



Premise



FIRM POWER

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Environmental Impact Statement

IN SUPPORT OF A DEVELOPMENT APPLICATION




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CERTIFICATION

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Address	154 Peisley Street, Orange, NSW, 2800				
Project details					
Project name	Muswellbrook Battery Energy Storage System				
Application number	SSD-29704663				
Address of the land in respect of which the development application is made	20-24 Sandy Creek Road, Muswellbrook – Lots 11 and 12 DP839233 Sandy Creek Road, Muswellbrook – Lot 15 DP 905479				
Applicant details					
Applicant name	Muswellbrook BESS Pty Ltd, owned by Firm Power				
Applicant address	Suite 203, 213 Miller Street, North Sydney, NSW, 2060				
Declaration					
Name	David Walker				
Declaration	<p>The undersigned declares that this EIS:</p> <ul style="list-style-type: none"> • has been prepared in accordance with Division 5 of the <i>Environmental Planning and Assessment Regulation 2021</i>; • 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; 				

	<ul style="list-style-type: none">• contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development;• contains a consolidated description of the project in a single chapter of the EIS;• contains an accurate summary of the findings of any community engagement; and• contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	25/08/22

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ABBREVIATIONS

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

Term	Definition
CCP	Community Consultation Plan
CCTV	Closed-circuit television
CEC	Clean Energy Council
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CER	Clean Energy Regulator
CHMP	Cultural Heritage Management Plan
CIV	Capital Investment Value
CML	Concessional Mass Limit
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
DAWE	(Commonwealth) Department of Agriculture, Water and the Environment (Formerly Department of Energy and Environment (DoEE))
dB(A)	Decibels, a measure of A-weighted (<i>c.f.</i>) sound levels.
DC	direct current
DECC	Department of Climate Change (now DPE)
DECCW	Department of Climate Change and Water (now DPE)
DEMP	Decommissioning Environmental Management Plan
DoA	(NSW) Department of Agriculture
DP	deposited plan
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
DPI	Department of Primary Industries
EEC	Endangered Ecological Community
EES	(NSW) Environment Energy and Science
EIS	Environmental Impact Statement
ELF	Extremely low frequency, in relation to Hz (<i>c.f.</i>)
EMFs	Electric and magnetic fields
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP&A Act	(NSW) <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	(NSW) <i>Environmental Planning and Assessment Regulation 2021</i>
EPA	(NSW) Environment Protection Authority

Term	Definition
EPBC Act	(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPC	Engineering Procurement and Construction
EPI	Environmental Planning Instruments
ERP	Emergency Response Plan
ESD	Ecologically sustainable development
GDE	Groundwater Dependent Ecosystems
GHG	Greenhouse gas
GML	General Mass Limit
GRP	gross regional product
GWh	Gigawatt hours
ha	hectares
HBT	Hollow Bearing Tree
Heritage NSW	The Heritage Council of NSW
IBRA	International Bioregions of Australia
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPA	Inner protection area
kl	kilolitres
km	kilometres
kV	kilovolts
kW	kilowatts
LALC	Local Aboriginal Land Council
LEMC	Local Emergency Management Committee
LGA	Local Government Area
LSC	Land and Soil Capability
LUCRA	Land Use Conflict Risk Assessment
m	metres
mm	millimetres
ML	Megalitres
MLEP	<i>Muswellbrook Local Environmental Plan 2009</i>
MNES	Matters of National Environmental Significance, under the EPBC Act (<i>c.f.</i>)
MSDS	Material and Safety Data Sheet

Term	Definition
MW	Megawatt
MWh	Megawatt hours
MSC	Muswellbrook Shire Council
NEG	National Energy Guarantee
NEM	National Electricity Market
NML	Noise Management Level
NPfI	NSW Policy for Industry (2017)
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
NRET	National Renewable Energy Target
O&M	Office and Maintenance
OEMP	Operation Environmental Management Plan
PBFP	Planning for Bushfire Protection
PCT	Plant Community Type
PCU	Power Conversion Unit
PHA	Preliminary Hazard Analysis
Planning Systems SEPP	<i>State Environmental Planning Policy (Planning Systems) 2021</i>
PMF	Probable Maximum Flood Level
POEO Act	<i>(NSW) Protection of the Environment Operations Act 1997</i>
PV	Photovoltaic
RAPs	Registered Aboriginal Parties
RBL	Rating Background Level – the level of background noise
RE Act	<i>(Commonwealth) Renewable Energy (Electricity) Act 2000</i>
RET	Renewable Energy Target
REZ	Renewable Energy Zone
RFS	(NSW) Rural Fire Service
RNP	Road Noise Policy
Roads Act	<i>(NSW) Roads Act 1993</i>
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEIFA	Socio Economic Indexes for Areas
SEPP	<i>(NSW) State Environmental Planning Policy</i>

Term	Definition
SHI	State Heritage Inventory
SSD	State Significant Development
SWMP	Soil and Water Management Plan
TEC	Threatened Environmental Communities
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
VIA	Visual Impact Assessment
V	Volts
WA	Water Assessment
WAD	Works Authorisation Deed
WAL	Water Allocation License
WARR Act	Waste Avoidance and Resource Recovery Act 2001
WMP	Waste Management Plan

EXECUTIVE SUMMARY

Introduction

Muswellbrook BESS Pty Ltd, owned by Firm Power (ABN: 18 631 500 519), the Applicant, is an Australian owned and operated company seeking to develop strategically located and scaled energy delivery solutions. Through careful site selection, rigorous constraints analysis and diligent impact assessment, Firm Power conceive, investigate, design and deliver electricity projects.

Firm Power seeks to develop a 150 megawatt (MW), 300 MW hour Battery Energy Storage System ('BESS') on Lots 11 & 12 DP839233, known as 20-24 Sandy Creek Road, Muswellbrook and Lot 15 DP 905479 Sandy Creek Road, Muswellbrook; within the Muswellbrook Local Government Area ('LGA'). The proposed development is characterised as state significant development ('SSD') as the proposal is for the purpose of electricity generating works with a capital investment value ('CIV') in excess of \$30 million, pursuant to Section 20 of Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021*.

Proposal

The Muswellbrook BESS project comprises a BESS with a capacity of 150 MW and 300 MWh and includes the following key infrastructure:

- Enclosed lithium-ion batteries;
- Power conversion systems including associated switchgear, protection and control equipment, transformers and enclosures for housing equipment;
- Underground power and fibre optic cabling interconnecting the equipment;
- Grid connection equipment including main power transformer, switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary/earthing transformers and enclosures/buildings for housing equipment;
- Underground or overhead 132kV sub-transmission lines to connect the BESS to the Muswellbrook substation;
- Earthing and lightning protection systems;
- Site office, storage area/enclosure, internal access tracks, on-site parking, security fencing, CCTV, lighting and temporary construction laydown area;
- Noise walls and vegetation screening; and
- Utilisation of existing site access arrangements.

It is expected that augmentation work within the Ausgrid substation site would be required to facilitate connection of the BESS.

The area of the site that will be impacted by the development ('the project area') occupies the entirety of the site.

The primary components associated with the installation of the BESS are as follows:

- Site investigations, vegetation clearing, levelling, bench and access way construction, drainage system installation and installation of foundations/supports to install equipment on;
- Transport to site and installation of equipment;
- Testing and commissioning of the equipment; and
- Operation and maintenance.

Environmental issues

An analysis of site constraints via an environmental risk assessment process has identified the following key environmental issues which for which technical reports prepared by specialists were prepared:

- Traffic and access;
- Biodiversity;
- Noise and vibration;
- Aboriginal cultural heritage and historic heritage ;
- Technological hazards;
- Bushfire;
- Water and flooding;
- Land and soil;
- Visual impacts; and
- Social impacts.

Other matters requiring qualitative assessment in the body of the EIS include, water quality, other land resources, groundwater, waste management, air quality and cumulative impacts.

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

TRAFFIC AND ACCESS

A Traffic Impact Assessment (TIA) was prepared for the project by Amber and is provided at **0**. The TIA includes an assessment of traffic generation and distribution, cumulative traffic impacts, route and intersections. The TIA provides a summary of the local and regional traffic environment. Access to the site would be provided via the New England Highway and Sandy Creek Road, and would utilise the existing partially sealed access driveway, currently used by Ausgrid to access the existing substation on site.

The TIA concludes that State and local roads along the access route, including a railway level crossing on Sandy Creek Road, can accommodate the volume, loads and type of vehicle movements generated during construction of the project. The cumulative impact assessment concluded that the road network through Muswellbrook and the surrounding area is able to readily accommodate traffic generated by the proposed development and other developments in the area. The TIA also concluded that the existing partially sealed, single lane site access driveway from Sandy Creek road can accommodate the expected volume and direction of project related traffic, and that the two intersections located along the proposed access route, being the intersections of New England Highway and Sandy Creek Road and Sandy Creek Road and the site access point, are suitable in terms of swept paths and sight distances, and do not require road upgrades.

A construction traffic management plan is recommended, incorporating a range of measures including but not limited to:

- Engagement with neighbours throughout the construction phase,
- Avoidance of deliveries by larger vehicles during school bus times on Sandy Creek Road;
- Ensuring all permits are obtained prior to works commencing;
- All vehicles to enter and leave the site in a forward direction;
- All loading and unloading to take place within the site.

Subject to the implementation of the above measures, significant impacts are not anticipated during construction.

BIODIVERSITY

A Biodiversity Development Assessment Report ('BDAR') was prepared for the project by EMM and is provided at **Appendix E**. The BDAR determined that the majority of the project area comprises exotic vegetation, with the exception of a minor area 0.21 ha of Grey Box-Slaty Box shrub to the east of the proposed internal access track and 0.09 ha Narrow-leaved Ironbark in the northern portion of the project area.

The project may directly impact 0.3 ha of potential habitat assumed present for up to nine threatened species, including the Leafless Tongue Orchid, Striped Legless Lizard, Pine Donkey Orchid, Pine Donkey Orchid population in the Muswellbrook LGA, Slaty Red Gum, , *Pterostylis chaetophora*, Illawarra Greenhood and Austral Toadflax.

Avoidance and minimisation strategies include avoiding native vegetation where possible.

To compensate for impacts on native vegetation, two ecosystem credits of PCT 1655 (Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin) are required.

To compensate for impacts on threatened species (assumed presence) the following credits are required:

- two species credits of Leafless Tongue Orchid;
- three species credits of Striped Legless Lizard;
- two species credits of Pine Donkey Orchid;
- two species credits of Pine Donkey Orchid population in the Muswellbrook LGA;
- two species credits of Slaty Red Gum;
- three species credits of *Prasophyllum sp. Wybong*;
- two species credits of *Pterostylis chaetophora*;
- two species credits of Illawarra Greenhood; and
- two species credits of Austral Toadflax.

The BDAR concludes the project is unlikely to result in a significant impact on the MNES and referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

NOISE AND VIBRATION

The Noise Impact Assessment (NIA) was prepared for the project by Assured Environmental and is provided at **Appendix F**. The NIA concludes that during construction no receptors will experience noise levels above the 'highly noise affected' criterion of 75 dB(A) as specified in the *Interim Construction Noise Guideline* (ICNG), however, a number of receivers would experience noise levels above the 'noise affected' criterion of 45 dB(A) for short durations during some construction stages. Road traffic noise during the construction of the project is predicted to comply with *NSW Road Noise Policy* (RNP). During operation of the project, the NIA concludes that compliance with can be achieved for all receptors. The predicted vibration levels during the construction and operation would also comply with the continuous maximum vibration nuisance and building damage criteria.

The NIA outlines that the project incorporates the installation of 3 metre noise barriers within the site. Subject to this, the NIA reflects compliance with the adopted criteria.

HERITAGE

An Aboriginal Cultural Heritage & Historic Heritage Assessment (ACHHHR) was prepared by OzArk and is provided at **Appendix G**. The Archaeological survey by OzArk did not identify any previously unrecorded Aboriginal sites within the proposal study area. One (1) previously recorded Aboriginal site (Muswellbrook Bypass AFT 2, also known as 37-2-5953) extends into the study area and part of AFT 2 is impacted by the footprint of the proposal. AFT 2 is a low density artefact scatter. The scientific value of the site within the study

area is considered to have low potential to provide further information on the traditional Aboriginal use of the region. Test excavation at the site completed via the *Aboriginal Cultural Heritage Assessment Stage 3 PACHCI: New England Highway Muswellbrook Bypass. Report to AECOM on behalf of Transport for NSW* (KNC confirmed the site is not associated with deposits of conservation value and no further subsurface investigations at the site is warranted.

No specific comments relating to the survey methodology, or the landforms being surveyed, were raised by the Aboriginal site officer during the survey. Further, RAPs did not identify any cultural values relating to the study area during the site survey. Standard mitigations are recommended for implementation during construction, including development of an Aboriginal Cultural Heritage Management Plan, salvage of Aboriginal site AFT 2, fencing of the project area to avoid impacts to adjacent known sites and confinement of disturbance activities to the site.

The assessment also considered historic heritage and confirms that no existing or newly identified items of historic heritage value were identified within the study area. Standard mitigation measures are proposed including an unexpected finds protocol, confinement of disturbance activities to the site and staff training of legislative protection requirements.

TECHNOLOGICAL HAZARDS

A Preliminary Hazard Analysis (PHA) was prepared for the project by Riskcon Engineering and is provided at **Appendix H**. The PHA provides an assessment of potential hazards including Li-ion battery fault, thermal runaway and fire, Li-ion battery fire and toxic gas dispersion, electrical equipment failure and fire, transformer internal arcing, oil spill, ignition and bund fire, transformer electrical surge protection failure and explosion and electromagnetic field impacts. It concludes that the risks at the site boundary are not considered to exceed the acceptable risk criteria; hence, the project would only be classified as potentially hazardous.

Recommendations to manage residual risks include ensuring appropriate transformer spill containment and completion of a Final Hazard Analysis at detailed design stage to demonstrate that the risk criteria remains below the acceptable levels.

BUSHFIRE

A Bushfire Assessment Report (BAR) has been prepared for the project by Cool Burn Fire and Ecology and is provided at **Appendix I**. The BAR recommends the implementation 10 metre-wide Asset Protection Zone (APZ) around the BESS and associated buildings, as well as other measures. These include construction in accordance with the National Construction Code (NCC), permits for hot works, appropriate housing of equipment, provision of an on-site firefighting tank, undergrounding of electricity connections if possible, installation and maintenance of bottled gas in accordance with relevant standards, upgrade and maintenance of the access in accordance with Planning for Bushfire Protection 2019 (PFBP) requirements and the implementation of a Fire Management Plan.

The above is determined based on a FFDI rating of 100 and GFDI rating of 130, predominant vegetation within 140 metres of the site being grassland and grassy woodland and an effective slope out to 100 metres from the site ranging between generally flat to the east and west, downslope (0-5 degrees) to the north and upslope to the south.

WATER

A Water Assessment (WA) has been prepared for the project by SLR and is provided at **Appendix J**. The WA identifies that the potential exists for construction and operational activities associated with the project to impact on the downstream environment. However, through the implementation of environmental controls and management practises, these impacts can be satisfactorily mitigated to ensure residual impacts are of limited

affect. This would include the preparation of Construction and Operational Environmental Management Plan (CEMP) and an associated erosion and sediment control plans, and the training of staff.

The WA also considered the potential impacts associated with flooding and concludes that the project is likely to represent a low risk, with readily manageable minor impacts. The flooding assessment within the WA concludes that:

- The flood hazard to persons within the project is low.
- The site hydrology shows the project has negligible effect to downstream flow conditions.
- The project will not affect flood behaviour.

Where the BESS enclosures are proposed to be located in areas that may encounter localised overland flow, detailed design shall ensure that the BESS enclosures are elevated to ensure there are appropriate levels of flood immunity, in accordance with relevant standards.

A closure plan would include infrastructure removal and site regrading to make the land suitable for the proposed closure land use, including topsoil replacement and revegetation. An ESCP and rehabilitation plan would support the decommissioning phase and closure activities.

LAND AND SOIL

A Land Use Conflict Risk Assessment (LUCRA) was prepared for the project by Premise and is provided at **Appendix K**. The LUCRA identified a total of 47 potential land use conflicts.

The initial risk ranking identified 16 low risk, 30 moderate risk conflicts and 1 high use conflict. The initial high risk land use conflict relates to the potential for subsidence, historical underground mining and/or asbestos remediation to impact the BESS.

The revised risk ranking identified 42 low risk and 5 moderate risk conflicts.

The average risk ranking of all identified conflicts was reduced from an initial risk ranking of 12.3 (moderate risk) to a revised risk ranking of 7.6 (low risk).

The average revised risk ranking for all identified land use conflicts is below 10 which is consistent with the LUCRA objective to lower the risk ranking to 10 or below.

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

Mitigation measures via the LUCRA are reflective of those recommended throughout the range of specialist reporting prepared to support the proposal.

A Land and Soil Capability Assessment (LSCA) was prepared for the project by SLR Consulting Australia (SLR) and is provided at **Appendix L**. Field survey by SLR during April 2022 as part of the LSCA identified one soil map unit within the Study Area, being Subnatric Brown Sodosol. All soil horizons within the study area are classed as slightly to moderately dispersive and the likelihood of acid sulfate soils occurring within the study area is very low due to its position away from the coast and potential acid sulfate landform type.

The study area cannot be considered biophysical strategic agricultural land (BSAL) due to failing Step 7 (moderately low inherent fertility) and Step 9 (poor drainage) on the Interim Protocol BSAL Criteria Flow Diagram of the *Interim protocol for site verification and mapping of biophysical strategic agricultural land*.

The study area is not considered highly productive agricultural land as defined in *The Land and Soil Capability Assessment Scheme; Second Approximation* (OEH, 2012). 90% of the study area is classified as LSC Class 4 which is considered to have moderate agricultural capability with moderate to high limitations for high-impact land uses. The remaining 10% is classified as LSC Class 5 which is considered to have moderate-low agricultural capability and has severe limitations for high impact land management uses such as cropping.

No specific mitigation measures are recommended by the LSCA however general measures have been recommended by this EIS.

VISUAL IMPACTS

A Visual Impact Assessment (VIA) has been prepared for the project by Iris Visual Planning and Design and is provided at **Appendix M**. The VIA includes an assessment of views of the project from the public domain and nearby private dwellings.

Viewpoints from the public domain were selected to represent the views from nearby roads such as the New England Highway and Sandy Creek Road, and nearby rural and urban dwellings, including along Queen Street and Burton Lane. The visual impact assessment confirmed there would be a limited number of locations in the public domain from which the project would be seen. From these locations there would be a minor adverse to negligible visual impact.

A detailed assessment of views from residential properties (private domain) identified a negligible visual impact from existing dwellings to the northwest, north and southwest and the potential for a minor visual impact from existing dwellings to the south and southwest of the site in the Northview Estate.

As construction would typically be limited to standard EPA construction hours, there would be a negligible visual impact at night. During operation, there would be some minor security lighting provided at the BESS facility and sensor lighting associated with the battery storage areas which would not noticeably alter the prevailing light levels in this area.

SOCIAL AND ECONOMIC IMPACTS

A Social and Economic Impact Assessment (SEIA) has been prepared for the project by bd infrastructure and is provided at **Appendix N**. The SEIA provides an assessment of the social impacts of the proposed development during the construction, operation and decommissioning phases, categorised as *accessibility, way of life, health and wellbeing, livelihoods* and *surroundings*. It concludes that the proposed development will have pre-mitigation negative impacts ranging between low and medium. Post-mitigation, negative impacts are reduced.

Recommended mitigation includes:

- Development and implementation of a local procurement policy which aims to engage the local construction workforce and relevant suppliers;
- A commitment to develop a complaints handling protocol prior to construction;
- Developing the proposal website further to be a central source of information. This should include:
 - A summary of all environmental and social impacts, with the associated committed actions and mitigation measures adopted in the EIS;
 - Links to all relevant publicly available proposal information;
 - Clear contact details to support a complaint handling protocol;
- Implementing the noise management measures developed in consultation with potentially impacted sensitive receivers;
- Establishing clear lines of communications with project teams responsible for the management and delivery of the Muswellbrook Bypass; and
- Supporting the adoption of all technical mitigation measures identified in other technical assessments.

Engagement

bd infrastructure completed engagement activities in conjunction with Firm Power, and with support from Premise, with the outcomes of engagement summarised in **Section 5** of this EIS.

The engagement process included direct and indirect engagement with the community and receivers in proximity to the project, together with targeted discussions with regulatory agencies, elected officials and Council staff.

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

- Perceived project benefits include improved power reliability and downward pressure on wholesale electricity prices, with community members also seeing benefit in the support of renewable energy development;
- Low levels of concern around the potential for visual and noise impacts associated with operational phase, particularly for residents of the future Northview Estate stages;
- Low levels of concern about the potential for noise and traffic impacts during construction;

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

- Development and implementation of a Local Procurement Policy;
- Introduction of on-site noise barriers to ensure off-site noise levels are consistent with adopted project criteria; and
- Introduction of enhanced on site landscaping to provide screening.

A range of ongoing measures are proposed throughout project delivery to ensure that the community and neighbours remain engaged by the project and that clear lines of communication between the project developers and the community are maintained.

Justification

The NSW Government has recognised that the NSW electricity system needs to change, acknowledging that traditional generators are ageing and the State's transmission system is congested. Further, electricity prices are putting pressure on households and businesses. This realisation has informed the preparation of Government policies and documents, the provisions of which have filtered to the local scale and informed local plan making.

The project will contribute to the provision of renewable energy in NSW and facilitate private investment in the state's electricity system over the next decade and beyond, a key consideration of the NSW Electricity Strategy. The BESS has an anticipated lifespan in the order of 15-20 years and will contribute to the NSW Government's three objectives for the electricity system: reliability, affordability and sustainability.

The project would support the electricity supply market shift from a centralised power generation system, overly reliant on fossil fuels, to a dispersed and smaller scale system. The project provides firming capacity to the market by filling supply gaps when renewable energy sources are not producing.

The project is contributing to the enhancement of the existing Ausgrid Substation infrastructure, through the provision and operation of the BESS, which will serve to balance the grid and support the performance and future uptake of renewable energy. The project seeks to invest in and contribute to the local economy through the creation of jobs and provision of affordable electricity.

The project has been sited and designed to minimise environmental impacts, where impacts cannot be avoided, mitigation measures have been proposed.

Conclusion

The assessments presented in the EIS indicate that the proposed Muswellbrook BESS should be approved on the basis that it provides a range of benefits to the local region, the state and the country, in the context of meeting renewable energy targets.

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

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

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

1. INTRODUCTION

1.1 The Applicant

Muswellbrook BESS Pty Ltd, owned by Firm Power (ABN: 18 631 500 519) is an Australian owned grid flexibility company which operates from the Sydney CBD with operations across the east coast.

Firm Power develops large-scale smart battery projects across the country, to support reliability under the changing face of Australia's energy supply. Utilising advanced technology ensures energy supply and demand can be dynamically balanced, creating a more flexible electricity grid and allowing for continued renewable energy integration and power price reduction.

Firm Power has recently received approval from the Sydney Western City Planning Panel on 11 May 2021 for the Western Sydney Smart Battery, a 20MW Battery Energy Storage System (BESS) to be located adjacent to the Penrith Zone Substation at 2235 – 2249 Castlereagh Road, Penrith.

Firm Power are currently working to deliver the Hunter Dispatchable Energy System, a portfolio of large-scale dispatchable energy systems for the Hunter Region of NSW. The project will seek to deliver BESSs at three locations throughout the Hunter Region, being Beresfield, Awaba and Muswellbrook. The Muswellbrook BESS is the site for which this EIS has been prepared. While the Muswellbrook BESS forms part of the Hunter Dispatchable Energy System, it would operate as a standalone project and would not rely on development of the BESSs at the Beresfield or Awaba sites, both of which would be subject to different development applications.

1.2 Simple Description of the Project

Premise has been commissioned by Firm Power (the Applicant) to prepare an Environmental Impact Statement (EIS) to support a State Significant Development Application (SSDA) for an approximately 150 Megawatt (MW), 300 MW hour Battery Energy Storage System (BESS) and associated works at Lots 11 and 12 DP839233 (otherwise known as 20-24 Sandy Creek Road, Muswellbrook, NSW 2333) and Lot 15 DP905479, Sandy Creek Road, Muswellbrook. The site would occupy part of Lots 11, 12 and 15, hereafter referred to as '**the site**', and would have an area of approximately 4.94 hectares (ha). This site is located in the Muswellbrook Shire Council (MSC) Local Government Area (LGA) (refer to **Figure 1**) and is to be known as the Muswellbrook BESS'.

The Muswellbrook BESS development footprint is to occupy up to 4.94 ha, which is the entirety of the site, also referred to as the '**project area**'. As shown in **Figure 7**, and described in greater detail in **Section 3** of this report, the project area is located to the north and west of the existing Muswellbrook Ausgrid Substation. The BESS will include standalone enclosed batteries, power conversion systems, switchgear, a control building, an overhead or underground 132 kV sub-transmission line connecting the BESS to the Ausgrid substation, cabling and collector units, storage area, internal access tracks, on-site parking, security fencing, lighting, noise barriers, vegetation screening and a temporary construction laydown area.

- The project has the objective of delivering a distributed stand-alone battery system for the Hunter region, designed to balance the grid and support the performance and future uptake of renewable energy in NSW.

The delivery of the project will provide a range of electricity and power market services to support Firm Power's mission to power the clean energy transition.

This EIS is prepared subsequent to a Scoping Report, also prepared by Premise, submitted to the Department of Planning and Environment (DPE) on 16 November 2021. This EIS has been prepared pursuant to Part 5, Division 5.1, Subdivision 3 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation), *State*

Significant Development Guidelines – Preparing an Environmental Impact Statement (DPIE 2021) and SEARs issued by DPIE on 10 December 2021 in response to the Scoping Report (refer to **Appendix A**).

1.3 Background to the Project

There is the existing Muswellbrook Substation located adjacent to the site, which is owned and operated by Ausgrid. The substation was commissioned in 1964 (Ausgrid, 2019).

The Muswellbrook BESS will be designed to provide grid flexibility services and will support the efficiency of the existing electrical network. The BESS would cycle in response to pricing signals, typically charging when prices are low and discharging during peak periods. Through regulating the availability of energy, the development will have the capacity to store unutilised energy during low demand and enhance the total supply of energy during high demand. This will benefit the existing electrical grid, improving the efficiency of electrical generation and providing consumers with a more consistent and reliable supply of energy.

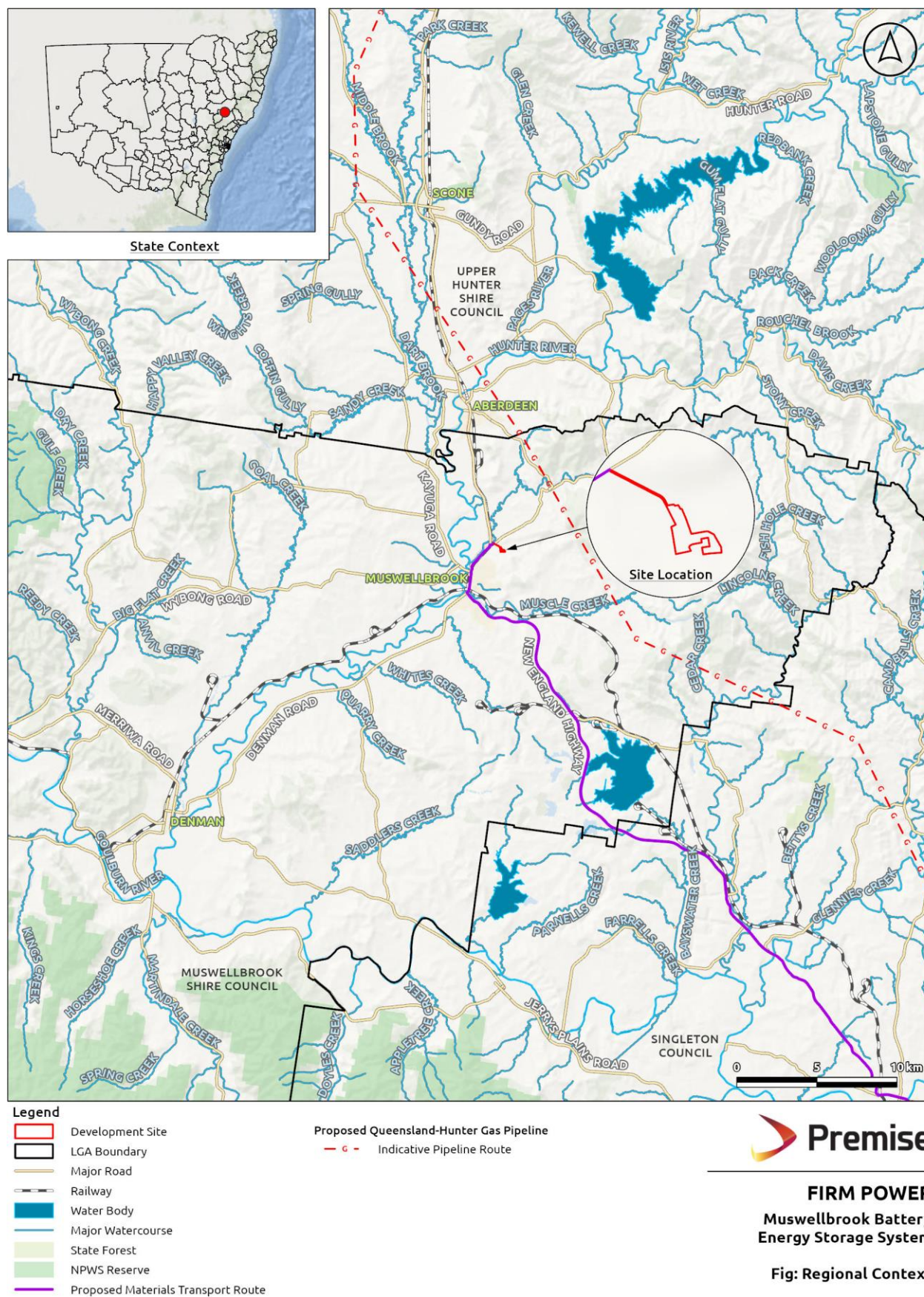
The BESS facility will utilise lithium-ion technology batteries installed in prefabricated enclosures similar in size to standard shipping containers. During periods of low demand, power will generally flow from the Ausgrid substation 132kV switchyard to the BESS facility via a new 132kV sub-transmission line. The power conversion systems rectify the power into a form that is suitable for storage in the facility's batteries. During periods of high demand, the stored energy in the batteries will generally flow back through these systems to the Ausgrid substation and ultimately the broader grid.

The BESS, through its connection to the substation, would possess the ability to store power and release it to the network at times of peak demand or critical need. It would also have the capacity to charge or discharge when power system services are required to maintain the stability of the broader electricity grid. The BESS strengthens the power network by providing greater flexibility in grid management.

A range of strategies have been employed through project conception, development and delivery, with the aim of avoiding, minimising and offsetting residual impacts associated with the project. In this context, the following is noted:

- Site selection has included identifying a site that is immediately adjacent to the existing substation, with suitable existing access arrangements;
- The site selected is primarily on land zoned SP2 - Infrastructure (except for the small area of land on C3 – Environmental Management associated with the sub-transmission line and the small area of land on R5 – Large Lot Residential associated with the access driveway), being land associated with the delivery of infrastructure;
- The site is located away from mapped waterways (Sandy Creek) and the BESS footprint has been located away from a tributary of Sandy Creek;
- The site has been located to avoid larger patches of surrounding vegetation;
- The site has been located to ensure a buffer is maintained between the site and residential areas to the west; and
- The project has been designed to provide a reasonable setback from the proposed Muswellbrook bypass to the east.

Figure 1 – Regional Context



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GOA2020 MCA Zone 56 File: 221312_05.aprx Prepared By: adam.davis Date: 29/07/2022

1.4 Any related development

A review of the Muswellbrook DA tracker confirms there are no other consents applying to the land.

Land immediately east of the site is subject to a pending assessment under Part 5 of the *Environmental Planning and Assessment Act 1979* for the proposed Muswellbrook Bypass. The Review of Environmental Factors for the project was prepared and displayed for public comment in early 2022. The response to submissions report for the project is currently available to view. It is expected a decision on the project will be made in later 2022.

1.5 Restrictions or covenants that apply to the site

A search of land titles that apply to the site has been completed and the results are provided at **Appendix O**. From a review of the titles, it is noted that right of carriage ways and easement for electricity transmission lines apply to the site.

These restrictions have been taken into account in project design and would not be impacted as a result of carrying out the project.

1.6 Report Structure

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

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

2. STRATEGIC CONTEXT

This section identifies key strategic considerations that are of relevance to the assessment of the project.

2.1 Justification of the Project

The NSW Government has recognised that the NSW electricity system needs to change, acknowledging that traditional generators are ageing and the State's transmission system is congested. Further, electricity prices are putting pressure on households and businesses. This realisation has informed the preparation of Government policies and documents, the provisions of which have filtered to the local scale and informed local plan making.

The project would support the electricity supply market shift from a centralised power generation system, overly reliant on fossil fuels, to a dispersed and smaller scale system. The project provides firming capacity to the market by filling supply gaps when renewable energy sources are not producing.

Following is a discussion of the applicable state and local strategies, policies and plans and how the project is facilitating the objectives of each as they relate to the delivery of renewable energy.

2.1.1 NSW ELECTRICITY STRATEGY & ELECTRICITY INFRASTRUCTURE ROADMAP

In order to address pressing matters around reliability, affordability and the fostering of a sustainable electricity future that supports a growing economy, the NSW Government has formed the NSW Electricity Strategy.

The NSW Electricity Strategy strives to:

- Deliver Australia's first coordinated Renewable Energy Zone in the Central-West Orana region;
- Save energy, especially at times of peak demand, via the Energy Security Safeguard;
- Support the development of new electricity generators;
- Set a target to bolster the state's energy resilience; and
- Make it easier and more efficient to do energy business in NSW.

The strategy encourages new private investment in NSW's electricity system over the next decade to support an estimated 1200 jobs, primarily in regional NSW. The strategy closely aligns with the NSW Government's 'Net Zero Plan Stage 1: 2020–2030'.

In November 2020, the NSW Government released the Electricity Infrastructure Roadmap, enabled by the *Electricity Infrastructure Investment Act 2020*. The Roadmap builds on the foundations of the Electricity Strategy and is expected to attract up to \$32 billion of private investment in regional energy infrastructure by 2030 and support over 9000 jobs, mostly in regional NSW.

The NSW Electricity Strategy acknowledges that firmed renewables are now the most cost-competitive form of new generation and cost less than the current wholesale electricity price.

The project will contribute to the provision of renewable energy in NSW and facilitate private investment in the state's electricity system over the next decade and beyond, a key consideration of the NSW Electricity Strategy. The BESS has an anticipated lifespan in the order of 15-20 years and will contribute to the NSW Government's three objectives for the electricity system: reliability, affordability and sustainability.

The location of the site in the context of the proposed Hunter-Central Coast Renewable Energy Zone is shown in **Figure 2**.

2.1.2 HUNTER REGIONAL PLAN 2036

The Hunter Regional Plan 2036 ('Regional Plan') is the NSW Government's strategy for guiding land use planning priorities and decisions over the next 20 years. It seeks to provide an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions.

The Regional Plan identifies energy as an emerging industry within the Hunter Region that has potential for growth. Direction 12: Diversify and grow the energy sector, notes that the Hunter accounts for 44 percent of

power generation in NSW. The Plan acknowledges that with its energy industries and research base, the Hunter region has the potential to be a major hub for next-generation power.

The project is consistent with Action 12.1 of the Plan, which seeks to diversify and grow the energy sector by working with stakeholders, including Councils, communities and industry, to identify and support opportunities for smaller-scale renewable energy initiatives.

2.1.3 DRAFT HUNTER REGIONAL PLAN 2041

The Draft Hunter Regional Plan 2041 ('Draft Regional Plan') was placed on public exhibition from 6 December 2021 to 4 March 2022 and represents a strategic vision for ensuring continued progress and prosperity for the Hunter community for the next 20 years. The Draft Regional Plan identifies the objectives and principles that councils should apply during local strategic planning.

The Draft Regional Plan adopts the United Nations Sustainable Development Goals, a cornerstone for planning, the second of which is 'affordable and clean energy'.

Objective 1: Diversify the Hunter's mining, energy and industrial capacity, acknowledges that the Hunter has the infrastructure assets and skilled workforce to support more renewable energy generation.

Objective 6: Reach net zero and increase resilience and sustainable infrastructure, states that a holistic approach to understanding social, economic and environmental impacts of climate change means that communities can do more than simply survive but gain the understanding and capacity to adapt and thrive.

The abovementioned objectives have informed the Muswellbrook Shire 2022-2032 Community Strategic Plan, which acknowledges the shift to renewable energy and seeks to move to a clean energy economy over the coming decades.

The project is consistent with these objectives through supporting the take up of renewable forms of energy generation.

Figure 2 – Renewable Energy Zone context



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- Legend**
- Site Locality
 - ▭ LGA Boundary
 - Major Road
 - Water Body
 - Major Watercourse
 - Indicative Hunter-Central Coast Renewable Energy Zone
 - Electricity Transmission Line**
 - 330kV Network
 - 500kV Network

- Renewable Energy Projects**
- In Planning
 - Approved

2.1.4 MUSWELLBROOK SHIRE 2022-2032 COMMUNITY STRATEGIC PLAN

The Muswellbrook Shire 2022-2032 Community Strategic Plan ('the Strategic Plan') identifies the community's vision and goals for the future, over a minimum timeframe of 10 years.

The Strategic Plan notes that in 2021 the NSW Government announced a \$25 million Royalties for Rejuvenation fund to drive job creation and provide support to the local community as it moves to a clean energy economy over the coming decades. The Strategic Plan acknowledges that in the coming decade Muswellbrook Shire Council will foster the move towards new industries, including renewable energy.

The Strategic Plan acknowledges the shift away from the thermal coal industry, which previously formed the focus of the 2012-2022 Community Strategic Plan and the need for Council to drive a transition towards renewable energy to diversify the local economy and build on the strengths of the region, with a skilled workforce and existing infrastructure assets.

The project is contributing to the enhancement of the existing Ausgrid Substation infrastructure, through the provision and operation of the BESS, which will serve to balance the grid and support the performance and future uptake of renewable energy. The project seeks to invest in and contribute to the local economy through the creation of jobs and provision of affordable electricity.

2.2 Key features of the site and surrounds

2.2.1 DESCRIPTION OF THE SURROUNDING AREA

The site is located within the north-eastern portion of the Muswellbrook LGA.

The urban area of Muswellbrook is located to the south-west of the site and comprises established, approved and planned residential development areas. Muswellbrook accommodates a residential population of approximately 12,072 persons, and employs people across a range of industries including the mining and retail industries. It features a sizeable central business district (CBD) with a range of businesses and facilities.

The Muswellbrook CBD is located approximately 2.5 km to the south-west of the site. The township of Muswellbrook is generally elongated along a north-south access along the alignment of the New England Highway. It is noted that a New England Highway bypass of Muswellbrook is proposed by Transport for NSW (TfNSW) that would re-route the highway past Muswellbrook, to the east of the site. Three options for the alignment have been presented in the New England Highway Muswellbrook Bypass Options Report (RMS 2018), currently in review stage following TfNSW community consultation in December 2020.

The site is connected to the local traffic network via Sandy Creek Road, which crosses the Main Northern Railway Line to connect to the New England Highway, approximately 620 metres from the site. The New England Highway connects Muswellbrook to Scone, Tamworth, Armidale, Glenn Innes, Tenterfield and Queensland in the north and to Newcastle via Singleton and Maitland in the south.

Under the *Muswellbrook Local Environment Plan 2009* (MLEP), land immediately surrounding the site includes a mixture of SP2 – Infrastructure, C3 – Environmental Management, RU1 – Primary Production, R5 – Large Lot Residential and R1 – General Residential – refer **Figure 5**.

Approximately seven (7) non-associated residential receivers are located within 400 m of the site, with a total of 26 non associated receivers within 500 metres. The closest developed non-associated receivers are 13 and 18 Lonhro Place, Muswellbrook at a distance of approximately 370 metres to the southwest of site.

Between 500 m and 1 km of the site, there are approximately 135 residential receivers, with the majority being located on low density residential allotments (R1 zoned land) within the Northview Estate to the west of the site. The Northview Estate residential subdivision features three constructed stages, whilst future Stages 4, 5 and 6 remain unbuilt. From discussions with the Northview Estate land owner, the R5 land to west of the site

is understood to be identified for the development of stage 7 of the Northview Estate, consisting of large residential lots with a minimum lot size of 4,000 m².

Other major nearby uses include the Muswellbrook waste management facility located approximately 500 metres to the south-east, a place of worship located approximately 650 metres to the north, the Muswellbrook Coal Mine is located approximately 1.7 kilometres to the east and the former Muswellbrook quarry located approximately 800 metres east of the site (subject to rehabilitation and remediation between 2016-2021).

The site is well separated from sensitive natural features such as significant waterways and other forms of sensitive landscape. Patches of woodland vegetation are located around the site.

As noted, the surrounding environment contains a range of infrastructure including the nearby Muswellbrook waste management facility and Muswellbrook Coal Mine, together with the alignment of the future New England Highway Muswellbrook Bypass.

Access to the site is provided by the New England Highway, Sandy Creek Road and a sealed, single lane driveway, located in a Crown reserve identified as TSR 70196, managed by the Hunter Local Land Services. TSR 70196 connects to Sandy Creek Road, a local, undivided and unmarked road with a speed limit that transitions from 60 to 80 to 100km/hr near the site. Sandy Creek Road is a local road, which connects with the New England Highway, which is a classified road for which MSC is also the roads authority, noting that some of the maintenance functions of the roads authority are adopted by Transport for NSW (TfNSW) due to the classified road status.

2.2.2 SITE DESCRIPTION

The site is largely cleared land, owned and managed by Ausgrid, with the exception of the existing access driveway (Crown reserve) and transmission lines shown in **Figure 3**. The site adjoins the existing Ausgrid Muswellbrook substation.

The site is located on land zoned SP2 – Infrastructure via the MLEP, with the exception of the proposed sub-transmission line from the BESS to the Muswellbrook substation, which is located on the C3 – Environmental Management zoned land, and the small portion of the land for the access driveway on R5 – Large Lot Residential land (**Figure 5**).

The existing partially sealed access driveway into the site crosses a mapped watercourse (via an existing culvert). The watercourse is mapped as key fish habitat and drains to Sandy Creek to the west (although noting that the creek is ephemeral). Sandy Creek drains towards the Hunter River in the west. The site generally slopes from south to north towards Sandy Creek and its tributaries.

One patch of mapped native vegetation is located within the site, east of the existing access driveway.

The site is not identified as being impacted by flooding in the 1:100-year ARI event or PMF under the Hunter River Flood Study (Muswellbrook to Denman) Model Revisions Report (Royal Haskoning DHV 2017).

The site is not mapped via the MLEP as containing any items of historic heritage significance and is not located within or adjacent to a heritage conservation area under the MLEP. The nearest sites of mapped historic heritage are located to the east (Muswellbrook Brick Works) and the north (St Heliers) – as per **Figure 3**.

The site and surrounds contain a number of mapped sites of Aboriginal heritage interest.

Existing improvements within the site consist of:

- Partially sealed access driveway connecting the Muswellbrook Substation to Sandy Creek Road; and
- Four (4) electricity transmission lines connecting to the existing substation including two 132kV lines extending to the north and two 33kV lines which extend to the east.

Adjacent to the eastern boundary of the site is the proposed Muswellbrook Bypass route, subject to commence construction in 2023.

2.3 Agreements with other parties

In order to facilitate the construction and operation of the project, a lease deed has been negotiated with Ausgrid.

A Reserve Use Permit P22/005 from Local Land Services (LLS) has been secured, allowing the use of R70196 Muswellbrook Town Travelling Stock Reserve (TSR) during the construction phase of the project.

2.4 Analysis of feasible alternatives to the project

This section provides an analysis of feasible alternatives to the project, having regard to the objectives of the development, including the consequences of not carrying out the development.

Two alternatives to the project were considered:

1. Not proceeding;
2. Proceeding with the project in another location.

Both options were considered as part of the feasibility analysis stage of the project, however neither was considered a suitable alternative.

The option of not proceeding with the project would result in no social or economic benefits being derived. The Muswellbrook Substation would continue to operate in its current state, with no potential to benefit from the balancing of the grid through the implementation of the BESS and improved renewable energy performance. Not proceeding with the project would present a lost opportunity to contribute to the realisation of the NSW Government's objectives of facilitating an affordable and sustainable electricity future, particularly where the environmental impacts of the project could be mitigated and managed to ensure the minimisation of harm to the environment.

The option of proceeding with the project in another location was considered, however the availability of the existing Muswellbrook Substation and the nature of the site presented a feasible opportunity for the project. The Applicant has also identified another two BESS sites which will be subject to separate applications, these being in Beresfield and Awaba. Abandoning the Muswellbrook site and only proceeding with the project at either/both of these sites would present a lost opportunity to meet the need for storage and grid stability, as well as diversify and expand the provision of renewable energy across regional NSW.

For the above reasons, it was considered most feasible from an economic, social and environmental perspective to proceed with the project at the current location. The site is well located to serve the local area, has excellent connections to the nearby road network, is separated from nearby receivers and can be developed with minimal impacts to the surrounding environment.

Figure 3 – The Development Site

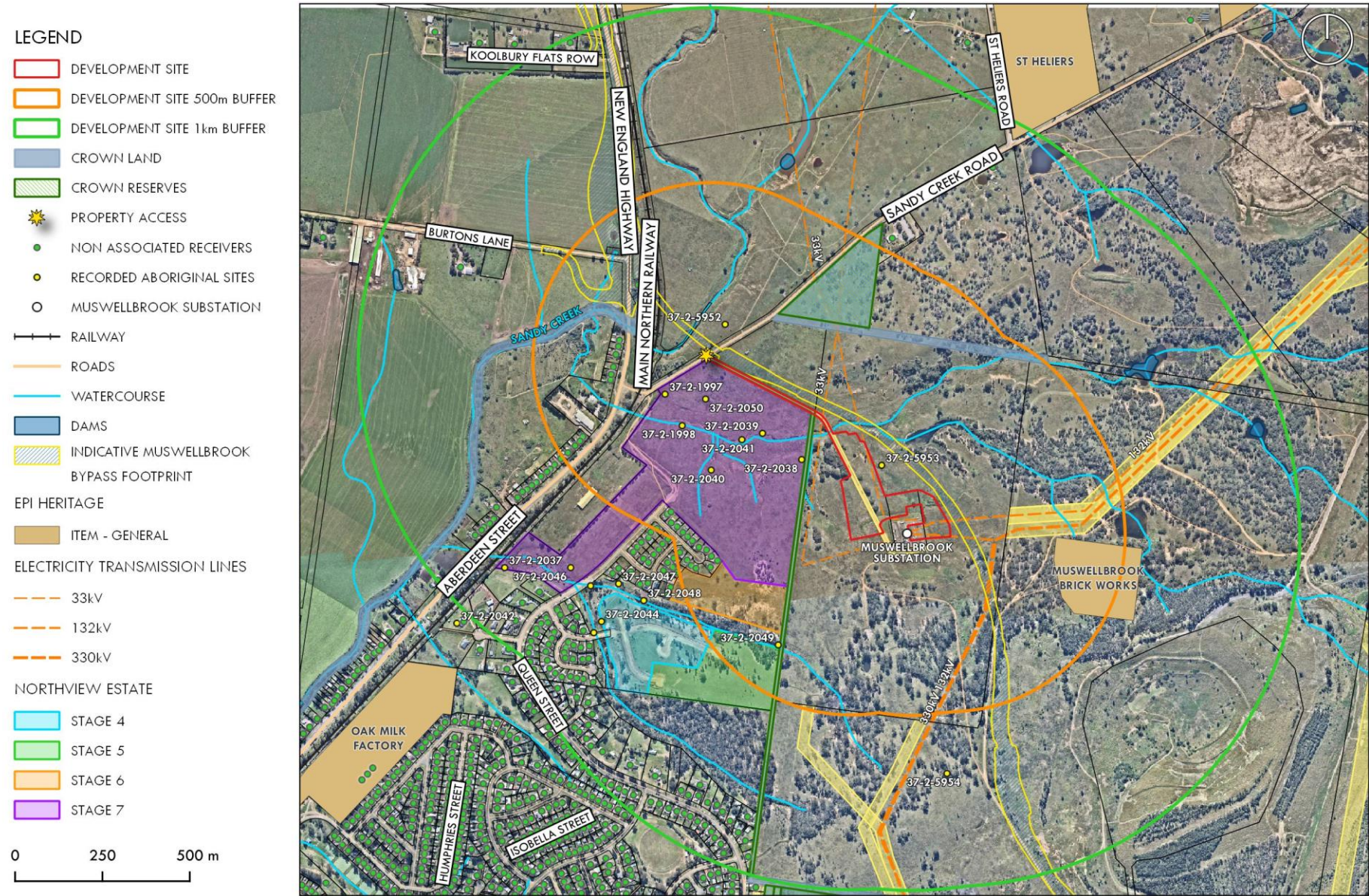
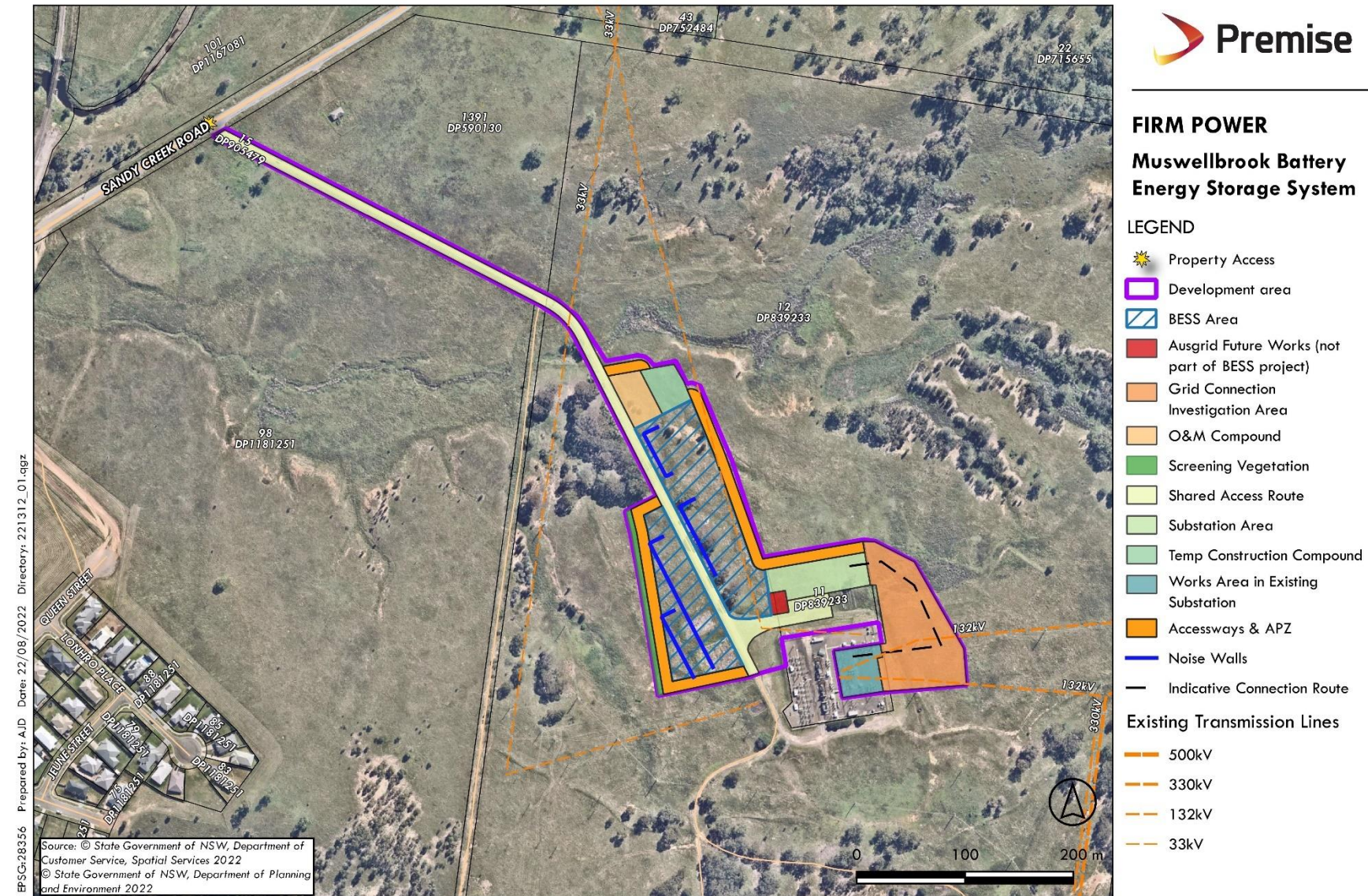


Figure 4 – Proposed layout



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3. PROJECT DESCRIPTION

3.1 Project Summary

The Muswellbrook BESS project comprises a BESS with a delivery capacity of up to 150 MW and useable energy storage of 300 MWh and includes the following key infrastructure:

- Enclosed lithium-ion batteries;
- Power conversion systems including associated switchgear, protection and control equipment, transformers and enclosures for housing equipment;
- Underground power and fibre optic cabling interconnecting the equipment;
- Grid connection equipment including main power transformer, switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary/earthing transformers and enclosures/buildings for housing equipment;
- Underground or overhead 132kV sub-transmission lines to connect the BESS to the Muswellbrook substation;
- Earthing and lightning protection systems;
- Site office, storage area/enclosure, internal access tracks, on-site parking, security fencing, CCTV, lighting and temporary construction laydown area;
- Noise walls and vegetation screening; and
- Utilisation of existing site access arrangements.

It is expected that augmentation work within the Ausgrid substation site would be required to facilitate connection of the BESS.

The area of the site that will be impacted by the development ('the **project area**') occupies the entirety of the site the subject of the application.

The primary components associated with the installation of the BESS are as follows:

- Site investigations, vegetation clearing, levelling, bench and access way construction, drainage system installation and installation of foundations/supports to install equipment on;
- Transport to site and installation of equipment;
- Testing and commissioning of the equipment; and
- Operation and maintenance.

Key features of the project are summarised in Table 1 and shown in Figure 3.

Table 1 – Project summary

Project Element	Summary of the Project
Site and development Area	4.94 ha
Site details	<p>20-24 Sandy Creek Road, Muswellbrook, being Part Lot 11 DP 839233 and Part Lot 12 DP 839233, and Sandy Creek Road, Muswellbrook, being Lot 15 DP 905479</p> <p>Areas impacted by the project in relation to the host lots are:</p> <ul style="list-style-type: none"> • Part Lot 11 has an area of 0.76 ha; • Part Lot 12 has an area of 3.8 ha; and • Part Lot 15 has an area of 0.4 ha.

Project Element	Summary of the Project
Development area	The development footprint of the BESS and associated operational and construction infrastructure, which would occupy the entirety of the site.
Battery storage capacity	150MW/300 MWh
BESS Lifespan	20 years, with the possibility of upgrades to extend the operational life
Infrastructure	<ul style="list-style-type: none"> Enclosed lithium-ion batteries with a capacity of up to 150 MW and 300 MW-hours, with associated power conversion systems, switchgear and a control building; An underground or overhead transmission line (approximately 300 m long) to connect the BESS to the adjacent Ausgrid substation; Cabling and collector units, storage area, internal access tracks, on-site parking, security fencing, lighting, temporary construction laydown area, noise barriers and vegetation screening
Site Access	<ul style="list-style-type: none"> Utilisation of an existing partially sealed site access driveway from Sandy Creek Road.
Access route	<ul style="list-style-type: none"> Vehicles would access the site via the New England Highway, Sandy Creek Road, and the existing site access point from Sandy Creek Road. It is anticipated that BESS infrastructure would be delivered to the Port of Newcastle and transported to the site via roads approved for heavy vehicle use and then the proposed access driveway (refer Figure 9).
Construction	<ul style="list-style-type: none"> Construction is expected to commence in late 2023 and occur over a 12 month period, including a peak period of 5 months. Construction would occur during standard construction hours. However, it is anticipated that some activities that are inaudible, and would not result in amenity impacts to surrounding receivers, may be required to occur outside of standard hours in accordance with an Out-of-Hours Construction Protocol. Approximately 20,000 L of water per day would be required during construction, delivered to site via water haulage trucks.
Operations and maintenance	<p>The project would be operated remotely with occasional maintenance activities generally be undertaken by 1-2 personnel within the following hours, the exception being where urgent emergency maintenance is required:</p> <ul style="list-style-type: none"> Weekdays: 7am to 6pm Saturday: 8am to 1pm Sundays and Public Holidays: no work
Decommissioning and rehabilitation	<ul style="list-style-type: none"> The site would be progressively rehabilitated during and following the construct period, including removal of the temporary construction facilities. At the end of operational life, above ground components would be removed and land rehabilitated to pre-development conditions.

Project Element	Summary of the Project
Workforce	Up to 75 construction jobs and 2-3 operational jobs
Hours of Operation	24 hours, 7 days a week
Capital Investment	Approximately \$157 million

3.2 Project refinements

The concept layout and design of the site has been considered in detail since issue of the scoping report as a result of design development, engagement with regulators and landholders, with the aim of reducing environmental and amenity impacts.

Key refinements, including justification, is provided below:

- Inclusion of noise barriers to ensure that noise impacts during operation comply with the adopted noise criteria;
- Inclusion of vegetation screening in the south-western extent of the site to ensure that off-site visual impacts are minimised;
- Through ongoing consultation with TfNSW, and sharing of information about design and delivery, refinement of the project footprint has occurred to avoid potential design conflicts with the development of the adjacent Muswellbrook bypass project; and
- The operational footprint has been refined to avoid impacts to Aboriginal heritage item AFT-1.

Figure 6 depicts the original concept layout, with **Figure 7** showing the proposed layout with the project refinements incorporated.

3.3 Uses and Activities

The project comprises the operation of electricity generating works, meaning a building or place used for the purpose of making or generating electricity, or electricity storage.

The existing Muswellbrook Substation will continue to operate and the BESS will operate in conjunction with the substation, to manage and store electricity generated by the substation.

Upon the commencement of operation, the only time personnel will be required on the site is for maintenance works. Personnel will access the site via the access driveway in standard vehicles.

Specific project elements are discussed in the following sections.

3.3.1 BATTERIES

The proposed BESS contains enclosed lithium-ion type batteries which will be manufactured offsite and delivered to the site for installation. The number and exact layout of battery modules would be confirmed during detailed design. However, the location of this equipment would be limited to the areas shown on **Figure 7**. For the purposes of the assessment of the BESS, a conservative approach was taken, whereby the maximum area and quantities of this infrastructure was considered, subject to this infrastructure being located wholly within the identified areas.

3.3.2 UNDERGROUND CABLING

Underground cabling would be designed in accordance with the relevant Australian and international standards and manufacturer's specifications and installed in trenches, measuring approximately 0.6 metres -

wide and 0.8 metres-deep. The cabling would be installed over a sand bed, covered with a layer of sand and backfilled with fill obtained on site.

3.3.3 SUB-TRANSMISSION LINE

The electrical connection from the BESS to the adjacent Muswellbrook Substation would be via a 132kV kV powerline (overhead/underground) running entirely within the site (up to 300 m in length).

The approximate location of the sub-transmission line has been identified, but would be subject to detailed design considerations in consultation with Ausgrid. Land within the nominated area comprises exotic vegetation, the majority of which is grassland. Any future vegetation growth within the easement would be maintained to mitigate fire risk and allow safe operation of the powerline.

3.3.4 AUSGRID SUBSTATION AND GRID CONNECTION

The existing substation would require some minor internal augmentation to accommodate the BESS infrastructure. The new feeder connection to the existing Muswellbrook Substation 132kV busbar is expected to comprise a single dedicated feeder bay and suitable overhead or underground conductor to which the required throughput meets Ausgrid thermal rating standards. Ausgrid standard design 'A' and 'B' 132kV feeder protection shall be installed for the new feeder, along with duplication of the existing 132kV busbar protection scheme at Muswellbrook. Modifications to SCADA equipment at Muswellbrook Substation may also be required.

These works would be wholly contained within the existing Ausgrid substation hardstand area, which is disturbed land comprising crushed rock surfacing, concrete foundations, and other substation equipment (such as switchgear, busbars, conductors, supports, etc).

3.3.5 INVERTERS, TRANSFORMERS AND SWITCHGEAR

Inverter stations would be installed and located at regular intervals across the site. Each would contain an inverter and a transformer. The inverter stations (containerised) would measure up to approximately 13 metres - long by 3 metres-wide by 3 metres-high.

132kV outdoor switchgear (bus bars and circuit breakers) would be installed within the subject property for separating the BESS from the electricity network if and when required.

Following consultation with Ausgrid, is anticipated that Ausgrid would undertake these works. For the purposes of the assessment of the BESS, these works have been considered in this development application.

3.3.6 ACCESS AND INTERNAL TRACKS

The existing access track located within the site would be used to provide access to the BESS via an existing access point on Sandy Creek Road. Upgrades to this access track are not expected to be required given the short-term duration of the construction phase and the ability to manage incoming and outgoing vehicles to minimise conflict. New gravel access tracks would be established within the area of the BESS infrastructure and would be accessible by vehicles as required.

As no upgrades are required to the existing site access driveway, no works are proposed to occur within the associated Crown reserve land (Lot 15 DP 905479), which extends for a distance of approximately 330 m between Sandy Creek Road and Ausgrid owned land (Lots 11 and 12 DP839233).

Figure 6 – Original site layout concept

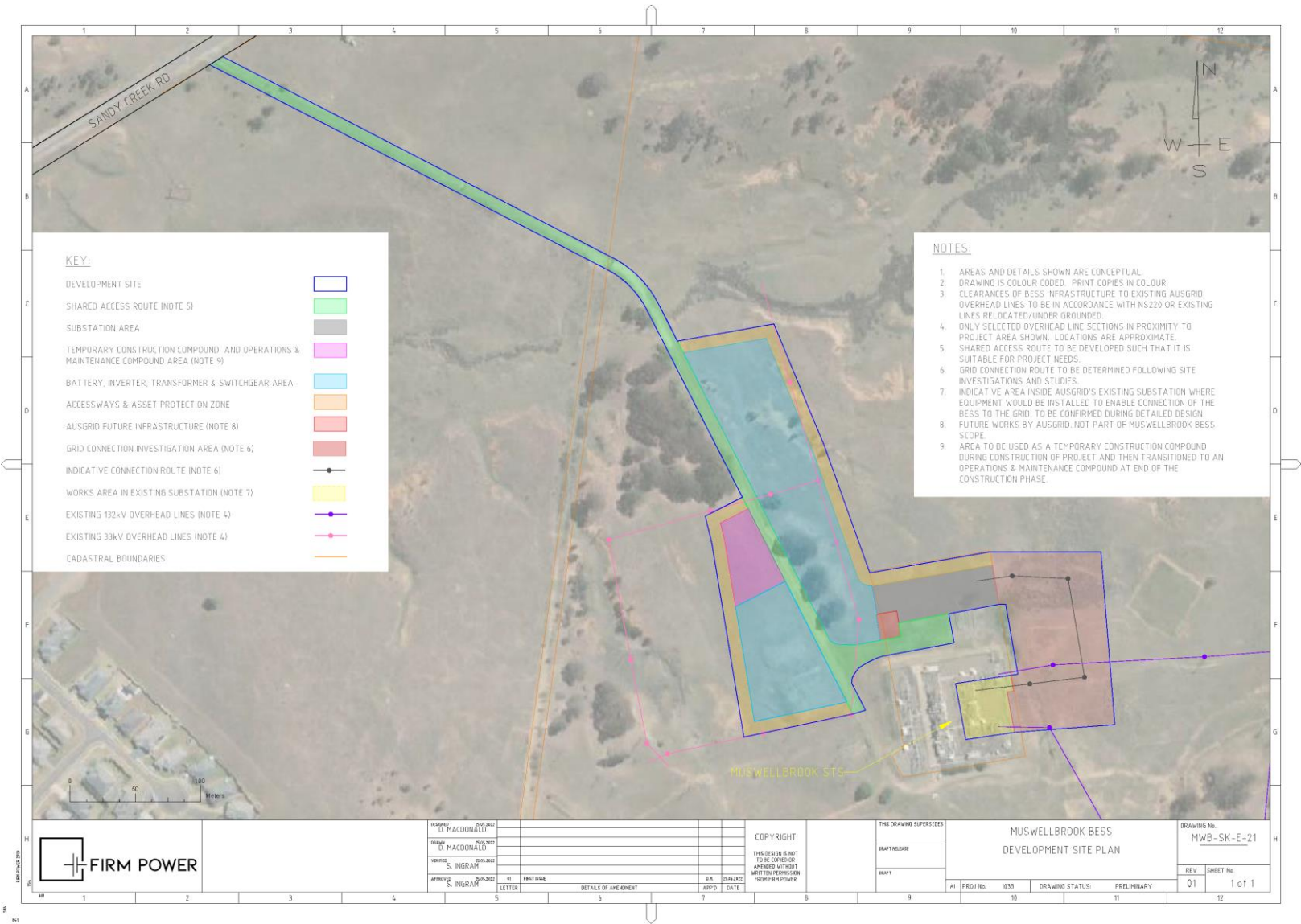
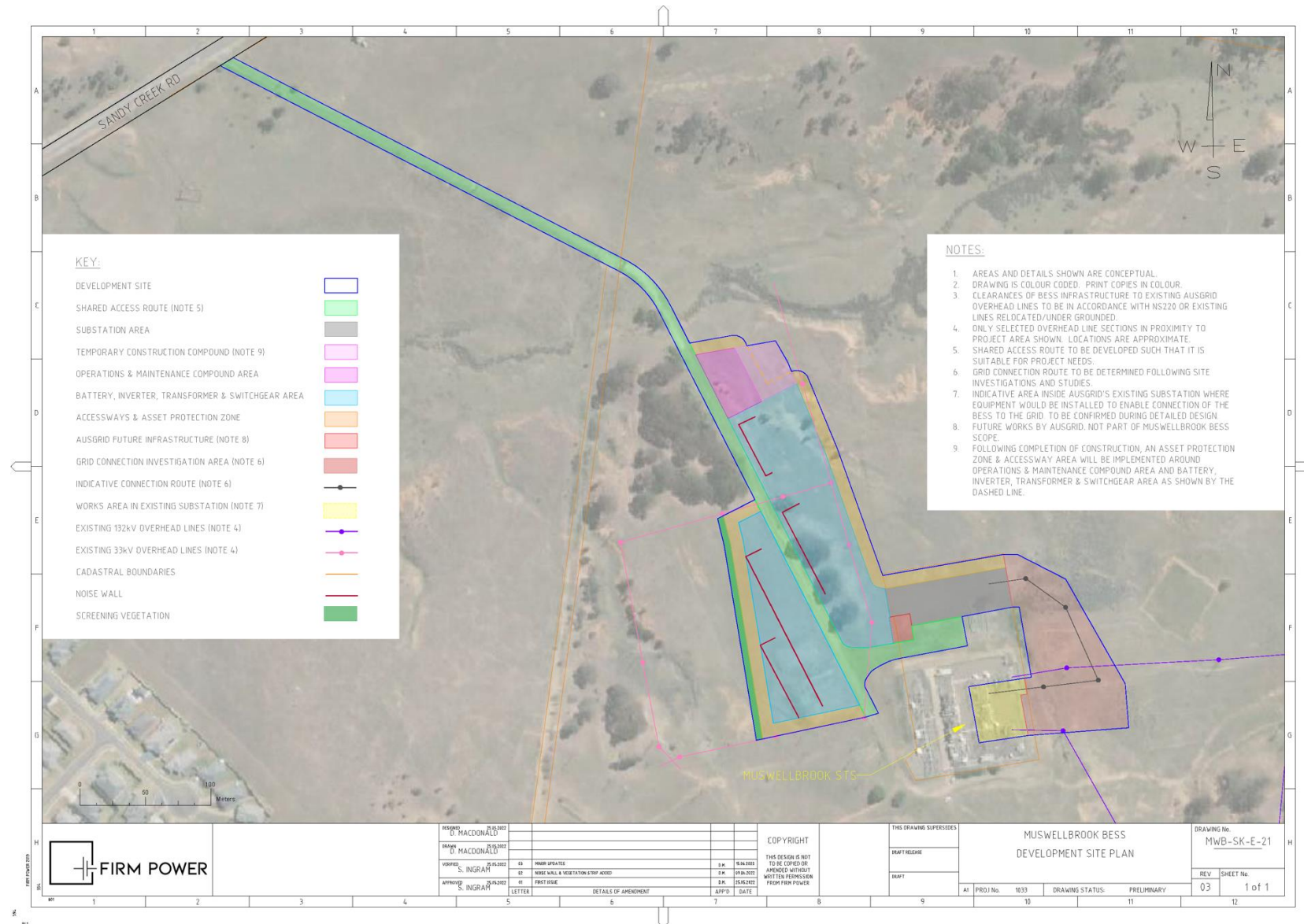


Figure 7 – Proposed project infrastructure layout



3.3.7 ANCILLARY TEMPORARY FACILITIES AND CONSTRUCTION COMPOUND

Ancillary facilities include:

- Material laydown areas;
- Temporary construction site offices;
- Car and bus parking areas for construction workers' transportation;
- Staff amenities including sanitary modules with septic tank, water tank, changing rooms, administrative office, undercover storage area, emergency muster point and genset for electricity supply, each with capacity to accommodate up to 75 staff on-site; and
- Parking for staff and visitors.

3.3.8 SECURITY FENCING

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

3.3.9 VEGETATION SCREENING

Through visual analysis via the project VIA (**Appendix M**), it has been recognised that there is the potential for residual visual impacts. It is therefore proposed to incorporate vegetation screening along the south-western side of the southern battery storage area – refer **Figure 7**.

Figure 2-2 of the project concept landscape plan at **Appendix M** depicts the extent of screening proposed.

3.3.10 NOISE WALLS

As a result of the noise assessment via the project NIA (**Appendix F**), three (3) metre high noise barriers would be installed within the site to ensure compliance with adopted criteria.

The barriers would be located around the BESS cell blocks, with the final location to be determined via detailed design. The conceptual location of the noise barriers is provided in **Figure 7**.

3.4 Timing

3.4.1 STAGES

The project would be delivered within a single construction program of approximately 12 months (5 months of peak activity). Specific construction elements are discussed further below.

Subject to approvals, construction is expected to commence late 2023.

3.4.2 PHASES

The project would involve 3 phases:

- Construction;
- Operation; and
- Decommissioning & Rehabilitation.

Each phase is discussed in detail below.

3.4.2.1 Construction

3.4.2.1.1 Construction Activities

It is anticipated that the construction phase will last approximately 12 months, with a five month peak construction period. The construction program is expected to feature seven specific construction stages, as follows:

1. Site establishment (i.e., vegetation clearing, earthworks and a temporary construction compound);
2. BESS installation and construction (i.e., leveling of the site to accommodate the BESS units and installation of the BESS units);
3. Substation construction;
4. Sub-transmission line construction;
5. O&M compound construction;
6. Testing and commissioning activities; and
7. Removal of construction equipment and rehabilitation of construction areas.

Stages 2-5 would be expected to overlap during the peak five month construction period.

3.4.2.1.2 Ground disturbance

The project area has a gradual slope to the north and a degree of levelling will be required to provide a suitable pad area to accommodate the proposed BESS infrastructure. The extent of the earthworks required will be determined at the detailed design phase of the project, noting that the extent of ground disturbance would not exceed the areas identified in **Figure 7**. Erosion and sediment control measures would be installed prior to the commencement of works for the project.

3.4.2.1.3 Construction Hours

Construction works are to be undertaken during standard working hours:

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

It is anticipated that some inaudible activities, or activities that would not result in amenity impacts to surrounding receivers, may be required to occur outside of standard hours in accordance with an Out-of-Hours Construction Protocol. This protocol would detail any proposed works and include consultation with relevant authorities and neighbouring residents.

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

3.4.2.1.4 Personnel and Equipment

It is anticipated that a maximum of approximately 75 construction personnel would be required on site during the peak construction period (approximately 5 months). Construction supervisors and the construction labour force, made up of construction labourers and technicians, are to be hired locally where possible. Workers would be accommodated in existing accommodation in Muswellbrook.

Equipment used during construction is anticipated to include earth-moving equipment for civil works, diesel generators, trucks and cranes.

3.4.2.1.5 Materials and Water Use

The following materials would be transported to the site from nearby towns and regional centres, including Muswellbrook and Newcastle. Quantities would be determined at the detailed design phase of the project:

- Gravel for BESS area;
- Sand for burying of cables;
- Metal for the mounting system, inverters and enclosures;
- Concrete for the foundations; and
- Approximately 20,000 L of water per day, sourced locally, trucked to site via water haulage trucks and stored using a water-tank for:
 - dust suppression depending on weather conditions;
 - vehicle washdown; and
 - drinking water.

3.4.2.2 Operation

Upon completion of the construction works and connection to the Ausgrid Muswellbrook Substation, the BESS would commence operation. Operational activities would include daily routine operations and maintenance by one to two personnel, including:

- Routine visual inspections and general maintenance;
- Site security; and
- Replacement of equipment and infrastructure, as required.

During operation of the BESS, no vehicles will be present on the site on a permanent basis with only occasional visits by standard vehicles. During major maintenance operations, this number could increase to 5-10 vehicles for a limited period.

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

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

Night lighting used during operation, for security and safety purposes, would be directed away from native vegetation, the surrounding road network and neighbouring properties.

The operational phase of the project would have a lifespan of approximately 15-20 years, but noting the potential for the development to be upgraded to extend the operational life (subject to appropriate approvals at that time).

3.4.2.3 Decommissioning & Rehabilitation

At the BESS end of life, all above ground infrastructure would be removed. Key elements of decommissioning include:

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

The sub-transmission line and substation connection may be decommissioned or may continue to be operated by the electricity supply authority for public power supply. In the event that the decision is made to decommission the sub-transmission line, above ground infrastructure and posts would be removed and the land would be returned to its pre-construction condition.

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

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

3.4.3 SEQUENCING

The construction program is anticipated to occur over a 12 month period and a peak 5 month construction period with:

- Construction commencing Q4 2023;
- Commissioning in Q4 2024;
- Operations commencing in Q1 2025; and
- Decommissioning in Q1 2045.

4. STATUTORY CONTEXT

In accordance with Section 3.5 of the *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021), the statutory requirements for the development are set out in **Table 2**.

Table 2 – Statutory requirements

Category:	Guidance:	Comment:
Power to grant approval	<i>Identify the legal pathway under which consent is sought, why the pathway applies, and who the consent authority is. If permissibility is relevant to this section, the discussion here should be cross-referenced rather than repeated.</i>	<p>Section 4.36(2) of the EP&A Act provides that a SEPP may declare any development, or any class or description of development, to be SSD.</p> <p>Clause 2.6(1) of <i>State Environmental Planning Policy (Planning Systems) 2021</i> (Planning Systems SEPP) provides that development is SSD for the purposes of the EP&A Act if:</p> <p>(a) <i>the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act; and</i></p> <p>(b) <i>the development is specified in Schedule 1 or 2.</i></p> <p>The proposed development is characterised as SSD as the proposal is for the purpose of electricity generating works with a capital investment value ('CIV') in excess of \$30 million, pursuant to Section 20 of Schedule 1 of the Planning Systems SEPP.</p> <p>Section 4.5(a) of the EP&A Act provides that the consent authority for SSD is the Minister, unless the development is of a kind which the IPC is declared by an environmental planning instrument to be the consent authority.</p>

		<p>Clause 2.7 of the State and Regional Development SEPP provides that the IPC is the consent authority for SSD for any of the following that is not carried out by or on behalf of a public authority and that is not SSI:</p> <ul style="list-style-type: none"> • Development to which the local council has objected to during the public exhibition of the proposal; • Development which has received at least 50 unique objecting submissions other than from Council during the public exhibition of the proposal; and • Development the subject of a DA made by a person who has disclosed a reportable political donation in connection with the DA. <p>On the basis that reportable political donations have not been made in connection with the DA to the knowledge of Premise, the consent authority will be the Minister in accordance with Section 4.5(a) of the EP&A Act unless objecting submissions of the type or number described in clause 2.7 of the Planning Systems SEPP are received during the public exhibition of the SSDA.</p>
Permissibility	<p><i>Identify the relevant provisions affecting the permissibility of the project, including any land use zones. If there are inconsistencies in these provisions, identify the inconsistencies and explain which provisions prevail to the extent of any inconsistency.</i></p> <p><i>If the project is partly or wholly prohibited, identify any provisions or actions being taken that would allow the project to be considered on its merits (e.g. making a concurrent amendment to the relevant environmental planning instrument). The rationale for allowing the project to be carried out on this land should be discussed in more detail in the justification and evaluation sections of the EIS.</i></p>	<p>Pursuant to the MLEP, the project area is zoned part SP2 Infrastructure (Classified Road) and part C3 Environmental Management, with the access driveway located on land zoned R5 Large Lot Residential.</p> <p>Electricity generating works are permitted with consent in the SP2 land use zone. The infrastructure of the project is wholly located within the SP2 zoned land, with the exception of the proposed sub-transmission line from the BESS to the Muswellbrook Substation. The sub-transmission line is located on C3 zoned land and the access driveway is located on R5 zoned land. Electricity generating works are prohibited in these zones.</p> <p>Section 4.38(3) of the EP&A Act provides that development consent for SSD may be granted despite the development being partly prohibited by an environmental planning instrument.</p>

		As this is a relatively minor aspect of the project, this minor prohibition is unlikely to result in any significant impacts.
Other approvals	<p><i>Identify any other approvals that are required to carry out the project and why they are required. These approvals should be grouped into the following categories:</i></p> <ul style="list-style-type: none"> • <i>Consistent approvals: approvals that cannot be refused if the project is approved and must be substantially consistent with the approval</i> • <i>EPBC Act approval, and whether the bilateral agreement applies</i> • <i>Other approvals: approvals that are not expressly integrated into the SSD assessment under the EP&A Act (e.g. water access licences under the Water Management Act 2000, leases under the National Parks and Wildlife Act 1974).</i> <p><i>Also identify the approvals that would have been required if the project was not an SSD project.</i></p>	<p>The following consistent approvals are required:</p> <ul style="list-style-type: none"> • A licence under Section 48 of the <i>Protection of the Environment Operations Act 1997</i> (the POEO Act) to perform an activity listed under Schedule 1. <p>As part of the SEARs process, the NSW EPA were consulted and advised that the project does not require an environmental protection licence under the POEO Act.</p> <p>A consent to connect a road to Sandy Creek Road or any of the other listed activities under Section 138 of the <i>Roads Act 1993</i> (the Roads Act).</p> <p>The project will utilise the existing connection to Sandy Creek Road and no further approval is required under the Roads Act.</p> <p>No Commonwealth approvals are required, as discussed below.</p>
Pre-condition to exercising the power to grant approval	<p><i>Identify any pre-conditions to exercising the power to grant approval for the project. These will include mandatory conditions that must be satisfied before the consent authority may grant approval.</i></p> <p><i>Each pre-condition should be summarised in a table with cross-references to the relevant sections of the EIS where it is addressed in more detail.</i></p>	<p>EMM carried out a search via the Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST). The PMST result identified five PCTs, six (6) species and eleven migratory as having the potential to occur on site.</p> <p>None of the PCTs identified on site are consistent with the PCTs listed via the PMST and thus these have not been considered further.</p> <p>Assessment of significance were completed for the six (6) species identified as having the potential to occur on site. These assessments concluded that the project is unlikely to result in significant impacts to these species. On this basis, impacts to matters of national environmental significance are not predicted and referral of the project to the Commonwealth Minister for the Environment is not required.</p> <p>No species listed as migratory under the EPBC Act were recorded as being present on the site or assessed as having a moderate or high likelihood of occurring within the subject site.</p>

		<p>A review of National Native Title Tribunal's Native Title Register did not identify any Native Title claims or applications, or Indigenous Land Use Agreements at or near the site under the <i>Native Title Act 1993</i> (the Native Title Act).</p>
<p>Mandatory matters for consideration</p>	<p><i>Identify the matters that the consent authority is required to consider in deciding whether to grant approval.</i></p> <p><i>Each mandatory matter should be summarized in a table with cross-references to the relevant sections of the EIS where it is addressed in more detail.</i></p>	<p>Pursuant to Section 1.7 of the EP&A Act, the <i>Biodiversity Conservation Act 2016</i> (the BC Act) is a mandatory matter for consideration. Section 7.9 of the BC Act provides that any application under Part 5 of the EP&A Act for SSD must be accompanied by a Biodiversity Development Assessment Report (BDAR) unless the Planning Agency Head and Environment Agency Head determine that the development is not likely to have any significant impact on biodiversity values.</p> <p>Refer to Section 6.1 of this EIS.</p> <p>Pursuant to Section 4.15 of the EP&A Act, the following mandatory matters for consideration apply:</p> <ul style="list-style-type: none"> • Relevant environmental planning instruments, including: <ul style="list-style-type: none"> – <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i>; – <i>State Environmental Planning Policy (Transport and Infrastructure) 2021</i>; – <i>State Environmental Planning Policy (Planning Systems) 2021</i>; – <i>State Environmental Planning Policy (Biodiversity and Conservation) 2021</i>; and – <i>Muswellbrook Local Environmental Plan 2009</i>. <p>These matters are discussed in Section 4.1.</p> <ul style="list-style-type: none"> • The relevant development control plan, being the <i>Muswellbrook Development Control Plan 2009</i> (noting that the application of development control plans is excluded from SSD under Clause 2.10 of the Planning Systems SEPP); • The likely impacts of the development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality; • The suitability of the site for the development; and

- The public interest.

5. ENGAGEMENT

This section provides a summary of the findings of the community engagement that was carried out for the project during the preparation of this EIS. This section also details what further community engagement will be carried out if the project is approved. A summary of engagement carried out during the development of the Scoping Report is also included for context.

5.1 Scoping Report Engagement

To inform preparation of the scoping report, the Applicant has carried out preliminary engagement with surrounding landowners, community groups and regulatory bodies.

The aims of engagement during development of the Scoping Report were to:

- Build an awareness of the project and proposed development
- Establish communication channels with the local community, and
- Respond to any questions or concerns the community may have and ensure these are considered during development of the project.

The Applicant implemented the following forms of engagement:

- Letters and notification issued to landowners surrounding the development, community groups and regulatory bodies.
- A project Infoline and email.
- A project website.
- Doorknocking.

Table 3 provides a summary of Scoping Report engagement.

Table 3 – Scoping Report engagement summary

Timing	Engagement activity	Audience and purpose
September - October 2021	Meetings and liaison	Key stakeholders including Department of Planning and Environment, Ausgrid, Subsidence Advisory NSW, and Muswellbrook Shire Council: to determine project feasibility and assessment requirements
September 2021 onwards	Project website	All stakeholders: source of up to date information on the project
22 September 2021	Notification letter	650m surrounding the proposal site (41 residential properties): to introduce the project and seek feedback on the proposal. No responses received.
27-29 September	Email	Engagement advice sent to seven regulatory bodies, and six community groups: to inform them of the Scoping Report development and seek feedback on the proposal. No responses received.
27 October 2021	Doorknocking	650m surrounding the proposal site (41 residential properties) 12 residents were briefed on the project and potential impacts during the doorknocking.

5.2 EIS Engagement

During the preparation of the EIS, the applicant has built on the engagement that was carried out during the Scoping Report phase with surrounding landowners, community groups and regulatory bodies. This engagement was carried out in accordance with the SEARs and DPE's *Undertaking Engagement Guidelines for State Significant Projects*, and to ensure that the EIS was developed with due consideration of community and stakeholder views.

The aims of community and stakeholder engagement during development of the EIS were to:

- Grow awareness of the project and proposed development
- Maintain communication channels
- Identify issues requiring consideration, and
- Deepen understanding of local views and values to be considered during development of the project, and
- Support the assessment of potential project impacts and benefits.

The Applicant implemented the following forms of engagement:

- Letters and emails to local stakeholders, community groups and regulatory bodies.
- Stakeholder meetings and interviews.
- Distribution of a project Fact Sheet.
- Advertising in local media.
- Community Survey.
- A project Infoline and email.
- A project website.
- Doorknocking.

Table 4 provides a summary of EIS engagement.

Table 4 – EIS engagement summary

Timing	Engagement activity	Audience and purpose
March to April 2022	<ul style="list-style-type: none"> • Provision of draft assessment methodology • Field assessment 	14 registered RAPs: <ul style="list-style-type: none"> • Consultation on the method of Aboriginal Cultural Heritage Assessment. • A representative of Tocomwall Pty Ltd assisted with the field assessment.
May 2022	<ul style="list-style-type: none"> • Meeting 	Ausgrid: <ul style="list-style-type: none"> • Consultation on construction planning and design interfaces.
May – June 2022	<ul style="list-style-type: none"> • Email and letter with project briefing offer, and interview request to discuss social and economic impacts • Project Fact Sheet • Social and economic impact scoping interview • Liaison during Traffic Impact Assessment development • Provision of draft Traffic Impact Assessment for comment 	Muswellbrook Shire Council: <ul style="list-style-type: none"> • Consultation to support assessment of social, economic and traffic impacts.

Timing	Engagement activity	Audience and purpose
May – June 2022	<ul style="list-style-type: none"> Meeting Liaison during Traffic Impact Assessment development Provision of draft Traffic Impact Assessment for comment 	<p>Transport for NSW:</p> <ul style="list-style-type: none"> Consultation on construction planning and design interfaces with the Muswellbrook Bypass project. Consultation to support assessment of traffic impacts.
May – June 2022	<ul style="list-style-type: none"> Phone and email Project Fact Sheet Meeting 	<p>Tindale Property (landowner of adjacent Northview Estate):</p> <ul style="list-style-type: none"> Consultation regarding potential the noise and visual impacts of the project on the Northview Estate development.
May 2022	<ul style="list-style-type: none"> Project website update 	<p>All stakeholders:</p> <ul style="list-style-type: none"> Providing a source of up to date information on the project, including the Project Fact sheet and community survey.
Ongoing	<ul style="list-style-type: none"> 1800 free call number 	<p>All stakeholders:</p> <ul style="list-style-type: none"> Included on all communications materials to provide a point of contact for feedback and/or enquiries. <p>Two calls received from members of the community.</p>
May – June 2022	<ul style="list-style-type: none"> Local media advertising in Hunter Valley News (two consecutive weeks) 	<p>General community (readership 14,462):</p> <ul style="list-style-type: none"> Promote awareness of the proposal and seek community feedback via the online survey
May – June 2022	<ul style="list-style-type: none"> Online survey 	<p>General and local community:</p> <ul style="list-style-type: none"> Consultation to support assessment of social and economic impacts. <p>Three surveys completed by members of the community.</p>
June 2022	<ul style="list-style-type: none"> Distribution of Project Fact Sheet 	<p>Local community within 1.5km of the proposal site:</p> <ul style="list-style-type: none"> Provide information about the proposal and seek community feedback via the online survey
June 2022	<ul style="list-style-type: none"> Doorknocking 	<p>Nearby residents within 650m of the site:</p> <ul style="list-style-type: none"> Provide information about the proposal and seek community feedback <p>Eight households were spoken to during doorknocking. 'Sorry I Missed You' cards were left at 33 properties.</p>
June 2022	<ul style="list-style-type: none"> Letter with project briefing offer and request for social and economic impact interview 	<p>Wanaruah Land Council: Consultation to support assessment of social and economic impacts. No response to the interview request was received.</p>
June 2022	<ul style="list-style-type: none"> Email and letter with project briefing offer, and interview request 	<p>Muswellbrook Sustainability Hub:</p>

Timing	Engagement activity	Audience and purpose
	<ul style="list-style-type: none"> Social and economic impact scoping interview 	<ul style="list-style-type: none"> Consultation to support assessment of social and economic impacts
June 2022	<ul style="list-style-type: none"> Emails and letters with project briefing offers, and interview requests 	<p>Community groups:</p> <ul style="list-style-type: none"> Consultation to support assessment of social and economic impacts. <p>No interviews were accepted or able to be scheduled with:</p> <ul style="list-style-type: none"> Committee For The Hunter McCullys Gap Community Muswellbrook Chamber of Commerce Sandy Hollow Progress Association Hunter Environment Institute Transition Newcastle
June 2022	<ul style="list-style-type: none"> Liaison during Traffic Impact Assessment development 	<p>ARTC:</p> <ul style="list-style-type: none"> Consultation to support assessment of traffic impacts
June 2022	<ul style="list-style-type: none"> Email and letter with project Fact Sheet and briefing offer 	<p>The Hon. Dave Layzell MP, NSW Member for the Upper Hunter:</p> <ul style="list-style-type: none"> Provide information about the impacts proposal and community feedback received during EIS consultation. <p>Briefing accepted and to be held prior to construction.</p>
June – July 2022	<ul style="list-style-type: none"> Email and letter with project Fact Sheet and briefing offer Project briefing 	<p>The Hon. Dan Rephacoli MP, Federal Member for the Hunter:</p> <ul style="list-style-type: none"> Provide information about the impacts proposal and community feedback received during EIS consultation.
July 2022	<ul style="list-style-type: none"> Provision of Site Plans 	<p>Subsidence Advisory NSW:</p> <ul style="list-style-type: none"> Consultation to support assessment of hazards and risks <p>SA NSW advised no objections to the project as the site is not undermined. Once plans are progressed, SA NSW will stamp for approval.</p>
July 2022	<ul style="list-style-type: none"> Provision of draft bushfire assessment and preliminary hazard analysis. 	<p>RFS and Fire and Rescue NSW</p> <ul style="list-style-type: none"> Consultation to support assessment of hazards and risks <p>F&RNSW indicated that detailed comments would be provided once the EIS has been formally lodged. General comments around the need to ensure compliance with the various relevant guidelines was supplied. The details of these have been considered in preparation of the PHA at Appendix H.</p>

Timing	Engagement activity	Audience and purpose
		RFS acknowledged the request for comment but did not provide a response at the time of finalisation of the draft EIS.
July 2022	<ul style="list-style-type: none"> Provision of draft Aboriginal Cultural Heritage Assessment 	<p>Heritage NSW</p> <ul style="list-style-type: none"> Consultation to support assessment of Aboriginal heritage <p>Heritage NSW responded to the request for comment via email on the 22/07/2022 to advise that Heritage NSW does not have capacity to review draft ACHARs for major projects.</p>
Ongoing	<ul style="list-style-type: none"> Ongoing discussions about landowners consent and licencing, and Aboriginal land title claims 	<p>Department of Planning and Environment - Crown Lands</p> <ul style="list-style-type: none"> Wanaruah Aboriginal Land Council have an undetermined claim on TSR 70196 (Lot 15 DP 905479) and have not formally responded to consultation, and are unlikely to rescind their rights over the land. Crown Lands have acknowledged the ongoing consultation that is occurring on this issue and have raised no objections to the lodgement of the EIS with DPE.
Ongoing	<ul style="list-style-type: none"> Meeting and phone calls with DPE planning staff 	<p>Department of Planning and Environment</p> <ul style="list-style-type: none"> Ongoing discussions about application lodgement, EIS content and project parameters

5.3 Community and Stakeholder Views

Engagement was used to gain a balanced understanding of community and stakeholder views relevant to perceived project benefits, and the construction and operation of the proposal. This engagement was instrumental in completing a Social Impact Assessments (**Appendix N**), along with other technical studies.

The SIA assessed both the unmitigated and mitigated social impacts and benefits. Mitigated social impacts relating to way of life (how people work, rest and play) and health and wellbeing were assessed as low in all but one instance, with a medium positive benefit resulting from additional employment opportunities in the local area.

The Applicant has responded to this potential benefit through proposing an enhancement in the form of a Local Procurement Policy.

The Applicant has responded to potential impacts through proposal refinement measures including the provision for 3-metre noise barriers and vegetation screening. These refinements specifically consider:

- The close proximity of current and future residents to the proposal site, and
- The valued rural lifestyle and scenery of the local area.

A description of community and stakeholder views on project benefits, and construction and operational impacts is included below.

5.3.1 BENEFITS

Engagement with local stakeholders and community demonstrated broad understanding and support for the role of Battery Energy Storage Systems in the energy market. This was primarily related to the potential for improved power reliability and downward pressure on wholesale electricity prices, with community members also seeing benefit in the support of renewable energy development. These stakeholders also placed a high value on local employment where possible, in preference to a temporary or drive-in-drive-out workforce. Concerns around housing supply and social cohesion were cited as issues which would be mitigated by maximising local employment opportunities.

Residents in proximity to the proposal and other stakeholders provided no feedback on potential project benefits.

Table 5 includes potential project benefits noted by stakeholders during engagement, and the mitigations proposed by the Applicant.

Table 5 – Project benefit enhancements

Benefit	Interested stakeholders	Proposed enhancement
Local employment	<ul style="list-style-type: none"> The Hon. Dan Rephacoli MP, Federal Member for the Hunter Muswellbrook Shire Council Muswellbrook Sustainability Hub General community 	<ul style="list-style-type: none"> Development and implementation of a Local Procurement Policy

5.2.2 CONSTRUCTION IMPACTS

Engagement with all stakeholders and community demonstrated a relatively low degree of concern around construction impacts associated with the proposal. Specifically, the proposed Muswellbrook Bypass project was called out as being of greater potential impact to the local community and residents. It was also, identified that collaborative working relationships would need to be established with Muswellbrook Bypass project team and the nearby Northview estate development to assist with the management of potential cumulative impacts.

In addition, the potential for noise impacts to shift workers was identified in the Social and Economic Impact Assessment (**Appendix N**) as a potential issue requiring a targeted management approach.

Stakeholder engagement identified post-approval steps that would need to be undertaken by the Applicant with regard, to the transportation of plant and equipment. This includes risk assessments for the crossing ARTC rail assets during the transportation of transformers to the proposal site.

Table 6 includes potential construction impacts noted by stakeholders during engagement, and the mitigations proposed by the Applicant.

Table 6 – Construction impact mitigations resulting from consultation

Impact	Interested stakeholders	Proposed mitigation/s
Traffic, transport and access: <ul style="list-style-type: none"> Increased local traffic Heavy vehicle rail crossings 	<ul style="list-style-type: none"> Transport for NSW ARTC Muswellbrook Shire Council General community 	<ul style="list-style-type: none"> Construction Traffic Management Plan Rail crossing risk assessment
Biodiversity: <ul style="list-style-type: none"> Site clearing, habitat protection 	<ul style="list-style-type: none"> General community 	<ul style="list-style-type: none"> Construction Environmental Management Plan

Impact	Interested stakeholders	Proposed mitigation/s
Noise and vibration: <ul style="list-style-type: none"> Sleep disturbance (shift workers) 	<ul style="list-style-type: none"> The Hon. Dan Rephacoli MP, Federal Member for the Hunter General community Nearby residents (incl. potential shift workers) 	<ul style="list-style-type: none"> Construction Environmental Management Plan Complaints handling protocol Inter-project communication Project website, newsletters / fact sheets and construction notifications Targeted consultation with nearby residents
Air quality <ul style="list-style-type: none"> Dust from earthworks, site clearing 	<ul style="list-style-type: none"> Muswellbrook Shire Council Muswellbrook Sustainability Hub General community 	<ul style="list-style-type: none"> Construction Environmental Management Plan Complaints handling protocol Inter-project communication Project website, newsletters / fact sheets and construction notifications

5.2.3 OPERATIONAL IMPACTS

Engagement with local stakeholders and community demonstrated a relatively low degree of concern around op impacts associated with the proposal, with the exception of potential future residents of the Northview Estate, Stages 4-7. In this location, where development is proposed in closer proximity to the BESS site, concerns around visual impacts and operational noise were raised as having the potential to affect the future amenity of these residences. Visual impact associated with land use change was also cited as a broader community concern in engagement with local stakeholders. **Table 7** includes potential operational impacts noted by stakeholders during engagement, and the mitigations proposed by the Applicant.

Table 7 – Operational impact mitigations resulting from consultation

Impact	Interested stakeholders	Mitigation
Visual impacts: <ul style="list-style-type: none"> Industrialisation of landscape Disruptions to existing views and rural setting 	<ul style="list-style-type: none"> Muswellbrook Shire Council Muswellbrook Sustainability Hub Tindale Property General community Nearby residents (future) 	<ul style="list-style-type: none"> Planting and maintenance of vegetation screening
Operational noise: <ul style="list-style-type: none"> Noise from batteries enclosures 	<ul style="list-style-type: none"> Muswellbrook Shire Council Tindale Property General community Nearby residents (future) 	<ul style="list-style-type: none"> Installation of 3m high noise barriers

5.4 Engagement to be Carried Out

Community and stakeholder engagement will continue to be undertaken if the project is approved, having regard to the community participation objectives in the 'Undertaking Engagement Guidelines for State Significant Projects.'

Table 8 details the proposed activities to undertaken following project approval.

Table 8 – Post-approval engagement activities

Stakeholder	Purpose	Method
Ausgrid	<ul style="list-style-type: none"> Confirm project design interfaces and connection requirements 	<ul style="list-style-type: none"> Meetings Letters / emails
The Hon. Dan Rephacoli MP, Federal Member for the Hunter	<ul style="list-style-type: none"> Update on project progress Advise on community issues or benefits 	<ul style="list-style-type: none"> Meetings Letters / emails Newsletters / Fact Sheets
The Hon. Dave Layzell MP, NSW Member for the Upper Hunter	<ul style="list-style-type: none"> Update on project progress Advise on community issues or benefits 	<ul style="list-style-type: none"> Meetings Letters / emails Newsletters / Fact Sheets
Wanaruah Land Council	<ul style="list-style-type: none"> Update on project progress Development of management plans 	<ul style="list-style-type: none"> Letters / emails Newsletters / Fact Sheets
Department of Planning and Environment	<ul style="list-style-type: none"> Endorsement of management plans Update on project progress Advise of environmental issues arising during construction 	<ul style="list-style-type: none"> Meetings Letters / emails Phone
Transport for NSW	<ul style="list-style-type: none"> Update on project progress Development of management plans Road access approvals Management of potential cumulative construction impacts resulting from the Muswellbrook Bypass 	<ul style="list-style-type: none"> Meetings Letters / emails Phone Newsletters / Fact Sheets
ARTC	<ul style="list-style-type: none"> Update on project progress Development of management plans Assessment of asset interactions 	<ul style="list-style-type: none"> Meetings Letters / emails
Muswellbrook Shire Council	<ul style="list-style-type: none"> Update on project progress Development of management plans Development / implementation of local procurement policy 	<ul style="list-style-type: none"> Meetings Letters / emails Phone Newsletters / Fact Sheets
Tindale Property	<ul style="list-style-type: none"> Update on project progress Management of potential cumulative construction impacts resulting from the Northview Estate stages 4-6 	<ul style="list-style-type: none"> Meetings Letters / emails Phone Newsletters / Fact Sheets

Stakeholder	Purpose	Method
Community Groups, including: <ul style="list-style-type: none"> • Muswellbrook Sustainability Hub • Muswellbrook Chamber of Commerce • Business Hunter • Committee For The Hunter • McCullys Gap Community • Sandy Hollow Progress Association • Hunter Environment Institute • Transition Newcastle 	<ul style="list-style-type: none"> • Update on project progress • Development / implementation of local procurement policy 	<ul style="list-style-type: none"> • Meetings • Letters / emails • Newsletters / Fact Sheets
Local community (properties within 1.5km of the proposal)	<ul style="list-style-type: none"> • Update on project progress • Provide contact details for management of community issues 	<ul style="list-style-type: none"> • Newsletters / Fact Sheets • Local advertising
Nearby residents (properties within 650m of the proposal)	<ul style="list-style-type: none"> • Update on project progress • Provide targeted notification of construction activities • Provide contact details for management of community issues • Identify shift workers • Develop approach to managing noise impacts 	<ul style="list-style-type: none"> • Newsletters / Fact Sheets • Local advertising • Construction notifications / emails • Doorknocking / home visits • Phone
All	<ul style="list-style-type: none"> • Update on project progress • Provide a centralised source of information • Provide access to the project team • Ensure timely and effective resolution of complaints 	<ul style="list-style-type: none"> • Project website • 1800 number (free call) • Project email address • Complaints handling protocol

6. ASSESSMENT AND MITIGATION OF IMPACTS

This section provides a detailed summary of the findings of the assessment of the potential impacts of the project. The scale and nature of the impacts of the project on each matter has informed the following table which ranks the matters based on the potential impacts generated by the project; from significant impacts ('high impact matters') through to those with minimal impacts ('low impact matters').

Table 9 – Impact assessment level

High Impact Matters	Medium Impact Matters	Low Impact Matters
Transport, traffic & access	Aboriginal cultural heritage	Flooding
Biodiversity	Hazards & risks	Groundwater
Visual	Bushfire	Waste
Noise & vibration	Surface water	Economic
	Water quality	Crown land
	Electromagnetic fields	
	Land	
	Social	

6.1 Transport, traffic & access

6.1.1 INTRODUCTION

A Traffic Impact Assessment (TIA; Amber 2022) is provided at **Appendix D**. It includes:

- A traffic assessment considering traffic generation and distribution;
- Cumulative traffic impacts;
- Route assessment;
- Intersection assessment; and
- Construction management plan.

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

6.1.2 EXISTING ENVIRONMENT

The site is accessed via the New England Highway, Sandy Creek Road and a partially sealed, single lane driveway, located in a Crown reserve identified as TSR 70196, managed by the Hunter Local Land Services. TSR 70196 connects to Sandy Creek Road, a local, undivided and unmarked road with a speed limit that transitions from 60 to 80 to 100km/hr near the site. Sandy Creek Road connects with the New England Highway, which is a classified road for which MSC is also the roads authority, noting that some of the maintenance functions of the roads authority are adopted by Transport for NSW (TfNSW) due to the classified road status.

The proposed site access location in the context of the local traffic environment is reflected in **Figure 8**.

An active (signalised) railway level crossing is located on Sandy Creek Road approximately 40 metres from the hold line at the intersection of the New England Highway and Sandy Creek Road. The level crossing provides a crossing over the Main Northern Railway line, for which the Australian Rail Track Corporation (ARTC) is the Rail Infrastructure Management (RIM) on behalf of TfNSW.

TfNSW traffic volume viewer provides volumes for the New England Highway for 2022, which confirms that the highway accommodates a moderate level of traffic (approximately 5,387 vehicles per day [vpd]). Existing peak hours on the highway are 408 vehicles per hour (vph) in the 8am-9am morning peak and 441 vph in the 4pm-5pm evening peak hour.

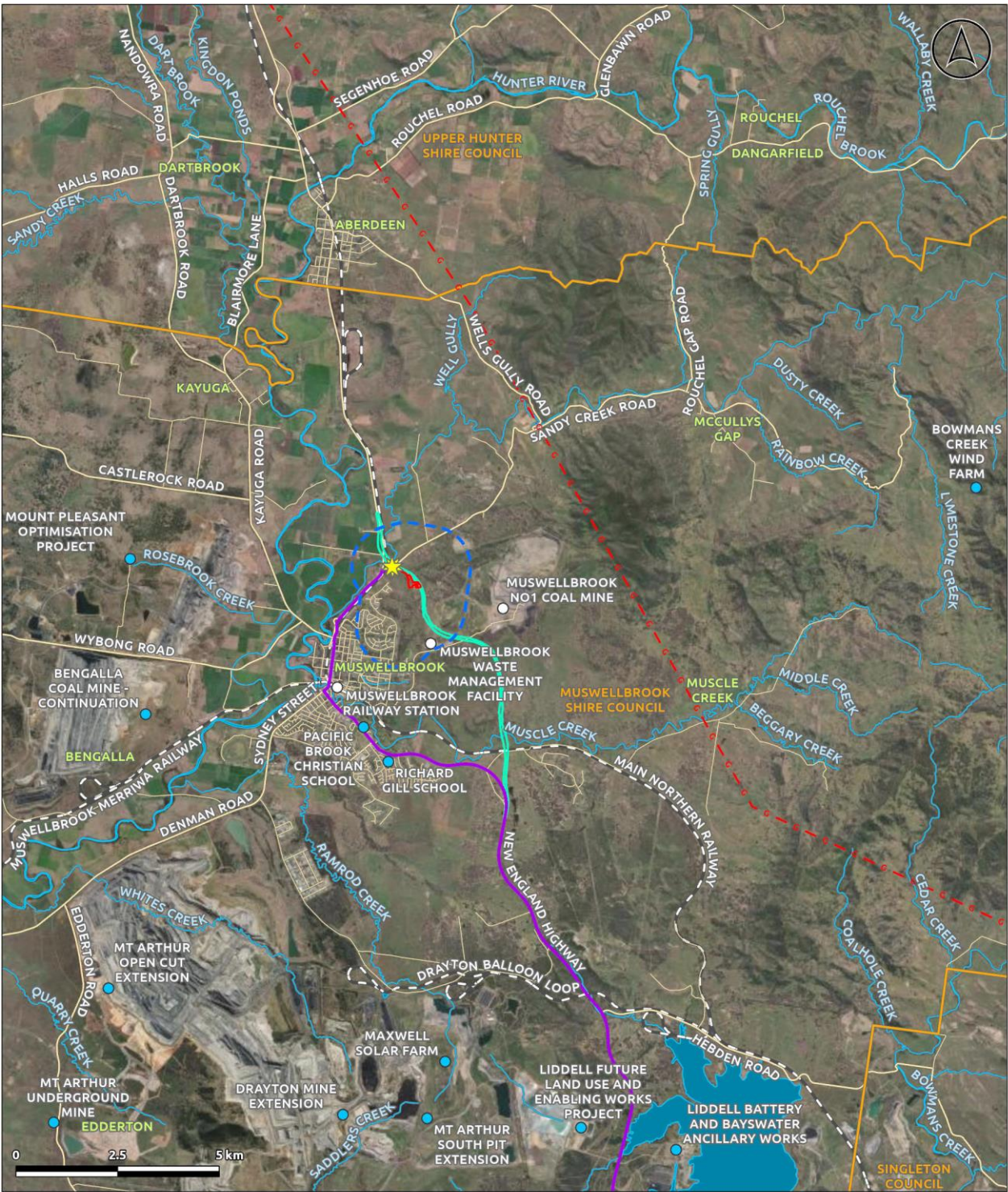
MSC provided traffic volume data for Sandy Creek Road from surveys completed in 2010. Via application of a 1% growth factor, current volumes of 829 vpd are accommodated. 13% of vehicles on Sandy Creek Road are currently heavy vehicles.

There are no public transport routes in Muswellbrook, however Osborn's Transport have confirmed a school bus route operates on Sandy Creek Road between 7:30am-8:30am and 4:00pm-5:00pm.

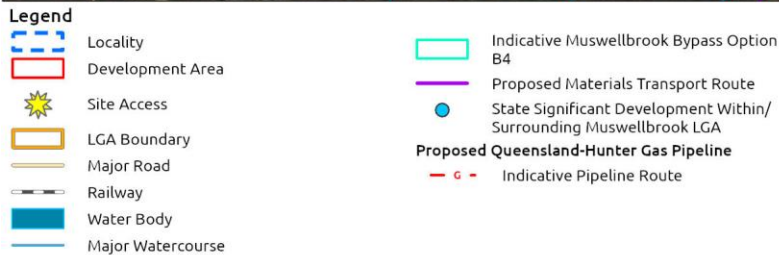
The New England Highway is an approved b-double route and Sandy Creek Road is an approved b-double route subject to restrictions.

A review of crash history in the vicinity of the site for the period between 2016-2020 identified eight crashes in the locality. Given the associated traffic volumes, and the low numbers of crash incidents, Amber conclude that the road network is operating in a relatively safe manner.

Figure 8 – Local traffic environment and site access



Sources: © State of NSW, Department of Customer Service, Spatial Services 2021
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GOA2020 MGA Zone 56 File: 221312_06.aprx Prepared By: adam.davis Date: 21/07/2022



6.1.3 ASSESSED IMPACTS

6.1.3.1 Traffic Generation

6.1.3.1.1 Construction traffic

The TIA summarises the traffic movements generated during the construction period of the BESS, reproduced in **Table 10**. Overall, the site is expected to generate approximately 51 one-way vehicle movements during the morning and evening peak hours during the peak construction period, which will reduce to 25 one-way vehicle movements over the typical construction periods.

Table 10 – Traffic generation during construction – one way vehicle movements

Vehicle Type	Average Vehicle Movements		Peak Vehicle Movements	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Passenger Vehicle (car/4WD)	30	20	60	40
Shuttle Buse	2	1	6	3
MRV/HRV	4	1	12	2
Truck and Dog	16	2	40	4
AV	4	1	8	2
Total	56	25	126	51

6.1.3.1.2 Operational traffic

During operation the BESS is expected to generate a minimal level of traffic associated with maintenance and operation services. The BESS is expected to be operated by up to 2 staff resulting in a traffic generation of up to 2 light vehicle movements per day and 1 heavy vehicle movement per month which would result in a negligible change to the traffic environment.

6.1.3.1.3 Decommissioning traffic

Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A comprehensive Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

6.1.3.2 Traffic Distribution

The following provides a breakdown of the anticipated access distribution for each of the vehicle classifications outlined within **Table 10**:

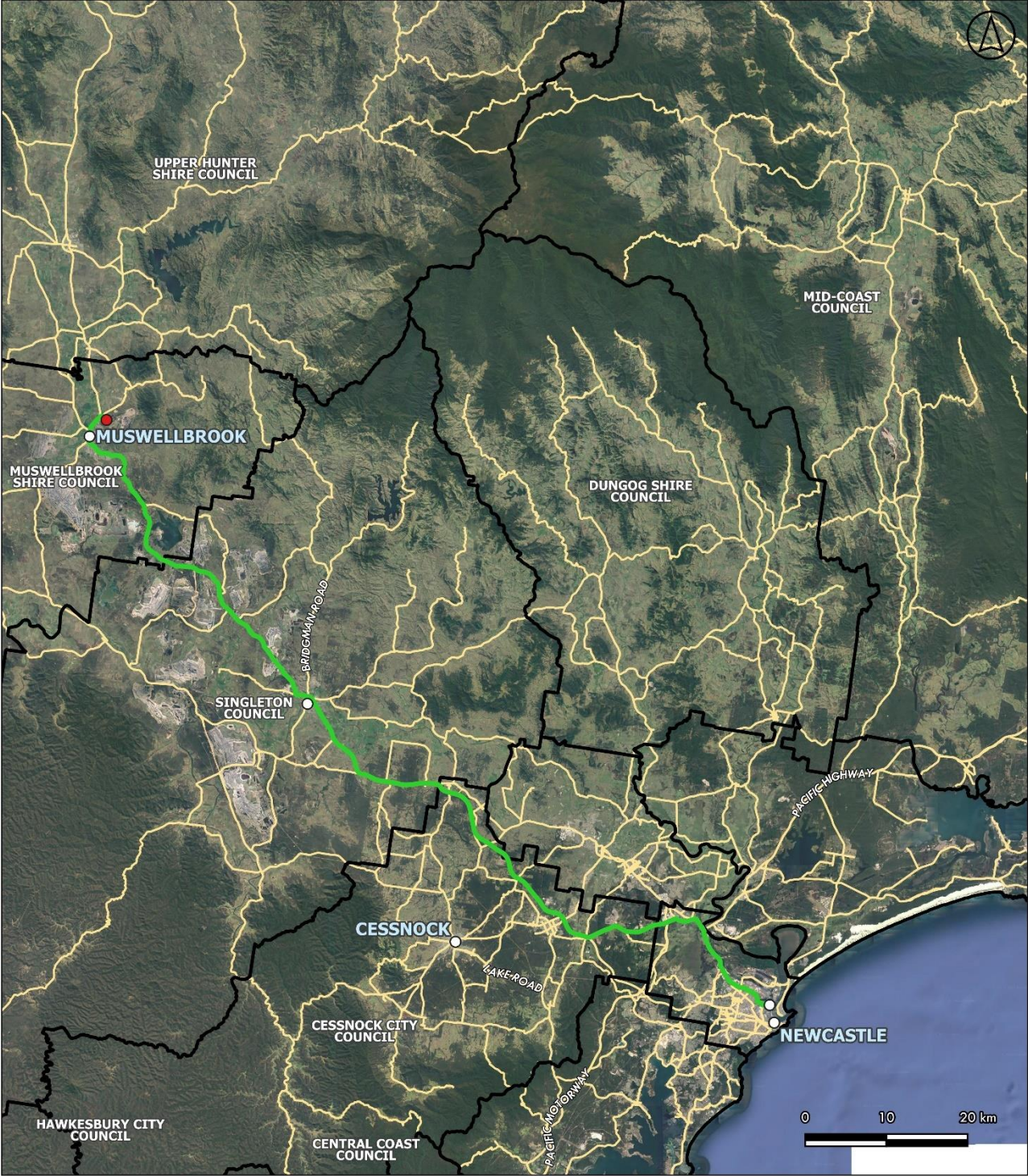
- Light Vehicles: It is anticipated that most staff will travel from Muswellbrook, with 90% of staff travelling from the south and 10% travelling from the north.
- MRV/HRV and Truck and Dog: These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area. The Applicant has advised that 95% will be travelling from the south and 5% travelling from the north.
- AV: It is anticipated that plant will be transported from Port of Newcastle to the site along New England Highway from the south (refer **Figure 9**).

The peak hour for construction will occur at the start and end of the day when staff are transported to/from the site. The majority of staff will typically arrive on-site between 6:00am and 7:00am. However, staff generally have staggered finish times which results in the evening peak hour being less pronounced. The TIA has assumed that






all staff depart between 5:30pm and 6:30pm and the evening peak traffic volumes is 80% of the morning peak volume.

During the morning peak all vehicle movements will be towards the site and in the evening peak all vehicle movements will be away from the site. Heavy vehicle movements will occur outside of peak times and be distributed throughout the day, and will be split evenly between inbound and outbound movements.

Figure 9 – Proposed transport route



EPSC:28356 Prepared by: AJD Date: 22/08/2022 File: 221312_01.qgz

- LEGEND**
-  LGA Boundary
 -  Site Locality
 -  Locality
 -  Road
 -  Materials Transport Route from Port of Newcastle

6.1.3.3 Traffic Assessment

The TIA includes a summary of the peak hour traffic volumes during construction along New England Highway and Sandy Creek Road, reproduced in **Table 11**.

Table 11 – Expected peak hour traffic volumes during construction

Road	AM Peak (7:00am)			PM Peak (6:00pm)		
	Existing Volume	Expected Volume	LOS	Existing Volume	Expected Volume	LOS
New England Highway	323 vph	374 vph	A	238 vph	280 vph	A
Sandy Creek Road	83 vph	134 vph	A	83 vph	125 vph	A

Levels of Service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

The TIA concludes that the additional 374 vehicles per hour during peak construction and 6-8 heavy vehicle movements per hour during the middle of the day is well within the capacity of the road network. The New England Highway and Sandy Creek Road are expected to continue to operate with a good level of service. Once operational, the increase in traffic of up to 2 vehicle movements per hour would result in a negligible change to the traffic environment.

6.1.3.4 Cumulative Traffic Impacts

With respect to cumulative traffic impacts, the TIA notes there is the potential for the overlap of construction periods with nearby projects, particularly with other renewable projects and the Muswellbrook Bypass. The cumulative impact of these activities is the potential for the generation of staff vehicle movements within Muswellbrook and along the New England Highway during peak periods associated with construction. It is a recommendation of the TIA that vehicle movements be planned in consideration of similar movements generated by nearby renewable projects and the bypass construction project.

Consultation with TfNSW as a component of preparation of the TIA confirms that no further cumulative assessment is required at this time but that the future Construction Traffic Management Plan should be prepared in consultation with the Delivery Project Manager for the bypass project. The applicant commits to this approach.

The cumulative traffic impact assessment in the TIA concludes that combined traffic generation associated with this and nearby projects are expected to be minimal, including through Muswellbrook and on the road network in the surrounding area.

6.1.3.5 Route Assessment

With respect to the access route, the TIA concludes that state and local roads along the access route are able to accommodate the loads and type of vehicles to be generated during construction. Specifically, the TIA notes that Sandy Creek Road has a width sufficient to accommodate simultaneous two-way vehicle movement.

The railway crossing at Sandy Creek Road is rated to accommodate articulated vehicles and is therefore ARTC has confirmed it is suitable to accommodate development traffic.

Access to the site is proposed via an existing access driveway located on a Crown reserve (TSR), which has a partially sealed carriageway. The access driveway that provides access to the site is expected to accommodate up to 126 one-way vehicle movements per day during peak construction periods, and 56 one-way vehicle movements per day during the average construction period.

Unsealed roads would typically be considered for sealing when they accommodate between 200 and 500 vehicle movements per day. Given the expected traffic volume on the local roads is less than 200 vehicles per day and the increase in traffic is only temporary it is considered acceptable for the driveway to remain partially sealed.

The existing access driveway is proposed to continue to operate with one lane which is considered acceptable given all vehicle movements in the peak hour are towards the site in the morning peak and away from the site in the evening peak. Further, truck movements through the day are able to be managed on-site to ensure two trucks don't meet along the road

6.1.3.6 Intersection Assessment

6.1.3.6.1 Turn treatments

The intersection assessment in the TIA considered the BESS additional vehicle movements generated at the intersection of the New England Highway and Sandy Creek Road. The requirement to provide turn facilities is primarily generated during the morning peak hour when staff access the site which occurs from 6:00am to 7:00am.

The intersection would require a Basic Left Turn (BAL) and a Channelised Right Turn (CHR) treatment. These turn facilities are already provided at the intersection although it is noted that the right turn treatment is based on an old design standard. Given the increase in traffic movements is temporary it is considered that the existing turn treatments are suitable to allow vehicles to turn safely from the New England Highway, with the implementation of traffic management measures.

The TIA included a swept path analysis for the largest heavy vehicle (19 m AV) proposed to access the site. The swept path analysis demonstrates that the existing New England Highway / Sandy Creek Road intersection and the existing Sandy Creek Road / site access point intersection can suitably accommodate 19 m AVs (travelling to/from the site), without requiring intersection upgrades.

6.1.3.6.2 Sight distance

The TIA confirms that available sight distances at the intersection of Sandy Creek Road and the New England Highway are approximately 185 metres south and 215 metres north, and therefore exceeds Austroads requirements. As such, vehicles are expected to be able to safely enter the State road network.

The TIA also confirmed that site distances at the intersection of Sandy Creek Road and the existing site access point Sandy Creek Road allows vehicles to safely access the local road network.

6.1.4 MITIGATION MEASURES

6.1.4.1 Construction

A Construction Traffic Management Plan (CTMP) will be prepared prior to construction of the site, including:

- Road transport volumes, distribution and vehicle types broken down into:
 - Hours and days of construction.
 - Schedule for phasing/staging of the project.
- The origin, destination and routes for:
 - Employee and contractor light traffic.
 - Heavy vehicle traffic.
 - Oversize and overmass traffic.

The following measures will form part of the CTMP to minimise the impact of construction traffic:

- Neighbours of the BESS be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.

- Deliveries by larger trucks avoid times when school buses are expected on Sandy Creek Road (7:30am to 8:30am and from 4:00pm to 5:00pm).
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time.
- All vehicles will enter and exit the site in a forward direction.
- Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. The following code is to be implemented as a measure to maintain safety within the site:
 - Utilisation of only the designated transport routes.
 - Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
- Implementation of a proactive erosion and sediment control plan for on-site access tracks, hardstands and laydown areas.
- All permits for working within the road reserve must be received from the relevant authority prior to works commencing.
- A map of the primary haulage route highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.
- A complaint resolution and disciplinary procedure.
- Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather).

The following additional measures will form part of the CTMP to minimise the impact of construction traffic along the unsealed roads:

- Prior to construction, a pre-condition survey of Sandy Creek Road between the site access driveway and New England Highway will be undertaken in consultation with Council. During construction the sections of the road network utilised by the project are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the BESS would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in a consistent condition as at the start of construction.
- Vehicles are recommended to drive at slower speeds when travelling on unsealed roads. This can reduce the amount of dust created and the amount of dirt tracked onto the public road network. Standard mitigation measures such as a water trucks to dampen the roads and reduce the amount of dust in the air, can also be considered to reduce dust levels.

The CTMP will be prepared following further consultation with the TfNSW Delivery Project Manager for the Muswellbrook Bypass to confirm the proposed construction traffic. Any vehicle movements larger than an AV will include consultation with ARTC in relation to the use of the railway level crossing.

6.1.4.2 Decommissioning

A comprehensive Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained during decommissioning.

6.2 Biodiversity

6.2.1 INTRODUCTION

A Biodiversity Development Assessment Report (BDAR, EMM, 2022) is provided at **Appendix E**. It has been prepared in accordance with the provisions of the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM). The BDAR has been prepared to document the biodiversity assessment

methods and results, initiatives built into the project design to avoid and minimise biodiversity impacts, and additional mitigation and management measures proposed, including offset requirements, to address any residual impacts not able to be avoided.

The BDAR includes (among other things):

- At stage 1, a summary of the site context, existing native vegetation and threatened species;
- At stage 2, an assessment of impacts of the proposed development including an assessment of other relevant biodiversity legislation;
- A conclusion; and
- A biodiversity credit report summary.

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

6.2.2 EXISTING ENVIRONMENT

The site is located in the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) region and the Hunter IBRA subregion. The assessment area is located across the Central Hunter Foothills and the Upper Hunter Channels and Floodplain NSW (Mitchell) Landscapes.

EMM note that the site is highly fragmented, with native vegetation typically occurring in isolated patches surrounded by exotic vegetation. This pattern of vegetation is consistent with surrounding land.

A third order stream is adjacent to the site. This stream features a highly disturbed riparian zone predominantly dominated by introduced species, including Sharp Rush (*Juncus acutus*).

No areas of geological significance occur on or near the BDAR assessment area.

There are no areas of outstanding biodiversity value within the subject land.

There are no nationally or internally important wetlands or Coastal Wetlands within the locality.

The Hunter River is located approximately 1.9 kilometres to the west of the site. An unnamed third order stream is located within the project area and is crossed by the existing internal access driveway via a culvert structure. This unnamed stream flows west towards Sandy Creek, and onward to the Hunter River. **Figure 10** and **Figure 11** provides details of the site context.

Figure 10 – Biodiversity context - region

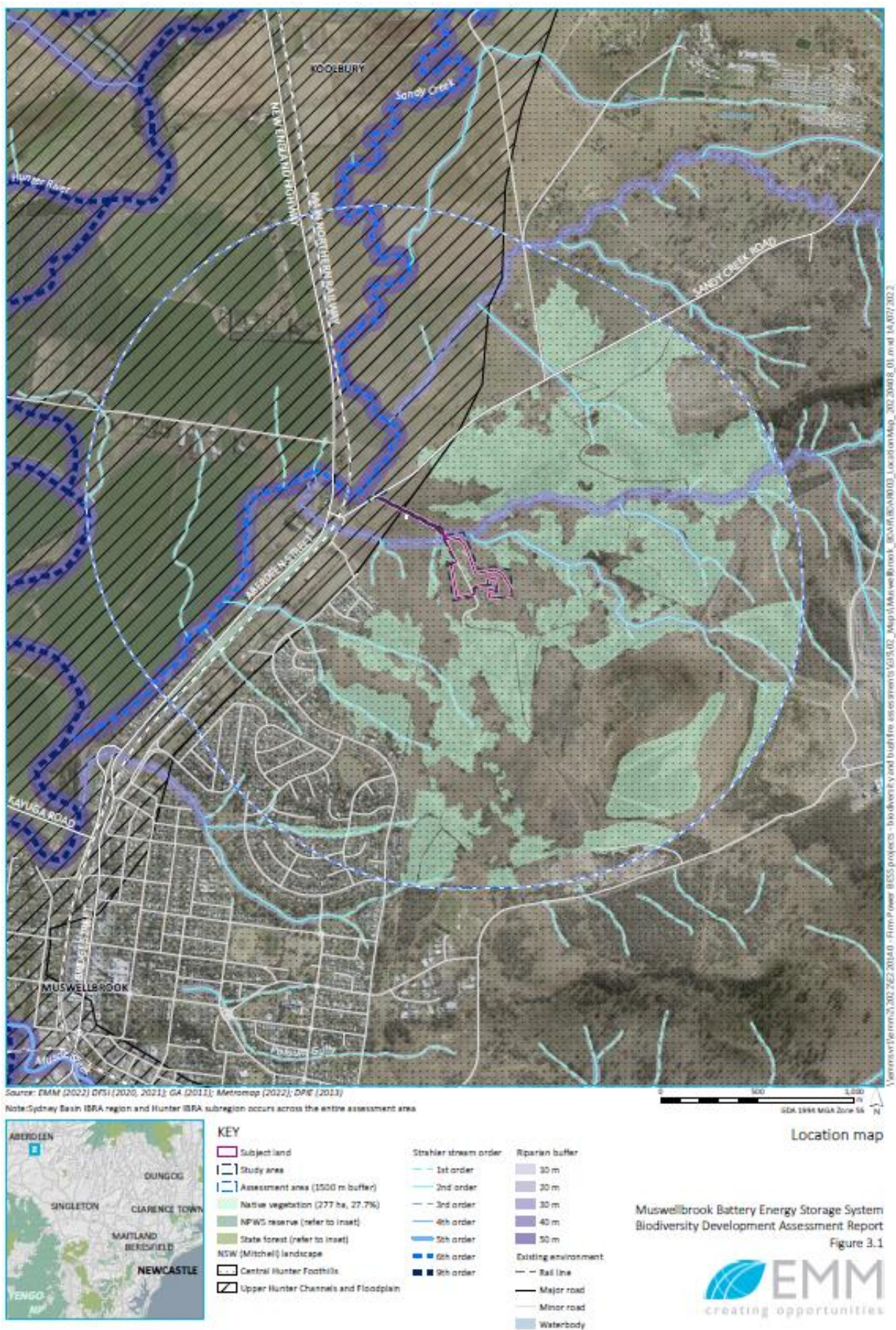


Figure 11 – Biodiversity context - local



Site survey was completed by EMM ecologists on the 28 March 2022 to confirm the vegetation composition on site. It was confirmed by the site survey that the majority of the project area comprises exotic vegetation (approximately 4.231 ha), with two distinct patches of native woodland vegetation. These have been classified as two plant community types (PCTs), being:

- An area of PCT 1655 - Grey Box-Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin (approximately 0.209 ha), located to the east of the proposed internal access track; and
- An area of PCT 1603 - Narrow-leaved Ironbark – Grey Box grassy woodland of the central and upper Hunter (approximately 0.094), located in the northern portion of the project area.

A further PCT (1692 – Narrow-leaved Ironbark – Grey Box grassy woodland of the Central and Upper Hunter) is located near to the project area but will not be impacted by the project.

The identified portion of PCT 1655 has a vegetation integrity score (VIS) of 21.1 and PCT 1603 has a VIS of 13.4.

Figure 12 shows the mapped areas of PCT and native vegetation identified via the site survey.

A review of habitat on site was completed during the site visit of 28 March 2022. With respect to potential threatened species habitat it is noted by EMM that the history of agricultural use of the land has resulted in the degradation or removal of many habitat features, with limited refuge or habitat for fauna remaining.

Some remaining dense woody debris within areas of exotic species have limited potential to provide habitat for the Striped Legless Lizard (*Delmar impar*), which has been recorded approximately 800 metres to the south of the subject land within similar habitat. Opportunistic searches for reptile species during site survey did not identify any Striped Legless Lizard.

The project area does not include hollow bearing trees.

Drainage lines are ephemeral, lack open water and are dominated by exotic species. These areas are assessed as not being suitable habitat for threatened frog species such as the Green and Golden Bell Frog, however, may provide habitat for common species such as the Spotted Marsh Frog, which was heard calling by EMM during site survey. Due to the ephemeral nature of the unnamed stream located within the project area, the land is unlikely to contain key fish habitat and is unlikely to support threatened species threatened fish species or aquatic communities.

It is noted that the site contains a number of Koala feed tree species, however these are isolated from other areas of woodland and are therefore considered unlikely to provide significant foraging resources for any local Koala populations that may occur.

Figure 12 – PCT and plot locations



6.2.2.1 Threatened species assessment

As a component of defining the existing environment, EMM have completed an assessment of the potential for threatened species to occur on site.

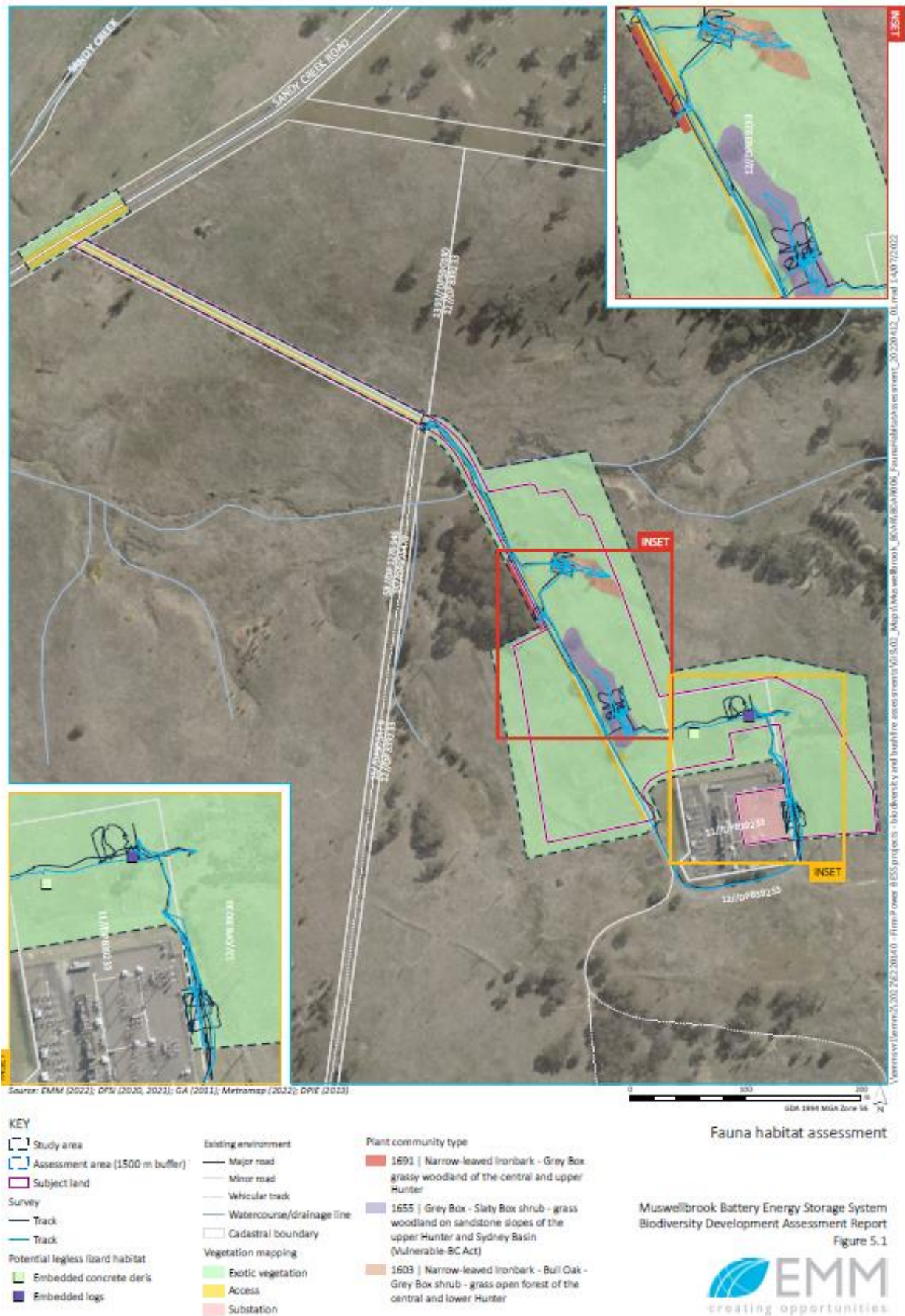
EMM identify 29 ecosystem credit species that have the potential to occur on the site (Table 5.1 at **Appendix E**). As a result of field assessment of habitat features (refer **Figure 13**), the following species require further assessment:

Table 12 – Ecosystem credit species requiring further assessment

Scientific name	Common name	EPBC Act status	BC Act status	Flora or fauna
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	Vulnerable	Vulnerable	Flora
<i>Delmar impar</i>	Striped Legless Lizard	Vulnerable	Vulnerable	Fauna
<i>Diuris tricolor</i>	Pine Donkey Orchid	-	Vulnerable	Flora
<i>Diuris tricolor – endangered Population</i>	Pine Donkey Orchid population in the Muswellbrook local government area	-	Endangered population	Flora
<i>Eucalyptus glaucina</i>	Slaty Red Gum	Vulnerable	Vulnerable	Flora
<i>Prasophyllum sp. Wybong</i>	Prasophyllum sp. Wybong	Critically Endangered	-	Flora
<i>Pterostylis chaetophora</i>	Pterostylis chaetophora	-	Vulnerable	Flora
<i>Pterostylis gibbose</i>	Illawarra Greenhood	Endangered	Endangered	Flora
<i>Thesium australe</i>	Austral Toadflax	Vulnerable	Vulnerable	Flora

Targeted surveys for these species have not been completed due to project timing and therefore all of the above species have been assumed to be present.

Figure 13 – Fauna Habitat Assessment



6.2.3 ASSESSED IMPACTS

The BAM considers a project could result in either or both direct or indirect impacts. Impacts can also be either prescribed or uncertain, or serious and irreversible impacts. Each of these impacts is discussed in the following sections.

6.2.3.1 Direct impacts

In the context of this project, direct impacts could include loss of native vegetation as a result of project development or the loss or degradation of native fauna impacts. A primary goal in designing the project has been to avoid direct impacts, and where these cannot be avoided, impacts are minimised. Direct impacts not reduced to zero would be managed through implementation of a site Biodiversity Management Plan and residual impacts would be offset through implementation of the Biodiversity Offset Scheme.

- The project will directly impact up to 0.303 ha of native vegetation comprising:
 - 0.209 hectares of PCT 1655: Grey Box-Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin, listed as vulnerable under the BC Act and not listed under the EPBC Act; and
 - 0.094 hectares of PCT 1603: Narrow-leaved Ironbark – Grey Box grassy woodland of the central and upper Hunter, not listed under the BC Act or EPBC Act.

However, as noted, the area of PCT 1603 has a VIS of 13.4, and thus does not require offset in accordance with Section 9.2.1 of the BAM.

Therefore, on the basis of the above, offsets to 0.209 ha of PCT 1655 are required.

With respect to threatened species habitat, offsets will be required as set out in Table 6.9 of Appendix E (reproduced as Table 13) and Figure 14 shows those areas of threatened species habitat requiring offset.

Table 13 – Summary of species credits required

Species	Vegetation zone name	Area (ha)/in individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAI	Species Credit
Leafless Tongue Orchid	1655_poor	0.21	21.1	0.0	-21.1	No	2
Striped legless lizard	1655_poor, 1655_poor	0.21, 0.09	21.1, 13.4	0.0	-21.1, -13.4	No	2, 1
Pine Donkey Orchid	1655_poor	0.09	21.1	0.0	-21.1	No	2
Pine Donkey Orchid population in the Muswellbrook LGA	1655_poor	0.21	21.1	0.0	-21.1	No	2
Slaty red gum	1655_poor	1	21.1	0.0	-21.1	No	2
<i>Prasophyllum</i> sp. Wybong	1655_poor	0.21	21.1	0.0	-21.1	Yes	3
<i>Pterostylis chaetophora</i>	1655_poor	0.21	21.1	0.0	-21.1	No	2

Species	Vegetation zone name	Area (ha)/individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAI	Species Credit
Illawarra Greenhood	1655_poor	0.21	21.1	0.0	-21.1	No	2
Austral Toadflax.	1655_poor	0.21	21.1	0.0	-21.1	No	2

Figure 14 – Impacts requiring offset



6.2.3.2 Indirect impacts

Indirect impacts could include weed introduction, erosion and sedimentation or increased noise, vibration or dust levels during construction, resulting in disturbance of fauna species and consequent changes in behaviour or abandonment of habitat.

Provided vehicles are clean prior to arrival on site, and prior to movement between sites, the potential for significant impacts associated with weed introduction is low. Standard measures would be implemented, including preparation and implementation of an erosion and sediment control plan during construction, to ensure that sediment does not run off to watercourses. Temporary impacts associated with noise, vibration and dust generation during construction are not considered likely to result in anything other than minimal impacts.

Mitigation measures around management of the above matters is provided in **Section 6.2.6**.

6.2.3.3 Prescribed and uncertain impacts

Prescribed and uncertain impacts have been considered by EMM. The potential for prescribed and uncertain impacts is considered low. With specific respect to clearing of non-native vegetation and the potential for impacts to the Striped Legless Lizard, EMM note that significant impacts are not predicted given:

- mitigation measures outlined in Section 6.4 (of **Appendix E**) are implemented;
- large areas of suitable habitat occur within the assessment area for this species;
- the clearing of up to 4.3 ha of exotic vegetation is unlikely to cause a significant decrease in the long-term viability of the species within the locality; and
- two species credits will be retired to offset impact on 0.21 ha of PCT 1655.

6.2.3.4 Serious and irreversible impacts

There is one identified candidate serious and irreversible impact (SAII) species with the project area that has the potential to be impacted by the project, being the *Prasophyllum* sp. Wybong. The *Prasophyllum* sp. Wybong is a species that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.

Tables 6.5 of the BDAR at **Appendix E** provides a summary of the current status of *Prasophyllum* sp. Wybong and Table 6.6 (**Appendix E**) provides a SAII assessment.

EMM conclude the project would not result in a SAII on the basis that:

- The subject land does not contain any known population of *Prasophyllum* sp. Wybong. The nearest known population is approximately 19km to the west;
- The potential habitat in the subject land is small (0.209 ha) and therefore only a small proportion of the total NSW population could be present;
- The impacted potential habitat represents less than 0.0001% of the species geographic range (being 0.209 ha of the estimated 48,000 km² geographic range);
- The 0.209 ha of potentially impacted land is already fragmented.

On the basis of the above, a SAII is not considered likely.

6.2.4 AVOIDANCE AND MINIMISATION

The project has been designed through a range of iterations in response to the identification of potential constraints and impacts resulting in, among other things, avoidance and minimisation of impacts to biodiversity. This includes retention of trees where practicable, locating the site to avoid surrounding intact areas of vegetation, largely avoiding land zoned C3 – Environmental Management. Subject to the implementation of mitigation measures, indirect impacts to adjacent remnant vegetation and waterways can be avoided/minimised and managed to acceptable level. Specific mitigation measures are discussed in **Section 6.2.6** and summarised in **Appendix C**.

6.2.5 OTHER RELEVANT LEGISLATION

6.2.5.1 Environment Protection and Biodiversity Conservation Act 1999

EMM carried out a search via the Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST). The PMST result identified five PCTs, six (6) species and eleven migratory as having the potential to occur on site.

None of the PCTs identified on site are consistent with the PCTs listed via the PMST and thus these have not been considered further.

Assessment of significance were completed for the six (6) species identified as having the potential to occur on site. These assessments concluded that the project is unlikely to result in significant impacts to these species. On this basis, impacts to matters of national environmental significance are not predicted and referral of the project to the Commonwealth Minister for the Environment is not required.

No species listed as migratory under the EPBC Act were recorded as being present on the site or assessed as having a moderate or high likelihood of occurring within the subject site.

6.2.5.2 Biosecurity Act 2015

One priority weed, Fireweed (*Senecio madagascariensis*) and one species of concern, Prickly pear (*Opuntia* sp.) were recorded on the site.

Any identified weeds would be removed from site in line with the recommended mitigation measure in **Section 6.2.6**, thus ensuring the relevant obligations under the Biosecurity Act are satisfied.

6.2.6 MITIGATION MEASURES

To compensate for impacts on native vegetation, two ecosystem credits of PCT 1655 (Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin) are required.

To compensate for impacts on threatened species (assumed presence) the following credits are required:

- two species credits of Leafless Tongue Orchid;
- three species credits of Striped Legless Lizard;
- two species credits of Pine Donkey Orchid;
- two species credits of Pine Donkey Orchid population in the Muswellbrook LGA;
- two species credits of Slaty Red Gum;
- three species credits of *Prasophyllum* sp. *Wybong*;
- two species credits of *Pterostylis chaetophora*;
- two species credits of Illawarra Greenhood; and
- two species credits of Austral Toadflax.

Firm Power propose to purchase credits from the market, or pay into the Biodiversity Conservation Fund (BCF) to fulfill their offset obligations for the project.

No offsets are required for the 0.094 ha of PCT 1603 to be removed due to its poor VIS.

The following mitigation measures are also recommended to manage residual impacts.

- Design phase:
 - Detailed design should include adequate design measures for drainage to capture and direct surface flows appropriately.
- Prior to and/or during construction:
 - A Site Plan should be included in the construction environmental management plan (CEMP), and should include:

- the extent of approved clearing;
 - stockpile, material laydown areas, and site compounds.
 - This Site Plan is to be placed in an accessible location to be viewed by all site personnel (site office for example).
- Clearing is to be to the minimum extent necessary. If parts of the development footprint areas are identified during construction as not necessary for construction activities, clearing will be avoided.
 - Define clearing limits using clearly visible barrier, such as flagging tape. This should be maintained and checked daily through construction.
 - Pre-clearance surveys to be conducted to identify all logs and debris to be removed.
 - Any logs and debris to be removed will be supervised by a qualified ecologist during clearing works.
 - Sediment controls, including fencing and sediment traps, should be installed in any areas where works will occur in proximity to low lying vegetation or streams.
 - All priority weeds within the subject land should be appropriately removed offsite, preferably without stockpiling prior to removal. If stockpiling of weeds is required before removal from site, weeds are to be stockpiled and appropriately covered and located in areas away from vegetation to be retained to minimise the spread of seed and other propagules.
 - Hygiene protocols should be implemented including hygiene procedures for equipment, footwear and clothing. Ensure works vehicles are washed down prior to entering the works area.

6.3 Noise & vibration

6.3.1 INTRODUCTION

A Noise Impact Assessment (NIA; Assured Environmental 2022) is provided at **Appendix F**. It includes an assessment of:

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

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

6.3.2 EXISTING ENVIRONMENT

The existing locality is characterised by a range of land uses including residential to the west, mining to the east, land filling to the south and a place of worship to the north. Major infrastructure in the form of electricity supply, roads and rail are all prevalent.

The character is generally low scale, and low density, with a transitional character between rural and urban.

6.3.3 ASSESSED IMPACTS

6.3.3.1 Construction Noise

The NIA includes an assessment of the construction noise impacts to 10 existing residential receptors and 3 receptors that are representative of potential future residential receptors within the unbuilt stages of Stage 7 of the proposed (but not yet addressed by a live DA or approved) Northview Estate residential subdivision.

With respect to construction noise, the NIA makes the following conclusions:

- The highest predicted noise level is 69 dB(A) at future receptor F1 during construction of the BESS. This potential future receptor is close to the project area boundary (145 m) and the access driveway.

Construction of the BESS may be completed before any residences are constructed or inhabited on this land.

- The highest predicted noise level at existing receptors is 60 dB(A) at R6 and R7 during BESS construction.
- The construction assessment is conservative in nature and the likelihood of exceeding these noise levels is low, as modelling assumes all plant and equipment operating concurrently and at the closest possible location receivers.
- Construction works are expected to progress across the site and would only be in a single area for a short period of time.
- As the highest predicted noise levels do not exceed the highly affected noise criteria of 75 dB(A) at any receptor, the implementation of additional noise controls (except those listed in **Section 6.3.4**) is not considered necessary.

With respect to cumulative construction noise impacts, the NIA identifies that TfNSW are expecting to commence construction of the bypass in the Muswellbrook area at a similar time to the commencement of construction for the BESS. Potential cumulative impacts are not assessed in the NIA as it is not known whether peak construction of both projects will overlap. As stated in the NIA, The Applicant will consult with TfNSW to manage any potential impacts and implement additional noise mitigation measures in accordance with the ICNG if required.

6.3.3.2 Road Traffic Noise

The NIA includes an assessment of the road traffic noise impacts during the construction phase. Predicted noise levels were modelled for road traffic noise at sensitive receptor locations along the site access route, on the New England Highway (Aberdeen Street) and Sandy Creek Road, with roadway setbacks of 24 m and 20 m, respectively.

The assessment concludes that compliance with the NSW Road Noise Policy (RNP) is achieved at the closest receptor.

6.3.3.3 Operational Noise

The NIA includes an assessment of the operational noise impacts to existing and potential future receptors based on sound power levels and source locations of operational equipment, as well as noise barriers and battery fan load conditions of 60% in day and evening periods and 50% at night.

The NIA concludes that the project will comply with the relevant project noise triggers levels in accordance with the *Noise Policy for Industry* (NPfI) under noise-enhancing meteorological conditions for all existing and potential future receivers during daytime, evening, and night-time periods.

With respect to cumulative operational noise impacts, the NIA compares the modelled project results with the conclusions reached by AECOM with respect to the TfNSW bypass project and notes that the predicted noise levels at the project site are 19 dBA lower in comparison to the predicted noise levels associated with the bypass.

It is therefore considered unlikely that the noise impacts of the project are unlikely to result in cumulative impacts in conjunction with the operation of the bypass.

6.3.3.4 Vibration

The NIA includes an assessment of the construction and operation vibration impacts of the project. Construction vibration levels are not predicted to exceed the continuous maximum vibration nuisance and building damage criteria for the closest receiver (located approximately 145 metres from the project site).

Intermittent vibration associated with construction vehicles, while harder to predict, is predicted to be within the maximum intermittent criteria of 0.2 mm/s.

Operational vibration impacts will be minimal due to the separation distance and design of the surface pad.

6.3.4 MITIGATION MEASURES

The following mitigations are specified in the NIA for each stage of the development.

6.3.4.1 Pre-construction

- The Applicant will consult with TfNSW to manage any potential impacts and implement additional noise mitigation measures in accordance with the ICNG if required.
- Determine the final location of 3 m noise barriers during detailed design to ensure that operational noise criteria are met.

6.3.4.2 Construction

- Limiting the type and scale of concurrent activities undertaken close to sensitive receptors where possible.
- Using broad band reversing alarms on all mobile plant and equipment.
- Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine.
- Operating plant in a quiet and efficient manner.
- Reduce throttle setting and turn off equipment when not being used.
- Regularly inspect and maintain equipment to ensure it is in good working order including checking the condition of mufflers.
- It is recommended that during any work generating high noise levels that have impulsive, intermittent, low frequency or tonal characteristics, consultation with sensitive receptors occurs regularly.

6.3.4.3 Operation

- Installation of noise barriers in accordance with detailed designs undertaken at the pre-construction stage to ensure that operational noise criteria are met.

6.4 Aboriginal cultural heritage

6.4.1 INTRODUCTION

An Aboriginal Cultural Heritage and Historic Heritage Assessment Report (ACHAR), inclusive of an *Aboriginal Cultural Heritage Assessment Report* (ACHAR), prepared by OzArk (2022), is provided at **Appendix G**. It has been prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Consultation has been completed in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. The ACHAR has been prepared to provide:

- A summary of study area, landscape and archaeological context;
- A summary of relevant legislation;
- A summary of the outcomes of consultation with Registered Aboriginal Parties (RAPs);
- The results of the Aboriginal archaeological assessment;
- Significance and harm assessments;
- A summary of appropriate management principles; and
- Recommendations

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

6.4.2 EXISTING ENVIRONMENT

6.4.2.1 Site and locality

The ACHAR study area encompasses the site and comprises an area of 6.8 ha. The archaeological survey undertaken by OzArk on 4 April 2022 was confined to the study area.

A search of the Aboriginal Heritage Information Management System (AHIMS) has identified 113 Aboriginal sites within 8 km radius of the study area, and 17 within a 1-kilometre buffer of the site (refer to **Figure 3**).

OzArk note that the study area is characterized by undulating lowlands, rounded to steep hills with rock outcrop on ridges on Permian lithic sandstone, conglomerate, shale and coal (OzArk, 2022). Elevation in the area is between 40 mAHd and 300 mAHd. Due to the consistency of the landform, it was not divided into different survey units.

The study area is noted to feature two soil landscapes, being the Donalds Gully and the Dochra landscapes. Soil landscape characteristics suggests generally poor drainage and thus are likely to have been less desirable for habitation.

The study area features an ephemeral drainage line draining westward towards Sandy Creek, and onward to the Hunter River. Vegetation is generally cleared with some small stands of native vegetation.

Historic land use is associated with the development and operation of the Ausgrid substation, including access roads, vegetation clearance, together with historic agricultural activities.

6.4.2.2 Archaeological context

Based on a review of the regional archaeological context, OzArk consider the study area has the potential to display evidence of occupation by small parties, given the proximity to watercourses, but is more likely to have been used for transitory movement.

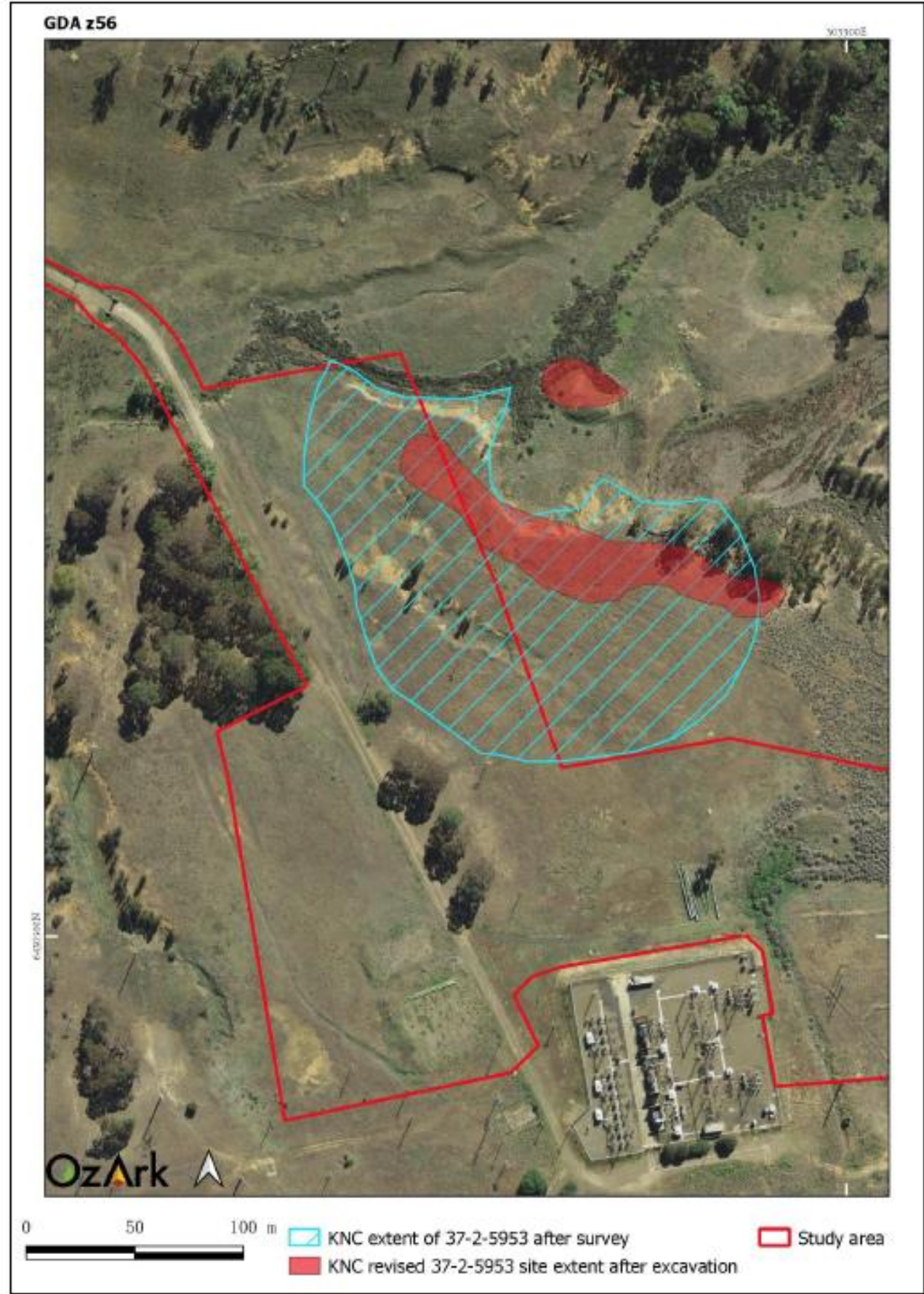
As noted above, an AHIMS search has identified 113 Aboriginal sites within an 8 km radius of the study area, with 85% of sites noted to be artefact scatters, 10% being isolated finds, 4% being modified trees and 1% being art sites. Stone artefacts sites in the locality area predominantly located on elevated landforms near the Hunter River. Modified trees are typically located near watercourses.

A range of other studies have been completed in the area which assist to provide a better understanding of the archaeological context. The nearest and most relevant of these is the report prepared by Kelleher Nightingale Consulting (KNC) in 2021 for the TfNSW Muswellbrook New England Highway Bypass project. KNC identified 12 artefact sites and subsequent subsurface testing was completed at 11 of these sites. Site 37-2-5953 (also known as Muswellbrook Bypass AFT 2) extends into the project area – refer **Figure 15**.

As a result of the subsurface testing by KNC, the extent of AFT 2 was able to be reduced.

KNC concluded that the site was of low scientific significance and further testing was not required.

Figure 15 – Site AFT 2 and revised site extent



6.4.3 CONSULTATION OUTCOMES

The preparation of the ACHAR compromised four main stages:

- Stage 1 - Identify RAPs who wish to be consulted on the proposal;
- Stages 2 and 3 - Provide information about the proposal to RAPs and acquire information about cultural values. These stages often run together; and
- Stage 4 – Issue of the draft ACHAR to RAPs for review and comment.

Stage 1 identified 14 groups or individuals as RAPs.

During stages 2 and 3, RAPs were provided with information about the project including a draft assessment methodology. One response was received during these stages.

During stage 4 the draft ACHAR was supplied to all RAPs. Feedback from two RAPs was received during this phase. Both supported the recommendations of the ACHAR.

In addition to the above, a copy of the draft ACHAR was provided to Heritage NSW for review and comment. Heritage NSW responded to advise that they do not have the capacity to review draft ACHAR's prior to submission – refer **Section 5.2**.

6.4.4 ASSESSED IMPACTS

The project ACHAR determined the following:

- No previously unrecorded Aboriginal sites were identified during the survey of the study area.
- No specific comments relating to the survey methodology, or the landforms being surveyed, were raised by the Aboriginal site officer during the survey. Further, no cultural values relating to the study area were identified to OzArk by RAPs.
- The scientific value of the site within the study area is considered to have low potential to provide further information on the traditional Aboriginal use of the region. There are no identifiable aesthetic or historic values of significance within the study area.
- The portion of the Muswellbrook Bypass AFT 2 site that extends into the proposed footprint of the BESS and associated infrastructure will be impacted by the proposal.

Table 14 presents a summary of potential impacts to Aboriginal cultural heritage associated with the proposal.

Table 14 – Aboriginal Cultural Heritage Impact Assessment

Site Name	Type of Harm (Direct/Indirect/None)	Degree of Harm (Total/Partial/None)	Consequence of Harm (Total/Partial/No Loss of Value)
Muswellbrook Bypass AFT 2	Direct	Partial	Partial loss of value

There will be a low level of impact to Aboriginal cultural heritage values as one (1) Aboriginal site will be partially harmed. No intangible heritage values have been identified within the study area.

The results of the surface survey and previous test excavation completed at the site indicate that significant Aboriginal cultural heritage values will not be harmed within the study area.

6.4.5 MITIGATION MEASURES

Recommended mitigation measures for Aboriginal cultural values within the study area are as follows:

1. Prior to construction, the Applicant will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with the RAPs and Heritage NSW. The ACHMP would include an unanticipated finds protocol, unanticipated skeletal remains protocol and heritage inductions and long-term management of the Aboriginal site being impacted.

2. The portion of Aboriginal site Muswellbrook AFT 2 (37-2-5953) located within the impact footprint of the proposal would be salvaged following approval of the ACHMP.
- a. The recommended methodology for the surface collection will be finalised during preparation of the ACHMP and will include the measures outlined in Section 9.2.1 (Surface collection) of the OzArk (2022) report.
- b. The salvage works will include the mapping, analysis, and collection of the surface artefact at the affected site. Results will be included in a brief report to preserve the data in a useable form and an Aboriginal Site Impact Recording Form (ASIRF) will be submitted to AHIMS.
3. All land-disturbing activities will be confined to within the study area.

6.5 Historic heritage

6.5.1 INTRODUCTION

An Aboriginal Cultural Heritage and Historic Heritage Assessment Report (ACHAR; 2022), inclusive of a Statement of Heritage Impact (SoHI) was prepared by OzArk (2022), is provided at **Appendix G**.

It has been prepared having regard to the NSW Heritage Manual.

The SoHI provides

- A summary of study area, landscape and context and a description of the project;
- A summary of relevant legislation;
- Results of the assessment;
- A summary of appropriate management principles; and
- Recommendations

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

6.5.2 EXISTING ENVIRONMENT

The site is not mapped as containing any items of heritage significance and is not located within or adjacent to a heritage conservation area under the MLEP. Mapped heritage items in proximity to the project area comprise the Muswellbrook Brick Works (MLEP Item No. I112), an item of local significance, located approximately 140 metres to the east of the project area, within the Muswellbrook Quarry lands – refer **Figure 3**.

6.5.3 ASSESSED IMPACTS

OzArk completed an Aboriginal Cultural Heritage and Historic Heritage Assessment Report (2022). The OzArk (2022) report accompanies this EIS in **Appendix G**.

The Historic Heritage Assessment study area and survey are consistent with the ACHAR, as described in **Section 6.4.1** of this EIS.

The Historic Heritage Assessment determined that no historic heritage sites or historic archaeological deposits were recorded in the study area. As such, there will be no impact to historic heritage from the proposal.

6.5.4 MITIGATION MEASURES

Recommended mitigation measures for historic heritage values within the study area are as follows:

1. Following development consent of the proposal, the proposed work may proceed with caution. If items of historic heritage significance and/or skeletal material are uncovered during the proposal, then the protocols in provided in Appendix 4 and/or Appendix 5 of the Ozark (2022) report should be enacted.

2. All land and ground disturbance activities must be confined to within the study area. Should the parameters of the proposal extend beyond the assessed areas, then further assessment may be required.
3. All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all historic items.

6.6 Hazards & risks

6.6.1 INTRODUCTION

A Preliminary Hazard Analysis (PHA) has been prepared by Riskcon (2022) in accordance with Hazard Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use and Safety Planning, Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DOP, 2011) and Multi-Level Risk Assessment (DOP, 2011) and accompanies this EIS at **Appendix H**.

The PHA has been prepared to provide:

- A summary of the assessment methodology in the context of the site and project description;
- Identification of hazards;
- Analysis of consequences;
- Frequency analysis and risk assessment; and
- Conclusions and recommendations.

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

6.6.2 EXISTING ENVIRONMENT

Relevant to the question of risk is the character and level of development/activity occurring in the surrounding locality and the nature of adjacent land uses. Relevant to the risk assessment, the PHA notes the potential for residential development located in future Stage 7 of the Northview Estate to the west and the future Muswellbrook Bypass to the east of the site.

A review of potential contamination associated with the historic uses of the land has been completed.

As per the LUCRA (**Appendix K**) the history of land use at the site can be described as follows:

- The site has been occupied by the Muswellbrook Substation since 1974.
- The site and locality have historically been comprised of rural agricultural land holdings with residential dwellings and associated farm infrastructure, including sheds, farm dams and paddock fencing.
- Residential development has expanded in a north-easterly direction towards the site boundary since 1974.
- The extent of vegetation within the site and locality has remained relatively consistent between 1974 and 1998.

A review of the contaminated land record and the list of sites notified to the EPA dated 8 August 2022 has identified the following sites in the Muswellbrook area:

- Former Caltex Depot at 1 Lower William Street (3 km to the south-west);
- Vacant rail land at 27 Brook Street (2.9 km to the south-west);
- Service station at 49-51 Maitland Street (3.4 km to the south-west);
- Former Mobil depot at 43-51 Ford Street (2.6 km to the south-west);
- Woolworths Petrol at 72 Brook Street (2.6 km to the south-west);
- Caltex Muswellbrook service station at 84-86 Maitland Street (3.6 km to the south);
- Former gasworks at corner Carl and Foley Street (2.86 km to the south-west);
- Bayswater Power Station at New England Highway (16 km to the south);

- Former industrial site at Lot 89 Rathmore Street;
- Service Station at 12-16 Sydney Street (3.1 km to the south-west);
- Former depot at 47-50 Victoria Street (2.9 km to the south-west); and
- Former pit top no.1 colliery Muswellbrook Coal at corner Clendinning Street and Victoria Street (2.9 km to the south-west).

Given the significant separation to these sites, minimum of 2.6 km, the site is not considered to be contaminated such that remediation is required. Additionally, it is reasonable to assume the site has been the subject of scrutiny by the electricity providers in relation to environmental assessments associated with site development. In the event that contamination was identified, it would be reasonable to assume it would have been identified, notified and remediated.

Noting the historic agricultural use of the site, it is also reasonable to consider the potential for contamination from agricultural sources that may not have been notified. Common contaminants associated with agricultural land uses can include pesticides, fertilisers, livestock treatment chemicals (such as from sheep dips/shearing sheds) and petroleum products (associated with the use of farm machinery).

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

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

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

6.6.3 ASSESSED IMPACTS

The key objectives of the PHA are to:

- Complete the PHA according to the Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Hazard Analysis (Ref. [1]);
- Assess the PHA results using the criteria in HIPAP No. 4 – Risk Criteria for Land Use Planning (Ref. [2]); and
- Demonstrate compliance of the site with the relevant codes, standards and regulations (i.e. Planning and Environment Regulation, WHS Regulation, 2017 Ref. [3]).

The Multi-Level Risk Approach (MLRA) has been adopted in preparing the PHA. The MLRA has been prepared in accordance with the Multi-Level Risk Approach Guidelines (DPIE, 2011). The MLRA Guidelines are intended to:

...assist industry, consultants and the consent authorities to carry out and evaluate risk assessments at an appropriate level for the project being studied.

The approach to the MLRA was as follows:

- Hazard analysis – to identify potential hazards in the context of the site, location and project details;
- Consequence analysis – for those hazards identified via the hazard analysis as having a potential offsite impact;

- Frequency analysis – those hazards identified via the consequence analysis of having the potential occur offsite were then considered in the context of an initiating event and the probability for the failure of safeguards;
- Risk Assessment and Reduction – the results of the consequence and frequency analysis for those incidents carried forward via the PHA were combined to the risk in the context of the HIPAP No. 4 risk criteria. Where the criteria was exceeded, a further assessment of the risk was completed in the context of proposed mitigation measures; and
- Reporting – a summary of the outcome of the above MRLA was developed for review and finalisation.

Via the MLRA a number of risks were discounted, and those that were carried forward as having a residual risk are:

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

These are discussed in the following sections.

6.6.3.1 Li-ion battery fault, thermal runaway and fire

As noted in the Riskcon PHA, there is potential that a Li-Ion battery may fault resulting in thermal decomposition and fire which may spread throughout the whole fire unit if not isolated / protected.

A review of the 23 kW/m² contour indicates it does not impact offsite; however, the distance calculated from the model indicates a distance of 6 m. The adjacent battery units are 2 m away; hence, the 23 kW/m² contour would impact these units which may result in incident propagation. It is noted that the battery enclosures are containerised, and the metal enclosure would prevent direct radiant heat impact onto the battery units within the adjacent unit. Therefore, it is considered that incident escalation is unlikely to occur; however, cosmetic damage to the adjacent battery units may occur.

6.6.3.2 Li-ion battery fire and toxic gas dispersion

As noted in the Riskcon PHA, in the event of a BESS fire, decomposition of solvents and additives used within the batteries will result in the formation of HF gas which will disperse downwind of the fire source. The following gases or classes of gases are noted as having the potential to form in the case of a fire:

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

The following is noted with respect to these gases.

6.6.3.2.1 Carbon dioxide

Riskcon note with respect to carbon dioxide:

The lithium-ion batteries are predominantly composed of metal structures. However, during a fire event ancillary equipment and materials within the batteries will be involved in the fire including wiring, plastics, anodes, etc. which will liberate carbon dioxide. However, a review of the toxicological impacts indicates high concentrations would be required to result in injury or fatality. Based upon a review of the sensitive areas, and the similar BESS fires, it is not considered that the formation of carbon dioxide in a fire would be sufficient to result in downwind impacts sufficient to cause injury or fatality. In other words, there would be insufficient production of carbon dioxide to generate a plume of sufficient concentration to displace the required oxygen for a significant

downwind consequence to occur. Therefore, this incident has not been carried forward for further analysis.

6.6.3.2.2 Carbon monoxide

Riskcon note with respect to carbon monoxide:

As noted, in Section 4.5.1 [of Appendix H] there is the potential for a fire to occur with the BESS units which could form carbon monoxide if there is insufficient oxygen to sustain complete combustion. However, it is noted that the combustible load within the BESS which could result in the formation of carbon monoxide is relatively low compared to the available oxygen in the surrounding atmosphere. Therefore, it is considered that the formation of carbon monoxide at levels which would result in a substantial downwind impact are not considered credible. Therefore, this incident has not been carried forward for further analysis.

6.6.3.2.3 Fluorine gases.

Riskcon note with respect to fluorine gases:

Of the fluorine gases formed, PF_5 is a short-lived gas while POF_3 is a reactive intermediate. Thermal destruction of a several battery chemistry, configurations and State of Charge (SOC) indicated the vast majority of these did not produce observable POF_3 with the only observance occurring in a specific battery chemistry at 0% SOC (Ref. [6]). Therefore, the main fluorine gas of concern in a Li-ion battery fire is HF.

HF gas is hygroscopic readily dissolving into water vapour / humidity or moisture in airways forming hydrofluoric acid. Hydrofluoric acid is a weak acid although is highly corrosive and may result in chemical burns. In addition, it is calcium scavenging. Hence, it will readily bind with calcium in cells and tissues disrupting the nerve signalling. The immediately dangerous to life or Health (IDLH) for HF is 30 ppm and the 10-minute lethal concentration is 170 ppm.

For a toxic gas dispersion, a battery container fire is necessary as the initiating event. As discussed in Section 4.4 the potential for a fire to occur is considered negligible due to the highly stable and safe battery chemistries used. As the potential for the initiating event is considered unlikely, this incident has not been carried forward for further analysis.

6.6.3.3 Electrical equipment failure and fire

With respect to electrical equipment failure and fire the Riskcon PHA notes:

Electrical equipment is located within the switch room which may fail resulting in overheating, arcing, etc. which could initiate a fire. In the event of a fire, it may begin to propagate to adjacent combustible materials (i.e. wiring). It is noted that electrical equipment fires typically start by smouldering before flame ignition occurs resulting in a slow fire development.

The type of equipment used within the project is ubiquitous throughout the world and across industry segments and is therefore not a unique fire scenario. Based upon fire development within switch rooms the fire would be considered to be relatively slow in growth and would be unlikely to result in substantial impacts in terms of offsite impact or incident propagation. Therefore, this incident has not been carried forward for further analysis.

6.6.3.4 Transformer internal arcing, oil spill, ignition and bund fire

As noted in the Riskcon PHA, there is potential that arcing may occur within the transformers which may lead to generation of gases and pressure above the structural integrity of the oil reservoir which may rupture leaking oil

into the bund. As a result of the arcing and rupture, the oil may ignite leading to a bund fire within the dimensions of the bund.

Riskcon note:

There are two components to determining the fatality risk from a transformer scenario. The first is the probability of failure of the unit, and the second is the probability of such a failure resulting in a fatality. A detailed report titled "Assessment of Power Transformer Reliability" (Ref. [8]) was prepared in 2011 in a collaboration by several German universities and electrical institutions. In this report, failure rate analysis of both power transformers and generator step-up transformers as a function of voltage class is conducted. The results of the generator step-up transformers failure rate analysis are outlined in Table 6-1 [of Appendix H] as these values are most applicable to the Muswellbrook site, in addition to being more conservative than the failure rates of power transformers. The most conservative value of 1.61% has been selected for this analysis

The same report provides information regarding the external effects of the 112 failures analysed within the report as shown in Figure 6-2 [of Appendix H]. For the purpose of this analysis, it is assumed that only fire or explosion/burst incidents will contribute to the potential for a fatality. The probability of either of these external effects occurring is the sum of fire probability (6.3%) and explosion or burst probability (2.7%) for a total of 9%.

*A transformer incident will only impact the closest site boundary if a northerly wind is blowing; hence, this has been used to identify the frequency with which northerly conditions occur based upon the average wind rose at 9 AM and 3 PM with data taken from the Scone Airport as provided in **Appendix D** [of Appendix H]. Northerly wind conditions occur approximately 8.5% of the time at 9 AM and 5.0% for 3 PM. Taking the average results in a northerly wind probability of 6.75%.*

It is also assumed that personnel will be in a position to be affected by such an incident for approximately 1 hour per week, or 0.6% probability.

Multiplying through the modifiers results in an overall fatality potential at the closest residences of $0.0161 \times 0.09 \times 0.0675 \times 0.006 = 5.9 \times 10^{-7}$ p.a.

6.6.3.5 Electromagnetic field impacts.

By reference to the Riskcon PHA, with relation to electromagnetic fields, the following is noted:

A review of the site indicates there are no immediate residences adjacent to the area where the facility or BESS will be developed providing substantial distance for attenuation of EMFs. Based upon the typical levels which may be generated by transmission equipment the cumulative effect would not exceed the 2,000 mG limit for prolonged exposure. In addition, the closest residence is approximately 400 m away from the EMF generating sources at the facility; hence, the potential for the EMF to exceed the accepted levels is considered negligible.

As the potential for exposure to EMF exceeding the international guidelines is negligible, this incident has not been carried forward for further analysis.

6.6.3.6 Total fatality risk

By reference to the above discussed matters, Riskcon provide a summary of total fatality risk in the immediate vicinity of the project, in Tables 6-2 of **Appendix H** and reproduced in **Table 15**.

Table 15 – Total Fatality Risk

Incident	Fatality risk (p.a.)
Transformer incident	5.9×10^{-7}
TOTAL	5.9×10^{-7}

6.6.3.7 Comparison against risk criteria

Riskcon note with respect comparison against the risk criteria:

The private property surrounding the site and BESS units is not neatly described by the criteria shown in Table 6-4 [of Appendix H]; however, the most applicable based upon the description would be active open spaces with a criterion of 10 pmpy.

The fatality risk estimated for the immediate vicinity was calculated to be 0.59 pmpy which is below the criteria of 10 pmpy. Therefore, from a fatality risk perspective the development does not result in an exceedance of the criteria and would be considered acceptable for the proposed location.

6.6.3.8 Assessment Conclusion

By reference to the Riskcon PHA, the following conclusions are reached:

A hazard identification table was developed for the Muswellbrook BESS project to identify potential hazards that may be present at the site as a result of operations or storage of materials. Based on the identified hazards, scenarios were postulated that may result in an incident with a potential for offsite impacts. Postulated scenarios were discussed qualitatively and any scenarios that would not impact offsite were eliminated from further assessment. Scenarios not eliminated were then carried forward for consequence analysis.

Incidents carried forward for consequence analysis were assessed in detail to estimate the impact distances. Impact distances were developed into scenario contours and overlaid onto the site layout diagram to determine if an offsite impact would occur.

Where an offsite impact was identified, a frequency analysis and risk assessment were conducted to identify the potential for fatality, injury and irritation to occur as a result of the development. The results indicated that the fatality risks would not exceed the acceptable criteria. Similarly, the injury and irritation criteria were not exceeded. Finally, the potential for incident propagation as assessed at the 23 kW/m² contour which didn't show any potential for off-site impact and similarly the 14 kPa contours didn't impact any areas of interest thus incident propagation would not be considered to occur.

Based on the analysis conducted, it is concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria; hence, the project would only be classified as potentially hazardous and would be permitted within the current land zoning for the site.

Based on the analysis conducted as part of the PHA, it has been concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria; hence, the project would only be classified as potentially hazardous.

6.6.4 MITIGATION MEASURES

Notwithstanding the above, the following mitigation measures would be implemented:

- *The transformers spill containment shall be designed according to the requirements of AS 2067:2016 – “Substations and high voltage installations exceeding 1kV a.c”.*
- *A Final Hazard Analysis (FHA) shall be prepared based upon the finalised layout of the site to demonstrate that the risk criteria remains below the acceptable levels.*

6.7 Bushfire

6.7.1 INTRODUCTION

A Bushfire Assessment Report (BAR) has been completed for the project by Cool Burn Fire and Ecology (2022) and is provided at **Appendix I**. The BAR was prepared to address the requirements of the Rural Fire Service publication *Planning for Bush Fire Protection* (2018).

The BA has been prepared to provide:

- A summary of the site details;
- An assessment of bushfire risk;
- Recommendations around required bushfire protection measures;
- A summary of recommendations; and
- A compliance summary

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

6.7.2 EXISTING ENVIRONMENT

As shown in **Figure 16**, the entirety of the site is mapped as bushfire prone land vegetation category 3.

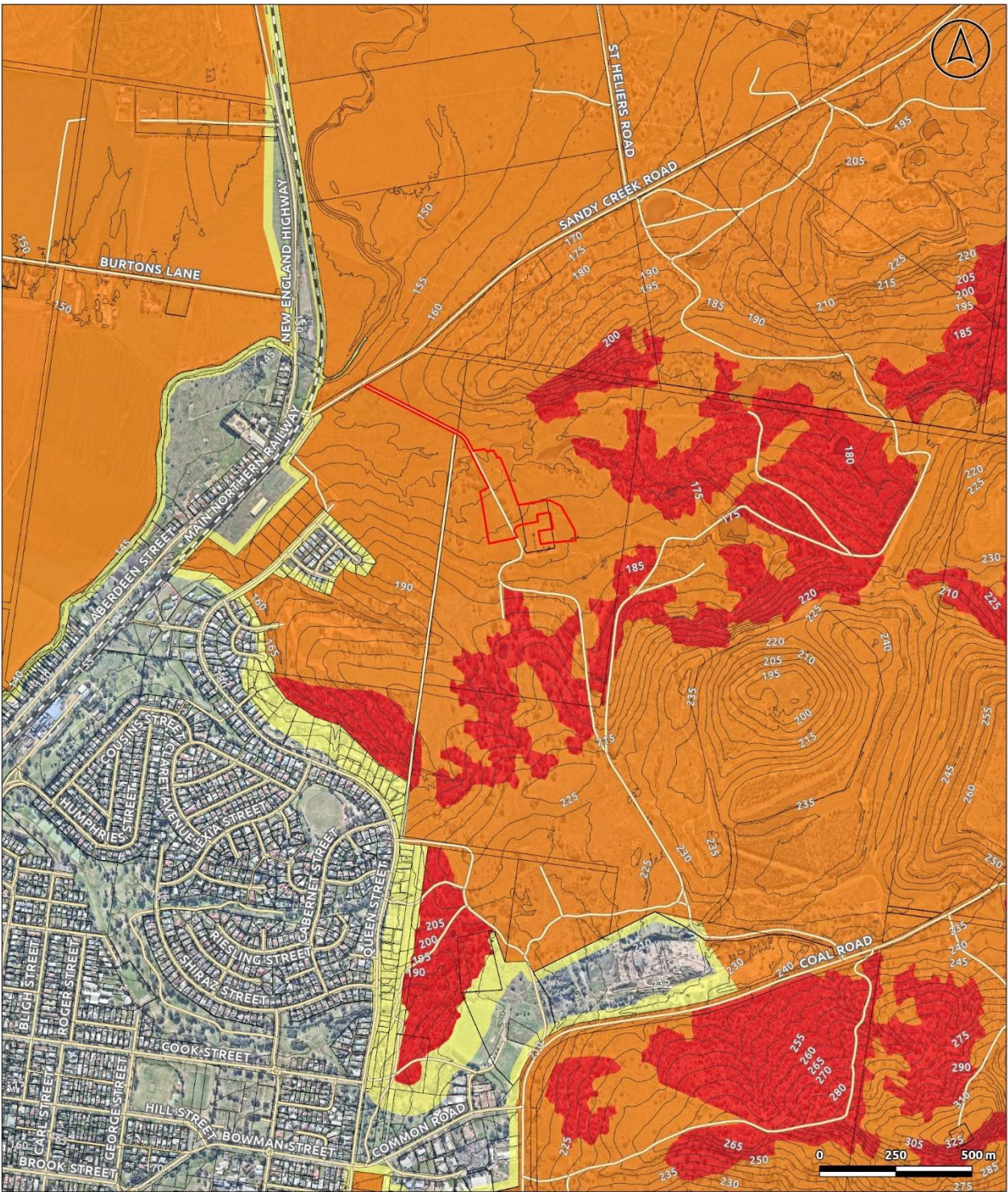
6.7.3 ASSESSED IMPACTS

The BAR notes that the site is:

- Located within the Muswellbrook Council area, which is in turn located in the Greater Hunter region fire weather district (district 3) and has a corresponding FFDI rating of 100 and GFDI rating of 130.
- The following vegetation types occur on or within 140 metres of the BESS site:
 - Grassland (up to 6t/ha): Native and derived grassland vegetation predominantly in the central portion of the site, extending into the north-west corner.
 - Grassy Woodlands: New England Grassy Woodlands (10.5t/ha surface/elevated – 20.2t/ha overall).
- The effective slope out to 100 metres from site are generally flat (0 degrees) to the east and west, down-slope to the north (0-5 degrees) and upslope to the south.

In the context of the objectives of PBFP, Cool Burn Fire and Ecology note the project would comply in full with the aims and specific requirements of PBFP, subject to the implementation of the recommended bushfire protection methods – summarised in **Section 6.7.4**.

Figure 16 – Bushfire



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- Legend**
- Development Site
 - Cadastre
 - Road
 - Railway
 - Natural Contrours (5m Interval)

- Bush Fire Prone Land**
- Vegetation Category 1
 - Vegetation Category 3
 - Vegetation Buffer

6.7.4 MITIGATION MEASURES

The following mitigation measures would be implemented as per Section 4 of **Appendix I**.

- Implementation of a 10 metre wide Asset Protection Zone (APZ) around the BESS and associated buildings, to ensure that radiant heat levels at the building surface remain below 29kW/m². The APZ is to feature a fuel free area (ie, sand, gravel, concrete etc) or grass (kept short or mown/maintained to a height of less than 10cm). The APZ is to be maintained to prescribed Inner Protection Zone standards.
- Building construction requirements as follows:
 - APZ (10m IPA) and water supply tank for bushfire fighting purposes to be constructed as the first stage of development.
 - Construction of the BESS and associated infrastructure to the general fire safety provisions of the National Construction Code (NCC).
 - Permits for hot works (e.g., grinders, welders, slashers) and no hot works on Total Fire Ban Days.
 - Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding bush. In this regard it is recommended that substations and other new building be constructed to comply with Australian Standard AS 3959- 2018 Construction of buildings in bushfire-prone areas, commensurate with the modelled bushfire attack levels.
- Provision of a dedicated onsite supply firefighting water of 20kL in a steel or concrete tank. The tank should be provided in a strategic location to provide appropriate access. The tank should incorporate fast fill options and easily accessible fill points such as 65mm Storz fittings for hydrant stands or direct link to tanks. Hardstand access capable of supporting weight and turning capacity for a fully loaded fire truck (23 tonne) should be provide at the tank location.
- Electricity connections to the sub-station should preferably be underground. If this is not possible, overhead lines are to be installed to PBFP requirements.
- If required, reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596:2014 ad the requirements of relevant authorities.
- Where required, the existing access should be upgraded in accordance with PBFP requirements.
- A Fire Management Plan (FMP) should be prepared prior to energisation in consultation with F&RNSW as per Section 4.8 of **Appendix I**.

6.8 Water

6.8.1 EXISTING ENVIRONMENT

6.8.1.1 Surface water and flooding

Surface water in the locality of the site is limited to a tributary drainage path, which links to Sandy Creek and ultimately the Hunter River downstream. The on-site tributary is located downstream of the development and runs from east to west at a slope of 1.4%. The tributary is fed by a number of overland flow paths. Drainage slopes are gentle, at around 2%. Elevations across the site vary from approximately 174 mAHD in the southwest to 158 mAHD in the northwest.

6.8.1.2 Groundwater

The nearest groundwater boreholes with a known standing water level approximately 2 kilometres to the south-west of the site, near the intersection of St Heliers Street and Bridge Street, include:

- GW202484, with a standing water level of 5.8 metres;
- GW202485, with a standing water level of 3.9 metres;

- GW202486, with a standing water level of 5.2 metres;
- GW200779, with a standing water level of 9 metres; and
- GW200781, with a standing water level of 9.8 metres.

Standing water levels in the above borehole cluster are likely to be higher than the site due to being located at lower elevation (RL 156 metres as compared to RL 170 metres near the centre of the site) and closer to the Hunter River.

6.8.1.3 Water quality

No existing water quality data is available for the site.

6.8.2 ASSESSED IMPACTS

6.8.2.1 Surface water and flooding

The environmental impact of the project on flooding and water resources is considered to be low risk and readily manageable.

The flooding assessment suggests that:

- The flood hazard to persons within the site is low.
- The site hydrology shows the project has negligible effect to downstream flow conditions.
- The project will not affect flood behaviour.

6.8.2.2 Groundwater

The project is not likely to have any impact on groundwater resources or Groundwater Dependent Ecosystems (GDE). Impacts to groundwater during construction and operation of the battery systems are unlikely to occur due to:

- The pattern of surface drainage and associated groundwater recharge will remain unchanged.
- Soil infiltration across the broader surface of the site will be unchanged, and therefore the rates of groundwater recharge will be unaffected.
- The Project does not include any deep excavation with potential to interact with groundwater.
- No battery systems or other infrastructure are proposed at or close to the locations of GDE's within the site.

6.8.2.3 Water quality

The WA identifies that during the construction phase, construction works will expose site soils, creating potential for erosion to mobilise sediments into receiving watercourses. Once operational, risks to water quality would be minimal and limited to maintenance activities, which will involve very small, localised disturbance areas on an infrequent basis. Water quality impacts from these minor disturbances is unlikely to have any significant impact on overall site water quality.

The primary risk to surface water quality during construction is ground disturbance associated with site earthworks. Construction works will expose site soils and there is potential for erosion to mobilise sediments into receiving watercourses. Without appropriate controls there is potential for an increase in turbidity and nutrient loads in the receiving watercourses which may cause water quality and ecological impacts.

6.8.3 MITIGATION MEASURES

The following mitigation measures are recommended in the Water Assessment:

- Flooding:
 - Staff/sub-contractor awareness;

- Installation of flood warning signs and depth markers along access road crossing of Sandy Creek; and
 - Flood management plan.
- Localised overland flows:
 - All BESS enclosures will be elevated above surrounding the ground. Elevation will be increased where there are localised overland paths running across the site areas with BESS enclosures.
- Erosion and sediment controls:
 - Limiting the area and time of disturbed areas.
 - Gentle grades, and a combination of progressive vegetation and surface cover across the site once disturbed.
 - Sediment sumps (including appropriate drainage).
 - Clean water diversions and sediment fencing.
 - Erosion Sediment Control Plan (ESCP).
- Spillage of hydrocarbons, chemicals and fuel:
 - Regular inspection of batteries which will identify any issues with leakage, spill response plan.
 - Storage of chemicals in accordance with Australian Standards.
 - Storage of hydrocarbon fuels within bunded storage areas.
 - Bunding of substations, transformers or other infrastructure that utilise oil.
 - Minimise usage of herbicides and avoid spraying when rain is predicted.
 - A Spill Response Plan, including emergency response and EPA notification procedures.
- Monitoring, licensing and reporting during construction and operation:
 - Accident documentation.
 - Water quality compliance with SEARs.
 - Construction Environmental Management Plan (CEMP).
 - Operational Environmental Management Plan (OEMP).
 - Regular inspection of batteries which will identify and issues with leakages.
 - A Spill Response Plan, including emergency response and EPA notification procedures.
- Traffic, dust generation:
 - Speed limit of 40km/hr on site.
 - Application of binders to road surfaces as required.
- Closure, decommissioning:
 - Erosion Sediment Control Plan (ESCP).
 - Temporary ground cover and revegetation after removal of BESS.
- Terrestrial Groundwater Dependent Ecosystems:
 - Further investigation on the low potential terrestrial GDEs is recommended
- Wastewater disposal:
 - Wastewater during construction will be captured and removed from site for off-site treatment.
 - Toilet facilities will involve waterless toilets that are emptied off-site.
- Water quality:
 - Water quality compliance with SEARs.
 - CEMP including an ESCP for construction activities.
 - OEMP to identify requirements for water quality monitoring and reporting.
 - Progressive rehabilitation of surfaces as installation and removal of batteries proceeds across the site.

6.9 Other Land Resources and Land Uses

6.9.1 INTRODUCTION

A Land and Soil Capability Assessment was completed for the project by SLR (2022) and a Land Use Conflict Risk Assessment was prepared by Premise (2022). These are provided at **Appendix L** and **Appendix K** respectively.

The LSCA was prepared to provide:

- A summary of the background to the assessment, objectives, study area and details of relevant legislation and standards;
- A summary of the assessment methodology;
- A summary of the outcomes of the soil assessment (this is discussed in **Section 6.10**);
- A summary of the outcomes of the LSC assessment;
- Preliminary BSAL verification;
- Soil erosive potential; and
- Conclusions and recommendations.

The LUCRA was prepared to provide:

- A summary of the study area and background to the assessment;
- A summary of relevant information relating to the site, including land uses in the locality, history land uses and details of a site inspection;
- A summary of the outcomes of a land use risk assessment, including risk reduction strategies;
- Limitations and assumptions; and
- Conclusions and recommendations.

A summary of the LSCA and LUCRA are provided in the following sections, together with consideration of other relevant matters, including impacts to Crown land and a summary of recommended mitigations measures.

6.9.2 EXISTING ENVIRONMENT

As noted in **Figure 17**, the Consolidated Coal Lease (CCL) 713 held by Muswellbrook Coal Company Ltd is located adjacent to the proposal.

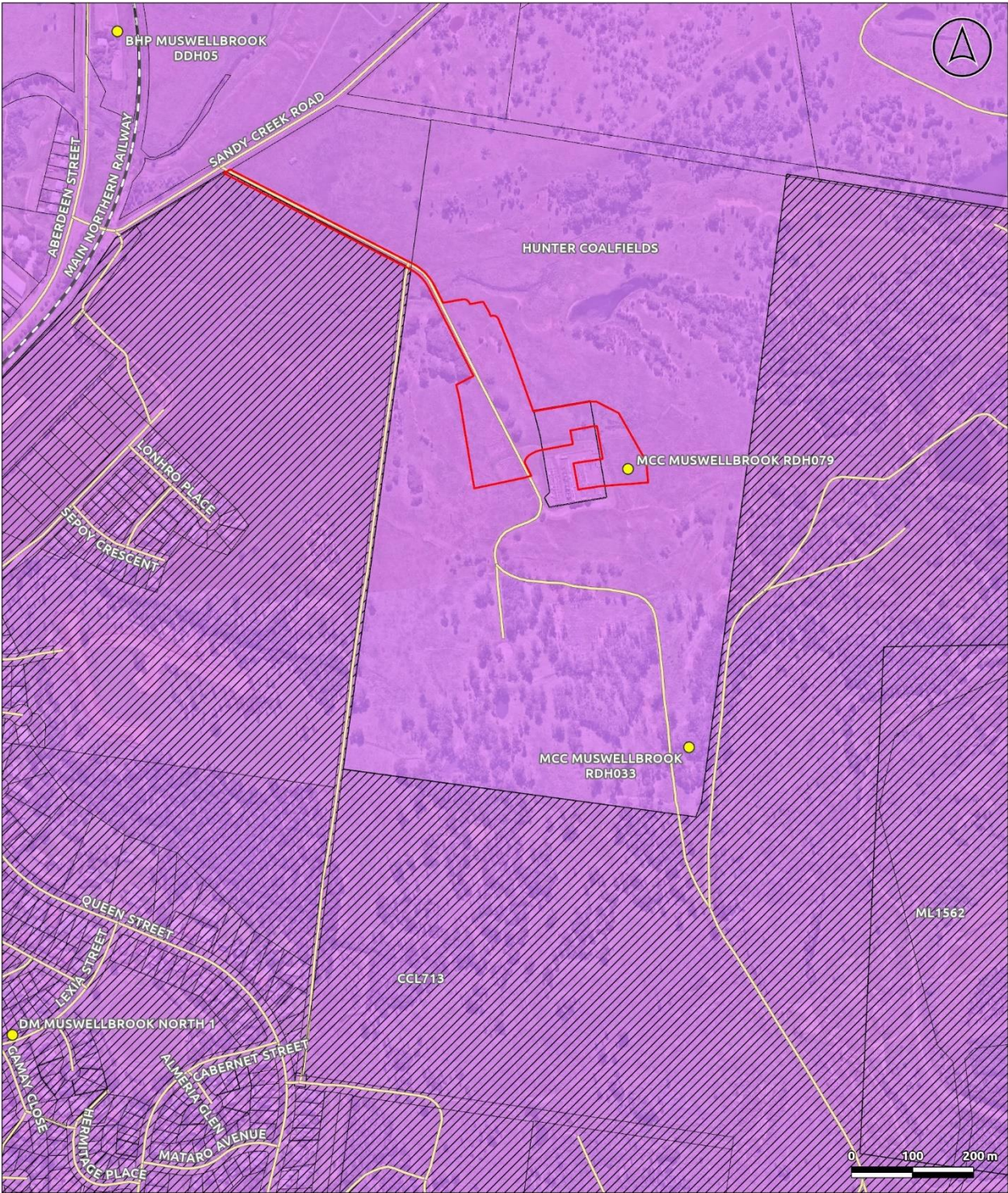
As shown in **Figure 18**, a minor portion of the north-western corner of the project area is identified as having Class 3 land soil capability with the remainder of the project area being identified as Class 5. Mapped biophysical strategic agricultural land corresponds with the abovementioned Class 3 land (located to the north-west of the site) but is not impacted by the proposed development.

Site analysis as a result of the LSCA has confirmed that the project area has an LSC Class of 5, with small section that has been conservatively assessed as Class 4 due to the return period for water logging for some of the site being every 2-3 years (Class 4) rather than every year (Class 5). This therefore represents a conservative assessment. According to the Interim protocol for site verification and mapping of biophysical strategic agricultural land the land does not represent BSAL on the basis that it fails step 7 of the BSAL criteria, due to moderately low inherent fertility, and step 9, due to poor drainage.

The land around the substation is currently agriculture in appearance (and mapped land use) but Ausgrid has confirmed that the land under their control (Lots 11 and 12) are not used in an agricultural capacity.

The site access is accessed via a Crown reserve identified as TSR 70196, managed by the Hunter Local Land Services. Urban development is occurring on adjacent land to the west of the site in the form of low density and large lot residential developments (including approved, under development and planned). The TfNSW New England Highway Muswellbrook Bypass is proposed on land to the east of the site - refer **Figure 19**.

Figure 17 – Mining

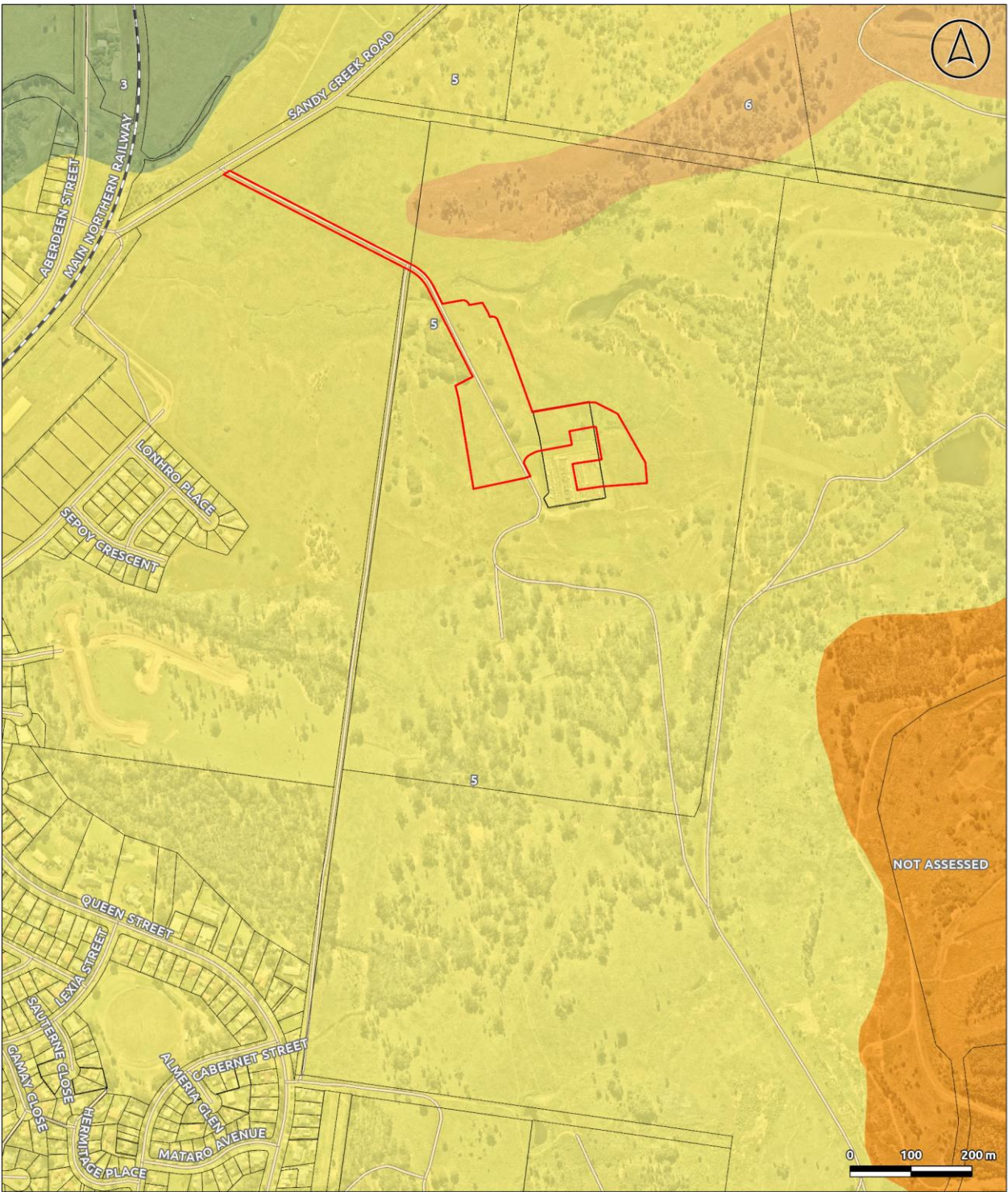


- Legend**
- Development Site
 - Cadastre
 - Road
 - Railway
 - Mines Subsidence District
 - NSW Exploration and Mining Titles
 - NSW Drillholes
 - Coal

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Figure 18 – Land Resources



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 Site Landowner
 NSW State Government
 Muswellbrook Shire Council
 Muswellbrook Coal Company

FIRM POWER

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6.9.3 ASSESSED IMPACTS

6.9.3.1 Agriculture

The subject land is currently predominantly zoned SP2, within which agriculture use is not permitted. Impacts to C3 zoned land is limited to the development of an aboveground or underground sub-transmission line, connecting the BESS to the substation. Whilst Ausgrid have confirmed the C3 portion of the land under their control is not actively used for agricultural purposes, the installation of the sub-transmission line would not preclude the agricultural use of the land if required.

6.9.3.2 Land Use Conflict Risk Assessment

The LUCRA identified a total of 47 potential land use conflicts.

The initial risk ranking identified 16 low risk, 30 moderate risk conflicts and 1 high use conflict. The initial high risk land use conflict relates to the potential for subsidence, historical underground mining and/or asbestos remediation to impact the BESS.

The revised risk ranking identified 42 low risk and 5 moderate risk conflicts.

The average risk ranking of all identified conflicts was reduced from an initial risk ranking of 12.3 (moderate risk) to a revised risk ranking of 7.6 (low risk).

The average revised risk ranking for all identified land use conflicts is below 10 which is consistent with the LUCRA objective to lower the risk ranking to 10 or below.

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

6.9.3.3 Urban development

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

- The C3 and SP2 land use zones applying to the site under the LEP does not permit urban land uses;
- The small portion of the land zoned R5 (the access driveway) is Crown land currently in use for the purposes of providing access to the substation on the land, and is therefore unlikely to be affected by any urban development projects;
- No planning proposals are known to have been submitted to MSC to seek rezoning of the site;
- The site is not identified as an "urban investigation area", "urban release area" or similar under an environmental planning policy or under any of the strategic policies considered in **Section 2.1** of this report and
- The impacts of urban development are significantly greater than that of a BESS as the former is permanent whilst the latter is to be decommissioned within 15-20 years, after which the land is rehabilitated to pre-development conditions.

6.9.3.4 Crown land

Access to the site from Sandy Creek Road is proposed to be gained via the existing TSR 70196 which currently provides access to the Ausgrid Substation site.

Upgrades to this are not expected to be required given the short-term duration of the construction phase and the ability to manage incoming and outgoing vehicles to minimise conflict. Within the area of the BESS, the ground would be treated with gravel and would be accessible by vehicles as required.

No works are proposed to the existing Crown reserve land.

Engagement with NSW Crown Lands with respect to the project has identified no objections to the carrying out of the project and the ongoing use of the existing access driveway for access purposes.

The impacted Crown Land, being a Travelling Stock Route (TSR) 70196, is managed by Hunter Local Land Services (LLS). Engagement with LLS throughout the EIS preparation period has secured a Reserve Use Permit (P22/05) for the TSR has been secured from LLS during construction of the project. No change is proposed to TSR 70196 as a result of the project. Construction traffic will be managed to minimise conflict.

Ongoing engagement with Wanaruah Aboriginal Land Council regarding an undetermined claim on TSR 70196 (Lot 15 DP 905479) and have not formally responded to consultation, and are unlikely to rescind their rights over the land.

6.9.3.5 Proposed Muswellbrook Bypass

As noted in **Appendix N**, the NSW Government has committed funding to the development of the proposed New England Highway Muswellbrook Bypass, which includes nine (9) kilometres of new single lane highway. The new highway will pass to the east of the site (refer **Figure 19**). The Bypass has been the subject of an environmental assessment including community engagement.

Construction of the Bypass is projected to commence in 2023 and will take around 3.5 years.

The applicant has engaged with TfNSW in the preparation of this EIS and in preparing concept plans for the project. As a result of this engagement refinements to the project footprint have been completed (refer **Figure 6** and **Figure 7**) to avoid potential design conflicts.

6.9.4 MITIGATION MEASURES

- Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS.

Mitigation measures via the LUCRA are reflective of those recommended throughout the range of specialist reporting prepared to support the proposal and are summarised in **Appendix C**.

No change is proposed to TSR 70196 as a result of the project, construction traffic will be managed to minimise conflict.

- Consultation with TfNSW during construction of the project if construction of the BESS and Muswellbrook Bypass overlap
- Visual screening to minimise potential visual impacts on residences and future residential development west of the site
- Construction of noise bund to ensure compliance with the relevant noise criteria under the NPfI during operations and implementation of all reasonable and feasible noise management measures during construction of the project in accordance with the ICNG.

6.10 Soils

6.10.1 INTRODUCTION

A Land and Soil Capability Assessment was completed for the project by SLR (2022) and is provided at **Appendix L**. The LSCA was prepared to provide:

- A summary of the background to the assessment, objectives, study area and details of relevant legislation and standards;
- A summary of the assessment methodology;
- A summary of the outcomes of the soil assessment;
- A summary of the outcomes of the LSC assessment (this is discussed in **Section 6.8**);
- Preliminary BSAL verification (this is discussed in **Section 6.8**);
- Soil erosive potential; and
- Conclusions and recommendations.

A summary of the LSCA is provided in the following sections and a summary of recommended mitigations measures.

6.10.2 EXISTING ENVIRONMENT

As shown in **Figure 20**, the Dochra soil landscape dominates the southern portion of the site and is also found in the north-western corner of the site, separated by Donalds Gully and Little Glasstree Hill soil landscapes. The Dochra landscape has moderate limitations to urban land uses whilst the Donalds Gully and Glasstree Hill soil landscapes have moderate to high limitation to urban land uses. All landscapes have moderate to high limitations for grazing and cultivation, except for the Little Glasstree Hill soil landscape which has very high to extreme limitations for cultivation.

Figure 20 – Soil landscapes

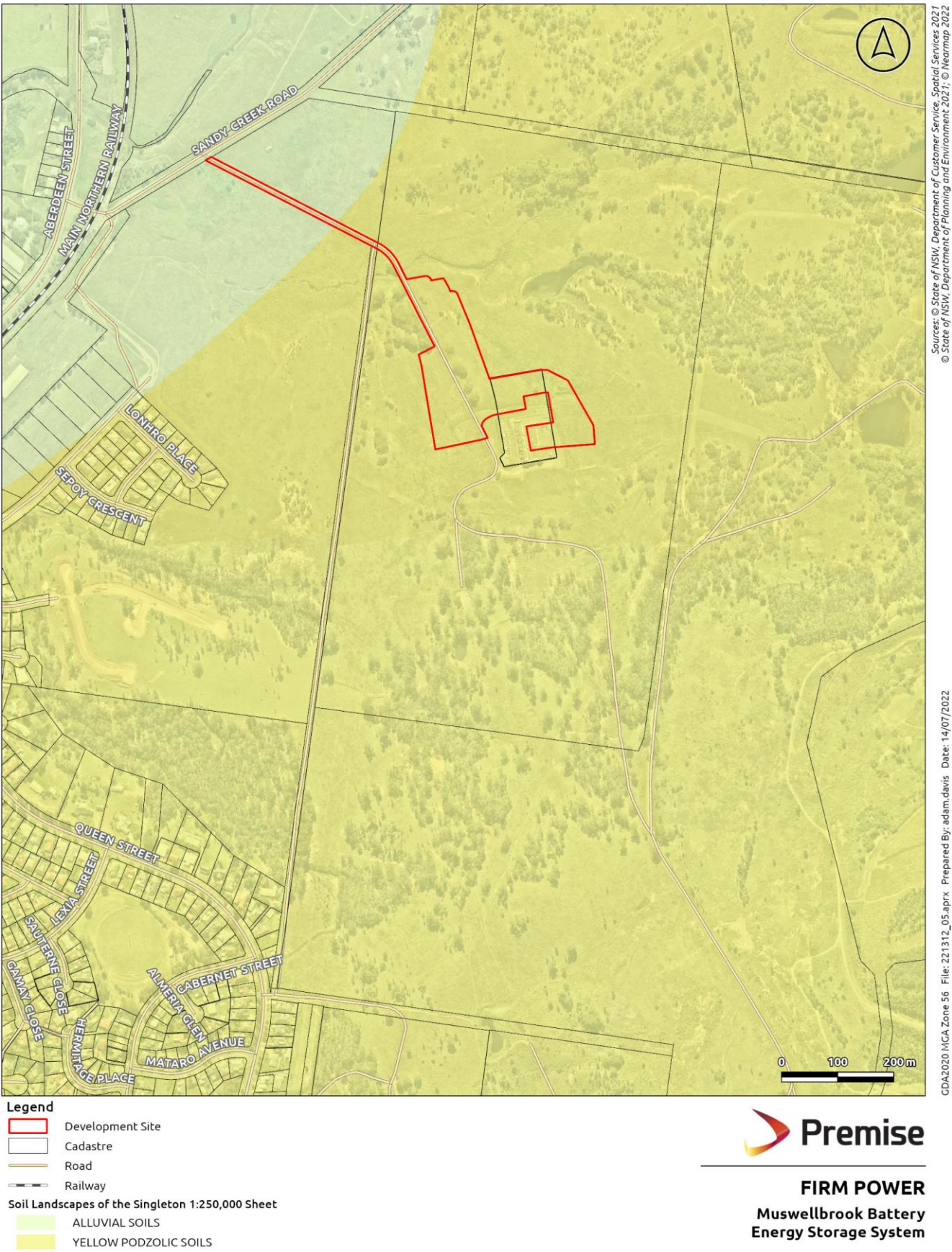
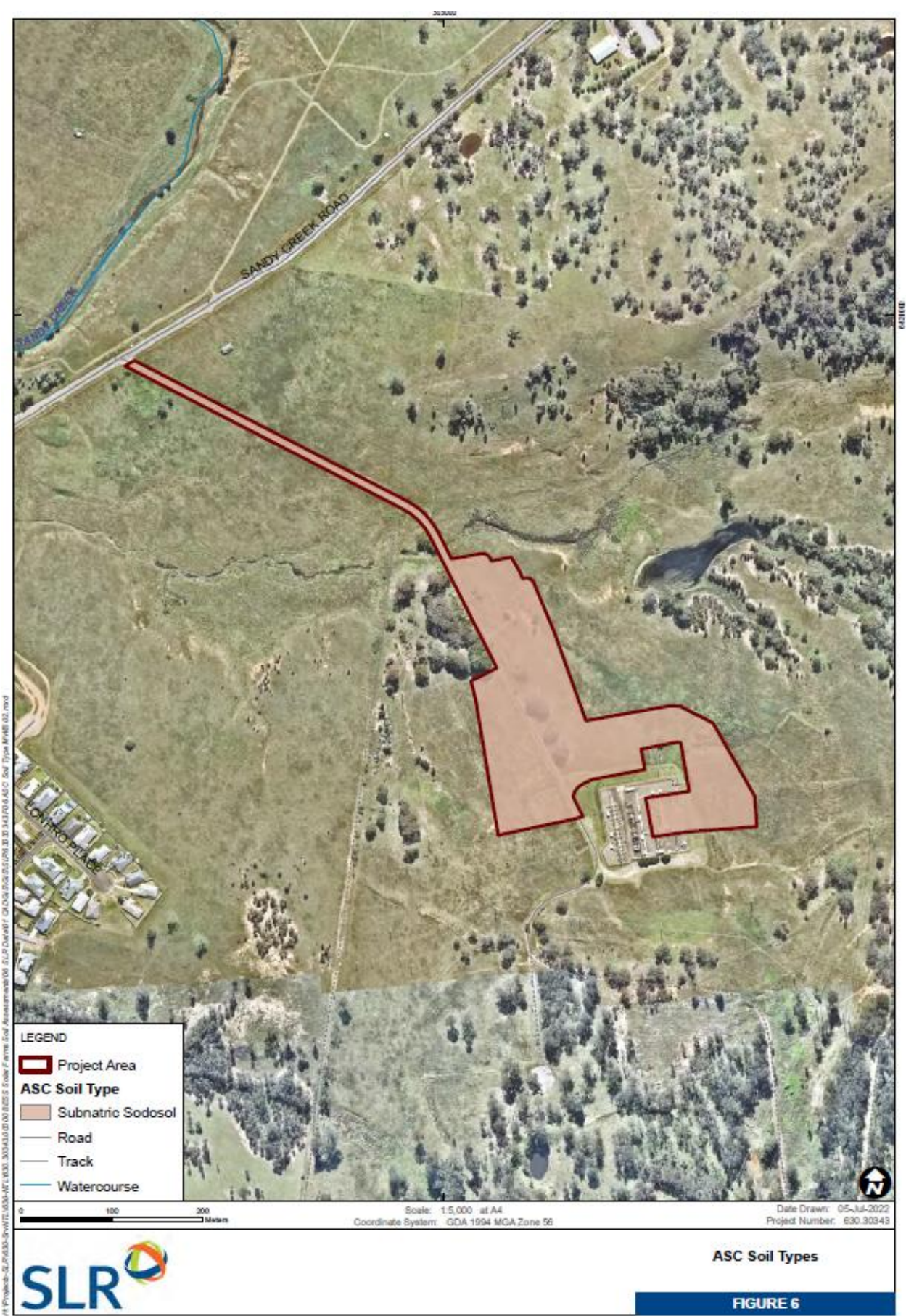


Figure 21 – Soil types



6.10.3 ASSESSED IMPACTS

A field survey was undertaken by SLR during April 2022 and included the assessment and collection of three (3) soil samples from the LSC study area, of which two (2) were subject to laboratory analysis.

One soil map unit was identified within the Study Area, a Subnatric Brown Sodosol - **Figure 21**. Sodosols are soils with a strong texture contrast between the A horizons and a sodic B horizon which are not strongly acidic (pH is greater than 5.5). The strongly sodic nature of the B horizon in Sodosols leave them prone to dispersion and tunnel erosion if left exposed for prolonged periods to water movement or rainfall. The dispersion class and erosive potential of soils within the study area were determined using the Emmerson Aggregate Test (EAT). All soil horizons within the study area are classed as slightly to moderately dispersive.

The likelihood of acid sulfate soils occurring within the study area is very low due to its position away from the coast and potential acid sulfate landform type. Furthermore, none of the soil types mapped within the study area have acid sulfate soil potential.

According to the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (Office of Environment and Heritage & Office of Agricultural Sustainability and Food Security 2013), the study area cannot be considered biophysical strategic agricultural land (BSAL) due to failing Step 7 (moderately low inherent fertility) and Step 9 (poor drainage) on the Interim Protocol BSAL Criteria Flow Diagram.

The study area is not considered highly productive agricultural land as defined in *The Land and Soil Capability Assessment Scheme; Second Approximation* (OEHL, 2012). All sites within the study area were classified as LSC Class 4. The exception to these is areas of greater than or equal to 10% slope which are classified as LSC Class 5, due to the presence of sodic subsoils.

LSC Class 4 is considered to have moderate agricultural capability with moderate to high limitations for high-impact land uses which restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. LSC Class 4 is associated with Sodosols and comprises 90% of the study area.

LSC Class 5 is considered to have moderate-low agricultural capability and has severe limitations for high impact land management uses such as cropping. This land is generally more suitable for grazing with some limitations or very occasional cultivation for pasture establishment. LSC Class 5 is associated with the Sodosols found on areas of greater than or equal to 10% slope and comprises 10% of the study area.

Potential impacts to soils include:

- Disturbance of surface and subsurface soils during construction, including as a result of:
 - Vegetation clearing that exposes soils
 - Construction (and use) of tracks
 - Earthworks (cut and fill, grading and compacting)
 - Excavation for trenching and sediment basins (if required)
 - Stockpiling of soils
- Potential impacts to soils during construction are likely to include:
 - Reduced soil stability
 - Mixing of soil horizons, affecting soil quality and impeding vegetation growth
 - Erosion, soil loss and sedimentation
 - Reduced soil permeability and increased run-off
- Operation of the BESS is anticipated to involve minimal disturbance to soils. However, potential impacts may include:
 - Erosion, soil loss and sedimentation.
 - Reduced soil permeability and localised run-off.

- Potential impacts during decommissioning are anticipated to be similar to construction impacts from soil disturbance. Longer term impacts of decommissioning may include:
 - Failure to return the site to existing land and soil capability (as outlined in this report) or improved land and soil capability.
 - Failure to return the site to a safe, stable and non-polluting landform.

6.10.4 MITIGATION MEASURES

Recommended mitigation measures include:

- Application of gypsum (10 tonnes/ha) during construction.
- Implementation of appropriate erosion and sediment control measures during construction.
- Prior to construction:
 - Ensure the detailed design incorporates all necessary measures from a Construction Erosion and Sediment Control Plan (ESCP) and Soil and Water Management Plan (SWMP).
 - Utilise existing tracks and driveways where possible, and where new tracks are required, be established within minimal disturbance.
- During construction:
 - Implement all measures from ESCP and SWMP.
 - Minimise all ground disturbance where possible.
 - Minimise construction activities during wet weather conditions.
 - Retain, stockpile, treat for weeds and ameliorate all disturbed or excavated soil, with all topsoil and subsoils stockpiled separately and returned in order.
 - Return stockpiled soil and cleared vegetation or organic matter to its original location (where possible) as soon as reasonably practicable.
 - Undertake rehabilitation and revegetation in accordance with an appropriate landscape, revegetation or rehabilitation plan prepared by a suitably qualified professional.
 - Ensure rehabilitation is undertaken progressively to minimise the total disturbance area at any one time.
- During operation:
 - Implement and maintain all operational requirements of the SWMP.
- During decommissioning:
 - Prepare an appropriate decommissioning management plan that incorporates appropriate soil management to return the site to existing or improved land and soil capability.
 - Specific soil management practices should be determined at the time of decommissioning.

6.11 Visual

6.11.1 INTRODUCTION

IRIS Visual Planning + Design (IRIS) completed a Visual Impact Assessment (VIA) (2022) for the proposal. The IRIS (2022) report accompanies this EIS in **Appendix M**.

The VIA was prepared to provide:

- A summary of the proposal, site context, planning context and site and setting;
- An assessment of potential visual impacts; and
- A summary of the avoidance, mitigation and offsetting of impacts.

The above sections of the VIA are summarised in the following sections.

6.11.2 EXISTING ENVIRONMENT

The visual catchment is determined in the VIA and includes the area from which the proposal would be seen. This area has been identified using a digital surface model (landform only) and the height of the proposed BESS enclosures in GIS software.

The visual catchment area does not include the screening effect of existing trees or future proposed trees and screening vegetation. However, this identifies the areas where there is the potential for a direct line of sight between the BESS and surrounding areas. This area was the basis for field investigations.

The visual catchment for this proposal is limited by the surrounding undulating landform. Generally, it extends:

- About 200 m to the north of the site, across fields to a small ridgeline
- A short distance to the east and southeast, including rural fields and west facing low hills extending between the terraces of Muswellbrook Coal mine and Skeletar Hill, including the areas that would be the future Muswellbrook Bypass
- A short distance to the south of the site including pasture fields zoned C3 Environmental Management
- To the west of the site, about 370 to 700 m across the fields located between the site and the Main North railway line (zoned R5), across the northern section of Queens Street and extending to a small ridgeline southwest of the site, at the edge of the dwellings in Northview Estate
- There are some areas to the northwest, where the valley opens up, that extend across the New England Highway to the fields extending along the Hunter River over several kilometres.

6.11.3 ASSESSED IMPACTS

Receptor views for the assessment have been selected from within the visual catchment to represent the range of locations from which the proposal would be seen from the public domain. These viewing locations have prioritised locations where there would be a larger number of potential viewers, such as the highway, but also includes views from local streets and lanes.

6.11.3.1 Public domain visual impacts

Viewpoints from the public domain were selected to represent the views from nearby roads such as the New England Highway and Sandy Creek Road, and nearby rural and urban dwellings, including along Queen Street and Burton Lane.

A detailed assessment of views from the public domain is contained in Table 5-4 of the IRIS (2002) report. The visual impact assessment confirmed there would be a limited number of locations in the public domain from which the project would be seen. From these locations there would be a minor adverse to negligible visual impact.

6.11.3.2 Private domain visual impacts

A detailed assessment of views from residential properties (private domain) is contained in Table 5-5 of the IRIS (2002) report. The visual impact assessment for the private domain identified:

- Negligible visual impact from existing dwellings to the northwest, north and southwest.
- There would be the potential for a minor visual impact from existing dwellings to the south and southwest of the site in Northview Estate along the northern side of Lonhro Place. However, this impact would be reduced to negligible with the implementation of the proposed screening vegetation.
- There is potential for views from future private dwellings if they were to be developed on the fields between the Northview Estate and the proposal site. Screening vegetation has been proposed to reduce any potential view to the proposal from these future dwellings.

6.11.3.3 Night-time visual impacts

There is not expected to be any construction at night. Therefore, there would be a negligible visual impact at night during construction.

During operation, there would be some minor security lighting provided at the BESS facility (lighting mounted outside the maintenance and operation building). There may also be some sensor lighting associated with the battery storage areas. This lighting would not noticeably alter the prevailing light levels in this area. As a result, there would be a negligible magnitude of change to an area of high visual sensitivity, and a negligible visual impact at night.

6.11.4 MITIGATION MEASURES

Potential impacts have been avoided/minimised by:

- The co-location of the project adjacent to the existing Ausgrid substation has minimised visual impact relative to a greenfield development.
- The proposal includes screening vegetation on the western boundary of the southern area of the development area, to respond to the potential for this area to be visible from areas to the southwest of the development area, including the future R5 Large lot residential area and Sandy Creek Road. The proposal has also been located as far as possible away from the existing and proposed residences within Northview Estate.

Additional proposed mitigation measures include:

- During construction:
 - Opportunities for the retention and protection of existing trees within the disturbance area would be identified during detailed construction planning. Identified trees of high conservation significance would be retained and protected where practicable.
 - Temporary and permanent access would be designed to minimise vegetation removal, changes to landform, and visual impacts where practicable.
 - Lighting at the construction compound would be designed and operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting.
- During operation:
 - Lighting at the BESS would be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.
 - The battery enclosure/s is/are be neutral colour, such as grey, to reduce their prominence where visible.
 - The noise barriers would be painted a dark neutral shade (such as Colourbond Woodland grey) to reduce their prominence in the landscape.

6.12 Social

6.12.1 INTRODUCTION

A Social and Economic Impact Assessment (SEIA; bd infrastructure 2022) is provided at **Appendix N**.

The social impact component of the SEIA has been prepared in accordance with the following guidelines:

- Social Impact Assessment Guideline for State Significant Projects (2021)
- Technical Supplement: Social Impact Assessment Guideline for State Significant Projects (2021).

The social impact component of the SEIA (hereafter referred to as the SIA) has been prepared to provide:

- An introduction and summary of the SIA framework and context;
- A summary of the SIA assessment methodology;

- A social baseline;
- An assessment of social impacts;
- Conclusions and recommendations.

These elements are discussed in the following sections.

6.12.2 EXISTING ENVIRONMENT

The SIA relies on the DPE's Social Impact Significance Matrix (The Matrix) to assess each social and economic impact and benefit, ranking each impact and benefit between low and very high. The former are expected to have a low probability of occurring either/and/or minimal impact/benefit whilst the latter are expected to have a high probability of occurring either/and/or significant impact.

The assessment approach relies on three core metrics to assess the identified social and economic impacts and benefits, as well as develop appropriate mitigation and enhancement measures:

- Nature: impacts/benefits can be negative (impact) or positive (benefit), with varying significance
- Experience: impacts/benefits can be perceived (intangible or perceptions) or actual (tangible), both carry equal importance
- Significance: building on an impact/benefit's nature, the Department of Planning's Social Impact Significance Matrix assesses the expected significance of predicted impacts/benefits.

Based on refinement of the SIA scoping tool, the following issues were identified as having a low social impact and were not subject to further assessment:

- Increased demand for temporary accommodation due to the relatively low construction workforce and limited construction period;
- Impacts on Aboriginal heritage and values, as informed by the ACHAR and HHA (OzArk 2022);
- Operational employment opportunities due to having a positive impact of low significance;
- Operational traffic due to resulting in a negligible change in the traffic environment arising from no more than two vehicle movements per hour;
- Increased firmness of renewable energy projects due to having a positive impact of low significance; and
- Reduction in electricity prices due to having a positive impact of low significance.

Those socials which are carried forward for assessment in the SIA are summarised in the following sections, including recommended mitigation measures.

6.12.3 ASSESSED IMPACTS

The SIA anticipated that the Muswellbrook BESS will have social impacts and benefits on the local area. Key considerations for the assessment of social impacts and benefits include:

- The close proximity of current and future residents to the proposal site.
- Valued rural lifestyle and scenery of the local area.
- The planned introduction of the Muswellbrook Bypass into the local area.

Key social impacts and benefits identified as having a potential notable impact/benefit as a result of the proposal are summarised below in **Table 16**.

Table 16 – Summary of assessed social impacts and benefits

Social impact	Nature	Social impact category	Proposal phase	Social impact rating	
				Unmitigated	Mitigated
Traffic	Negative	Accessibility, way of life	Construction	Medium (C2)	Low (C1)
Noise	Negative	Health and wellbeing	Construction	Medium (B2) (local residents) High (B3) (shift workers)	Low (C1) (local residents) Medium (C2) (shift workers)
Air Quality	Negative	Health and wellbeing	Construction	Medium (A2)	Low (A1)
Workforce need	Positive	Livelihoods	Construction	Low (D2)	Medium (C3)
Network resilience	Positive	Health and wellbeing	Operation	Medium (C3)	N/A
Noise	Negative	Health and wellbeing, Way of life	Operation	Medium (B2)	Low (C1)
Visual	Negative	Surroundings	Operation	Medium (C3)W	Low (D2)

6.12.4 MITIGATION MEASURES

The SIA recommends that the following actions be adopted in order to enhance potential benefits and mitigate potential social impacts:

- Development and implementation of a local procurement policy;
- Develop and implement a meaningful complaints handling system;
- Develop clear and transparent communication channels;
- Develop noise management measures in consultation with potentially impacted sensitive receivers;
- Establish inter-project communication channels with the Muswellbrook Bypass delivery team in order to manage cumulative impacts as needed; and
- Adopt all recommendations in other technical reports.

6.13 Economic

6.13.1 INTRODUCTION

A Social and Economic Impact Assessment (SEIA; bd infrastructure 2022) is provided at **Appendix N**.

The economic impact assessment section of the SEIA contains the following elements:

- A summary of the assessment methodology;
- A summary of the economic profile;
- A summary of the outcomes of the economic assessment; and
- Conclusion.

The economic impact component of the SEIA is summarised in the following sections, including recommended mitigation measures.

6.13.2 EXISTING ENVIRONMENT

bd infrastructure provide a summary of the economic profile to better understand the economic context of the Hunter Region. Five key areas have been considered:

1. unemployment rates (historical and current)
2. regional employment profile
3. economic opportunity
4. regional exports
5. regional value-added.

The above key areas are discussed in the following subsections.

6.13.2.1 Unemployment Rates

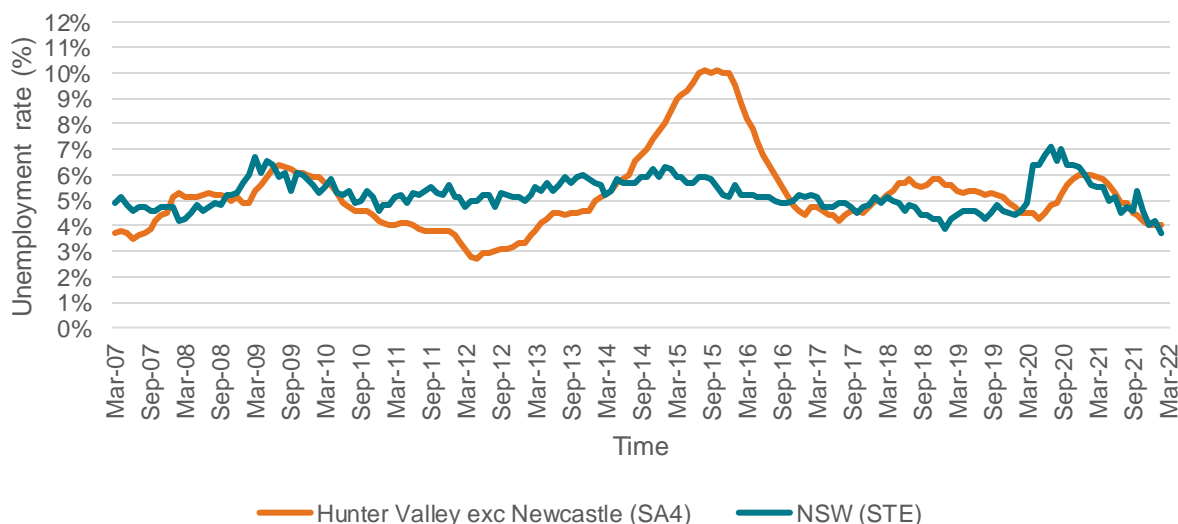
Since 2007 the Hunter Region has experienced notably different unemployment rates compared to the remainder of NSW, although noting that current (2022) rates are generally consistent with the current NSW rate (3.7% and 4% respectively).

This was particularly evident since 2020 and the beginning of the COVID-19 pandemic, where the Hunter Region experienced notably lower peak unemployment rates compared to the rest of NSW and a delay in the rise of unemployment rates associated with lockdowns.

This suggests that the Hunter Region experiences unique economic drivers by comparison to the rest of NSW.

Rates of unemployment in the Hunter Region compared to the NSW average is reflected in Figure 8-1 of the SEIA (**Appendix N**) and reproduced in **Figure 22**.

Figure 22 – Unemployment rates Hunter Region (bd infrastructure, 2022)



6.13.2.2 Regional Employment Profile

The top industries of employment in the Hunter Region are:

- mining (11.0 per cent)
- retail trade (10.7 per cent)
- health care and social assistance (10.7 per cent).

The top industries of employment within the region, in terms of resident employment are:

- health care and social assistance (12.2 per cent)

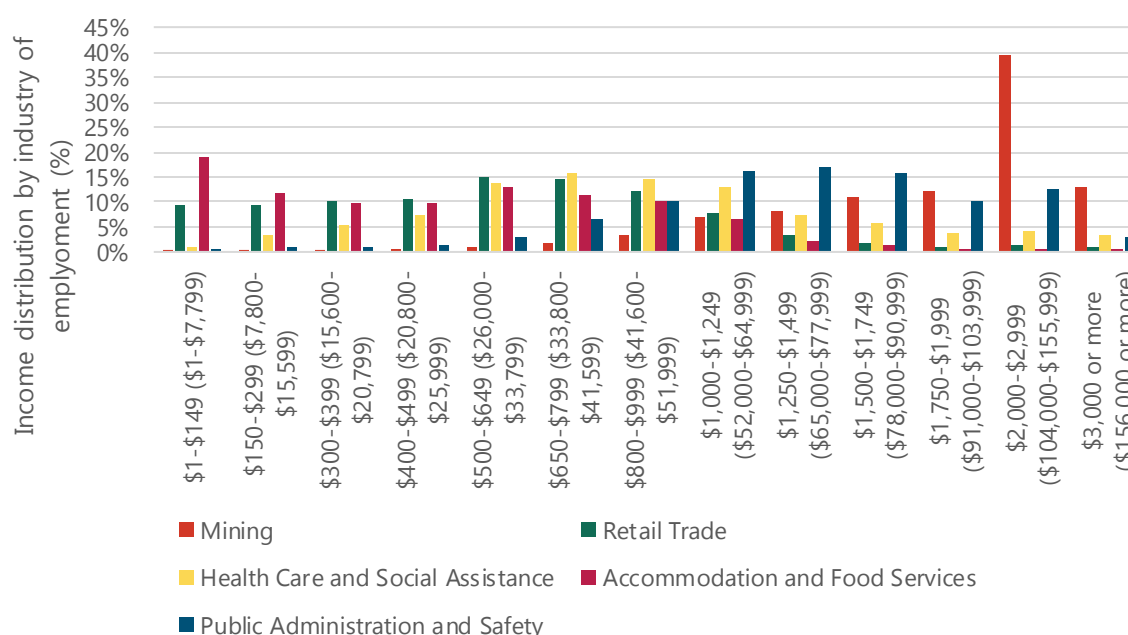
- retail trade (10.5 per cent)
- mining (9.3 per cent).

The above figures highlight the importance of the mining sector to the region.

6.13.2.3 Economic Opportunity

Figure 8-2 of the SEIA (**Appendix N**), reproduced as **Figure 23**, shows there are significant differences between economic opportunities between local employment opportunities in the region. These differences suggest there is the potential for strong economic inequality, in turn leading to potential increased resident and work vulnerability to economic change (such as house prices, cost of living and interest rates). Similarly, due to its dominance, those residents working in the mining sector may be impacted by mine closures to a lack of opportunities to earn similar high incomes elsewhere (known as lifestyle lock-in).

Figure 23 – Income distribution (bd infrastructure, 2022)



6.13.2.4 Regional Exports

Hunter Valley regional exports in 2021 were estimated at approximately \$28.8 billion, of which approximately 63.2% is associated with the mining sector (mining exports are approximately \$18.2 million).

6.13.2.5 Regional Value-Added Benefits

In 2021, the Hunter Valley region generated value-added benefits of approximately \$27.6 billion, of which the mining sector contributed \$11.2 billion (42.7% of all value-added benefits).

This high contribution by the mining sector underpins the importance of this sector to the region and its inhabitants, but also reflects the lack of economic diversity in the region.

6.13.3 ASSESSED IMPACTS

The SEIA concludes that the proposal has the potential to generate a range of economic benefits within the Hunter Valley Region and NSW economies. These include:

- 34-68 direct and 10-18 indirect construction services jobs (FTE) and \$4.627-\$9.254 million direct and \$1.206-\$2.611 million indirect value added to the Hunter Valley Regional economy over the 12 month construction phase

- 68 direct and 18 indirect construction services jobs (FTE) and \$9.254 million direct and \$3.426 million indirect value added to the NSW economy over the 12 month construction phase
- 2-3 direct and 3-4 indirect electricity distribution jobs (FTE) and \$1.271-\$1.907 million direct and \$0.925-\$1.388 million indirect value added per annum to the Hunter Valley Regional economy during operation phase
- 2-3 direct and 8-12 indirect electricity distribution jobs (FTE) and \$1.137-\$1.706 million direct and \$2.021-\$3.030 million indirect value added per annum to the NSW economy during operation phase.

In addition to employment benefits and increased value-added, the proposal is expected to:

- directly strengthen and support the construction industry within the Hunter Valley Region, an important industry of employment for residents
- provide new employment opportunities and value-added generated in the electricity distribution industry, supporting economic diversification in the Region while supporting the Region's vision to remain an energy production hub
- indirectly support future capital investment in renewable energy projects in the Region and across NSW, further stimulating Regional and State economies
- indirectly support the viability of cheaper electricity generation cost sources, such as wind and solar, by contributing to network firming with the potential to provide cheaper household electricity costs to households in the Region, and to a lesser extent NSW.

6.13.4 MITIGATION MEASURES

No negative economic impacts were identified in the SEIA. Therefore, no recommended mitigations measures are provided.

6.14 Air Quality

6.14.1 INTRODUCTION

An assessment of the potential impacts to air quality during construction and operation of the project has been provided by Premise.

6.14.2 EXISTING ENVIRONMENT

The site is located in a quasi-rural area on the fringe of the Muswellbrook urban area, in an area synonymous with mining and extractive industries. Likely existing sources of air pollution include emissions from vehicles (including those using the New England Highway and rural vehicles), dust from agricultural operations, dust emissions from mining and extractive industries in the locality and, potentially, emissions from wood heaters used in residential properties.

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

The nearest extractive/mining industries in the locality are the:

- Muswellbrook Quarry located approximately 800 m to the north-east of the site, along Sandy Creek Road Muswellbrook. The quarry is owned by MCC and was leased to Daracon for quarrying operations. A closure plan for the quarry was in place in 2016, with rehabilitation and remediation taking place in 2016 and 2021 (refer **Appendix K**);
- Muswellbrook Coal Mine, an opencut coal mine operated by Muswellbrook Coal Company (MCC) and located approximately 3 km north-east of the centre of Muswellbrook (refer **Appendix K**).

The National Pollution Inventory (NPI) reporting for the Muswellbrook Coal Mine indicates fugitive air emissions were 590,000 kg for PM₁₀ and 21,000 kg for PM_{2.5} (NPI, 2022).

DPE provide data services which record air quality information around NSW. The nearest recording stations to the site are at Bowman Park (Muswellbrook) and corner Wybong Street and Kayuga Road (Muswellbrook NW). The Muswellbrook NW facility, along with the Singleton (south) air quality monitoring station, is one of two Upper Hunter sites designated as a diagnostic site for fine particles.

Muswellbrook NW station measures the following air pollutant and meteorological variables:

- Fine particles as PM₁₀
- Wind direction, wind speed and sigma theta
- Ambient temperature
- Relative humidity

Muswellbrook measures the following air pollutant and meteorological variables:

- Oxides of nitrogen (NO, NO₂ and NO_x)
- Sulfur dioxide (SO₂)
- Fine particles as PM_{2.5}
- Fine particles as PM₁₀
- Wind direction, wind speed and sigma theta
- Ambient temperature
- Relative humidity
- Precipitation
- DPE categorises air pollutants by air quality categories, as set out in **Table 17**.

Table 17 – DPE Air Quality Categories

Air pollutant	Averaging period	Units	Good	Fair	Poor	Very poor	Extremely poor
Ozone O ₃	1-hour	pphm	<6.7	6.7–10.0	10.0–15.0	15.0–20.0	20.0 and above
Ozone O ₃	4-hour rolling	Pphm	<5.4	5.4–8.0	8.0–12.0	12.0–16.0	16.0 and above
Nitrogen Dioxide NO ₂	1-hour	Pphm	<8	8–12	12–18	18–24	24 and above
Visibility Neph	1-hour	Bsp	<1.5	1.5–3.0	3.0–6.0	6.0–18.0	18.0 and above
Carbon monoxide CO	8-hour rolling	Ppm	<6.0	6.0–9.0	9.0–13.5	13.5–18.0	18.0 and above
Sulfur dioxide SO ₂	1-hour	Pphm	<13.3	13.3–20.0	20.0–30.0	30.0–40.0	40.0 and above
Particulate Matter (PM) <10 µm PM ₁₀	1-hour	µg/m ³	<50	50–100	100–200	200–600	600 and above
Particulate Matter (PM)	1-hour	µg/m ³	<25	25–50	50–100	100–300	300 and above

Air pollutant	Averaging period	Units	Good	Fair	Poor	Very poor	Extremely poor
<2.5 μm PM _{2.5}							

Pollutant measurements at the Muswellbrook and Muswellbrook NW stations for July 2021 to July 2022 are outlined in **Table 18** and **Table 19**.

Table 18 – Muswellbrook Pollutant Measurements

	Sulfur Dioxide 1hr average	NO 1hr average	NO ₂ 1hr average	Particles PM ₁₀	Particles PM _{2.5}
	pphm	pphm	pphm	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
31/07/2021	0.1	1.8	0.8	17.2	11.2
31/08/2021	0.1	1.2	0.8	19	9.5
30/09/2021	0.1	0.9	0.9	18.8	6.4
31/10/2021	0.1	0.5	0.8	19	5.5
30/11/2021	0.3	0.5	0.8	16.5	5.1
31/12/2021				18.5	6.4
31/01/2022				19.5	6.4
28/02/2022				17.9	5.5
31/03/2022	0.4	0.5	0.6	15.2	4.5
30/04/2022	0.3	1	0.7	16.3	5.3
31/05/2022	0.3	1.4	0.8	15.8	6.7
30/06/2022	0.1	1.5	0.8	17.1	8.9

Table 19 – Muswellbrook NW Pollutant Measurements

	Particles PM ₁₀ ($\mu\text{g}/\text{m}^3$)
31/07/2021	13.7
31/08/2021	15.3
30/09/2021	16.4
31/10/2021	17.3
30/11/2021	14.6
31/12/2021	16.6
31/01/2022	17.5
28/02/2022	16.7
31/03/2022	11.2
30/04/2022	12.9
31/05/2022	11.9

	Particles PM10 ($\mu\text{g}/\text{m}^3$)
30/06/2022	13.2

All of the above readings fall within the 'good' classification by reference to the DPE air pollutant classification ratings (the highest category) at **Table 17**, reflecting that the current environment is a good quality air environment.

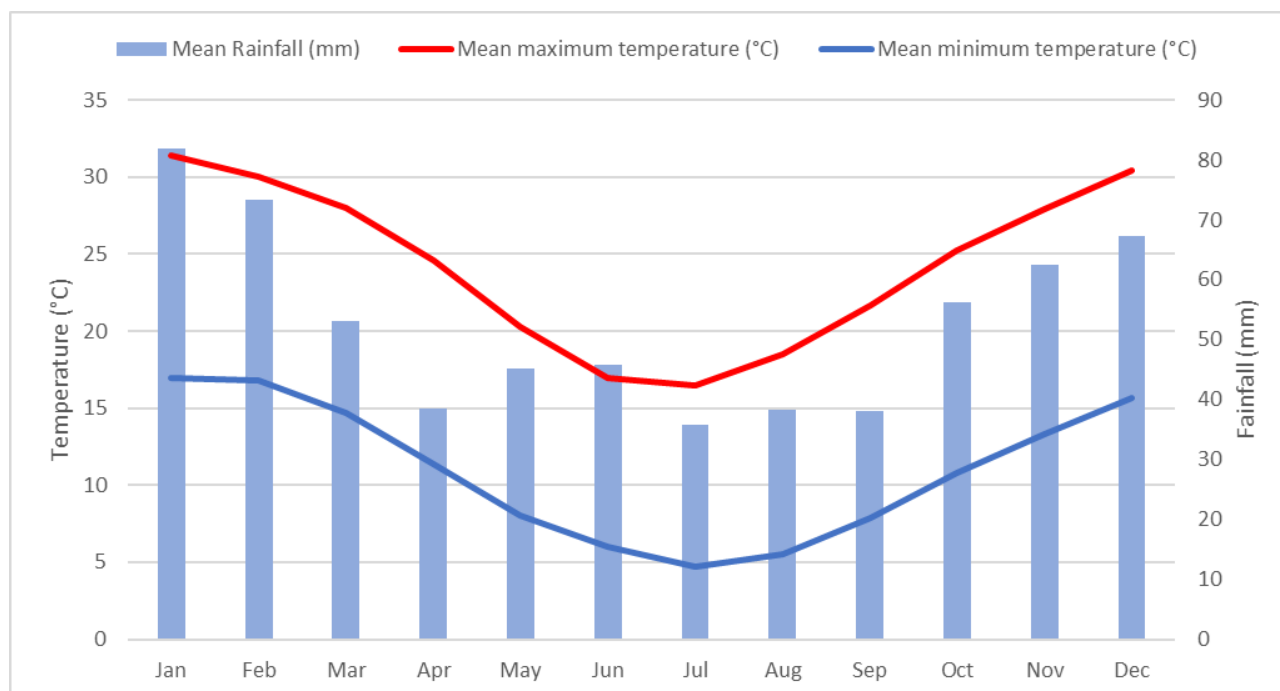
6.14.2.1 Climate

The closest Australian Bureau of Meteorology (BoM) weather station with daily weather observations is Scone Soil Conservation Service (Station 061089), located approximately 19 km north of the site, west of Scone. Other BoM weather stations are closer to the site but only provide Daily rainfall and solar exposure statistics.

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

- The mean annual maximum temperature is 24.3°C and the mean annual minimum temperature is 11.0°C (BoM, 2022).
- Mean annual rainfall is 636.0 mm and records indicate monthly mean rainfall received at the site is highest in the months of November through to February (BoM, 2022).

Figure 24 – Climate statistics for the locality



6.14.2.2 Climate change

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

6.14.3 POTENTIAL IMPACTS

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

There are no associated receivers and approximately 26 non associated receivers within 500 metres of the project boundary. The closest of these are 13 and 18 Lanhro Place, Muswellbrook at a distance of approximately 370 metres to the southwest of site.

Primary air quality impacts associated with the development relate to the construction and decommissioning phases of the BESS, and would include dust generation resulting from excavation, earthworks and vehicle movements. Air quality impacts associated with construction and decommissioning of the development are considered manageable via the application of the mitigation measures provided in **Section 6.14.4**.

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

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

6.14.4 MITIGATION MEASURES

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

6.14.4.1 Prior to construction

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

6.14.4.2 During Construction and Decommissioning

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

6.14.4.3 During Operation

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

6.15 Waste

6.15.1 INTRODUCTION

Premise has conducted a review of likely waste impacts associated with the construction and operation of the project. The legislative framework and assessment of impacts is provided in the following sections.

6.15.2 EXISTING ENVIRONMENT

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

6.15.3 ASSESSED IMPACTS

6.15.3.1 Construction

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

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

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

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

6.15.3.2 Operation

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

Noting the life of the project at 20 years, it is likely that batteries will require replacement 1-2 times during the life of the project.

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

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

6.15.3.3 Decommissioning

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

Waste expected to be generated includes:

- Electrical infrastructure including batteries, inverters, transformers and other components;
- Cabling.

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

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

electricity authority (such as the switching station or sub-station) would remain on site, subject to agreements with the landowner.

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

6.15.4 MITIGATION MEASURES

A Waste Management Plan for all phases of the project would be prepared and implemented prior to the commencement of any works on the site.

6.16 Cumulative impacts

6.16.1 INTRODUCTION

A review of the potential for cumulative impacts has been prepared by Premise.

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

6.16.2 EXISTING ENVIRONMENT

A review of the major project website for solar farms within the Muswellbrook LGA was completed. Six (6) renewable energy projects at various stages were identified and are detailed in **Table 20** and depicted in **Figure 25**.

Table 20 – SSD Renewable projects

Location:	Stage:	Distance (Direction) from Site:
Muswellbrook Solar Farm	Request SEARs	4 kilometres (south-east)
Bowmans Creek Wind Farm	Additional Information Requested	10 kilometres (west)
Maxwell Solar Farm	Determined	10 kilometres (south)
Hunter River Solar Farm	Prepare EIS	17.5 kilometres (south-west)
Bridgman Solar Farm	Prepare EIS	36 kilometres (south east)
Kyoto Wind Farm	Determined	33 kilometres (north)

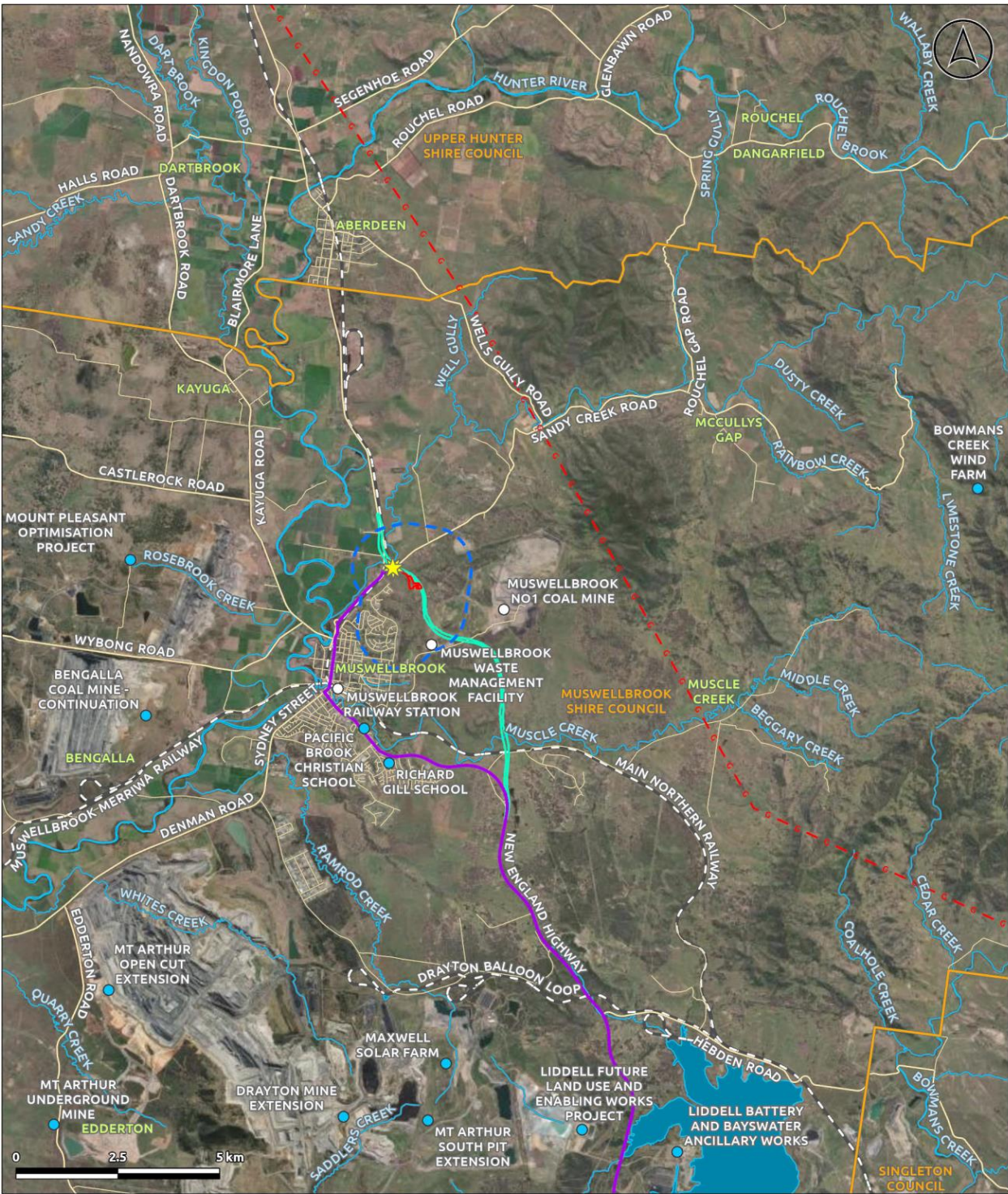
Several other state significant major projects were identified within the locality. These are detailed within **Table 21**.

Table 21 – Other Major Projects within the Locality

Project Name	Development Stage	Distance from Site (km)
Mount Pleasant Optimisation Project	Recommendation	Approximately 7.5 kilometres (west)
Bengalla Coal Mine	Determination	Approximately 10 kilometres (west)
Mr Arthur Open Cut Extension	Determination	Approximately 10.5 kilometres (south-west)
Mr Arthur Underground Mine	Determination	Approximately 13.5 kilometres (south)

Project Name	Development Stage	Distance from Site (km)
Mr Arthur South Pit Extension	Determination	Approximately 16 kilometres (south)
Mangoola Coal Continued Operations Project	Determination	Approximately 20 kilometres (south-west)
Mangoola Coal Mine	Determination	Approximately 20 kilometres (south-west)
Dowlendee Quarry	Determination	Approximately 26.5 kilometres (south-west)
Focono Quarry	Prepare EIS	Approximately 20.5 kilometres (south-east)
Drayton Mine Extension	Determination	Approximately 12.5 kilometres (south)
Drayton Coal Mine Extension	Determination	Approximately 12.5 kilometres (south)
Liddell Future Land Use and Enabling Works Project	Prepare EIS	Approximately 15 kilometres (south-east)

Figure 25 – Major projects within local context



Sources: © State of NSW, Department of Customer Service, Spatial Services 2021
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GDA2020 MGA Zone 56 File: 221312_06.aprx Prepared By: adam.davis Date: 21/07/2022

- Legend**
- Locality
 - Development Area
 - Site Access
 - LGA Boundary
 - Major Road
 - Railway
 - Water Body
 - Major Watercourse
 - Indicative Muswellbrook Bypass Option B4
 - Proposed Materials Transport Route
 - State Significant Development Within/ Surrounding Muswellbrook LGA
 - Proposed Queensland-Hunter Gas Pipeline
 - Indicative Pipeline Route

6.16.3 POTENTIAL IMPACTS

As noted, there are a range of projects being in development or in operation within the locality of the project that have the potential to act cumulatively to cause impacts.

These impacts can conceptually include impacts associated with traffic generation/movements, noise from construction and operation, air quality impacts and visual impacts.

Cumulative impacts associated with traffic, noise and visual are addressed within the respective specialist studies and discussed in **Sections 6.1.3.4, 6.3 and 6.11** of this documentation. The conclusion of those assessments is that cumulative impacts are not anticipated.

As noted in **Section 6.14.1**, the closest operating land uses to the site with the potential to result in cumulative impacts from an air quality perspective are the Muswellbrook Coal Mine and Muswellbrook quarry. Muswellbrook Quarry has been closed and rehabilitated, while Muswellbrook Coal Mine continues to operate. Air quality information associated with the MCM are provided in **Section 6.14.3**. Other projects with the potential to generate air quality impacts is the construction of the proposed Muswellbrook Bypass, and the expansion of the Muswellbrook landfill, located to the east and south of the subject site respectively. These have the potential to generate emissions during construction and operation.

Cumulative air quality impacts associated with the proposal is limited to emissions during constructions. Subject to the implementation of mitigation measures outlined in **Section 6.14.4**, the likelihood of significant cumulative impacts is considered low. It is notable that the proposal would generate limited air emissions during operation.

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

- The proposed site access does not share an access with any other nearby major projects;
- Use of Sandy Creek Road would be avoided during periods when school buses are using the road – as per **Section 6.1.4.1**;
- The construction period is a discrete, limited period, that would be managed with appropriate management plans and controls to limit the opportunity for cumulative impacts;
- Ongoing engagement with the contractor for the proposed Muswellbrook bypass will ensure that opportunities for avoidance of residual cumulative impacts can be effectively managed and addressed via the project CEMP.

Operational cumulative impacts are considered unlikely on the basis that:

- The site is well separated from other state significant renewable and major projects and thus is unlikely to lead to any cumulative visual impacts;
- The operational noise levels are low and generally contained within or very close to the site, without contributing to noise levels generated by adjacent and nearby major operations;
- Construction impacts of the BESS and these projects, whilst having the potential to coincide, can be managed through the application of appropriate management plans and mitigations to ensure that impacts are minimised;
- Operational impacts to the BESS are predominantly limited to the potential for noise and visual impacts. Detailed analysis at **Appendix M** and **Appendix F** reflects that these impacts are manageable and unlikely to result in cumulative impacts.

6.16.4 MITIGATION MEASURES

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

- Consultation with TfNSW regarding the construction of the Muswellbrook Bypass. Traffic management plans would be developed to address potential traffic impacts caused by concurrent projects generating construction traffic.
- Cumulative construction noise impacts would be addressed in a Noise Management Plan. Consultation with TfNSW, and other proponents if applicable, would be completed to determine if construction activities may take place in close proximity to adjoining projects. Where possible, noise generating activities would be scheduled for different areas of the proposal site to avoid cumulative construction noise impacts.
- If there is potential for construction of multiple projects to occur in and around Muswellbrook at the same time, and large workforce numbers are required, consideration would be given to alternative accommodation options such as neighbouring towns.

7. JUSTIFICATION OF THE PROJECT

This section provides a justification and evaluation of the project, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development.

7.1 Design of the Project

The project area has been carefully located to avoid impacts on native vegetation and habitat, where possible, by focusing the disturbance footprint in mostly cleared areas and near access tracks. The disturbance footprint has been located close to the existing Muswellbrook Substation to minimise disturbance to natural features including vegetation and watercourses.

The project area is sufficiently removed from the nearest residential receivers, located in the order of 230 metres west of the project area. The noise impacts on these receivers have been considered as part of the acoustic assessment undertaken, as discussed in **Section 6.3** of this EIS.

7.2 Consistency of the Project with the Strategic Context

The NSW Government has recognised that the NSW electricity system needs to change, acknowledging that traditional generators are ageing and the State's transmission system is congested. Further, electricity prices are putting pressure on households and businesses. This realisation has informed the preparation of Government policies and documents, the provisions of which have filtered to the local scale and informed local plan making.

The project will contribute to the provision of renewable energy in NSW and facilitate private investment in the state's electricity system over the next decade and beyond, a key consideration of the NSW Electricity Strategy. The BESS has an anticipated lifespan in the order of 15-20 years and will contribute to the NSW Government's three objectives for the electricity system: reliability, affordability and sustainability.

Refer to the detailed discussion at Section 2 of this EIS.

7.3 Compliance with Relevant Statutory Requirements

The proposed development is characterised as SSD as the proposal is for the purpose of electricity generating works with a capital investment value ('CIV') in excess of \$30 million, pursuant to Section 20 of Schedule 1 of the Planning Systems SEPP.

Pursuant to the MLEP, the project area is zoned part SP2 Infrastructure (Classified Road), part C3 Environmental Management and part R5 Large Lot Residential.

Electricity generating works are permitted with consent in the SP2 land use zone. The project is wholly located within the SP2 zoned land, with the exception of the proposed sub-transmission line from the BESS to the Muswellbrook Substation. The sub-transmission line is located on C3 zoned land. The access driveway is located on R5 land but is not proposed to be affected by the project beyond ongoing use for access during construction and operation.

Section 4.38(3) of the EP&A Act provides that development consent for SSD may be granted despite the development being partly prohibited by an environmental planning instrument.

The positioning of the proposed sub-transmission line connection between the BESS and the existing Ausgrid Muswellbrook Substation would be located on C3 zoned land. Electricity generating works are prohibited in the zone. As this is a relatively minor aspect of the project, this minor prohibition is unlikely to result in any significant impacts.

Refer to Section 4 of this EIS for a detailed discussion.

7.4 Community Views About the Project

Members of the community have expressed views ranging between negative, neutral and positive during the community engagement phase. Where concerns were raised with specific aspects such as visual impact, noise or traffic, these are addressed through the mitigation measures as recommended in appended technical reports and summarised in this EIS. Refer to **Section 5** of this EIS for a detailed discussion.

7.5 Economic, Social, Environmental and Cumulative Impacts of the Project

The project is contributing to the enhancement of the existing Ausgrid Substation infrastructure, through the provision and operation of the BESS, which will serve to balance the grid and support the performance and future uptake of renewable energy. The project seeks to invest in and contribute to the local economy through the creation of jobs and provision of affordable electricity.

The project has been sited and designed to minimise environmental impacts, where impacts cannot be avoided, mitigation measures have been proposed.

A review of public record information for large scale projects with the potential to generate cumulative impacts within 10 kilometres of the site identifies:

- There are no known existing BESS developments in proximity to the site;
- The nearest major project developments at various stages of approval, are identified as the Muswellbrook Landfill (290 metres to the east), The Richard Gill School (3.7km to the south), Mount Pleasant Extension of Life of Open Cut Operation (8.8km to the west) and the Bowmans Creek Wind Farm (10km to the west).

The proposed development is sufficiently separated from the nearest proposed large scale projects so as to not result in any cumulative impacts.

Refer to **Section 6.16** of this EIS for a detailed discussion.

7.6 Compliance Monitoring and Communication

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

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

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

The site is expected to operate for a period of approximately 15-20 years, after which it would be decommissioned, in accordance with the measures outlined in a decommissioning management plan.

7.7 Key Uncertainties

Due to the extent of technical studies undertaken to inform the project and the mitigation measures proposed to address impacts of the development, there are no uncertainties with the project. All impacts can be adequately mitigated through the location and design of the BESS and on-going management practices and monitoring.

7.8 Public interest

The public interest may be determined by consideration of relevant national, state and local government goals, as well as community priorities, which are expressed through a range of documentation. Relevant strategic documents are considered in **Section 2**.

It also requires the consideration of the principles of ecologically sustainable development, discussed in **Section 7.9**. It has been consistently held through a range of determinations in the NSW Land and Environment Court that the ESD precautionary intergenerational equity principles include considerations associated with climate change (impact of the development on climate change and impacts of climate change on development).

Mostly recently, the LEC held that the downstream impacts of mining projects, including the burning of fossil fuels for energy production, is a public interest consideration. Namely, in *Gloucester Resources Limited v Minister for Planning* [2019] NSWLEC 7, Preston J stated at 499:

Many courts have held that indirect, downstream GHG (greenhouse gas) emissions are a relevant consideration to take into account in determining applications for activities involving fossil fuel extraction or combustion or electricity generated by fossil fuel combustion.

In summing up, Preston noted that the impacts associated with climate change, among others, were sufficient to justify refusal of the project.

It follows that a project that seeks to provide for improved grid stability and support and encourage the uptake of renewable forms of energy is in the public interest as it reduces the reliance on forms of electricity generation that rely on the consumption and burning of fossil fuels and that negatively contribute to the impacts of climate change as a result. Adoption of forms of development that counter the need for these high impact uses is therefore positive in the context of the ESD principles and in the public interest.

The proposed development is considered to be in the public interest on the basis that it:

- Offers an opportunity for productive and sustainable economic activity within the area;
- Presents an excellent opportunity to the local region to provide local employment opportunities;
- Has been designed with appropriate to the consideration to social, environmental and sustainability interests of the community;
- Aims to minimise impacts to natural resources through minimising the land required to support energy supply;
- Assists to reduce reliance on traditional, fossil fuel burning forms of electricity generation, thereby assisting in curbing the long term impacts of climate change.

7.9 Ecologically sustainable development

The *National Strategy for Ecological Sustainable Development* (NSED) (Department of Environment and Heritage 1992) defines Ecologically Sustainable Development (ESD) as:

using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (refer website)

The concept of ESD gives formal recognition to environmental and social considerations in decision-making to ensure the current and future generations can enjoy an environment that functions as well as or better than the environment they inherit.

The core objectives of the NSED are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

As outlined in Clause 193 of the *Environmental Planning and Assessment Regulation 2021*, the four principles of ESC are listed below. These are discussed in the following sections.

- Precautionary principle;
- Intergenerational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation and pricing of environmental resources.

7.9.1 PRECAUTIONARY PRINCIPLE

The precautionary principle states where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a justification for not implementing mitigation measures or strategies to avoid potential impact. This has been held in various decisions in the NSW Land and Environment Court to include considerations associated with climate change (impact of the development on climate change and impacts of climate change on development).

The potential impact from the proposal has been identified in the environmental assessment section of this report and all mitigation measures summarised in **Appendix C**.

The proposal supports improvements to grid efficiency, including the uptake of renewable forms of renewable energy. This assists in reducing the long term impacts of climate change and is therefore in the public interest. The potential outcome of climate change, being higher temperatures and greater periods of sunlight, also suggests that increasing reliance of renewable forms of energy generation is sustainable. This is discussed in further detail in **Section 7.8**.

7.9.2 INTERGENERATIONAL EQUITY

The second principle of ESD is intergenerational equity, such that the present generation should ensure the health, diversity and productivity of the environment are equal to or better for future generations.

All work would be carried out in accordance with the environmental safeguards summarised in **Appendix C** to mitigate potential impact associated with noise and vibration, socio-economic considerations, traffic and transport, drainage and water quality, air quality, greenhouse gas emissions, climate change, Aboriginal and non-Aboriginal heritage, topography, soils, waste and hazardous materials.

The proposal supports the development of sustainable forms of renewable energy, and in doing so reduces reliance on traditional forms of electricity generation, including the burning of fossil fuels. This assists in reducing the impacts of climate change and therefore assists in ensuring the health of future generations is protected; the development is therefore in the public interest. This is discussed in further detail in **Section 7.8**.

7.9.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

The third principle of ESD is conservation of biological diversity and ecological integrity such that ecosystems, species and genetic diversity within species are maintained.

The proposed development has been the subject of a comprehensive assessment in accordance with the provisions of the *Biodiversity Conservation Act 2016* by reference to **Appendix E**.

The mitigating measures for protecting biodiversity at the site are provided in **Section 6.1**.

7.9.4 IMPROVED VALUATION, PRICING AND INCENTIVE MECHANISMS

The final principle of ESD is improved valuation and pricing of environmental resources which establishes the need to determine economic values for services provided by the natural environment such as the atmosphere's ability to receive gaseous emissions, cultural values and visual amenity. The principle is designed to improve methods of carrying out valuation of environmental costs and benefits and use this information when making decisions.

The development of policy to guide pricing and incentive mechanisms in delivering ecologically sustainable development is the responsibility of governments and regulatory stakeholders.

7.10 Site suitability

As outlined throughout this EIS, the site is considered to be suitable for the proposed purpose on the basis that:

- The site is not unduly constrained such that the development would result in significant impacts;
- The site is proximal to existing infrastructure (substation and transmission lines) to meet the objectives of the project;
- The site is located within a proposed renewable energy zone, and will support the delivery of the future REZ;

- Access to the site is established and would not require upgrade to facilitate the development;
- The co-location with the existing substation ensures that the project would not result in a radical transformation of the locality;
- The project has been refined (as discussed in **Section 3.2**) to ensure the design and delivery of the project would not lead to unreasonable impacts.

7.11 Conclusion

This EIS has been prepared pursuant to Part 5, Division 5.1, Subdivision 3 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation), *State Significant Development Guidelines – Preparing an Environmental Impact Statement* (DPIE 2021) and SEARs issued by DPIE on 10 December 2021 in response to the Scoping Report (refer to **Appendix A**).

An assessment of potential environmental impacts has identified a number of minor adverse impacts to the environment that would require the implementation of appropriate controls to ensure compliance in accordance with relevant legislation, standards and guidelines. Measures are proposed during both construction and operation to ensure impacts are appropriately managed. These measures would ensure compliance with relevant legislation and any conditions of approval.

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APPENDIX A

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*

Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD-29704663
Project Name	<p>Muswellbrook Battery Energy Storage System which includes:</p> <ul style="list-style-type: none"> the construction and operation of a battery energy storage system (BESS) with an estimated capacity of approximately 150 MW / 600 MWh; and associated infrastructure, including connection into the Muswellbrook substation
Location	20-24 Sandy Creek Road, Muswellbrook (Lots 11 and 12 DP 839233), approximately 2.5 km north-east of Muswellbrook
Applicant	Firm Power Pty Ltd
Date of Issue	10/12/21
General Requirements	<p>The Environmental Impact Statement (EIS) must meet the minimum form and content requirements as prescribed by Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> (EP&A Regulation) and must have regard to the <i>State Significant Development Guidelines</i>.</p> <p>In particular, the EIS must include:</p> <ul style="list-style-type: none"> stand-alone executive summary; a full description of the development, including: <ul style="list-style-type: none"> details of construction, operation and decommissioning; a high quality site plan at an adequate scale showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); a high quality detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development; 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, residential and rural development, subdivision potential, Crown lands adjacent to the site and neighbouring industrial and infrastructure developments); an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: <ul style="list-style-type: none"> a description of the existing environment likely to be affected by the development using sufficient baseline data; an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments

	<p>in the region in accordance with the <i>Cumulative Impact Assessment Guideline</i> (DPIE, July 2021);</p> <ul style="list-style-type: none"> – a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and – a description of the measures that would be implemented to monitor and report on the environmental performance of the development; • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; • a detailed evaluation of the merits of project as a whole having regard to: <ul style="list-style-type: none"> – the requirements in Section 4.15 of the <i>Environmental Planning and Assessment Act 1979</i>, and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; – the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and – feasible alternatives to the development (and its key components), including the consequences of not carrying out the development; • a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and • a signed statement from the author of the EIS, certifying that the information contained within the document is neither false nor misleading. <p>The EIS must also be accompanied by:</p> <ul style="list-style-type: none"> • a report from a suitably qualified person providing a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; • an estimate of the jobs that will be created during the construction and operational phases of the proposed infrastructure; and • certification that the information provided is accurate at the date of preparation. <p>The development application must be accompanied by the consent of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).</p>
Key issues	<p>The EIS must address the following specific matters:</p> <ul style="list-style-type: none"> • Biodiversity – including: <ul style="list-style-type: none"> – an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values; – the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM; and

	<ul style="list-style-type: none"> – if an offset is required, details of the measures proposed to address the offset obligations. • Heritage – including: <ul style="list-style-type: none"> – an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW</i> (OEH, 2011) and the Code of Practice for the <i>Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW, 2010); – provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents</i> (DECCW, 2010); and – assess the impact to historic heritage having regard to the <i>NSW Heritage Manual</i>. • Land – including: <ul style="list-style-type: none"> – 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, permissibility, strategic context and existing site constraints; and – an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: <ul style="list-style-type: none"> ○ a consideration of the project's location in a mine subsidence district, flood prone land, acid sulphate soils, Crown lands, Travelling Stock Reserve (TSR 70196 Lot 15 DP 905479), mining, quarries, mineral or petroleum rights; ○ a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and ○ 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: <ul style="list-style-type: none"> ○ consideration of the zoning provisions applying to the land, including subdivision; ○ completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide. • Visual – including an assessment of the likely visual impacts (including night lighting) of all components of the project (including transmission lines and any other ancillary infrastructure) on surrounding residences, scenic or significant vistas and road corridors in the public domain. • Noise – including an assessment of the construction noise impacts of the development in accordance with the <i>Interim Construction Noise Guideline</i> (ICNG), operational noise impacts in accordance with the <i>NSW Noise Policy for Industry</i> (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. • Transport – including: <ul style="list-style-type: none"> – an assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail;
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	<ul style="list-style-type: none"> – an assessment of the likely transport impacts to the site access route, site access point(s), particularly in relation to the capacity and condition of the roads; – a cumulative impact assessment of traffic from nearby developments; and – provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority. <ul style="list-style-type: none"> • Water – including: <ul style="list-style-type: none"> – an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts; – details of water requirements and supply arrangements for construction and operation; and – a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with <i>Managing Urban Stormwater: Soils & Construction</i> (Landcom 2004). • Hazards – including: <ul style="list-style-type: none"> – a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011); – a Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-Level Risk Assessment (DoP, 2011); and – an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) <i>Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields</i>. • Social Impact – including an assessment of the social impacts in accordance with <i>Social Impact Assessment Guideline</i> (DPIE, July 2021); • Economic – including an assessment of the economic impacts or benefits of the project for the region and the State as a whole; and • Waste – identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.
Plans and Documents	<p>The EIS must include all relevant plans, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents.</p> <p>In addition, the EIS must include high quality files of maps and figures of the subject site and proposal.</p>
Legislation, Policies & Guidelines	<p>The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified.</p>

	<p>A list of some of the legislation, policies and guidelines that may be relevant to the assessment of the project can be found at:</p> <ul style="list-style-type: none"> • https://www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance • https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and • http://www.environment.gov.au/epbc/publications#assessments
Consultation	<p>During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders.</p> <p>In particular, you must undertake detailed consultation with affected landowners surrounding the development, Muswellbrook Shire Council, and NSW Aboriginal Land Council.</p> <p>The EIS must:</p> <ul style="list-style-type: none"> • detail how engagement undertaken was consistent with the <i>Undertaking Engagement Guide: Guidance for State Significant Projects</i> (DPIE, July 2021); and • describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided.
Expiry Date	<p>If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.</p>



Our ref: DOC21/1046605-3
Your ref: SSD-29704663

Karl Okorn

Team Leader Environmental Assessments
Energy Resource Assessment
Department of Planning, Infrastructure and Environment
karl.okorn@planning.nsw.gov.au

Dear Karl

Input into Secretary's Environmental Assessment Requirements – Muswellbrook Battery Energy Storage System (SSD-29704663)

I refer to your email dated 25 November 2021 seeking input into the Secretary's Environmental Assessment Requirements (SEARs) for Beresfield Battery Energy Storage System project located at 20-24 Sandy Creek Road, Muswellbrook (Lots 11 and 12 DP839233). The proposed development is within the Muswellbrook local government area.

The Biodiversity and Conservation Division (BCD) understands that Firm Power (FP) is seeking to establish a new battery energy storage system within 4 hectares of land as described above. FP wish to establish a 100-megawatt (MW) stand-alone battery that will be used to store and provide power to the local energy grid. BCD understands that the proposal is a State Significant Development (SSD) project under the *Environmental Planning and Assessment Act 1979*.

BCD has reviewed the Scoping Report as prepared by FP (dated 19 November 2021) and provides our Standard SEARs which are presented in **Attachment A**. We have no project-specific SEARs provided for this project (**Attachment B**). Details of guidance documents are provided in **Attachment C**.

If you require any further information regarding this matter, please contact Steve Lewer, Senior Regional Biodiversity Conservation Officer on 4927 3158 or via email at rog.hcc@environment.nsw.gov.au.

Yours sincerely

STEVEN CRICK
Senior Team Leader Planning
Hunter Central Coast Branch
Biodiversity and Conservation Division

Enclosure: Attachments A, B, C

7 December 2021

Attachment A – Standard Environmental Assessment Requirements

Biodiversity

1. Biodiversity impacts related to the proposed development (SSD-29704663) are to be assessed in accordance with the [Biodiversity Assessment Method 2020](#) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s6.12), *Biodiversity Conservation Regulation 2017* (s6.8) and [Biodiversity Assessment Method 2020](#).
2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the [Biodiversity Assessment Method 2020](#).
3. The BDAR must include details of the measures proposed to address the offset obligation as follows;
 - The total number and classes of biodiversity credits required to be retired for the development/project;
 - The number and classes of like-for-like biodiversity credits proposed to be retired;
 - The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules;
 - Any proposal to fund a biodiversity conservation action;
 - Any proposal to conduct ecological rehabilitation (if a mining project);
 - Any proposal to make a payment to the Biodiversity Conservation Fund.

If seeking approval to use the variation rules, the BDAR must contain details of the [reasonable steps](#) that have been taken to obtain requisite like-for-like biodiversity credits.

The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2020 under s6.7 of the *Biodiversity Conservation Act 2016*.

Water and soils

4. The EIS must map the following features relevant to water and soils including:
 - a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).
 - b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).
 - c. Wetlands as described in s4.2 of the Biodiversity Assessment Method.
 - d. Groundwater.
 - e. Groundwater dependent ecosystems.
 - f. Proposed intake and discharge locations.

<p>5. The EIS must describe background conditions for any water resource likely to be affected by the development, including:</p> <ul style="list-style-type: none"> a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
<p>6. The EIS must assess the impacts of the development on water quality, including:</p> <ul style="list-style-type: none"> a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.
<p>7. The EIS must assess the impact of the development on hydrology, including:</p> <ul style="list-style-type: none"> a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.
<p>Flooding and coastal erosion</p>
<p>8. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:</p> <ul style="list-style-type: none"> a. Flood prone land. b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).

9. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.
10. The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios: <ul style="list-style-type: none"> a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.
11. Modelling in the EIS must consider and document: <ul style="list-style-type: none"> a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW Floodplain Development Manual 2005.
12. The EIS must assess the impacts on the proposed development on flood behaviour, including: <ul style="list-style-type: none"> a. Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure. b. Consistency with Council floodplain risk management plans. c. Compatibility with the flood hazard of the land. d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land. e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site. f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council. h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council. i. Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES. j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

13. The [EIS/EA] must describe the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016), including sea level rise and climate change:

- a. On the proposed development
- b. Arising from the proposed development.

14. The [EIS/EA] must consider have regard to any certified Coastal Management Program (or Coastal Zone Management Plan) and be consistent with the management objectives described in the Coastal Management Act 2016 and development controls for coastal management areas mapped under the State Environmental Planning Policy (Coastal Management) 2018.

Attachment B – Project specific environmental assessment requirements

Biodiversity - nil
Water and soils - nil
Flooding and coastal erosion - nil

Attachment C – Guidance material

Title	Web address
Relevant legislation	
<i>Biodiversity Conservation Act 2016</i>	https://www.legislation.nsw.gov.au/#/view/act/2016/63/full
<i>Coastal Management Act 2016</i>	https://www.legislation.nsw.gov.au/#/view/act/2016/20/full
<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
<i>Environmental Planning and Assessment Act 1979</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
<i>Fisheries Management Act 1994</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
<i>Marine Parks Act 1997</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
<i>National Parks and Wildlife Act 1974</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
<i>Protection of the Environment Operations Act 1997</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
<i>Water Management Act 2000</i>	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
<i>Wilderness Act 1987</i>	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
Biodiversity Assessment Method (OEH, 2020)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH, 2017)	http://www.environment.nsw.gov.au/resources/bcact/guidance-decision-makers-determine-serious-irreversible-impact-170204.pdf
Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE, 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
NSW Survey Guide for Threatened Frogs – A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method	https://www.environment.nsw.gov.au/research-and-publications/publications-search/species-credit-threatened-bats-nsw-survey-guide-for-biodiversity-assessment-method
Fisheries NSW policies and guidelines	http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm

Title	Web address
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)	http://www.environment.nsw.gov.au/protectedareas/developmntadjoiningdecc.htm
Acid sulphate soils	
Acid Sulfate Soils Planning Maps via Data.NSW	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.environment.nsw.gov.au/resources/soils/acid-sulfate-soils-laboratory-methods-guidelines.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding and coastal erosion	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Guidelines for Preparing Coastal Zone Management Plans	Guidelines for Preparing Coastal Zone Management Plans http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf
NSW Climate Impact Profile	http://climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

Muswellbrook Battery Energy Storage System

The Department of Planning, Industry and Environment – Crown Lands has reviewed the Draft SEARs and Scoping Report for the subject proposal.

The proposal requires the use of a Crown reserve, being Travelling Stock Reserve (TSR) 70196 (Lot 15 DP 905479). Note that the Scoping Report incorrectly describes this land as “an unnamed Crown road”.

Pursuant to clause 49 of the *Environmental Planning and Assessment Regulation 2000* the proponent requires the consent from the Department, as landowner, to lodge the development application, unless the development is designated as a public notification development.

The Departments’ landowner’s consent application form can be found on our website here: https://www.industry.nsw.gov.au/data/assets/pdf_file/0003/144345/landowners-consent-application-form.pdf

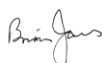
TSR 70196 is managed by the Hunter Local Land Services (LLS) and is subject to the provisions of the *Local Land Services Act 2013*. Lot 15 DP 905 is also subject to an undetermined Aboriginal Land Claim, made under the *Aboriginal Land Rights Act 1983*.

In addition to the criteria already outlined in the Draft SEARs the EIS must include:

- An accurate description of Crown land within the development area, specifying the land owner, reserve purpose, reserve manager, and any third-party interests, including other permit or licence holder(s), easements, aboriginal land claims and native title considerations and relevant legislation.
- A description of any works, including the construction and maintenance of any access tracks, transmission lines, storage of plant or equipment, etc. proposed on the TSR.
- An assessment of the impact of the proposal on the TSR, including any conflicts with the existing land use(s), and compatibility with the reserve purpose of “travelling stock” and the Local Land Services Act.
- A description of approvals or agreements required to authorised the proposed activity and use of the TSR.
- During preparation of the EIS the proponent is to consult with the Department, as an affected landowner, and the Hunter LLS as land manager.

If the proponent requires further information, or has any questions, please contact Mark Grace, NRM Project Officer in Crown Lands, on (02) 4937 9331 or at mark.grace@crownland.nsw.gov.au.

Yours sincerely



Brian Jones
Group Leader Hunter

OUT21/17353

Karl Okorn
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

karl.okorn@planning.nsw.gov.au

Dear Mr Okorn

**Muswellbrook Battery Energy Storage System (SSD-29704663)
Comment on the Secretary's Environmental Assessment Requirements (SEARs)**

I refer to your email of 25 November 2021 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

The following recommendations are provided by DPIE Water and NRAR.

The SEARS should include:

- The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface and groundwater monitoring activities and methodologies.
- Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at <https://www.industry.nsw.gov.au/water>).

Any further referrals to DPIE Water and NRAR can be sent by email to water.assessments@dpie.nsw.gov.au, or to the following coordinating officer within DPIE Water: Alistair Drew, Project Officer, E: Alistair.drew@dpie.nsw.gov.au.

Yours sincerely



Alistair Drew
Project Officer, Assessments, Knowledge Division
Department of Planning, Industry and Environment: Water
2 December 2021



Our ref: DOC21/1048620-3

Karl Okorn
Department of Planning, Industry and Environment
By email: karl.okorn@planning.nsw.gov.au

Attention: Karl Okorn

6 December 2021

Dear Mr Okorn

Muswellbrook Battery Energy Storage System – SSD 29704663

Thank you for your request for input from the NSW Environment Protection Authority (EPA) on Secretary's Environmental Assessment Requirements (SEARs), dated 25 November 2021, for the proposed Muswellbrook Battery Energy Storage System, SSD 29704663, at 20-24 Sandy Creek Road, Muswellbrook.

The proposal is for:

- The construction and operation of a battery energy storage system (BESS) with an estimated capacity of up to 150 MW and 600 MWh; and
- Associated infrastructure, including connection into the Muswellbrook substation

Based on the information provided, the proposal does not appear to require an environment protection licence under the *Protection of the Environment Operations Act 1997*. Furthermore, the EPA understands that the proposal is not being undertaken by or on behalf of a NSW Public Authority nor are the proposed activities, other activities for which the EPA is the appropriate regulatory authority.

In view of these factors, the EPA has no comments to provide on this project and no follow-up consultation is required.

Muswellbrook Shire Council should be consulted as the appropriate regulatory authority for the *Protection of the Environment Operations Act 1997* in relation to the proposal.

If you have any questions about this matter, please contact Michael Howat on (02) 4908 6819 or by email to info@epa.nsw.gov.au.

Yours sincerely

A handwritten signature in black ink, appearing to read 'K. Gallagher', with a stylized flourish at the end.

KAREN GALLAGHER
Acting Unit Head - Regulatory Operations - Metro North

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(from outside NSW)

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File Ref. No: FRN21/3578 BFS21/4822 8000018663
TRIM Doc. No: D21/132220
Contact: Senior Firefighter Lachlan Haar

9 December 2021

Karl Okorn
NSW Department of Planning, Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 5022

Dear Karl Okorn

Re: Comment on Secretary's Environmental Assessment Requirements (SEARs) for Muswellbrook Battery Energy Storage System (SSD-29704663)

Fire & Rescue NSW (FRNSW) acknowledge correspondence received on 25 November 2021, requesting input into the preparation of the SEARs for the Muswellbrook Battery Energy Storage System (BESS) (SSD-29704663).

FRNSW have reviewed the SEARS and make the following recommendations:

FRNSW will not be providing comment at this time as there is currently insufficient information available regarding the fire safety and emergency response management aspects of the project.

We request that we be given the opportunity to review and provide comment once approvals have been granted and the project has progressed such that there is more relevant detailed information available. FRNSW note that a SEPP 33 screening process will be conducted for the proposal.

As additional details become available Fire & Rescue NSW requests to be consulted with respect to the proposed fire and life safety systems and their configuration at the project's preliminary and final design phases.

While there is currently no requirement for a fire safety study, FRNSW may request one be undertaken at a later stage should information be provided such it is deemed that the development poses unique challenges to the response to and management of an incident.

For further information please contact the Operational Liaison and Special Hazards Unit, referencing FRNSW file number BFS21/4822. Please ensure that all correspondence in relation to this matter is submitted electronically to firesafety@fire.nsw.gov.au.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'John Hawes', written in a cursive style.

Superintendent John Hawes
Manager
Operational Liaison and Special Hazards Unit

Cc: karl.okorn@planning.nsw.gov.au

HERITAGE NSW – Aboriginal Cultural Heritage - SEARs

Project Name: Major Projects – New Request for Advice - Muswellbrook Battery Energy Storage System (SSD-29704663) (Muswellbrook Shire)

1. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the [Code of Practice for Archaeological Investigation in NSW](#) (DECCW 2010), and be guided by the [Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales](#) (OEH 2011).
2. Consultation with Aboriginal people must be undertaken and documented in accordance with the [Aboriginal Cultural Heritage Consultation Requirements for Proponents](#) (DECCW 2010). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.
3. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to Heritage NSW.
4. The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.
5. The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.
6. The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.

NOTE: The process described in the *Due Diligence Code of Practice for the protection of Aboriginal objects in NSW* (DECCW 2010) is not sufficient to assess the impacts on Aboriginal cultural heritage of Major Projects.



Regional
NSW

Karl Okorn
Team Leader - Environmental Assessments
NSW Department of Planning, Industry and Environment
12 Darcy Street
PARRAMATTA NSW 2150

Our ref: DOC21/1079556
Your ref: SSD-29704663

Emailed: via Major Projects Portal

6 December 2021

Dear Mr Okorn

Subject: Muswellbrook Battery Energy Storage System – SEARs requirements.

Thank you for the opportunity to provide advice on the above matter. This is a response from the NSW Department of Regional NSW – Mining, Exploration and Geoscience (MEG) – Geological Survey of NSW (GSNSW).

MEG is responsible for providing strategic advice relating to the current and potential future uses of land in NSW pursuant to the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* and the *Environmental Planning & Assessment Act 1979*. Our role is to ensure that proposals do not unnecessarily preclude access to known resources or exploration for future resource discovery and extraction. MEG will also assess the application with respect to biodiversity offset considerations.

MEG has reviewed the Scoping Report (dated 19 November 2021) and advise there are currently no mineral or energy exploration titles (or applications) covering the subject site. However, Consolidated Coal Lease (CCL) 713 held by Muswellbrook Coal Company Ltd is located adjacent to the proposal and should form part of stakeholder engagement in order to ensure the title holder is aware of the project.

MEG request the proponent check for any mineral and energy titles that may be granted (at a later stage) in the vicinity of the subject site (including areas proposed for electricity transmission infrastructure and transmission lines) during all decision-making stages of the project to ensure that other stakeholders (eg title or tenement holders) with interest in the area are aware of the BESS project. Should further mining titles or mineral tenements be granted, the proponent must consult with any identified title or tenement holders regarding the general project. Current mining and exploration titles and applications can be viewed through the Department's Minview application at:

<https://www.resourcesandgeoscience.nsw.gov.au/miners-and-explorers/geoscience-information/services/online-services/minview>

We note that *Section 6.7* of the Scoping Report advises that a Biodiversity Assessment Report (BDAR) would accompany the EIS. Accordingly, should biodiversity offsets become considered, MEG would appreciate the opportunity for early consultation in relation to the proposed location of any biodiversity offset areas, or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.

Queries regarding the above information should be directed to the MEG-GSNSW Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'M. Drummond'.

Malcolm Drummond
Senior Geoscientist - Land Use Assessment
for
Steven Palmer
Manager, Land Use Assessment
Geological Survey of NSW – Mining, Exploration & Geoscience

Enquiries**Please ask for** Theresa Folpp**Direct** 02 6549 3700**Our reference** ID 1334643

7 December 2021

Karl Okorn
Team Leader, Development Assessments
Department of Planning

Dear Karl

**Muswellbrook Battery Energy Storage System
Muswellbrook Shire Council comments on draft Secretary's Environmental
Assessment Requirements**

I refer to Scoping Report 'Muswellbrook Battery Energy Storage System (BESS)' dated 19 November 2021, prepared by Premise and request for input to draft Secretary's Environmental Assessment Requirements (SEARs) for the environmental assessment (the Assessment) for Muswellbrook BESS (the Project).

The Project generally includes:

- Installation of containerised lithium-ion batteries with a capacity of up to 150 megawatts (MW) and 600 MW-hours, with associated power conversion systems, switchgear and a control building;
- An underground or overhead 33 kV or 132 kV sub-transmission line to connect the BESS to the Muswellbrook substation;
- Cabling and collector units, storage areas, internal access tracks, on-site parking, security fencing, lighting and temporary construction laydown area; and
- Utilisation of existing site access arrangements from Sandy Creek.

It is noted that the Scoping Report and draft SEARs identify matters that will require consideration and assessment. Council supports the matters in both the documents and expands on them as follows.

Recommend that the Environmental Impact Statement (EIS) should include:

- Site plans to show dimensions of all Project components
- Figures to show:
 - Survey Area – Areas which have been subject to detailed assessment related to the Project; and
 - Disturbance Area – Areas subject to direct physical works and vegetation clearing, including buffers for work zones.
- Table showing assessed Associated, Neighbour and Non-Associated Dwellings (residence ID, distance to Project)
- The terms of any proposed voluntary planning agreement with Muswellbrook Shire Council
- Land - an assessment of the likely impacts of the development on the soils and land capability of the site and surrounds, paying particular attention to any strategic agricultural land

- Consideration of the permissibility of different elements of the project with regard to the C3 Environmental Management zone
- Transport
 - An assessment on the potential traffic impacts of the Project on road network function including intersection performance, road safety (including school bus routes and school zones)
 - Assessment to include decommissioning phase
- Visual
 - An assessment in consideration of the 'New England Highway Muswellbrook Bypass Options Report';
 - Inclusion of photomontages from key residences and public viewpoints; and
 - Consideration of vegetative screening to mitigate views toward the Project
- Economics
 - Costs and benefits of the Project; identifying whether the development as a whole would result in a net benefit to the region;
 - Identification of demand for the provision of local infrastructure and services; and
 - Identification of workforce requirements which identifies: projected construction workforce and composition by local government area for construction and whether opportunities for apprentices and trainees to be engaged over the Project life
- Greenhouse gas and lifecycle – greenhouse gas emissions for all phases of the Project
- Waste – Identification of recycling opportunities and relevant schemes for major asset components including (where relevant) for lithium ion batteries, battery container, inverter container, air conditioning units, step-up transformers, switch room, prefabricated steel structure and pier footings.
- Water – Assessment of groundwater in the contamination conceptual site model, or detailed justification as to why groundwater not included
- Rehabilitation - Details of progressive rehabilitation of the site
- Decommissioning –detailed description of the decommissioning arrangement with Ausgrid
- Cumulative – Assessment to include the Muswellbrook Coal operations, pumped hydro project at Bells Mountain, Upper Hunter Energy Park, and consideration of the alignment of the Queensland-Hunter Gas Pipeline
- Consultation - In addition to the consultation outlined in Table 4 of the Scoping Document, consultation should occur with the parties identified in Table 3 of the Scoping Report, and with the following additional regulators/community groups:
 - Biodiversity Conservation Division
 - Other major projects in the vicinity
 - Real estate agents
 - Department of Agriculture, Water and the Environment (to confirm no referral required)
- Social Impact Assessment (SIA) - In addition to matters identified in Appendix A of the Scoping Report, the SIA should include an assessment (impacts and opportunities) for economic development, labour force, access to housing and accommodation, public safety and security, rural character, health and wellbeing, community cohesion, culture and the voluntary planning agreement

Appendices

Recommend that appendices should include the following:

- SEARS and Regulatory Input to the SEARS and where addressed
- Study Team
- Stakeholder Engagement Issues and where addressed

Reports to consider when preparing the EIS

- 'New England Highway Muswellbrook Bypass Options Report'

Thank you for the opportunity to comment on the SEARs for the Project. Please contact me should you require any further detail on the matters raised in this letter.

Yours faithfully



Sharon Pope
Executive Manager Environment and Planning

9 December 2021

Department of Planning, Industry & Environment
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Karl Okorn

SSD/SEARS: 29704663

SEARS REQUEST - BATTERY ENERGY STORAGE SYSTEM, 20-24 SANDY CREEK ROAD, MUSWELLBROOK (LOTS 11 & 12 DP 839233)

I refer to the request by the Department of Planning, Industry and Environment (DPIE) dated 25 November 2021 seeking input from Transport for NSW (TfNSW) to the Secretary's Environmental Assessment Requirements (SEARs) for the abovementioned development proposal.

TfNSW key interests are the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with the *Future Transport Strategy 2056*.

The proposed 'development area', as outlined in purple within the scoping document, overlaps the Muswellbrook bypass proposed road corridor shown in Figures 3-1 and 3-7 of the Review of Environmental Factors (REF) currently on public exhibition until 17 December 2021.

Accordingly, the SEAR's should specifically reference consultation during the preparation of the EIS with TfNSW regarding the proposed Muswellbrook bypass.

TfNSW requests that a Traffic Impact Assessment (TIA) be prepared by a suitably qualified person/s in accordance with the Austroads *Guide to Traffic Management Part 12*, the complementary TfNSW Supplement and *Roads and Maritime Guide to Traffic Generating Developments*.

The TIA should be tailored to the scope of the proposed development and include, but not be limited to, the following:

- Detailed development and construction staging plans clearing illustrating that the proposed development sits wholly outside the proposed acquisition areas as shown in

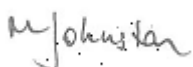
Figures 3-1 and 3-7 of the 'New England Highway bypass of Muswellbrook REF dated October 2021. It is noted that the current proposed road corridor for the Muswellbrook bypass clashes with the proposed development boundary.

- An indication of construction timing and potential road use conflicts given construction access for the Muswellbrook bypass is also proposed off Sandy Creek Road.
- The cumulative environmental impacts of construction including works associated the Muswellbrook bypass project.
- Traffic management considerations and any required safety improvements for the level railway crossings situated on Sandy Creek Road.
- A map of the surrounding road network identifying the site access, relevant traffic route/s and connections to the classified (State) road network.
- Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject properties.
- Current traffic counts for all relevant traffic routes and relevant intersections, including connections to the classified (State) road network.
- The anticipated additional vehicular traffic generated from both the construction and operational stages of the project.
- The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.
- An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for relevant intersections along the identified transport route/s, including connections to the classified (State) road network.
- Consideration of the traffic impacts on existing and proposed intersections, in particular, the intersection of the New England Highway (HW9) Sandy Creek Road. Consideration shall also include access to the site, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area.
- Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council.

- Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model, including:
 - Current traffic counts and 10 year traffic growth projections
 - With and without development scenarios
 - 95th percentile back of queue lengths
 - Delays and level of service on all legs for the relevant intersections
 - Electronic data for TfNSW review.
- Relevant swept path analysis for the largest design vehicle accessing the site.
- Any other impacts to the road network including consideration of active transport and public transport facilities.
- Identification of necessary road upgrades that are required to mitigate the impact of the development. Preliminary concept drawings for any road upgrades shall be designed in accordance with Austroads Guidelines, Australian Standards and TfNSW Supplements and be submitted with the EIS. Road upgrades shall be to the satisfaction of TfNSW and/or Council in accordance with relevant Roads Act functions.
- Details of any Traffic Management Plan (TMP) proposed to address the construction phase of the proposed development. The TMP and associated Traffic Control Plans (TCPs) should be prepared by suitably qualified persons in accordance with the *TfNSW Traffic Control at Work Sites Manual*.

On Council's determination of this matter, please forward a copy of the Notice of Determination to TfNSW for our records. Should you require further information please contact Holly Taylor, Development Services Case Officer, on 02 4908 7688 or 0499 313 670 or by emailing development.north@transport.nsw.gov.au.

Yours sincerely



Marg Johnston

Team Leader Development Services North

Hazards and Risks – The EIS must include a Preliminary Hazard Analysis (PHA) prepared in accordance with the Department’s *Hazardous Industry Planning Advisory Paper No. 6, ‘Hazard Analysis’ and Multi-Level Risk Assessment*. The PHA must:

- consider the most recent standards and codes such as and not limited to NFPA 855, AS 5139, IEC 62897, UL 9540, FM Global DS 5-33, and UL 9540A test reports when establishing separation distances;
- demonstrate that the separation distances between BESS to on-site or off-site receptors and the separation distances between BESS sub-units (containers, modules, etc.) prevent fire propagation;
- verify that the areas designated for BESS are sufficient taking into account separation distances between BESS sub-units; and
- demonstrate that the fire risks from BESS can comply with the Department’s *Hazardous Industry Advisory Paper No. 4, ‘Risk Criteria for Land Use Safety Planning’*.

Let me know if you need anything else.

Public Authority Response

Thursday, 9 December 2021 8:35:46 AM AEDT

Notes:

DPI Agriculture has no comment

Public Authority Response

Tuesday, 30 November 2021 9:39:10 AM AEDT

Notes:

Thank you for contacting the Department.

The only issue the Department would raise with the project is the potential need for any road upgrades on the access road to the site for construction traffic.

The Sears should note that under Transport: Any construction or upgrade of the creek crossing should comply with DPI Fisheries Policy and Guidelines for Waterway Crossings.

Table 23 – Response to SEARs

	Details:	Section of EIS where issue addressed:
General Requirements	In particular, the EIS must include:	
	<ul style="list-style-type: none"> a stand-alone executive summary; 	Refer to Executive Summary .
	<ul style="list-style-type: none"> a full description of the development, including: <ul style="list-style-type: none"> details of construction, operation and decommissioning; a high quality site plan at an adequate scale showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); a high quality detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development; 	Refer to Sections 2 and 3
	<ul style="list-style-type: none"> 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, residential and rural development, subdivision potential, Crown lands adjacent to the site and neighbouring industrial and infrastructure developments); 	Refer to Section 2
	<ul style="list-style-type: none"> an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: 	
	<ul style="list-style-type: none"> – a description of the existing environment likely to be affected by the development using sufficient baseline data; 	Refer to Section 2
	<ul style="list-style-type: none"> – an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region in accordance with the <i>Cumulative Impact Assessment Guideline</i> (DPIE, July 2021); 	Refer to Sections 3 & 6.14
	<ul style="list-style-type: none"> – a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and 	Appendix C.
	<ul style="list-style-type: none"> – a description of the measures that would be implemented to monitor and report on the environmental performance of the development; 	Refer to Section 7.6.

	<ul style="list-style-type: none"> a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and 	Refer to Appendix C .
	<ul style="list-style-type: none"> a detailed evaluation of the merits of project as a whole having regard to: 	
	<ul style="list-style-type: none"> the requirements in Section 4.15 of the <i>Environmental Planning and Assessment Act 1979</i>, and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; 	Refer to Section 4
	<ul style="list-style-type: none"> the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and 	Refer to Section 6.9
	<ul style="list-style-type: none"> feasible alternatives to the development (and its key components), including the consequences of not carrying out the development. 	Refer to Section 2.4
	<ul style="list-style-type: none"> a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and 	Refer to Section 2.1
	<ul style="list-style-type: none"> a signed statement from the author of the EIS, certifying that the information contained within the document is neither false nor misleading. 	Refer to Certification (Page ii)
	<p>The EIS must also be accompanied by a report from a suitably qualified person providing:</p> <ul style="list-style-type: none"> a report from a suitably qualified person providing a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; an estimate of the jobs that will be created during the construction and operational phases of the proposed infrastructure; and certification that the information provided is accurate at the date of preparation. 	Provided as a separate attachment
	The development application must be accompanied by the consent in writing of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).	This is provided.
Key Issues	The EIS must address the following specific matters:	
	<ul style="list-style-type: none"> Biodiversity – including: <ul style="list-style-type: none"> an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> 	Refer to Section 6.1 and Appendix E

	<p>(NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values;</p> <ul style="list-style-type: none"> – the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed – if an offset is required, details of the measures proposed to address the offset obligation. 	
	<ul style="list-style-type: none"> • Heritage – including: 	
	<ul style="list-style-type: none"> – an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW</i> (OEH, 2011) and the Code of Practice for the <i>Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW, 2010); 	Refer to Section 6.3 and Appendix G .
	<ul style="list-style-type: none"> – provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents</i> (DECCW, 2010); and 	Refer to Section 6.3 and Appendix G
	<ul style="list-style-type: none"> – assess the impact to historic heritage having regard to the <i>NSW Heritage Manual</i>; 	Refer to Section 6.5 .
	<ul style="list-style-type: none"> • Land – including: 	
	<ul style="list-style-type: none"> – 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, permissibility, strategic context and existing site constraints; and 	Refer to Sections 2.4 and 6.9 and Appendix K .
	<ul style="list-style-type: none"> – an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: <ul style="list-style-type: none"> o a consideration of the project's location in a mine subsidence district, flood prone land, acid sulphate soils, Crown lands, Travelling Stock Reserve (TSR 70196 Lot 15 DP 905479), mining, quarries, mineral or petroleum rights; o a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and o a cumulative impact assessment of nearby developments; 	Refer to Section 6.9 and Appendix L .

	<ul style="list-style-type: none"> – an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including: <ul style="list-style-type: none"> ○ consideration of the zoning provisions applying to the land, including subdivision; ○ completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide. 	Refer to Section 4 and Appendix K.
	<ul style="list-style-type: none"> • Visual – including an assessment of the likely visual impacts (including night lighting) of all components of the project (including transmissionlines and any other ancillary infrastructure) on surrounding residences, scenic or significant vistas and road corridors in the public domain 	Refer to Section 6.11.
	<ul style="list-style-type: none"> • Noise – including an assessment of the construction noise impacts ofthe development in accordance with the <i>Interim Construction Noise Guideline</i> (ICNG), operational noise impacts in accordance with the <i>NSW Noise Policy for Industry</i> (2017), cumulative noise impacts (considering other developments in the area), and a draft noisemanagement plan if the assessment shows construction noise is likelyto exceed applicable criteria. 	Refer to Section 6.3.
	<ul style="list-style-type: none"> • Transport – including: <ul style="list-style-type: none"> – an assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport or materials by rail; – an assessment of the likely transport impacts to the site access route, site access point(s), particularly in relation to the capacity and condition of the roads; – a cumulative impact assessment of traffic from nearby developments; and – provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority. 	Refer to Section 6.1.
	<ul style="list-style-type: none"> • Water – including: <ul style="list-style-type: none"> – an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts; – details of water requirements and supply arrangements for construction and operation; and – a description of the erosion and sediment control measures that would be implemented to mitigate any 	Refer to Section 6.8.

	impacts in accordance with <i>Managing Urban Stormwater: Soils & Construction</i> (Landcom 2004).	
	<ul style="list-style-type: none"> • Hazards – including: <ul style="list-style-type: none"> – a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011); – a Preliminary Hazard Analysis prepared in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Guideline for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011) – an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) <i>Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields</i>. • Social impact – including an assessment of the social impacts in accordance with <i>Social Impact Assessment Guideline</i> (DPIE, July 2021); • Economic - including an assessment of the economic impacts or benefits of the project for the region and the State as a whole; and • Waste – identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. 	<p>Refer to Section 6.6</p> <p>Refer to Appendix H</p> <p>Refer to Sections 6.6, 6.7, Appendix I and Appendix H</p> <p>Refer to Sections 6.12 and Appendix N.</p>
		Refer to Section 6.15.
Plans and Documents	<p>The EIS must include all relevant plans, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents.</p> <p>In addition, the EIS must include high quality files of maps and figures of the subject site and proposal.</p>	Figures throughout
Legislation, Policies & Guidelines	<p>The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. A list of some of the legislation, policies and guidelines that may be relevant to the assessment of the project can be found at:</p> <ul style="list-style-type: none"> • https://www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance • https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and 	

	<ul style="list-style-type: none"> • http://www.environment.gov.au/epbc/publications#assessments 	
Consultation	<p>During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders.</p> <p>In particular, you must undertake detailed consultation with affected landowners surrounding the development, Muswellbrook Shire Council, and NSW Aboriginal Land Council.</p> <p>The EIS must:</p> <ul style="list-style-type: none"> • detail how engagement undertaken was consistent with the Undertaking Engagement Guide: Guidance for State Significant Projects (DPIE, July 2021); and • describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided. 	Refer to Section 5 .
Expiry Date	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.	Noted



APPENDIX B

STATUTORY COMPLIANCE TABLES

Table 24 – Commonwealth Legislation

Statutory Reference	Pre-condition	Relevance	Section in EIS
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Direct or indirect impacts to a Matter of National Environmental Significance (MNES)	The project is unlikely to have a significant impact on a biodiversity MNES and therefore is unlikely to be deemed a controlled action based on impacts to biodiversity.	Section 6.2
<i>Native Title Act 1993</i>	Objective of the Act is to recognise and protect Native Title.	<p>Lot 15 is subject to an undetermined Aboriginal Land Claim made pursuant to this Act.</p> <p>Wanaruah Aboriginal Land Council have an undetermined claim on TSR 70196 (Lot 15 DP 905479) and have not formally responded to consultation, and are unlikely to rescind their rights over the land.</p> <p>Crown Lands have acknowledged the ongoing consultation that is occurring on this issue and have raised no objections to the lodgement of the EIS with DPE.</p>	Section 5.2

Table 25 – NSW Legislation

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
<i>Aboriginal Land Rights Act 1983</i>	Section 36	The NSW Aboriginal Land Council may make a claim for land on its own behalf or on behalf of one or more Local Aboriginal Land Council.	Lot 15 is subject to an undetermined Aboriginal Land Claim made pursuant to this Act.	N/A
<i>Biodiversity Conservation Act 2016</i>	Section 7.9	Any SSD or SSI application is required to be accompanied by a BDAR unless the Planning and	The proposed development is SSD and has not been assessed by the Planning and Environment Agency Heads. A BDAR is required.	Section 6.2

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
		Environment Agency Heads determine that the proposed development is not likely to have any significant impact on biodiversity values.		
<i>Contaminated Land Management Act 1997</i>	Section 11	The EPA may declare any land it believes to significantly contaminated as significantly contaminated land.	The site is not identified as significantly contaminated land.	Section 6.6.2
<i>Electricity Infrastructure Investment Act 2020</i>	Section 19	The Minister may declare a renewable energy zone (REZ) by reference to a specified geographical area of the State and a specified generation, storage or network infrastructure (including planned or existing infrastructure).	Whilst the Hunter REZ hasn't been defined by a specified geographical area as yet, it is anticipated that the site will be located within the REZ given the Muswellbrook LGA forms part of the Hunter Region.	Section 2.1
<i>Environmental Planning and Assessment Act 1979</i>	Section 1.3	Objects of the Act	The proposed development is consistent with each of the Objects of the Act, with the exception of Object (d) which relates to the delivery and maintenance of affordable housing which is not relevant to this proposal.	N/A
	Section 4.15(1)	Consideration of the relevant provisions of any environmental planning instruments	<ul style="list-style-type: none"> • <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i>; • <i>State Environmental Planning Policy (Transport and Infrastructure) 2021</i>; • <i>State Environmental Planning Policy (Planning Systems) 2021</i>; • <i>State Environmental Planning Policy (Biodiversity and Conservation) 2021</i>; and 	Section 4

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
			<ul style="list-style-type: none"> <i>Muswellbrook Local Environmental Plan 2009.</i> 	
		Consideration of the relevant provisions of any proposed environmental planning instruments	No draft environmental planning instruments apply.	N/A
		Consideration of the relevant provisions of any development control plans	Development control plans do not apply to SSD by way of clause 2.10 of the Planning Systems SEPP.	Section 4
		Consideration of the relevant provisions of any planning agreements or draft planning agreements	No planning agreements or draft planning agreements apply.	N/A
		Consideration of the relevant provisions of the regulations	Refer next section of this table	This table
		Consideration of the likely impacts of the development		Section 6
		Consideration of the suitability of the site for the development		Section 7.10
		Consideration of any submissions made in accordance with this Act or the regulations	The proponent will be required to prepare a Submissions Report in accordance with Appendix C to the SSD Guidelines following the completion of the mandatory public exhibition period.	N/A
		Consideration of the public interest		Section 7.8
<i>Environmental Planning and Assessment Regulation 2021</i>	Section 23	Requires the consent of all landowners to be obtained for the making of a Development Application.	Lots 11 and 12 are owned by Ausgrid and Lot 15 is owned by the Crown.	Attached to the EIS submission

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
	Clause 192	(1) An environmental impact statement must contain the following—		
		(a) a summary of the environmental impact statement,		Executive Summary
		(b) a statement of the objectives of the development, activity or infrastructure,		Section 1.2
		(c) an analysis of feasible alternatives to the carrying out of the development, activity or infrastructure, considering its objectives, including the consequences of not carrying out the development, activity or infrastructure,		Section 2.4
		(d) an analysis of the development, activity or infrastructure, including—		
		(i) a full description of the development, activity or infrastructure, and		Section 3
		(ii) a general description of the environment likely to be affected by the development, activity or infrastructure and a detailed description of the aspects of the		Section 2.2

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
		environment that are likely to be significantly affected, and		
		(iii) the likely impact on the environment of the development, activity or infrastructure, and		Section 6
		(iv) a full description of the measures to mitigate adverse effects of the development, activity or infrastructure on the environment, and		Throughout Section 6 and summarised in Appendix C
		(v) a list of the approvals that must be obtained under another Act or law before the development, activity or infrastructure may lawfully be carried out,		This table
		(e) a compilation, in a single section of the environmental impact statement, of the measures referred to in paragraph (d)(iv),		Appendix C
		(f) the reasons justifying the carrying out of the development, activity or infrastructure, considering biophysical, economic and social factors, including the principles of ecologically sustainable development set out in section 193.		Section 7

Statutory Reference	Section/Clause	Pre-condition	Relevance	Section in EIS
<i>Heritage Act 1977</i>	Section 58	Approval in respect of the doing or carrying out of an act, matter or thing referred to in s 57(1)	No interim heritage order/s or listing/s apply to the site under the State Heritage Register. The proponent will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) following receipt of development consent in consultation with the Registered Aboriginal Parties (RAPs) and the Department of Planning and Environment (DPE) (with input from Heritage NSW)	Section 6.5
<i>Local Land Services Act 2013</i>			TSR 70196 is managed by the Hunter Local Land Services and is subject to the provisions of this Act.	
<i>National Parks and Wildlife Act 1974</i>	Section 90	Grant of Aboriginal heritage impact permit	The results of the surface survey and previous test excavation completed at the site indicate that significant Aboriginal cultural heritage values will not be harmed within the study area.	Section 6.4
<i>Protection of the Environment Operations Act 1997</i>	Sections 43(a), 43(b), 43(d), 47, 55 and 122	Various environmental protection licences	The NSW EPA were consultant as part of the SEARs process and advised that the project does not require an environment protection licence under this Act.	Section 5
<i>Roads Act 1993</i>	Section 138	Various activities within road reserves	The project will utilise the existing connection to Sandy Creek Road and no further approval is required under the Roads Act.	N/A
Water Management Act 2000	Sections 89, 90 and 91	Water use approval, water management work approval or activity approval under Part 3 of Chapter 3	Whilst works are proposed within 40 metres of a mapped waterway, a Controlled Activity Approval is not required pursuant to Section 91 of the <i>Water Management Act 2000</i> (WM Act) by reference to Section 4.41 of the EP&A Act (approvals that do not apply).	



APPENDIX C

MITIGATION MEASURES TABLE

Table 26 – Mitigation Measures

Impacts:	Phase:	Mitigation Measures:
Transport, Traffic and Access	Construction	<p>A Construction Traffic Management Plan (CTMP) will be prepared prior to construction of the site. The CTMP will provide additional information regarding the traffic volumes and distribution of construction vehicles that is not available at this time, including:</p> <ul style="list-style-type: none"> • Road transport volumes, distribution and vehicle types broken down into: <ul style="list-style-type: none"> – Hours and days of construction. – Schedule for phasing/staging of the project. • The origin, destination and routes for: <ul style="list-style-type: none"> – Employee and contractor light traffic. – Heavy vehicle traffic. – Oversize and overmass traffic. <p>The following measures will form part of the CTMP to minimise the impact of construction traffic:</p> <ul style="list-style-type: none"> • Neighbours of the BESS be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access. • Deliveries by larger trucks avoid times when school buses are expected on Sandy Creek Road (7:30am to 8:30am and from 4:00pm to 5:00pm). • Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time. • All vehicles will enter and exit the site in a forward direction. • Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. The following code is to be implemented as a measure to maintain safety within the site: <ul style="list-style-type: none"> – Utilisation of only the designated transport routes. – Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities. • Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas. • All permits for working within the road reserve must be received from the relevant authority prior to works commencing. • A map of the primary haulage routes highlighting critical locations. • An induction process for vehicle operators and regular toolbox meetings. • A complaint resolution and disciplinary procedure.

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather). <p>The following additional measures will form part of the CTMP to minimise the impact of construction traffic along the unsealed roads:</p> <ul style="list-style-type: none"> Prior to construction, a pre-condition survey of the driveway and section of Sandy Creek Road between the driveway and New England Highway be undertaken, in consultation with Council. During construction the sections of the road network utilised by the proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the BESS would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in the consistent condition as at the start of construction. Vehicles are recommended to drive at slower speeds when travelling on unsealed roads. This can reduce the amount of dust created and the amount of dirt tracked onto the public road network. Standard mitigation measures such as a water trucks to dampen the roads and reduce the amount of dust in the air, can also be considered to reduce dust levels. <p>The CTMP will be prepared following further consultation with TfNSW to confirm the proposed construction traffic with the Delivery Project Manager for the Muswellbrook Bypass Project. Any vehicle movements larger than an AV will require consultation with ARTC in relation to the use of the railway level crossing.</p>
Transport, Traffic and Access	Decommissioning	<p>A comprehensive Construction Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained during decommissioning.</p>
Biodiversity	Throughout	<p>Biodiversity offsets are required for direct impacts on the 0.21 ha of Grey Box – Slaty Box shrub-grass woodland on sandstone slopes of the upper Hunter and Sydney Basin and 0.21ha of habitat. These offsets are to be provided through implementation of the Biodiversity Offset Scheme ("BOS").</p> <p>Firm Power propose to purchase credits from the market, or pay into the Biodiversity Conservation Fund (BCF) to fulfill their offset obligations for the project.</p> <p>No offsets are required for the 0.094 ha of Narrow-leaved Ironbark-Bull-Oak-Grey Box shrub-grass open forest of the central and lower Hunter to be removed.</p>

Impacts:	Phase:	Mitigation Measures:
Noise and Vibration	Pre-Construction	<ul style="list-style-type: none"> The Applicant will consult with TfNSW to manage any potential impacts and implement additional noise mitigation measures in accordance with the ICNG if required. Determine the final location of 3 m noise barriers during detailed design to ensure that operational noise criteria are met.
Noise and Vibration	Construction	<ul style="list-style-type: none"> Limiting the type and scale of concurrent activities undertaken close to sensitive receptors where possible. Using broad band reversing alarms on all mobile plant and equipment. Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine. Operating plant in a quiet and efficient manner. Reduce throttle setting and turn off equipment when not being used. Regularly inspect and maintain equipment to ensure it is in good working order including checking the condition of mufflers. It is recommended that during any work generating high noise levels that have impulsive, intermittent, low frequency or tonal characteristics, consultation with sensitive receptors occurs regularly. Heavy vehicles (trucks) are limited to 2 heavy trucks per hour during the night. Installation of noise barriers in accordance with detailed designs undertaken at the pre-construction stage to ensure that operational noise criteria are met.
Aboriginal Cultural Heritage	Throughout	<ol style="list-style-type: none"> Following development consent for the proposal, the proponent will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with the Registered Aboriginal Parties (RAPs) and the Department of Planning and Environment (DPE) (with input from Heritage NSW). The ACHMP would also include an unanticipated finds protocol, unanticipated skeletal remains protocol and heritage inductions and long-term management of the Aboriginal site being impacted. The portion of Aboriginal site Muswellbrook AFT 2 (37-2-5953) located within the impact footprint of the proposal should be salvaged following approval of the ACHMP. <ol style="list-style-type: none"> The recommended methodology for the surface collection will be finalised after the approvals process has been completed in the ACHMP but will include the measures outlined in Section 9.2.1 (Surface collection) of the OzArk (2022) report.

Impacts:	Phase:	Mitigation Measures:
		<p>b. The salvage works will include the mapping, analysis, and collection of the surface artefact at the affected site. Results will be included in a brief report to preserve the data in a useable form and an Aboriginal Site Impact Recording Form (ASIRF) will be submitted to the Aboriginal Heritage Information Management System.</p> <p>3. All land-disturbing activities must be confined to within the study area. Should the parameters of the proposed work extend beyond this, then further archaeological assessment will be required.</p>
Historic Heritage	Throughout	<p>1. Following development consent of the proposal, the proposed work may proceed with caution. If items of historic heritage significance and/or skeletal material are uncovered during the proposal, then the protocols in provided in Appendix 4 and/or Appendix 5 of the Ozark (2022) report should be enacted.</p> <p>2. All land and ground disturbance activities must be confined to within the study area. Should the parameters of the proposal extend beyond the assessed areas, then further assessment may be required.</p> <p>3. All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all historic items.</p>
Hazards and Risks	Throughout	<ul style="list-style-type: none"> The transformers spill containment shall be designed according to the requirements of AS 2067:2016 – “Substations and high voltage installations exceeding 1kV a.c”. A Final Hazard Analysis (FHA) shall be prepared based upon the finalised layout of the site to demonstrate that the risk criteria remains below the acceptable levels.
Bushfire	Throughout	<ul style="list-style-type: none"> Implementation of a 10 metre wide Asset Protection Zone (APZ) around the BESS and associated buildings, to ensure that radiant heat levels at the building surface remain below 29kW/m². The APZ is to feature a fuel free area (ie, sand, gravel, concrete etc) or grass (kept short or mown/maintained to a height of less than 10cm). The APZ is to be maintained to prescribed Inner Protection Zone standards. Building construction requirements as follows: <ul style="list-style-type: none"> APZ (10m IPA) and water supply tank for bushfire fighting purposes to be constructed as the first stage of development. Construction of the BESS and associated infrastructure to the general fire safety provisions of the National Construction Code (NCC).

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> – Permits for hot works (e.g., grinders, welders, slashers) and no hot works on Total Fire Ban Days. – Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding bush. In this regard it is recommended that substations and other new building be constructed to comply with Australian Standard AS 3959- 2018 Construction of buildings in bushfire-prone areas, commensurate with the modelled bushfire attack levels. • Provision of a dedicated onsite supply firefighting water of 20kL in a steel or concrete tank. The tank should be provided in a strategic location to provide appropriate access. The tank should incorporate fast fill options and easily accessible fill points such as 65mm Storz fittings for hydrant stands or direct link to tanks. Hardstand access capable of supporting weight and turning capacity for a fully loaded fire truck (23 tonne) should be provide at the tank location. • Electricity connections to the sub-station should preferably be underground. If this is not possible, overhead lines are to be installed to PBFP requirements. • If required, reticulated or bottled gas shall be installed and maintained in accordance with AS/NZS 1596:2014 ad the requirements of relevant authorities. • Where required, the existing access should be upgraded in accordance with PBFP requirements. • A Fire Management Plan (FMP) should be prepared prior to energisation in consultation with F&RNSW as per Section 4.8 of Appendix I.
Surface Water	Throughout	<p>The potential for erosion will be mitigated by the following factors:</p> <ul style="list-style-type: none"> • Construction will proceed in two major stages, and within each stage the construction activities will be sequenced, such that the disturbance area at any one time will be a small proportion of the overall site area. • Construction areas will be progressively revegetated as installation of batteries proceeds across the site. • Gentle grades across the site reduce the potential for erosion or sediment transport. <p>With the implementation of standard erosion and sediment control measures in accordance with Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition</p>

Impacts:	Phase:	Mitigation Measures:
		<p>(Landcom 2004) the potential environmental impact is considered very low and manageable.</p> <p>A site wide Erosion and Sediment Control Plan (ESCP) will be prepared as part of the Construction Environmental Management Plan (CEMP) for the project. The ESCP will be prepared in accordance with Landcom (2004), known as 'the Blue Book', and Volume 2A Installation of Services (DECC 2008a).</p> <p>Mitigation measures and site management practices will include:</p> <ul style="list-style-type: none"> • Staging of construction works and progressive revegetation to limit the disturbed area. • Establishment of 'no go areas' to prevent unnecessary disturbance of site soils by construction vehicles in site areas outside of the construction footprint. • Progressive revegetation of disturbed areas. • Stabilisation of table drains alongside access tracks using vegetation, and rock check dams. • Installation of sediment fences around the perimeter of disturbance areas. • Installation of a sediment traps with level spreaders at locations where site overland flow paths discharge to the adjacent existing landform. • Install a shaker pad at the site exit to reduce mud or clay on vehicle wheels being tracked onto external roads. • Appropriate site storage of hydrocarbons within bunded areas, and documented spill response procedures. • Inspection of ESC measures following heavy rainfall. • Water quality monitoring and reporting requirements. • Providing an appropriate level of resourcing for environmental management and monitoring.
Water Quality	Throughout	<ul style="list-style-type: none"> • Flooding: <ul style="list-style-type: none"> – Staff/sub-contractor awareness; – Installation of flood warning signs and depth markers along access road crossing of Sandy Creek; and – Flood management plan. • Localised overland flows: <ul style="list-style-type: none"> – All BESS enclosures will be elevated above surrounding the ground. Elevation will be increased where there are localised overland paths running across the site areas with BESS enclosures. • Erosion and sediment controls: <ul style="list-style-type: none"> – Limiting the area and time of disturbed areas.

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> – Gentle grades, and a combination of progressive re-vegetation and surface cover across the site once disturbed. – Sediment sumps (including appropriate drainage). – Clean water diversions and sediment fencing. – Erosion Sediment Control Plan (ESCP). • Spillage of hydrocarbons, chemicals and fuel: <ul style="list-style-type: none"> – Regular inspection of batteries which will identify any issues with leakage, spill response plan. – Storage of chemicals in accordance with Australian Standards. – Storage of hydrocarbon fuels within bunded storage areas. – Bunding of substations, transformers or other infrastructure that utilise oil. – Minimise usage of herbicides and avoid spraying when rain is predicted. – A Spill Response Plan, including emergency response and EPA notification procedures. • Monitoring, licensing and reporting during construction and operation: <ul style="list-style-type: none"> – Accident documentation. – Water quality compliance with SEARs. – Construction Environmental Management Plan (CEMP). – Operational Environmental Management Plan (OEMP). – Regular inspection of batteries which will identify and issues with leakages. – A Spill Response Plan, including emergency response and EPA notification procedures. • Traffic, dust generation: <ul style="list-style-type: none"> – Speed limit of 40km/hr on site. – Application of binders to road surfaces as required. • Closure, decommissioning: <ul style="list-style-type: none"> – Erosion Sediment Control Plan (ESCP). – Temporary ground cover and revegetation after removal of BESS. • Terrestrial Groundwater Dependent Ecosystems: <ul style="list-style-type: none"> – Further investigation on the low potential terrestrial GDEs is recommended • Wastewater disposal: <ul style="list-style-type: none"> – Wastewater during construction will be captured and removed from site for off-site treatment.

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> – Toilet facilities will involve waterless toilets that are emptied off-site. • Water quality: <ul style="list-style-type: none"> – Water quality compliance with SEARs. – CEMP including an ESCP for construction activities. – OEMP to identify requirements for water quality monitoring and reporting. – Progressive rehabilitation of surfaces as installation and removal of batteries proceeds across the site.
Other Land Resources and Land Uses		<ul style="list-style-type: none"> • Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS. • Prepare and effectively implement construction, operation and decommissioning management plans that incorporate all mitigation measures in this EIS. • Consultation with TfNSW during construction of the project if construction of the BESS and Muswellbrook Bypass overlap • Visual screening to minimise potential visual impacts on residences and future residential development west of the site • Construction of noise bund to ensure compliance with the relevant noise criteria under the NPfI during operations and implementation of all reasonable and feasible noise management measures during construction of the project in accordance with the ICNG.
Soils	Throughout	<ul style="list-style-type: none"> • Application of gypsum (10 tonnes/ha) during construction. • Implementation of appropriate erosion and sediment control measures during construction. • Prior to construction: <ul style="list-style-type: none"> – Ensure the detailed design incorporates all necessary measures from a Construction Erosion and Sediment Control Plan (ESCP) and Soil and Water Management Plan (SWMP). – Utilise existing tracks and driveways where possible, and where new tracks are required, be established within minimal disturbance. • During construction: <ul style="list-style-type: none"> – Implement all measures from ESCP and SWMP. – Minimise all ground disturbance where possible. – Minimise construction activities during wet weather conditions.

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> – Retain, stockpile, treat for weeds and ameliorate all disturbed or excavated soil, with all topsoil and subsoils stockpiled separately and returned in order. – Return stockpiled soil and cleared vegetation or organic matter to its original location (where possible) as soon as reasonably practicable. – Undertake rehabilitation and revegetation in accordance with an appropriate landscape, revegetation or rehabilitation plan prepared by a suitably qualified professional. – Ensure rehabilitation is undertaken progressively to minimise the total disturbance area at any one time. • During operation: <ul style="list-style-type: none"> – Implement and maintain all operational requirements of the SWMP. • During decommissioning: <ul style="list-style-type: none"> – Prepare an appropriate decommissioning management plan that incorporates appropriate soil management to return the site to existing or improved land and soil capability. – Specific soil management practices should be determined at the time of decommissioning.
Visual	Throughout	<p>Potential impacts have been avoided/minimised by:</p> <ul style="list-style-type: none"> • The co-location of the project adjacent to the existing Ausgrid substation has minimised visual impact relative to a greenfield development. • The proposal includes screening vegetation on the western boundary of the southern area of the development area, to respond to the potential for this area to be visible from areas to the southwest of the development area, including the future R5 Large lot residential area and Sandy Creek Road. The proposal has also been located as far as possible away from the existing and proposed residences within Northview Estate. <p>Additional proposed mitigation measures include:</p> <ul style="list-style-type: none"> • During construction: <ul style="list-style-type: none"> – Opportunities for the retention and protection of existing trees within the disturbance area would be identified during detailed construction planning. Identified trees of high conservation significance would be retained and protected where practicable. – Temporary and permanent access would be designed to minimise vegetation removal, changes to landform, and visual impacts where practicable.

Impacts:	Phase:	Mitigation Measures:
		<ul style="list-style-type: none"> – Lighting at the construction compound would be designed and operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting. • During operation: <ul style="list-style-type: none"> – Lighting at the BESS would be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting. – The battery containers to be neutral colour, such as grey, to reduce their prominence where visible. – The noise barriers would be painted a dark neutral shade (such as Colourbond Woodland grey) to reduce their prominence in the landscape.
Waste	Pre-Construction	A Waste Management Plan for all phases of the project would be prepared and implemented prior to the commencement of any demolition works on the site.
Air and Microclimate	Pre-Construction	Development of a dust management plan as a sub-plan to the site specific CEMP, including (but not limited to) measures as set out in the following sections.
Air and Microclimate	Construction and Decommissioning	<ul style="list-style-type: none"> • A water cart (truck) would be utilised routinely, wetting all access roads/tracks and exposed dusty surfaces as appropriate to the conditions of the site. • Stockpiled topsoil and other materials that exhibit significant dust lift off would be wet down routinely and as appropriate. • Stabilising techniques and/or environmentally acceptable dust palliatives will be utilised if the wetting down of surfaces prove to be ineffective.
Air and Microclimate	Operation	<ul style="list-style-type: none"> • Any area that was temporarily used during construction would be restored back to original condition or re-vegetated with native plants. • Areas that may not have been hard packed but have been disturbed in some form would be vegetated with seeds native to the area.
Social	Throughout	<ul style="list-style-type: none"> • Development and implementation of a local procurement policy; • Develop and implement a meaningful complaints handling system; • Develop clear and transparent communication channels; • Develop noise management measures in consultation with potentially impacted sensitive receivers; • Establish inter-project communication channels with the Muswellbrook Bypass delivery team in order to manage cumulative impacts as needed; and • Adopt all recommendations in other technical reports.



APPENDIX D

TRAFFIC IMPACT ASSESSMENT



APPENDIX E

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT



APPENDIX F

NOISE IMPACT ASSESSMENT



APPENDIX G

ABORIGINAL CULTURAL AND HISTORIC HERITAGE ASSESSMENT REPORT



APPENDIX H

PRELIMINARY HAZARD ANALYSIS



APPENDIX I

BUSHFIRE ASSESSMENT



APPENDIX J

WATER ASSESSMENT



APPENDIX K

LAND USE CONFLICT RISK ASSESSMENT



APPENDIX L

LAND AND SOIL CAPABILITY ASSESSMENT



APPENDIX M

VISUAL IMPACT ASSESSMENT



APPENDIX N

SOCIAL AND ECONOMIC IMPACT ASSESSMENT



APPENDIX O

TITLE SEARCHES



APPENDIX P

HIGH RESOLUTION FIGURES



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