribee and Goulburn Mulwaree LGAs, anchored around key centres such as Goulburn, Moss Vale and Bowral. The Upper Lachlan Shire will support a smaller amount of growth estimated at +1,230 residents between 2023 and 2041.

6.13.2.2 Labour Force, Occupational and Business Structure

As of March 2024 (latest available), the EIA Study Area had an unemployment rate of 1.9%, which is significantly lower compared to the rate for NSW (3.5%). The Project is likely to require 96 workers on average over the construction phase, with potentially 20% of these workers (20 workers) sourced locally or from within the EIA Study Area, providing short term opportunities for unemployed job seekers (subject to appropriate skills match).

The latest available employment related census data (ABS Census 2021) shows 32.6% of employed residents in the EIA Study Area were occupied in activities generally associated with the types of skills required for the construction of renewable energy projects (e.g., technicians and trades workers, machinery operators and drivers, and labourers). The EIA Study Area's representation in these occupations is well above the State average of 26.1%, indicating a generally suitable occupational base for the Project is present in the region.

The EIA Study Area's occupational and business structures indicate a good base exists to service the needs of the Project with 13,680 workers involved in construction-related industries.

6.13.2.3 Accommodation

Commercial Accommodation Capacity

It is estimated that the EIA Project Area has approximately 1,842 rooms/cabins across 86 providers (see **Table 6.46**).

A conservative estimate of 70% occupancy rates across hotel and motel accommodation has been utilised based on consultation undertaken during the SIA. Provided this occupancy rate of 70% for commercial accommodations in the EIA Study Area, it is estimated that 552 rooms will be vacant. It is conservatively assumed that 30% of these 552 rooms are accessible for the Project equating to 165 rooms available for use by the workforce.

Table 6.46 Commercial Accommodation, Considering Occupancy Rates

Locality	Number of Providers	Total Number of Rooms	Number of Rooms at 70% Occupancy	Rooms Available at 30% Utilisable
Goulburn	27	767	230	69
Marulan	5	55	16	5
Moss Vale	12	159	48	14
Mittagong	13	256	77	23
Bowral	23	386	116	35
Taralga	3	18	5	2
Crookwell	3	37	11	3
Gunning	23	24	7	2
Bundanoon	20	27	8	2
Remainder of Project Area	21	113	34	10
Total	**86**	**1,842**	**552**	**165**

Private Accommodation

Private accommodation is also a consideration for the Project workforce and may include the temporary leasing of holiday homes and investment properties. An overview of the private accommodation options that may become available to the Project is provided below:

- As of the 2021 Census, the EIA Study Area has 5,032 unoccupied dwellings that may enter the market to support the Project and other major infrastructure projects in the region.
- As of April 2024, the vacancy rate for long-term rental properties in the EIA Study Area was 2.6% or approximately 194 properties highlighting a constrained market.
- As of April 2024, 1,110 active short-term rentals were advertised in the EIA Study Area which represents approximately 2,980 rooms, based on an average of 2.7 rooms per rental (conservative estimate). Based on the occupancy rate of 70% and assuming 30% of these unoccupied listings are available for the Project, 268 rooms may be available to non-local workers required for the construction phase of the Project.

6.13.2.4 Township Services

The major regional townships of Goulburn, Mittagong, Moss Vale and Bowral have the capacity and labour force to service aspects of the Project, while smaller settlements such Crookwell, Taralga, Gunning, and Marulan have the potential to provide more limited provision of labour, accommodation, and other general services.

6.13.3 Assessment of Economic Impacts

The net economic impacts of the Project, as presented in the EIA, are as shown in **Table 6.47**.

Table 6.47 Net Economic Outcomes

Factor	Value
Negative Economic Outcome: **Temporary loss of agricultural land (Including Substation) (30 years)**	Approx. 75 ha
Negative Economic Outcome: **Loss of employment (direct and indirect)**	0 Jobs
Positive Economic Outcome: **EDC**	Approx. +$405 Million
Positive Economic Outcome: **EIA Study Area investment (including wage stimulus)**	+$ 61 Million
Positive Economic Outcome: **National construction employment (direct and indirect)**	Direct: 71 FTE Indirect: 114 FTE
Positive Economic Outcome: **EIA Study Area construction employment (direct and indirect)**	37 FTE
Positive Economic Outcome: **National operation employment (direct and indirect)**	Direct: 15 FTE Indirect: 45 FTE

Factor	Value
Positive Economic Outcome: **EIA Study Area operational employment (direct and indirect)**	24 FTE
Operational Economic Stimulus: **Total net local economic stimulus (operational wage stimulus, community/neighbour payments, increased council land tax returns)**	+$51 Million
Total Economic Benefits	**+$112 Million**

6.13.3.1 Project Investment and Employment

The Project will require approximately $405 million in investment during the construction phase, of which approximately $61 million will be retained in the EIA Study Area during construction.

Approximately 185 FTE positions would be supported in the national economy over the 18-month construction period (71 Direct FTE jobs and 114 Indirect FTE jobs). Direct employment is assessed as jobs created to support the on-site construction and operation of the Project. Indirect employment is assessed as jobs supported through the supply-chain and consumption/induced impacts of each Project stage. The location of the workforce is also broken down by those employed from within the Project Area and those employed from outside the Project Area as defined in **Section 6.13.1**.

The EIA Study Area has a comparably moderate provision in terms of construction-related workers (7,360 workers) and businesses (1,873 businesses) to manage both the requirements of the Project, and concurrent regional infrastructure projects if required. The Project will provide new participation opportunities for businesses and workers located in the EIA Study Area, having regard for the good match of skills and resources available.

This level of employment will equate to an estimated $8.7 million in wages (2024 dollars). It is anticipated that approximately $3.3 million of these wages will be spent within the EIA Area which will be directed to local and regional businesses during the construction period. The increased number of FTE equivalent jobs that this spending will generate has been included in the indirect employment figures for the EIA Study Area detailed in **Table 6.47**.

6.13.3.2 Accommodation

The 'external' project labour requirement would be expected to generate an accommodation need for 82 FTE workers at the peak of the Project. This represents 4.5% of total commercial accommodation rooms/cabins within the EIA Study Area. At this level of accommodation requirements, the Project in isolation is likely to have a limited impact on the EIA Study Area housing and accommodation market.

The 82 non-local workers requiring accommodation during the Project's peak would equate to just 4.5% of the total 1,842 commercial accommodation rooms available in the EIA Study Area. This requirement decreases to 3.1% of total commercial accommodation rooms, when considering the average monthly 57 FTE non-local workers over the 18-month construction phase. At this level of employment, the Project in isolation would have a negligible impact on the EIA Study Area housing and commercial accommodation sector.

However, the cumulative impact assessment shows that there is a number of projects likely to overlap with the Project construction phase (including the Wattle Creek Solar Farm project). Accordingly, it is highly likely that there could be a shortage of local accommodation in the EIA Study Area to support multiple major infrastructure projects concurrently, as well as support local industry and population growth pressures. Given the greatest provision of accommodation is located across Goulburn Mulwaree and Wingecarribee LGAs, townships in these areas such as Goulburn, Mittagong, Moss Vale and Bowral are more likely to have the capacity to support some accommodation requirements of the Project. However, these townships will also be more likely to experience housing and accommodation impacts as a result of demand from multiple concurrent projects, other industry sectors (i.e. tourism) and ongoing population growth.

Further capacity is available in caravan parks (powered sites), workers staying with family and friends (where available) and potentially unoccupied dwellings – some of which may become available to the market to support the Project.

An AES would form part of pre-construction planning (refer to **Section 6.13.3**) to minimise impacts on the local community.

6.13.3.3 Agricultural

The Project will require approximately 75 ha of existing agricultural land which is currently used for cropping, grazing, forestry, horticulture or nature conservation. Once the Project is fully decommissioned, no agricultural land will be negatively affected and will be returned to prior land capabilities. This land is currently mainly used for grazing and has no identified high capability land, with the Development Footprint entirely consisting of LSC class 5 and Class 6 land (moderate – low capability land). The Project is estimated to result in a negligible impact of just 0.02% on the Upper Lachlan Shires agricultural gross output. No loss of employment associated with the Project Area is anticipated, either directly (on-site) or through associated supply chains. Additional agricultural impacts are detailed the SLAIA (**Appendix 13**) and summarised in **Section 6.10.3**.

6.13.3.4 Ongoing Economic Stimulus

Ongoing economic stimulus associated with the operation of the Project is estimated at approximately $49.2 million (rounded) (over 30 years, CPI adjusted) relating to operational wage stimulus, community fund payments and net land tax revenue to Council. Further details on each of these elements are provided in **Appendix 17**.

6.13.4 Mitigation and Management

To minimise potential project impacts and maximise project benefits, the following mitigation measures are proposed in **Table 6.48**.

Table 6.48 Economic Impact Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
E-01	Should the Project be approved, an AES will be prepared and implemented, to confirm: • There is sufficient accommodation for the workforce associated with the construction phase of the Project. • Measures to address any specific cumulative impacts arising associated with other SSD projects in the area. • Measure to prioritise the employment of local workers and the procurement of local businesses for the construction and operation of the Project. • A program to monitor and review the effectiveness of the strategy over the life of the Project.	Pre-Construction

6.14 Waste

An assessment of waste was undertaken by Umwelt to assess the potential risks associated with waste management of the Project. This section outlines the key findings of the waste assessment, the potential waste streams and quantities associated with the Project and proposed mitigation and management measures.

The assessment of waste was prepared in accordance with the requirements of the Project's SEARs (**Appendix 1**) which require:

- a waste management plan to identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.

6.14.1 Existing Environment

Waste management facilities located in proximity to the Project Area are outlined below in **Table 6.49**. There are 4 facilities within 50 km of the Project Area which accept a range of different waste streams. These facilities generally cover all the expected forms of waste from the Project that cannot be recycled or re used on site.

Table 6.49 Waste Facilities Availability to the Project

LGA	Distance from the Project	Accepted Forms of Waste
Marulan Waste Management Centre	13 km south of the Project	Accepts a range of waste types including commercial and industrial, and household wastes.
Resource Recovery centre	29 km northeast to the Project	Accepts green waste, general recyclables, commercial mixed waste, soil, contaminated soil, scrap metal, electronic waste and accepts a range of waste types including commercial and industrial, construction and demolition waste.
Goulburn Waste Management Centre	31 km southwest of the Project	Accepts a range of waste types including commercial and industrial, and household wastes.

LGA	Distance from the Project	Accepted Forms of Waste
Bowral Waste Centre	35 km northeast of the Project	Accepts green waste, commercial mixed waste, soil, contaminated soil, scrap metal, electronic waste and accepts a range of waste types including commercial and industrial, construction and demolition waste.

6.14.2 Methodology

A qualitative waste assessment was undertaken for the Project which involved:

- Identification of waste types (including the appropriate waste classification) and estimates of waste expected to be generated at each stage of the Project.
- Consideration of circular design principles and strategies to mitigate impacts and reduce waste generation throughout all stages of the Project (such as using recycled, reusable and low-impact raw materials where possible).
- Consideration of end-of-life reuse, refurbishment and recycling strategies for PV panels and associated equipment that maximise high recovery methods.

The NSW Waste Avoidance and Resource Recovery Strategy (EPA, 2014a) outlines the requirements for best practice waste management, which combines the principles of ecologically sustainable development with the implementation of resource management hierarchy principles as specified in the WARR Act, which include:

- Avoidance of unnecessary resource consumption.
- Resource recovery (including reuse, reprocessing, recycling, and energy recovery consistent with the most efficient use of the recovered resources).
- Disposal, including management of all disposal options in the most environmentally responsible manner in accordance with the Waste Avoidance and Resource Recovery Strategy 2014–2021 (EPA, 2014a).

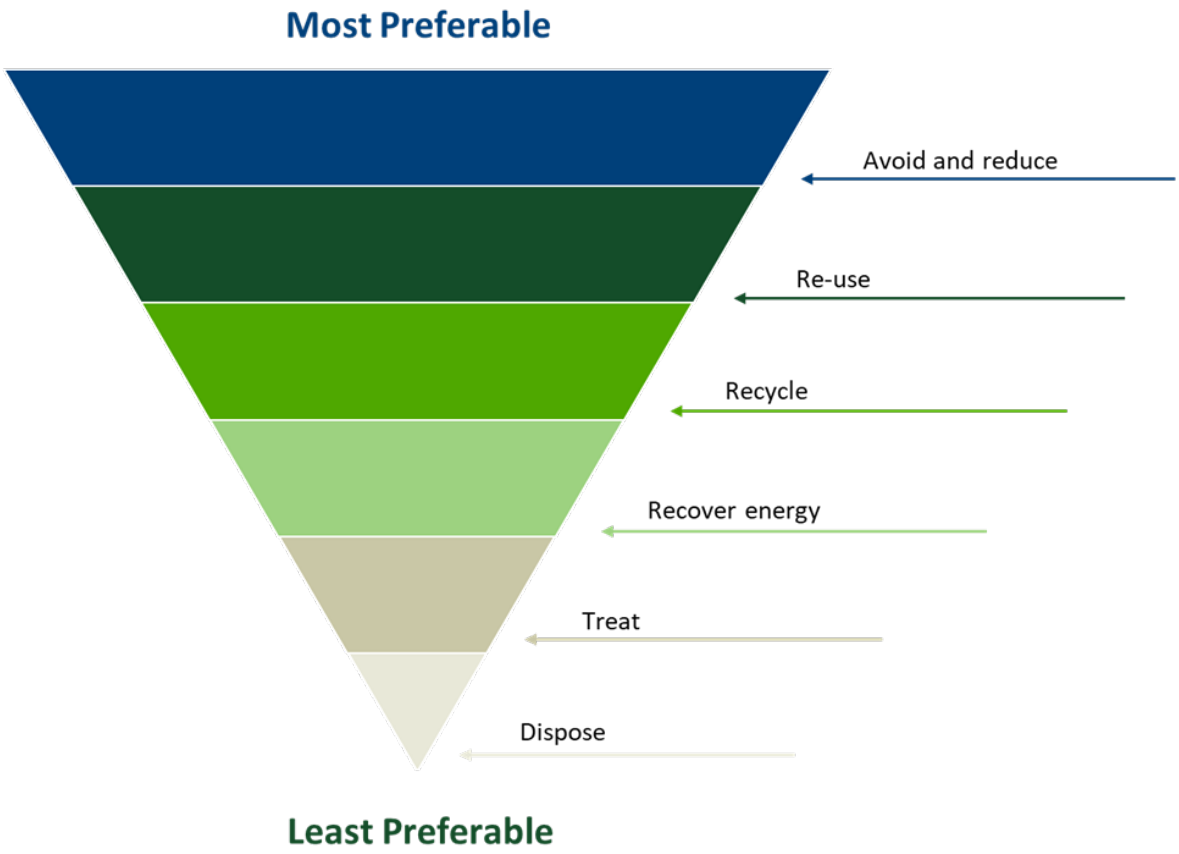


Figure 6.19 NSW EPA Waste Hierarchy (EPA, 2017)

6.14.3 Anticipated Waste Generation

Under the Waste Classification Guidelines – Part 1: Classifying wastes (EPA, 2014b), waste can be classified into six different classes based on risks to the environment and human health. These are:

- Special waste – asbestos, waste tyres and clinical wastes.
- Liquid waste – wastewater effluent, fuels and lubricants.
- Hazardous waste – contaminated soils.
- Restricted solid waste.
- General solid waste (putrescible) – food waste, organics and animal wastes.
- General solid waste (non-putrescible) – glass, plastic, rubber, bricks, concrete, metal, paper, cardboard and other domestic waste.

Identified waste types and quantities expected to be generated by the Project during the construction, operation and decommissioning phases are included in **Table 6.50**, assessed in the context of the above guidelines. The below waste quantities are indicative only and will be refined further prior to and during construction pending final design refinements.

Table 6.50 Waste Generation Activities, Classification and Expected Waste Types

Phase	Waste Type	Estimated Value	End Market/Facility
Construction	Green Waste	Subject to detailed design. Likely to be stored on site for rehabilitation use unless identified as weed infested (conservative estimate approx. 30 m^3 (approx. 50 tn).	Processed at Marulan Waste Management Centre and Resource Recovery Centre
Construction	Hazardous Waste	Unknown volume, waste associated with minor maintenance of generators and earthmoving equipment.	Processed at Marulan Waste Management Centre and Resource Recovery Centre
Construction	Liquid Waste	100 kL over entire construction phase.	Stored on site in appropriate septic system and collected by licenced contractor Processed at Goulburn Wastewater Treatment Plant
Construction	General Solid Waste (Non-Putrescible) – Mixed	2 tn	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Construction	General Solid Waste (Non-Putrescible) – Office (paper/cardboard)	minimal	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Operation	Green Waste	10 m^3 (minimal expected – maintenance only)	Processed at Marulan Waste Management Centre and Resource Recovery Centre
Operation	Hazardous Waste	To be determined during detailed design.	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Operation	Liquid Waste	Unknown – subject to detailed design – treated on site with septic system.	On site in approved septic system or compositing system with removal of final waste products at appropriate intervals by licensed contractor.
Operation	General Solid Waste (Non-Putrescible) – Mixed	<1 tn per year	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Operation	General Solid Waste (Non-Putrescible) – Office (paper/cardboard)	<1 tn per year	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Decommissioning	Green Waste	Subject to detailed design. Likely to be used on site for rehabilitation use unless identified as weed infested.	Processed at Marulan Waste Management Centre and Resource Recovery Centre

Phase	Waste Type	Estimated Value	End Market/Facility
Decommissioning	Hazardous Waste	To be determined during detailed design.	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Decommissioning	Liquid Waste	50 kL total	Processed at Goulburn Wastewater Treatment Plant
Decommissioning	General Solid Waste (Non-Putrescible) – Mixed	As generated.	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Decommissioning	General Solid Waste (Non-Putrescible) – Office (paper/cardboard)	As generated.	Landfill at Marulan Waste Management Centre and Resource Recovery Centre
Decommissioning	General Solid Waste (Non-Putrescible) – Steel	End-of-life or defective Li-ion batteries are expected to be returned to the supplier for repurposing or appropriate disposal. Steel components will be recycled.	Recycled at Marulan Waste Management Centre and Resource Recovery Centre

6.14.4 Impact Assessment

The majority of Project waste would be generated during the construction and decommissioning stages with minor quantities of waste to be generated by the day-to-day operation of the Project. If not appropriately stored and managed, waste generated by the Project could have a range of environmental and health impacts, including:

- Aesthetic quality and visual amenity of the Project Area and adjacent landholders.
- Pollution of hydro lines, local watercourses and drainage lines if wastes are not effectively controlled. This is particularly relevant for gross pollutants (litter) that may become wind borne and enter any watercourses during construction.
- Health and safety of workers and other visitors to the Project Area.
- Changes to the capacity of waste disposal facilities detailed in **Section 6.14.1**.
- Potential spread of pest species.
- Reduction in future land capability if not appropriately stored and handled.

Spark Renewables has consulted with Council on the waste streams and quantities detailed above. The council has confirmed that the listed waste streams are within the capacity of local waste management facilities and for any potential exceedances, additional services will be contacted via existing council relationships. Green waste will be processed in Marulan Waste Management Centre or Resource Recovery Centre.

6.14.5 Management Measures

A range of mitigation and management strategies in response to the identified impacts of the project on waste are summarised below in **Table 6.51**.

Table 6.51 Waste Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
W-01	A WMP will be prepared including a detailed breakdown of the waste types and quantities in accordance with relevant legislation and guidelines. The WMP will include the following measures: • A summary of the waste types, classification and estimated annual quantities of wastes produced during the construction of the Project. • Measures to manage waste disposal in accordance with the principles of the waste hierarchy, with emphasis on reducing, reusing and recycling wastes prior to disposal. • The procedure for assessing, classifying and storing waste in accordance with EPA guidelines. • Procedures for storage, transport and disposal of waste. • Monitoring, record keeping and reporting, including the use of waste tracking data to demonstrate the lawful disposal of contaminated products, waste or residues generated by the Project (if any).	Pre-construction

ID	Mitigation and Management Measures	Phase
W-02	Waste generated during the operational phase of the Project will be limited to those generated by operational maintenance activities and operational staff. Volumes are anticipated to be significantly less than those produced during construction and decommissioning. Management of waste will occur in accordance with an operational WMP prepared for the OEMP.	Operation
W-03	A Decommissioning and Rehabilitation Management Framework (DRMF) will be developed for the Project, detailing the decommissioning processes in **Section 3.6**. It ensures environmental management aligns with legal requirements, consent conditions, stakeholder interests, and industry best practices.	Decommissioning

6.15 Air Quality

The SEARs do not require a detailed air quality impact assessment. During construction dust particles and other emissions may be released from a range of activities through ground disturbance, civil construction activities and plant/vehicle exhaust emissions. However, these emissions would be temporary, for the duration of the construction phase. The construction activities that may generate dust will be localised and small at any one time in the context of the overall scale of the Project Area.

The primary source of air emissions during operations will be emissions from vehicle movements along site tracks, however, the risk will be much lower than for construction given the much lower intensity of vehicle movements and can be mitigated via effective road maintenance and vehicle speed management.

Appropriate mitigation measures will be implemented during the construction and operation phases of the Project to address any potential air quality impacts.

6.15.1 Mitigation and Management Measures

A range of mitigation and management strategies in response to the identified impacts of the project on waste are summarised below in **Table 6.52**.

Table 6.52 Air Quality Impacts Mitigation and Management Measures

ID	Mitigation and Management Measures	Phase
A-01	The CEMP will include the following air quality management and mitigation measures: • Minimise dust emissions from areas exposed by construction through the application of water and/or dust suppressants using a water cart (as required). • Locate, shape and seed longer-term topsoil stockpiles in a strategic manner to minimise dust erosion from exposed surfaces. • Limit construction activities during unfavourable (windy) weather conditions.	Construction
A-02	• Implement and enforce speed limits for construction vehicles and equipment on unsealed access tracks and hardstand areas. • Maintain internal access roads.	Construction and Operation

ID	Mitigation and Management Measures	Phase
A-03	The following management and mitigation measures will also be implemented for the on-site construction activities. Such measures could include: • On-site speed limits / restrictions along internal access tracks. • Appropriate dust suppression measures, including the use of water carts or other dust suppression measures where needed on internal access tracks. • Completion of all loading and unloading movements to occur within the designated work areas.	Construction

6.16 Cumulative Impact

When viewed separately, the environmental, social, and economic effects associated with a Project may be limited or minor. However, when the impacts of numerous projects on the same recipients, communities, and surroundings are taken into account the significance of the impacts may change (both positive and negative). Cumulative impacts also provide opportunities for greater collaboration and innovation to manage and mitigate.

The Project is located outside of the five REZs identified in NSW, as a result the cumulative impacts associated with projects in this region will be less than comparable renewable energy projects located within the REZs. The nearest REZ is the Illawarra REZ, located 50 km east of the Project Area. Although the Project is located outside a REZ, the Wattle Creek Solar Farm project and the Marulan Gas Fired Power Station are directly adjacent to the Project and potential cumulative impacts of these projects has been a key consideration throughout the preparation of the EIS. Nearby projects considered in the cumulative impact assessment are identified in **Figure 1.1**.

The SEARs require the EIS to include an assessment of the likely impacts of all stages of the Project, including any cumulative impacts of the site and existing proposed projects in the region, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice.

This section presents an assessment of the potential cumulative impacts associated with the construction, operation and decommissioning of the Project when considered in combination with other projects and activities occurring near (and within) the Project Area. It also presents an approach for the management of any cumulative impacts. This assessment was conducted in accordance with the requirements of the SEARs and the Cumulative Impact Assessment Guidelines for State Significant Projects (CIA Guidelines) (DPIE, 2022).

6.16.1 Assessment Methodology

In accordance with the CIA guideline, a scoping summary was prepared to identify the potential for cumulative impacts to occur as a result of the Project. The scoping summary determined that given the distance between other projects in the vicinity of the Project Area and the relatively minor impacts associated with the operations phase of the Project, the majority of the potential cumulative impacts are associated with the construction and decommissioning phases (particularly with respect to traffic and social/economic impacts).

The relevant specialist assessment has informed the potential cumulative impacts associated with each environmental and social aspect of the Project. This process allows for the EIS to capture the standalone and cumulative impacts that may be perceived by the surrounding area and community.

Nearby projects with the potential to result in cumulative impacts with, or as a result of, the Project were identified using the following sources:

- NSW DPE Major Projects website including renewable and other projects in the area
- Transport for NSW current projects register (relative to transport routes)
- DCCEEW Protected Matters Search Tool
- Upper Lachlan Shire and Goulbourn Mulwaree Council development application registers
- Google Maps.

6.16.2 Identified Developments

The Major Projects website (NSW Government, 2024) was utilised to undertake a search of renewable and non-renewable SSDs and State Significant Infrastructure (SSI) projects within 50 km of the Project Area with a potential to contribute to cumulative impacts (see **Table 6.53**). The Wattle Creek Solar Farm project and approved (but not constructed) Marulan Gas Fired Power Station are located adjacent to the Project and potential cumulative impacts of these projects has been a key consideration throughout the EIS process.

Generally, cumulative impacts have been qualitatively assessed, based on the perceived likelihood of impact and scale of interaction between the Project and nearby developments. In some cases, a detailed assessment (traffic, visual, noise, economic and social) was carried out to identify and assess the cumulative impacts associated with the Project.

The scaling of potential impacts between no potential cumulative impact to certain cumulative impact, was based on the qualitative specialist assessments as outlined in the relevant subsections in **Section 6.0**. **Table 6.53** outlines the likelihood of nearby developments to contribute to the various potential cumulative impacts of the Project. In determining the potential for cumulative impacts, the distance between the Project and the development, the scale of the development, the likelihood that the developments construction phases would overlap with the Project and the vulnerability of the environment and community to these impacts was considered to scale the potential cumulative impact. The assessment of impact is conservative given is it unknown whether all projects will be approved or whether they will proceed within the current indicative timelines provided.

There are several development projects that may contribute to the cumulative impacts of the Project, assuming that construction will occur at the same time as the Project, which are provided in **Table 6.53**. A detailed analysis of all nearby projects including those which are unlikely to result in cumulative impacts is undertaken in **Appendix 18.**

Table 6.53 Cumulative Impact Summary

Project	Detail	Potential Cumulative Impact
Wattle Creek Solar Farm Project	• Within Project Area (less than 1 km away). • EDC = $543 Million. • Approximate disturbance area = 75 ha. • Construction timing expected to commence end of 2025 and anticipated to be 13 months duration. • Approximately up to 302 FTE workers during the peak months of the construction period with an average of 250 FTE workers over the 18-month period. • Project located within the Project Area directly adjacent to Project. • Use of same transport route - Hume Highway, and Red Hill Road, Ambrose Road, Brayton Road to Canyonleigh Road, and access the Project via the central access point off Canyonleigh Road. • Construction phase expected to overlap with Project construction phase.	Biodiversity Waste Social/ Economic Noise Visual Aboriginal Heritage Historic Heritage Land Use Transport
Marulan Gas Fired Power Station	• Adjacent to Project Area (less than 1 km away). • 800 MW Gas Fired Power Station. • EDC = $809 Million. • Approximate disturbance area = 34.2 ha of native vegetation. • Construction timing and commencement unknown. • Average onsite employment during construction estimated to be 60 FTE employees and 20 FTE employees during operations. • Project located outside and directly south of Project Area. • Use of same transport route Hume Highway, and Red Hill Road, Ambrose Road, Brayton Road to Canyonleigh Road, and access the Project via the central access point off Canyonleigh Road. • Construction is not expected to begin in concurrently with Project however, if that does occur, it will cause overlap with the Project.	Biodiversity Waste Social/ Economic Noise Visual Aboriginal Heritage Historic Heritage Land Use Transport

Project	Detail	Potential Cumulative Impact
Gunlake Quarry	• 5 km southwest. • 4.2 million tonnes per annum (Mtpa) Quarry Operations. • EDC = $4.3 Million. • Approximate disturbance area = 4.5 ha extended area in existing pit from existing 100 ha disturbance area. No direct impact to vegetation. • There is potential for minor cumulative traffic impacts. The overlapping transport route along Brayton Road, Ambrose Road, and the Hume Highway has been considered.	Traffic and transport
Marulan Solar Farm	• 16 km south. • 152 MW solar farm. • EDC = > $30 million. • Approximate disturbance area = 26.8 ha of native vegetation within 330 ha development footprint. • RU1 primary production, land use is agriculture. • Construction commence early 2023 and take 18 months, therefore minimal overlap with Project is expected. • Use of Hume Highway as a primary access roads to the site.	Traffic and transport Socio-economic
Hume Link	• 32 km south. • 360-kilometre 500 kilovolt (kV) high-voltage transmission Line. Includes construction and modifications of substations along alignment. • EDC = $4.5 Billion. • Approximate disturbance area = 670 ha of native vegetation within the indicative disturbance area Construction is expected to commence in 2024 and take about 2.5 years to complete overlapping with the construction phase of the Project. However, impacts will be dependent on the location of where works are occurring at any particular time.	Traffic and transport Socio-economic
Gundry Solar Farm	• 40 km southwest. • 400 MW Solar Farm. • EDC = $540 Million. • Approximate disturbance area = 14 ha of native vegetation within a development footprint of 512 ha. • Construction expected to take approximately 18 to 24 months and planned to commence in late 2024 or early 2025 and expected to overlap with the construction phase of the Project. • Typical daily traffic volume unknown however, primary transport route is predicted to be off Hume Highway.	Traffic and transport Socio-economic

Project	Detail	Potential Cumulative Impact
Merino Solar Farm	• 40 km southwest. • 450 MW Solar Farm with 300 MW BESS. • EDC unknown. • Approximate vegetation disturbance area unknown however development footprint currently covers 760 ha Construction expected to take approximately 12 to 18 months however, timing of commencement unknown at this stage. There is potential for overlap with the construction phase of the Project. • Typical daily traffic volume of unknown however, primary transport route is predicted to be off Hume Highway.	Traffic and transport Socio-economic

6.16.3 Assessment of Cumulative Impacts

A detailed cumulative assessment has been undertaken where potential for impact has been identified through the cumulative scoping assessment (refer to **Appendix 18**) relevant to the Project. As summarised in **Table 6.53**, this assessment was focused on identified projects and relevant impacts, including the potential biodiversity, agriculture, visual, glint and glare, noise and vibration, transport, hazards and risks, and social and economic cumulative impacts.

Cumulative impact related to Aboriginal cultural heritage, historical heritage, water resources, waste management, and air quality were also considered in the assessment, however the isolated nature of the Project Area and the minor nature of such impacts did not warrant additional assessment from a cumulative perspective. Further detail is available in the relevant specialist assessments.

6.16.3.1 Social and Economic

Both the SIA and EIA considered cumulative social and economic impacts of the Project and other developments that may interact, as detailed in **Table 6.44** and identified in **Table 6.53**. Key cumulative social and economic impacts include:

- Competition for construction aligned services and labour resulting in a shortage of workers in the regional area.
- A shortage of available commercial and private accommodation due to the demand from multiple infrastructure projects, resulting in a lack of available rooms to service other sectors (i.e. tourism, visitation, business etc) and lack of available rental housing for local communities in a very tight rental market (especially in Goulburn).
- Demands to other services in key townships e.g. health, food services/ facilities and education facilities. With several possible concurrent construction phases for just renewable energy projects in the region there may be a strain on current services to meet the demands of large population influxes causing significant strain on the availability of services for those communities. This can also enhance economic outcomes for local businesses due to the increased commercial activity, spending and revenue generation from workforces accessing and utilising these businesses or services within the townships.

The Project's peak period is largely outside of and /or following that of the other major projects, however there may be some months of overlap, in particular with the Wattle Creek Solar Farm project, Marulan Solar Farm and Hume Link Project. The Hume Link Project proposes to accommodate its workers in accommodation facilities, with the closest proposed near Crookwell, however, the project footprint is largely covering areas further south-west of the Project's social locality. Based on this, it is not expected that the overlapping construction timeframes will add cumulative strain on the local housing and accommodation market. It is currently unknown where the Marulan Solar Farm proposes to accommodate its workers however, it will be required to prepare an AES prioritising local workers, which is estimated could comprise up to 50% of the construction workforce requirements.

In consideration of the likelihood of the construction phase of the identified developments overlapping with the construction phase of the Project and the economic capacity of the region, the SIA considers that the potential cumulative impacts associated with the Project will be manageable.

Spark Renewables is committed to developing an AES for the Project and committed to monitoring and evaluating the effectiveness of the AES, which will assist in the management of the cumulative social and economic impacts. These strategies will be developed prior to commencement of the construction phase of the Project to reflect and respond to actual regional demand conditions at that time, especially in relation to concurrent projects within the Upper Lachlan Shire LGA and neighbouring LGAs. During the Project's pre-construction and construction phases, the AES would be reviewed bi-annually to assess the effectiveness of steps taken to secure sufficient accommodation for the workforce.

6.16.3.2 Traffic

As discussed in **Section 6.8,** the cumulative addition of traffic from the Project and other adjacent state significant developments lead to minimal increases in daily traffic volumes on the relevant sections of the state controlled Hume Highway, with higher increases for the Project only scenario on the relevant local road links including Red Hills Road (118%), Ambrose Road (118%), Brayton Road (113% south of quarry access / 263% north of quarry access) and Canyonleigh Road (840%), noting that the majority of the increases as a result of the high traffic volumes identified to be associated with the construction phase of the proposed (but not constructed) Marulan Gas Fired Power Station project.

The management and mitigation measures recommended in **Section 6.8,** including the implementation of a TMP, proposed road upgrades and traffic management strategies will also address cumulative impacts from nearby projects.

6.16.3.3 Visual

Cumulative visual impacts were assessed as part of the LVIA completed for the Project. There are two key aspects of this assessment, being cumulative impacts on views from viewpoints such as local residences and public viewing locations and the broader impacts on the landscape character of the area.

The study area for the cumulative visual impact assessment has been defined as follow, in line with the Technical Supplement:

- 4 km radius from the Project Area boundary for impact to viewpoints
- 5 km radius from the Project Area boundary for impact to landscape character.

Based on the above, the LVIA identified that the Wattle Creek Solar Farm project and Marulan Substation is the only relevant project to consider for cumulative visual impacts. All other developments will be located more than 5 km from the Project Area and are therefore not anticipated to result in cumulative visual impacts.

As shown in the cumulative zone of visual influence (provided in **Figure 6.3**), there are limited opportunities to view both the Project and the Wattle Creek Solar Farm project PV Array outside a section of Canyonleigh Road to the south of the Project Area and distant views from non-associated dwelling R128. Dense vegetation between Canyonleigh Road and the Project Area will likely screen a clear view of Project and will not increase overall visual impact from this location.

Marulan Substation is an existing substation located along Canyonleigh Road within the Project Area. The Project is proposed to utilise this infrastructure, connecting to the existing substation. When viewed in conjunction with the Project, the visual impact remains low on account of existing character and short viewing times where the assessment has indicated visibility.

6.16.3.4 Noise

The Transgrid Marulan 330 kV Substation, located approximately 500 m east of the nearest project equipment, along with other potential future developments, such as the Marulan Gas Fired Power Station and a proposed Wattle Creek Solar Farm project, could contribute to cumulative industrial noise impacts.

While the current noise levels from the substation have not been measured, the NPfI project amenity noise level has been designed to address cumulative noise impacts from both existing and future industry. Adjustments have been made to account for these contributions. As the project's noise levels meet NPfI standards, no further assessment of cumulative noise from these developments is deemed necessary.

The CEMP as proposed to address noise impacts assessed in **Section 6.4** will include a CNVMP and address all relevant feasible and reasonable construction noise and vibration management and mitigation measures to manage both Project only and cumulative impacts.

6.16.3.5 Land use and Agriculture

Cumulative impacts to agriculture, such as changes to land used for agricultural land, reduced primary productivity and loss of agricultural support services, are anticipated as a result of the Project, due to the number of proposed renewable developments in the region (assuming all projects are approved for construction and operation), as identified in **Table 6.53**. A cumulative assessment was undertaken in the Soils, Land and Agricultural Impact Assessment provided in **Appendix 13**.

Given the nature and scale of the established agricultural industries within the region that interface with renewable energy and other proposed projects (that is, predominantly livestock grazing with some broadacre cropping), significant impacts to agriculture are unlikely to occur in the foreseeable future.

The cumulative impact on agriculture from the renewable developments in the region is considered to be low given changes to agricultural land use and agricultural productivity are anticipated to be minor for each project.

At the scale of NSW, the cumulative risk to agricultural land and productivity because of large-scale solar development is estimated to be very low (DPE 2022). Overall, given the nature and scale of the established agricultural industries within the region and wider state, significant impacts to critical mass thresholds and regional and state agricultural infrastructure are unlikely to occur.

The CEMP and OEMP proposed for the Project and provided in **Section 6.10.4** and **Appendix 4** will provide soil and land management practices including suitable erosion and sedimentation controls to manage Project and cumulative impacts.

6.16.3.6 Waste

The identified projects proposed within the region are anticipated to generate similar waste types and classifications. The capacity of waste management and recycling facilities within the region as mentioned in **Section 6.14.1** are time sensitive and as such unable to be confirmed at this stage.

The implementation of a WMP has been recommended in response to the waste impact assessment conducted in **Section 6.14** and will include a detailed investigation of capacity of nearby Waste Management Facilities including consideration of other projects under construction and will include any additional management measures required to address cumulative impact.

6.16.3.7 Biodiversity

There is potential for cumulative biodiversity impacts to the availability of habitat in the region, including loss of habitat connectivity, removal of hollow-containing trees and clearing of vegetation used for shelter or food resources.

The potential cumulative impact to availability of habitat would typically be associated with developments within 1 km of the Project Area, which includes the Wattle Creek Solar Farm project and Marulan Gas Fired Power Station Projects.

However, habitat availability for highly mobile species may be affected for proposed developments located further from the Project Area. Given the nature of the impacts associated with the Project, it is likely that the Project will contribute to cumulative impact on biodiversity during construction and operation from a range of projects in the broader southern highland's region. It is considered likely that cumulative impact will increase the loss of similar native vegetation and threatened species habitat to the project in the region. However, key impact avoidance and mitigation measures as described in **Section 6.5.3.5** have been undertaken to reduce the potential cumulative impact.

There may be cumulative impact associated with the dispersal of weeds and invasive pests for proposed developments within 1 km of the Project Area. With the implementation of management and mitigation measures provided in **Section 6.0** and **Appendix 4,** the potential cumulative impact to biosecurity would be minimised.

6.16.3.8 Aboriginal Cultural and Non-Aboriginal Heritage

To assess whether the proposed impacts from the Project will have a broader impact on the cultural resources of the region, an analysis of AHIMS sites associated with current or previous AHIPs based on the results of the extensive AHIMS search completed for this Project within the ACHA (see **Section 6.6** and **Appendix 8**).

AHIMS sites were additionally analysed in relation to their current or future zoned use. The purpose behind this analysis is to determine the volume of AHIMS sites that are located within zonings that have or are likely to be subject to progressive development. This assumed that sites located within land zoned residential (R1–R5), business (B1–B5) and industrial (IN1–IN4) purposes are more likely to have been harmed or may be under threat of harm. Sites that are zoned for environmental (E1–E5), recreational (RE1–RE2) and rural (RU1–RU6) purposes are unlikely to be subject to agricultural activities and renewable energy development and have not been further assessed. This analysis is presented in **Table 6.54.**

Table 6.54 Analysis of Number of AHIMS Sites in Relation to Land Zoning

Land Zone Classification	Number of Sites by Zone	Percentage of Sites by Zone
RU2: Rural Landscape	67	78.82
RU1 Primary Production	18	21.18

Although not always possible, avoiding sites and protecting them with buffers means these sites will continue to contribute to the cultural and social knowledge of past Aboriginal use of the area. As an alternative to complete destruction, community collection is recommended as a way of preserving the objects located within the site. Given, the extensive clearing and agricultural practices of the Project Area it is unlikely that a number of the sites occur in situ and therefore their removal will have less impact due to being out of their original context.

No AHIPs have been listed against any of the AHIMS identified during the preparation of the ACHA for this project.

In regard to non-Aboriginal (historic) heritage, the SoHI undertaken (see **Section 6.7** and **Appendix 9**) the Project is an addition to the existing energy infrastructure within the Project Area being the existing transmission lines and neighbouring Marulan Substation. While there is a degree of cumulative impact on the overall vistas of the rural landscape of the Project Area, this cumulative impact is isolated to the southern portion of the Project Area and do not directly impact the identified heritage items.

7.0 Justification of the Project

The SEARs require the EIS to provide both a 'a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land use, other proposed or approved major projects, rural/residential development, Crown lands within and adjacent to the project site and subdivision potential).

This section addresses this requirement and provides a conclusion discussing the justification for the Project (**Section 7.1**), taking into consideration the suitability of the Project Area (**Section 7.2**), and the environmental, social and economic impacts (**Section 7.3**).

Section 7.4 discusses the principals of Ecologically Sustainable Development (ESD) as defined in Division 5, Section 193 (1) of the EP&A Regulation 2021.

As outlined in **Section 2.0** the Project is consistent with the strategic context applicable to the Project and the Project Area. The Project is also consistent with and will comply with the relevant statutory requirements as outlined in **Section 4.0**.

7.1 Project Justification

As discussed in **Section 2.1**, the Project is a direct response to the NSW Government's commitment to transition to renewable electricity generation. The Project would provide a number of benefits at Federal, State, regional and local levels, including:

- Contributing to and supporting the National Energy Market (NEM) by providing energy storage capacity and improving the security, stability, and resilience of the NEM.
- Facilitating the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy (with a storage capacity of 350 MW or 1,600 MWh over 4 hours).
- Establishing a strong network of positive and long-term relationships within the local community.
- Providing energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.
- Making efficient use of existing transmission electrical infrastructure, notably the capacity of Marulan substation to support to new connections.
- Providing direct and indirect financial benefits to the regional and local community, including employment generation creating an average of approximately 71 direct jobs during the construction phase and approximately 15 direct jobs during the operational phase.
- Providing flow on economic benefits to local services through the construction and operation phases.

- Enabling economic empowerment of First Nations people from implementation of an Aboriginal participation Plan that will be developed following the NSW Electricity Infrastructure Roadmap First Nations Guidelines (NSW Government Office of Energy and Climate Change (OECC), 2022).
- Enabling continued research on new and emerging technologies in partnership with UoS, through the establishment of a dedicated onsite testbed facility.

The Project is justified and of interest to the public as:

- It is suitably located in a region with ideal climatic and physical conditions for large-scale energy storage.
- Contains suitable terrain and topography to support large-scale energy storage infrastructure.
- The Project Area has access to existing transmission line infrastructure that has capacity to transport the electricity to the grid. This minimises the need for construction works and disturbance associated with additional infrastructure (i.e. new transmission lines) often required to connect large-scale energy projects to the electricity market.
- It would not result in significant negative biophysical, social or cultural impacts although would present significant positive economic outcomes.
- Potential to create employment opportunities and benefits to the local and regional economy.

Spark Renewables is committed to reducing impacts on the land within the Project Area. The consequences of not proceeding with the Project would result in:

- Loss of opportunity to move towards cleaner electricity generation, reduce CO2 emissions and their impact on climate change.
- Loss of increased energy security and supply to the Australian grid.
- Loss of significant social and economic benefits created through capital investment and provision of direct and indirect employment opportunities during the construction and operation of the Project.

7.2 Suitability of the Project Site

As outlined in **Section 2.1**, Spark Renewables was selected by the University of Sydney to investigate and develop a hybrid renewable energy facility within the Project Area. As part of this process, a high-level investigation area was initially identified to inform the preliminary design. This analysis involved the following considerations for suitability of the Project Area:

- Current land use.
- Environmental and social constraints, including biodiversity and heritage.
- Capability to connect to the electricity grid and access to transmission line network.
- Land suitability (i.e. topography) to support renewable energy development.

Specifically, this Project Area was identified as suitable due to the following:

- The Project Area is strategically located to connect to existing transmission infrastructure.
- The Project Area has only two landholders.
- The Project Area has been disturbed and/or historically cleared for agricultural land use practices, primarily sheep grazing.
- The Project would provide electricity storage capacity to the NEM via the existing substation and overhead transmission lines (**Figure 1.2**).
- The Project Area has lower impacts on environmental aspects including aboriginal heritage, hydrogeology and biodiversity than alternatives considered.

A summary of the land use considerations is provided in **Table 7.1** below.

Table 7.1 Land Use Considerations

Land Use Consideration	Identified Features and Assessment
Existing Land Use	• The Project Area largely comprises areas that have previously been disturbed and/or historically cleared associated with agricultural land use. • The Project would not impede future agricultural activities in line with existing operations, both during operation of the project and following decommissioning of the Project. • The conceptual layout has been developed to maximise the use of existing disturbed areas and avoid and minimise impact to identified biodiversity, hydrology and Aboriginal cultural heritage values on the Project Area. • Structures within the Project Area currently used for agricultural activities will not be impacted by the Project and would be useable during operation of the Project and post decommissioning phase.
Nearby Projects	• Consideration of cumulative impacts has been undertaken in specialist assessments for social, water, visual amenity, traffic, biodiversity, heritage, land and soils, economic, noise and vibration and waste. • Cumulative impacts have been considered and addressed in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (CIA Guidelines) (DPE, 2022c).
Rural and Residential Development	• The Project does not impede the possible development of rural or residential dwellings within proximity to the Project Area. • Development for the purposes of housing would be excluded from the Project Area for all phases of the Project with potential dwelling construction occurring post decommissioning. • Within 4 km of the Project Area there are 49 non- associated dwellings. The closest non-associated dwellings are located approximately 2.4 km south of the BESS infrastructure outside of the Project Area.
Crown Land	• The Project Area includes land designated as a Crown Waterway (Wollondilly River). • Spark Renewables have consulted with Crown Lands in relation to the Project, will seek relevant access licence requirements in relation to the waterway crossing upgrade through the Crown Waterway within the Project Area to facilitate the construction and operation of the Project.

7.3 Environmental, Social and Economic Impacts

As highlighted throughout the EIS, the Project has been designed using an iterative approach. The conceptual project layout, transmission line corridor, Project Area access, internal access roads and other supporting infrastructure has been subject to ongoing refinement with the aim of minimising associated environmental and social impacts. Measures taken to avoid, mitigate and minimise impacts is outlined in **Section 1.5**.

The environmental, social and economic impacts of the Project have been identified and were subject to detailed assessment based on:

- Assessment of the site characteristics (existing environment).
- Focused consultation with relevant government agencies.
- Engagement with local community and other stakeholders.
- Environmental and social risk analysis.
- Application of the principles of ESD, including the precautionary principle, intergenerational equity, conservation of biological diversity and valuation and pricing of resources.
- Expert technical assessment.

The key issues identified, including those specified in the SEARs, were subject to comprehensive specialist assessment to identify the potential impacts of the Project on the existing environment. These assessments are detailed in **Section 6.0** and the appendices to this EIS. Additionally, community views were assessed through a range of consultation approached and mechanisms to identify a social baseline and the values which are import to the local population (**Section 5.0**).

Detailed cumulative assessment has been undertaken where potential for impact has been identified through the cumulative scoping assessment (refer to **Appendix 18**) relevant to the Project. These impacts are summarised in **Table 6.53**, which focused on developments within 50 km of the Project which have relevant impacts associated with the Project impacts. Such impacts including the potential traffic and transport, noise, social impacts, the cumulative impacts

As outlined in **Section 6.0**, the potential environmental, cultural and social impacts associated with the Project can be appropriately managed through the implementation of appropriate management, mitigation and monitoring measures. A consolidated list of proposed management and mitigation measures is provided in **Appendix 4**.

The impacts of the Project have been kept to a minimum through:

- Obtaining a detailed understanding of the issues and impacts by scientific evaluation and stakeholder engagement.
- Detailed project planning considering the environmental and social constraints of the locality and investigation of various project alternatives which resulted in changes to the Project that reduced impacts.

- Active engagement with key stakeholders, including proximal landholders to identify key concerns and issues and to allow these to be considered in the Project design process.
- A commitment to proactive and appropriate strategies to avoid, minimise, mitigate, offset and/or manage a range of potential environmental impacts (refer to **Section 6.0**).

7.4 Ecologically Sustainable Development

An object of the EP&A Act is to encourage ESD within NSW. As noted in **Section 4.2**, the Project is classified as SSD in accordance with the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and has been subject to an environmental impact assessment under Part 4, section 4.1 of the EP&A Act.

To justify the Project with regard to the principles of ESD, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- The precautionary principle.
- Intergenerational equity.
- Conservation of biological diversity.
- Valuation, pricing and incentive mechanisms.

ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

7.4.1 The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

> i. if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

To achieve a level of scientific certainty in relation to potential impacts associated with the Project, the EIS includes an extensive evaluation of all the key components of the Project. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in this EIS.

The assessment process has involved a detailed study of the existing environment (refer to **Section 6.0**), and where applicable the use of scientific modelling to assess and determine potential impacts as a result of the Project (such as noise and flooding). To this end, there has been careful evaluation as part of the project design and assessment process to avoid, where possible, irreversible damage to the environment. The Project has been designed and located to avoid native vegetation and sensitive environments (i.e. waterways) as much as possible and to minimise the use of natural and artificial resources while considering the social and economic welfare of the local community. Specialist studies were undertaken to provide accurate information to assist with the evaluation and development of the Project.

The decision-making process for the design, impact assessment, consultation and development of management processes has applied the precautionary principle in the following respects:

- Government authorities, landholders potentially affected by the Project, the local community, RAP groups including Burra Burra Aboriginal Corporation and the Pejar Local Aboriginal Council and other stakeholders were consulted during preparation of this EIS (refer to **Section 5.0**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.
- The community has been engaged throughout the development and assessment of the Project through a range of mechanisms including one-on-one meetings, community information sessions to inform project design and management of key issues, and community information sheets, amongst other mechanisms (refer to **Section 5.0**) which provided landholders and stakeholders with both information and the opportunity to influence Project outcomes.
- Spark Renewables will develop and implement a CEMP and OEMP, which will implement best practice management and will incorporate all identified mitigation and management measures identified in this EIS. Additionally, the Project will be subject to an independent auditing and verification process consistent with relevant requirements for SSD projects. The CEMP and OEMP will incorporate the additional controls committed to in this EIS (refer to **Appendix 4**).

7.4.2 Intergenerational Equity

The EP&A Regulation defines the principle of intergenerational equity as:

> ...that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The objectives of the Project are outlined in **Section 1.4** and in relation to intergenerational equity, they include to:

- Contribute to and support the National Energy Market (NEM) by providing renewable energy generation and storage capacity and improving the security, stability, and resilience of the NEM.
- Facilitate the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy (with a storage capacity of 350 MW or 1,600 MWh over 4 hours).
- Establish a strong network of positive and long-term relationships within the local community and contribute to economic and social growth with a community fund and a neighbour benefit fund that meets the unique needs of the wider community, and delivers long-lasting social, economic, and environmental benefits for decades to come.
- Provide energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.

- Make efficient use of existing transmission electrical infrastructure, notably the capacity of Marulan substation to support to new connections.
- Provide direct and indirect financial benefits to the regional and local community, including employment generation creating an average of approximately 71 direct jobs during the construction phase and approximately 15 direct jobs during the operational phase.
- Flow on economic benefits to local services through the construction and operation phases.
- Economic empowerment of First Nations people from implementation of an Aboriginal participation Plan that will be developed following the NSW Electricity Infrastructure Roadmap First Nations Guidelines (NSW Government Office of Energy and Climate Change (OECC), 2022).
- Enabling continued research on new and emerging technologies in partnership with UoS, through the establishment of a dedicated onsite testbed facility.

Further to the Project objectives, a range of environmental management measures discussed in **Section 6.0** and **Appendix 4** have been developed and evaluated to minimise the impact on the environment to the greatest extent reasonably possible.

The Project would benefit future generations by reducing the reliance on energy sources derived from non-renewable resources, which produce greenhouse gas emissions. Once decommissioned, the land within the Development Footprint will have the capacity to be returned to its existing land use.

The EP&A Act requires consent authority to consider matters of relevance to the public interest. Intergenerational equity is a matter of public interest and will be achieved by the proposed Project through the conservative approach taken in the assessment and mitigation of impacts, the implementation of renewable energy, increased employment across the 35-year operational lifespan of the Project and providing options to return the Project Area to preexisting agricultural conditions.

7.4.3 Conservation and Biological Diversity

The EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project have been assessed in the BDAR (refer to **Appendix 8**). Potential biodiversity related impacts are outlined in **Section 6.5** and proposed mitigation measures to manage residual impacts of the Project on biodiversity are outlined in **Section 6.5.4**.

The development of the Project design went through several stages. This included identifying key constraints areas that needed to be avoided as provided in **Section 2.8.3**. After an avoidance lens was applied, the minimisation of ecological impacts was prioritised by the minimisation of impacts to key fauna habitat located in the Project Area, remnant vegetation that provides fauna connectivity across the Project Area, hollow bearing trees within the Project Area and EPBC listed EEC within the Project Area. Once a minimisation lens was applied the Project design, mitigation strategies were applied to reduce potential impacts on species and communities that were not avoided. A BMP will be implemented as part of the Project's CEMP demonstrating adaptive management strategies to ensure key milestones are achieved, exclusion zones will be established around sensitive features and other mitigation measures as detailed in **Section 6.5.7**.

7.4.4 Valuation and Pricing of Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle has been defined in the EP&A Regulation as follows:

- That environmental factors should be included in the valuation of assets and services, such as:
    - Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement;
    - The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and
    - Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The environmental consequences of the Project have been assessed in this EIS (refer to **Section 6.0**) and mitigation measures identified for factors with potential for adverse impact (**Appendix 4**). Implementing the mitigation measures would impose an economic cost on the proponent, increasing both the capital and operating costs of the Project. This signifies those environmental resources have been given appropriate valuation.

The Project has been developed and designed with the objective of avoiding and minimising potential impacts on the environment. It is acknowledged that uncertainties remain with regards to detailed design and the assumptions and limitations of the impact assessments contained within this EIS. These have been identified throughout and will be continually monitored and addressed as the Project progresses through the post approval design phase.

The aims, structure and content of this EIS have incorporated these ESD principles. The mitigation measures in **Appendix 4** provide an auditable environmental management commitment to these parameters. The Project aligns with the principals of ESD and is considered to be satisfied, due to the social, economic and environmental benefits provided in **Section 1.4**, and the mitigation measures put in place to protect from adverse impacts on the environment.

7.5 Conclusion

As outlined in **Section 7.4**, the Project has been assessed against the principles of ESD as required by the EP&A Act and EP&A Regulation. This assessment has indicated that while the Project, would have some impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant economic and environment benefits in the form job creation and production of renewable energy for the NEM. The assessment therefore concludes that the Project is consistent with the principles of ESD.

The Project would provide long-term, strategic benefits to the State of NSW, including:

- Renewable energy supply to assist with fulfilling the current obligations under State and Federal renewable energy targets.
- Providing for cleaner reliable electricity generation, assisting with meeting current load demand while reducing greenhouse gas emissions and the impacts of climate change.
- Employment generation creating on average 71 direct jobs during the construction phase and 15 direct jobs nationally during the operational phase.
- Indirect benefits to local services through the construction and operation phases.

Spark Renewables has applied an iterative approach through the development of this EIS responding to both environmental constraints and community concerns through refinement of the layout and the overall Project approach. Residual impacts where avoidance was not possible are addressed through the implementation of best practice management. As such the potential environmental and cultural heritage impacts associated with the Project can be appropriately avoided or managed. Avoidance and mitigation of impacts also address concerns raised by the community and associated social impacts identified during the stakeholder engagement process. Spark Renewables will develop and implement an EMS post approval to provide the strategic framework for environmental management. Given the net benefit and commitment from Spark Renewables to appropriately manage the potential environmental impacts associated with the Project, it is considered the Project would result in a net benefit to the region and broader NSW community. The Project aligns with the principals of ESD and is considered to be satisfied, due to the social, economic and environmental benefits.

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