Environmental Impact Statement

23-Feb-2022
Great Western Battery

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Environmental Impact Statement

Client: Neoen Australia Pty Ltd

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Prepared by

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Declaration

This EIS has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*

Environmental assessment prepared by

Role	EIS Verifier	Project Manager	EIS Lead Author	EIS Author	EIS Author
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Position	Technical Director - Environment	Senior Environmental Planner	Environmental Scientist	Environmental Planner	Environmental Scientist
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Applicant and land details

Applicant	Neoen Australia Pty Ltd
Applicant address	Level 10 / 227 Elizabeth Street, Sydney NSW 2000
Proposal	Neoen Australia Pty Ltd (Neoen) is seeking development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 500 megawatts (MW) and approximately 1000 megawatt-hour (MWh) at 173 Brays Lane, Wallerawang, NSW 2845 (the Site), as well as a new transmission line that would connect the BESS to the existing Transgrid 330 kilovolt (kV) substation at Wallerawang (the Project). The Project would also provide storage and firming capacity to the National Energy Market as well as additional services to assist grid stability including frequency control ancillary services.
Land to be developed	The proposed location of the BESS is on located at 173 Brays Lane, Wallerawang NSW 2854, on Lot 4 DP 751651. The Project would involve the installation of a new transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation. The new transmission line would traverse: • Lot 8 and Lot 9 DP 252472 • Lot 2 DP 108089 • Lot 1 DP 108089 • Lot 10 DP 1168824 • Lot 1115 DP 1204803 • Lot 91 DP 1043967.

Environmental Impact Statement

An Environmental Impact Statement (EIS) is attached. The EIS assesses the environmental impacts of this Project and includes the matters referred to in Secretary's Environmental Assessment Requirements provided to the Applicant on 04 February 2020 under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.

Declaration

I certify that the contents of the EIS, to the best of my knowledge, has been prepared as follows:

- In accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000;*
- In accordance with the requirements of the *Environmental Planning and Assessment Regulations 2000;* and *State Environmental Planning Policy (State and Regional Development) 2011;*
- The statement contains all available information that is relevant to the environmental assessment of the Project; and
- The information contained in this report is neither false nor misleading.

Signature: Date: 23 Feb 2022

Name: William Miles CEnvP IA

Table of Contents

List of tables

List of figures

List of appendices

Glossary and abbreviations

Acronym	Definition
AADT	Annual average daily traffic
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHMP	Aboriginal Cultural Heritage Management Plan
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AIP	Aquifer Interference Policy
ALARP	As low as reasonably practicable
ANSI	American National standards Institute
APZ	Asset Protection Zone
ARPANSA	As low as reasonably practicable
AVTG	Assessing Vibration: A Technical Guideline
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BAM-C	BAM-Calculator
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BESS	Battery energy storage system
BGS	Below ground surface
BMP	Biodiversity Management Plan
BMS	Battery Management System
BOM	Bureau of Meteorology
BPL	Bushfire prone land
BS	British Vibration Standard
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CEMP	Construction Environmental Management Plan
CEP	Community Engagement Plan
CHL	Commonwealth Heritage List
CIV	Capital investment value
CLM Act	*Contaminated Land Management Act 1997*
CNVMP	Construction Noise and Vibration Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTMP	Construction Traffic Management Plan

Acronym	Definition
DA	Development application
DAWE	Commonwealth Department of Agriculture, Water and Environment
dB	Decibel
dB(A)	A-weighted decibels
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water NSW
DEM	Digital Elevation Model
DP	Deposited Plan
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EES	Environment, Energy and Science
EIS	Environmental Impact Statement
EMF	Electromagnetic field
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
NSW EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment protection licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable development
FDR	Fire Danger Rating
FSS	Fire Safety Study
GDE	Groundwater Dependent Ecosystems
HDD	Horizontal Directional Drilling
HIPAP 6	*Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis*
HV	High-voltage
HVAC	Heating, containerised ventilation, and air condition
ICNG	*Interim Construction Noise Guideline*
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISEPP	Infrastructure State Environmental Planning Policy
ISP	Integrated System Plan
JHR	John Holland Rail
km	Kilometres
km/hr	Kilometres per hour
kV	Kilovolt
$L_{Aeq,15\ min}$	A-weighted equivalent continuous sound pressure level of noise from the source, measured over a 15 minute period

Acronym	Definition
LALC	Local Aboriginal Land Council
LCPP	Lithgow Community Power Project
LCZ	Landscape Character Zone B44
LEP	Local Environmental Plan
LGA	Local Government Area
LSAT	Landscape Scale Assessment Tool
LSPS	Local Strategic Planning Statement
LUCRA	Land Use Conflict Risk Assessment
m	Metres
ML	Mega litres
MLRA	Multilevel Risk Assessment
MNES	Matters of National Environmental Significance
MV	Medium-voltage
MW	Megawatts
MWh	Megawatt-hour
NCA	Noise catchment area
NEM	National Energy Market
NPfI	NSW *Noise Policy for Industry*
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NSWALC	NSW Aboriginal Land Council
OEMP	Operational Environmental Management Plan
PAD	Potential archaeological deposit
PAH	Polycyclic Aromatic Hydrocarbons
PBP	Planning for Bush Fire Protection 2019
PCB	Polychlorinated Biphenyl
PCT	Plant Community Types
PHA	Preliminary Hazard Analysis
POEO Act	Protection of the Environment Operations Act 1997
RAP	Registered Aboriginal Party
RBL	Rating background levels
REZ	Renewable Energy Zone
RFS	Rural Fire Service
RNP	*Road Noise Policy*
ROL	Road Occupancy Licence
SDWC	Sydney Drinking Water Catchment
SEARs	Secretary’s Environmental Assessment Requirements

Acronym	Definition
SEPP	State Environmental Planning Policy
SEPP 33	*State Environmental Planning Policy No 33 – Hazardous and Offensive Development*
SEPP 55	*State Environmental Planning Policy No. 55 – Remediation of Land*
SOHI	Statement of Heritage Impact
SSD	State Significant Development
SSDA	State Significant Development Application
SWL	Sound power levels
SWMP	Soil and Water Management Plan
TEC	Threatened Ecological Community
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
VPA	Voluntary Planning Agreement
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WCMS	Water Cycle Management Study
WM Act	*Water Management Act 2000*
WMP	Waste Management Plan
WSUD	Water sensitive urban design

Executive Summary

Overview

Neoen Australia Pty Ltd (Neoen) is seeking development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 500 megawatts (MW) and approximately 1000 megawatt-hour (MWh) at 173 Brays Lane, Wallerawang, NSW 2845 (the Site), as well as a new transmission line that would connect the BESS to the existing Transgrid 330 kilovolt (kV) substation at Wallerawang (the Project). The Project would provide storage and firming capacity to the National Energy Market (NEM) as well as additional services to assist grid stability including frequency control ancillary services.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, this Environmental Impact Statement (EIS) has been prepared in accordance with the relevant provisions of the EP&A Act. It has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning, Industry and Environment (DPIE) (now referred to as the Department of Planning and Environment (DPE)) on 4 February 2021 and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation). This EIS presents an assessment of the potential environmental issues identified during the planning and assessment of the Project. The assessment considers the areas directly or indirectly affected by construction and operation of the Project, as relevant to each environmental or social matter considered.

The Project

The proposed location of the BESS is at Lot 4 Deposited Plan (DP) 751651. The Site consists of the majority of this Lot. The Site is located approximately 1.25 km north west of the Transgrid Wallerawang 330 kV substation, located off James Parade, Wallerawang 2845 (Lot 91 of DP 1043967). The Project proposes the installation of a transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation. The Site, transmission line corridor and connection to the substation is collectively referred to as the Project Area.

The alignment of the proposed transmission line would traverse:

- Lot 8 and Lot 9 DP 252472
- Lot 2 DP 108089
- Lot 1 DP 108089
- Lot 10 DP 1168824
- Lot 1115 DP 1204803
- Lot 91 DP 1043967.

Key features of the Project include:

- Site establishment, including installation of fencing, environmental controls, grading and other civil works
- Establishment of a new driveway located at the southern boundary of the Site, providing access to the Site from Brays Lane
- Establishment of internal access roads and car parking
- Installation, commissioning, and operation of a large-scale BESS including battery enclosures, inverters, and transformers
- Construction of permanent operations buildings, including staff amenities
- Construction of lighting and installation of security devices around the perimeter of the BESS compound
- Establishment of noise walls, landscaping and screening vegetation

- An underground transmission line connection from the BESS to the existing Wallerawang 330 kV substation switchyard
- Upgrades to the Wallerawang 330 kV substation switchyard
- Subdivision of Lot 4 DP 751651 to separate the existing residence in the south eastern portion of the lot from the proposed BESS.

The key features of the Project are shown on **Figure E-1**.

Consultation

A Community Engagement Plan (CEP) has been developed for the Project. The CEP has been developed in accordance with guidelines set out in line with the Clean Energy Council's community engagement and benefit-sharing guidelines. The CEP outlines the overall process and approach to community consultation across the lifecycle of the Project. It also provides a summary of the key stakeholders including landholders, neighbours, local community and local government, and how they have been, and will continue to be consulted with. The CEP outlines the following strategic approach being adopted during consultation as follows:

- **Involving** the community in the development, construction and operation of the Project
- **Collaborating** with the community to help ensure that local advice and insights are shaping Neoen's approach to engagement and benefit sharing
- **Empowering** the community to shape key elements of the Project.

Neoen have undertaken consultation with a number of key agencies and stakeholders throughout the development of the Project to date, including: Lithgow City Council, NSW DPE, the NSW Heritage Council, Transport for NSW, the NSW Environment Protection Authority, NSW Rural Fire Service, Water NSW, Transgrid, as well as with the community and nearby residents and land owners.

Neoen has consulted with and will continue to consult with the community and key stakeholders using social media, one-on-one meetings, the Project website, Project update newsletters, community meetings, local newspaper advertisements, and the distribution of fact sheets.

The EIS will be placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period, community members and stakeholders have the opportunity to submit feedback to the NSW DPE.

Environmental assessment

Figure E-2 presents a summary of the Project's key environmental constraints. These are discussed in further detail in the following sections.

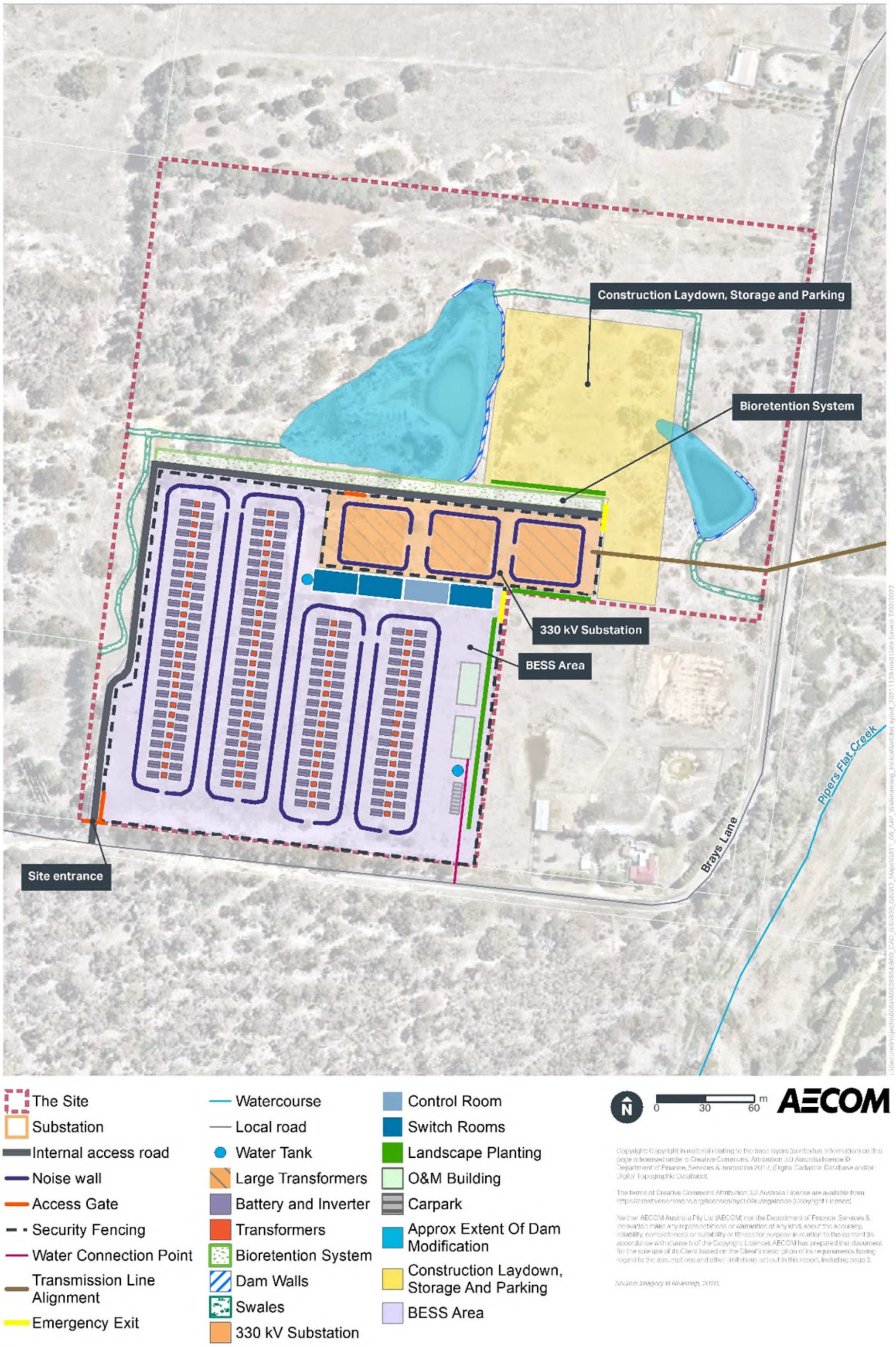


Figure E-1 Indicative layout of the Site

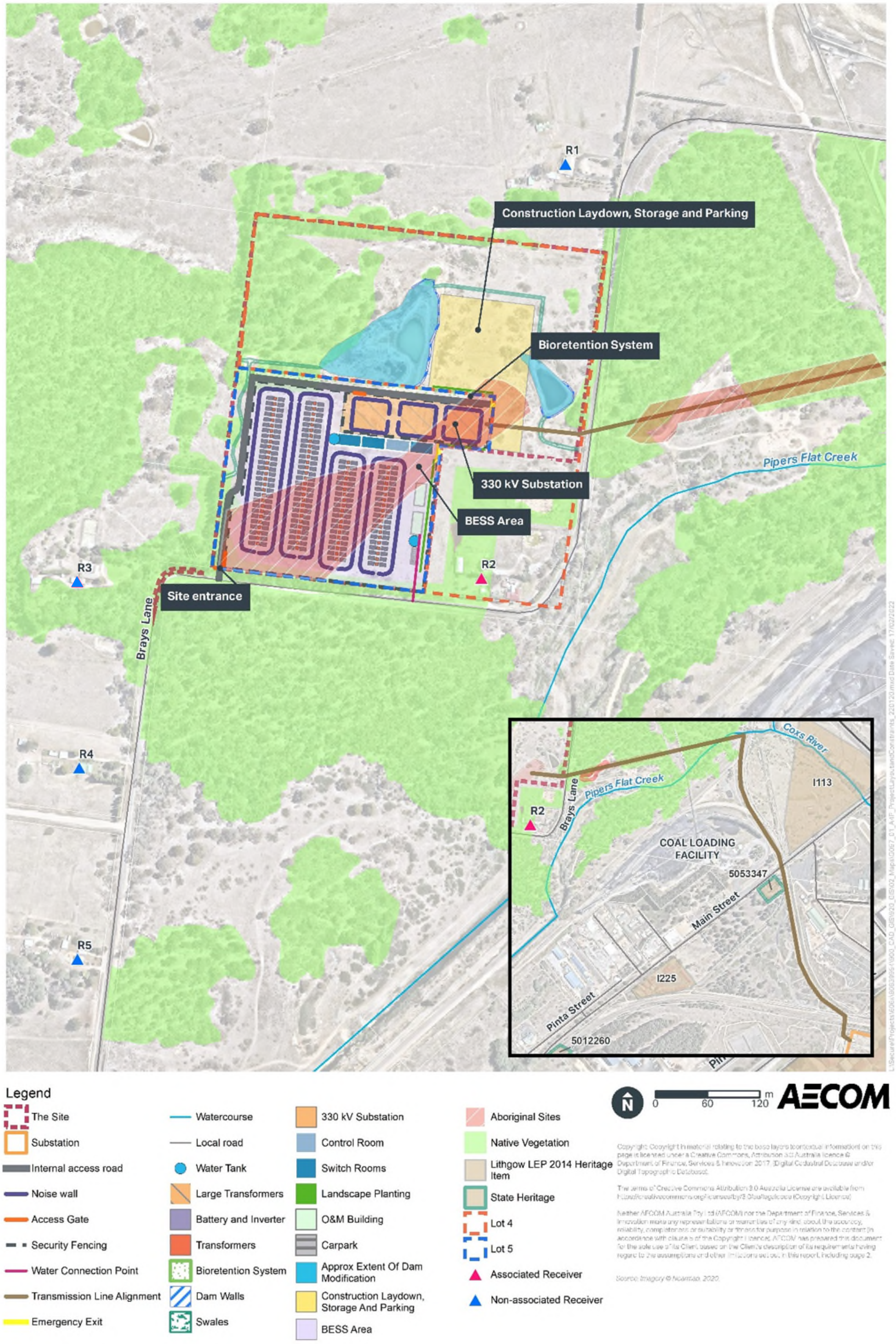


Figure E-2 Summary of environmental constraints for the Project

Biodiversity

A Biodiversity Development Assessment Report (BDAR) has been prepared for the Project. This was supported by fieldwork and assessed impacts relevant to both the *Biodiversity Conservation Act 2016 (NSW)* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act). The majority of Project impacts on biodiversity would occur during construction from clearing of native vegetation and removal of habitat for flora and fauna.

Construction of the Project would involve the removal of approximately 0.93 ha of native vegetation from two NSW Plant Community Types (PCTs) throughout the Project Area. The Project would result in the removal of the following threatened flora individuals / habitat:

- PCT 677 (Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion), which is known Black gum habitat (two individuals)
- PCT 732 (Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion), which provides Squirrel Glider, Greater Glider, Koala and Eastern Pygmy Possum habitat.

The construction and operation of the Project would also result in indirect impacts on biodiversity values, for example due to edge effects, noise and light spill.

No threatened biodiversity at risk of Serious and Irreversible Impacts are known or considered likely to occur in the Project Area or would be impacted by the Project. A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the Project has been undertaken using the Biodiversity Assessment Method Calculator. The calculation concluded that a total of 92 credits (combined ecosystem credits and species credits) would be required to offset ecological impacts associated with the Project.

Direct and indirect impacts are proposed to be mitigated primarily through Project design, as well as management and mitigation measures, including offsetting.

Aboriginal heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared for the Project to identify the Aboriginal cultural heritage values of the Project Area and assess the potential impact of the Project on these values. The ACHAR involved consultation with Aboriginal stakeholders, detailed desktop research, and conducting an archaeological survey and test pit investigations of the Project Area. Surveys and test pit investigations within the Project Area, alongside Registered Aboriginal Parties (RAPs), identified two Aboriginal archaeological sites. These identified sites consist of surface and subsurface artefact scatter SU1a-A5 and surface and subsurface stone quarry site GWB-STQ1-21.

Construction of the proposed transmission line within and immediately surrounding artefact scatter SU1a-A5 would occur using Horizontal Directional Drilling (HDD) to a depth of about 1.5 metres (m) below ground level (BGL). The HDD process would only disturb surface soils above 1.5 m BGL at the launch pit and receiving pit, located at each end of the drilling path. The launch pit and receiving pit would be located outside of the SU1a-A5 site and would not impact on its heritage value. As the maximum observed depth of subsurface Aboriginal objects within SU1a-A5 was at 40 cm below ground level, the HDD works are not expected to impact the cultural value of the site. Subject to the implementation of appropriate protective measures such as the HDD process a negligible impact risk for SU1a-A5 has been determined.

The construction and operation of the BESS on the Site would result in a near-complete, permanent loss of value for stone quarry GWB-STQ1-21. A comprehensive salvage program has been proposed to mitigate this impact.

Overall, it is estimated that the Project would result in a 0.02% decline in the region's potential Aboriginal archaeological resources. On this basis, it is concluded that the impact of the Project on this resource would be negligible.

Historic heritage

A Statement of Heritage Impact (SOHI) has been prepared for the Project to identify the non-Aboriginal cultural heritage values of the Project Area and assess the potential impact of the Project on these values.

A total of 14 historic items were identified during an archaeological survey undertaken within and around (within about 800 m) the Project Area. The closest listed historic heritage item is St John the Evangelical Church located about 30 m west of the transmission line and about 1 km south east from the Site. This heritage item is listed on the NSW State Heritage Register and the Lithgow Local Environmental Plan (LEP), 2014. No historic heritage items have been identified nearby the Site.

The use of vibratory construction methods to install the transmission line may have the potential to result cosmetic damage impact to this heritage item. Subject to the implementation of appropriate protective measures (such as limiting the use of certain methods within 50 m of the church), construction and operation of the Project is not expected to have adverse impacts to St John the Evangelical Church or other potential heritage or historical archaeological sites.

An unexpected finds procedure is included in the proposed mitigation and management measures to be included in the Construction Environmental Management Plan (CEMP).

Surface water, flooding and water use

A Water Cycle Management Study (WCMS) has been prepared for the Project to assess potential impacts relating to surface water, flooding and water use. The development of the BESS would require the rearrangement of the existing dams on the Site, earthworks to level parts of the Site, an increase in hardstand, and installation of stormwater management controls (including swales and a bioretention system) to retain and manage the release of runoff as required.

While the transmission line for the Project would traverse Piper Flat Creek, an underboring construction method would be employed to avoid work occurring within the waterway. The Site incorporates two ephemeral drainage lines, which join within it to form one south-easterly trending ephemeral drainage line. Through a review of historical aerial imagery, it is understood these drainage lines have been heavily modified through historical land use activities (including construction of farm dams and/or road/vehicle tracks) and no evidence of natural stream morphology (such as defined banks, beds or riparian vegetation) can be observed within the Site. As such, no works are proposed within waterways or within a riparian area.

During construction, surface water flows would be managed to avoid sediments or other materials being mobilised offsite and impacting the water quality of nearby waterways. The quantity and rate of runoff leaving the Site would also be managed to avoid offsite erosion impacts.

During operation, surface runoff would derive primarily from hard surfaced areas which would be directed to the stormwater management controls within the Site. Measures to manage potential water quality and water quality risks associated with the Project would include the retention and modification of the dams, construction of swales and incorporation of a bioretention system.

The quantity of stormwater runoff could potentially increase and therefore stormwater management controls would be retained, improved and installed to reduce these flows compared to current discharges. This reduction in flow would mitigate potential erosion / scour impacts and concerns regarding downstream flooding.

The quality of surface water discharges from the Site was also assessed. A bioretention system was identified and incorporated into the Project to help ensure that the surface water discharges from the Site during operation demonstrate a neutral or beneficial effect on the receiving water environment. With the establishment of a bioretention system, the quantity of stormwater runoff is expected to improve on existing conditions.

Once treated, runoff would exit the Site to the east and be directed to Pipers Flat Creek, as per current conditions. Therefore, the Project is not expected to significantly alter existing surface water flow regimes or water quality.

As the Site is sloped and elevated above the surrounding area, the risk of flooding impacting the Site and Project is low. The modified dams would be effective at attenuating surface water flows and reducing peak discharge rates. The Project is not expected to result in an increase to the peak discharge rate or volumes during the major storm events and would therefore be expected to result in a neutral impact on the receiving environment.

Geology, soils, contamination and groundwater

Erosion

Ground disturbance works during construction would include excavation, transport, storage and reuse of soils across the Site, underboring, and trenching. It is considered that there is a low to moderate erosivity risk associated with the soils that occur within the Project Area. Despite the general region and its soil types being prone to high levels of erosivity, local conditions demonstrated by the soil testing and slope within the Project Area demonstrate a reduced level of erosion risk.

Potential impacts would be manageable through erosion and sediment controls implemented during construction. No erosion or sedimentation impacts are expected during operation of the Project.

Soils and contamination

The Site is unlikely to be contaminated, however parts of the transmission line corridor could potentially contain contaminated soils or contaminants of potential concern due to the potential presence of fill and historic (and ongoing) use of this area as a rail corridor. The disturbance of potentially contaminated soils could result in adverse impacts to human health and sensitive ecological receptors if not managed appropriately. With appropriate mitigation measures, including measures for unexpected finds, this impact is considered to be manageable.

Accidental spills and leaks of fuels and oils from plant and equipment during construction would potentially result in unintentional contamination onsite and the potential for additional contamination to mobilise offsite. With the implementation of site management controls, the risk of accidental spills and leaks occurring during construction would be low.

The operation of the Project is not anticipated to result in contamination impacts to the Project Area. Operations would be carried out in accordance with maintenance protocols for the Site.

Groundwater

The possibility that groundwater may be encountered by Project construction works is considered to be low. With the implementation of appropriate mitigation and management measures, the risk of groundwater contamination due to groundwater interception and accidental spills and leaks during the construction would be low.

It is unlikely that the installation of the transmission line would change groundwater depth and quality. As such significant impacts to groundwater dependent ecosystems are also considered to be unlikely.

Noise and vibration

A noise and vibration assessment has been undertaken to assess the potential noise and vibration impacts during construction and operation of the Project.

The construction of the Project is predicted to generally comply with the noise management levels at non-residential receivers, with some minor exceedances predicted to occur. These exceedances would generally be within the 1-10 dB exceedance band. Exceedances within the 1-10 dB exceedance band would largely occur during the civil, structural, mechanical, electrical and transmission connection works. The 86 exceedances of 1-10 dB that would occur during this phase are limited to:

- Isolated rural residential receivers closest to the Site and the proposed transmission line
- Residential areas directly to the south of the Site in the township of Wallerawang
- Residential areas to the north east of the proposed transmission line.

The duration of the impacts to receivers would not occur throughout the entirety of this phase. Works to complete the proposed transmission line would progressively move along the transmission line corridor, meaning that impacts to individual affected receivers affected by these works would not last for the entire duration of the phase. Thirteen exceedances within the 11-20 dB band are predicted to occur at isolated rural residences located closest to the Project Area. The assessment assumptions are conservative, and appropriate noise mitigation measures would be implemented to manage potential impacts. One construction exceedance potentially greater than 20dB, but below the highly affected category of >75dB(A) is expected to occur at the rural residence to the south east of the Site (173 Brays Lane). This exceedance would occur only during the civil, structural, mechanical, electrical works and commissioning phase. Appropriate noise mitigation measures would be implemented to manage potential impacts.

With the implementation of minimum working distances of high impact items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. The separation distance between the Project Area and the nearest potentially affected receivers is sufficient for vibration levels to be compliant with both the human comfort and cosmetic damage criteria.

Taking into consideration existing traffic volumes, construction traffic to the Project Area is predicted to increase noise levels by less than 1 dB. Therefore, the potential traffic noise impact on residential receivers would be negligible and not noticeable.

During operation the Project would install noise walls with sound absorptive lining around the battery enclosures and the high-voltage (HV) transformers. The noise walls would allow the Project to comply with the established Project noise trigger levels at most residential receivers, however marginal exceedances of the trigger levels have been predicted for three residential receives under both standard and noise-enhancing meteorological conditions. Recommendations for at-property noise mitigation measures at these three receivers have been made to further reduce these marginal increases. No exceedances of sleep disturbance criteria are expected. Given the low operational traffic proposed, potential operational traffic noise impact would be negligible.

Overall, potential noise and vibration impacts of the Project would be manageable with the implementation of standard mitigation measures. A Construction Noise and Vibration Management Plan (CNVMP) would be prepared to manage potential impacts during construction.

Transport and access

A Traffic Impact Assessment Report and a Route Analysis Report has been prepared for the Project to assess potential traffic, transport and access impacts during construction and operation of the Project. During construction, the Project would introduce additional traffic to Brays Lane, generated as a result of the delivery of plant, equipment and materials and the movement of workers. Special access measures would be required to allow for the egress of oversized / over mass vehicles (about eight total vehicles) would include temporary bridging beams to be installed over the culverts at Brays Lane, and up 240 square metres of compacted gravel or road base to be used to help stabilise the outer verge of Brays Lane where it forms a right angle, directly west of the Site. During peak construction periods, up to 50 light vehicles and 20 heavy vehicles are anticipated to access the Project Area per day. Potential impacts from the introduction of construction traffic would be temporary and localised, and likely only affect one road user at a time due to the low traffic levels on Brays Lane. Potential minor construction traffic impacts would be manageable with the implementation of management and mitigation measures, including the preparation of a Construction Traffic Management Plan (TMP).

Parking would be provided for up to 50 light vehicles within the Site. Overspill parking for workers would be provided at a location that would be determined in consultation with Lithgow City Council. Property access to neighbouring properties would be maintained at all times. The Project is also not anticipated to result in impacts to the public transport or active transport network.

During operation, traffic generation would be negligible (up to six staff members intermittently), resulting in limited impacts on the road network surrounding the Project. Car parking spaces would be provided within the Site.

Landuse

The construction and operation of a BESS for electricity generating works is permissible with consent in an area zoned RU1- Primary Production. The impact on land use would be minor due to the relatively small footprint of the Site. In addition, Project would not conflict with the land use objectives of RU1 Primary production.

A Land Use Conflict Risk Assessment (LUCRA) has been prepared for the Project. The LUCRA identified and ranked a number of potential land use risks associated with the construction and operation of the Project. The BESS facility would be located at the Site and would be surrounded by various rural land uses including some homesteads, grazing land and land containing native vegetation. The BESS facility would sit within a broader landscape that includes these uses as well as various extractive industries, power generation and electricity transmission uses. The construction and operation of the BESS would be unlikely to significantly impact how the surrounding land is currently used. Whilst some temporary construction related amenity impacts and marginal noise increases and visual impacts would be expected from the Project, neighbouring lands used for grazing or residential purposes would be able to be used for these purposes. Mitigation measures have been identified for the impacts related to each of these risks. The implementation of these mitigation measures would result in any residual risks being acceptable. On this basis the construction and operation of the Project is unlikely to impact the land uses surrounding the Site.

Hazards and risk

A Preliminary Hazard Analysis (PHA) has been prepared to assess potential hazards and risk associated with the Project. A screening assessment was undertaken for the Project in accordance with the *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* (HIPAP 6) and State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) using the Multilevel Risk Assessment (MLRA) from the NSW Department of Planning and Infrastructure (2011). Additionally, the potential hazards of electromagnetic fields were assessed against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*.

Based on the MLRA screening, three threshold exceedances were found for *other types of hazards*, associated with the lithium-ion battery. A hazard identification exercise was undertaken as part of the PHA in order to identify all reasonably foreseeable hazards and associated events that may arise during the operation of the Project. A summary of the identified hazardous events included:

- Fire at the BESS, e.g. from thermal runaway or electrical fault
- Loss of containment causing pollutant
- Electrical fault
- Exposure to electromagnetic fields
- External hazardous events including:
    - Natural hazards
    - Security breach that causes a hazardous incident
    - On-site traffic impact causes hazardous incident.

Taking into consideration the likelihood and potential consequences of these events occurring, the overall risk associated with each hazardous event range from low to moderate. However, with the implementation of proposed management and mitigation measures, the likelihood of these events occurring would be considered rare.

Bushfire

A bushfire threat assessment has been undertaken for the Project to assess potential bushfire risk. The potential risk to the Project Area and potential risk of fire spreading to external assets from the Project has been considered. A Landscape Scale Assessment Tool (LSAT) considered the likelihood of a bushfire associated with the Project. The tool considered the following factors:

- Access is readily available to a place that provides shelter from bushfire
- The type and extent of vegetation beyond 150 metres is likely to result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to Site
- Bushfire can approach from more than one aspect and fires have hours or days to grow and develop before impacting and / or Site is surrounded by unmanaged vegetation
- Extreme bushfire behaviour is very likely due to the broader landscape
- Evacuation to alternate location that provides life safety refuge

- Pinch points that are likely to restrict access along evacuation routes for short periods (15-30 mins) and carry fire across roads
- Hazard separation between extreme bushfire hazard and buildings of 20 to 50 metres.

The LSAT outcome rates the Project's bushfire risk as a moderate threat, where it is subject to extreme landscape scale bushfire risk. Notwithstanding, management and mitigation measures would be implemented to address residual risks. This would include the implementation of an APZ to minimize bushfire risks at the Site.

Other matters

Other matters considered as 'low risk' due to the nature of the Project were also assessed. These included social and economic; waste management; and air quality. The findings from these assessments are summarised below.

Initially, impacts relating to landscape and visual had been considered a low risk, however as the Project design has developed through the EIS process, the inclusion of noise walls has meant that this matter is now moderate priority. As such, this matter has been afforded an increased level of investigation and the findings from this investigation are also summarised below.

Visual

The Project is located in an area which is regionally characterised by non-homogenous existing land uses including a mix of rural-residential, industrial, electricity generating infrastructure and mining.

Construction at the Site would have the potential to be visible to four main visual receptors (137 (R3), 173 (R2), 233 (R1) Brays Lane and Brays Lane vehicle users). All residential visual receptors would have partially obscured or near fully obscured views from inside their residential properties to the Site, due to the presence of existing intervening vegetation and built structures. The construction works for the BESS facility would be limited to the Site and would be relatively short in duration (approximately twelve months). Views to the Site would change temporarily during construction but be less obvious to users of Brays Lane than to residential receptors. With regards to the construction of the new transmission line, the visual compatibility of construction activities with the surrounding industrial uses present in the area are likely to be generally acceptable. In addition, construction of the new transmission line would take place progressively along the alignment, and disturbed areas would be reinstated as soon as practicable, limiting the duration of construction works in any one location. As such, visual impacts associated with the construction of the new transmission line would be considered low. Overall, whilst a change would occur, the temporary nature of the construction works, the low number of receptors impacted, and the existing screening around the Site mean that a moderate and/or low level of visual impact is expected during construction.

During operation, the Project would introduce a new industrial element to the existing landscape at Brays Lane. In the context of the area surrounding the Site, rural residential land uses coexist alongside industrial and electricity generating land uses, and the Site is not able to be viewed from the township of Wallerawang. As such the visual impact of the Project at a landscape-scale is anticipated to be low.

With regards to the identified nearby visual receptors (R1, R2 and R3 (refer to **Figure E-2**) at 137, 173, 233 Brays Lane respectively and Brays Lane vehicle users), the visual impact for most receivers is expected to be moderate to moderate-low given the presence of existing screening vegetation and built structures (such as sheds) that would limit direct views to proposed BESS and associated built infrastructure (such as the noise walls). For the R2 visual receptor at 173 Brays Lane, while some intercepting vegetation and existing structures would break up the view, the view to the proposed BESS and surrounding noise walls would only be partially obstructed, and within closer proximity when compared to other nearby receivers.

To minimise the visual impacts associated with the construction and operation of the Project, a number of mitigations measures have been proposed, including that noise walls would be designed to be visually recessive (for example they may be painted or coloured to blend more discreetly into the existing landscape) and screening vegetation plantings would also be provided where possible, to further reduce the visual impacts potentially affected receptors. Potential visual impacts and visual mitigation measures have been discussed with the three adjacent residential receivers (R1, R2 and R3).

Social and economic

The Project would result in social and economic benefits, including assisting in improving the security, resilience and sustainability of NSW's electricity grid, support for further renewable energy projects, job creation and generation of income within the community. The Project has the potential to affect amenity (traffic and access, noise and vibration, visual and air quality), sense of place, the local economy, access and connectivity, culture, health and wellbeing, the local demographic profile and council infrastructure. These potential negative impacts range from low to high-moderate and would be appropriately addressed through the implementation of various management and mitigation measures.

Waste management

Construction of the Project has the potential to produce waste from a number of waste streams. Potential impacts associated with construction waste likely to be generated by the Project include:

- Spoil directed to landfill due to inadequate recycling, re-use, or poor classification of generated wastes
- Contamination of soil, surface and/or groundwater from the inappropriate excavation, storage, transport and disposal of liquid and solid waste
- Small amounts of contaminated fill may be encountered where excavation would occur within the rail corridor. This may introduce risks to human health if encountered and during any handling or transportation activities
- Increased presence of pests due to incorrect storage, handling and transport of wastes.

A Construction Waste Management Plan would be prepared and implemented as part of the Construction Environmental Management Plan (CEMP) for the Project and would outline ways to optimise resource efficiency and waste management during construction.

Given that operation of the Project would employ between five to six employees that would only be required to attend the Site periodically for maintenance activities, waste generated by workers would be minimal.

With the implementation of the Construction Waste Management Plan and other management and mitigation measures, it is not anticipated that construction or operational waste management activities for the Project would pose a significant risk to the environment or human health

Air quality

During construction, dust would potentially be generated by earthwork activities, as well as from vehicle movements. Additionally, fuel emissions could be generated from vehicles and machinery.

Taking into consideration the temporary nature of the works, the fact that all disturbed areas would be stabilised as soon as practicable, and the limited number of receivers located nearby the Project Area, air quality impacts during the construction and operation are not considered to be significant. Potential air quality impacts would be manageable through the implementation of standard air quality management measures, including dust minimising methods with would be incorporated into the CEMP for the Project.

Cumulative impacts

A cumulative impact assessment was undertaken in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPIE 2021). Taking into consideration the minor residual environmental impacts of the Project, following the implementation of management and mitigation measures, there would be limited potential for cumulative environmental impacts to occur with other projects in the region. Should construction of the Project and the Wallerawang Battery Energy System occur concurrently, there may be the potential for an increase in construction traffic in the local area. Communication between these two projects during construction has been recommended to help avoid or minimise peak traffic movements occurring at the same time.

Conclusion

This EIS has been prepared in accordance with the relevant provisions of the EP&A Act. It has been prepared to address the SEARs issued by the Secretary of the DPE on 4 February 2021 and the relevant provisions of Schedule 2 of the EP&A Regulation. The EIS provides a comprehensive assessment of the Project and its relevant environmental, social and economic issues, both for the Project alone and cumulatively. Potential impacts have been assessed and strategies to avoid, minimise and mitigate those impacts have been identified. The Project would deliver several benefits. In particular, the Project would deliver critical energy infrastructure that would benefit Wallerawang and support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region. Based on the findings detailed within this EIS, the Project is considered to be justified and is recommended to proceed subject to Ministerial approval being granted.

1.0 Introduction

1.1 Project overview

Neoen Australia Pty Ltd (Neoen) is seeking development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 500 megawatts (MW) and approximately 1000 megawatt-hour (MWh) at 173 Brays Lane, Wallerawang, NSW 2845 (the Site), as well as a new transmission line that would connect the BESS to the existing Transgrid 330 kilovolt (kV) substation at Wallerawang (the Project). The location of the Project and its regional context is shown on **Figure 1-1**.

The proposed location of the BESS is at Lot 4 Deposited Plan (DP) 751651. The Site is located approximately 1.25 km north west of the Transgrid Wallerawang 330 kV substation. This substation is located at James Parade, Wallerawang 2845 (Lot 91 of DP 1043967).

The Project would involve the installation of a transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation. The alignment of the new transmission line would traverse:

- Lot 8 and Lot 9 DP 252472
- Lot 2 DP 108089
- Lot 1 DP 108089
- Lot 10 DP 1168824
- Lot 1115 DP 1204803
- Lot 91 DP 1043967.

The Site, transmission line easement and connection to the substation is referred to as the Project Area and is shown on **Figure 1-2**.

Other key components of the Project would include:

- Site establishment, including installation of fencing, environmental controls, grading and other civil works
- Establishment of a new driveway located at the southern boundary of the Site, providing access to the Site from Brays Lane
- Establishment of internal access roads and car parking
- Installation, commissioning, and operation of a large-scale BESS including battery enclosures, inverters, and transformers
- Construction of permanent operations buildings, including staff amenities
- Construction of lighting and installation of security devices around the perimeter of the BESS compound
- Establishment of noise walls, landscaping and screening vegetation
- Above ground and/or underground transmission line connections from the BESS to the existing Wallerawang 330 kV substation switchyard
- Upgrades to the Wallerawang 330 kV substation switchyard
- Subdivision of Lot 4 DP 751651 to separate the existing residence in the south east portion of the lot from the proposed BESS.

The key components of the Project that would be located at the Site are shown indicatively on **Figure 1-3**.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) as it satisfies the requirements of Clause 8 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), being:

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

b. *The development is specified in Schedule 1 or 2 of the SRD SEPP.*

The NSW *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW. Division 4 of the ISEPP applies to electricity generating works or solar energy systems.

Under Division 4, electricity generating work means a building or place used for the purpose of:

a. *Making or generating electricity, or*

b. *Electricity storage.*

The purpose of the Project is to store energy in chemical form and generate electrical energy on demand in discharge mode. As such, the Project would be for the purpose of electricity storage and Division 4 of the ISEPP is applicable.

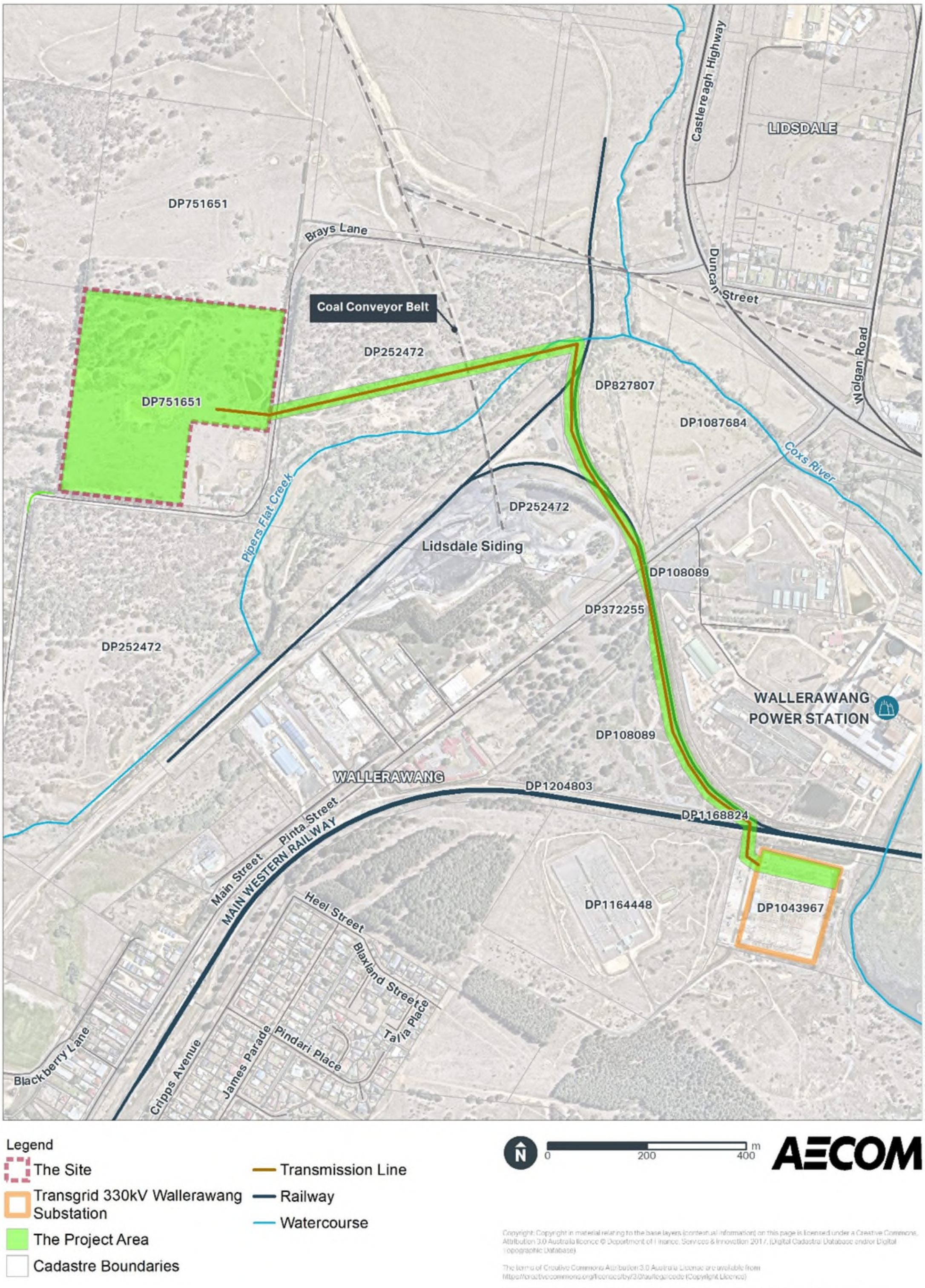
Clause 34 of the ISEPP provides that development permitted with consent for electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

The Project is located on land zoned under the Lithgow Local Environment Plan 2014 (Lithgow LEP) as: RU1 – Primary production; SP2 – Rail Infrastructure Facility; and IN1 – General industrial. The Site and Transgrid substation are located on land zoned RU1 - Primary production. The alignment of the new transmission line would be located within land use zones: RU1 – Primary Production; IN1 – General Industrial; and SP2 – Rail Infrastructure Facility (refer to **Section 2.4**).

Under Clause 34 of the ISEPP, electricity generating works are a permissible with consent on RU1, SP2, and IN1 land use zones as they are defined as prescribed rural, special use and industrial zones under Division 4 of the ISEPP. As such, the Project is permissible with development consent under the ISEPP.

Clause 20 under Schedule 1 of the SRD SEPP relates to electricity generating works with a capital investment value (CIV) of greater than $30 million. The Project is defined as electricity generating works and the CIV for the Project is estimated to be about $400 million. On this basis, the Project is classified as SSD.

Figure 1-1 Regional context of the Project Area



Source: Imagery © Nearmap, 2020.

Figure 1-2 The Project Area

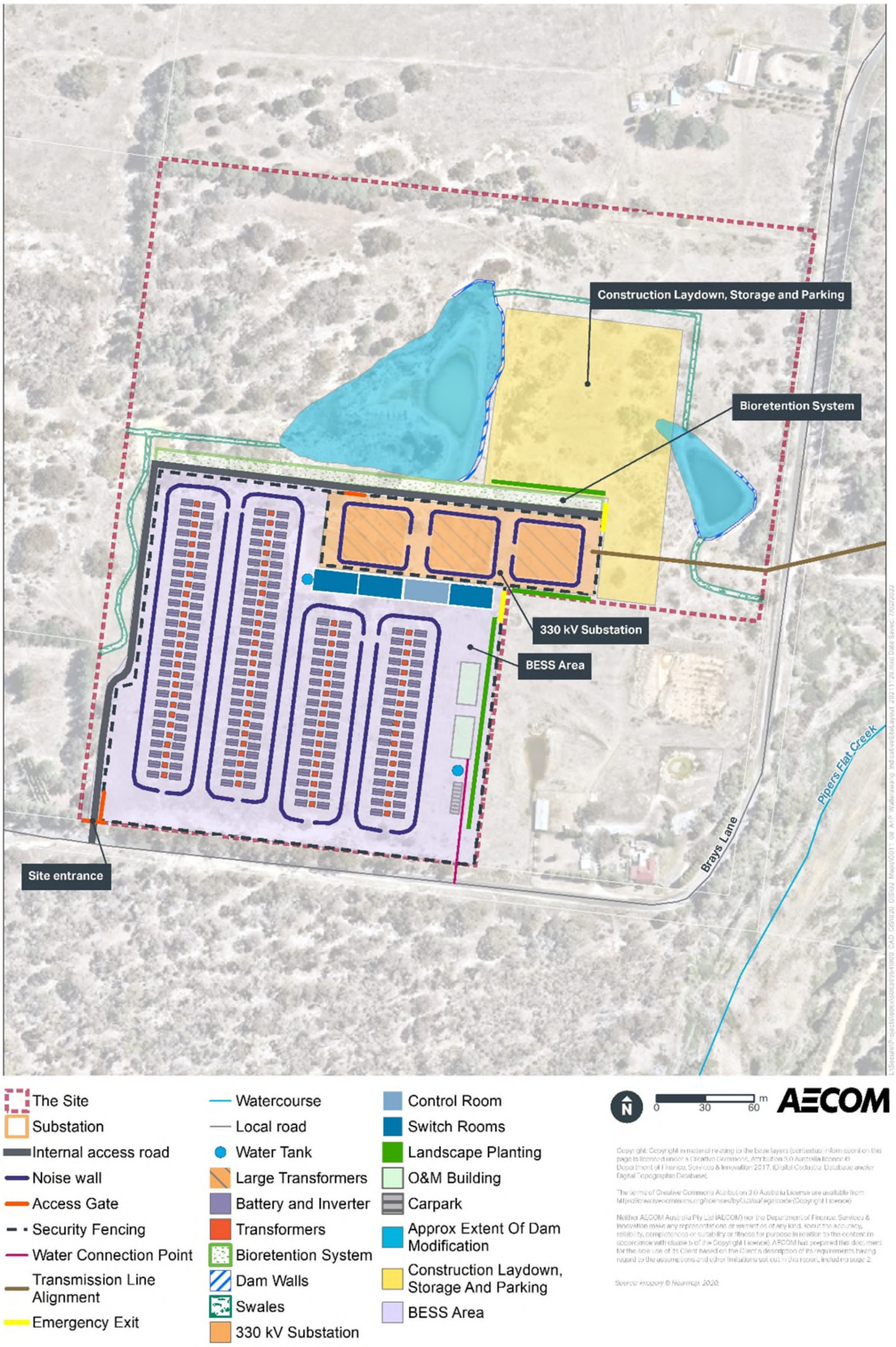


Figure 1-3 Indicative layout of the Project

1.2 Project objectives

Partnering large-scale battery storage with renewable energy will be a key enabler for an affordable, reliable and sustainable energy future for Australia.

Through the provision of a large-scale BESS, the Project would help deliver system security, reliability and a stable energy supply through its ability to store power and consequently, provide input and output power upon demand.

In developing the Project, Neoen seek to deliver a large-scale BESS that would:

- Improve the security, resilience and sustainability of NSW's electricity grid with a cost effective, environmentally sensitive, and proven solution
- Contribute infrastructure that would directly support the NSW Government's commitment to facilitating, supporting and securing private investment in renewable energy developments
- Reduce the potential for future blackout or load shedding events that may occur as a result of an overburdened, underperforming network
- Provide electricity to the NEM during periods of high demand.

1.3 The Proponent

Founded in 2008 in France, Neoen is one of the world's most dynamic independent producers of renewable energy. Neoen already has more than 2 gigawatts (GW) of project in operation or under construction in Australia alone.

Neoen is active in France, Australia, El Salvador, Zambia, Jamaica, Portugal, Mexico, Mozambique, Finland and Argentina and has assets in more than 15 countries. It operates Europe's most powerful solar PV farm (300 MW in Cestas, France) and the world's largest lithium-ion power reserve in Hornsdale, Australia (150 MW/194 MWh storage capacity).

Neoen has been listed since October 2018 on the Compartment A of the regulated market of Euronext Paris. Combined with a committed and stable shareholding, Neoen has secured access to the capital it needs to support its growth: Neoen is targeting 10 GW capacity in operation and under construction worldwide by 2025.

From its inception, Neoen's core business model has been to develop, build, own and operate all of its projects for the entirety of their lifespans. This strategy means that Neoen takes a long-term approach to its assets, to the local communities in which they are situated, and to electricity markets overall.

Neoen Australia began in Sydney in 2012. Since then, the Australian branch has grown rapidly and represents Neoen's largest portfolio outside Europe and a major strategic priority. Neoen's local team has grown to more than 60 employees across both Sydney and Canberra working in development, finance, construction and operations.

As of July 2021, Neoen has over 2 GW of renewable assets in operation or under construction in Australia, representing over $3 billion Australian dollars in investment. The company intends to reach 5 GW in Australia by 2025.

1.4 Purpose of this EIS

This Environmental Impact Statement (EIS) has been prepared in accordance with

- The relevant provisions of the EP&A Act
- The requirements outlined in clauses 6 and 7 of Schedule 2 of the EP&A Regulation
- The requirements of the relevant State Significant Development Guidelines and Other State Significant Project Guidelines.

This EIS has also been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the Project (discussed in more detail in **Section 1.5.1** below).

In accordance with Division 4.7 of the EP&A Act, this EIS presents an assessment of potential environmental issues identified during the planning and assessment of the Project. The assessment considers the areas directly or indirectly affected by construction and operation of the Project, as relevant to each technical assessment.

Alongside the Proponent's community consultation and stakeholder engagement program, public exhibition of the EIS gives the community, government agencies and other interested parties an understanding of the Project and an opportunity to comment on the development application. It also provides the Department of Planning and Environment (DPE) (formerly referred to as the Department of Planning, Industry and Environment (DPIE)) with sufficient information to assess the potential environmental impacts, confirm the management and mitigation measures proposed and understand the benefits of the Project.

Neoen will consider feedback received during the exhibition of the EIS in the further development of the Project and will respond to issues raised through the preparation of a Submissions Report. Further details on the assessment process for the Project are provided in **Chapter 5 Strategic and statutory context**. A full account of the community and stakeholder consultation process undertaken for the Project is included in **Chapter 5 Stakeholder and community engagement**.

1.5 Environmental impact assessment process

1.5.1 Scope of the EIS

This EIS has been prepared to support a development application (DA) for the Project. The EIS provides a detailed outline of the environmental constraints, opportunities, impacts and mitigation measures associated with the Project.

In December 2020 Neoen provided a Scoping Report to DPE to request SEARs. SEARs were issued on 04 February 2021. The full SEARs as issued, along with where and how each item has been addressed, is provided in **Appendix A Secretary's Environmental Assessment Requirements**.

The SEARs identified both general requirements and key issues to be addressed in the EIS. Key issues that must be addressed include those relating to:

- Biodiversity
- Heritage – Aboriginal and historic
- Land
- Visual
- Noise
- Transport
- Water
- Hazards – Bushfire and Preliminary Hazards Analysis
- Socio-economic
- Waste.

The SEARs also outlined requirements for consultation with relevant NSW Government agencies, other stakeholders and the community.

In addition to the SEARs, further considerations for the EIS were identified through consultation. These considerations are summarised in **Chapter 5 Stakeholder and community engagement**.

1.5.2 Preparation and exhibition

This EIS has been prepared to meet the assessment requirements outlined in **Section 1.5.1**. The key issues identified in the SEARs have been investigated through targeted assessments in line with relevant guidelines and assessment requirements. The range of assessments undertaken on behalf of the Project have been used to identify relevant management and mitigations measures, and to inform the justifications and conclusions of this EIS. This EIS aims to provides DPE with sufficient information to accept the SSD application, assess the potential environmental impacts, confirm the management and mitigation measures proposed and understand the benefits of the Project

1.5.3 Assessment and determination

Following exhibition of the EIS, DPE will provide Neoen with any submissions (or a summary of the submissions) received from stakeholders, the community and government agencies during the exhibition period.

Neoen would provide a written response to any stakeholder, community of agency submissions that is received within the subsequent Submissions Report for the Project.

This Submissions Report would include detail regarding how many submissions were received, and by whom. It would also describe how submissions were received, what issues were raised, and it would demonstrate how each issue has been addressed.

1.6 Structure of this EIS

An overview of how this EIS is structure is provided in **Table 1-1**.

Table 1-1 Structure of this EIS

Chapter Number	Chapter Title
-	Executive Summary
1	Introduction
2	Project location
3	Need and alternatives
4	Project description
5	Strategic and statutory context
6	Consultation
7	Scoping and assessment
8	Biodiversity
9	Aboriginal heritage
10	Historic heritage
11	Surface water, hydrology and flooding
12	Geology, soils, groundwater and contamination
13	Noise and vibration
14	Traffic and access
15	Land use
16	Hazard and risks
17	Bushfire
18	Other issues Visual Social and economic Waste management Air quality.
19	Cumulative impacts
20	Environmental management

Chapter Number	Chapter Title
21	Project evaluation and justification
22	References

A number of appendices are also included as part of the EIS. The purpose of these appendices is to provide additional technical detail that supports the findings made in the main body of the EIS. The appendices to this EIS include:

- Appendix A: SEARs
- Appendix B: Community Engagement Plan
- Appendix C: Biodiversity Development Assessment Report
- Appendix D: Aboriginal Cultural Heritage Assessment Report
- Appendix E: Addendum Aboriginal Cultural Heritage Assessment Report
- Appendix F: Statement of Heritage Impact
- Appendix G: Water Cycle Management Study
- Appendix H: Noise Impact Assessment
- Appendix I (a): Traffic Impact Assessment Report
- Appendix I (b): Route Analysis Report
- Appendix J: Land Use Conflict Risk Analysis
- Appendix K: Preliminary Hazards Assessment
- Appendix L: Bushfire Threat Assessment
- Appendix M: Social Impact Assessment

2.0 Project location

2.1 Local history and context

The Project is located in the Central Tablelands of NSW, in the suburb of Wallerawang, about 110 km west of Sydney. Wallerawang is located in the Lithgow City Local Government Area (LGA). The regional context of the Project Area is shown on **Figure 1-1**.

The traditional custodians of the area west of the Blue Mountains, which includes Wallerawang, are the Wiradjuri Aboriginal Australians. The Wiradjuri people were a hunter-gatherer society, made up of small clans or family groups whose movements followed seasonal food gathering and ritual patterns (Wiradjuri Condobolin Corporation, 2021). The boundary of the Wiradjuri Nation extends from Coonabarabran in the north, along the Great Dividing Range to the Murray River in the south (Murray Lower Darling Rivers Indigenous Nations 2021).

Post-European colonisation of Australia, Wallerawang served as a large pastoral estate from around 1824. In the late 1820s, it became a key stop over for people travelling from Sydney to Mudgee. The town of Wallerawang was built up around Wallerawang railway station, which was established around 1870, continuing operation until 1989. In 1957, a thermal coal power station was established and operated until 2014, where the closure of the power station was announced by Energy Australia.

2.2 Project Area and Site description

The Site is located at 173 Brays Lane, Wallerawang NSW, 2854 on Lot 4 Deposited Plan (DP) 751651. Lot 4 is about 16.5 hectares (ha) in size. According the indicative site layout shown on **Figure 1-3**, the area required to construct the BESS would only occupy up to 7 ha of Lot 4 DP 751651. The Project is subject to ongoing design development and it is possible that the extent of land required for the construction of the Project may be up to 7 ha in area. Following the completion of construction, it is proposed that Lot 4 DP 751651 would be subdivided to delineate the existing residential landuse at the south east portion of the lot from the proposed BESS.

The south eastern corner of the Lot is currently occupied by a residential property and a few small agricultural buildings (sheds etc.) (refer to **Figure 1-3**). Beyond the residential property the majority of the Lot is used for occasional horse grazing. As a result of its use for grazing and residential purposes, the land has undergone vegetation removal and the majority of vegetation present consists of pasture grasses. A small area of mature vegetation in located in the north western corner of the Lot (refer to **Figure 2-1**). The Lot is currently accessed through an entrance close to the residential property.

The Site is located within the Lot and consists of the majority of the land except for the residential property in the south eastern corner and a few small agricultural buildings and some land immediately surrounding them. Two broad ridgelines traverse the Site, with the more prominent of the two occupying the north-western portion of the property. The highest parts of the Site associated with these ridgelines occur in the north western and south western corners and are between about 900 metres and 910 metres Australian Height Datum (m AHD). The lowest part of the Site is along the central and south eastern boundary at about 880 m AHD.

A series of small man-made dams are located on the Site. The dams are fed by two ephemeral drainage lines that enter the Site on the western boundary and generally flow to the east before entering the largest dam onsite and becoming one drainage line. This drainage line passes through one more dam before leaving the Site along the southern part of the eastern boundary before draining to Pipers Flat Creek offsite. The Project would involve the installation of a new transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation. The new transmission line would traverse:

- Lot 8 and Lot 9 DP 252472
- Lot 2 DP 108089
- Lot 1 DP 108089
- Lot 10 DP 1168824

- Lot 1115 DP 1204803
- Lot 91 DP 1043967.

The Transgrid Wallerawang substation is located about 1.25 km south east from the Site at Lot 91 of DP 1043967. The substation is located on freehold land owned by Electricity Transmission Ministerial Holding Corporation (ETMHC) and operated by Transgrid.

The new transmission line for the Project would be located on land that is currently owned and / or managed privately, by Transport for NSW, Transgrid, Lithgow City Council, and John Holland Rail. The new transmission line would connect the BESS to the Transgrid Wallerawang 330 kV substation. The new transmission line would exit from the eastern boundary of the Site, crossing Brays Lane and entering into the vegetated area to the east of Brays Lane. From here, it would travel in a north easterly direction, before passing under Pipers Flat Creek and into the existing rail corridor where it would travel south east along the rail corridor (including its crossing of Main Street) to connect to the north western portion of the Transgrid Wallerawang substation and is shown in **Figure 1-2**.

The new transmission line would also pass under the existing coal conveyor belt that transports coal between the nearby Springvale Colliery, Mt Piper Power Station, Springdale Coal Services, and Lidsdale Siding (coal loader). The location of the conveyer belt relative to the Project is shown on **Figure 1-2**.

Neoen have obtained landowners consent from the required residential landowners and Lithgow City Council to lodge this development application for the BESS and ancillary transmission line and easement (as required in clause 49(1)(b) of the EP&A Regulation). Neoen have undertaken detailed consultation with both Transport for NSW and Transgrid. During this consultation process, both Transport for NSW and Transgrid have committed to providing landowners consent following review of the final exhibited EIS. On this basis landowner’s consent from Transport for NSW and Transgrid is expected during exhibition of the EIS.

2.3 Description of the surrounding area

The Project is located in an area which is characterised by the dominant land uses of heavy industry, agricultural, infrastructure and mining.

The more rural characteristics of the area around the Site include open cleared pastures, small dams, and associated drainage lines. Residences consist mostly of very low-density single dwellings or homesteads, which are often setback some distance from the road, and often several hundred metres from the nearest neighbour. Some nearby properties are used for grazing activities.

The closest sensitive receivers to the Site include residential receivers: 233 Brays Lane about 50 m to the north of the Site (R1); 173 Brays Lane located immediately east of the Site (R2); 137 Brays Lane about 100 metres (m) from the south western corner of the Site (R3); and 113 Brays Lane about 260 m south west of the Site (R4). The location of these residential receivers are shown on **Figure 2-1**, and their features are summarised in **Table 2-1**. Receivers that the Project is likely to provide benefits to (associated with land acquisition payments), are referred to as ‘associated receivers’. Receiver 173 Brays Lane (R3) is considered to be the only associated receiver for the Project. All other receivers who would not receive benefits as a result of the Project are referred to as non-associated receivers and comprise 233 (R1), 173 (R2), 113 (R4) and 91 (R5) Brays Lane. Due to the detailed extent of detailed consultation undertaken with 233 (R1), 173 (R2) and 137 (R3) Brays Lane, these receivers are considered to be ‘involved’ with the Project (refer to **Table 6-3** for details regarding community consultation undertaken for the Project). Receivers located nearby the Site are summarised below in **Table 2-1** and shown on **Figure 2-1**.

Table 2-1 Receivers identified for the Project

Receiver	Address	Distance to the Project Area (m)	Elevation of the receiver (mAHD)	Associated / non-associated [1]	Involved / not involved [2]
R1	233 Brays Lane	90	894	Non-associated	Involved
R2	173 Brays Lane	60	890	Associated	Involved
R3	137 Brays Lane	90	904	Non-associated	Involved
R4	113 Brays Lane	205	892	Non-associated	Not-involved
R5	91 Brays Lane	410	896	Non-associated	Not-involved

1. *'Associated receivers' are defined as receivers that would receive a benefit from the Project. 'Non-associated receivers' are defined as those receivers who would not receive benefits as a result of the Project.*
2. *'Involved receivers' are defined as those receivers who have been consulted with in detail. 'Not involved receivers' are defined as those who have received a standard consultation experience (refer to* ***Table 6-3*** *for details regarding community consultation undertaken for the Project).*

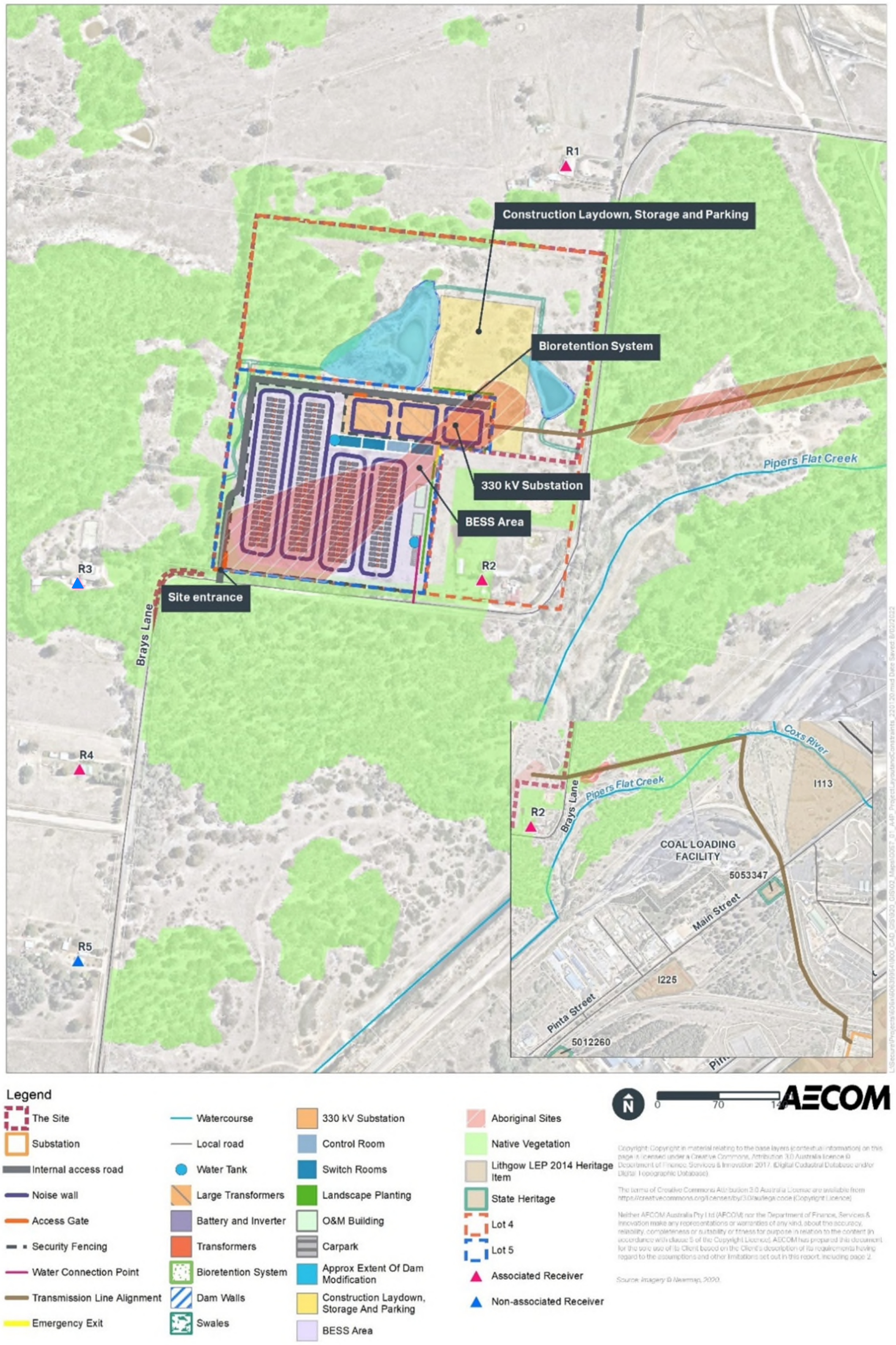


Figure 2-1 Summary of environmental constraints for the Project

The remaining receivers are at least 500 m from the Site and have been, and would continue to be, consulted with as per those methods detailed for 'Community' in **Table 6-3**

The township of Wallerawang is comprised of low to medium density housing, with associated infrastructure including schools, sporting fields, places of worship, community centres and clubs, shops, etc. At the time of the 2016 census, Wallerawang had a population of about 1,980 people (ABS, 2016). The Site is located about 1.4 km north of the centre of the township of Wallerawang (measured from the Wallerawang Post Office) and approximately 800 m from the nearest residential property within the township.

In contrast to these rural, residential and agricultural land uses, a number of industrial and extractive industry land uses are present in the area surrounding the Site. Wallerawang power station is located about 1.5 km south east of the Site and adjacent to the proposed transmission line easement. Wallerawang power station was a large coal-fired electrical power station. The power station has been decommissioned, however it still comprises two 500 MW steam turbine generators. The large ventilation stacks at the power station have not been demolished and can be viewed from the Site and a large part of the surrounding area.

Lidsdale Siding coal loading facility is located to the south of the Site (about 400 m) and processes coal from Springvale Colliery, which is located about 3.5 km east of the Site. A series of large conveyer belts cross the landscape to transport coal between coal mines, the nearby Mount Piper Power Station and Lidsdale Siding. Wallerawang ash repository is located about 2 km east of the Site and accepts ash from the retired Wallerawang power station as it continues to be dismantled. A detailed Closure and Rehabilitation Plan is being developed for the Wallerawang Ash Repositories and will form part of the reclamation works for the Wallerawang Power Station (Energy Australia, 2018).

As shown on **Figure 1-1.** Ben Bullen State Forest is located to the east of the Site and Lidsdale State Forest is located to the south. Both are managed by the Forestry Corporation of NSW and are accessible to the public for hiking and four-wheel driving. However, their primary function is as a forestry resource. Marrangaroo National Park is located about 3.5 km to the south of the Site and is managed by the NSW National Parks and Wildlife Service.

Pipers Flat Creek is the closest watercourse to the Project. This creek is located about 50 m east of the Site (at its closest point). Pipers Flat Creek is a tributary of Cox River. The Cox River is located about 2 km north of the Site. Other mapped and named waterways and waterbodies in the vicinity of the Project include:

- Lake Wallace (part of Cox River)
- Adams Creek.

Waterways that occur within proximity of the Project are shown on **Figure 1-1** and **Figure 1-2**.

Wallerawang is located on the Main Western railway line at the junction of the Gwabegar line. Wallerawang train station is located about 1.2 km south of the Site. No regularly scheduled passenger trains are known to operate at Wallerawang. Rail traffic along this line is prominently freight rail. The location of rail lines nearby the Project are shown on **Figure 1-1** and **Figure 1-2**.

2.4 Surrounding land uses

A review of the *Lithgow Local Environmental Plan 2014* (Lithgow LEP) was undertaken to identify the land use zones applicable to the Site and the surrounding area. The Site is located on land zoned as RU1 – Primary Production. The transmission line easement is located on land zoned as RU1 – Primary Production, IN1 – General Industrial, and SP2 – Rail Infrastructure Facility. The Transgrid Wallerawang 330 kV Substation is located on land zoned RU1 – Primary Production.

Land use zones at and surrounding the Project are shown on **Figure 2-2**.

A detailed Land Use Conflict Risk Assessment (LUCRA) has been undertaken for the Project and is provided in **Appendix J Land Use Conflict Risk Assessment**. A summary of the LUCRA and the potential for the Project to impact on landuse is discussed in detail in **Chapter 15 Land use.**

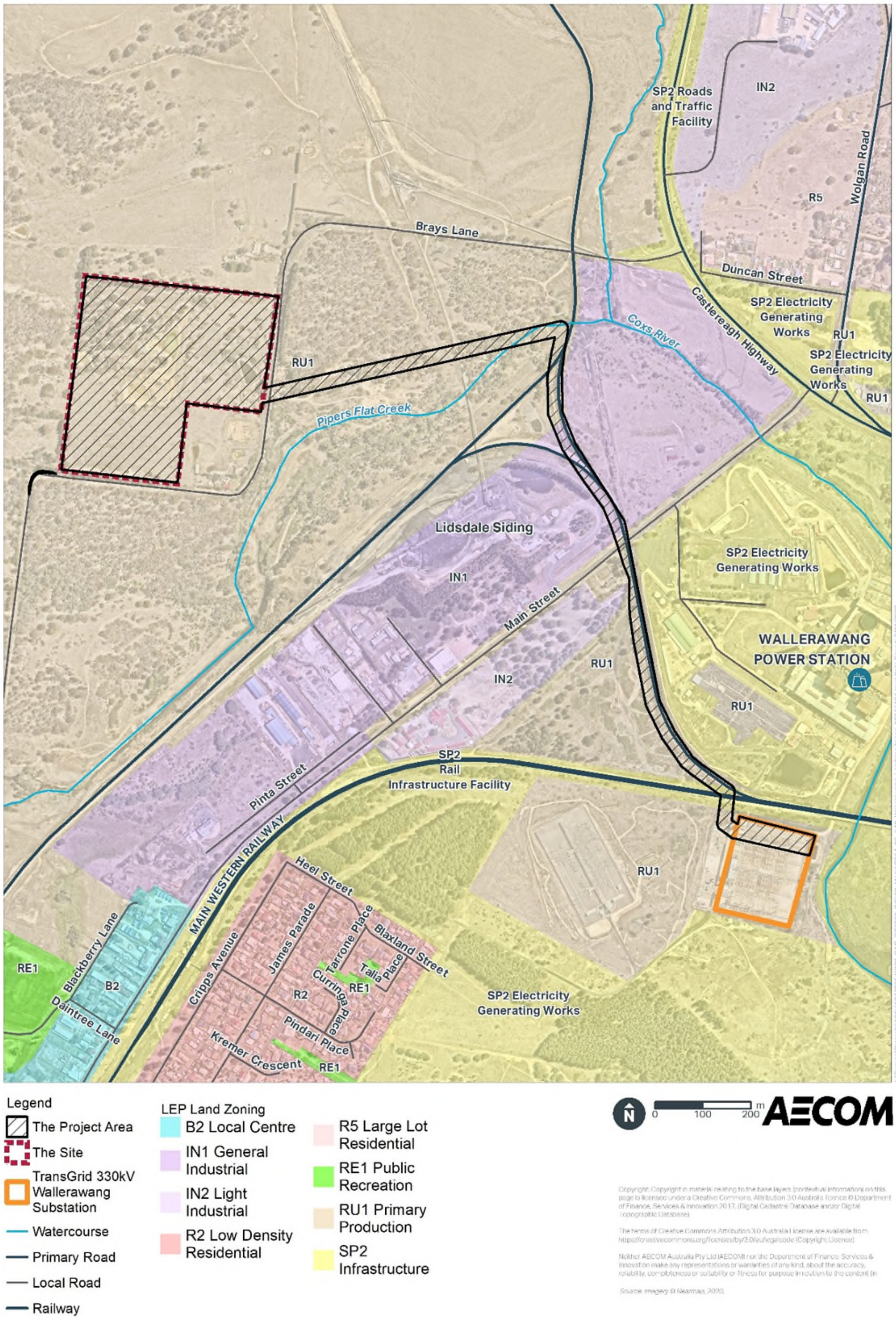


Figure 2-2 Land use zones (Lithgow LEP 2014)

3.0 Need and alternatives

This chapter explains the need for the Project and outlines the Project's objectives. It describes the alternatives that were considered for the Project as well as the options that were considered during the design development process to date. The chapter details the reasons why the Project was chosen as the preferred option to be assessed within this EIS.

3.1 Secretary's Environmental Assessment Requirements

The SEARs relevant to the need and alternatives of the Project are presented in **Table 3-1**.

Table 3-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
In particular, the EIS must include: • a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved energy facilities, rural residential development and subdivision potential)	• A strategic justification of the development focusing on site selection, and the suitability of the Site for the proposed Project, including compatibility with existing land uses is discussed in this Chapter • The compatibility of the Project with existing land uses is discussed in more detail in **Chapter 15 Land use** • A detailed LUCRA has been undertaken for the Project, and is provided in **Appendix J Land Use Conflict Risk Assessment** • The existing land uses of the Project Area, results of the LUCRA, and the potential for the Project to impact on landuse is discussed in detail in **Chapter 15 Land use**.

3.2 Project need

The National Energy Market (NEM) is experiencing rapid change as existing coal fired power stations across NSW and Australia are reaching the end of their operational life. These changes are likely to be complemented with the continued drive to transition to renewable energy sources, as set out in the NSW Climate Change Policy Framework (OEH,2016) refer to **Chapter 5 Strategic and statutory context**.

The NSW government has identified a need for an increase in renewable energy generation projects to be able to meet their commitment to facilitating private investment in this market. However, according to the NSW Government's Electricity Strategy (DPIE, 2019), a critical barrier to future investment in and uptake of renewable energy in NSW, and the future resilience and sustainability of the delivery of energy to consumers across NSW, is existing limitations in grid reliability and stability.

In addition, the potential for the existing network to fall short of meeting current reliability standards is projected to increase after Liddell Power Station closes in 2022. As NSW's aging power stations reach the end of their operational life, the potential for early unplanned closures poses an additional high risk to energy security of NSW consumers. A closure of Liddell Power Station would remove about 13% of NSW's electricity supply contribution from the NEM. The closure of the remaining end-of life coal fired power stations would potentially see the removal of more than an additional 10,000 MW from the NEM by 2040 (DPIE, 2018). In worst case scenarios, this potential future lack of capacity and reliability could lead to load shedding or blackout events.

The role of the NEM is to provide electricity reliably and securely, which means it needs to continually meet a growing demand for a stable power source in Australian cities. Over the past decade there has been a progressive increase in installed renewable generators within the NEM. Renewable generation (in particular wind and solar) is intermittent in nature generating when wind and solar resources are available respectively.

Energy storage has emerged as a key enabler for the decarbonisation of the Australian electrical system. Energy storage allows greater penetration of intermittent renewable energy sources while maintaining network stability and security. This is aligned with the need identified by the *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future* (the Finkel Review) (Commonwealth of Australia, 2017), that the NEM requires stable, dispatchable generation to balance network requirements as renewable generation fluctuates depending on the predominate solar and wind resources available at the time. The need for storage capacity is expected to increase in the next 20 years, in line with the progressive retirement of thermal generators from the NEM.

The Project seeks to provide a critical element for the expanding renewable energy industry and the future capacity and resilience of the NSW energy network through the provision of a large-scale BESS for the purposes of energy storage.

The Australian Energy Market Operator (AEMO) prepared and released an Integrated System Plan (ISP) for the NEM in July 2020 (AEMO, 2020). The 2020 ISP is a roadmap for eastern Australia's power system to optimise consumer benefits through the expected energy transition. The ISP identifies that:

> *"Australia's energy sector faces a profound, complex and accelerating transition. As its traditional generators retire, Australia must invest in a modern energy systems with significant consumer-led distributed energy resources (DER) and utility-scale variable renewable energy (VRE), supported by sufficient dispatchable resources. Digitalised power system services must leverage advances in computing and data analytics to drive greater efficiencies and increase value to consumers and investors...*
>
> *… Historically, Australia's power system has been based on large-scale power stations located around fuel centres supplying remote load centres through large-scale transmission, which is how the physical assets that comprise the current NEM were designed and built. Now, the NEM, like other power systems around the world, is undergoing a rapid transition. On certain measures, the rate of change in Australia is the fastest of any country in the world. In this context, the ISP must set out an optimal development path for the NEM's transmission assets. It does so by optimising a power system that ranges far – both technologically and geographically – over consumer-led DER investments, storage and generation investments, and demand side responses. To optimise that system, the ISP must consider the full range of energy services required to integrate new technologies, including the vital system security services. It takes into account the capital and fuel costs of generation as well as of transmission, and opportunities for DER. It anticipates the impact of parallel shifts in coupled sectors such as transport, gas and hydrogen, and incorporates emerging innovations in consumer-owned DER, virtual power plants (VPPs), large-scale generation, energy storage and power system services."*

The Project would contribute to the storage requirements identified in the ISP. Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby placing a downward pressure on energy prices. Furthermore, battery storage technologies are anticipated to be key to the development of Renewable Energy Zones under the NSW Government's Transmission Infrastructure Strategy 2018.

Neoen believe that the provision of the physical infrastructure to store electricity is a critical first step to supporting investment in, and the development of renewable energy solutions for NSW. The large-scale BESS delivered by the Project would provide services on a scale unlike any other device currently connected to the NSW network, and would provide a range of services with extremely fast response times to support a stable network and security of supply. The energy storage capacity provided by the Project would also allow for increased installation of renewable energy sources while helping maintaining network stability and security.

3.3 Project objectives

Partnering large-scale battery storage with renewable energy will be a key enabler for an affordable, reliable and sustainable energy future for Australia. Through the provision of a large-scale BESS, the Project would also contribute to deliver system security, reliability and a stable energy supply through its ability to store power and consequently, provide input and output power upon demand.

In developing the Project, Neoen seek to deliver a large-scale BESS that would:

- Improve the security, resilience and sustainability of NSW's electricity grid with a cost effective, environmentally sensitive, and proven solution
- Contribute infrastructure that would directly support the NSW Government's commitment to facilitating, supporting and securing private investment in renewable energy developments (refer to **Section 3.2** above and to **Chapter 5 Strategic and statutory context**)
- Reduce the potential for future blackout or load shedding events that may occur as a result of an overburdened, underperforming network
- Provide electricity to the NEM during periods of high demand and store excess electricity supply on the network during periods of high generation and/or low demand.

3.4 Project alternatives

Two project options were considered by Neoen. These included:

- Option one (1): a base case, or 'do nothing' approach
- Option two (2): construct a BESS.

3.4.1 Option 1: 'do nothing'

The 'do nothing' option would involve not constructing and operating a BESS. This option would not deliver a dispatchable energy solution for the NSW electricity network and more broadly for the NEM.

The do-nothing approach would not improve system security of the NEM nor would it help provide a reliable and stable energy supply, or assist with providing the system reliability and storage capacity required to facilitate, support and secure private investment in renewable energy developments.

For these reasons, the 'do nothing' scenario would fail to contribute to fulfilling Neoen's objectives for the development, and consequently would not support the NSW Government's NSW Energy Strategy, the NSW Climate Change Policy Framework or the Central West and Orana Regional Plan, 2036.

This scenario would not meet the objectives of the Project and would deliver no Project benefits. Whilst the 'do nothing' approach, would mean that some margin agricultural land would not be developed, it would also mean that wider state level energy security benefits of the Project would not be realised. For these reasons, the 'do nothing' scenario is not the preferred option.

3.4.2 Option 2: construct and operate a BESS

Option 2 would involve the construction of the BESS at a location in close proximity to an existing Transgrid substation. Construction of the BESS at or close to an existing substation with available capacity is preferred to reduce potential environmental impacts, construction and operational costs and transmission losses. It also allows access to electricity from the wider network, as opposed to if the BESS was located at a point of generation.

The option to develop a BESS at a location in close proximity to an existing Transgrid substation would meet the Project objectives as this option would:

- Improve the security, resilience and sustainability of NSW's electricity grid with a cost effective, environmentally sensitive, and proven solution
- Allow for the firming capacity of renewable energy projects on the transmission network in the wider region through the ability to store energy and provide it to the grid when required
- Provide increased capacity to capture and utilise the curtailed energy from renewable projects throughout the region
- Help reduce the potential for future blackout or load shedding events that may occur as a result of an overburdened, underperforming network.

By constructing a BESS in proximity to an existing Transgrid substation, this option would reduce disruptions to energy supply, and therefore achieve the Project objectives described above.

3.4.3 Option 3: construct and operate an alternative energy storage project

There are number of existing and emerging alternative technologies that offer different ways of storing energy. These include:

- Pumped hydro
- Compressed air storage
- Solid state batteries
- Hydrogen fuel cells
- Flow batteries.

Some of these technologies will be able to help support the renewable energy transition, however some of them, such as pumped hydro and compressed air storage, require specific topographical or geological conditions, whereas the other battery options and hydrogen fuel cells, are an emerging technology, have higher capital costs or are not as efficient.

Lithium-ion batteries are at present, the most popular battery storage option, accounting for more than 90% of the global grid battery storage market (International Energy Agency, 2020). Compared to other battery options, lithium-ion batteries have high energy density, are lightweight, provide a high capacity for efficient energy storage and release, and their popularity and ease of manufacturing make them relatively cost effective.

Neoen has had proven success in the delivery of large-scale lithium-ion BESS technology for the purposes of providing dispatchable energy to the NEM. This is demonstrated by Neoen's successful construction and operation of the Hornsdale Power Reserve project in South Australia, which was the world's first large-scale lithium-ion battery energy storage system.

Frequency Control Ancillary Services is a process used by the energy market operator to maintain the frequency of the electricity system within the 'normal operating band' of around 50 cycles per second. This process is used to provide a fast injection of energy, or fast reduction of energy, to manage supply and demand as required. As set out in the Year 2 Report – Technical and Market Impact Case Study for the Hornsdale Power Reserve project (Aurecon, 2020), and in Neoen's global experience, the use of high capacity battery storage technology has had demonstrated success in improving the responsiveness and resilience of the electricity grid to changing energy demands. During the first two years of operation, the Hornsdale Power Reserve has reduced the cost of Frequency Control Ancillary Services by $156 million, a cost saving that directly benefited customers.

3.4.4 Preferred option

Given the considerations detailed above, the construction of a lithium-ion BESS was considered as the preferred option for the Project. As noted, Neoen has had demonstratable success in the delivery of this technology, and the delivery of a large-scale lithium-ion BESS represents a proven, cost effective and environmentally sensitive solution, capable of improving the security, resilience and sustainability of NSW's electricity grid. Therefore, it was considered that option 2 best meets the project objectives.

3.5 Site selection

3.5.1 Identifying the Site

A site selection process was undertaken for the Project. This process focused on the key requirements of this type of infrastructure, including proximity to physical services such as reliable road access, existing and available high capacity substations, and existing transmission line easements. Indeed, locating a BESS close to a high capacity substation allows to provide high levels of reliability to the network. As such, the locations considered for the Project were identified around these high capacity substations.

In addition, Neoen looked for substations close to load centres, as BESSs operate most effectively when they are close to major load centres such as major cities. To this end, substations that were close to Sydney were preferred. The substations that were most promising in terms of proximity to Sydney and access to private land were Wallerawang and Mount Piper.

The site identification process also considered the likelihood of potential environmental impacts and constraints, based on a review of the existing environment in the area. The availability of a number of locations around the Mount Piper and Wallerawang substations were investigated. Two available sites, one close to Mount Piper substation and one close to Wallerawang substation were available for purchase, within close proximity to the substations, and correctly zoned under the City of Lithgow Local Environmental Plan (LEP).

While the Mount Piper site within the City of Lithgow LGA was shortlisted as part of this process, this location was not considered to be as favourable a location as the Site for the following reasons:

- Reduced availability of key services and infrastructure, including the proximity of the closest high capacity substation and suitability of local roads
- The purchase availability of the secondary development site was less favourable
- The highly sloping topographic characteristics of the secondary development site was less favourable to constructability
- The local context was more rural in nature with a range of dissimilar existing developments, potentially increasing the sensitivity of receptors to potential impacts.

In consideration of the above, the Site was chosen as the preferred location for the development of the BESS.

3.5.2 Identifying the transmission line easement

A selection process was undertaken to determine the optimal alignment for the new transmission line component of the Project. This process focused on the key requirements of this type of infrastructure, including proximity to physical services such as reliable access to facilitate any maintenance requirement for the life of the Project, proximity to the selected Transgrid Wallerawang 330Kv substation. The transmission line alignment identification process also considered the likelihood of potential environmental impacts and constraints, based on a review of the existing environment in the area.

A total of 11 alignment options were initially considered for the Project. This included options that exited from the southern as well as the eastern boundary of the Site, passing through the township of Wallerawang and traversing local streets, as well as following the existing rail corridors in the vicinity of the Site. These 11 options were narrowed down to two (2) options that were assessed in the Great Western Battery Scoping Report (AECOM, 2020) that was prepared for the Project. These two options comprised the southern and the eastern transmission line options, and were described in the Scoping Report as follows:

- The southern transmission line alignment option exited from the south of the Site, travelling through the vegetated area to the south of the Site, crossing under Pipers Flat Creek before turning north of Wallerawang oval to head east. From here this option doglegged north, then east to traverse over Main Street, before travelling east through a vegetated area and adjacent Transgrid substation area before connecting to the Transgrid Wallerawang 330 kV substation
- The eastern transmission line alignment option exited from the eastern boundary of the Site, crossing Brays Lane and entering into the vegetated area to the east of Brays Lane. From here, it travelled in a north easterly direction, before passing under Pipers Flat Creek and into the existing rail corridor where it travelled south east along the rail corridor (including its crossing of Main Street) to connect to the south western portion of the Transgrid Wallerawang substation.

3.6 Justification of preferred option (the Project)

The Project is deemed justified in the proposed Wallerawang location and in this arrangement as it would:

- Be located within close proximity to key transmission infrastructure which itself is located close to identified future growth zones with regards to investment in renewable energy infrastructure

- Be close to the Transgrid Wallerawang 330 kV substation (which is currently one of the strongest in NSW) and therefore would be well located to provide support to the Central-West Orana REZ and its associated infrastructure
- In this location, the Project would deliver critical energy infrastructure that would help support the uptake and use of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy
- Be located on a site that when compared to other available options presents environmental impacts that are on balance equal to or less than other available options in the local area
- Present the most economical and environmentally sensitive technology and method of delivering a dispatchable energy facility
- Provide for an advantageous and economically beneficial use of land in a landscape that has a history of power generation and transmission alongside various rural land uses.

The design of the Project has been and will continue to be developed in consideration of a range of alternatives and options for achieving the need and objectives for the Project.

The design of the Project has been prepared with a view to the construction of similar layouts to that which Neoen have delivered in other locations. The advantages of this approach are a reduction in design costs, worksite familiarity for staff who have worked at other locations on similar projects, and the ability to take advantage of economies of scale though the procurement of standardised equipment.

3.7 Project benefits

The Project would provide the following benefits:

- Improving the security and resilience of the electricity grid
- Attracting new renewable energy investment and projects
- Attracting and growing local expertise in renewable energy technology
- Increasing competition and pushing electricity prices down
- Helping to avoid load shedding and blackouts and the associated costs.

A large-scale BESS can help reduce costs for consumers by supporting more investment in renewable energy technology, which generally represents cheaper forms of power, when compared to traditional fossil fuel driven power generation (such as coal fired operations). The above benefits would apply to a large proportion of NSW's residents who rely on a secure supply of electricity on a daily basis.

In delivering on the above benefits, the Project would address the specific technical and market needs in the NSW energy network, as identified in key strategic planning documents including:

- The NSW Transmission Infrastructure Strategy
- The NSW Electricity Strategy
- The NSW Climate Change Policy Framework
- The Central West and Orana Regional Plan, 2036.

The Project's alignment with these key strategic planning documents is discussed in more detail in **Chapter 5 Strategic and statutory context**.

4.0 Project description

4.1 Secretary's Environmental Assessment Requirements

The SEARs relevant to the description of the Project are summarised in **Table 4-1**.

Table 4-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
This EIS must include: • A full description of the development, including: - Details of construction - Operation and decommissioning - A site plan showing all infrastructure and facilities (including infrastructure that would be required for the development, but the subject of a separate approvals process).	This chapter provides a detailed description of the Project. An overview of the Project is provided in **Section 4.2**. This includes a description of built form, required infrastructure, and servicing arrangements. Further detail regarding the construction, operation and decommissioning of the Project is provided in **Section 4.3**, **Section 4.4**, and **Section 4.5** respectively. **Figure 4-1** presents the proposed layout of the Project.
The EIS must also be accompanied by a report from a suitably qualified person providing: a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; and certification that the information provided is accurate at the date of preparation.	**Section 4.6** provides the Capital Investment Value (CIV) for the Project. A CIV report has been prepared for the Project by Neoen and has been provided to DPE separately.

4.2 Project overview

The Project comprises a BESS with a capacity of approximately 500 MW, and 1000 MWh, that would store and discharge energy from the electricity network, and a new underground transmission line that would connect the BESS to the existing Transgrid 330 kV substation at Wallerawang.

Key features of the Project are summarised in **Table 4-2**. These features comprise the proposed development for which development consent is sought under this State Significant Development Application (SSDA).

Table 4-2 Key features of the Project

Project	Great Western Battery
Key features of the Project	
Key features	• Construction and operation of a BESS with a capacity of approximately 500 MW and 1000 MWh • Connection of the BESS via a new underground transmission line (up to 330 kV) to the existing Transgrid 330 kV substation at Wallerawang.
Proposed development	The Project would generally involve the following components: • Site establishment, including installation of fencing, environmental controls, grading and other civil works • Rearrangement of existing dams on the Site to ultimately comprise two dams, with associated dam walls and spillways (this is discussed in more detail in **Chapter 11 Surface water, flooding and water use**)

Project	Great Western Battery
	• Construction of stormwater and flooding controls including a bioretention basin, and swales that would divert water towards the two dams and ultimately, convey water from the Site • Establishment of a new driveway located at the southern boundary of the Site, providing access to the Site from Brays Lane • Installation, commissioning, and operation of a large-scale BESS including battery enclosures, inverters, and transformers • Construction of new 330/33 kV substation on the Site (including outdoor switchgear (up to 330 kV) and transformers) • Construction of 10 m high noise walls around each battery row and around each transformer within the new 330/33 kV substation • Inclusion of a 10 m buffer (or Asset Protection Zone (APZ)) around all required infrastructure. This buffer area would comprise non-combustible ground cover with no vegetation present • Installation of a new underground transmission line from the BESS to the existing Transgrid Wallerawang 330 kV substation. This would be constructed primarily using a trenching method, however underboring would be utilised where required to avoid areas of environmental sensitivity associated with waterways, biodiversity and Aboriginal heritage, as well as railway crossings. This cable would be approximately 1.5m underground • Connection of the new transmission line with the existing Wallerawang 330kV substation switchyard alongside minor upgrades to the switchyard • Construction of two single-story permanent operations and management (O&M) buildings • Construction of one control room and three switch rooms • Establishment of a new driveway and access road (up to 10 m wide), located at the south-western boundary of the Site, providing access to the Site from Brays Lane • Construction of a permanent car parking area with spaces for up to eight light vehicles • Installation of lighting, security fencing and security devices around the perimeter of the BESS area and 330/33 kV substation on the Site Installation of two 45 kL metal water tanks • Establishment of landscaping and screening vegetation • Provision of fire alert equipment • A 400 kilovolt ampere (kVA) diesel generator with a 24-hour tank capacity would be stored at the Site for use during operation or use in case of an emergency • Vegetation trimming of trees located on Brays Lane, at the Site entrance. Any vegetation trimming would be limited to that required to provide egress for oversized vehicles during construction • Inclusion of gravel or road base on the outer edge of the final right hand turn on Brays Lane before entering the Site to assist with the movement of overmass / oversized vehicles • Subdivision of Lot 4 DP 751651 to separate the existing rural residential use of the Lot from the proposed BESS
Project layout	Refer to **Figure 4-1**.
Site description	• The location of the Site is at 173 Brays Lane, Wallerawang, 2845, NSW. The Project would only occupy a portion of the total area of the Site. • The Transgrid Wallerawang 330 kV substation located at James Parade, Wallerawang

Project	Great Western Battery
	• The new transmission line would connect the BESS at the Site to the Wallerawang 330 kV substation (Lot 91 DP 1043967). In addition to the Site and the Wallerawang 330 kV substation, this new transmission line would cross the following lots: - Lot 8 and Lot 9 DP 252472 - Lot 2 DP 108089 - Lot 1 DP 108089 - Lot 10 DP 1168824 - Lot 1115 DP 1204803.
Access	• Access to the Site would be via Brays Lane • From the north, access to Brays Lane and the wider Project Area would be via the Castlereagh Highway • From the south, access to Brays Lane and the wider Project Area would be via the Great Western Freeway, Barton Avenue, and Pipers Flat Road • Heavy and oversized / overmass vehicles would access the Site from the Castlereagh Highway via Main Street and Pipers Flat Road to Brays Lane • The new transmission line would be accessed via Brays Lane and / or Main Street, Wallerawang. Main Street can also be accessed from the Castlereagh Highway and the Great Western Freeway.
Grid connection	• An underground 330 kV transmission line from the Site to the Transgrid Wallerawang 330 kV substation (approximately 1.5km) would be constructed using a combination of trenching and underboring construction methods • Within the substation perimeter, the transmission line would come above ground to connect to the substation switchyard.
Construction	
Construction activities	Construction works would involve: • Enabling works and prefabrication • Civil, structural, mechanical and electrical works • Installation of transmission line • Commissioning • Finishes and demobilisation A construction laydown, stockpiling and parking area would also be provided on the Site.
Plant and equipment	A range of plant and equipment would be used during construction. The final equipment and plant requirements would be determined by the construction contractor. Indicative plant and equipment have been broadly categorised into the following activities: • Enabling works and prefabrication - Front end loaders - Dump trucks - Road trucks to deliver materials, plant, equipment and pre-fabricated elements of the Project - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: - Front end loaders

Project	Great Western Battery
	- Bobcat - Dump trucks - Road trucks - Excavators - Graders - Scrapers - Compactors - Water trucks - Hydro Vacuum Excavator - Concrete trucks and pumps - Elevated work platforms - Cranes - Concrete saws and grinders - Compacters and rollers - Scrapers - Backhoe - Generators (where connection to existing utilities is not available) - Light vehicles, heavy rigid and articulated trucks (including multi trailer) low loaders • Installation of transmission line: - Directional drilling rig truck and associated infrastructure (i.e. drilling fluid recovery and recycling unit) - Pump/s for dewatering - Hydro Vacuum Excavator - Telehandlers - Water Trucks - Excavators/backhoe - Graders - Compactors - Light vehicles - Excavators - Concrete saws and grinders - Crane Truck - Tipper Truck - Cable installation kit: Rollers, crawlers, cable winches, synthetic draw ropes - Concrete supply • Commissioning: - Elevated work platforms - Cranes - Generators (where connection to existing utilities is not available) - Light vehicles • Finishes and demobilisation: - Heavy vehicles - Water trucks - Backhoe - Compactors - Light vehicles
Construction duration	• Construction of the Project will take approximately 12 months to complete
Construction workforce	• Up to 250 construction workers would be required at the busiest peak of construction for a period of about two months • Outside of this peak time, an average of about 50 workers a day would be required

Project	Great Western Battery
	• These workers would be preferentially sourced locally where appropriate skill sets are economically available.
Construction hours	The construction activities would be primarily carried out during standard construction hours, as defined by the NSW Environment Protection Authority's (EPA) *Draft Construction Noise Guideline* (2020), being: • 7am to 6pm, Monday to Friday • 8am to 1pm, Saturdays • No work on Sundays or public holidays. While it is anticipated that work would primarily take place during standard construction hours, some works may be required to be undertaken outside of standard hours. Where this would be required, this would occur Monday to Saturday, 6am to 6pm. Where work outside of standard hours may be required, the noisiest works would be scheduled to occur during standard hours listed above.
Construction traffic volumes	On average, construction of the Project would require up to 50 light vehicles, and 20 heavy vehicles per day. During the two months that would comprise the peak construction period, up to 140 vehicle movements a day would be required. Oversized and over mass vehicles are expected to be required to deliver large pre-fabricated elements for the construction of the Project. This is likely to include eight (8) oversized vehicles to transport the crane, transformers, switch rooms and control room to the Site. The transformers are expected to weigh between 140 to 180 tonne (T) each. The switch rooms would be about 23 m long x 4.5 m wide x 4 m high and would weigh about 60T.
Operation	
Operational life expectancy	The Project has an initial design life of 20 years. There is potential to extend the life beyond 20 years, in which case components are anticipated to be replaced or upgraded as required.
Operational workforce	• The Project would be an unmanned facility that is managed remotely • Between five to six employees would be required to attend the Site periodically for maintenance activities.
Operation maintenance equipment	• Light vehicles • Lawn mowers • Assorted hand-held power-tools • Pressure washers.
Security	• Up to a 2.7-metre-high security fence would be constructed around the perimeter of the BESS • All access to the BESS would be controlled through an access point off Brays Lane • Areas within the Site not required for the operation of the BESS would be rehabilitated to as close to its existing condition as practical. This remaining land would be fenced with stock fencing or similar.
Typical operating scenario	• The BESS is expected to operate on a 24 hour per day, seven days per week basis • The BESS is expected to undergo approximately one charge and discharge cycle per day, averaging 365 full cycles per year.
Services and infrastructure	Existing services and utility infrastructure in the nearby vicinity would be extended, adapted and augmented to meet the demands of the Project. This would include a connection to the existing potable water supply and the existing 11 kV electricity line, located within Brays Lane. This connection

Project	Great Western Battery
	would be made within Brays Lane (as shown on **Figure 4-1**) and would travel underground (using a trenching method) to connect with the new O&M building on the Site. A water holding tank would be installed in the vicinity of the new O&M building to collect wastewater generated during the operation of the Project (from worker facilities). During operation, the water holding tank would be periodically collected by a licenced operator, and wastewater would be appropriately disposed of offsite.
Decommissioning	
Decommissioning	The BESS is intended to have an operational life of up to 20 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe. Following the end of economic life, above ground components would be removed and re-purposed where possible and land rehabilitated to achieve existing conditions as far as is reasonably practicable, if and as required, in accordance with applicable Federal, State, and Local legislative permits, approvals and regulatory requirements at the time.

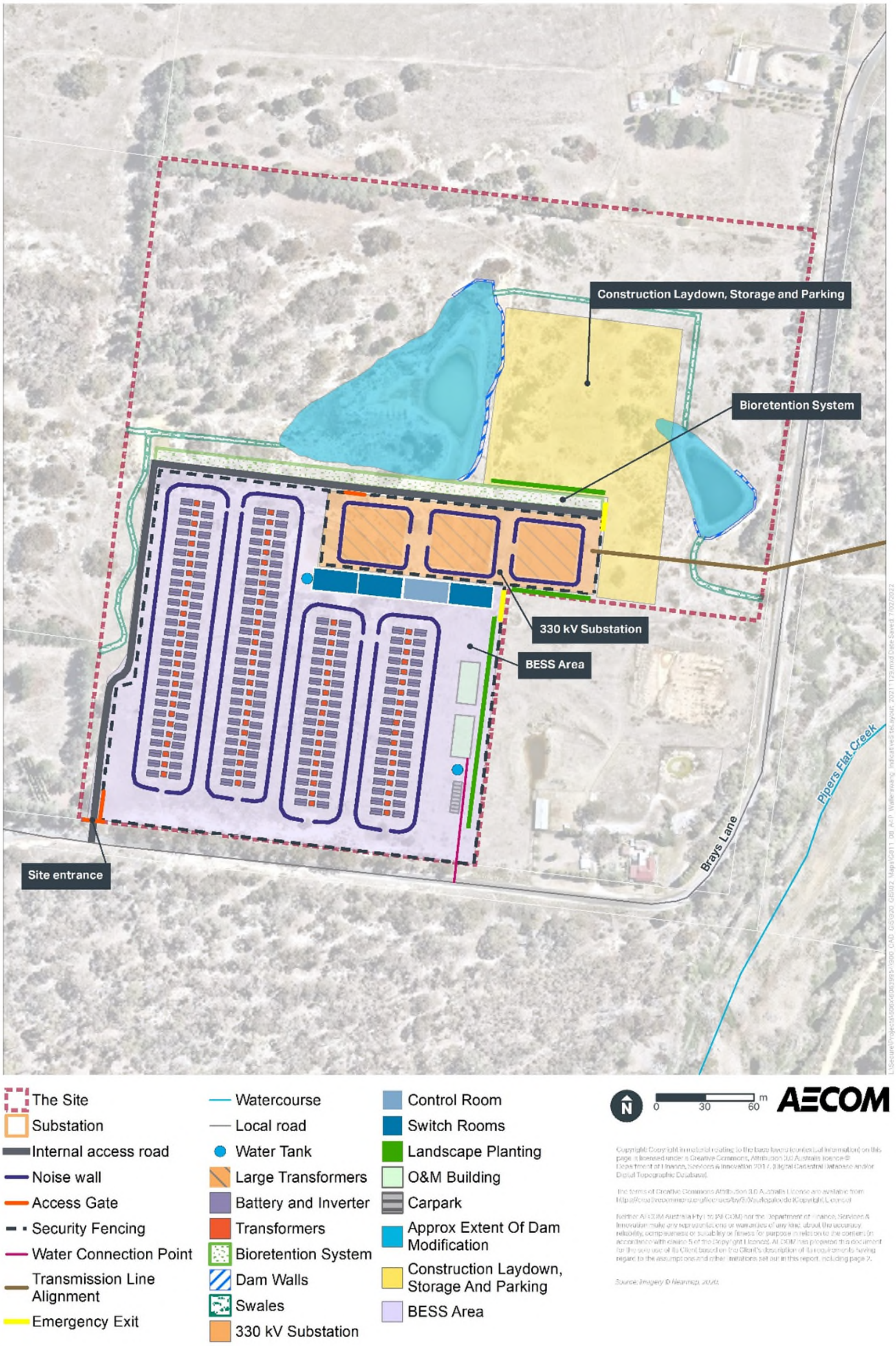


Figure 4-1 Indicative layout of the Site

Figure 4-2 Location of proposed transmission line route

4.2.1 Battery storage technology and plant

Battery energy storage system

The BESS technology provider for the Project is yet to be determined and therefore the Project would be subject to ongoing design refinement and procurement activities. The BESS would ultimately consist of a series of containerised or stacked lithium-ion type batteries with associated integrated elements.

The integrated battery units are anticipated to be approximately 2.5 m tall and have a footprint of approximately 3.5 m by 7 m each. The integrated battery units would be arranged in a series of rows, or groupings that consist of the lithium-ion battery cells, inverters, medium voltage (MV) transformers, associated control systems, heating, containerised ventilation, and air condition (HVAC) units.

It is anticipated that the battery modular units would be mounted on a compacted gravel or concrete slab.

The BESS is intended to have an operational life of up to 20 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe. Following the end of economic life, above ground components would be removed and re-purposed where possible. The land would be rehabilitated consistent with the surrounding area, and in accordance with legislative requirements to achieve pre-development conditions as far as is reasonably practicable, if and as required.

An onsite substation comprising up to three transformers would occupy around 1 hectare of the Site. It would be constructed on gravelled hardstand and be bounded by security fencing that would be delineate the substation from the BESS. The maximum height of the infrastructure (the lightning rods) within the substation would be 20 metres, whereas the main transformers within the 330 kV substation on the Site would have a height of approximately 8 m. This substation would connect to the new transmission line.

Operations and management infrastructure

Two single-story O&M office buildings, one control room and three switch rooms would also be included as part of the Project. The O&M office buildings would be designed to be about 12 m wide x 25 m long and 5 m high

The control room and switch rooms would be about 23 m long x 4.5 m wide x 4 m high. As the switch rooms would sit elevated above the ground surface on piers measuring about 2.2 m high, they would constructed to a maximum height of approximately 7 m.

Refer to **Figure 4-1** for the indicative location of these three elements (O&M buildings, switch rooms and control room).

Battery Management System

A Battery Management System (BMS) is a system control unit with the capacity to monitor, control, and optimise the performance of a BESS. It also provides a mechanism that can be used to control the disconnection of a BESS from the system in the event of abnormal conditions.

The Project's BESS would be connected to a BMS product that provides a range of safety measures including:

- Preventing overcharging and current surges
- Maintaining voltage levels and ensuring the automatic cut-out in the event of electrical shorts
- Overheating or other unplanned events.

A heating, ventilating, and cooling system would maintain the batteries in the enclosure within safe operational temperature limits.

4.2.2 Access, circulation and parking

Access

The traffic access routes for the Project are summarised in **Figure 4-3**. From the north, the Site can be accessed via the Castlereagh Highway, which feeds traffic directly onto Brays Lane. The Site is located about 1.5 km from the intersection of the Castlereagh Highway and Brays Lane. From this intersection to the bridge crossing of Cox's River, Brays Lane is a well maintained, wide, paved, dual lane road. The bridge crossing is one-lane wide. Between the bridge and the Site, Brays Lane narrows and comprises a sealed, bi-directional road. The majority of light vehicles associated with the construction traffic are expected to access the Site via the Castlereagh Highway and Brays Lane.

From the south, traffic can turn from the Great Western Freeway to Barton Avenue, which provides access into the township of Wallerawang. From Barton Avenue, traffic would turn onto Pipers Flat Road, which then leads to Brays Lane, and the Site. The Site is located about 1.35 km from the intersection of Pipers Flat Road and Brays Lane. This stretch of Brays Lane comprises a sealed, bi-directional road. Two road culvert crossings occur over Pipers Flat Creek, and over a small unnamed tributary of Pipers Flat Creek.

The majority of the heavy vehicles (up to B-doubles) and all of the oversized / over mass vehicles would access the Site via the Castlereagh Highway / Main Street intersection and then turn onto Main Street Wallerawang before connecting to Pipers Flat Road and Brays Lane. Some heavy vehicles (up to B-doubles) may access the Site from the Great Western Highway / Barton Avenue intersection and travel onto Barton Avenue, and Pipers Flat Road, and then to Brays Lane, and the Site. As the Castlereagh Highway and Great Western Highway and are approved B-double routes they are considered to be in an appropriate condition to accommodate heavy vehicles required of the construction of the Project.

A new access point on to the Site would be constructed off Brays Lane, at the south western most corner of the land (refer to **Figure 4-1**). This new access point would be used for construction and eventually operation. Some vegetation would be cleared and gravel or road base laid down on the outer edge of the final right hand turn on Brays Lane before entering the Site to allow for heavy and oversized / overmass vehicles to turn the corner (as shown on **Figure 14-2**).

If required, temporary bridging beams would be used to accommodate the proposed weight of oversized vehicle loads crossing the culverts on Brays Lane. The two culverts on Brays Lane would be checked for capacity to carry the weight of oversized vehicles. If these culverts cannot support the axle loads of the heavier vehicles, then temporary bridging beams would be used to cross the culverts. An example of a temporary bridging beam is provided in **Appendix I (b) Route Study**. The temporary bridging beams would be laid over the top of the existing road surface and culverts. No earthworks or roadworks would be required. At the completion of vehicle movements the temporary bridging beams would be removed. Further detail on the temporary bridging beams is provided in **Chapter 14 Traffic and access**.

The proposed new transmission line easement located outside the boundaries of the Site would be accessed via Brays Lane and / or Main Street, and via the existing rail corridor, in which it would be part located.

During the peak of construction, which would be about two months in duration, the following traffic volumes are anticipated:

- Up to 250 construction workers per day would be accessing the Project Area during peak construction periods of the Project (these workers would access the Site by no more than 50 light vehicles a per day and the remainder would be transported to Site in a shuttle bus)
- Up to 20 heavy vehicles per day are anticipated on average to access the Project Area during the construction period.

Construction activities are proposed to be carried out over 11 hours per day.

Circulation

Internal access roads would be provided to enable vehicular access around the Site during both construction and operation. The internal access roads are indicatively shown on **Figure 4-1**. A turn-around area would be provided within the construction laydown area.

Parking

Approximately eight car parking spaces would be provided for the operation of the Project. The amount of parking supplied for the operational phase is consistent with the low operational staffing needs of the Project.

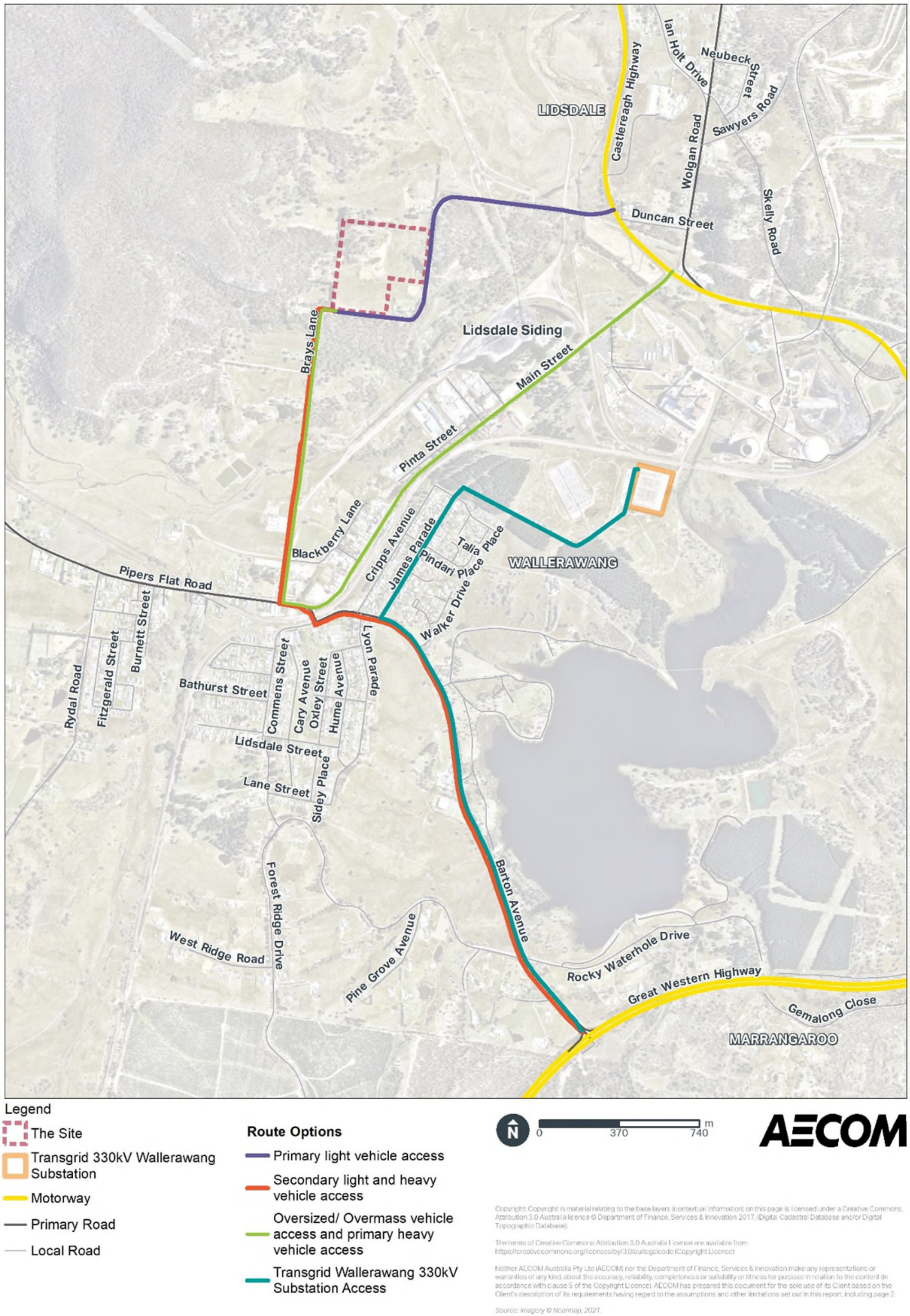


Figure 4-3 Traffic access routes for the Project

4.2.3 Transmission connection

A new underground transmission line would be constructed to connect the BESS part of the Site to the Transgrid Wallerawang 330 kV substation. It is expected that the new transmission line would be approximately 1.5 km in length and would be located underground. The cable would have a voltage of up to 330 kV.

The transmission line could connect to the northern section of the Transgrid Wallerawang 330 kV substation. This would involve the following activities:

- Site establishment, including the temporary removal of existing security fencing at the northern end of the Transgrid Wallerawang 330 kV substation, installation of mobile security fencing to allow for construction access while restricting community access, establishment of erosion and sediment controls and location of lay down areas as required.
- The transmission line would be installed underground using a combination of trenching and underboring methodologies. Underboring is proposed to be used to avoid areas of environmental sensitive that have been identified, including those related to Aboriginal heritage, biodiversity, Pipers Flat Creek, and rail crossing. All other areas of the new transmission line would be installed using trenching.
- Underboring would take place using horizontal direction drilling (HDD). HDD is a trenchless construction method for installing conduits that is associated with less surface ground disturbance than trenching.
- For HDD, a launch pit would be constructed to accommodate plant and equipment (including an area to layout the conduit, conduct pipe-stringing activities, and to set up a drill rig). A drill rig is used to bore an opening in the ground through which a pipe is passed through. The hole is opened by passing progressively larger pipes through the bore hole until a sufficient diameter is reached to allow the conduits to be passed through. Drilling fluid is used in the process of HDD, which comprises a mixture of water and biologically neutral drill additives (such as bentonite). This fluid is continuously pumped through the bore and serves multiple purposes, including cooling the drill cutting head, removing cuttings, stabilising the bore hole and lubricating the passage of the conduits. Slurry generated from the drilling fluid would be primarily captured and reused in the HDD process. When this is no longer feasible the waste slurry would be collected and appropriately disposed.
- Where it would be located within the boundary of the Transgrid Wallerawang 330 kV substation, the new transmission line would transition to an above ground arrangement to allow for a connection point to be established
- The transmission line would be connected to the Transgrid Wallerawang 330 kV substation
- Following the completion of this work, all trenched areas would be backfilled, any grassed areas would be re-established, and the permanent security fencing would be reinstalled.

4.2.4 External security

A permanent security fence would be constructed around the perimeter of the BESS for the operation of the Project. This permanent fence would be approximately 2.7 m in height and would comprise an anti-climb weld-mesh fence (or similar), with coiled razor or barbed wire capping the top of the fence.

Access to the Site during operation would be restricted by locked security gates, to allow for authorised access only. In addition, movement-triggered security lighting and security devices such as closed circuit television (CCTV) cameras would be installed around the perimeter of the BESS compound for the operation of the Project.

During operation, the reminder of the Site not occupied by the BESS and the substation would have a perimeter fence comprising of stock fencing or similar.

4.2.5 Subdivision

The Project involves the subdivision of Lot 4 DP 751651 to separate the rural residential use that would remain across much of the Lot from the proposed BESS. After construction, the subdivision would aim to return as much land back to the landowner and leave only the essential operational BESS infrastructure.

Following subdivision of the Lot, the area occupied by the BESS would be about 7 hectares (ha) in size and would potentially form a new ‘Lot 5’ of DP 751651. The remaining part of the lot (around 9.5 ha) would be returned to the existing property owner (Lot 4). The proposed subdivision is shown on **Figure 4-4**.

During operation Lot 5 would be used for the ongoing operation of the BESS and would be land used for the purpose of electricity generating works. Lot 4 would continue to be used for rural residential proposes.

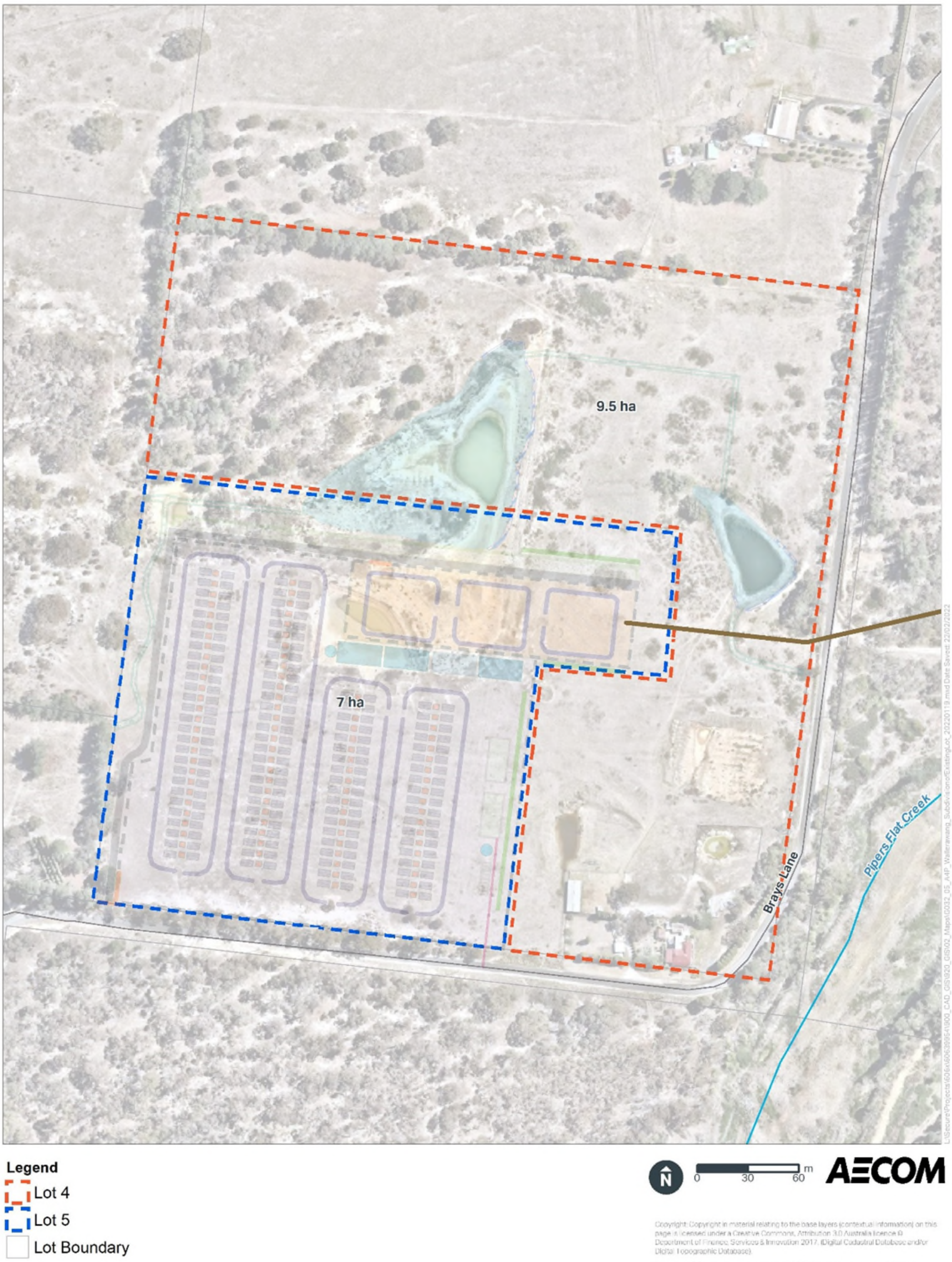


Figure 4-4 Subdivision of the existing lot

4.2.6 Infrastructure services

Table 4-3 summarises the existing service infrastructure in proximity to the Site, and the amendments required in order to service the Project.

Table 4-3 Infrastructure services

Infrastructure	Amendment/connection requirement
Stormwater	A concept level stormwater design has been developed. The stormwater design includes the adjustment of existing dams on the Site to ultimately comprise two dams. Each dam would be constructed to provide appropriate dam walls and spillways. The detailed design of the dams would be undertaken in accordance with any relevant requirements outlined in Lithgow LEP 2014, the Lithgow Rural Residential Development Control Plan. Stormwater and flooding controls would also include the construction of a bioretention basin, and swales that would maintain water quality and divert surface water towards the two dams and ultimately, convey water from the Site. Refer to **Chapter 11 Surface water, flooding and water use** and **Appendix G Water Cycle Management Study** for further detail.
Potable and non-potable water	During construction, is anticipated that approximately 2,000 litres of water per day would be required per day during peak construction (during the civil, structural, mechanical, electrical and transmission connection works phase), inclusive of dust suppression requirements. This water would be sourced from onsite dams, the local water supply, or from treated wastewater that would be trucked to the Site. Construction workers would also contribute to water consumption. This would require a temporary higher demand for potable water. It is noted that during the two months of peak of construction, up to 250 workers may attend the Site in a day, however this number would more typically be about 50 workers a day outside of the peak construction period. Potable water would initially be delivered to the Site with water trucks until such time as a potable water connection is established. During operation the Project would be connected to the existing potable water reticulated service available on Brays Lane. This would service the site office and the operation of the Project.
Sewer	During construction, the wastewater generated by temporary portable worker facilities would be collected by a contractor and disposed offsite at a suitable facility. Washdown bays for construction vehicles and equipment would be containerised and collected for offsite disposal. During operation, the Project would not be connected to an existing sewer network. A water holding tank would be installed to collect sewer waste at the Site during operation.
Electricity	During construction, the Project components at the Site not connected to the BESS (e.g. site office and lighting) would be connected to the existing low voltage electrical above ground network that services other premises along Brays Lane. A 24-hour generator may be stored on site for use if required. During operation, electricity would be provided though the new substation connection point.
Fire services	• Fire detection devices would be installed inside the enclosures • A gas suppression system would be installed within the control room and switch room if required by Australian standards and through a safety in design review • Connection to existing potable water would be established • Two 45 kL metal water tanks would provide water to the Site.

4.3 Project construction

This section describes the anticipated stages of construction and associated construction activities. The construction methodology would be further refined during the detailed design phase and in consultation with the delivery contractor, once engaged.

4.3.1 Construction methodology

The construction of the Project would be likely to include the following:

Enabling works

- Site preparation: establishing site access, establishing erosion and sediment controls, establishing marked no go areas, site clearing, installing security fencing, establishing laydown areas, establishing construction amenities (including temporary offices, lunchrooms, storage areas and washrooms)
- Transportation of plant, equipment, materials and workforce to and from the Site as required.
- Provision of construction power: installing on site generators until power can be sourced from the existing distribution network.

Civil, structural, mechanical and electrical works

- Earthworks to form a level and benched BESS pad and new substation area, as well as to infill certain dams and expand retained dams. These works would include potential import or export of fill as required
- Rearrangement of existing dams on the Site to ultimately comprise two dams. One larger dam to the north west of the site and one smaller dam to the east of the Site. For each dam, the required dam walls and spillways would be provided
- Installation of Site drainage, stormwater management measures, including swales and bioretention basin, and underground utilities installation
- Transport of project elements including but not limited to the battery enclosures, transformers, water tanks, O&M buildings and switch rooms
- Connections to surrounding utilities
- Installation of noise walls
- Hardstand foundations in the form of compressed gravel or concrete slab would be laid to support BESS battery enclosures, site facilities and ancillary components (including the new substation and water tank)
- Construction, installation and connection of aboveground civil, mechanical and electrical plant equipment and structures, including battery enclosures, invertors, transformers, substation infrastructure and connection infrastructure
- Construction of supporting structures, e.g. office building and associated amenities, workshop, formal access, permanent fencing and internal roads
- Construction of transmission connection between the Site and the Transgrid Wallerawang 330 kV substation including installation of supporting infrastructure, laying and connecting the transmission line, and minor enabling works at the Wallerawang 330 kV substation.

Commissioning

- Testing and commissioning activities. Commissioning would include the operation of all elements of the Project ensuring the Project is operating safely and in accordance with quality and environmental management systems and processes.

Finishes and demobilisation

- Installation of landscaping and rehabilitation of disturbed areas (e.g. laydown areas)
- Removal of construction equipment and construction facilities.

4.3.2 Materials, stockpiling and laydown areas

The location at the Site for construction laydown, storage and parking is shown on **Figure 4-1**, and would provide for:

- Spoil handling and storage
- Dangerous goods storage
- Equipment storage
- Onsite construction parking
- Construction compounds with site offices and staff amenities.

The location of where each of these specific elements would occur would be outlined within the Construction Environmental Management Plan (CEMP). The CEMP would be prepared by the contractor prior to the commencement of construction.

Construction laydown, storage and parking areas would be compacted and sheeted (for example with asphalt), as required. All areas would have adequate drainage and erosion and sediment controls installed.

4.3.3 Transmission connection

The proposed new transmission line would be installed below ground using a combination of open trench and underboring methods. Underboring would be employed where required to avoid areas of sensitivity (such as Pipers Flat Creek, sensitive vegetation, areas of Aboriginal heritage sensitivity, and rail crossings).

To construct the new transmission line using open trenching, a small excavator would be used to dig a trench to the appropriate depth, and excavated materials would be temporarily stockpiled adjacent to the trench to use as backfill. The depth to which the trench would be dug would allow for the correct overlying coverage required by the relevant Australian standards, codes, regulations and guidelines (such as the National Electricity Network Safety Code for a 330kV cable and the *Electricity Supply (Safety and Network Management) Regulation 2014*). However, the depth of the trench is unlikely to exceed 1.5 m below ground surface (BGS). A ballast such as sand would be laid in the trench, followed by the cable and required cable accessories and connections. Once the cable installed, the trench would be backfilled using the previously stockpiled materials (where possible). The method would be employed progressively along the alignment, to limit the extent of exposed soil at any given time during the construction of the new transmission line.

Underboring would take place using horizontal direction drilling (HDD). HDD is a trenchless construction method for installing conduits that is associated with less surface ground disturbance than trenching.

For HDD, a launch pit would be constructed to accommodate plant and equipment (including an area to layout the conduit, conduct pipe-stringing activities, and to set up a drill rig). A drill rig is used to bore an opening in the ground through which a pipe is passed through. The hole is opened by passing progressively larger pipes through the bore hole until a sufficient diameter is reached to allow the conduits to be passed through. Drilling fluid is used in the process of HDD, which comprises a mixture of water and biologically neutral drill additives (such as bentonite). This fluid is continuously pumped through the bore and serves multiple purposes, including cooling the drill cutting head, removing cuttings, stabilising the bore hole and lubricating the passage of the conduits. Slurry generated from the drilling fluid would primarily be captured and reused in the HDD process. When this is no longer feasible the waste slurry would be collected and appropriately disposed.

4.3.4 External security

During construction, a temporary security fence would be constructed around the perimeter of the Site. This temporary fence would be approximately 2.7 m in height and would comprise a cyclone wire chain link fence (or similar). Access to the Site during construction would be controlled by security gates to facilitate authorised access only.

4.3.5 Construction program

An indicative schedule for construction is provided in **Table 4-4**. Some of the stages below are expected to be conducted concurrently.

Table 4-4 Indicative construction schedule

Task / stage	Date/ duration
Enabling works	1-3 months
Civil, structural, mechanical and electrical works	10-12 months
Commissioning	1-2 months
Finishes and demobilisation	<1 month
Total construction duration	12-14 months

4.3.6 Construction plant and equipment

Table 4-2 provides the likely list of the plant and equipment that would be used to construct the Project. The equipment list would be further refined during detailed design.

4.3.7 Construction traffic

From the north, the Site can be accessed via the Castlereagh Highway, which feeds traffic directly onto Brays Lane. From the south, traffic can turn from the Great Western Freeway to Barton Avenue, which provides access into the township of Wallerawang. From Barton Avenue, traffic would turn onto Pipers Flat Road, which then leads to Brays Lane, and the Site.

The proposed transmission line would be accessed via Brays Lane and / or Main Street, and via the existing rail corridor in which it would be located.

A new access driveway on to the Site would be constructed off Brays Lane at the most south west corner of the Site. This new access point would be used for construction and eventually operation. An internal access road would also be provided for construction traffic to navigate to the construction laydown, storage and parking area where vehicles would be able to park, offload deliveries, and turn to exit, the new access driveway, internal road and construction laydown, storage and parking area are shown on **Figure 4-1**.

During construction, the Project would introduce additional traffic to Brays Lane, generated as a result of the delivery of plant, equipment and materials and the movement of workers. This additional traffic would generally consist of up to 50 light vehicles and 20 heavy vehicles per day. However, during the peak of the proposed construction schedule, this may comprise up to 140 vehicle movements per day.

Heavy vehicles would be required for the delivery of construction equipment, removal of spoil (if required) and the delivery of the various Project components, including pre-fabricated elements. Light vehicles would be used by the construction workforce. Oversized and over mass vehicles are expected to be required to deliver large pre-fabricated elements for the construction of the Project. This is likely to include eight (8) oversized vehicles to transport the transformers to the Site, in addition to the switch rooms and O&M building. Gravel or road base would be laid down on the outer edge of the final right hand turn on Brays Lane before entering the Site to allow for heavy and oversized / overmass vehicles to turn the corner (as shown on **Figure 14-2**). Temporary bridging beams may also laid down over the culverts on Brays Lane to help facilitate the movement of oversized and over mass vehicles.

During construction, parking would be provided for up to 50 light vehicles within the Site, in the construction and storage, laydown and parking area shown on **Figure 4-1**. Overspill parking for workers would be provided at a location that would be determined in consultation with Lithgow City Council. The selection of this site would seek to minimise local parking impacts to the community. Workers would be bussed from this parking overflow location to the Site. (refer to **Chapter 14 Traffic and access** for further detail). A Construction Traffic Management Plan (CTMP) would be prepared as part of the CEMP and would be implemented prior to the commencement of construction.

No parking of workers vehicles (light or heavy) would occur along the verges of Brays Lane or on other public roads.

4.3.8 Construction workforce and hours

It is anticipated that up to 250 construction workers (at peak) would be required to complete the construction works. These workers would be preferentially sourced locally where appropriate skill sets are economically available.

The construction activities would be primarily carried out during standard construction hours, as defined by the NSW Environment Protection Authority's (EPA) *Draft Construction Noise Guideline* (2020), being:

- 7am to 6pm, Monday to Friday
- 8am to 1pm, Saturdays
- No work on Sundays or public holidays.

While it is anticipated that work would primarily take place during standard construction hours, some works may be required to be undertaken outside of standard hours. Where this would be required, this would occur Monday to Saturday, 6am to 6pm. Where work outside of standard hours may be required, the noisiest works would be scheduled to occur during standard hours listed above.

4.4 Operation activities

4.4.1 Operational activities

The operation of the Project would involve but not be limited to the following:

- Maintenance and management of equipment, site buildings and landscaping
- General office activities
- Receipt of goods
- Waste removal.

4.4.2 Operational workforce and hours

The Project would operate 24 hours a day, 7 days a week.

The Project is expected to undergo approximately one charge and discharge cycle per day, averaging 365 full cycles per year. A cycle is defined by the full depth of discharge plus the full depth of charge. For a 500 MW facility this would mean that up to 2 GWh could be exchanged through the battery in a day. This will likely change depending on whether the battery is contracted to provide specific services.

The Project would be an unmanned facility that is managed remotely by Neoen. It is anticipated that five to six employees would be required periodically for maintenance activities.

4.4.3 Operational plant and equipment

Table 4-2 provides an indicative list of the plant and equipment that would be used to maintain the Project.

4.5 Project decommissioning

The BESS is intended to have an operational life of up to 20 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe. Following the end of economic life, above ground components would be removed and re-purposed where possible and land rehabilitated to achieve existing conditions as far as is reasonably practicable, if and as required.

All decommissioning and restoration activities would be in accordance with applicable Federal, State, and Local legislative permits, approvals and regulatory requirements at the time.

Demolition and remediation works are subject to certain environmental approvals and safeguards.

4.6 Estimated Capital Investment Value

The Capital Investment Value (CIV) of the Project would be approximately $400m.

5.0 Strategic and statutory context

5.1 Secretary's Environmental Assessment Requirements

Table 5-1 sets out the SEARs relevant to the strategic and statutory context and where the requirements have been addressed in this EIS.

Table 5-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
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: • https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and • http://www.environment.gov.au/epbc/publications#assessments	This chapter details the relevant policies and plans that have been considered by the assessment provided in this EIS.

5.2 Strategic context

5.2.1 Lithgow Community Strategic Plan 2030

The *Lithgow Community Strategic Plan 2033* (Lithgow CSP) (Lithgow City Council, 2017) sets out the community's vision for the strategic direction of the Lithgow LGA. The Lithgow CSP is divided into five key themes and addresses social, environmental, economic and civic leadership matters in an integrated manner. The five themes include:

- Caring for our Community
- Strengthening our Economy
- Developing our Built Environment
- Enhancing our Natural Environment
- Responsible Governance and Civic Leadership.

The overall vision for the future of Lithgow City Council is to create a centre of regional excellence that encourages community growth and development and contributes to the efficient and effective management of the environment, community and economy for present and future generations. To aid in achieving this vision, the Lithgow CSP outlines focus areas within each key theme identified above, as outlined in **Table 5-2**.

Table 5-2 Focus areas of the key themes outlined in the Lithgow CSP

Key theme	Focus area
Caring for our Community	To retain, respect and strengthen both the overall sense of community, and the unique linked communities of groups, rural areas, villages and towns that make up the Lithgow LGA
Strengthening our Economy	To provide for sustainable and planned growth through the diversification of the economic base, the development of diverse job opportunities and the provision of a broad range of formal and non-formal educational services
Developing our Built Environment	To provide a choice of effective public and private transport options, suitable entertainment and recreational facilities, and lifestyle choices while enhancing the existing rural areas, villages and towns that make up Lithgow LGA
Enhancing our Natural Environment	To balance, protect and enhance the diverse environmental elements, both natural and built, for the enjoyment and support of both current and future generations

Key theme	Focus area
Responsible Governance and Civic Leadership	To develop community confidence in the organisation by the way it is directed, controlled and managed

As demonstrated throughout this EIS, the Project is consistent with the key themes and focus areas within the Lithgow CSP. In particular the Project:

- Maintains the power sector heritage of the local area and the community's connection to it through the transition from coal fired generation to a new form of dispatchable energy supply
- Diversifies the economic base of the LGA by providing a new type of industry that whilst typically unmanned during operations, will require maintenance activities which will provide a small level of economic benefit to the community
- Has been located on land that has limited environmental value and has been designed to avoid key environmental constraints (e.g. threatened communities, permanent watercourses), mitigate potential impacts and to enhance connections across the Site.

5.2.2 Lithgow 2040 Local Strategic Planning Statement

The *Lithgow 2040 Local Strategic Planning Statement* (LSPS) (Lithgow City Council, 2020). The LSPS provides an overarching strategic direction on how Lithgow City Council is planning for the present and the future. The four key themes of the LSPS are liveability, infrastructure, economy and environment. The LSPS generally aims to:

- Create a 20-year land use vision for the Lithgow region
- Identify special characteristics that contribute to local identity
- Recognise shared community values and how they will be maintained or enhanced
- Identify and manage new growth
- Identify and give effect to directions located within the Central West and Orana Regional Plan.
- Identify gaps of knowledge where further strategic planning work is needed.

This Project is consistent with a number of local planning priorities under the LSPS and actions contained within the LSPS, as identified in **Table 5-3**.

Table 5-3 Planning priorities contained within the LSPS

Key theme and planning priority	How the Project supports planning priorities
Liveability - Establish a framework for sustainable growth.	The Statement highlights the need to diversify the local economy to capitalise on the regional location and connectivity to economic centres. It identifies renewable energy as one of the emerging industries over the next 20 years. The Project would provide a critical piece of energy infrastructure that would support the development of renewable energy in the region.
Infrastructure - Align development with essential infrastructure	Lithgow City Council has been challenged by a backlog of infrastructure renewal, where elements of the infrastructure are nearing end of life. Critical electricity providing facilities are undergoing decommissioning (such as Wallerawang Power Station), or have had their decommissioning plans accelerated (such as the Mount Piper Power Station), showing the need for essential electricity infrastructure within the area, which the Project would provide
Economy - Attract investment and grow local jobs	The Project would provide investment in the local economy and provide local jobs. This investment would provide employment opportunities within the local community, particularly during

Key theme and planning priority	How the Project supports planning priorities
	construction. The delivery of the Project would also provide critical infrastructure that may facilitate the delivery of future renewable energy projects within the region.
Environment - Adapt to natural hazards and climate change	Lithgow City Council has identified a need for an increase in renewable energy industries. The Project seeks to provide a critical element for the expanding renewable energy industry, and the future capacity and resilience of the NSW energy network.

5.2.3 Central West and Orana Regional Plan, 2036

The Central West and Orana Regional Plan, 2036 aims to guide the NSW Government's land use planning priorities and decisions over the next 20 years, to establish the Central West and Orana as the leading, and most diverse regional economy in NSW.

As part of the Central West and Orana Regional Plan, 2036, the NSW Government are seeking to provide quality infrastructure networks for the region.

With regards to developing greater infrastructure networks, Direction 9 of the Plan seeks to increase renewable energy generation within the region. The Plan recognises that the region has significant potential for growth in renewable energy industries, particularly for wind power generation, large-scale solar energy and bioenergy generation. Action 9.1 of the Plan seeks to identify locations with renewable energy generation potential and access to the electricity network.

The Project would complement and support the Central West and Orana Regional Plan, 2036 by providing energy storage infrastructure that would support investment in renewable energy and would improve access to and the reliability of the electricity network. The Project is well-placed to directly support the Central-West Orana Renewable Energy Zone (REZ) due to it being in close proximity to the Transgrid Wallerawang 330 kV substation, which is currently one of the strongest in NSW. The Central-West Orana REZ is located approximately 90 kilometres north west of the Project Area, and has been defined as part of the NSW Electricity Strategy 2019, as described in more detail in **Section 5.2.6**.

5.2.4 2020 Integrated System Plan

The 2020 Integrated System Plan (2020 ISP) (Australian Energy Market Operator (AEMO), 2020) guides industry, government, and consumers on energy investment required to secure affordable reliable energy in the future while meeting prescribed emission targets. It provides an optimal development path for the National Electricity Market (NEM) based on achieving system and policy needs while meeting the long-term interests of consumers.

Development opportunities for an optimal energy system identified in 2020 ISP acknowledge that to firm up the inherently variable nature of distributed and large-scale renewable energy generation, new flexible, dispatchable resources, including large-scale battery energy storage systems will be needed. The Project would involve the development of a large-scale BESS that connects to existing power supply transmission networks and therefore strongly aligns with and supports the intent of the 2020 ISP.

5.2.5 NSW Transmission Infrastructure Strategy 2018

The NSW government recognises that a key challenge for the electricity grid is the capacity required to connect to the range of technologies that will drive the energy future of the State. The NSW Transmission Infrastructure Strategy (Department of Planning and Environment, 2018) was developed to address this challenge and is underpinned by five driving principles:

- Lower energy bills for NSW households and businesses
- A technology neutral approach to new energy generation projects
- Private sector led investment in transmission and generation
- Regional economic growth and increased job opportunities
- Ongoing secure and reliable energy to power the NSW economy.

The NSW Transmission Infrastructure Strategy sets out a plan to facilitate private sector investment in priority transmission infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond. The Strategy forms part of the government's broader plan to make energy more affordable, secure investment in new power stations and network infrastructure; and ensure new technologies deliver benefits for consumers. The objectives of the Project (as outlined in **Section 3.3**) align with the driving principles and goals set out in the NSW Transmission Infrastructure Strategy.

In particular a BESS can act as a "non-network solution" to infrastructure projects and support existing and future transmission lines. For example, the Victorian Big Battery is providing such a solution to the interconnector between Victoria and NSW, increasing the flow of the transmission line, effectively reducing the need for network augmentation by allowing for better utilisation of the existing interconnector.

As part of NSW Transmission Infrastructure Strategy, the NSW Government is also seeking to increase energy capacity by prioritising REZs in the Central West Orana, South West and New England regions of NSW. The REZs will be a driving force to deliver affordable energy into the future. The establishment of REZs is discussed in more detail below.

5.2.6 The NSW Electricity Strategy 2019

The NSW Electricity Strategy is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy. This strategy is designed to complement the NSW Transmission Infrastructure Strategy, and the work of the national energy market (NEM) bodies.

In the development of the strategy, the NSW Government have recognised that congestion in the existing transmission system is leading to a reduced investment in the new infrastructure that is required to reduce electricity prices, improve reliability and protect the environment. Market research indicates that grid connection is the highest concern for potential private investors in the energy market, and at present, it is estimated that there is only sufficient capacity to connect 1 in 20 private sector generation proposals in NSW.

To address this, the strategy aims to improve the efficiency and competitiveness of the NSW electricity market by facilitating investment in new energy saving, energy storage and transmission, demand response and electricity generation technologies.

To assist in promoting investment in renewable energy projects in NSW, the NSW Electricity Strategy sets out a plan to deliver three REZs, including in the State's Central-West Orana. The establishment of the REZs will coordinate the development of new grid infrastructure in energy rich areas, efficiently connecting multiple generators in the same location. In this way, it is proposed that the REZs would operate as a solution to a power station, by combining generation, transmission, storage and system strength services. It is envisaged that the establishment of the REZs would help to provide NSW with a secure, affordable and reliable energy system. To support the development of the REZs, the government is seeking to facilitate and support private sector investment in strategic infrastructure upgrades. In doing so, the REZs will boost regional economies and improve resilience of the energy network by ensuring there are new generation projects coming online to replace the retiring power stations.

Neoen has assessed that the best location to provide support to REZ infrastructure is to be located at the point of connection of the REZ with the existing network, or at a well-connected point as close as possible to the point of connection. The Great Western Battery is, electrically speaking, on the edge of the Central-West Orana REZ, and the Transgrid Wallerawang 330 kV substation is currently one of the strongest in NSW. As such, the Project is ideally located to provide support to the Central-West Orana REZ and its associated infrastructure.

5.2.7 The NSW Electricity Infrastructure Roadmap

The NSW Electricity Strategy (DPIE, 2019) is to be implemented through the NSW Electricity Infrastructure Roadmap (DPIE, 2020). It envisions a modern electricity system in NSW built on the following five pillars:

1. *"Driving investment in regional NSW: supporting our regions as the State's economic and energy powerhouse.*
2. *Delivering energy storage infrastructure: supporting stable, long-term energy storage in NSW.*

3. *Delivering Renewable Energy Zones: coordinating regional transmission and renewable generation in the right places for local communities.*
4. *Keeping the grid secure and reliable: backing the system with gas, batteries or other reliable sources as needed.*
5. *Harnessing opportunities for industry: empowering new and revitalised industries with cheap, reliable and low emissions electricity".*

The *Electricity Infrastructure Investment Act 2020* and the Electricity Infrastructure Investment Bill 2020 was passed in late 2020. The Project strongly aligns with the vision of the NSW Electricity Infrastructure Roadmap. It represents a private regional investment, delivers energy storage, is appropriately zoned and uses existing transmission infrastructure, provides security to the NEM and provides cost effective and reliable electricity with no additional emissions.

5.2.8 The NSW Climate Change Policy Framework

The NSW Climate Change Policy Framework (OEH, 2016) sets out the NSW Government's position on responding to climate change. The Framework seeks to directly influence how energy is generated and consumed in NSW.

The NSW Climate Change Policy Framework aims to maximise the economic, social and environmental wellbeing of NSW in the context of a changing climate and current and emerging international and national policy settings and actions to address climate change. Its aspirational long-term objectives are to achieve net-zero emissions by 2050 and make NSW more resilient to a changing climate.

The Project would complement the NSW Climate Change Policy Framework by helping to facilitate increased investment in renewable energy Projects by improving the capacity and resilience of the network.

5.3 Statutory context

5.3.1 Environmental Planning and Assessment Act 1979

Overview

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation) provide the framework for land use planning and development control in NSW. The EP&A Act and the Regulation is supported by a number of Environmental Planning Instruments (EPIs), which include State Environmental Planning Policies (SEPPs) and Local Environment Plans (LEPs).

Part 4 of the EP&A Act establishes a framework for assessing development, categorising it as either 'exempt development', 'complying development', 'development that requires consent', or 'prohibited development'. The term 'development' is defined under Section 1.5 of the EP&A Act.

In addition, Section 4.36 of the EP&A Act outlines the key criteria that must be met if a development is to be considered State Significant Development (SSD) and establishes that a development can be declared SSD by an EPI (such as a SEPP) or by the NSW Minister for Planning and Public Spaces.

Permissibility

The Project meets the definition of 'development' under Section 1.5 of the EP&A Act as it involves the subdivision of land, use of land and the erection of a building. The Project is defined under the *Standard Instrument*, as 'electricity generating works', as this definition includes a building or place used for the purpose of 'electricity storage'.

The NSW *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW. Division 4 of the ISEPP applies to electricity generating works or solar energy systems.

Under Division 4, electricity generating work means a building or place used for the purpose of:

a. *making or generating electricity, or*
b. *electricity storage.*

The purpose of the Project is to store energy in chemical form and generate electrical energy on demand in discharge mode. As such, the Project would be for the purpose of electricity storage and Division 4 of the ISEPP is applicable.

Clause 34 of the ISEPP provides that development permitted with consent for electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

The Project is located on land zoned under the Lithgow Local Environment Plan 2014 (Lithgow LEP). The Site is located on land zoned RU1 - Primary production. The alignment of the new transmission line would be located within land use zones: RU1 – Primary Production; IN1 – General Industrial; and SP2 – Infrastructure (Rail Infrastructure Facility) (refer to **Figure 2-2**).

Under Clause 34 of the ISEPP, electricity generating works are not permissible without development consent on RU1, SP2, and IN1 land use zones as they are defined as prescribed rural, industrial or special use zones under Division 4 of the ISEPP.

On this basis, the Project is permissible with development consent under the ISEPP. Development consent will be sought under Part 4 of the EP&A Act.

Planning approval pathway

The Project is classified as SSD under the EP&A Act as it satisfies the requirements of Clause 8 of the *State Environment Planning Policy (State and Regional Development) 2011* (SRD SEPP), being:

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

b. The development is specified in Schedule 1 or 2 of the SRD SEPP.

As discussed above, in line with clause 34 of the ISEPP, the Project is "*not permissible without development consent under Part 4 of the EP&A Act*" in the applicable land use zones provided by the Lithgow LEP. The Project is also *"development…specified in Schedule 1 or 2* [or the SRD SEPP]*"* as clause 20 of Schedule 1 of the SRD SEPP refers to electricity generating works with a CIV of greater than $30 million. The Project is defined as electricity generating works and the CIV for the Project is estimated to be about $400 million. Therefore, the Project is classified as SSD.

Section 4.12(8) of the EP&A Act states that a "*development application for State significant development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations."*

Schedule 2 of the EP&A Regulation sets out the requirements of an EIS and requires that the content of an EIS is '*subject to the environmental assessment requirements that relate to the EIS'*. Secretary's Environmental Assessment Requirements (SEARs) were issued by the NSW Department of Planning, Industry and Environment on 4 February 2021. Appendix A shows where in this EIS the SEARs have been addressed.

In accordance with Section 4.5 of the EP&A Act, the consent authority for the Project is likely to be the NSW Minister for Planning and Public Spaces. In the case of greater than 50 public objections to the application, objection from Lithgow City Council, and/or any reportable political donations made by the proponent in the two years prior to lodgement, the Independent Planning Commission would be assigned as the consent authority for the Project.

As noted in Section 4.40 of the EP&A Act, SSD applications are evaluated and determined in line with the requirements of Section 4.15 of the EP&A Act. Matters for consideration include relevant EPIs, likely impacts to the built and natural environment and social and economic impacts, submissions made on the application, site suitability and the public interest.

Table 5-4 outlines each of the approvals referred to in section 4.42 of the EP&A Act and their applicability to the Project. These approvals, if required, cannot be refused if they are necessary for carrying out the SSD.

Table 5-4 Review of approvals required under section 4.42 of the EP&A Act

Authorisation	Applicability review
An aquaculture permit under section 144 of the *Fisheries Management Act 1994*	The Project would not involve aquaculture therefore no aquaculture permit would be required.
An approval under section 15 of the *Mine Subsidence Compensation Act 1961*	The Project would not be located within a known mapped mine subsidence district. An approval under section 15 of the *Mine Subsidence Compensation Act 1961* would not be required.
A mining lease under the *Mining Act 1992*	The Project does not include any mining activities. A review of the NSW Government's Resources & Geoscience MinView mapping portal indicated that the Project would not be undertaken within a lease area. A mining lease would not be required.
A production lease under the *Petroleum (Onshore) Act 1991*	The Project would not involve any petroleum production. A production lease would not be required.
An EPL under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act)	The Project would not be classified as a scheduled activity under the POEO Act 1997. An EPL would not be required for the Project.
Consent under section 138 of the Roads Act 1993	The Site would be located at Brays Lane within the Lithgow City Council LGA. An approval would be sought under Section 138 of the Roads Act 1993 in order to formalise appropriate access to the Site.
A licence under the Pipelines Act 1967	The Project would not involve installation of pipelines to/ from the Site and therefore a licence would not be required.

5.3.2 Environmental Planning and Assessment Regulation 2000

This EIS has been prepared to support the development application for the Project. On 4 February 2021, DPE issued SEARs for the Project pursuant to Section 4.12(8) of the EP&A Act and in line with Schedule 2 of the EP&A Regulation.

Schedule 2, Part 3 (6) and (7) of the EP&A Regulation states that certain information must be included within the EIS. This information, and where it can be found within this EIS, is shown below in **Table 5-5**.

Table 5-5 EIS Statutory Requirements

Requirement	EIS Location
The name, address and professional qualifications of the person by whom the statement is prepared.	**Declaration**
The name and address of the responsible person.	
The address of the land: • In respect of which the development application is to be made, or • On which the activity or infrastructure to which the statement relates is to be carried out.	**Chapter 2 Project location**
A description of the development, activity or infrastructure to which the statement relates.	**Chapter 4 Project description**

Requirement	EIS Location
An assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule.	**Chapters 8 to 18 of the Environmental Impact Statement**
A declaration by the person by whom the statement is prepared to the effect that: • The statement has been prepared in accordance with this Schedule • The statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates • That the information contained in the statement is neither false nor misleading.	**Declaration**
A summary of the findings of the environmental assessment process.	**Executive summary**
A statement of the objectives of the proposed activity.	**Chapter 1 Introduction**
An analysis of any feasible alternatives to the carrying out of the proposed activity, having regard to its' objectives, including the consequences of not carrying out the proposed activity.	**Chapter 3 Needs and alternatives**
An analysis of the proposed activity, including a full description of the proposed activity.	**Chapter 4 Project description**
A general description of the environment likely to be affected by the proposed activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected.	**Chapter 2 Project location** provides a general description and **Chapters 8 to 18** provide the environmental impact assessments while **Chapter 19 Cumulative impacts** assesses the potential cumulative impacts of the Project in consideration of other nearby projects.
The likely impact on the environment resulting from undertaking the proposed activity.	
A full description of the measures proposed to mitigate any adverse effects of the activity on the environment.	**Chapter 20 Environmental management**
A list of any approvals that must be obtained under any other Act or law before the proposed activity may lawfully be carried out.	**Chapter 5 Strategic and statutory context**

Requirement	EIS Location
The reasons justifying the carrying out of the activity in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development (ESD) relating to: • The adoption of precaution in instances of uncertainty (the precautionary principle) • The preservation of the environment as a resource between generations (inter-generational equity) • The conservation of biological diversity and ecological integrity • The improved valuation of environmental assets and services-based mechanisms such as the polluter pays principle, lifecycle costing and establishing environmental goals.	**Chapter 21 Project evaluation and justification**

5.3.3 Environmental planning instruments

The following EPIs are considered relevant to the Project, or the land to which it relates, and have been considered as part of this EIS:

- State Environmental Planning Policy (State and Regional Development) 2011
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy 33 – Hazardous and Offensive Development
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- State Environmental Planning Policy No 55—Remediation of Land
- Lithgow Local Environmental Plan 2014.

These policies are considered further in the following sections.

State Environmental Planning Policy (State and Regional Development) 2011

Consideration of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) and its relevance to this Project is discussed in detail in **Section 5.3.1**. The Project is declared as SSD under Clause 8(1) of this EPI. Clause 8(2) declares that in most cases (including for this Project) where a "*development application comprises development that is only partly State significant development declared under subclause (1), the remainder of the development is also declared to be State significant development*". Clause 11 of this SEPP states that Development Control Plans do not apply to SSDs.

State Environmental Planning Policy (Infrastructure) 2007

The aim of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) is to facilitate the effective delivery of infrastructure across the State.

As discussed above, the Project is permissible at the Site under Division 4 of the ISEPP.

In addition, Clause 45 under the ISEPP applies to a development application for development comprising or involving any of the following (reproduced from cl.45(1) of the ISEPP):

a. *The penetration of ground within 2m of an underground electricity power line or an electricity distribution pole or within 10m of any part of an electricity tower.*

b. *Development carried out-*

   i. *Within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or*
   ii. *Immediately adjacent to an electricity substation, or*
   iii. *Within 5 m of an exposed overhead power line.*

c. *[Not relevant]*

d. *Development involving or requiring the placement of power lines underground, unless an agreement with respect to the placement underground of power lines is in force between the electricity supply authority and the council for the land concerned.*

The Site is situated in proximity to a number of overhead electricity transmission lines and will involve development within the existing Transgrid Wallerawang 330 kV substation (refer to **Chapter 2.0 Project location**, and **Figure 1-2**). On this basis, the requirements under clause 45 are applied to this development application, and the requirements under Clause 45(2) must be considered.

Clause 45(2) of the ISEPP states that *'before determining a development application (or an application for modification of a consent) for development to which this clause applies, the consent authority must:*

a. *Give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and*

b. *Take into consideration any response to the notice that is received within 21 days after the notice is given.*

In light of this requirement, it is expected that DPE will refer this development application to Transgrid to provide comment on the Project, specifically in relation to potential safety risks. Comments received within 21 days of the notice will be taken into consideration as part of the Submissions Report for the Project.

The Project would involve development within a rail corridor for the installation of the transmission line connection between the proposed BESS and the Transgrid Wallerawang 330 kV substation. Clause 85 - *Development adjacent to rail corridors*, and Clause 86 - *Excavation in, above, below or adjacent to rail corridors* outline notification requirements for works within a rail corridor that could have an adverse impact on rail safety (cl.85(1)(a)) and involves the penetration of ground to a depth of at least 2 m below ground level within, below or within 25 m of a rail corridor. Under both clauses before determining a development application the consent authority must

- Give written notice to the rail authority
- Consider any response to the notice that is received within 21 days after the notice is given.

Clause 86 (3) notes that the consent authority must not grant consent to development to which this clause applies without the concurrence of the rail authority for the rail corridor, and Clause 86 (4) outlines what the rail authority must consider prior to providing concurrence.

Clause 104 outlines requirements for development defined as 'traffic generating development'. The Project would be considered as 'Any other purpose' under this clause as it does meet the other land use definitions provided. To be considered as traffic generating development, the Project would need to result in "*200 or more motor vehicles per hour*". The Project would be typically unmanned and during operation would only have up to eight car parking spaces. On this basis the Project is not traffic generating development.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) outlines the approach used in NSW for planning and assessing the risks and hazards associated with industrial developments. Through this policy, the permissibility of a project is linked to its safety and pollution control performance. SEPP 33 applies to any projects that fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'.

For projects classified as '*potentially hazardous industry'* the policy establishes a comprehensive test by way of a preliminary screening assessment and preliminary hazard analysis (PHA) to determine the risk to people, property and the environment. The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant offsite effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations, as well as transport to and from the site.

In response to the SEARs, a PHA has been prepared to assess potential hazards and risks associated with the Project. The complete report is attached in **Appendix J Preliminary Hazard Analysis** with relevant sections summarised in **Chapter 16 Hazards and risk** of the EIS.

A Preliminary Screening Assessment was undertaken in accordance with *Applying SEPP 33 - Hazardous and Offensive Developments*, with the findings provided in **Appendix K Preliminary Hazard Analysis**.

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

The State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (SDWC SEPP) defines the Sydney drinking water catchment and the rivers that fall within it. Clause 10(1) of this SEPP requires that "*a consent authority must not grant consent to the carrying out of development under Part 4 of the EP&A Act on land in the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality.*"

Clause 10(2) of the SDWC SEPP also requires the use of the 'Neutral or Beneficial Effect (NorBE) tool to assess certain developments, however as this Project would be considered as an 'Module 5 - Other Development' in *Sydney Drinking Water Catchment - Water Quality Information Requirements* (WaterNSW, 2020), the use of this tool is not applicable.

Clause 11 discusses the need for concurrence; however this requirement is not applicable as the NSW Minister for Planning and Places is the consent authority for the SSD application.

A Water Cycle Plan that aligns with the requirements of the SEARs and the low risk posed by the Project to water quality has been developed to demonstrate how the Project can be constructed and operated to achieve a neutral or beneficial effect on water quality. The Water Cycle Plan is attached in **Appendix G Water Cycle Management Study** and is summarised in **Chapter 11 Surface water, hydrology and flooding**.

State Environmental Planning Policy No. 55 – Remediation of Land

The objects of *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) are to provide a State-wide planning approach for the remediation of contaminated land and to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP 55 restricts consent authorities from issuing development consent on land that may be contaminated, unless the consent authority is satisfied that the land in question is suitable for the development proposed to be carried out or would be suitable if appropriate remediation is undertaken. The Site is not on the list of NSW Contaminated Sites Register and does not appear on the Contaminated Land: Record of Notices.

The Site consists of marginal agricultural land that has not been previously developed or used for intensive agricultural purposes. The Site for the BESS does not contain any barns or sheds and as such the Site is unlikely to contain contamination risk of harm to human health or any other aspect of the environment.

The new transmission line would traverse land that comprises the vegetated area to the east of Brays Lane, the existing rail corridor, land occupied by the existing Transgrid Wallerawang 330 kV substation. A review of publicly available information indicated that of these areas, the existing rail corridor may have potential for the presence of trace contaminants from the historic operation of rail activities and the potential presence of imported fill. Imported fill has potential to contain contaminated materials. The Transgrid Wallerawang 330 kV substation is located on an area mapped as comprising disturbed terrain soils. Disturbed terrain soils have the potential to comprise some imported fill. As such, the installation of the transmission line could potentially encounter soils that may contain contaminants of potential concern, however the likelihood of encountering highly contaminated material during installation of the transmission line is considered to be low. As such, prior to construction, soil samples would be collected where trenching is proposed and tested for contaminants of potential concern to determine presence and whether contamination levels pose a health risk to construction workers. The approach to managing and disposing of contaminated soils would be detailed in the Soil and Water Management Plan (SWMP) for the Project. This plan would identify areas along the transmission line corridor where trenching is proposed, if these areas are contaminated to a degree that they pose a risk to human health or ecological receptors, and the measures required to manage these risks.

Chapter 12 Geology, soils, groundwater and contamination details the low risk of existing contamination within the Project area and potential for the Project to result in contamination impacts to any receiving environments. Ultimately, this assessment confirmed that the Project Area is suitable to support the Project, thereby complying with the requirement under clause 7 of SEPP 55.

5.3.4 Lithgow Local Environmental Plan 2014

The Project is located within the Lithgow LGA, which is subject to the application of the *Lithgow Local Environmental Plan 2014* (Lithgow LEP). The Lithgow LEP aims to make local environmental planning provisions for land in Lithgow in accordance with the relevant standard environmental planning instrument under section 3.20 of the EP&A Act.

Lithgow City Council has chosen not to adopt the following principal development standards (i.e. Part 4 of the LEP):

- Clause 4.3 – Height of buildings
- Clause 4.4 – Floor space ratio

In light of this, no further consideration will be afforded to these principal development standards as part of this EIS. Instead, the clauses that are relevant to consider include:

- Clause 2.3 – Zone objectives and land use table
- Clause 2.6 – Subdivision – consent requirements
- Clause 4.1 – Minimum subdivision lot size
- Clause 4.2 – Rural subdivision
- Clause 5.10 – Heritage conservation
- Clause 5.21 – Flood Planning
- Various Part 7 Clauses including: 7.1, 7.3, 7.4, 7.5, 7.6, 7.7 and 7.10.

These clauses are discussed further below.

Zone objectives and land use table

The Site is located on land zoned as: RU1 Primary production. The landuse objectives of RU1 Primary production, as described in the Lithgow LEP, are presented and discussed in **Table 5-6** below.

Table 5-6 RU1 – Primary production – land use zone objectives

RU1 zone objectives	Discussion
Encourage sustainable primary industry production by maintaining and enhancing the natural resource base	The Project would not conflict with this objective. As discussed in **Chapter 15 Land use** the land has moderate to extreme soil limitations with regards to its value as agricultural land. It is not located on an area that is subject to a mining lease and is not used for forestry. The existing natural resource base of the LGA would be largely maintained.
Encourage diversity in primary industry enterprises and systems appropriate for the area	The Project would not conflict with this objective. Indeed, indirectly, the Project could help support this objective by helping to secure a reliable source of electricity for future primary industries in the LGA and beyond.
Minimise the fragmentation and alienation of resource lands	The Project would not conflict with this objective as it is not impacting resource lands.

RU1 zone objectives	Discussion
Minimise conflict between land uses within this zone and land uses within adjoining zones	The Project is not directly adjacent to other land use zones and would not cause a conflict between land use zones or neighbouring land uses.
Minimise the environmental and visual impact of development on the rural landscape	The Project would not conflict with this objective. The Site is largely screened from the majority of nearby sensitive visual receivers. Potential environmental impacts are assessed in **Chapters 8 to 18**. Mitigation measures are outlined in **Chapter 20 Environmental management** and have been developed to minimise potential environmental impacts.
Provide for recreational and tourist development and activities of an appropriate type and scale that do not detract from the economic resource, environmental or conservation value of the land.	The Project would not conflict with this objective and it does not involve recreational or tourist development.
Maintain or improve the water quality of receiving water catchments.	The Project would not conflict with this objective. The Project is unlikely to contaminate stormwater flows. **Chapter 11 Surface water, hydrology and water use** assesses the potential impacts of the Project on surrounding water quality. The Project would not contaminate stormwater flows and therefore would not conflict with this objective.

The transmission line component of the Project would cross the RU1 Primary Production; IN1 General Industrial; and SP2 Infrastructure (Rail Infrastructure Facility) land use zones. The land use objectives of IN1 General Industrial, as described in the Lithgow LEP aim to:

- Provide a wide range of industrial and warehouse land uses
- Encourage employment opportunities
- Minimise any adverse effect of industry on other land uses
- Support and protect industrial land for industrial uses
- Maintain or improve the water quality of receiving water catchments.

The land use objectives of SP2 Infrastructure, as described in the Lithgow LEP aim to:

- Provide for infrastructure and related uses
- Prevent development that is not compatible with or that may detract from the provision of infrastructure
- Maintain or improve the water quality of receiving water catchments.

The Project would be compatible with the objectives of the IN1 General Industrial and SP2 Infrastructure zones.

The Project is defined as '*electricity generating works'*, which is permitted with consent in the RU1 Primary Production, IN1 General Industrial and SP2 Infrastructure land use zone under the ISEPP. The Project is considered consistent with the objectives of these three land use zones.

Subdivision – consent requirements

Subdivision—consent requirements of the Lithgow LEP sets out the consent requirements from proposed subdivision within the Lithgow LGA. Clause 2.6 (1) notes that land can only be subdivided with development consent (unless in some circumstances where its exempt or complying development). Clause 2.6 (2) notes that consent cannot be granted for the subdivision of land on which a secondary dwelling is situated, if the subdivision would result in the principal dwelling and the secondary dwelling being situated on separate lots. There is no secondary dwelling within the Site, as such, this provision is not applicable to the Project.

Rural subdivision and minimum subdivision lot size

Section 4.2 Rural subdivision of the Lithgow LEP provides the consent requirements for proposed subdivision within a rural zone. The Site, and the proposed subdivision component of the Project is located in land zoned as RU1 – Primary Production, whereby land may be subdivided for the purpose of primary production to create a lot of a size that is less than the minimum size shown on the Lot Size Map relevant to that land. In addition, a lot cannot be created if an existing dwelling would, as the result of the subdivision, be situated on the lot and dwelling cannot be erected on such a lot.

Clause 4.1 Minimum subdivision lot size of the Lithgow LEP provides that the size of any lot resulting from the subdivision of land shown on the Lot Size Map cannot be less than the minimum size shown on the Lot Size Map in relation to that land and that the land cannot an environment protection zone.

The Site is not located within an environment protection zone, nor would the proposed subdivision be such that the existing dwelling at 173 Brays Lane would be located within the Site. Also, no new dwelling is proposed to be constructed on the Site.

The proposed subdivision would however result in smaller lot sizes than the minimum size which is defined for Site. According to the Lot Size Map, the Site is located in an area mapped as AB3 and is subject to a minimum lot size of 40 ha. At present, Lot 4 DP 751651 is about 16.5 ha in area. As such, subdividing this lot while meeting the 40 ha lot size is not possible. The proposed subdivision of this lot would comprise about 7 ha for the Site and 9.5 for the existing residential property on the south east corner.

Neoen sought advice from Baker Mackenzie Law Firm in February 2021 regarding the compatibility of the Project with subdivision requirements noted under Lithgow LEP. The advice received from the lawyers found that the relevant requirements of the Lithgow LEP concerning the subdivision of land would not present an obstacle to the lawful grant of development consent for the Project for the following reasons:

- Clause 34 of ISEPP authorises "development" (including the subdivision of land as contemplated by the subdivision component of the Project) for the purpose of "electricity generating works" (including electricity storage) at the Site. The provision in the Lithgow LEP that may otherwise prohibit the subdivision component of the Project would be inconsistent with the provisions in the ISEPP to facilitate "electricity generating works" at the Site and within the RU1 zone
- Section 3.28 of the EP&A Act provides that, to the extent such inconsistency arises as between the provisions of the Infrastructure SEPP and the Lithgow LEP, the provisions of the Infrastructure SEPP prevail to the extent of the inconsistency
- While the subdivision would be incompatible with the Lithgow LEP (minimum lot size). Having regard to the broader context and purpose of the Lithgow LEP all other remaining components of the Project are compatible with the LEP
- Therefore, section 4.38(3) of the EP&A Act would be applicable, whereby the relevant consent authority for the Project (i.e. the Minister for Planning or the Independent Planning Commission) can grant development consent to the SSD application for the Project despite the subdivision component being partly prohibited by the Lithgow LEP.

Heritage conservation

Clause 5.10 of the Lithgow LEP provides specific provisions for the protection of heritage items, heritage conservation areas, archaeological sites, Aboriginal objects and Aboriginal places of heritage significance within the Lithgow LGA. This clause outlines when development consent is required for certain actions that may impact these values. Heritage items are listed in Schedule 5 of the LEP and shown on the relevant LEP heritage map. No heritage items listed in the LEP are located on the Site or the neighbouring lots. The alignment for the proposed transmission line runs close to two LEP heritage items (I112 - Church of St John the Evangelist, and I113 - Old Wallerawang School) but would not involve works on the land where these items are located and would not impact these items.

Following site investigations, evidence of Aboriginal cultural heritage has been found within the Project Area (refer to **Chapter 9 Aboriginal heritage**). Clause 4.10(8) notes that:

The consent authority must, before granting consent under this clause to the varying out of development in an Aboriginal place of heritage significance:

a. Consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and

b. Notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.

Appendix D Aboriginal Cultural Heritage Assessment Report (ACHAR) provides an assessment of the Project on Aboriginal cultural heritage and outlines the investigations that support this assessment. This ACHAR has been produced in consultation with Registered Aboriginal Parties (RAPs).

Flood planning

Clause 5.21 outlines requirements that must be met before development consent can be granted if the site is located within the LEP flood planning area. This clause does not apply to the Project as the Project Area is not located in the LEP flood planning area.

Part 7 clauses

Part 7 of the Lithgow LEP outlines additional local provisions for certain activities or sensitive areas. Seven of the clauses under Part 7 are potentially relevant to the Project. These clauses are discussed in **Table 5-7** below.

Table 5-7 Lithgow LEP Part 7 clauses

Part 7 clause	Discussion
7.1 – Earthworks	The objective of this clause is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land. Clause 7.1(3) provides a list of considerations for consent authorities. The Project will involve earthworks including the likely benching of the Site to reduce the amount of imported and exported spoil. The relevant considerations outlined in Clause 7.1(3) have been assessed in various chapters and appendices of this EIS. Potential impacts to these considerations can be appropriately managed.
7.3 - Stormwater management	This clause applies to all residential, business and industrial zones and the RU5 – Village land use zone. The proposed transmission line will pass through a IN1 General Industrial zone, however the considerations under this clause are not relevant to this type of development.
7.4 – Terrestrial biodiversity	The objective of this clause is to maintain terrestrial biodiversity. The clause applies to and identified as 'Biodiversity' in the Lithgow LEP maps. The north eastern part of the Site, the northern Site boundary and the land between the Site and the Rail Corridor where the transmission line is proposed all contain land identified as Biodiversity on the Lithgow LEP maps. **Appendix C Biodiversity Development Assessment Report** contains an assessment of the potential biodiversity impacts of the Project. The land identified on north eastern part of the Site and along the northern Site boundary would not be developed by the Project.

Part 7 clause	Discussion
7.5 – Groundwater vulnerability	The Project Area is located in an area of Groundwater Vulnerability as designed by the Lithgow LEP. **Chapter 11 Surface water, hydrology and water use** and **Chapter 12 Geology, soils, groundwater and contamination** provide an assessment of the potential impacts the Project could have on water resources and groundwater and provide mitigation measures to address these potential impacts.
7.6 – Riparian land and watercourses	The objective of this clause is to protect and maintain water quality within watercourses, the stability of the bed and banks of watercourses, aquatic and riparian habitats, and ecological processes within watercourses and riparian areas. The clause applies to land identified as 'Sensitive Waterway' on the LEP maps and/or land that is within 40 m of the top of the bank (measured horizontally) of land identified as 'Watercourse' on that map. The Project Area is not located in any areas identified in the LEP as Sensitive Waterway or within 40 m of land identified as Watercourse.
7.7 – Sensitive lands	The objective of this clause is to protect, maintain and improve the diversity and stability of landscapes. The clause includes potential restrictions of development in certain circumstances. The clause applies to land identified as 'Sensitive Land Areas' on the LEP maps. Parts of the Site are identified as Sensitive Land Areas, but none of the transmission line alignment. The reason for the Site being identified under this clause are not clear but may relate to the presence of the farm dams aligning with the 'impeded drainage' consideration. The Project has been designed to not restrict stormwater flows or imped drainage.
7.10 – Essential services	Clause 7.10 of the Lithgow LEP stipulates that development consent must not be granted to unless the consent authority is satisfied that the following services that are essential for the development are available or that adequate arrangements have been made to make then available when required: the supply of water; the supply of electricity; the disposal and management of sewage; stormwater drainage or onsite conservation; and suitable vehicular access. As detailed in **Section 4.2**, the Project would have access to potable water supply, and electricity supply. A water holding tank would be installed as part of the Project. During operation, sewerage would be periodically collected from the water holding tank by a licenced operator and disposed of as appropriate. A concept stormwater design has been developed for the Project and is discussed in **Chapter 11 Surface water, hydrology and water use**. Vehicular access to the Site is provided from Brays Lane, via Castlereagh Highway and Pipers Flat Road. **Chapter 14 Traffic and access** provides more detail regarding transport and access routes to the Site. On this basis, it is evident the Project has access to essential services and, therefore is compliant with this clause.

5.4 Other NSW legislation

5.4.1 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was established to return land in NSW to Aboriginal peoples through a process of lodging claims for certain Crown reserves. The ALR Act, is administered by the NSW Department of Aboriginal Affairs and establishes a compensatory regime, which recognises that land is of spiritual, social, cultural and economic importance to Aboriginal people. The ALR Act established the NSW Aboriginal Land Council (NSWALC) and a network of over 120 Local Aboriginal Land Councils (LALCs) and requires these bodies to:

- Take action to protect the culture and heritage of Aboriginal persons in the LALC's area, subject to any other law

- Promote awareness in the community of the culture and heritage of Aboriginal persons in the LALC's area.

LALCs constituted under the ALR Act can make claims. The Registrar of the ALR Act must maintain the Register of Aboriginal Land Claims under section 166 of the ALR Act. All land claims that have been made under the Act are recorded in the Register.

The Project is located in the Wiradjuri Local Aboriginal Land Council (LALC) area, with Bathurst being the closest LALC office location.

The Project is located entirely within a registered land claim, Warrabinga-Wiradjuri #7 (NC2018/002). This claim was entered on the Register of Native Title Claims on 22 November 2018. The total area of this claim covers about 14,139 square km and encompasses 12 LGAs, including the Lithgow LGA.

5.4.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by Heritage NSW, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Secretary of Heritage NSW responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined as follows:

- An *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of the area that compromises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- An *Aboriginal place* is a place so declared by the Ministers under section 84 of the NPW Act because in the opinion of the Minister, the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.

A permit is required under section 90 of the NPW Act before harming or desecrating an Aboriginal object, otherwise, such action is an offence under the NPW Act. Despite this, under section 4.41 of the EP&A Act, an Aboriginal Heritage Impact Permit is not required for SSD. Instead, potential impacts to Aboriginal heritage are typically managed under Aboriginal Cultural Heritage Management Plans (ACHMPs), required under relevant conditions of consent.

5.4.3 Water Management Act 2000

The *Water Management Act 2000* (WM Act) establishes a framework for managing water in NSW. Section 91 of the WM Act discusses activity approvals and notes that there are two types of approvals, namely controlled activity approvals and aquifer interference approvals.

The WM Act specifies certain activities as controlled activities when carried out on waterfront land. This is defined as within 40 m of the banks of a river, lake or estuary. Pipers Flat Creek is the closest waterway and is located about 50 m to the east of the Site boundary. Pipers Flat Creek is a tributary of the Cox River. The Cox River is located about 2 km north of the Site.

The proposed transmission line is proposed to cross Pipers Flat Creek. This crossing would be completed using Horizontal Directional Drilling to avoid impacts on this watercourse.

A series of small farm dams (up to four) are located on the Site. These are fed by overland flow from land to the west of the Site. No riparian vegetation or geomorphological features are present on the Site.

A controlled activity approval would not be required by virtue of Section 4.41 of the EP&A Act. This section of the Act specifies certain approvals that are not required for SSD, including an activity approval under section 91 of the WM Act. Despite this provision, this section of the Act does not remove the requirement for obtaining an aquifer interference approval.

A review of existing nearby boreholes was undertaken (refer to **Chapter 12 Geology, soils, groundwater and contamination**. The depth of groundwater in these locations indicate it would be unlikely for groundwater to be encountered during the construction of the Project. As such, the requirement for an aquifer interference approval is unlikely.

5.4.4 Protection of the Environment Operations Act 1997

The objects of the POEO Act are to rationalise, simplify and strengthen the regulatory framework for environment protection, among others contained under Section 3 of the POEO Act. Chapter 3 of the POEO Act outlines the specific circumstances under which an environment protection licence (EPL) must be obtained.

Schedule 1 of the POEO Act provides a list of activities for which an EPL would be required. Clause 17 of this Schedule applies to '*electricity generation*' and lists four activities. However, the Project does not involve the generation of electricity. The Project stores and releases electricity that has already been generated. As such, clause 17 does not apply to the Project, and an EPL is not required.

5.4.5 Contaminated Land Management Act 1997

The general object of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated enough to require regulation under Division 2 of Part 3. A search of the NSW EPA contaminated land database (undertaken on 10 November 2021) confirmed that the Project Area is not listed as a contaminated site under the CLM Act. As a result, no further attention is afforded to the CLM Act for the purpose of this SSDA.

5.4.6 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (described in section 6(2) of the *Protection of the Environment Administration Act 1991*).

Section 7.9 of the BC Act states that a development application for SSD is to be accompanied by a biodiversity development assessment report (BDAR) (as defined under section 7.1 of the BC Act), unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values. Further guidance is provided under section 7.9(3), which denotes that the EIS, which accompanies any such application, is to include the biodiversity assessment required by the environmental assessment requirements (i.e. SEARs).

A BDAR has been undertaken for the Project. The BDAR is provided in **Appendix C Biodiversity Development Assessment Report** with relevant aspects discussed in **Chapter 8 Biodiversity**. An impact assessment was undertaken in the BDAR in accordance with the Biodiversity Assessment Method (BAM), which outlines the avoidance, management and mitigation measures that have been incorporated into the Project design or would be employed during construction, operation or completion of the Project to reduce impacts on biodiversity values (refer to **Section 8.4**).

A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the Project has been undertaken using the BAM-Calculator (BAM-C). The results of the BAM-C in terms of vegetation integrity scoring for vegetation zone and associated ecosystem offset credit requirements are shown in **Section 8.4.5**. Following the implementation of the management and mitigation measures provided in **Section 8.5**, the Project is considered consistent with the objectives BC Act.

5.4.7 Roads Act 1993

An object of the *Roads Act 1993* (Roads Act) is to confer certain functions (in particular, the function of carrying out road work) on Transport for NSW and on other roads authorities among others. Section 7 of the Roads Act defines the respective road authorities depending on the classification of road. Of relevance to this Project is Brays Lane, which is a local road under the Roads Act. The Council of a local government area is the roads authority for all public roads within the area, other than:

- Any freeway or Crown road, and
- Any public road for which some other public authority is declared by the regulations to be the roads authority.

Section 138 of the Roads Act relates to works and structures, whereby *a person must not erect a structure or carry out a work in, on or over a public road… otherwise than with the consent of the appropriate road's authority*.

As detailed in **Chapter 4 Project description**, the Project involves the construction of a new access point off Brays Lane, in order to provide access to the Site. The Project would also require that the proposed transmission line crosses Brays Lane and Main Street. As such, an approval under section 138 of the Roads Act will be required to be obtained from Lithgow City Council (being the roads authority) prior to the commencement of any work in, on or over Brays Lane and Main Street.

5.4.8 Heritage Act 1977

The *Heritage Act 1977* (NSW) aims to promote an understanding, encourage conservation and provide for protection of NSW State heritage. State and/or local heritage significance can relate to historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values of a place, building, work, relic, moveable object or precinct.

Two items on State Heritage Register have been identified within proximity of the Project. Some local heritage items have also been identified within proximity to the Project. On this basis a Statement of Heritage Impact has been undertaken. The assessment is provided in **Appendix F Statement of Heritage Impact**. Potential impacts of the Project on these heritage items and on non-Aboriginal heritage values to these items are discussed in **Chapter 10 Historic heritage**.

5.5 Commonwealth legislation

5.5.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long-term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult with the appropriate Minister of that state or territory.

No declarations relevant to the Project Area have been made under the ATSIHP Act.

5.5.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on Matters of National Environmental Significance (MNES). Approval from the Commonwealth Minister is in addition to any approvals under NSW legislation.

The EPBC Act lists nine MNES that must be considered when assessing the environmental impacts of a project. These matters are:

- World heritage properties
- National heritage places
- Ramsar wetlands of international significance
- Threatened species and ecological communities
- Migratory species
- Nuclear actions (including uranium mining)
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act also requires Commonwealth approval for any activity that will, or is likely to have, a significant impact on Commonwealth land. The land on which the Project would be constructed is not Commonwealth land, and there is no Commonwealth land within proximity to the Project that could be impacted by the construction or operation of the Project.

The BDAR (discussed in **Chapter 8 Biodiversity** and contained in **Appendix C Biodiversity Development Assessment Report** has identified threatened biodiversity listed under the EPBC Act that may be potentially impacted by the Project.

The EPBC Act defines 'environment' as incorporating both natural and cultural environments and therefore includes Aboriginal heritage. Under the EPBC Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) (NHL) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies) (CHL). These two lists replaced the Register of the National Estate (RNE), which was closed in 2007. Statutory references to the RNE in the EPBC Act were removed on 19 February 2012. However, the RNE retains an archive of over 13,000 heritage places throughout Australia.

A search of the Australian Heritage Database, which includes places listed on the World Heritage List (WHL), NHL, CHL, RNE and List of Overseas Places of Historic Significance to Australia, was undertaken in May 2021. No items were identified.

Under the EPBC Act, activities that have the potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Energy for assessment. No significant impact on MNES is anticipated as a result from the Project, as such an EPBC referral has not been submitted for the Project.

5.5.3 Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NT Act recognises native title for land over which native title has not been extinguished and where persons are able to establish native title are able to provide continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed, as well as a framework for notifying of native title stakeholders for certain future acts on land where native title has not been extinguished.

Searches of the *Schedule of Applications (unregistered claimant applications), Register of Native Title Claims, National Native Title Register, Register of Indigenous Land Use Agreements* and *Notified Indigenous Land Use Agreements* were undertaken on 03 May 2021 using the NNTT Native Title Vision online system (refer to **Appendix D Aboriginal Cultural Heritage Assessment Report**).

6.0 Stakeholder and community engagement

6.1 Secretary's Environmental Assessment Requirements

Table 6-1 sets out the SEARs relevant to consultation and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 6-1 SEARs – Consultation

Relevant SEARs	
Consultation	**Where addressed**
During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development and Lithgow City Council. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	This chapter provides an overview of the consultation undertaken for the Project to date. Details regarding consultation with Government agencies and community stakeholders are outlined in **Section 6.4.1** and **6.4.2,** respectively. A detailed description of the consultation process, the issues raised and where the issues have been addressed within the EIS is outlined in **Section 6.4.3**.

6.2 Consultation objectives

The objectives of Neoen's community engagement relating to the Project are to:

1. **Communicate and engage with community members at an early stage** to ensure the community feel meaningfully included during the feasibility, planning and development phase
2. **Inform the local community and stakeholders** of upcoming milestones or key decision points, demonstrating our commitment to transparency and accountability
3. **Educate the local community and stakeholders** through providing adequate explanations and information regarding how batteries contribute to the renewable energy transition
4. **Minimise outrage or negative sentiment** by identifying potentially impacted groups and individuals and working with them authentically to address their concerns
5. **Establish a strong social licence to operate** by understanding and meeting community expectations
6. **Understand how Neoen can positively contribute to the community** for the lifespan of the Project and beyond, with engagement activities each year
7. M**eet regulatory community engagement requirements** required for the development application process

6.3 Community and stakeholder engagement

A Community Engagement Plan (CEP) has been developed for the Project and is provided in **Appendix B Community Engagement Plan**. This document identifies the community relations approach and objectives for the Project and surrounding communities. It also outlines the overall framework for consultation for the Project and details that Neoen maintains a stand-alone stakeholder register which is updated through the lifecycle of the delivery of the Project. This register details key Project stakeholders including landholders, neighbours, local community, government and businesses.

The CEP has been developed in line with the Clean Energy Council's community engagement and benefit-sharing guidelines.

The CEP is one of the three tools, along with the stakeholder register and the project website, that is intended to accompany the Project all the way from early feasibility stage through to decommissioning. A such, the CEP is a living document which will be updated progressively as the Project advances through each stage in its lifecycle.

Neoen's objectives for engaging stakeholders support the consultation objectives described above, and are set out in the CEP as follows:

- Foster a transparent and open approach to the development of the Project and ensure 'no surprises' for the local community
- Keep the community and stakeholders informed about the Project through the provision of accurate, timely and factual project information
- Identify and address community and stakeholder concerns and maintain transparency in the project design, implementation and ongoing operations
- Involve stakeholders and community regarding key decisions
- Identify opportunities for local business involvement and local employment in the construction and operation of the Project
- Co-design, develop and deliver a benefit sharing program in collaboration with the community, and in partnership with local stakeholders where possible
- Develop long-term relationships and partnerships with community and stakeholders.

An eight-phased approach will guide the implementation of the CEP in alignment with each of the lifespan stages. Key project activities and milestones are outlined on the page below, with the associated community relations activities on the following page.

6.4 Consultation activities undertaken to date

6.4.1 Agency and stakeholder consultation

Neoen has undertaken a suite of consultation to date on the Project with Government Agencies and Non-Government Stakeholders.

Further, during the preparation of the SEARs, DPE consulted with the relevant stakeholders. In response to this consultation, a number of stakeholders provided input into the preparation of the SEARs or requested for Neoen to address any specific concerns.

Neoen have undertaken consultation with a number of key agencies and stakeholders throughout the development of the Project to date, including: Lithgow City Council, DPE, the NSW Heritage Council, Transport for NSW, Transgrid, NSW Rural Fire Service, Water NSW and the NSW EPA. Details of this consultation to date is summarised below in **Table 6-2**.

Table 6-2 Government Agencies and Non-Government Stakeholders consultation summary

Stakeholder	Method	Date	Details of consultation
Transport for NSW	A combination of meetings, phone calls, emails, letter	3 May 2021	A letter was sent via email to the Secretary of Transport for NSW in May, to request for a person at TfNSW following the project of the Great Western Battery during its development and discussions with TfNSW.
		6 May 2021	Following this letter, a call with the Director of Development Services for Regional and Outer Metropolitan of Transport for NSW was held in May, to help coordinate with TfNSW. This call led to TfNSW assigning their Team Leader of Development Services-Renewables for Regional and Outer Metropolitan Division to the Project.
		From 7 June 2021 - ongoing	From June 2021 fortnightly meetings were organized with TfNSW, its land manager John Holland Rail, AECOM (as needed) and Neoen, to coordinate activities on TfNSW land. To facilitate surveys, access licences have been provided to allow for consultants to go on to TfNSW land. The approval for construction within TfNSW's land was discussed and would be further assessed when technical design is finalised. On 1 November, TfNSW advised Neoen that JHR would be replaced by UGL at the end of January 2022. TfNSW and Neoen agreed to coordinate to ensure information is passed down to UGL once it becomes the new land manager for TfNSW.
Transgrid	A combination of emails and calls		In May 2020, feedback was sought from Transgrid with respect to a few different substations, to ensure the development of the Great Western Battery would target an appropriate substation. A connection enquiry was lodged with Transgrid on 19 November 2020. In September 2021, Neoen and Transgrid (Lumea) agreed on the connection process for the Great Western Battery. Lumea has provided Neoen with the Connection Process Agreement for the Great Western Battery.
Lithgow City Council	A combination of calls, emails, meetings		In November 2020, an email was sent to the Acting Team Leader of Development of the Lithgow City Council to organize a meeting to present the Project to Council. The meeting was held on 10 December 2020 at the Lithgow City Council office. Several members of the Development Team attended, including the Director for Economic Development and Environment. The General Manager also attended the meeting. Representatives for Council asked questions about the workforce necessary, both for construction and operation, as well as questions about the transmission line and the choice of location. These questions were addressed during the meeting and taken into consideration for further communication with the community. A second meeting to present the Project was organized with the Mayor and Deputy Mayor on the 16 December 2020. No additional questions/issues were raised during the meeting.

Stakeholder	Method	Date	Details of consultation
			Prior to the first community event, efforts were made to schedule a meeting with the Councillors, but due to limited availability, it was decided a video would be recorded and sent to them instead. The video was viewed by Councillors on the 16 January 2021. On 10 May 2021, a meeting was organised with Council to provide an update on the Project. Council representatives had questions about the physical location and extent of the footprint of the Project, as well as the potential positive impact the Project could have in the Lithgow region. These questions were addressed directly during the meeting. On 20 October 2021 a meeting was held with representatives of Council to give an update on the Project. Council mentioned it was likely a bond would be required to conduct works on Brays Lane. Council also mentioned their interest in seeking a Voluntary Planning Agreement (VPA) from Neoen. Neoen agreed to have a further discussion on the topic to discuss the VPA commitment in detail. The Director of Infrastructure was consulted via email in October 2021 on road load capacity for Brays Lane, as well as city sewers infrastructure location. An email was sent to the Director of Infrastructure on 8 February 2022 to detail the proposed measures to allow for oversized and overmass vehicle to access Brays Lane, namely the potential installation and removal of temporary bridging beams at the culverts of Brays Lane, and the stabilisation of the outer verge of Brays Lane (at the right hand turn immediately west of the Site) with compacted gravel or roadbase. The Director did not express any concern regarding these proposed measures in a reply email dated 18 February 2022. On 27 January 2022, a meeting was held with representatives from Council to discuss the possibility of establishing a Voluntary Planning Agreement (VPA), and the likely timing for agreeing a signed document detailing the VPA between the Council and Neoen. It was agreed during the meeting that Neoen would send a letter of offer to initiate the discussion with the representatives from Council. It was agreed that further discussions would then occur over a period of up to several weeks to refine the terms. Once the Council representatives are satisfied with the terms they would be presented to the Council for validation. It was agreed that Council and Neoen would aim to have a signed VPA around the end of financial year 2022. Subsequent to agreements made in this meeting, a letter of offer was sent to Council on 11 February 2022 to initiate VPA discussions. Following this letter, a meeting was held between Neoen and Council on the 23 February 2022 to discuss the offer.

Stakeholder	Method	Date	Details of consultation
DPE	Scoping meeting	3 December 2020	A meeting was conducted with DPE on 3 December 2020 to provide a detailed overview of the Project. The meeting was attended by representatives of Neoen, DPE and AECOM. The purpose of the meeting was to discuss the conclusions of the Scoping Report. At the meeting, the following was discussed: • Project background, need and objectives • Proposed Site, alignment and Project description • Statutory planning context • Community and agency consultation undertaken to date and plans for future community and agency consultation • Key matters with regards to potential environmental impacts were discussed including: Aboriginal heritage, historic heritage, biodiversity, visual impacts, traffic, bushfire, hazards and risk, surface water and flooding • Proposed timing for the EIS • Proposed timing of the construction and operation of the Project. In response to the above items, DPE provided the following feedback: • The proposed planning approval pathway was agreed (as described in **Chapter 5 Strategic and statutory context)** • No significant concerns raised with regards to potential environmental impacts • community consultation, including with adjacent neighbours, should be undertaken prior to lodgement of the Scoping Report • the Scoping Report would be live on the NSW Government Major Projects website immediately following lodgement.
	Emails and phone calls	Commenced February 2021 – ongoing	Consultation with DPE has also involved various phone calls and emails. DPE also attended a meeting with Heritage NSW to discuss delays to Aboriginal heritage test pit investigations as a result of COVID19 restrictions. This is discussed below. Emails were exchanged in February 2021 to seek the advice of the Department with respect to finding a contact at Transport for NSW. Emails and calls were exchanged in June 2021 to give an update to the Department on the progress of the Project.

Stakeholder	Method	Date	Details of consultation
NSW Heritage Council	Virtual meeting	7 September 2021	The NSW Heritage Council (along with DPE) was consulted with regarding ongoing delays to Aboriginal heritage test pit investigations as a result of COVID19 restrictions. In response the NSW Heritage Council advised that test pitting should be undertaken prior to the lodgement of the EIS, and that a combination of working within the existing NSW health guidelines and employing flexible solution such daily updates and using virtual tools would be considered an acceptable approach. As a result, the Aboriginal heritage test pit investigations were carried out and included in this EIS, using the methodology outlined in detail in **Chapter 9 Aboriginal heritage**.
Case Management – Energy Infrastructure & Zones - DPE	A combination of calls, emails and virtual meetings.	Commenced March 2021 – ongoing	Since March 2021, Neoen has had monthly communications with the Case Management team providing monthly updates on the progression of the Project.
Public Works Advisory & Regional Development Central West Far West – Department of Regional NSW	Virtual meeting	27 April 2021	A meeting was held on the 27 April 2021 with representants of the Lithgow region from the Department of Regional Development NSW to provide an update on the Project. Questions were asked with respect to jobs and the use of the BESS in the electricity grid. The questions were answered during the meeting.
Priority Assessment Program	A combination of calls, emails and virtual meetings	Commenced August 2021 – ongoing	Since August 2021, Neoen has been in regular contact with the Priority Assessment Program and provided regular updates on the Project.
NSW Rural Fire Service (RFS) and Lithgow City Council.	Meeting	10 December 2020	A meeting was held with Lithgow City Council and the NSW RFS on Thursday 10 December 2020 in conjunction with Lithgow City Council. The NSW RFS representative asked questions about the fire risk related to the Project, as well as the measures put in place to address the risks. These questions were answered at the meeting and an assessment of Bushfire Risk has been provided in **Chapter 17 Bushfire** and **Appendix L Bushfire Threat Assessment**.

Stakeholder	Method	Date	Details of consultation
John Holland Rail	A combination of phone calls and email communication	Commenced August 2020 – ongoing	Consultation with John Holland Rail commenced in August 2020 with informal discussions about the Project. A combination of phone calls and email communication has been undertaken to provide representatives of John Holland Rail with Project maps, lot numbers and an outline of key Project design, including the proposed location and extent of the transmission line options, noting the eastern transmission line option utilises land managed by John Holland Rail. John Holland Rail provided advice regarding the filling of an application for an 'Approval in Principle'. This application was submitted to John Holland Rail in March 2021. The Approval in Principle was granted on the 19t April 2021. In anticipation to surveys that would need to be conducted on Transport for NSW land, fortnightly meetings were put in place to help share information between the different parties, namely Transport for NSW, John Holland Rail, Neoen and AECOM (as needed). These meetings have helped secure the licences needed to allow surveys on this land to be conducted, as well as coordinate with Rail Protection Officer requirements for surveys to be completed safely. To date, John Holland Rail have not raised any objections or concerns related to the Project.
Water NSW	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. No response was received.
NSW Rural Fire Service (RFS)	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. A response was received 17 November 2021. The response noted a number of items that should be considered in the EIS. These considerations and where they have been addressed are provided as follows: • *A bushfire report should be prepared by a suitably qualified person to address Section 8.3.9 of Planning for Bush Fire Protection 2019, including a Fire Safety Study (FSS) prepared in accordance with the Hazardous Industry Planning Advisory Papers* — A bushfire report has been prepared in accordance with Planning for Bush Fire Protection 2019 by a suitably qualified professional. This report is provided in **Appendix L Bushfire Threat Assessment** • *The FSS should provide details of all credible fire hazards (including bush fires) and the associated fire prevention and mitigation measures for the development* — **Appendix K Preliminary Hazard Analysis** and well as **Appendix L Bushfire Threat Assessment** provide details of credible fire hazards and the associated fire prevention and mitigation

Stakeholder	Method	Date	Details of consultation
			measures. These are also summarised in **Chapter 16 Hazard and risks** and **Chapter 17 Bushfire** • *The proposal is to consider appropriate siting of the development and maximise Asset Protection Zones to minimise its susceptibility to bush fire attacks and potential to start bush fires* — Detail regarding the requirement for establishing suitable Asset Protection Zones is provided in **Appendix L Bushfire Threat Assessment.** In addition, the ongoing design development of the Project would continue to seek opportunities to incorporate Asset Protection Zones into the Project • *The proposal must be designed to commensurate and withstand bush fire hazards and associated risks* — The Site selection and design of the Project to date has sought opportunities to reduce potential environmental impact, including those that may be associated with bushfire hazards (refer to **Section 3.4** and **Section 3.5**). The ongoing design development of the Project would continue to seek opportunities to be designed to withstand bush fire hazards and associated risks.
DPE Biodiversity, Conservation and Science Directorate	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency A response was received 1 November 2021 requesting contact details be updated in the stakeholder register. The representative from DPE Biodiversity, Conservation and Science Directorate noted they look forward to viewing the Biodiversity Assessment for the Project.
DPE Agriculture	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. No response was received.
NSW Environment Protection Authority (EPA)	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. A response was received 22 November 2021. The response noted that the EPA had previously provided advice on the SEARs for the Project to DPE. It was also noted that the EPA is aware the Project is included within the DPE's Priority Assessment Program and that the EPA will continue to engage with DPE through the planning pathway process.
DPE Water and the Natural Resources Access Regulator	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. No response was received.

Stakeholder	Method	Date	Details of consultation
DPE Fisheries	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. No response was received.
Transport for NSW	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. A response was received 9 November 2021. The response noted a number of items that should be considered in the EIS. These considerations and where they have been addressed are provided as follows: • *As per the input to SEARs a Traffic impact assessment would be required* — **Appendix I Traffic Impact Assessment Report** provides a detailed traffic impact assessment for the Project • *A strategic concept for the intersection with Pipers Flat Road and supporting* — As no local road upgrades are proposed as part of the Project, no strategic concept for the intersection with Pipers Flat Road has been provided • *A strategic concept, and the location of the transmission line details should be provided* — **Figure 1-2 Project Area** shows the indicative location of the proposed transmission line.
Lithgow City Council	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. A response was received 4 November 2021 which noted that no action or response is required.
Transgrid	Letter via email	27 October 2021	A letter for agency consultation was sent on the 27 October 2021. The letter contained information relating to the Project, with a focus on the items that would interest the agency. No response was received.

6.4.2 Community consultation

Community consultation was undertaken in accordance with clauses 6 and 7 of Schedule 2 of the EP&A Regulation. As discussed above, Neoen seeks to establish and maintain open and effective communication and relationships with the community and interested stakeholders. As such, Neoen have commenced consultation with the community and relevant agencies / other stakeholders. Detail regarding community consultation activities undertaken to date is provided in in **Table 6-3**.

Properties that are located immediately adjacent to the Site include 173 and 137 Brays Lane (R2 and R3 respectively). The remainder of receivers in the area are not directly adjacent, however, of these, the properties at 233 and 113 Brays Lane are located within 300 m of the Site. As such, these receivers have been recipients of more detailed and personalised consultation.

The remaining receivers are at least 500 m from the Site and have been and would be consulted with as per those methods detailed for 'Community' in **Table 6-3**.

Table 6-3 Community consultation undertaken to date

Targeted receiver	Detail of consultation undertaken
Community (general)	A website has been developed that provides details regarding the Project to the community. The website will be periodically updated to inform the community of key project milestones and changes as they occur. Contact details of Neoen's Great Western Battery Project Manager are available on the website. The website can be accessed at www.greatwesternbattery.com.au A flier has been produced for distribution that that provides detail regarding the Project, the website address, and the contact details of Neoen's Great Western Battery Project Manager. 800 copies of the flier were distributed to the Wallerawang community in December 2020. A public community event was hosted on the 3 February 2021 in Wallerawang. The drop-in session attracted around 60-80 nearby residents. Various questions were asked during the community day, and responses have been provided as follows: • *Job creation: how many jobs would the battery create, which part was construction, which part was operation* — These questions were answered directly. Based on Neoen's experience with community days, Neoen representatives are under the impression that due the historical background of energy generation of the region, many local residents have experience in the market, which could be useful to help local employment during construction. • *Job destruction: would the battery accelerate the end of life of Mount Piper Power Station?* In response, it was communicated that the Project would not accelerate the end of life of Mount Piper Power Station • *Visual impact: Would the battery be seen from the town?* These questions were answers directly in the meeting and the results of the visual impact assessment provided in **Section 18.2** concludes that the Project would not be seen from the town • *Recycling methods and decommission* — These questions were answers directly in the meeting and is discussed in **Section 18.4** which described how waste generated by the Project would be classified, handled, and disposed of • *Fire risks* — These questions were answered directly in the meeting and **Chapter 16 Hazard and risks** and **Chapter 17 Bushfire** describe the likely level of fire risk associated with the Project how this would be managed • *Choice of location* — These questions were answered directly in the meeting and an overview of the Site selection process is provided in **Section 3.5** • *Noise pollution* — These questions were answered directly in the meeting and an assessment of the likely construction and operation noise impacts of the Porrect is provided in **Chapter 13 Noise and vibration**. 19 of the attendees volunteered to answer to an online survey, where responses were very positive, with an average support of the Project rated at 8.2/10. More than 80% of answers considered that benefits included supporting renewable energy, as well as stabilizing the grid and helping to prevent blackouts. More than 60% of answers mentioned bringing investment to the region, as well as helping reduce energy cost for consumers. A public event was hosted in Lithgow on the 10 May 2021. Around 80 people attended the event. A Q&A session was held, during which residents enquired about energy strategy of the Lithgow region, including the construction of

Targeted receiver	Detail of consultation undertaken
	transmission lines, considering the region a REZ, the use of battery services to answer to the needs of the grid, and the reason the town of Wallerawang was chosen as the location for the battery. All of the questions were answered directly at the public event. The event received a largely positive response, with an attending member of Council suggesting additional events considering the interest it had received. A public event was also held on the 8 December 2021 in cooperation with the Lithgow Community Power Project association. It was hosted in Wallerawang and was advertised in the local paper.
Non-associated / involved receiver (Receiver R1) Owner occupied. 233 Brays Lane	A phone call was conducted on 4 December 2020 to inform the owner/occupier about the Project. At this time, Neoen offered to meet with the occupants, however, they indicated that they do not wish for Neoen to conduct individual, personalised meetings on their behalf. As a follow up to the phone call, a letter was sent to this residence on 7 December 2020. The content of this letter provided, in writing, the detail discussed on the phone regarding the Project, and how residents can be involved in the ongoing consultation process. The letters included a link to the website for the Project, as well as the contact details of the project manager At the time of the scoping assessment, no additional response to consultation was received from these owner/occupiers. A meeting in person was held on the 3rd February 2021 with the owner, as well as a close family member of the owner. Questions around the choice of the location, as well as the visual and noise impact were asked. Representatives from Neoen made sure that all the questions from the owner were answered during that time. A phone call was conducted on 1 November 2021 to provide an update on the Project to the owner and its was agreed to meet. A meeting was held on the 11 November 2021 with two family members of the resident of 233 Brays Lane. Representatives of Neoen discussed the development assessment process, shared information on the latest layout, and described the key considerations for the resident. The family of the resident asked questions about the visual impact, as well as the noise impact, which were answered during the meeting. The resident requested that a hard copy of the EIS would be sent to them when public. Representatives of Neoen are working with the resident to respond to concerns they have with respect to the Project. A meeting was held on the 10 February 2022, during which a summary of all previously communicated Project information and key EIS assessment outcomes was provided. This discussion specifically focused on the likely visual and noise impacts of the Project at this property, as well as the proposed mitigation measures to manage these impacts, including the proposed 10 m noise walls and potential vegetation screening. The possibility of delivering noise specific mitigations measures at the property was also discussed, and the resident agreed to have mitigation measures installed if the Project is found to have noise exceedances.

Targeted receiver	Detail of consultation undertaken
	On 15 February 2022, Neoen received an email from the landowner that provided consent for the proposed visual impact mitigation measures proposed for the Project, as well as for the installation of at-property noise mitigation treatments, as required and at Neoen's cost.
Associated / involved receiver (Receiver R2) Tenant occupied. 173 Brays Lane.	The owner of the property has been involved in ongoing consultation with Neoen since May 2020. This consultation process has been undertaken through regular meetings in person, phone calls, and emails. The owner has raised questions that relate to the project footprint, design, and visual impact. These questions have been addressed through the consultation process, and more detail has been provided as the Project has been refined during the preparation of the EIS. The owner of the Site has a tenant on their property, with whom consultation started in December 2020. A phone call was conducted on 7 December 2020 with the tenant of the property. As a result of this call, the tenants agreed to a meeting with Neoen. The scheduled meeting on the 10 December 2020 was cancelled by the tenant. Another meeting was scheduled for the 3 February 2020, although it was cancelled as well. Representative from Neoen regularly tried to call the tenant during the months of March and April but did not receive a response. A meeting was scheduled with the help of the owner of the property for the 11 May 2021. Representatives of Neoen met with the tenant on the 11th May 2021 to provide an overview of the Project. The tenant asked questions about the footprint and the visual impact of the Project. These questions were answered during the meeting. Information was provided on water use on the Site, access to water has been taken into account in the EIS, and in **Appendix G Water Cycle Management Study**. A follow-up email as well as a postal letter were sent on the 12 May 2021 with additional information and maps of the site. No comments were received. Neoen tried to call the tenant during the months of August and October 2021 to set up a new meeting received no response. The owner of the property helped coordinate a meeting on the 10 November 2021. A meeting was held on the 10 November 2021 with the tenant. Representatives of Neoen discussed the development assessment process, shared information on the latest layout, and described the key considerations for the tenant. The resident mentioned access to water during construction was their main concern due to their animals and garden. Representatives of Neoen are working with the tenants and the landowner to find ways of managing any concerns they have with respect to the Project. This has been considered in detail in **Appendix G Water Cycle Management Study**. A meeting was held on the 10 February 2022, during which a summary of all previously communicated Project information and key EIS assessment outcomes was provided. This discussion specifically focused on the likely visual and noise impacts of the Project at this property, as well as the proposed mitigation measures to manage these impacts, including the proposed 10 m noise walls and potential vegetation screening. The possibility of delivering noise specific mitigations measures at the property was also discussed, and the resident agreed to have mitigation measures installed if the Project is found to have noise exceedances.

Targeted receiver	Detail of consultation undertaken
	On 15 February 2022, Neoen received an email from the landowner that provided consent for the proposed visual impact mitigation measures proposed for the Project, as well as for the installation of at-property noise mitigation treatments, as required and at Neoen's cost.
Non-associated / involved receiver (Receiver R3) Owner occupied 137 Brays Lane	The owner of the property has been involved in ongoing consultation with Neoen since May 2020. Throughout this consultation process, the owners have raised various questions about the Project, which have been answered through the intermediary of the property owner. Questions raised have included those related to the Project footprint, design and concerns regarding likely visual impact. A phone call was conducted on 7 December 2020 to inform the owner/occupier in more detail about the Project. At this time, Neoen offered to meet with the occupants. As a result of this call, the occupants agreed to a meeting with Neoen in January 2021. In follow up to phone call, a letter was also sent to this owner 7 December 2020. The content of this letter provided, in writing, the detail discussed on the phone regarding the Project, and how residents can be involved in the ongoing consultation process. The letters included a link to the website for the Project, as well as the contact details of the Neoen project manager. Representatives of Neoen met with the owner on 3 February 2021, as well as 11 May 2021. A phone call was also conducted on 20 October 2021. During these sessions, questions were asked around the footprint of the Project, timing of the Project, the design life for the Project, and the visual impact of the Project. All of these questions were addressed during the meetings and phone call, and are provided in **Chapter 4 Project description** and **Section 18.3**, respectively. A meeting was held on 10 November 2021 with the owner. Representatives of Neoen discussed the development assessment process, shared information on the latest layout, and described the key considerations for the owner. The resident had questions regarding visual impact and noise impact, which were answered during the meeting. Representatives of Neoen are working with neighbours to find ways of managing any concerns they have with respect to the Project. A meeting was held on the 10 February 2022, during which a summary of all previously communicated Project information and key EIS assessment outcomes was provided. This discussion specifically focused on the likely visual and noise impacts of the Project at this property, as well as the proposed mitigation measures to manage these impacts, including the proposed 10 m noise walls and potential vegetation screening. The possibility of delivering noise specific mitigations measures at the property was also discussed, and the resident agreed to have mitigation measures installed if the Project is found to have noise exceedances. On 15 February 2022, Neoen received an email from the landowner that provided consent for the proposed visual impact mitigation measures proposed for the Project, as well as for the installation of at-property noise mitigation treatments, as required and at Neoen's cost.

Targeted receiver	Detail of consultation undertaken
Non-associated / not involved receiver (Receiver R4) Owner occupied 113 Brays Lane	A phone call was conducted on 4 December 2020 to inform the owner/occupier about the Project. At this time, Neoen offered to meet with the occupants, however, they indicated that they do not wish for Neoen to conduct individual, personalised meetings on their behalf. As a follow up to the phone call, a letter was sent to this residence 7 December 2020. The content of this letter provided, in writing, the detail discussed on the phone regarding the Project and how residents can be involved in the ongoing consultation process. The letters included a link to the website for the Project and contact details of the Neoen project manager. At the time of the scoping assessment, no additional response to consultation was received from these owner/occupiers. Representatives of Neoen were informed via a phone call that the owner was not interested in attending the community event on 3 February 2021.
Paul Toole, State Member for Bathurst	A letter was sent to the State Member to inform them of the Project on 3 December 2020. No comments were received.
Hon Andrew Gee, Federal Member for Calare	A letter was sent to the Federal Member to inform them of the Project on 3 December 2020. No comments were received.
Lithgow Environment Group	A few emails were exchanged with the head of the association between January 2021 and February 2021. Information about the area to be surveyed and the footprint of the Project was shared. Lithgow Environment Group proposed to coordinate to collect seeds in the event of vegetation clearance in a sensitive area. The proposal was welcome but will not need to be acted upon, considering that areas of sensitive biodiversity have been avoided. Members of the association attended the community day hosted on 3 February 2021 in Wallerawang, where representative of Neoen provided more information on the Project.
Lidsdale and Wallerawang Progress Association	Phone call conducted in January 2021 prior to the community day (3 February 2021). The main details of the Project were presented to the head of the association. A meeting in person was conducted on 3 February, during which questions about the choice of location and job creation were asked. These questions were answered during the conversation.

Targeted receiver	Detail of consultation undertaken
Lithgow Community Power Project (LCPP)	Following the community day on 3 February 2021, emails were exchanged through March 2021 and April 2021 between the head of the LCPP group and Neoen, where Neoen shared information about the Project, as well as its strategic value for the region. Questions on various topics such as battery services, positive impact on network, impact on region, impact on energy sector in the region were asked during a discussion in person on 10 May 2021. All of these questions were answered during this conversation. The public event in Lithgow on the 10 May 2021 was co-organized by LCPP and Neoen. Another similar event was hosted in Wallerawang on 8 December 2021.

6.4.3 Response to agency, stakeholder and community issues raised to date

A summary of the issues raised during agency, stakeholder and community consultation, and where each issue has been addressed in this EIS is provided in **Table 6-4**.

Table 6-4 Summary of issues raised and where they have been addressed in this EIS

Originator	Summary of the issue	Where addressed in this EIS
Receiver R1, R2 and R3	Visual impact on close residents	**Chapter 18 Other matters (visual)**
Community (general)	Visual impact on the town	**Chapter 18 Other matters (visual)**
Receiver R1, R2 and R3	Noise impact on close residents	**Chapter 13 Noise and vibration**
Community (general)	Noise impacts on the town	**Chapter 13 Noise and vibration**
Council, Community (general), DPE	Job creation, during construction and operation	**Chapter 4 Project description**
Council, Community (general), RFS	Fire hazard of the facility	**Chapter 17 Bushfire**
Transport for NSW/JHR	Transmission line concept design	**Chapter 4 Project description**
Community (general)	Choice of location	**Chapter 2 Site context and background**
Community (general)	Transmission line: overhead or underground	**Chapter 4 Project description**

6.5 Consultation during the public exhibition of the Environmental Impact Statement

6.5.1 Overview

The EIS will be placed on public exhibition by DPE from 15 December to 23 January 2022, in accordance with the requirements of the EP&A Act. During this period, stakeholders and the community would be able to view and download electronic copies of the EIS from the DPE Major Projects website (https://www.planningportal.nsw.gov.au/major-projects).

Neoen would continue to consult with stakeholders during this period to discuss the EIS. A description of the consultation activities to be carried out during the public exhibition period is detailed below.

Note that if COVID 19 restrictions are in effect during this period, alternative consultation methods may be undertaken. Restrictions introduced during the COVID 19 pandemic required cancelation of some engagement activities involving face-to-face interaction with large groups. Engagement activities are limited to those without face-to-face interaction, such as via internet, radio, and print media. Given the significant and prolonged economic impact of the pandemic, it has been considered that some stakeholders may have limited capacity to engage.

6.5.2 Ongoing communication tools

Neoen would continue to use of the contact points and information tools established for the Project. These would be available for all stakeholders to directly contact the Project team and request Project information.

6.5.3 Consultation

Project collateral would be developed to inform stakeholders and the community about the EIS exhibition period, provide instruction on how to make a submission and explain the EIS approval process, EIS display locations and the planned community information session.

Neoen would undertake the following activities:

- Media release – to be published on the project website at or on approach to the commencement of the EIS exhibition period
- Website – the Project's webpage would be updated on the first day of the EIS exhibition period and would provide a link to view and download electronic copies of the EIS from the DPE Major Projects website, and to lodge a submission
- Telephone – a phone number is open to receive calls from the community regarding the Project
- Email – Neoen intends to send an email to stakeholders and community members registered on the stakeholder database, notifying them of the commencement of the EIS display period.

6.5.4 Preparation of a Submissions Report

Written submissions received during the EIS exhibition period would be forwarded by DPE to Neoen for consideration and review.

After reviewing the submissions, Neoen would prepare Submission Report documenting the submissions received and Neoen's response.

This report would be made publicly available on the DPE major projects website.

To inform stakeholders and the community that the Submissions Report for the Project is available to view, Neoen would:

- Publish a media release on the project website
- Update the Project webpage
- Send an email to stakeholders and community members registered on the stakeholder database.

6.6 Future consultation during construction and operation

Neoen aims to maintain community engagement throughout the construction of the Project. Continued community consultation and engagement, through the means of social and traditional media, will encourage community involvement in the Project. Neoen will take particular care with key stakeholders including neighbouring landowners, ensuring they are kept satisfied and informed by undertaking private briefings.

A specific email address, dedicated phone number and online forum would be set up to receive and address any expressions of concern from the community during the construction and operation of the Project.

7.0 Scoping and assessment

7.1 Environmental scoping for the Project

7.1.1 Overview

This EIS documents a range of environmental assessments. These assessments identify potential environmental impacts that may result from the Project and identify measures to manage or mitigate these impacts as appropriate.

The identification of potential impacts, and confirmation of appropriate assessment methodologies, is determined through a scoping process. The scoping process for this EIS was based upon:

- Review of available information and documents relating to the existing environment
- A review of the Great Western Battery Scoping Report (AECOM 2020) (refer to **Section 7.1.2**)
- Site visits
- Request for assessment requirements from DPE
- Receipt of the SEARS for the Project (refer to **Appendix A Secretary's Environmental Assessment Requirements**)
- Consultation with government agencies, community groups and other stakeholders (refer to **Chapter 6 Stakeholder and community engagement**)
- A review of relevant legislation and planning policy (refer to **Chapter 5 Strategic and statutory context**)
- Identification of the sensitivities of the local environment
- Understanding the characteristics of the Project
- Identification of other projects or actions that may cumulatively add to the residual impacts from the Project.

An initial review of potential issues for consideration in the EIS has been undertaken, with the aim of determining the likely level of assessment required to adequately and appropriately address each issue. In undertaking the initial screening, consideration has been given to the significance of potential environmental impacts for each environmental matter (through a preliminary environmental risk screening) and also to the likely level of stakeholder interest in each issue. The inclusion of stakeholder perceptions of potential environmental impacts is considered an important part of determining the level of assessment that should be applied, given that key stakeholder matters may not necessarily align with a purely technical analysis of environmental risks.

By combining the likely significance of each identified environmental issue with the expected level of stakeholder interest, an assessment has been made as to those issues integral to the assessment of the Project, and to determine where a detailed specialist investigation or desktop analysis would be appropriate. Where a high level of stakeholder interest is expected, potential environmental impacts have been determined to be key issues, requiring a more detailed assessment irrespective of the outcomes of environmental risk screening.

7.1.2 Great Western Battery Scoping Report

The initial environmental scoping process for the Project was documented in the Great Western Battery Scoping Report (AECOM 2020). This Scoping Report was used to request SEARs for the Project.

The Scoping Report identified potential impacts of construction and operation of the Project (as it was described at the time), and noted that the extent of the impacts and the means of mitigating them would be determined as part of the design development process and the environmental impact assessment (documented within this EIS).

The potential impacts identified in the Scoping Report included the following:

- Biodiversity – in relation to the potential for the Project to require vegetation removal

- Bushfire – the Project would be located within a bushfire risk zone
- Hazard and risk –DPE have adopted the approach that the assessment of BESS Projects is to be supported by a PHA, in line with the *Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis* (DPIE 2011) and the *Multilevel Risk Assessment guideline* (DPIE, 2011). As such, for the purpose of the scoping report hazard and risk was considered to be a key issue
- Non-Aboriginal, and Aboriginal heritage – as a result of the construction of underground transmission line infrastructure in proximity to items of heritage significance
- Noise and vibration – as a result of the potential construction and operation impacts of the Project on the existing noise environment
- Traffic and access – in relation to the addition of heavy vehicles and construction traffic on low traffic, local roads
- Surface water, flooding and water use – in relation to the adjustment of existing farm dams at the Site, earthworks to level parts of the Site, retention or relocation of drainage channels through the Site, an increase in hard stand and installation of stormwater management controls to retain and manage the release of runoff as required.

These issues are accounted for in the following sections, along with additional issues subsequently identified in the SEARs.

7.2 Summary of potential issues identified

Following review of the SEARs and the scoping process outlined above, **potential** impacts were determined for the following environmental matters, as relevant to the Project:

- Biodiversity
- Aboriginal heritage
- Historic heritage
- Surface water, hydrology and wateruse
- Geology, soils, groundwater and contamination
- Noise and vibration
- Traffic and access
- Land use
- Hazards and risk
- Visual
- Social and economic
- Waste
- Air quality.

7.3 Prioritisation of potential issues

A risk assessment was undertaken to determine the key issues and prioritise the scope of work for each environmental matter. This risk assessment was undertaken based on the guidelines outlined in AS/NZS ISO 31000:2018, and has considered items raised in the SEAR, as well as issues raised in submissions and feedback received from relevant stakeholders and the public.

Table 7-1 outlines the key **potential** environmental matters in relation to the Project.

Table 7-1 Prioritisation of potential issues

High Priority Matters	Medium Priority Matters	Low Priority Matters
• Chapter 8 Biodiversity • Chapter 9 Aboriginal heritage • Chapter 11 Surface water, hydrology and flooding • Chapter 13 Noise and vibration.	• Chapter 10 Historic heritage • Chapter 12 Geology, soils, groundwater and contamination • Chapter 14 Traffic and access • Chapter 15 Land use • Chapter 16 Hazards and risks • Chapter 17 Bushfire • Chapter 18 Other matters - Visual[1] (Section 18.1)	• Chapter 18 Other matters - Social and economic (Section 18.2) - Waste (Section 18.3) - Air quality (Section 18.4).

Note 1: Initially, impacts relating to landscape and visual had been considered a low priority for the assessment, however as the Project design has developed through the EIS process, the inclusion of noise walls has meant that this matter is now moderate priority. As such, this matter has been afforded an increased level of investigation.

7.4 Format of assessment chapters

Where possible, a common format has been adopted for each of the assessment chapters of the EIS. This format is outlined below.

Secretary's Environmental Assessment Requirements

The introduction outlines the relevant SEARs for the particular environmental matter and outlines where within the chapter (or elsewhere) they are addressed. In certain cases, a particular requirement may be excluded. If so, this is indicated, and a justification provided.

Assessment approach

This section summarises the assessment approach for:

- Determining the existing environment and identifying sensitive receptors or values as relevant to the particular environmental matter
- Determining criteria or thresholds for the assessment of the significance of impacts
- Conducting an assessment of the **potential** impacts in relation to the relevant environmental matter
- Assessing whether these impacts are significant
- Providing a suite of measures to avoid, mitigate or offset these impacts.

For each environmental matter an explanation is provided outlining the approach to identifying impacts and assessing whether a potential impact is likely to be significant. Assessments can be either quantitative (relying on calculation, modelling, criteria, standards and thresholds) or qualitative (using certain scientific material, case studies, experience etc., but ultimately making decisions based on professional judgement).

Where relevant, legislation, policies and plans relevant to the specific environmental matter may also be included in this section. A review of legislation and policy relevant to the Project as a whole is provided in **Chapter 5 Strategic and statutory context**.

Existing environment

This section describes the key components, characteristics and status of the existing environment relevant to the environmental matter. This includes detail on historic and ongoing operations at the Site, as relevant to the matter under consideration. Key sensitive receptors or values for the assessment of the relevant environmental matter will be identified.

Impact assessment

This section identifies potential impacts of the construction and operation of the Project on relevant receptors for particular environmental matters assessed. It includes matter-specific methodologies for evaluating the significance of the impact in accordance with the criteria detailed in the method of assessment.

In general, impacts may be referred to as either prior to (potential impact) or following mitigation (residual impact). For this section of each chapter all impacts are potential impacts.

Impacts can be considered as:

- Direct or indirect
- Adverse or beneficial
- Significant, non-significant (negligible) or neutral.

Where existing criteria, guidance, environmental standards or assessment methodologies exist, the significance of an impact is based on that information. Where possible and/or necessary quantitative assessments about the significance of an impact are made using this information. Where no explicit guidance or Site-specific quantitative information exists, a qualitative assessment of the significance of an impact is made. Where qualitative judgements are required, some or all of the following characteristics are considered to understand the potential magnitude of impact:

- Extent - the area potentially affected by the impact
- Magnitude - the size or amount of the impact
- Duration - how long the impact is likely to last
- Frequency - whether the impact is continuous, brief or intermittent
- Timing - if the impact occurs at a particularly sensitive time
- Permanence - whether the impact is permanent or temporary.

Consideration of whether an impact is significant will depend on the importance or sensitivity of the receptor (e.g. as defined by legislation, policy, standards, guidance or professional judgement) and the magnitude of the impact (as determined by quantitative or qualitative means). For the purposes of the ‘impact assessment’ section of each technical assessment chapter all impacts are considered ‘alone’ and not cumulatively.

Management of impacts

This section describes the measures that have been identified to avoid, reduce and compensate for the relevant impacts on the environment arising from the construction and operation of the Project.

The mitigation hierarchy has been used to help identify management and mitigation measures for each of the technical assessments. Wherever possible, impacts have firstly been avoided, then either reduced at the source or at the receptor where avoidance cannot be achieved and finally either compensated or offset where avoidance or reduction is not possible or would not achieve practicable or acceptable levels of mitigation.

If management and mitigation measures are to be implemented through particular environmental management plans, these are also discussed in this section.

The mitigation and management measures from all technical assessment chapters are collated into a single table within **Chapter 20 Environmental management**.

8.0 Biodiversity

8.1 Secretary's Environmental Assessment Requirements

Table 8-1 sets out the SEARs relevant to biodiversity and where the requirements have been addressed in this EIS.

Table 8-1 SEARs – Biodiversity

Relevant SEARs	
Biodiversity	**Where addressed**
This EIS must include: • an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCD and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values; • the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM; • an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts; and • if an offset is required, details of the measures proposed to address the offset obligation.	A BDAR was prepared to assess biodiversity values and likely biodiversity impacts of the Project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM). The BDAR is presented in **Appendix C Biodiversity Development Assessment Report**. It applies the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM. This assessment is summarised in **Section 8.4**. There are no aquatic habitat impacts relating to the *Fisheries Management Act 1994.* The offset requirements (as per the BAM) are outlined in **Section 8.4.5**. The offset obligations of the Project would be met by paying into the BCT Offset Fund.

8.2 Methodology

A BDAR has been undertaken for the Project. The complete report is attached in **Appendix C Biodiversity Development Assessment Report** (BDAR) with relevant aspects summarised in this chapter. The primary objective of the BDAR is to use the Biodiversity Assessment Methodology (BAM) (DPIE 2020a) to describe and assess the potential impacts of the Project on the ecological values within the Project Area and surrounds, determine whether the Project is likely to have an impact on threatened biodiversity listed under the *Biodiversity Conservation Act 2016 (NSW)* (BC Act) and identify and quantify associated biodiversity offsetting requirements.

The BDAR has two broad stages consistent with the BAM methodology:

Stage 1 – Biodiversity assessment:

This stage identifies the types of biodiversity values on land. In general Stage 1 focuses on the assessment of the landscape context, the vegetation integrity (VI) of native vegetation, and habitat suitability for threatened species.

Stage 2 – Impact assessment (biodiversity values and prescribed impacts):

This stage applies the avoid, minimise and offset hierarchy and assesses direct, indirect and prescribed impacts associated with the development or clearing proposal. It is used to determine the offset requirements for all residual impacts on biodiversity values at a proposed site. In general, these are measured as ecosystem credits and species credits.

8.2.1 Stage 1: Biodiversity assessment

Desktop review

Database searches within a 5 kilometre radius around the Project Area were conducted prior to field investigations, to identify threatened biodiversity and migratory species with known occurrences or with the potential to occur in the Project Area. The following databases and datasets were reviewed:

- Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool for matters protected by the EPBC Act
- NSW Environment, Energy and Science (EES) BioNet Atlas of NSW Wildlife for species, populations and ecological communities listed under the BC Act
- PlantNET (The Royal Botanic Gardens and Domain Trust)
- BirdLife Australia, the New Atlas of Australian Birds 1998-2020
- The NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database (DPIE 2021a).
- Relevant vegetation mapping, such as the State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778
- NSW BAM Calculator
- Biodiversity Values map
- Native vegetation regulatory map
- BAM Important Areas maps.

The subject land is the total area of proposed disturbance, which includes the Project Area and any other locations where there may be direct or indirect impacts. The assessment area includes the subject land and a 1.5 kilometre buffer zone as specified by the BAM. These areas are shown on **Figure 8-1.**

An assessment of landscape features was also undertaken for the Project. Landscape features were used to identify biodiversity values that are important for the subject land and inform the habitat suitability of the subject land for threatened species. To understand the landscape value of the study area the assessment considered the following factors:

- IBRA bioregions and subregions
- Rivers, streams, estuaries, and wetlands
- Habitat connectivity
- Geological features
- Areas of outstanding biodiversity value
- NSW (Mitchell) landscape
- Hydrology.

Additionally, the subject land and the 1.5 kilometre buffer around the subject land was assessed for soil hazard features or other additional features required to be assessed by the SEARs.

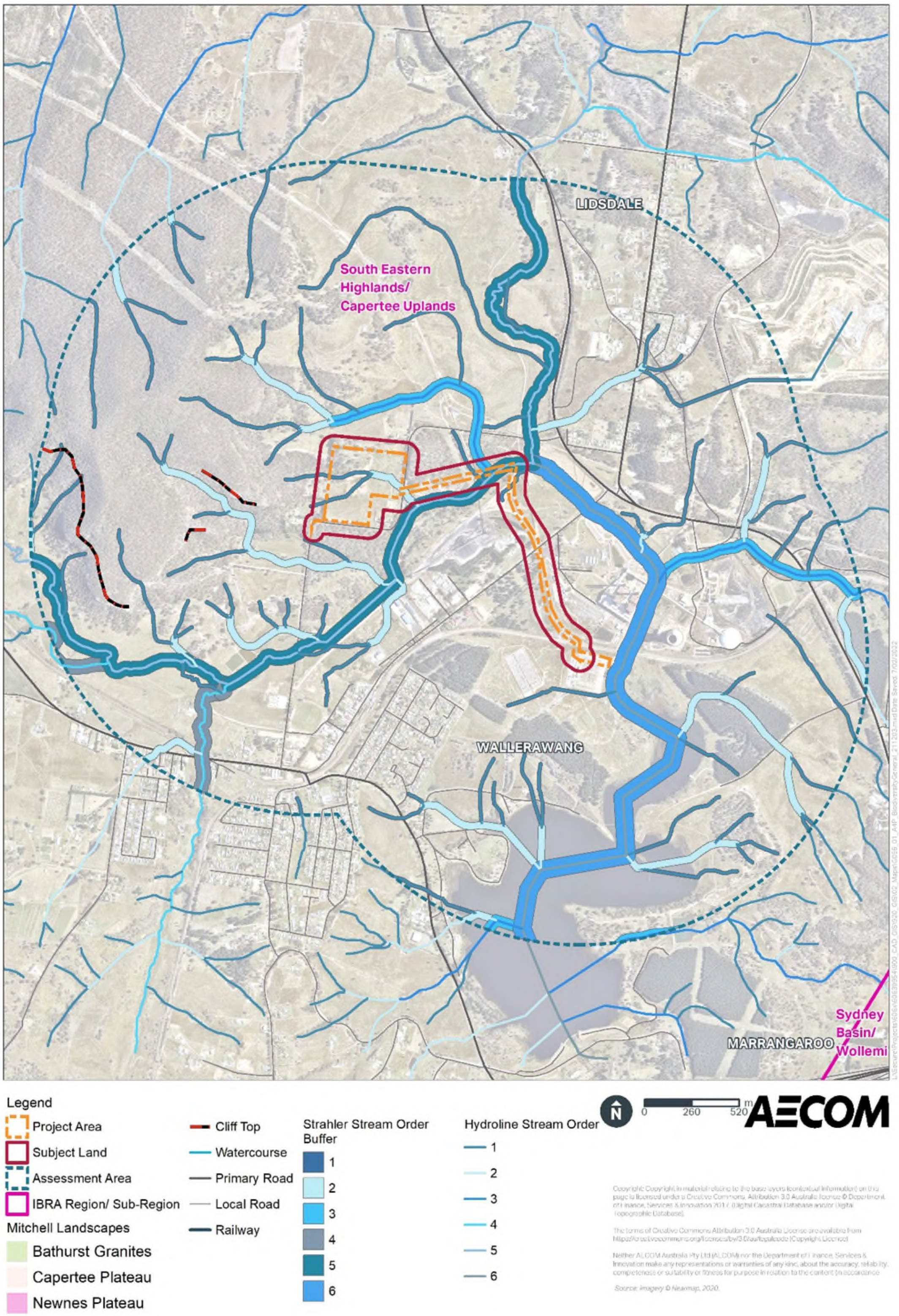


Figure 8-1 Landscape features of the Project Area, subject land and assessment area

Existing information regarding native vegetation was reviewed to inform field investigations. In accordance with section 3.2 of the BAM, native vegetation cover was estimated for the study area. The State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778 (DPIE 2018) was reviewed prior to the field survey to determine the vegetation communities likely to be present in the study area.

Based on the results of the background review and the requirements of the BAM, appropriate surveys were then designed for the subject land and Project Area.

Field investigation

Field surveys were conducted on 17-18 March 2021, 16 June 2021 and 12 November 2021. The Project Area was surveyed in accordance with the BAM. The field surveys included the following:

- Identification and mapping of PCTs according to the structural definitions held in the BioNet Vegetation Classification database, with reference to information provided in State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778 (DPIE 2018)
- Undertaking floristic plots within each vegetation zone in accordance with Section 4 of the BAM (DPIE 2020a), considering varying condition states and avoidance of ecotones, areas of disturbance, and edges
- The identification of native and exotic plant species, according to the Flora of NSW (Harden 1992, 1993, 2000, 2002) with reference to recent taxonomic changes
- Targeted searches for plant species of conservation significance according to the Surveying threatened plants and their habitats (DPIE 2016b)
- Incidental observations using the “random meander” method (Cropper 1993)
- Identification of previous and current factors threatening the ecological function and survival of native vegetation within and adjacent to the development site
- An assessment of the natural resilience of the vegetation of the site
- Identifying and mapping fauna habitats (e.g. hollow-bearing trees, rock outcropping etc.), assessing their condition and value to threatened fauna species, and considering threatened species’ habitat constraints
- Observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings)
- Targeted surveys for threatened fauna species.

Spatial locations for the assessment are considered to have an accuracy of ± 5 metres.

A vegetation integrity assessment was conducted to assess the condition of the vegetation mapped. PCTs within the subject land were assessed and stratified, based on broad condition state, into vegetation zones in accordance with Section 4.3 of the BAM. A total of six BAM plots were completed within the vegetation zones present within the Project Area. Plot data was entered into the BAM Calculator to determine vegetation integrity score. Additionally, patch size classes for each vegetation zone present within the subject land were assessed as per Section 4.3.2 of the BAM, where a single patch is defined as native vegetation with a gap of less than 100 metres from the next area of native vegetation.

The integrity of the vegetation was then used to determine whether biodiversity offsets were required for impacted vegetation.

Threatened species and populations

An assessment of threatened species and populations was undertaken as part of the BDAR. Species were categorised as either predicted species (ecosystem credit species) or species credit species in accordance with the BAM. This categorisation was based on whether species could be reliably predicted to be present based on landscape features and vegetation. In summary:

- **Predicted species (ecosystem credit species)** - A list of predicted species (ecosystem credit species) expected to occur within the subject land was generated as per Section 5 of the BAM.

Impacts to these species require assessment, however targeted survey is not required as these species are assumed to occur, based on the occurrence of the PCTs, habitat constraints, native vegetation cover in the landscape and calculated patch sizes. These species are identified as ecosystem credit species in the Threatened Biodiversity Data Collection (TBDC). These species were considered when prescribing management and mitigation measures for the Project.

- **Species credit species** - Species credit species are threatened species for which vegetation surrogates and / or landscape features cannot reliably predict the likelihood of their occurrence, or components of their habitat. These candidate species are identified as species credit species in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land, or alternatively the species can be assumed to be present (DPIE 2020a).

Appendix C Biodiversity Development Assessment Report provides the full list of species credit species predicted to occur within the subject land based on the IBRA subregion within which the Project occurs, the native vegetation cover present within the 1,500 metre assessment area, the PCTs present within subject land, and the patch sizes within the area.

Targeted surveys were conducted to confirm the presence of species credit species candidates. Further details on the survey methods are provided in **Appendix C Biodiversity Development Assessment Report**.

The results of field investigations were used to determine the extent of native vegetation, threatened ecological communities (TECs) and vegetation integrity within the subject land in accordance with Section 4 of the BAM.

8.2.2 Stage 2: Impact assessment

In accordance with the BAM, an impact assessment was undertaken in the BDAR in line with this methodology that outlines:

- The avoidance, management and mitigation measures incorporated into the Project design or that would be employed during construction and operation of the Project to reduce potential impacts on biodiversity values (**Section 8.4.1**)
- An assessment of potential direct and indirect impacts during construction (**Section 8.4.2**)
- An assessment of potential direct and indirect impacts during operation (**Section 8.4.3**)
- A conclusion regarding whether there is the potential for impacts on biodiversity values that are at risk of serious and irreversible impacts (**Section 8.4.4**)
- A calculation of the biodiversity credits required due to biodiversity impacts associated with the Project. This calculation was undertaken using the BAM Calculator and is summarised in **Section 8.4.5**.

8.3 Existing environment

The Project is located within a mosaic of agricultural land and habitat areas. Habitat areas are situated along watercourses, reserves or roads and contain native woodland vegetation and terrestrial and aquatic fauna habitat features. These reserves are subject to edge effects and have been disturbed by past and ongoing land clearing, agricultural activities and weed invasion.

8.3.1 Landscape features

A description of the landscape features of the study area is provided in **Table 8-2**, and shown on **Figure 8-1**.

Table 8-2 Landscape features

Landscape features	Description
IBRA bioregions and subregions	The subject land occurs within the Sydney Basin IBRA bioregion and the Capertee Uplands IBRA subregion.
Rivers, streams, estuaries, and wetlands	Several watercourses dissect the subject land, including Pipers Flat Creek, and several unnamed watercourses. The closest major waterbody is Lake Wallace located approximately 200 metres south-east of the Project Area. The closest major river is Coxs River which flows parallel to the proposed transmission line and flows into Lake Wallace.
Habitat connectivity	The subject land does not form part of any recognised biodiversity corridors, flyways or significant habitat connectivity features. Habitat connectivity occurs predominantly in east – west bands along drainage lines or roads, and remnant vegetation along Pipers Flat Creek.
Geological features	There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the subject land.
Areas of outstanding biodiversity value	To date no Areas of Outstanding Biodiversity Value (AOBVs) have been declared within the Project Area or subject land.
NSW (Mitchell) geological landscape	The subject land occurs within the Capertee Plateau Mitchell Landscape (Mitchell 2002).
Hydrology	The subject land is mapped on the Groundwater Dependent Ecosystems (GDE) Atlas as containing High and Moderate Potential Terrestrial GDEs (BOM 2021). Two plant communities that are known to be GDEs are mapped within the subject land (further discussed in section 3 of this report). One watercourse (Pipers Flat Creek) within the subject land is designated on the Biodiversity Values Map (DPIE 2021b) as "Protected Riparian Land".
Additional landscape features	The study area did not contain soil hazard features or other additional features that are required to be assessed according to the SEARs.

8.3.2 Native vegetation

The subject land supports 39.52 hectares of native vegetation with varying levels of disturbance. The land within the Project Area can be defined as three distinctly different board vegetation types, medium, low, and disturbed.

Figure 8-2 shows the native vegetation extent recorded within the subject land, Project Area and 1.5 km assessment area.

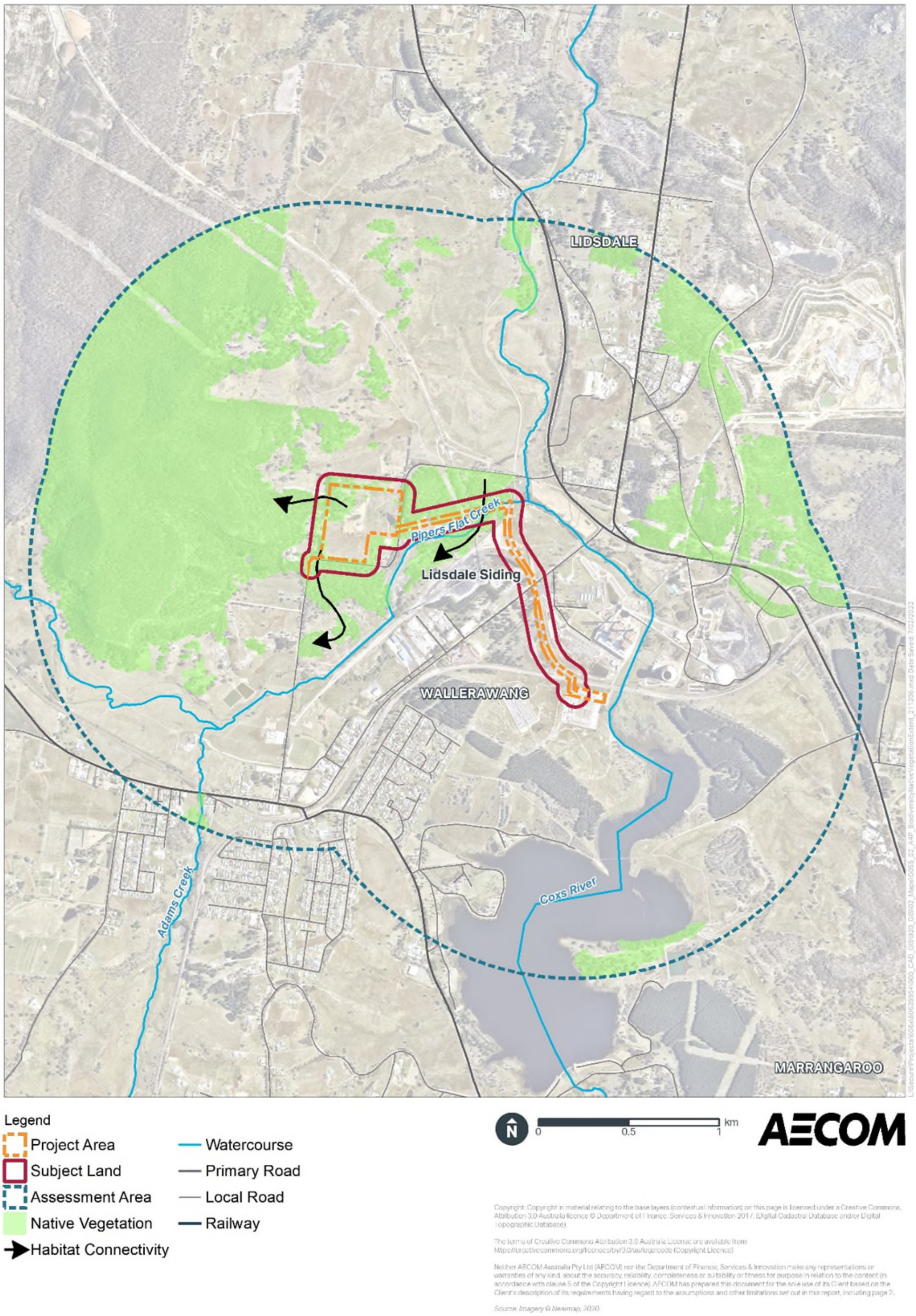


Figure 8-2 Native vegetation extent

Parts of the subject land mapped as Urban Native / Exotics with no native over storey or mid storey cover met the definition of non-native vegetation. Areas not shown as native vegetation cover within the subject land, and which do not provide habitat for threatened species, are not included for further assessment in accordance with Section 5.1.1.5 of the BAM (DPIE 2020a). However, non-native vegetation which does provide habitat for threatened species is required to be assessed.

The following Plant Community Types (PCTs) were present within the study area:

- PCT 677 - Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion
- PCT 732 - Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion.

The recorded PCTs do not align to a Threatened Ecological Community (TEC) listed in the BC Act or EPBC Act.

Seven high threat weeds (HTW) were identified in the subject land, including:

- Hawthorn (*Crataegus monogyna)*
- St. Johns (Wort *Hypericum perforatum*)
- Paspalum (*Paspalum dilatatum)*
- Sweet Briar (*Rosa rubiginosa)*
- Sheep Sorrel (*Acetosella vulgaris)*
- Browntop Bent (*Agrostis capillaris*)
- Blackberry complex (*Rubus fruticosus sp. Aggregate*), listed as priority weed for the Central Tablelands region of NSW.

8.3.3 Threatened species and populations

Predicted species (ecosystem credit species)

A list of predicted species (ecosystem credit species) expected to occur within the subject land is presented in **Table 8-3**. These species are assumed to occur based on the occurrence of the PCTs, habitat constraints, native vegetation cover and calculated patch sizes. Targeted surveys were therefore not undertaken for these species.

Table 8-3 Predicted species (ecosystem credit species) with the potential to occur

Species scientific name	Common name
Anthochaera phrygia	Regent Honeyeater (foraging)
Artamus cyanopterus cyanopterus	Dusky Woodswallow
Callocephalon fimbriatum	Gang-gang Cockatoo (foraging)
Chthonicola sagittata	Speckled Warbler
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Daphoenositta chrysoptera	Varied Sittella
Dasyurus maculatus	Spotted-tailed Quoll
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Glossopsitta pusilla	Little Lorikeet
Grantiella picta	Painted Honeyeater
Hieraaetus morphnoides	Little Eagle (foraging)
Hirundapus caudacutus	White-throated Needletail
Hoplocephalus bungaroides	Broad-headed Snake (foraging)

Species scientific name	Common name
Lathamus discolor	Swift Parrot (foraging)
Miniopterus orianae oceanensis	Large Bent-winged Bat
Neophema pulchella	Turquoise Parrot
Ninox connivens	Barking Owl (foraging)
Ninox strenua	Powerful Owl (foraging)
Petaurus australis	Yellow-bellied Glider
Petroica boodang	Scarlet Robin
Petroica phoenicea	Flame Robin
Phascolarctos cinereus	Koala (foraging)
Pteropus poliocephalus	Grey-headed Flying-fox (foraging)
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat
Scoteanax rueppellii	Greater Broad-nosed bat
Stagonopleura guttata	Diamond Firetail
Tyto novaehollandiae	Masked Owl (Foraging)
Varanus rosenbergi	Rosenberg's Goanna

The Glossy Black-Cockatoo *Calyptorhynchus lathami,* was discounted due to an absence of feed trees (*Allocasuarina* and *Casuarina*).

Species credit species

Species credit species with the potential to occur within the subject land, and thus considered candidate species credit species, have been either assumed present or are the subject of a targeted survey. 17 predicted species credit species have been excluded based on a lack of suitable habitat, degradation of existing habitat and lack of required microhabitat features. A detailed assessment of potential for occurrence, and potential for impact, for all relevant species credit species is presented in **Appendix C Biodiversity Development Assessment Report.**

Targeted species surveys were conducted to determine whether candidate species credit species or their habitats were present.

Targeted threatened flora surveys

Results of targeted flora surveys are presented in **Table 8-4** below.

Table 8-4 Summary of targeted flora survey results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Eucalyptus aggregata	Black Gum	10 metre separated transect searches of areas of potential habitat in June 2021	Species detected during targeted survey. 258 individuals recorded.	258 individuals recorded.
Prasophyllum petilum	Tarengo Leek Orchid	5 metre separated transect searches of areas of potential habitat in November 2021	Not detected	n/a

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Swainsona sericea	Silky Swainson-pea	5 metre separated transect searches of areas of potential habitat in November 2021	Not detected	n/a
Veronica blakelyi	-	5 metre separated transect searches of areas of potential habitat in November 2021	Not detected	n/a

Targeted threatened fauna species

Results of targeted fauna surveys are presented in **Table 8-5** below.

Table 8-5 Summary of targeted fauna survey results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Phascolarctos cinereus	Koala	• 2 nights call-playback and spotlighting • 15 – 16 November 2021	Not detected	3.69 ha of PCT 732
Petaurus norfolcensis	Squirrel Glider	• 2 nights spotlighting • 15 – 16 November 2021	Species detected	3.69 ha of PCT 732
Cercartetus nanus	Eastern Pygmy Possum	• Baited remote camera survey / Assumed present	Assumed present	3.69 ha of PCT 732
Petauroides volans	Greater Glider	• 2 nights spotlighting • 15 – 16 November 2021	Assumed present	3.69 ha of PCT 732
Chalinolobus dwyeri	Large-eared Pied Bat	• Ultrasonic recording • 10 – 15 November 2021	Not detected	Not required, no suitable breeding habitat occurs within 100 metres of the subject land.
Miniopterus orianae oceanensis	Large Bent-winged Bat	• Ultrasonic recording • 10 – 15 November 2021	Species detected	Not required, no suitable breeding habitat occurs within 100 metres of the subject land.

Additionally, the Purple Copper Butterfly *Paralucia spinifera*, was identified as a candidate species for the subject land. A targeted survey could not be conducted for the species within the allowable surveyable period and was therefore not undertaken. However, habitat mapping was carried out in March 2021 for the species. The species was assumed to be present within all suitable habitat identified and mapped.

The following threatened species were recorded during fauna surveys:

- Dusky Woodswallow *Artamus cyanopterus* (identified as an ecosystem credit species)
- Little Eagle *Hieraaetus morphnoides* (identified as an ecosystem credit species).

8.4 Impact assessment

8.4.1 Avoidance of impacts

Primarily impacts on biodiversity values within the Project Area and subject land were reduced by avoiding and / or minimising the removal of native vegetation and fauna habitat at all stages of the Project, including:

- Site selection and planning
- Construction
- Operation.

Where avoidance was not possible, measures to mitigate residual impacts would be implemented, particularly for construction.

Site selection and planning

The Project Area was selected, in part, to minimise impacts to native vegetation and flora and fauna habitats present within the broader subject land. In particular:

- The BESS facility was located in the southern part of the Site to avoid adverse impacts on the higher quality native vegetation in the northern west corner of the Site
- The transmission line corridor was chosen as it incorporated the railway corridor for a large part of the route which was already highly disturbed.

Construction

Construction methods have been selected to minimise potential impacts to biodiversity values. The proposed transmission line would be installed under the land between Brays Lane and the railway corridor using underboring to minimise disturbance to native vegetation and the Pipers Flat Creek riparian corridor.

In addition, to avoid direct and indirect impacts to biodiversity during construction, various mitigation measures have been identified in **Section 8.5**.

Operation

Stormwater generated and discharged from the Site is not to be substantially different in volume relative to the pre-development regime to protect downstream communities from erosion impacts. In addition, the stormwater design for the BESS facility is likely to include a bioretention system or similar which would mean surface water discharges during operation have a neutral or beneficial impact on the receiving environment.

The BDAR recommends that should any perimeter fencing be established between retained canopy trees, this would be of a ‘fauna-friendly’ design to minimise potential impacts to flying and gliding arboreal mammals (e.g. sugar gliders) which may utilise retained trees within the subject land. As no security fencing is proposed to be established between canopy trees, this measure has not been brought forward into this EIS.

8.4.2 Construction

Direct impacts

The direct impacts associated with construction of the Project, and an assessment of their significance are outlined in **Table 8-6**.

Table 8-6 Summary of direct construction impacts

Potential direct impact	Description of impact	Assessment / significance of impact
Removal of native vegetation and flora and fauna habitats	Removal of 0.93 ha of native vegetation from two PCTs throughout the Project Area	The majority of the vegetation and habitats impacted by the Project have undergone historical modification through clearing and other detrimental landuse practices, and all native vegetation

Potential direct impact	Description of impact	Assessment / significance of impact
	supporting habitat for a range of threatened and non-threatened flora and fauna species. The loss of native vegetation would be from the Site and the corner of Brays Lane.	identified within the Project Area is in low or moderate condition. Whilst the removal native vegetation and threatened species' habitats by the Project could be considered an impact, when considered in the context of the size of the Project Area, and the general landscape, the impact of native vegetation removal is not considered to be significant. Substantial efforts have been made through the Project development to reduce and minimise impact to native vegetation habitats, and this process has resulted in the residual impacts being limited to areas that are degraded, fragmented, and edge effected.
Removal of known mapped habitat for threatened flora species and individual plants	The Project would result in the removal of the following threatened flora individuals / habitat: • Black Gum – two individuals, 0.31 ha of known habitat.	As with impacts to native vegetation, impacts to threatened flora species and habitats are not considered significant when assessed in the context of the scale of the Project. Direct impacts to a total of two individual plants, and 0.31 ha of known mapped habitat, are considered to be an acceptable outcome for the Project. Significant efforts have been undertaken to minimise and avoid impacts to threatened flora over the course of the Project development, including underboring along the proposed transmission line corridor would avoid the majority of Black Gum habitat identified within the Project Area.
Removal of known habitat for threatened fauna species	The Project would result in the removal of the following threatened flora individuals / habitat: • 0.67 ha of Squirrel Glider, Greater Glider, Koala and Eastern Pygmy Possum habitat.	Overall direct impacts to threatened fauna habitats are not considered significant when assessed in the context of the scale of the Project. Targeted surveys and habitat assessments have concluded that the majority of the Project Area supports only marginal quality habitat for threatened fauna species, having undergone degradation from historical landuse. Removal of higher quality habitat in the north-west corner of the Site has been avoided. In addition, the underboring of the proposed transmission line would avoid all direct impacts to native vegetation in this area. Impacts to potential microbat habitat at the Site have been assumed based on the presence of potential habitat within the subject land and the lack of targeted survey data.

Loss of hollow-bearing trees

Five hollow-bearing trees (HBTs) were identified within the Project Area. These were located within the transmission line corridor and along Brays Lane where vegetation trimming is proposed for large plant / oversized vehicle access. These trees have the potential to provide roosting habitat for the Large-eared Pied Bat and Large Bent-winged Bat.

The hollow-bearing tree located within the transmission line corridor would not be removed, however, the tree may experience some indirect impacts from underboring works, as a result of water runoff, light spill and access by construction workers. These impacts would be prevented or minimised through the application of appropriate mitigation measures. Indirect impacts associated with construction of the Project are assessed in more detail in **Table 8-7** and a list of the management and mitigation measures are provided in **Table 8-11**.

A total of six hollow bearing trees have been identified as occurring within the Project Area. Two hollow-bearing trees located on Brays Lane would potentially be removed or require trimming during the construction phase of the Project. Branch and vegetation trimming may be required in this area to allow for heavy-rigid plant and machinery to access the Site. However, the recorded hollows were considered low quality and provided limited roosting opportunities to microbat species.

The overall Project impact on hollow bearing trees is therefore considered minimal.

Indirect impacts

Indirect impacts associated with construction of the Project and an assessment of their significance are outlined in **Table 8-7**.

Table 8-7 Summary of indirect construction impacts

Indirect impact	Assessment / significance of impact
Inadvertent impacts on adjacent habitat or vegetation	Impacts to the vegetation associated with the transmission line corridor would be prevented through the utilisation of an underboring method known as horizontal directional drilling (HDD). HDD would be used where required to avoid areas of sensitivity, including Aboriginal heritage, biodiversity, Pipers Flat Creek, and rail crossings. Sending and receiver pits for the underboring would be located in disturbed areas with low conservation value. The remainder of the transmission line would be installed using an open trenching methodology which would occur in areas of low conservation value. Additional inadvertent impacts may potentially occur to adjacent vegetation, due to water runoff, light spill and access by construction workers. These impacts would be prevented or minimised through appropriate exclusion fencing, implementation of a CEMP detailing appropriate environmental protection measures, strict water quality practices and stormwater controls, and by ensuring lighting is directed towards the developed area, rather than towards the surrounding remnant vegetation
Reduced viability of adjacent habitat due to noise, dust or light spill	It is predicted that the adjacent habitat would be impacted in a small way by noise, dust and light spill, during construction. This would be managed as outlined in the CEMP. The construction of the Project will result in additional heavy, medium and light vehicular traffic. The Project would result in a change to the Site and the amount or type of vehicular traffic, noise and light pollution during construction. Indirect impacts from lighting may affect foraging of threatened microbats, but impacts are not considered significant as it is highly unlikely that species abundance would be diminished.
Transport of weeds and pathogens from the site to adjacent vegetation	Weeds occurring within the subject land are common with those occurring within adjacent vegetation to be retained. Increased transport of pathogens and weeds is unlikely to occur during construction but would be managed by biosecurity measures outlined in the CEMP.
Trampling of threatened flora species	A population of the threatened flora species, Black Gum, was identified within both Site and transmission line corridor. It is anticipated that only two Black Gum trees would be impacted as a part of the Project, as the proposed transmission line would be installed underground using underboring at environmentally sensitive locations. The Project would avoid direct impacts to the main Black Gum population and would minimise foot traffic where the threatened flora species is present. Thus, trampling of threatened flora species is unlikely, and is not considered to be a significant impact.

Indirect impact	Assessment / significance of impact
Rubbish dumping	Standard environmental controls for construction would ensure potential impacts of waste are minimised. Works would follow an approved Waste Management Plan (refer to **Section 18.4** (Waste).
Increase in pest animal populations	The Project occurs in a rural and semi-industrial area with impacts including introduced domestic pets such as cats *Felis catus* currently occurring within the locality. Pest animals such as Rats *Rattus rattus* and European Rabbit *Oryctolagus cuniculus* are also widely spread within the region and are likely to occur across the locality. The Project would not result in an increase in available habitat for these species and is unlikely to lead to an increase in pest animal populations. Suitable waste disposal implemented during and post construction would further reduce the resources available for pest species.
Disturbance to specialist breeding and foraging habitat	No specialist breeding and foraging habitat would be indirectly impacted by the Project. Direct impacts to breeding and foraging habitat for Koala and Squirrel Glider would be offset. The Project is unlikely to constitute significant disturbance, to adjacent habitats as underboring would avoid the majority of vegetation clearing and once the works are completed minimal disturbance would be generated to adjacent areas. The Project is not considered to have a significant indirect impact to specialist breeding or foraging habitat.

8.4.3 Operation

There would be no direct impacts on biodiversity from the operation of the Project. Indirect impacts associated with operation of the Project and an assessment of their significance are outlined in **Table 8-8**.

Table 8-8 Indirect operational impacts

Indirect impact	Assessment / significance of impact
Reduced viability of adjacent habitat due to edge effects	Adjacent habitats are currently subject to a high degree of edge effects due to prior clearing and surrounding existing residential and agricultural land use. Since a small and localised patch of vegetation (0.93 ha) is to be directly impacted by the Project, an increase to edge effects is not expected to occur to the remnant vegetation surrounding the subject land, as a result of the Project. In addition, a large proportion of native vegetation within the subject land would be underbored, thus edge effects are not expected to be exacerbated as a result.
Reduced viability of adjacent habitat due to noise, dust or light spill	It is predicted that the adjacent habitat would be impacted in a small way by noise and light spill, during operation of the Project. The Project would result in a change at the Site, particularly regarding a marginal increase in noise and possibly light pollution. Indirect impacts from lighting may affect foraging of threatened microbats during operation, but impacts are not considered significant as it is highly unlikely that species abundance would be diminished.
Increased risk of starvation, exposure and loss of shade or shelter	The habitat present in the subject land considered marginal for most fauna species given the disturbed condition, however there is potential habitat for the Purple Copper Butterfly, Koala, Squirrel Glider, Greater Glider, Eastern Pygmy-possum and several threatened microbat species. The Project would not result in an increased risk of starvation, exposure and loss of shade or shelter to native species due to the small total area of vegetation

Indirect impact	Assessment / significance of impact
	being removed. The loss of vegetation also represents a very small proportion of available habitat in the immediate vicinity.
Loss of breeding habitats	No specialist breeding habitat would be impacted by the operation of the Project. Retained vegetation in adjacent lots and along riparian corridors within the local area provides higher quality habitat and would not be reduced by the Project.
Increase in predators	The subject land is already largely cleared and heavily fragmented. The vegetation clearance proposed from within the Project Area is unlikely to increase predatory species populations.
Changed fire regimes	The subject land is largely cleared of vegetation. Appropriate APZs and fire mitigation systems would be implemented for the Project so as to not result in an increased risk of fire (refer to **Chapter 17 Bushfire**).
Fragmentation of movement corridors	Movement corridors are currently restricted in width and availability through the locality. The occurrences of habitat connectivity occurs predominantly in east – west bands along drainage lines or roads. The Project Area crosses a number of features that provide opportunities for movement of biodiversity values across the landscape. However, most of these features would not be directly impacted by the Project (with underboring proposed in the most sensitive part of the transmission line corridor). The Project would result in the removal of 0.93 ha of native vegetation that fringes the subject land to the north and west. Remnant vegetation along Pipers Flat Creek and within the transmission line corridor would remain intact and not be fragmented.

8.4.4 Serious and irreversible impacts

In accordance with Clause 6.7 of the Biodiversity Conservation Regulation 2017 an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct.

No vegetation communities or threatened species are considered to meet the principles defining serious and irreversible impacts for this Project.

8.4.5 Offset requirements

A calculation of the nature and extent of biodiversity credits (ecosystem and species) required due to biodiversity impacts associated with the Project has been undertaken using the BAM Calculator.

Impacts to native vegetation (ecosystem credits)

As outlined in Section 9.2.1 of the BAM, the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity (VI) score of ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

On this basis, offsets are required for four vegetation zones. **Table 8-9** provides a summary of the ecosystem credit offsets required for impacts from the Project.

Table 8-9 Offsets required (ecosystem credits)

Vegetation zone	Impact (ha)	VI score	Offset required	TEC	HBTs	Credit requirement
677 Low	0.3	46.9	Yes	No	1	1
677 Moderate	0.23	51.9	Yes	No	1	7
732 Moderate	0.67	83.6	Yes	No	1	24

Vegetation zone	Impact (ha)	VI score	Offset required	TEC	HBTs	Credit requirement
732 NOG	10.7	0.2	No	No	0	0

Impacts to threatened species and their habitat (species credits)

As outlined in Section 9.2.2 of the BAM, an offset is required for the impacts of the Project on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17.

Table 8-10 provides a summary of the species credit offsets required for impacts from the Project.

Table 8-10 Offsets required (species credits)

Vegetation zone	Species	Habitat condition (vegetation integrity score) loss	Area (ha) / individuals	Biodiversity risk weighting	Credit requirement
677 Moderate	Black Gum	- 51.9	2 individuals	2	4
732 Moderate	Squirrel Glider	- 83.6	0.67 ha	2	28
732 Moderate	Koala	- 83.6	0.67 ha	2	28

A BAM credit summary has been prepared for the Project based out the outcomes of the BDAR. According to the outcomes of the report, a total of 32 ecosystem credits for plant community types (PCTs), ecological communities and threatened species habitat, and 60 species credits for threatened species would be required for the Project. Neoen propose to meet this offset obligation through payment into the BCT Offset Fund.

8.5 Management and mitigation measures

The implementation of management measures would reduce the potential biodiversity impacts of the Project to the greatest extent practicable. A list of the management and mitigation measures that would be implemented during the detailed design, construction, and operation phases of the Project are listed below in **Table 8-11**.

Prior to construction commencing a Construction Environmental Management Plan (CEMP) would be developed which would include the various mitigation and management measures identified within this EIS. It is likely that this CEMP would be supported by a number of subplans including a Biodiversity Management Plan (BMP). The measures detailed within these management plans would be implemented during construction. A separate Operational Environmental Management Plan (OEMP) would outline the measures to be implemented during operation.

Mitigation measures in other chapters that are relevant to the management of surface water impacts include:

- **Chapter 11 Surface water, flooding and water use**, specifically measures which address water quality, erosion and sediment control for the Site and transmission line corridor during construction and operation
- **Chapter 12 Geology, soils, contamination and groundwater**, specifically measures which address erosion and sediment control for the Site and transmission line corridor during construction and operation
- **Chapter 17 Other issues**, specifically measures which address waste and dust during construction and operation.

Table 8-11 Mitigation and management measures – Biodiversity

ID	Mitigation measure	Timing
B1	A Biodiversity Management Plan would be prepared for the Project. This plan would include management and monitoring measures to be implemented to mitigate potential biodiversity impacts which could occur during construction. The following measures would be included in the plan: • Appropriate exclusion fencing would be installed to the boundary of the retained vegetation and any construction areas where there is some potential for accidental encroachment. This would include appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' to protect areas of biodiversity value. • No Go Zones or similar would be identified in site inductions and communicated to all construction personnel. • Internal fencing / barricades are to be used to establish Tree Protection Zones (TPZs) around retained individual native trees (ie biodiversity values that are not part of existing 'No Go Zones') in accordance with the Standards Australia Committee (2009). • All construction site perimeter fencing is to be of a design that excludes terrestrial fauna, so as to minimise the risk of Koala ingress to the construction site. • All material stockpiles, vehicle parking and machinery storage should be located within the areas proposed for clearing, and not in areas of native vegetation that are to be retained. • Weed and pathogen management measures including weed hygiene protocols for personnel, machinery and construction materials entering and exiting construction areas to minimise risk of weed and pathogen introduction and spread.	Pre-construction
B2	All vegetation is to be inspected immediately prior to removal, by a qualified ecologist, to confirm absence of resident fauna.	Construction
B3	Measures to minimise light pollution impacts (adapted from Part 4 (good lighting design principles) of the Dark Sky Planning Guideline (DPE 2016)), would be implemented as appropriate. The following measures would be considered: • Installing light fitting shields with an opaque cover, mounted horizontally across the top of the lighting module to allow only the downward projection of light • Directing lights downwards and avoid reflecting light skywards • Utilising low beam angles that are close to vertical where possible to minimise light glare.	Construction, operation

ID	Mitigation measure	Timing
	• Security lighting within the construction site would be minimised and is to be oriented such that light spill beyond the subject land and in to patches of retained vegetation is minimised.	
B4	Dam dewatering is to be undertaken during the dam works to ensure that fauna within the dams is salvaged and relocated by an appropriately experienced ecologist (an ecologist would only be required on site when dam water levels are below 1/3 capacity).	Construction
B5	Selection and retention of suitable logs (>10 centimetres diameter only) and hollows for placement within retained native vegetation adjoining the subject land.	Construction
B6	Where appropriate native vegetation cleared from the subject land would be mulched for re-use on the Site to stabilise bare ground.	Construction
B7	Offsetting requirements of this Project would be met as determined by the BAM Calculator following detailed design.	Detailed design

9.0 Aboriginal heritage

9.1 Secretary's Environmental Assessment Requirements

Table 9-1 sets out the SEARs relevant to Aboriginal heritage and where the requirements have been addressed in this EIS.

Table 9-1 SEARs – Aboriginal heritage

Relevant SEARs	
Heritage	**Where addressed**
This EIS must include: • an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development and consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents	Potential impacts of construction and operation of the Project on Aboriginal heritage are outlined in **Section 9.4**, and **Section 9.4.2** respectively. The consultation process is detailed in **Section 9.2.2** Further detail is provided in **Appendix D Aboriginal Cultural Heritage Assessment Report**.

9.2 Methodology

9.2.1 Overview

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been undertaken for the Project to identify the Aboriginal cultural heritage values of the Project Area and assess the potential impact of the Project on identified Aboriginal cultural heritage values.

The complete report is attached in **Appendix D Aboriginal Cultural Heritage Assessment Report** with relevant aspects summarised in this chapter. In addition, an addendum to the ACHAR was completed to assess the Aboriginal heritage impacts of the Project on a crescent shaped, 240 square metre area, located at the right hand corner of Brays Lane directly to the west of the proposed site entrance (refer to **Figure 9-1**). This area was found to be required for the movement of overmass / oversized vehicles following completion of the ACHAR. The addendum is attached in **Appendix E Addendum Aboriginal Cultural Heritage Assessment Report**.

The ACHAR was conducted in accordance with

- Heritage NSW's Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010b).

To determine the Aboriginal heritage values of the Project Area, the assessment involved:

- **A desktop-based assessment of the Project Area** – A desktop assessment was undertaken to review the landscape context of the Project Area, with specific consideration of its potential for past Aboriginal land use and the survival of associated archaeological materials. This included a search of publicly available databases, reports and map data including; the Aboriginal Heritage Information Management System (AHIMS); historical aerial photography; topographic maps; and geological map data (including the 1:100 000 geological map sheet for the Western Coalfield (south)
- **An archaeological survey of the Project Area** - The archaeological survey was conducted on 16 June 2021. The survey was conducted on foot, with a total of seven transects completed over the course of the survey. With the exception of areas of severely disturbed terrain within the fenced Lidsdale Siding facility and existing Transgrid Wallerawang 330 kV substation, all landform elements within the Project Area were subject to survey

- **Test excavations** – The test excavations were carried out 5 to 8 October 2021. Test excavations were completed in two phases. Phase 1 testing involved the excavation of 50 x 50 centimetres test pits across the entirety of the PAD area (excluding areas of severely disturbed terrain), with pits placed on an underlying 25 m grid and the completion of two linear transects of 50 x 50 cm test pits, with pits on each transect spaced at 25 m intervals. Phase 2 of the test excavation program involved small expansion excavations around four Phase 1 test pits. These pits were selected on the basis of artefact yields and/or the technological characteristics of their associated Phase 1 artefact assemblages. In all instances, phase two excavations involved the three 50 x 50 cm test pits around the original test pit, producing 1 m^2 pits. All excavated sediment was dry-sieved onsite through five-millimetre wire-mesh sieves and all definite and potential cultural lithic items were collected from the sieves and bagged in consultation with relevant Aboriginal stakeholders (as described below).

9.2.2 Consultation

Aboriginal community consultation was undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). The results of the consultation process undertaken are summarised in this section.

Stage 1 - Notification and registration

The following regulatory agencies were notified of the Project via letter and asked to provide contact details of relevant stakeholders for the purpose of preparing an ACHAR:

- Heritage NSW
- Bathurst LALC
- Office of the Registrar, *Aboriginal Land Rights Act 1983* (NSW)
- The National Native Title Tribunal (NNTT)
- NTSCORP Limited
- Lithgow City Council
- Central Tablelands Local Land Services (Central Tablelands LLS).

Responses were received from three agencies providing details of persons or groups who hold cultural knowledge of the area (refer to Section 4.1.1 of **Appendix D Aboriginal Cultural Heritage Assessment** for details of the responses).

A public notice was placed in the Lithgow Mercury on 29 January 2021 and letters were written inviting expressions of interest (EOI) from all Aboriginal persons and organisations identified by the regulatory agencies. A total of nine Aboriginal people or organisations registered an interest in being consulted about the Project, including:

- Warrabinga-Wiradjuri #7 Native Title Claimant Group
- Bathurst LALC
- North East Wiradjuri Company
- Didge Ngunawal Clan
- Murra Bidgee Mullangari Aboriginal Corporation
- Merrigarn
- Muragadi
- Corroboree Aboriginal Corporation
- Gunjeewong Cultural Heritage Aboriginal Corporation.

These nine Registered Aboriginal Parties (RAPs) were consulted with throughout the stages described in the following sections.

Stage 2 - Presentation of information about Project

During Stage 2, RAPs were provided with information about the proposed scope of the Project and cultural heritage assessment process. Information about the Project Area and the Project was provided to the RAPs as part of the registration of interest process described in Stage 1. A project summary and draft assessment methodology was sent out to all RAP on 23 February 2021 as part of the assessment methodology review process described below.

Stage 3 – Gathering information about cultural significance

All RAPs were provided a draft of the proposed assessment methodology for the ACHAR and a summary of the Project on 23 February 2021. RAPs were given a minimum of 28 days to review and provide feedback. Written responses to the draft methodology were provided by three RAPs (refer to Table 3 of **Appendix C Aboriginal Cultural Heritage Assessment**). The responses received from all three RAPs endorsed the methodology and recommendations presented.

As test excavation was not covered by the draft assessment methodology provided to RAPs, a copy of the draft test excavation methodology, was forwarded to all RAPs for their review and comment on 10 September 2021. RAPs were invited to provide comment on the draft methodology by 27 September 2021. Written and verbal responses to the draft methodology were provided by seven RAPs (refer to Table 4 of **Appendix D Aboriginal Cultural Heritage Assessment**). The responses received from all three RAPs endorsed the methodology and recommendations presented.

One response from the Warrabinga-Wiradjuri #7 Native Title Claimant Group expressed a concern over the use of the informal access road in the vegetated area opposite the Site (through which the new transmission line would traverse), prior to surveys being conducted. In response to this concern, the Site was accessed via Brays Lane, an existing sealed road. No physical impacts to Brays Lane are proposed as part of the Project. All existing vehicle tracks within the Project Area were subject to survey on 16 June 2021.

All RAPs were invited to participate in an archaeological survey of the Project Area on 16 June 2021, with invitations to participate forwarded on 2 June 2021. Four RAPs provided site officers for the survey. All RAPs were also invited to participate in the archaeological test excavation program.

Due to site visit restrictions associated with the COVID-19 pandemic, a meeting was held with the NSW Heritage Council on 10 September 2021 to determine how to best provide the appropriate opportunities for the RAPs to be suitably involved in field work, while maintaining compliance with relevant NSW Government health orders. In agreement with the NSW Heritage Council, RAPs were given the opportunity to either attend site in person or receive daily updates via e-mail and / or phone. Five RAPs participated in the program and attended the site in-person. Regardless of their physical representation at the test excavations, all RAPs were kept informed of the results of the test excavation program via daily e-mail updates.

Stage 4 – Review of draft assessment report

In accordance with Section 4 of the Consultation Requirements, on 25 October 2021, a draft of the ACHAR was issued to all RAPs for their review (by email). The closing date for comments was 23 November 2021, which provided the necessary minimum 28-day period for comment.

Following this period, RAPs who had not provided comments were contacted again by telephone. Responses to the draft ACHAR were provided by six RAPs. Five RAP responses provided that they agree with the assessment and recommendations made in the Draft ACHAR.

One RAP provided that they agree with the Anthropological assessment and Aboriginal Cultural Heritage evidence presented in the Draft ACHAR as well as the proposed management measures. However it was noted that generally the RAP disagrees with archaeologists where a site (such as SU1a-A5) is assessed as being of “Minor” importance because it may sit in an area of a largely destroyed terrain, or would be severely impacted, while being considered as “Moderate” by the RAP, citing “*even a flake is a “site” which has Historic and Aesthetic value and has consequence when accorded impac*t”.

In response, previously recorded artefact scatter SU1a-A5 has been assessed as being of low scientific significance in accordance with standard archaeological significance assessment criteria. However, AECOM acknowledges that all Aboriginal sites, irrespective of assessed levels of scientific significance, hold cultural value for Aboriginal people. It is note that SU1a-A5 would not be impacted by the Project.

Additional consultation

Further consultation was undertaken regarding the Addendum to the ACHAR, which was conducted
Further consultation was undertaken regarding the Addendum to the ACHAR, which was conducted
following the amendment of the Project Area to include a crescent shaped, 240 square metre area located at the right hand corner of Brays Lane close to the proposed site entrance.

Consistent with Section 4 of the Consultation Requirements, on 25 January 2022, a draft of this Addendum ACHAR was issued to RAPs for their review. The closing date for comments was 23 February 2022, which provided the necessary 28 days for comment.

Ultimately, eight RAPs provided responses, seven in writing and one verbally. These responses are provided in **Appendix E Addendum Aboriginal Cultural Heritage Assessment Report**. All RAPs indicated that they were satisfied with AECOM's assessment and/or the recommendations provided in **Appendix E Addendum Aboriginal Cultural Heritage Assessment Report**. The Warrabinga-Wiradjuri #7 Native Title Claimant Group also suggested that consideration should be given during the development of the Project's Aboriginal Cultural Heritage Management Plan (ACHMP) for local Aboriginal heritage interpretation initiatives, including interpretive signage for the nearby Lidsdale burial ground.

9.3 Existing environment

This section summarises the landscape and cultural context of the Project Area. The results of the field surveys and assessment of significance is also presented. Further detail is provided in **Appendix D Aboriginal Cultural Heritage Assessment Report**.

9.3.1 Landscape context

Consideration of the landscape context is based on the well-established proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local flora and fauna communities have played an important role in influencing how Aboriginal people moved within and utilised their Country. Amongst other things, these variables would have affected the availability of suitable campsites, drinking water, economic plant and animal resources, and raw materials for the production of stone and organic implements. An assessment of historical and contemporary land use activities, as well as geomorphic processes such as soil erosion and aggradation (deposition of material by water), is critical to understanding the formation and integrity of archaeological deposits, as well as any assessments of Aboriginal archaeological sensitivity.

A detailed description of the composition of local flora and fauna communities, hydrology, topography, and geology within the Project area is provided in **Chapter 8 Biodiversity**, **Chapter 11 Surface water, hydrology and flooding**, and **Chapter 12 Geology**, **soils, contamination and groundwater**, respectively. Key observations about the landscape context of the Project Area, relevant to Aboriginal heritage include:

- The topography of the Project Area is typical of the local area, encompassing sections of both elevated rolling terrain and floodplain, as well as severely disturbed landform elements. Landform elements amenable to occupation by Aboriginal people are present within both the Site and the location of the proposed transmission line.
- The Site incorporates two unnamed ephemeral drainage lines, which join within it to form one south-easterly trending unnamed ephemeral drainage line. These drainage lines appear to have been modified through historical land use activities (including construction of farm dams and vehicle tracks) and no evidence of natural stream morphology (such as defined banks, beds or riparian vegetation) can be observed within in the Site.
- The Project Area is located within the upper Coxs River sub-catchment and encompasses parts of several mapped ephemeral streams. Pipers Flat Creek, a locally significant >4th order watercourse, flows in a north easterly direction between the Site and the Lidsdale Siding facility,

traversing the north eastern portion of the transmission line corridor before its confluence with the Coxs River.

- While sections of Pipers Flat Creek, both within and outside of the Project Area, are known to have been modified historically (including where the proposed transmission line would be installed under Pipers Flat Creek), the original alignment of the creek adjacent to the Project Area appears to have been largely preserved.
- Pipers Flat Creek is fed within and immediately adjacent to the Project Area by three unnamed streams, the most significant of which comprises a 3rd order stream and follows, in part, the alignment of a former Coxs River meander in this area. Historical aerial imagery indicates that this meander was artificially ‘cut off’ from the river in the 1950s, with the Coxs River realigned to flow in a general north-south direction around 100 m to the east of the Project Area. Prior to being diverted, the Coxs River may have directly abutted the north eastern portion of the transmission line corridor.
- Stones suitable for flaked and/or ground stone artefact manufacture are available locally from alluvial (deposited by water) and colluvial (deposited at the base of a slope) gravel deposits.
- Prior to European settlement, the floral and faunal resources of the Project Area and its immediate surroundings would have been sufficient to facilitate intensive and/or repeated occupation by Aboriginal people.
- Native vegetation within the Project Area has been extensively modified, with the majority cleared historically for grazing and other activities. Nonetheless, there remains some, albeit limited, potential for the Project Area to contain mature trees with cultural scarring.
- Examination of historical aerial imagery for the Project Area indicates a range of ground disturbing land use activities. While parts of the Project Area have been severely disturbed and retain low to negligible Aboriginal archaeological potential, others retain at least a moderate degree of integrity and the potential for intact archaeological deposits.

9.3.2 Ethnohistoric context

MacDonald (1983), and Tindale’s (1974) tribal map places Wallerawang at the eastern extremity of Wiradjuri country, a few kilometres west of the Darug speaking boundary. However, other sources (Bowdler, 1983; Smith, 1990) suggest that this area was, in fact, occupied by Gundungurra speaking peoples or, comprised a ‘zone of interaction’ between the Wiradjuri, Gundungurra and Darug language groups.

The first European to survey the Wallerawang area was James Blackman, who surveyed the first road from Bathurst to Wallerawang in 1820. Settlers soon followed, with James Walker taking up a 2000 acre land grant at Wallerawang in 1824. Walker named his station ‘Wallerawang” (also spelt Wallerowong), a local Aboriginal word variously cited as meaning “water on rocks”, “plenty of water” or “place near wood and water”. There are records of an Aboriginal camp located around 500 m from Walker’s homestead (Smith, 1990). According to Smith (1990:4), this camp was occupied until the late 1880s, with residing Aboriginal people recorded as being employed for casual work and given handouts.

There are accounts of a group of Gundungurra speakers known as the ‘Wywandy’ that were “headquartered” along Pipers Flat Creek but moved seasonally within their country and also made long distance journeys into other tribal territories. This concurs with recollections of former Lidsdale resident Fay Hasler, a member of the Lithgow & District Family History Society who reported that the local Aboriginal group were known as the ‘Wywandy tribe’ and that this group travelled regularly over the mountains. According to Hasler, a large Aboriginal ‘settlement’ was located at Pipers Flat Creek and a burial ground at Lidsdale. Violent confrontations between the Wywandy and local White settlers, took place around 1824, with several Wywandy either shot or taken prisoner. By the 1860s, Hasler describes the local Aboriginal population as having been ravaged by introduced diseases, and massacres.

This narrative is consistent with substantial declines in Aboriginal populations at the time due to violence, introduced diseases, as well as a reduction in food resources. Despite the enormous social upheaval that accompanied European settlement of the area, traditional ceremonial activities continued to take place, with records of several tribes meeting at Wallerawang for “mystic rites” according to written accounts by Jane Piper (1831-1904).

9.3.3 Archaeological context

Regional context

The results of previous surface and subsurface investigations within the greater Wallerawang-Lidsdale area have painted a picture of past Aboriginal occupation and land use generally consistent with the Central Tablelands region. Open artefact sites are the dominant site type in this area, with recorded examples varying substantially in size and content. Other site types, such as grinding grooves, rockshelters, scarred trees and burials, have also been identified, though comparatively infrequently, with known rockshelter sites concentrated in areas of elevated sandstone terrain. Consistent with broader regional trends, available surface and subsurface archaeological datasets for the “off-plateau” components of the greater Wallerawang-Lidsdale area confirm an occupational emphasis on elevated low gradient landform elements adjacent to higher order watercourses, as well as an emphasis on the procurement and reduction of both quartz and silicified tuff. The Coxs River, in particular, appears to have been a focal feature for Aboriginal peoples occupying this area, with the river and its associated economic resources likely facilitating sustained and/or repeated occupation over thousands of years. Known sites appear to be primarily of mid-to-late Holocene antiquity, however, pre-Bondaian occupation is also indicated.

AHIMS database review

A search of the AHIMS database on 17 February 2021 for a 5 x 5 km area centred on the Project Area (AHIMS search area) returned 32 site entries. Removal of a single duplicate entry provided a revised total of 31 sites. As is typical for the local area, open artefact sites are the most common site type within the AHIMS search area, accounting for 67.7% of recorded sites. Other less common types include five rockshelter sites, two burial sites, two grinding groove sites, and a single potential archaeological deposit.

Registered centroid coordinates for previously recorded Aboriginal sites within the AHIMS search area place five sites within 200 m of the Project Area. A review of associated sites cards and reports indicated that all but one of these sites - artefact scatter SU1a-A5 (45-1-2716) - are located wholly outside of the Project Area. According to RPS (2012), the artefact scatter SU1a - A5 comprised 19 artefacts located in an area measuring 120 m (east - west) by 20 m (north - south) with a ground surface area of approximately 2,141 m^2. The majority of artefacts consisted of complete flakes (11 pieces) and transversely broken flake fragments (4 pieces). Two pieces of debris and two multi-platform cores were recorded.

SU1a-A5 was assessed by RPS as being of moderate scientific significance on a local scale and low scientific significance on a regional scale. The site is listed on the AHIMS database and is located on land covered by Centennial Coal’s approved Aboriginal Cultural Heritage Management Plan (ACHMP) for their Western Operations.

Archaeological predictions

Accounting for the landscape context of the Project Area, as well as the local and regional archaeological data reviewed in this chapter, the following predictions were made regarding the Aboriginal archaeological record of the Project Area:

- Open artefact sites will be the dominant site type
- Site types with *reasonable* potential to occur include scarred trees, stone quarries and grinding grooves
- Site types with *limited* potential to occur include stone arrangements and burials
- In view of the Project Area’s proximity to the historical ‘core’ of Wallerawang, as well as the presence of post-contact glass artefacts in nearby artefact scatter Brays Lane AS1 (45-1-2799), there exists moderate to high potential for one or more open artefact sites within the Project Area to contain post-contact materials (e.g., flaked bottle glass and/or ceramics)
- Subsurface artefact distribution within the Project Area will vary significantly in relation to landform, distance to water and stream order

- Subsurface artefact density within the Project Area will be highest in the crest landform unit followed by the floodplain unit
- Most, if not all, of the Aboriginal archaeological materials present within the Project Area will be of mid-to-late Holocene antiquity
- Grinding groove sites, if present, will occur in direct association with mapped watercourses
- Aboriginal burials, if present, will be located in floodplain contexts
- The dominant raw material for flaked stone artefact production within the Project Area will be quartz, with silicified tuff the second most common material
- Flaked stone assemblages will be dominated by flake debitage items (Andrefsky 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented
- Knapping floors, if present, will exhibit evidence indicative of systematic backed artefact manufacture
- Complete and/or fragmentary backed artefacts will dominate the retouched components of recorded flaked stone artefact assemblages
- Tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts.

9.3.4 Archaeological survey and test excavation results

Taking into account the results of the archaeological survey and test excavations. Two Aboriginal archaeological sites are recognised within the Project Area. Identified sites, the extents of which are shown on **Figure 9-1**, consist of surface and subsurface artefact scatter SU1a-A5 and surface and subsurface stone quarry site GWB-STQ1-21. Summary information on both sites is provided below.

Artefact scatter SU1a-A5

The artefact scatter was originally identified by RPS (2012). During the archaeological survey, a total of ten stone artefacts were identified on and immediately adjacent to the vehicle track surveyed by RPS, with artefacts restricted to the floodplain of Pipers Flat Creek. The artefacts had properties consistent with those described by RPS.

A total of 57 subsurface Aboriginal objects, consisting exclusively of flaked stone artefacts, were recovered from test excavations across the area. The majority of artefacts were recovered from the top 10 cm of excavated deposits. No artefacts were recovered more than 20 cm below ground level.

Stone quarry GWB-AS1-21

GWB-AS1-21 consists of a scatter of flaked stone artefacts in association with naturally occurring pebbles/cobbles derived from the Early Permian Shoalhaven Group. Artefacts and unmodified quartz pebbles/cobbles occur in a series of erosion exposures running along part of the southern boundary of Lot 4 DP751651. A total of 58 artefacts were identified during the survey, with the majority clustered in the westernmost portion of the site.

A total of 14 subsurface Aboriginal objects, consisting exclusively of flaked stone artefacts, were recovered from test excavations across the area. The highest density of artefacts occurred in the eastern half of the potential archaeological deposit. No artefacts were encountered more than 40 cm below ground level.

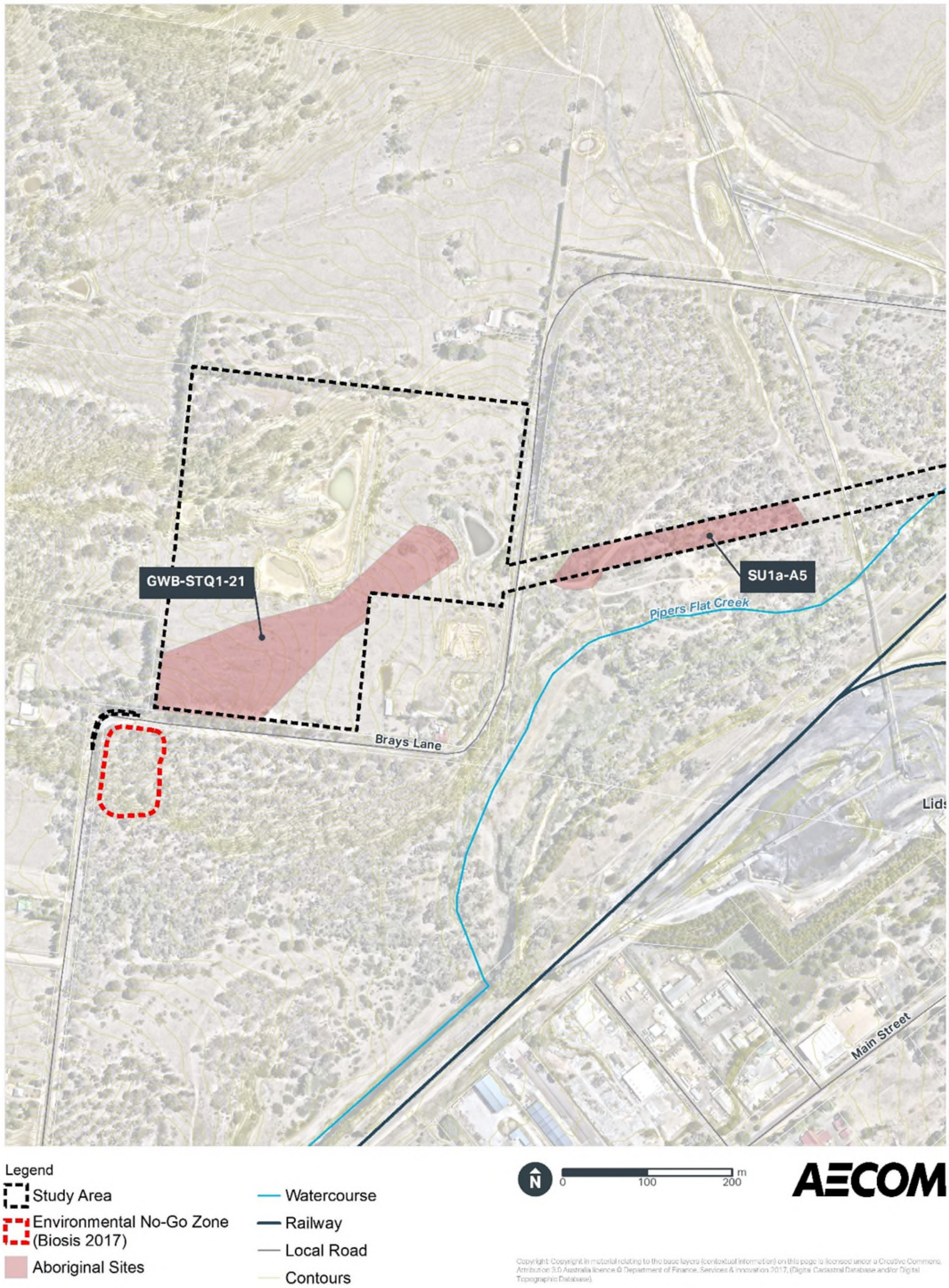


Figure 9-1 Aboriginal sites within the Project Area

9.3.5 Cultural values

Cultural value refers to the spiritual, traditional, historic and contemporary associations and attachments a place or area has for Aboriginal people. During the consultation process, RAPs identified the following cultural values for the Project Area and surrounding land:

- The Project Area forms part of a much larger cultural landscape for the Aboriginal community. This landscape includes a number of highly significant cultural sites, with local examples including the nearby Lidsdale burial ground and Maiyingu Marragu (Blackfellows Hand rockshelter)
- The Lidsdale burial ground, located outside of, but in close proximity to the Project Area, is a sacred site and has associated cultural protocols and restrictions
- The Coxs River and Pipers Flat Creek would have been focal resource features for Aboriginal people occupying the local area, offering a range of plant and animal foods, as well as rocks for flaked and edge-ground stone tool manufacture
- Campsites in the local area would have been positioned in areas of elevated, low gradient terrain overlooking, and providing ready access to, the floodplains of the Coxs River and Pipers Flat Creek
- Excavations for the realignment of the Castlereagh Highway in the mid-2000s, which investigated elevated, low gradient landforms adjacent to the Coxs River, northeast of the Project Area, yielded thousands of stone artefacts, indicative of a major camping area
- Stone artefact assemblages from the greater Lithgow-Wallerawang area tend to be dominated by artefacts manufactured out of quartz, a widely available but generally difficult material to work
- Quarrying of gravels, such as those observed within the Site, was likely opportunistic in nature, with people utilising gravels that were exposed naturally as opposed to digging for them
- The silicified tuff present within the Project Area was likely obtained through trade, as this high-quality material does not occur locally.

The overall significance of the Aboriginal cultural heritage value of the Project Area is considered low to moderate. The stone quarry GWB-STQ1-21 was assigned moderate scientific value, as Aboriginal stone quarries are rare on a local scale and relatively rare on a regional scale. The artefact scatter site SU1a-A5, was assigned low scientific value, as artefact scatters are a locally and regionally common site type and SU1a-A5 is considered a poor example of its type. The Project Area was considered to be of low historical significance and moderate aesthetic significance.

9.4 Impact assessment

9.4.1 Construction

Proposed ground disturbance activities within the Project Area are anticipated to result in a near-complete loss of value for stone quarry GWB-STQ1-21 and, subject to appropriate measures, no loss of value for artefact scatter SU1a-A5 (refer to **Figure 9-2**).

As shown on **Figure 9-2**, impacts to the stone quarry (GWB-STQ1-21) would occur as a result of the construction of multiple project components. Artefact-bearing soil profiles and surfaces within the Site would be disturbed due to earthworks associated with the construction of the BESS pad and new substation area. This would result in a near-complete, permanent loss of the scientific, historic and aesthetic value associated with the stone quarry.

Installation of the transmission line within and immediately surrounding artefact scatter SU1a-A5 would occur using Horizontal Directional Drilling (HDD, also known as underboring) at a depth of 1.5 metres below ground level. The HDD process would only disturb surface soils above 1.5 m below ground level at the launch pit and receiving pit, located at each end of the drilling path. The launch pit and receiving pit would be located outside of the SU1a-A5 site and would not impact on its heritage value. In view of the maximum observed depth of subsurface Aboriginal objects within SU1a-A5 (40 cm below ground level), the HDD process is not expected to impact the cultural value of the site.

The vehicle track within SU1a-A5 would not be used for access. The Site would be accessed via Brays Lane, which is an existing sealed road, located outside the identified Aboriginal sites.

Subject to the implementation of appropriate protective measures (refer to **Section 9.5**), the HDD process, with its associated launch and receiving pits and light and/or heavy vehicle movements are likely to result in no impact to SU1a-A5.

A crescent shaped, 240 square metre area located at the corner of Brays Lane close to the proposed site entrance would be cleared and compacted gravel or roadbase would be laid over the existing road-verge surface where required to allow for oversize / overmass vehicles to access the Site during construction (refer to **Figure 9-1**). An addendum to the ACHAR was completed to assess the impacts of the Project to this area which was added to the Project Area following completion of the ACHAR. The addendum is presented in **Appendix E Addendum Aboriginal Cultural Heritage Assessment Report**. The addendum concluded that the area is considered to retain negligible potential for Aboriginal objects (as defined by the NPW Act) in surface and subsurface contexts. While impacts to Aboriginal objects within the addendum ACHAR study area are considered highly unlikely, in recognition of the fact that this area has not been physically inspected for such objects, the ACHMP proposed for the Project would include a provision to visually inspect the area prior to the commencement of any ground disturbing works therein.

Biosis (2017) also identified an AHIMS registered open artefact site ‘Brays Lane AS1’ (45-1-2799), located close to the addendum ACHAR study area, in the area of native vegetation on the opposite side of Brays Lane. No impacts to this area are anticipated, and the area would be marked as an ‘environmental no-go zone’.

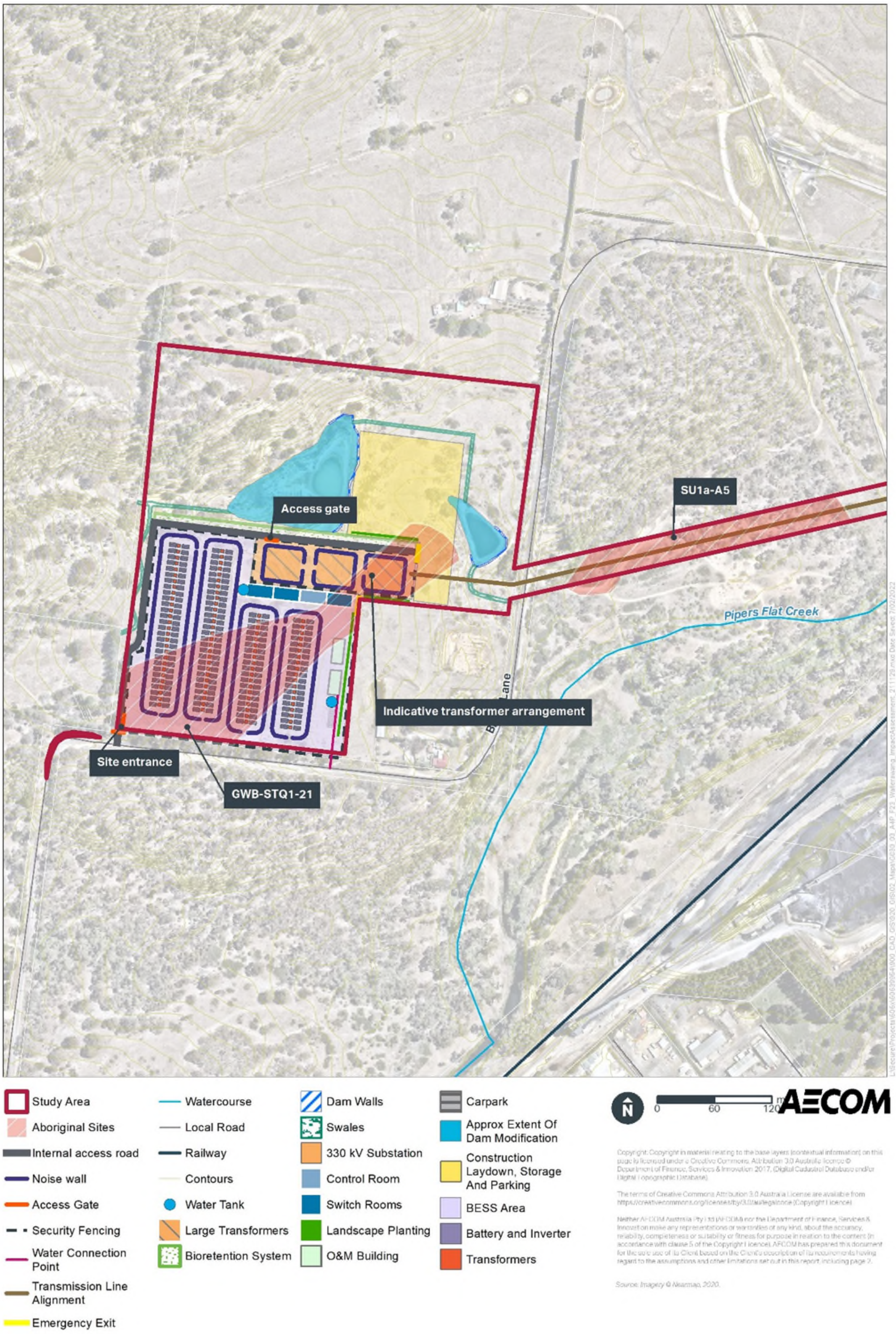


Figure 9-2 Potential impacts of the Project on Aboriginal sites

9.4.2 Operation

The construction of the BESS at the Site would result in a near-complete, permanent loss of value for stone quarry GWB-STQ1-21. No further loss would be expected during operation. No loss of value for artefact scatter SU1a-A5 is expected due to operation of the Project.

The ACHAR determined the Project would result in a 0.02% decline in the region's potential Aboriginal archaeological resource. On this basis, it is concluded that the impact of the Project on this resource would be negligible.

9.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to Aboriginal heritage are listed in **Table 9-2.**

Table 9-2 Mitigation and management measures – Aboriginal heritage

ID	Mitigation measure	Timing
AH1	An Aboriginal Cultural Heritage Management Plan (ACHMP) would be prepared for construction of the Project. This would guide the management of Aboriginal cultural heritage within the Project Area during construction of the Project. The ACHMP would be subject to periodic review to ensure that all management policies are being adhered to and are working effectively.	Detailed design
AH2	An archaeological salvage program incorporating surface collection and manual open area excavation would be conducted for the stone quarry site, GWB-STQ1-21. Salvage activities within GWB-STQ1-21 would be undertaken in accordance with the salvage methodology provided in **Appendix M** of the ACHAR for the Project.	Prior to construction
AH3	High-visibility fencing would be installed along the boundary of the SU1a-A5 site and be actively maintained throughout the construction phase of the Project. The location of SU1a-A5 would be clearly defined within the CEMP and associated plans as an 'environmental no go zone'.	Prior to construction
AH4	An Unexpected Aboriginal Heritage Finds Procedure (UAHFP) would be included in the ACHMP to cover the unanticipated discovery, at any point outside of the GWB-STQ1-21 salvage program, of an actual or potential Aboriginal heritage item for which Neoen does not have an existing management process in place. The procedure should cover all Aboriginal objects (as defined by the *National Parks and Wildlife Act 1974*), including human skeletal remains.	Detailed design
AH5	Provisions regarding appropriate consultation protocols with RAPs would be included in the ACHMP. Contact details and preferred contact methods for each Registered Aboriginal Party, as well as other relevant stakeholders, would be specified.	Construction
AH6	The Project's standard environmental site induction would include an Aboriginal heritage component. This would outline current protocols and responsibilities with respect to the management of Aboriginal cultural heritage within the Project Area (including the unexpected finds protocol) and provide an overview of the diagnostic features of potential Aboriginal sites and objects.	Construction

ID	Mitigation measure	Timing
AH7	Aboriginal archaeological works carried out under the ACHMP for the Project would be prepared to a standard comparable to that required by the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW. Printed and/or digital copies of associated reports should be made available to Registered Aboriginal Parties upon request.	Construction
AH8	The proposed transmission line would be installed beneath artefact scatter SU1a-A5 using underboring (such as Horizontal Directional Drilling). The launch pit, receiving pit and any associated works or activities related to these ‘pits’ would be located outside of the SU1a-A5 site.	Construction
AH9	The Addendum ACHAR study area would be subject to a visual inspection prior to the commencement of ground disturbing works within this area. The inspection should be undertaken by a field team consisting of a qualified archaeologist and minimum of one RAP field representative.	Construction
AH10	Any Aboriginal objects identified during the visual inspection referenced in AH9 would be subject to surface collection as part of the archaeological salvage program for impacted stone quarry site GWB-STQ1-21 (45-1-2853). Any such objects would be considered to comprise part of GWB-STQ1-21. If required, the boundary for GWB-STQ1-21 should be revised and updated in the Aboriginal Heritage Information Management System (AHIMS) database.	Construction
AH11	Contractors engaged to complete the proposed works should be made aware of the nature and location of previously recorded Aboriginal sites GWB-STQ1-21 (45-1-2853) and Brays Lane AS1 (45-1-2799), both of which are located in the immediate vicinity of the Addendum ACHAR study area.	Construction
AH12	An ‘environmental no go zone’ would be clearly defined within the CEMP and associated plans over the area identified by Biosis (2017) as Brays Lane AS1 (45-1-2799) shown on **Figure 9-1**.	Construction

10.0 Historic heritage

A Statement of Heritage Impact (SOHI) has been prepared for the Project and is provided in **Appendix F**. This chapter summarises the assessment of potential construction and operational impacts on non-Aboriginal heritage values and outlines environmental management and mitigation measures to avoid or reduce impacts.

10.1 Secretary's Environmental Assessment Requirements

Table 10-1 sets out the SEARs relevant to historic heritage and where the requirements have been addressed in this EIS.

Table 10-1 SEARs – Heritage

Relevant SEARs	
Heritage	**Where addressed**
This EIS must include: • an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development and consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents	• An assessment of potential construction and operation impacts to historic heritage is included in **Section 10.4.1** • An assessment of impacts to Aboriginal heritage is included in **Chapter 9 Aboriginal Heritage**.

10.2 Methodology

The SOHI was prepared in accordance with the Heritage NSW documents Assessing Heritage Significance (NSW Heritage Office, 2001) and Statements of Heritage Impact (NSW Heritage Office & Department of Urban Affairs & Planning, 2002) and involved the following methodology:

- A desktop search of the statutory and non-statutory historic registers and lists was undertaken to identify non-Aboriginal heritage items with the potential to be impacted by the Project. Registers and lists that were searched included:
  - World Heritage List
  - National Heritage List
  - Commonwealth Heritage List
  - Register of the National Estate (non-statutory)
  - National Trust Historic Buildings Register
  - NSW State Heritage Register
  - Section 170 Heritage and Conservation Registers
  - Lithgow City Local Environmental Plan 2014.
- A desktop review was conducted to develop an understanding of the existing environment within and surrounding the Project Area using: historical research from primary and secondary resources; and background research into the historical development of the area using historical plans, historical photographs and other primary and secondary historical sources as relevant
- A site inspection was undertaken on 4 March 2021 by AECOM staff to identify the existing character of the Project Area and surrounding land uses
- An assessment of the potential impacts of the Project on non-Aboriginal heritage values and identified heritage items during construction and operation
- Management measures to address potential impacts to non-Aboriginal heritage values were identified.

10.3 Existing environment

10.3.1 Historical context

The region of Wallerawang has been a hub of agricultural and industrial activity throughout the years with the main stock route coming through the Wallerawang Valley area from western regions. The discovery of gold in Bathurst and Mudgee in 1851 encouraged expansion into the region. Following the gold rush, growth in the area was defined by the development of coal mining and power generating infrastructure, with coal being discovered in the 1860s. These industries spurred the development of the railway in the region which contributed to the growth of Wallerawang from a small village to a bustling township and industrial centre for the region (C. A. & Associates, 1998:26).

The first colonial settler in the area was James Walker, a retired British Marines officer who obtained a 2000 acre land grant in 1823 on the banks of the Coxs River. This was called Wallerawang Station (C. A. & Associates, 1998:13). James Walker predominantly used the land for grazing sheep and wool production, using convicts to work the land (Crew, 1963:27).

Walker built a homestead on rising ground overlooking the bend in Coxs River, where he grew wheat. There were also turf huts with thatch rooves for the convicts. Troubles with convicts in the area meant that by 1839 the minority of the workers on Walker's farm were assigned convicts, with the majority of workers being migrants that James Walker had procured himself during his time visiting England in 1831-1838. James Walker and the Walker family (along with his brother William and nephews) became primary landholders in the area (Crew, 1963:27).

The Great Western Railway commenced construction in 1855 and in 1857 Edwin Barton came to the Wallerawang area to survey the route between Nepean and Bathurst. Construction on this part of the railway started in 1866 and the railhead reached Wallerawang in 1870. With this rail connection, the former village grew rapidly, with the rail line playing a significant role in the population growth of the town in the 1880s. It was at this time that Wallerawang became an important junction for the two main rail lines which led west to Bathurst and north to Mudgee by 1885 with the main rail line running from just near the St John the Evangelist Church (C. A. & Associates, 1998:11, 27). Though the original track arrangement from the 1870s has changed significantly over time, initially the original alignment ran adjacent to the main street of Wallerawang. This changed in the 1920s with an off-shoot north of the original alignment, approximately 2.5 km east of the Project Area.

Georgina Walker established the first school in the area and commissioned the design and construction of St John the Evangelist Church which opened in 1881 (I. D. Associates, 2005:10).

From 1873 onwards the area saw an increase in coal mining with 15 collieries opening along the Lithgow seam at Mount Piper between Wallerawang and Lidsdale between 1880-1951. This coal mining history continues to be visible in the area today. Collieries continued to be opened within the vicinity of the Project between 1975 and 1984. Shale oil was also found in the area in 1900 with three shale oil works opening in the Wolgan Valley (1900), Newnes (1905) and Glen Davis (1937), though these were short-lived. Pine forests were planted around Wallerawang to supply local mills (C. A. & Associates, 1998:29).

With the shift away from steam powered trains in the 1950s, and ongoing development of coal mining activities in the region. Wallerawang became host to the Wallerawang Power Station, which is located adjacent to the proposed transmission line. The Power Station (now undergoing decommissioning) was fuelled with coal from local collieries, including those immediately south of the Project Area. A series of coal conveyor belts were also constructed to transport coal across the area from local mines for use at the Power Station and distribution from the Lidsdale Siding.

10.3.2 Historic image analysis

Historical aerial photographs for the Project Area from 1975 to 1998 were sourced from the NSW Spatial Collaboration Portal. A review of these photographs indicates a range of activities and associated ground surface impacts have taken place within and surrounding the Project Areas. Key findings from this review are as follows:

- 1975 - Confirmation of the long-term agricultural / industrial nature of the area, demonstrated by operational Wallerawang Power Station and the colliery south east of the Site. The land within the Project Area can also be seen to be cleared for agricultural purposes (refer to **Figure 10-1** - the location of the Site is marked with a red dot)

- 1985 - By 1984 the Coxs River was dammed and the previous James Walker landholding/catchment area was partially flooded, becoming Lake Wallace (refer to **Figure 10-2** - the location of the Site is marked with a red dot)
- In the 1990s the land within the Project Area was partially excavated and two new dams were created. The industrial and coal mining character of the area was further established with the development of the previously described coal conveyors, and a coal stockpiling area to the south east of the Site that would eventually become the Lidsdale Siding (refer to **Figure 10-3** - the location of the Site is marked with a red dot).

Figure 10-1 1975 aerial photograph of Wallerawang (Source: Historical Imagery)

Figure 10-2 1984 aerial photograph of Wallerawang (Source: Historical Imagery)

Figure 10-3 1998 aerial photograph of Wallerawang (Source: Historical Imagery)

10.3.3 Archaeological potential

Based on the desktop historical research, the Site appears to have been cleared for agricultural or agistment purposes. The Site does not appear to have been developed as part to a larger homestead or farming estate. No buildings are known to have been built on the Site, and it is likely that its use has been limited to small-scale farming purposes. No evidence of any former buildings or other archaeological sites were recorded at the Site during the site inspection.

The creation of five dams on the Site has caused land disturbance within the location of the dams themselves, and in the areas around each dam where the spoil from dam construction was placed.

No evidence of any former agricultural use of the property were present on the Site, including fence lines. The property boundary does not appear to have changed. Other than the dams described above, no support or other ancillary works, including any drainage or water infrastructure, were recorded during the site inspection. If present, these features would be expected to have a minimal archaeological footprint, with nil to low potential for archaeological remains to be present.

The route of proposed transmission line from the Site through to the existing rail corridor also appears to have been highly disturbed. This disturbance was likely caused by historic vegetation clearance, the construction of the existing coal conveyor, and more recently due to illegal dumping and 4WD access (as observed during the site inspection). No evidence of former buildings or other infrastructure, such as those relating to agricultural purposes, were recorded within this vegetated area to the east of Brays Lane.

The existing rail easement and substation at the Wallerawang Power Station are considered to be highly disturbed and do not contain any known or potential heritage or historical archaeological potential.

10.3.4 Heritage items

A search of historic registers and lists was undertaken to identify heritage items within or in the immediate vicinity of the Project. The results of the searches are included **Table 10-2** and **Figure 10-4**.

There are no locally or state listed items within the Project Area and there are no heritage listed items or archaeological sites within at least 700 m of the Site.

There are three items listed on the NSW State Heritage Register within the vicinity of the Project Area.

Table 10-2 Historic heritage register and list searches

Heritage register	Results	Location (approximate)
World Heritage List	None	N/A
National Heritage List	None	N/A
Commonwealth Heritage List	None	N/A
Register of the National Estate (non-statutory)	None	N/A
National Trust Historic Buildings Register	None	N/A
NSW State Heritage Register	St John the Evangelist Church (5053347)	The curtilage of this item is about 10 m from the transmission line however the built structures are about 30 m from the transmission line
	Wallerawang Railway Station and Yard group (5012260)	760 m south of the Site
	Wallerawang rail bridges over Cox's River (5012261)	50 m north east of the Transgrid Wallerawang 330 kV substation
Section 170 Heritage and Conservation Registers	None	N/A

Heritage register	Results	Location (approximate)
Lithgow Local Environmental Plan 2014	Old Wallerawang School (Former National School), (I113)	The curtilage of this item is about 20 m from the transmission line however the built structures are about 130 m from the transmission line
	St John the Evangelist Church (I112), (also listed on the NSW State Heritage Register)	As above
	Wallerawang Railway Station and yard group (I208), (also listed on the NSW State Heritage Register)	As above
	Former Wallerawang Public School and Residence (I225)	380 m west of the proposed transmission line
	Stone Viaduct Cox's River Wallerawang (I440), (also listed on the NSW State Heritage Register)	100 m east of the proposed transmission line
	Braemai (I193)	470 m north east of the proposed transmission line
	Meadowside (I192)	530 m north east of the proposed transmission line
	Uniting Church (I194)	670 m north east of the proposed transmission line
	Cottage (I195)	710 m north east of the proposed transmission line
	Wallerawang Conservation Area and associated heritage items: Bottom Pub (I207), Surgery (I209), Wang Antiques Emporium (I210), Post Office (I211), and Former Commercial Banking Co. (I212)	Located about 820 m south of the Site

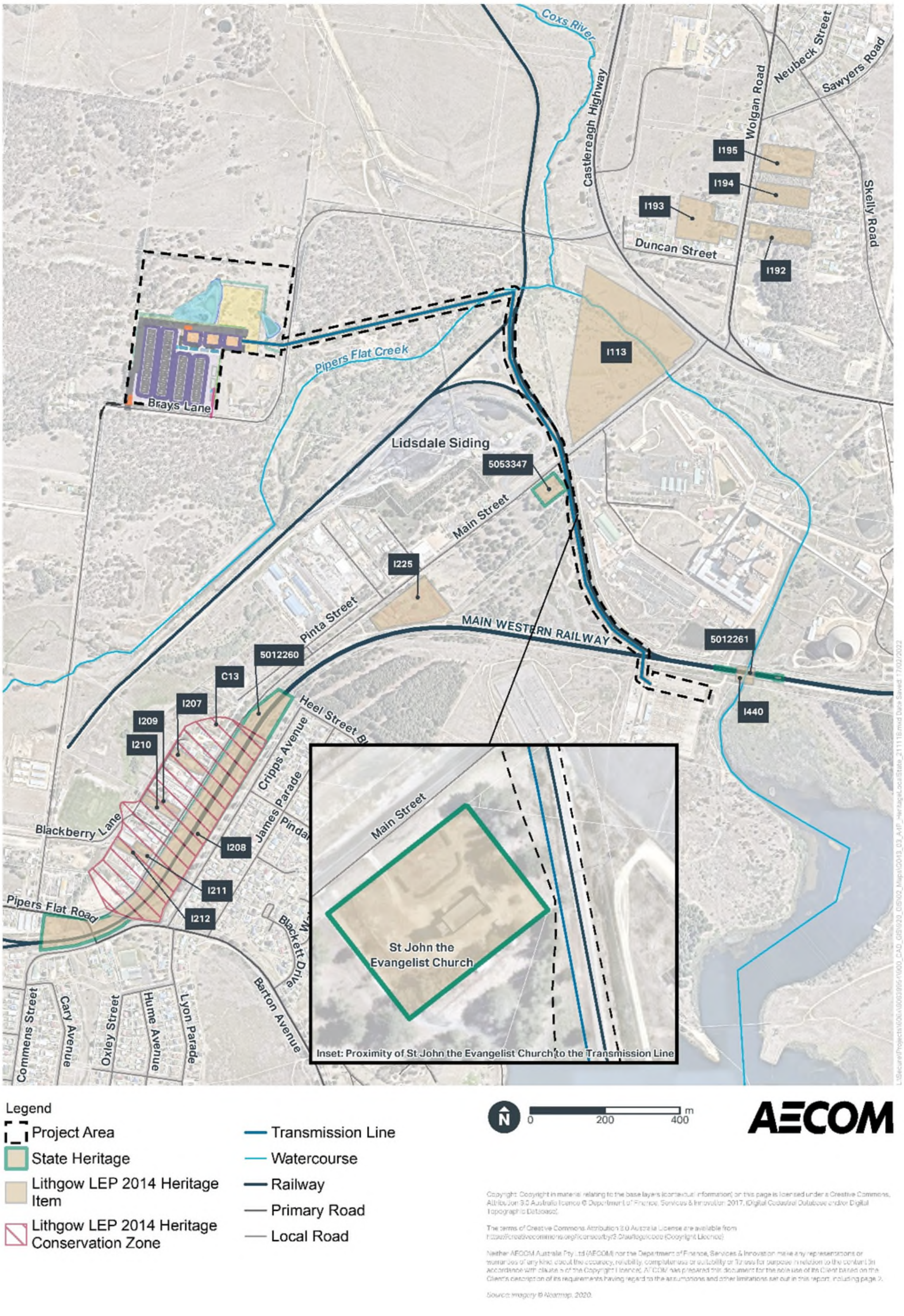


Figure 10-4 **Local and State Heritage Areas near the Project Area**

10.4 Impact assessment

10.4.1 Construction

No construction impacts are anticipated as a result of construction to be carried out at the Site, as there are no heritage listed items or archaeological sites within at least 700 m.

The heritage curtilage of the St John the Evangelist Church contains the church building along with the stone boundary walls, fences, and boundary plantings, including those that are located along the boundary with the rail corridor. The distance from the proposed transmission line to St John the Evangelical Church building is about 30 m as shown in **Figure 10-4**. The route of the proposed underground transmission line would be placed within the existing rail easement, an area previously disturbed from the construction and operation of the rail line.

When using high vibratory construction methodologies, there may be potential for cosmetic damage to heritage structures. To avoid damage occurring, high vibratory construction methodologies would not be used within 50 m of St John the Evangelical Church as far as is practicable.

Subject to the implementation of appropriate protective measures, construction of the BESS and proposed transmission line is not expected to have adverse impacts to known or potential heritage or historical archaeological sites.

10.4.2 Operation

During operation, BESS activities would be limited to occasional maintenance involving 5-6 employees visiting the Site. Employees would not need to access any heritage listed items as part of their work.

In addition, the Site is located at least 700 m from the closest heritage item or conservation area and as the transmission line would be underground, the Project would not affect views to, and from any known heritage item. Therefore, impacts to the heritage values are not anticipated during operation of the Project.

10.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to non-Aboriginal heritage are listed in **Table 10-3**.

Mitigation and management measures in other chapters that are relevant to the management of potential historic heritage impacts include:

- **Chapter 13 Noise and vibration** specifically measure NV4 which addresses potential vibration impacts associated with the installation of the proposed transmission line.

Table 10-3 Management and mitigation measures – Non-Aboriginal heritage

ID	Management and mitigation measure	Timing
HH1	The CEMP would include a stop works procedure for unexpected finds in the unlikely event that intact archaeological relics or deposits are encountered.	Construction
HH2	To avoid damage occurring, where feasible high vibratory construction methods would not be used within 50 m of St John the Evangelical Church. Should high vibratory methods be used within 50 m of the church, these will not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around 1 m, from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective. (This is also provided in measure NV4).	Construction

11.0 Surface water, flooding and water use

A Water Cycle Management Study (WCMS) has been prepared for the Project and is provided in **Appendix G Water Cycle Management Study**. This chapter summarises the assessment of potential construction and operational impacts of the Project on surface water, flooding and water use and outlines environmental management and mitigation measures to avoid or reduce impacts.

11.1 Secretary's Environmental Assessment Requirements

Table 11-1 sets out the SEARs for water and where the requirements have been addressed in this EIS.

Table 11-1 SEARs – Other matters

Relevant SEARs	
Water	**Where addressed**
The EIS must address:	
An assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including watercourses traversing the site and surrounding watercourses, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts	**Section 11.5.1** identifies the potential impacts of the Project on surface water considerations during construction and **Section 11.5.2** identifies the potential impacts during operation (including flooding, watercourses, drainage channels, wetlands, riparian land, farm dams). Section **11.5.3** outlines the management and mitigation measures proposed to manage these impacts. Potential impacts of the Project to groundwater resources as well as potential impacts from acid sulphate soils have been discussed in **Chapter 12 Geology, soils, groundwater and contamination**. Potential impacts of the Project to groundwater dependent ecosystems have been discussed in **Chapter 8 Biodiversity**. Potential impacts of the Project to groundwater resources and bore infrastructure (including adjacent licensed water users and basic landholder rights) have been discussed in **Section 11.5.1** and **Section 11.5.2**.
Details of water requirements and supply arrangements for construction and operation	**Section 11.5.1** details the water use and supply arrangement during construction and **Section 11.5.2** details the water use and supply arrangements during operation.
A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004);	**Section 11.5.3** outlines the management and mitigation measures relating to surface water, flooding and water use and details the erosion and sediment control measures proposed for the Project. Management and mitigation measures relating to erosion and sediment control are included in **Section 11.5.3** and **Section 12.5**. This includes committing to the preparation of a soil and water management plan in accordance with the Managing Urban Stormwater: Soils & Construction (Landcom, 2004) (referred to as the 'Blue Book').

11.3 Methodology

A surface water, flooding and water use assessment has been undertaken for the Project. While the assessment includes the whole Project Area, focus has been placed on the Site as the majority of surface water, flooding and water use impacts are anticipated to occur as a result of the BESS facility construction. The complete report is attached in **Appendix G Water Cycle Management Study** with relevant sections summarised within this chapter. A concept stormwater management design (AECOM, 2021) has been prepared to inform the surface water assessment, and was modelled as part of the flood assessment, included in **Annex A** of **Appendix G Water Cycle Management Study**.

The approach for assessing the potential impacts on surface water, flooding and water use included:

- A desktop review and analysis of existing information to characterise the existing environment, identify surface water receptors, existing flood behaviours and drainage infrastructure
- Consideration of the location of the Project Area in the context of surrounding catchment areas and potential sensitivity and influence on downstream waterways
- Identification of key topographical features such as likely overland flow paths and low/sag points around the Project Area
- Assessment of potential construction and operational impacts relating to flooding, drainage and surface water, including drainage modelling. In particular:
  - The flooding assessment involved defining the upstream catchment areas contributing to flows moving through or around the Site, estimating peak flows generated by these catchments and assessing whether the capacity of the surrounding drainage system is capable of conveying the flows without risking inundation and damage of the Site
  - The water quality assessment included an assessment of the impervious surfaces that would be created by the Project, and the associated pollutant generation and treatment
- Identification of appropriate mitigation and management measures to mitigate potential impacts on the environment.

Modelling was used to assess the potential impacts on surface water, flooding and water use which included:

- A flood model (TUFLOW) was developed to assess the performance of the proposed stormwater management and dam alteration plan in comparison to the existing flood behaviour and existing discharge conditions. This modelling approach and results have been documented in **Annex A of Appendix G Water Cycle Management Study**
- An assessment of the effect of the Project on the water quality within a drinking water catchment. WaterNSW developed *Using MUSIC in the Sydney Drinking Water Catchment* (WaterNSW 2019) to help consultants prepare stormwater quality models using the MUSIC modelling program to assess whether a neutral or beneficial effect (NorBE) on water quality can be achieved for proposed urban and rural land use developments. The manual includes instructions relating to setup of pre- and post- development site layouts, considering the existing site characteristics, the climatic region, drainage configuration and the configuration of post-development site layout and treatment measures in the context of NorBE. This modelling approach and results have been documented in **Appendix G Water Cycle Management Study**.

The assessment draws on a number of data sources and reference documents, which included:

- Project information, including the site layout plan and contours within the Site
- Elevation data in the form of a Digital Elevation Model (DEM) at a resolution of 1 m, obtained from the NSW Government Spatial Services.

11.4 Existing environment

11.4.1 Catchment

The Project is located within the Hawkesbury-Nepean catchment. The Hawkesbury-Nepean catchment is the longest coastal catchment in NSW. The Hawkesbury River (and its tributaries) is over 470 km long and the catchment area is 22,000 km². The Project is located towards the top of the catchment with Pipers Flat Creek joining Coxs River and flowing into Lake Burragorang, which flows as Warragamba River until it eventually becomes the Hawkesbury River, and flows south easterly to its mouth at Broken Bay, and out to the Tasman Sea. The main tributaries of the Hawkesbury–Nepean River commence in rural areas and national parks.

The Project is also part of the Warragamba Catchment which is located within Sydney's Drinking Water Catchment. Warragamba is the largest of Sydney's five drinking water catchments and covers an area of 9,050 km^2. The catchment is spread between north of Lithgow at the head stream of the Coxs River to the source of the Wollondilly River west of Crookwell. The Project is therefore subject to State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (SDWC SEPP). This policy requires that the Project has either a neutral *or* beneficial effect (NorBE) on the quality of water across the catchment.

11.4.2 Watercourses, water bodies and site drainage

Pipers Flat Creek is the closest watercourse to the Project, located about 50 m to the east of the Site. Pipers Flat Creek joins the Coxs River about 700 m downstream from the Site. Other mapped and named watercourses in the vicinity of the Project include Lake Wallace (part of Coxs River, 4 km downstream from the Site). Watercourses that occur within close proximity of the Project are shown on **Figure 11-1**.

11.4.3 Riparian land

DPE have guidelines that apply to riparian corridors, the *'Natural Resources Access Regulator – Guidelines for controlled activities on waterfront land – Riparian Corridors'* (NRAR 2018). Based on these guidelines, the two flow paths that run in an easterly direction through the Site (refer to **Figure 11-2** and discharge to Pipers Flat Creek were assessed and results reported in the Biodiversity Development Assessment Report (Biosis 2021). The assessment concluded that the flow paths within the Site were not considered to provide diversity of habitat for terrestrial, riparian and aquatic plants and animals or provide habitat connectivity, (Biosis 2021), and as such were not subject to the requirements of controlled activities on waterfront land.

11.4.4 Site drainage features

The existing dams influence surface water flows and flooding across the Site. The dams attenuate surface water flows as they move through the Site, and the dams help to contain more surface water onsite, thereby reducing the volume and rate of water discharged offsite and entering Pipers Flat Creek.

The location and extent of the Site, as well as the existing flow paths and various dams scattered across the Site, are displayed in **Figure 11-2**. There are four main dams that exist across the Site (dams 1, 2, 3 and 4) in addition to three smaller dams located within the south-eastern residential property (dams A, B and C). There are also two main flow paths moving through the Site:

1. Northern flow path – collecting runoff from the northern portion of the Site and running through dams 1, 3 and 4, before directing flow over Brays Lane and discharging to Pipers Flat Creek.
2. Southern flow path – collecting runoff from the southern portion of the Site and directing it through Dam 2, before merging with the northern flow path at Dam 3, which discharges to Pipers Flat Creek via Dam 4.

These main flow paths, as well as all other flow paths across the Site, are ephemeral and only convey surface water following a rainfall event. No beds, banks or other geomorphological features are present that suggest that these flow paths are watercourses or creeks. Equally these flow paths do not support any riparian vegetation.

A small (approximately 1.6 ha) portion of the Lot also directs runoff into the south-east residential property, draining to the dams within that property (dams A, B and C).

Figure 11-1 Watercourses within close proximity of the Project

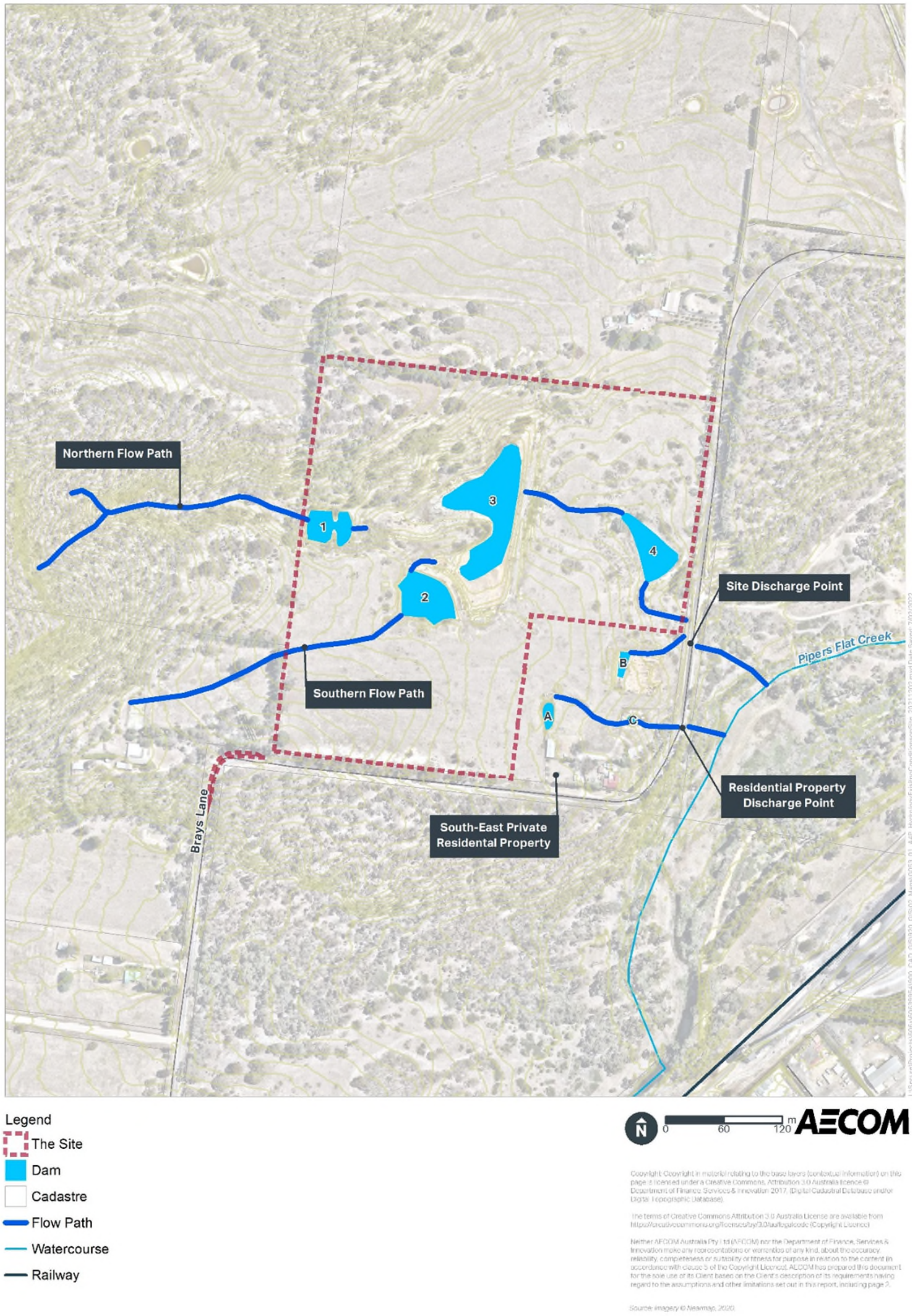


Figure 11-2 Existing conditions on the Site

11.4.5 Receiving environment

Runoff from the Site discharges to Pipers Flat Creek which drains eastwards into Coxs River (about 700 m). Coxs River is part of the Hawkesbury/Nepean catchment which is also within the Sydney Drinking Water Catchment, as discussed in **Section 11.4.1**. Runoff from the proposed transmission line corridor would drain to Pipers Flat Creek and the Coxs River depending on where works are being completed.

11.4.6 Existing flood risk

As shown in **Figure 11-3** the general flood behaviour across the existing Site consists of:

- Floodwaters along the northern flow path move in an easterly direction and enter Dam 1 before eventually spilling into Dam 3.
- Floodwaters along the southern flow path move in a north-easterly direction and enter Dam 2 before eventually spilling into Dam 3.
- Flows overtopping from Dam 3 then head in an easterly direction towards Dam 4.
- Flows spilling out of Dam 4 are then directed towards Brays Lane, where flows overtop the road and head towards Pipers Flat Creek.
- A small portion (2.0 ha) of the Site directs runoff into the adjacent south-east property and feeds into their existing dams A and C. Rain falling directly on the property also helps fill these two dams, along with Dam B.
- Flow spilling out of Dam B heads towards Brays Lane and merges with flows discharging from the Site before overtopping the road and heading towards Pipers Flat Creek.
- Flow spilling out of dams A and C head towards Brays Lane, where they overtop the road and head towards Pipers Flat Creek. The point where these private property flows overtop Brays Lane is approximately 75 m south of the discharge point for the Site.

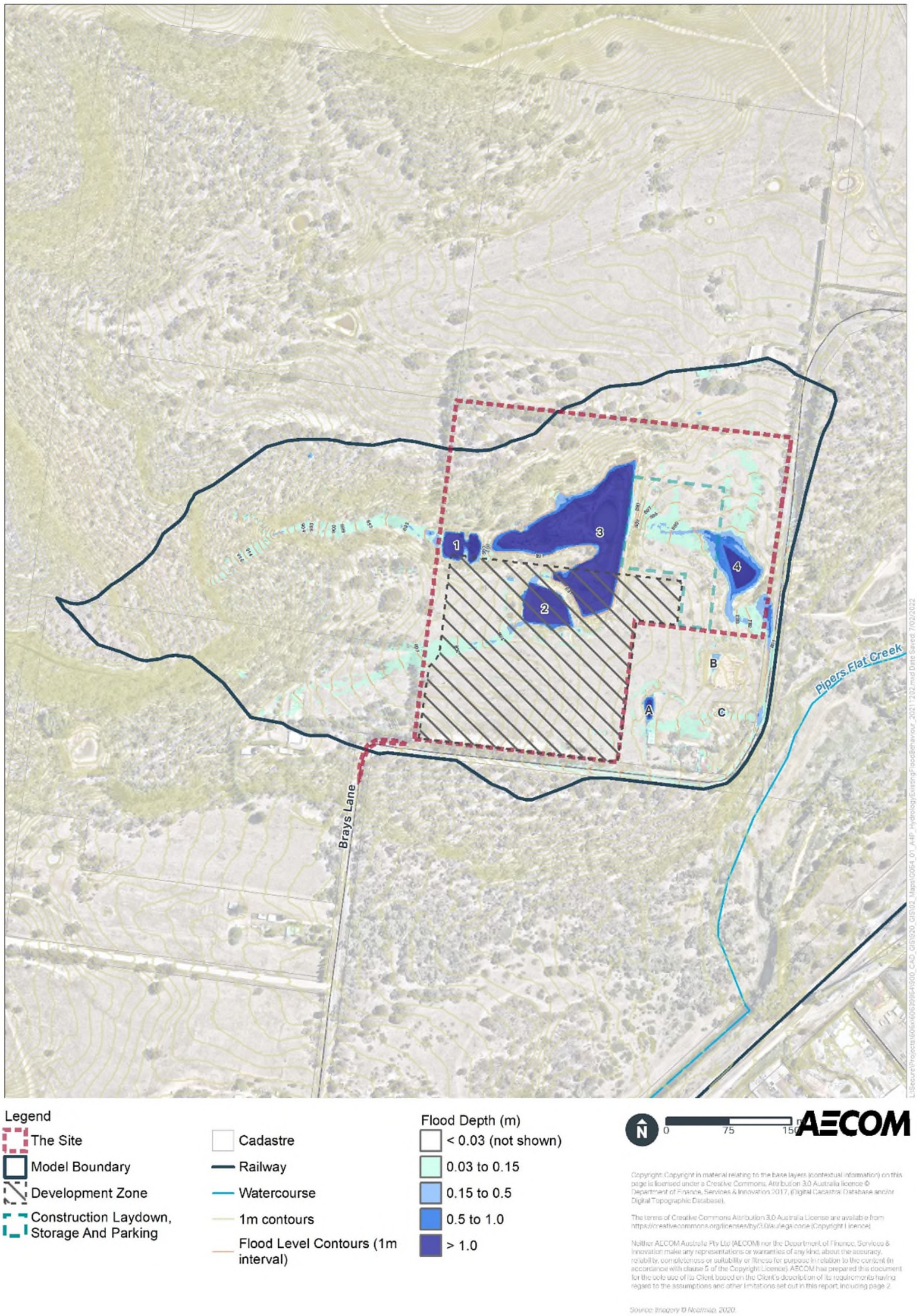


Figure 11-3 Existing flood behaviour across the Site

11.4.7 Existing water quality

The existing Site and wider Project Area does not include formal water quality treatment or erosion protection measures before discharging to Pipers Flat Creek. Some areas across the Site are bare and vulnerable to the effects of scouring due to rainfall and runoff.

Pasture grasses and other vegetation across the Site is likely to provide some protection against erosion. The existing dams onsite have been assumed to provide some level of pollutant removal by allowing for sediments and other potential particulate pollutants, to settle out of suspension. Vegetation within the dams would also help to remove nutrients, such as nitrogen and phosphorus.

Existing areas of vegetation would provide greater protection against the erosive effects of rainfall and runoff; however, there are still some areas of exposed soils that would be susceptible to erosion and contribute to the transportation of sediments in waterways.

Further information on the existing vegetation within and around the Project is provided in **Chapter 8 Biodiversity** and the Biodiversity Development Assessment Report which has been prepared for the Project (Biosis, 2021) and is attached in **Appendix C**.

11.4.8 Water use and wastewater management

The residential property located on Lot 4 DP 751651 and is connected to the existing water main that runs along Brays Lane. It is assumed that wastewater is currently held in a residential septic tank or similar, and disposed of offsite. Given the remainder of the Lot is currently used for occasional grazing, there is limited demand for potable water and wastewater services.

Currently, there are no requirements for water or wastewater services within the remaining portion of the Project Area, nor are there any existing water or wastewater mains servicing this land.

11.5 Impact assessment

11.5.1 Construction

Surface water drainage

As discussed in **Section 11.4**, there are two flow paths moving through the Site in an easterly direction. To allow the construction of the BESS pad, it is proposed to undertake earthworks to divert the southern flow path north once it enters the Site, joining it to the northern flow path closer to the western boundary. From this point the combined ephemeral flow paths would flow east adjacent to the northern boundary of the proposed BESS pad towards a revised Dam 3 (referred to as Dam 5). Diverting the southern ephemeral drainage line would allow surface water to flow around the BESS pad (refer to **Figure 11-4**).

Construction of the Project would also require the infilling of Dam 1, Dam 2 and the southern part of Dam 3. Dam 2 is located on the southern drainage line and the land on which both it and the southern part of Dam 3 are located would be required for the BESS facility and associated infrastructure.

The proposed earthworks, diversion of the southern drainage line and changes to the dams have the potential to cause a minor redistribution of some surface flows generated by the Project Area. The disruption of existing flow paths and the earthworks required to build the diversion channel could result in the following surface water impacts during construction:

- Localised ponding occurring at new areas across the Site with the potential to impact works
- Earthworks causing runoff to move as concentrated flows, as opposed to existing runoff moving as sheet flow, which has the potential to scour out the earth and mobilise sediment in runoff discharging to Pipers Flat Creek
- Earthworks directing concentrated flows into the neighbouring properties which could potentially create drainage/flooding issues within these properties and the surrounding downstream environment.

Given the small size of the Project Area in the context of the wider catchment draining to the ephemeral drainage line, the redistribution and possible increase of flows during construction is not expected to significantly affect the performance of downstream drainage infrastructure. Management and mitigation measures are included in **Section 11.5.3**.

Surface water quality

The potential impacts to water quality as a result of the construction of the Project include:

- Earthworks and temporary stockpiling could increase the amount of sediment and nutrients being mobilised and transported downstream via stormwater runoff
- Earthworks resulting in concentrated flows, as opposed to sheet flow, that have more potential to scour the earth and increase sediment loads carried by surface waters
- Contamination of surface waters due to accidental spillages of fuel, lubricants, effluent and other chemicals and materials used during construction
- Loosening of soils due to vehicle movements which could transport sediment into the waterways either by runoff carrying sediment or through sediments attached to the vehicles traversing the ephemeral drainage line
- Dewatering open excavations following periods of rainfall, which may contain sediments and other pollutants mobilised by the rainfall.

The proposed underground transmission connection between the Site and the Transgrid Wallerawang 330 kV substation would cross the Pipers Flat Creek riparian corridor near the railway bridge. The transmission line is to be underbored beneath the creek to avoid impact to the riparian corridor.

A frac-out is the un-intentional release of drilling fluids to the surface during directional drilling. Impacts to the quality of surface water during the construction of the new transmission line could be caused in the unlikely event that drilling fluid is released into the surrounding environment. The products selected for mixing the drilling fluid slurry would be inert (such as bentonite clay) or biodegradable (such as biopolymers or xanthan gum), many of which are certified for use in aquifers containing potable quality groundwater. Additionally, a qualified drilling engineer would be employed. To reduce impact to sediment escaping into surface water measures to respond to a frac out would be provided as part of the Soil and Water Management Plan (SWMP).

Where sediments are mobilised from construction areas and allowed to enter the receiving waterways, there is potential for adverse impacts to water quality by increased turbidity, lowered dissolved oxygen levels and increased nutrients and pollutants. Sediment controls would employ to manage soils on the Site during construction of the BESS and the installation of the transmission line. The SWMP would include a specific Erosion and Sediment Control Plan (ESCP) for the construction works at the Site to show where specific controls will be employed and to help ensure that erosion is minimised and nearby watercourses are protected. Measures that would be included within the SWMP and ESCP are discussed in **Section 12.5**.

Whilst a number of potential impacts could occur, these impacts are typical of the development of greenfield sites and are managed on a regular basis. With the implementation of the mitigation and management measures described in **Section 11.5.3** and in **Section 12.5**, impacts to the receiving watercourses would be neutral or beneficial to the water quality of the receiving waters.

Flooding

As discussed in **Section 11.4**, there are two flow paths moving through the Site in an easterly direction. Whilst these flow paths are dry outside periods of rainfall events, there is potential for the two upstream catchments to generate flows during heavy rainfall events which would be directed through the Site along the drainage lines and into the existing dams before discharging to Pipers Flat Creek. The proposed construction areas are located on these existing flow paths, in a rainfall event, this could lead to floodwaters moving through the construction site.

Flooding along the ephemeral drainage line during construction works would present a safety hazard to construction personnel, could cause damage or loss of materials and equipment and could potentially lead to materials being washed offsite which could potentially block drainage infrastructure and/or have environmental impacts (for example, increased sediment flow to the receiving surface water environment).

To manage this risk, works related to the management of surface water flows and to upgrade the dams onsite would be completed early in the construction program. Completing this work early in the construction program would reduce the risk of increased surface water flows or flooding impacting construction works areas across the Site. Prior to these works being completed, where heavy rain and flood warnings are predicted for the area, construction at the Site would be stopped and machinery, equipment made safe and protected as further detailed in mitigation measures.

Given the short-term duration for the construction works along the transmission line corridor, it is extremely unlikely that a flood event would coincide with construction works.

Flooding impacts would be avoided and minimised through the implementation of management and mitigation measures identified in **Section 11.5.3**.

Water use and wastewater

Potable water would be required during the construction of the Project to support a number of construction activities, including concreting, dust suppression, and washing of hard surfaces, equipment and vehicles. In addition, a comparatively smaller amount of water would be used to service worker facilities (e.g. hand washing facilities).

In consideration of the likely onsite water needs during construction, and with the implementation of best practice water saving measures, it is considered that the amount of water required for construction of the Project would be minimal. The main use of water during construction would be to suppress dust on an ‘as needed’ basis, as well as for production of concrete.

Water use would be required for concreting activities to combine the cement and aggregate. Concrete requires high quality water, as impurities can impact on the quality of the concrete and its overall strength. For this reason, potable water is highly suitable for this use. The majority of concrete that would be used to build the Project would be brought in from offsite using concrete mixing trucks. These trucks would be filled at a concrete batching plant. As such, while water usage for concrete is likely to comprise a significant portion of the Project’s water needs during construction, this need would be fulfilled away from the Site, and would limit the total consumption of water at the Site.

Sustainable water use techniques would be used to reduce water use during construction, including using brooms instead of water for cleaning where possible, and using high-pressure, low-volume trigger nozzles on hoses for wash down facilities to limit water consumption. Water for onsite construction activities (such as dust suppression) would be sourced from the onsite dams where feasible, and where not feasible treated recycled water would be trucked to the Site.

An estimation of potable and non-potable water use during construction was undertaken with reference to a similar projects undertaken across NSW as well as a publicly available construction water use estimation table (QLD Government 2022).It is anticipated that approximately 2,000 litres of water per day would be required per day during peak construction (during the civil, structural, mechanical, electrical and transmission connection works phase), inclusive of dust suppression requirements. This water would be sourced from onsite dams, the local water supply, or from treated wastewater that would be trucked to the Site. Construction workers would also contribute to water consumption. The number of workers on the Site and across the Project Area would be at its largest during the construction phase of the Project. To accommodate these workers, there would be temporary office facilities including amenities. This would require a temporary higher demand for potable water. It is noted that during the two months of peak of construction, up to 250 workers may attend the Site in a day, however this number would more typically be about 50 workers a day outside of the peak construction period. Potable water would initially be delivered to the Site with water trucks until such time as a potable water connection is established. It is proposed to make the connection to the potable supply network at the start of the construction process so that potable water would be available during the construction phase for worker amenity. It is estimated that about 20 litres of water per person, per day would be required resulting in 5,000 litres of water a day when construction worker numbers are at their peak.

Temporary worker amenities would be provided during construction. The wastewater generated by these facilities would be collected by a contractor and disposed offsite at a suitable facility. Washdown bays for construction vehicles and equipment would be containerised and collected for offsite disposal.

Measures to mitigate potential impacts related to water use and wastewater are provided in **Section 11.5.3**.

11.5.2 Operation

Surface water drainage

Under existing conditions the Site is almost entirely pervious. The proposed layout of the Site would increase the impervious area which would in turn increase the runoff generated by the Site. Areas contributing to an increase in impervious area include:

- Hardstand areas in the form of compressed gravel or concrete slab to support battery enclosures, transformers, site facilities etc.
- Access/internal roads
- Buildings
- Car park.

The impervious area across the Site would likely increase from 3% to 41% which would increase in the amount of runoff generated. All drainage infrastructure within the development areas would be designed to safely convey runoff towards the nearest dam. This would be Dam 5 for the majority of the BESS facility.

A concept stormwater management design is shown in **Figure 11-4**. It is expected that this design would be refined and optimised during detailed design. The concept stormwater and drainage design were assessed as part of the flood assessment summarised below (refer to **Appendix G Water Cycle Management Study**).

The Site's drainage system would typically consist of minor (underground) and major (overland) drainage systems with a combined capacity capable of conveying the 1% Annual Exceedance Probability (AEP) flows. Both the minor and major drainage systems would be designed during the detailed design phase, including appropriate erosion and scour protection measures.

The proposed dam modification strategy would be capable of storing site runoff and controlling/reducing the peak discharge rates (as discussed further below under the operational flooding assessment). This reduction in peak flows and discharge volumes would reduce the risk of scour and associated water pollution in downstream environments.

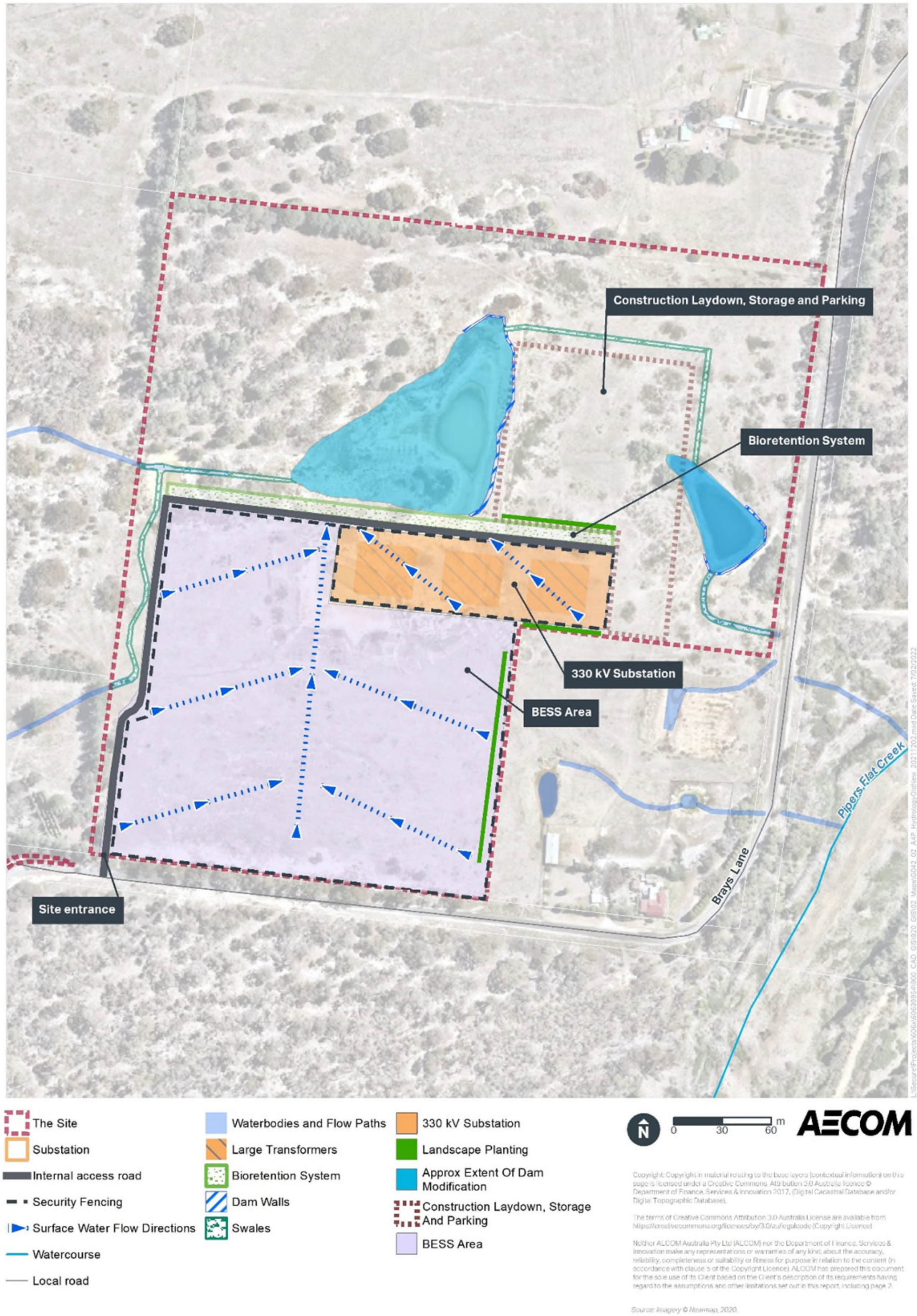


Figure 11-4 **Proposed stormwater management plan with bioretention basin**

Surface water quality

The design of the Project would result in a 38% increase in total impervious area of the Lot (from 3% to 41%). Without treatment, this could result in an increase in a commensurate increase contaminants and litter in the runoff that would discharge to Pipers Flat Creek and Coxs River.

Risks related to water quality associated with the operation of the BESS include:

- Stormwater runoff from hard surfaces being discharged to Pipers Flat Creek and Coxs Creek
- Accidental spill or leakage events during site operations
- New site layout concentrating flows which may increase the risk of scour and sediment mobilisation
- Raindrop and rill erosion on the pervious surfaces surrounding the batteries pervious surfaces due to the surface not having a protective cover or having insufficient compaction.

The NorBE guidelines require a 10% improvement in the pollutant loads for the proposed scenario compared to the existing scenario. As the existing scenario was predominately pervious and had four farm dams that treat water quality, the benchmark pollutant loads are low.

A bioretention system has been proposed as part of the Project to treat surface water flows from the BESS facility to a standard that meets the requirements of the NorBE Guidelines. Bioretention systems are vegetated filters that treat runoff as it flows vertically through a filter media. Pollutants are removed through the physical processes of screening, chemical process of adsorption and precipitation, and biological processes of uptake and transformation.

MUSIC Modelling results conducted on the Site showed that NorBE requirements for reducing pollutant loads can be achieved for the area of the Site to be developed, when compared to the existing scenario. These results are presented in **Table 11-2**. The results indicate that the inclusion of a bioretention system is sufficient to achieve a reduction of pollutant loads, such that the pollutant loads resulting from the Project would be at least 10% less than the existing scenario and achieve NorBe objectives.

Table 11-2 Developed Area - MUSIC modelling pollutant load results

Scenario/Catchment	Annual Pollutant Loading (kg/yr)			
	Total suspended soils	Total phosphorus	Total nitrogen	Grass pollutants
Existing	903	2.43	25.8	138
Proposed	138	1.57	22.5	0
Difference	-765	-0.86	-3.3	-138
% Improvement	**84.7**	**35.4**	**12.8**	**100**
Neutral or beneficial effect? (Y/N)	Y	Y	Y	Y

Although the treatment requirements for stormwater runoff can be met with a bioretention system, there would be additional treatment buffers provided by the Project that are not accounted for in the modelling. These are:

- The water bodies proposed for flood attenuation onsite would provide further pollutant removal for runoff from the BESS area
- A series of vegetated swales would be used to convey surface water flows around the BESS facility and across the Site, between the dams and from the dams offsite. Some treatment would occur in the swales as water interacts with the soil and vegetation.

Further, aquatic habitats would be created by the construction of the Dams 4 and 5 and connecting swales. The creation of these habitats would contribute to the habitat values of the Pipers Flat Creek riparian corridor downstream.

Once construction is complete along the transmission line corridor, the disturbed areas would be rehabilitated to pre-development conditions. During operation, surface infrastructure associated with the transmission line would be limited to access covers to cable inspection pits. These would be located at intervals along the alignment at spacings of about 250 m. The cable inspection pit covers are typically small in size (less than 1 m^2). Given the spacing and the size of the pit covers these are not expected to alter the water absorption or runoff capacity in the Project Area. As such this is considered to be a neutral impact and would be consistent with NorBE objectives.

Surface water quality impacts would be avoided and minimised through the implementation of management and mitigation measures identified in **Section 11.5.3**.

Flooding

The main flood impacts resulting from the Project include:

- The proposed diversion flow path along the western boundary of the Site would be designed to divert the southern flow path around the proposed BESS. This diverts flows from the southern flow path into the northern flow path and then into Dam 5 (refer to **Figure 11-4**).
- The Project alters flow paths across the southern part of the Site, directing runoff from most of the area towards the proposed Dam 5 at the centre of the Site.
- Other areas of the Site, if disturbed during the construction phase, would be rehabilitated as pasture grasses and no impacts to flows are expected in the long term.
- Following construction, the temporary hardstand area would be returned to a condition similar to the existing condition (pasture grasses). This area is the only site catchment to direct runoff into Dam 4 (refer to **Figure 11-4**). The swale used to divert flows around the construction laydown area would be removed following construction and a swale established to follow the contours of the land (refer to **Figure 11-4**).
- Storage that would be lost at dams 1, 2 and 3, by partially or completely infilling them to make room for the development, would be diverted to other areas of the Site (proposed Dam 5). This alters the location and extents of flood storage across the Site. The design sought to retain a similar surface area and flood attenuation volume to the existing conditions in order to minimise impacts to flows.
- Flood extents and depths at Dam 4 would increase due to the proposed increases in imperviousness resulting from the construction of the BESS, and to accommodate the associated increases in runoff.
- Flows from the Site that would previously enter the south-eastern property would be reduced to zero, as the Project would extend up to the south-eastern property boundary. Areas that currently drain towards the south-eastern property would be directed back towards Dam 5. This would reduce the amount of flow filling up their dams and leaving the land around this property.

TUFLOW modelling results are discussed in **Annex A Flood Assessment** of **Appendix G Water Cycle Management Study**, and show that the Project would maintain (or reduce) the peak discharge rates and volume for major design storm events. Under existing conditions, the Site is estimated to discharge to Pipers Flat Creek at a peak discharge rate of 2.9 m^3/s in a 1% Annual Exceedance Probability (AEP) event and 1.1 m^3/s in a 10% AEP event. The modelled results indicated that the Project is capable of reducing the peak discharge rate to 1.5 m^3/s in a 1% AEP event and 0.6 m^3/s in a 10% AEP event.

The modified dams would be effective at attenuating surface water flows and reducing peak discharge rates. The flood modelling conservatively assumed that all dams are completely full at the beginning of a storm event. However, it is expected that runoff generated in some of these smaller storm events could be entirely contained within the dams as they would not always be full and would therefore have some available storage for the retention of floodwaters.

The proposed dam alterations would be able to adhere to the requirements of the *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (SEPP), as the Project is not expected to result in an increase to the peak discharge rate or volumes during the major storm events and would therefore be expected to result in a neutral impact on the receiving environment.

As a result of the Project, the modelled results indicate that flow entering the south eastern property via its western boundary would be effectively reduced to zero, thus reducing the risk of flood hazards. This is due to the development zone extending to the eastern Site boundary. Runoff generated in this area would be directed to Dam 5 as opposed to the land around the south-eastern property.

Water use and wastewater

During operation, water use would be minimal and likely limited to worker amenities and some watering of vegetation. Therefore, the application of the average yearly water use for a residential dwelling from the *2016 Developer Charges Guidelines for Water Supply, Sewerage and Stormwater* (DPIE 2016) has been adopted to represent likely operational water use for the Project. For inland utilities, this volume was 252 kL due to the hotter and drier climate, together with the use of evaporative air cooling. The State-wide median for this indicator was 175 kL per connected property.

The Project would be connected to the existing potable water reticulated service on Brays Lane. This would service the site office and the operation of the Project. The potable water demand during the operation phase is expected to be minimal since the Site would be an unmanned facility managed remotely by Neoen. It is anticipated that the Site would be periodically visited by five to six employees as required for maintenance activities.

Runoff would also be collected in rainwater tanks at the Site and used as needed to reduce demand on the local potable water service.

The volume of wastewater produced is also expected to be minimal. A wastewater Water holding tank would be installed to collect sewer waste at the Site during operation. The waste in the tank would be periodically collected by a truck and disposed of at an appropriately licensed waste facility offsite.

With the minimal demand on the existing potable water network supply, and the wastewater Water holding tank, it is not expected that there would be any impacts to other users of the local potable water supply, the wastewater network or to the water quality of receiving environments.

There would be no additional operational demand for potable water and wastewater services across the remainder of the Project Area.

11.5.3 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential surface water, flooding and water use impacts are listed in **Table 11-3**. Mitigation measures in other chapters that are relevant to the management of surface water impacts include:

- **Chapter 12 Geology, soils, contamination and groundwater**, specifically measures which address erosion and sediment control for the Site and transmission line corridor during construction and operation
- **Chapter 16 Hazards and risk**, specifically measures which address potential spills during construction and operation
- **Chapter 17 Other issues**, specifically measures which address waste and air quality management during construction and operation.

Table 11-3 Mitigation and management measures – Surface water, flooding and water use

Reference	Mitigation and management measures	Timing
SW1	A Soil and Water Management Plan (SWMP) would be prepared for the Project in accordance with the requirements and principles of the Managing Urban Stormwater – Soils and Construction, Volume 1 (the Blue Book) (Landcom 2004), Volume 2A (DECC1 2008 a) and Volume 2D (DECCW 2008b). This plan would include management and monitoring measures to be implemented to mitigate the potential surface water quality impacts which could occur during construction. This plan would outline: • The objectives of the SWMP	Pre-construction

Reference	Mitigation and management measures	Timing
	• Performance criteria and key performance indicators to measure the success of plan • Legislative requirements including reference to relevant conditions of consent and management and mitigation measures • A summary of the activities that are likely to cause impacts related to soil and water and the potential impacts identified in the SSD application documentation • A summary of the proposed approach to managing potential impacts • A list of the measures that would be implemented to meet the legislative requirements and the performance criteria alongside information on who is responsible for each measure and the frequency and/or timing that applies to each measure • An outline of the monitoring requirements that would be implemented to meet the legislative requirements and the performance criteria alongside information on who is responsible for monitoring and the frequency and/or timing that applies • Information on reporting requirements and the approach to corrective actions. The principal performance criteria for the Project during construction would be to ensure that surface water flows leaving the Site or worksites along the transmission line corridor have a neutral of beneficial effect on the water quality of Pipers Flat Creek and/or Coxs River.	
SW2	Where existing drainage lines are to be impacted during construction, an alternate (diversion) path, of equal capacity, would be established at the start of the construction works.	Construction
SW3	Areas established within the Project Area for stockpiling would be planned, operated, and decommissioned in accordance with the RTA Stockpile Site Management Guideline 2011 and the Blue Book (Landcom, 2004).	Construction
SW4	The rehabilitation of disturbed areas would be undertaken progressively as construction stages are completed, and in accordance with the Blue Book (Landcom, 2004).	Construction
SW5	Following the installation of the transmission line, all trenched areas would be backfilled, grassed areas would be re-established in accordance with the Blue Book (Landcom, 2004).	Construction
SW6	Following the completion of the construction work, the construction laydown area would be broadly returned to the pre-development conditions in accordance with the Blue Book (Landcom, 2004). Any channels installed to divert flows around the laydown area during the construction phase would be removed and a vegetated swale would be established to broadly follow the natural contours of the land between Dam 4 and the Dam 5 spillway following the completion of construction.	Constructed

Reference	Mitigation and management measures	Timing
SW7	Consistent with the SWMP, control measures would be implemented to minimise risks associated with erosion and sedimentation and entry of materials to drainage lines and waterways. Controls that would be considered, include: • Identification of upslope run-on waters from undisturbed areas of catchment and diversion of these around un-stabilised areas of the Site • Sediment management devices, such as fencing, hay bales or sandbags, coir logs and graded or lined earth or sandbag diversion bunds and banks • Measures to divert, capture and/or filter water prior to discharge, such as drainage diversion channels and sediment sumps or traps • Scour protection and energy dissipaters at locations of high erosion risk • Installation of measures at key work entry and exit points to minimise movement of material onto adjoining roads, such as rumble grids or wheel wash bays, or regular sweeping • Location and storage of construction materials, fuels, and chemicals, including controls where possible would be managed in accordance with Managing urban stormwater: soils and construction (the Blue Book). Controls may include: - Cover before significant weather events - Bunds - Diversion of offsite flows away from storage - Stabilised laydowns - Storage clear of frequently flooded low-lying areas • Stabilisation of the surface of batters and drains, including temporary works and diversions.	Construction
SW8	A Spill Management Procedure would be prepared and implemented during construction. This procedure would form part of the CEMP (or one of its subplans). The Spill Management Procedure would address, but not necessarily be limited to: • Management of chemicals and potentially polluting materials • Specialist containment, security and bunding requirements • Maintenance of plant and equipment • Emergency management, including notification, response, and clean-up procedures Spill kits would be located close to locations where chemicals, fuels, oils etc. are stored.	Construction
SW9	Discharge of potentially contaminated runoff, originating from the construction site, would not occur without prior treatment or testing, and/or necessary approvals. Surface water would be managed in accordance with the Blue Book (Landcom, 2004). If potentially contaminated water cannot be treated onsite, then it would be collected, tested and disposed offsite at an appropriately licensed facility.	Construction

Reference	Mitigation and management measures	Timing
SW10	Regular monitoring of weather and rainfall conditions would be conducted to identify severe weather warnings and potential flood conditions for the Project Area. Procedures would be included in the CEMP to cease work and secure equipment to ensure safety of workers prior to and during potential flood conditions.	Construction
SW11	The stormwater and drainage design for the Site would be finalised at detailed design. Water sensitive urban design (WSUD) measures would be incorporated into the drainage design to treat surface water before discharging to the receiving waterway. Stormwater treatment devices would be used to ensure a Neutral or Beneficial Effect (NorBE) on runoff water quality. A bioretention system is proposed, but other options may be considered provided that an equivalent or better performance outcome can be achieved. If a bioretention system is to be installed, the following measures would be undertaken prior to and during construction of the bioretention basin: • The design and construction of the bioretention basin would be overseen by a person with previous experience in the construction and successful operation of these systems • Drainage systems, filtration media and vegetation would be installed in line with agreed designs • Erosion and sediment control measures would be in place during the construction phase of the Project to ensure that the bioretention systems are protected from high sediment loads • The bioretention system would be brought online at the end of the construction phase once major earthworks at the Site are complete to minimise the risk of clogging from sediments • Vegetation would be selected based on local climate and rainfall regime.	Design, operation
SW12	The proposed dam modifications would be designed in accordance with any relevant guidelines, standards, and assessment and certification requirements (which may include; Dam Safety NSW guidelines (Dam Safety NSW 2021), *Dam Safety Act 2015* (NSW Government 2019) and *Dams Safety Regulation 2019 (NSW Government 2020)*) to help ensure that: • The dams meet relevant design and safety standards • Embankments are stable and unlikely to fail • Each dam has a designated and suitably designed spillway • An appropriate maintenance and inspection plan is in place.	Design, operation
SW13	The site drainage would be designed to drain the BESS area to the proposed Dam 5. Dam 5 would provide attenuation for increases in peak flows that result from the Project.	Design, operation

Reference	Mitigation and management measures	Timing
SW14	The ground surface of the BESS area would be set at a level above the 1 % AEP flood event so that the infrastructure would not be impacted by regional flooding. The office buildings, inverters, transformers and batteries would be elevated above surface level on concrete pads to protect them from potential local flooding impacts.	Design, operation
SW15	Operational maintenance requirements for bioretention systems would include: • Monitoring for scour and erosion • Monitoring for and regular removal of accumulated litter, fine sediment, pests and debris • Weed removal and plant re-establishment to maintain high nutrient removal efficiency • Monitoring overflow pits for structural integrity and blockage • If clogging or contamination is observed, replacement of vegetation and the filter media layer may be required.	Operation
SW16	Where feasible, runoff would be collected from buildings into rainwater tanks at the Site and used during operation as needed.	Operation
SW17	Wastewater collected onsite would be periodically removed by a licensed waste contractor.	Construction, operation

12.0 Geology, soils, groundwater and contamination

12.1 Secretary's Environmental Assessment Requirements

Table 12-1 sets out the SEARs relevant to geology, soils, contamination and groundwater and where the requirements have been addressed in this EIS.

Table 12-1 SEARs – Geology, soils, groundwater and contamination

Relevant SEARs	
Soil and water	**Where addressed**
This EIS must include: • an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources (including watercourses traversing the site and surrounding watercourses, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licensed water users and basic landholder rights and measures 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 *Managing Urban Stormwater: Soils & Construction* (Landcom 2004);	An assessment of the potential impacts to groundwater is covered in **Section 0**. The other requirements related to surface water and flooding are addressed in **Chapter 11 Surface water, hydrology and flooding.** Erosion and sediment control measures are outlined in **Section 12.5**
Land	
An assessment of the potential impacts of the development on existing land • a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights; • uses on the site and adjacent land, including: a soil survey to determine the soil characteristics and consider the potential for erosion to occur	Soil characteristics and erosivity, including the relationship of soil properties to the productivity of agricultural land, is discussed in **Section 0.** Requirements related to agricultural land, Crown lands, mining, quarries, mineral or petroleum rights and uses of the Site and Project Area are discussed in **Chapter 15 Land use.** Requirements related to flood prone land is discussed in **Chapter 11 Surface water, hydrology and flooding.**

12.2 Methodology

12.2.1 Overview

This geology, soils, contamination and groundwater assessment has been undertaken using the following methodology:

- A desktop assessment was undertaken which included a review of relevant available historic and current data and background information, including:
  - NSW Environment Protection Authority (EPA) Contaminated Land Register and the List of Contaminated Sites Notified to the EPA (which details sites that have been notified to the EPA as potentially contaminated)

  - Geological and soil survey maps including the 1:100 000 geological map sheet for the Western Coalfield (south), and the Department of Conservation and Land Management Soil Landscapes of the Wallerawang 1:1000 000 Sheet (King.D.P, 1993)
  - Other NSW DPE (including DPE Water, formerly NSW Department of Primary Industries - Office of Water), and Commonwealth Scientific and Industrial Research Organisation (CSIRO) registers and databases (as cited in the body of this assessment), to understand land zoning, topography, water resources, land capability, and sensitive receptors
  - Review of historical aerial imagery
- Site inspections were undertaken on 4 March 2021 and 5 October 2021 to identify building waste, waste stockpiles or disused agricultural equipment at the Site
- A detailed topographical survey of the Site was undertaken on 17 June 2021 using Light Detection and Ranging (LiDAR) capable drones. A 1 m contour map of the Site was produced with the results of this survey
- Soil samples were taken from the Site from 5 to 8 October 2021. Soil samples were collected at six locations, as shown on **Figure 12-2**. Soil samples were collected from the surface and at changes in soil profile in these locations
- Soils samples underwent laboratory analysis to determine sediment particle size, to inform the potential for soils erosivity at the Site.

Information from the above sources was collated and analysed to characterise the Site and to allow an assessment of potential impacts related to geology, soil, groundwater and contamination to be undertaken. The impact assessment was qualitative given the low level of contamination risk associated with the Site and the proposed works. The focus of the assessment was on the potential for erosion and sedimentation impacts. Mitigation measures to address these potential impacts have been identified.

Given that the areas where disturbance would occur for the installation of the new transmission line are limited, (underboring and no progressive trenching and backfilling) collection of soil samples within the transmission line corridor (i.e. outside of the Site) have not been undertaken. Notwithstanding, potential impacts within the transmission line corridor are discussed qualitatively in this chapter, and detailed soil testing will be undertaken within the transmission line alignment during detailed design.

The results of the desktop assessment (refer to **Section 12.3**) indicate that the potential for contamination within the Project Area, would be limited to trace contaminates that are typically associated with the historic operation of a rail line, and agricultural land uses. Mitigation measures to consistent with the approaches employed by Transport for NSW to manage the risks associated with potential contamination are outlined in **Section 12.5**.

12.3 Existing environment

12.3.1 Topography

The topography of the Project Area is typical of the local area, encompassing sections of both elevated rolling terrain and floodplain, as well as severely disturbed landform elements.

A topographical survey of the Site was undertaken on 17 June 2021. The Site has a mostly gently undulating topography. Two broad ridgelines traverse the Site, with the more prominent of the two occupying the north-western portion of the property. The highest parts of the Site associated with these ridgelines occur in the north western and south western corners and are between about 900 metres and 910 metres Australian Height Datum (m AHD). The lowest part of the Site is along the central and south eastern boundary at about 880 m AHD.

While two ephemeral drainage channels are mapped as occurring at the Site, only the northern drainage channel was topographically discernible ‘by eye’ during the walk over of the Site. This shallow ephemeral drainage channel drains to the east with slightly higher land to the south, north and west. No banks or creek beds were identified within this channel.

To the east of the Site, within the new transmission line corridor, the surrounding topography can be described as elevated rolling terrain (associated with the Cullen Bullen soil landscape), transitioning further east to level, to very gently undulating topography within the floodplain of Pipers Flat Creek (and the Pipers Flat soil landscape). The proposed transmission line is located close to the existing rail corridor which is relatively flat, varying between 878 m to 881 m AHD across the Project Area. This is consistent with soil disturbance and development noted in the historical aerial imagery from 1954.

Where the transmission line would traverse under Pipers Flat Creek. The left bank floodplain has a maximum width of around 220 m and sits at an elevation of approximately 875 m AHD. In the north eastern portion of the transmission line corridor, the floodplains of Pipers Flat Creek and the Coxs River merge. South of the junction of Pipers Flat Creek and the Coxs River, the natural topography of the transmission line corridor has been significantly altered by a range of historical land use activities, with the most significant impacts to natural landform elements associated with road and rail construction.

12.3.2 Geology and soils

Geology

Reference to the 1:100 000 geological map sheet for the Western Coalfield (south) indicates that the surface geology of the study area is of Permian to Quaternary antiquity, with rocks of the Early to Late Permian Shoalhaven Group (Ps) underlying its elevated rolling terrain and Quaternary alluvium (Qa) mantling the floodplains of both Pipers Flat Creek and the Coxs River.

Unconformably overlying metamorphic rocks of Silurian and Devonian antiquity, the Early to Late Permian Shoalhaven Group is made up to two geological formations: the Early Permian Snapper Point Formation and the Late Permian Berry Siltstone (previously known as the Berry Formation) (Yoo et al., 2001: 9). Approximately 90 m thick, the Snapper Point Formation comprises a medium-grained sandstone with sporadic pebbly layers throughout. Conglomerates are also present, predominantly in the basal portion of the formation. The overlying Berry Siltstone, meanwhile, consists predominantly of a grey micaceous sandy siltstone. Boulders of granite, quartzite and other igneous rocks are also present, with those in the basal portion of the formation larger and more angular than those in its upper parts (Yoo et al., 2001: 10).

Soils

Soils within the Project Area and surrounds have been mapped by King (1993) and are shown on **Figure 12-1** Soils mapped within the Project Area include the Cullen Bullen (cb), Lithgow (li), Pipers Flat (pf) and Disturbed (xx) soil landscapes. Soils within the Disturbed soil landscape (xx) are described as having been disturbed to a depth of at least 100 cm, with original soils either removed, buried or otherwise severely disturbed (King, 1993: 117). The Transgrid Wallerawang 330 kV substation is located within an area classified as a disturbed soil landscape.

Searches were conducted for the Project Area to investigate the likely risk of acid sulfate soils, salinity and mine subsidence as follows:

- A review of the Environmental Planning Instrument and Lithgow LEP 2014 Acid Sulfate Soil Risk Mapping did not identify any risk of acid sulfate soil
- The NSW DPE Hydrogeological Landscape and Salinity Hazard Maps did not identify any areas of inland soil salinity risk
- No risk of mine subsidence was been identified following a review of the NSW Government Mine Subsidence District Mapping; however, the Project is located within an area that supports coal mining activities.

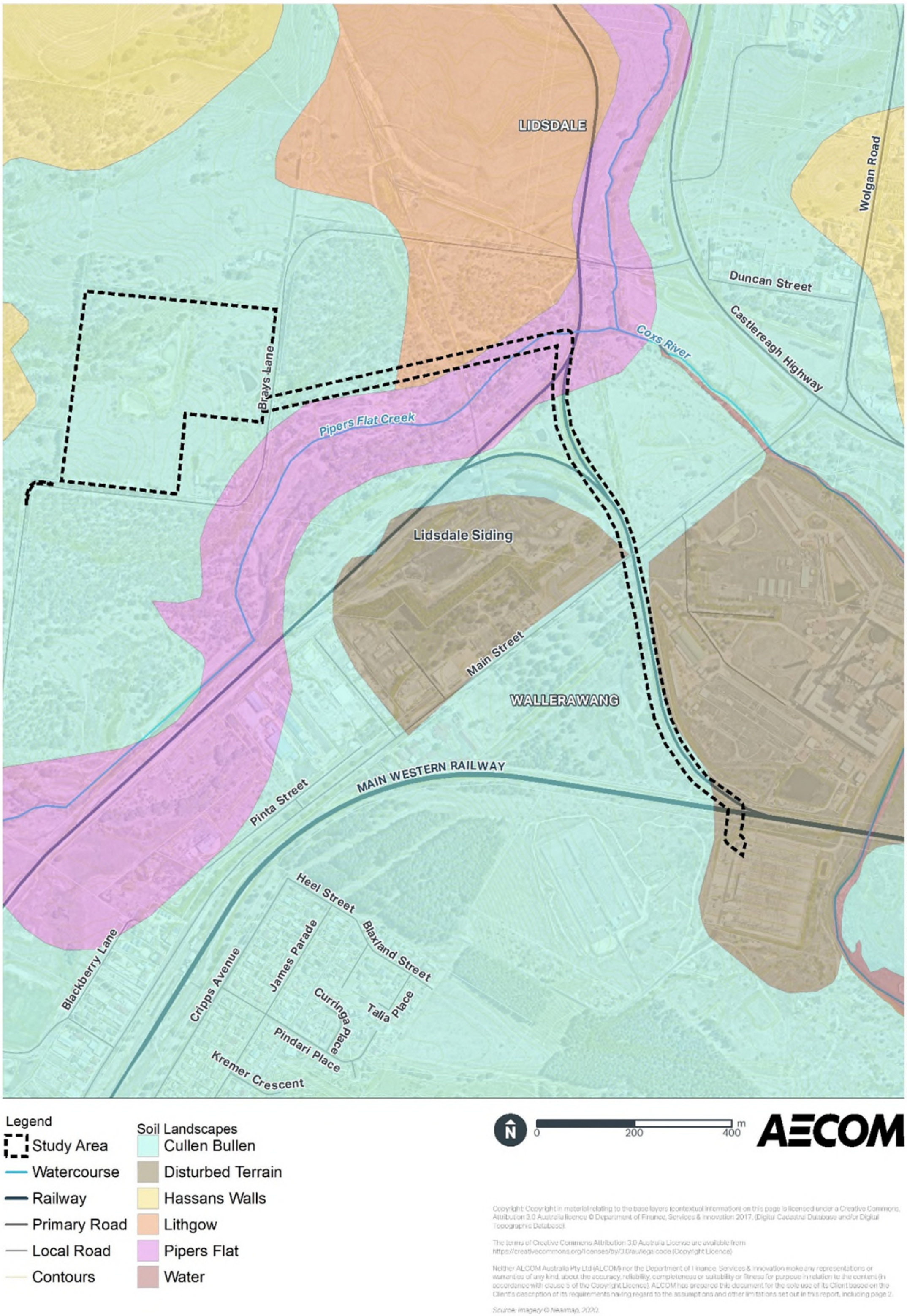


Figure 12-1 Soil landscapes of the Project Area

Land capability

As the Site is located on land zoned as RU1 Primary Production, a review of the Land and Soil Capability Mapping of NSW was undertaken to understand the likely capability of the Site to sustain agricultural land uses.

The Site is mapped as comprising Class 4, Class 5, and Class 8 land and soil capability, where Class 4 denotes moderate to severe soil limitations, Class 5 denotes severe limitations for high impact land management uses such as cropping, and Class 8 denotes extreme soil limitations.

The acidic, erosive soils on the Site confirmed by the soil samples and regional geology supports the land capability findings for the Site.

As such, it is considered that the likely capability of the Site to sustain agricultural land uses would be moderate to very low. This is discussed further in **Chapter 16 Land Use**.

Erosivity

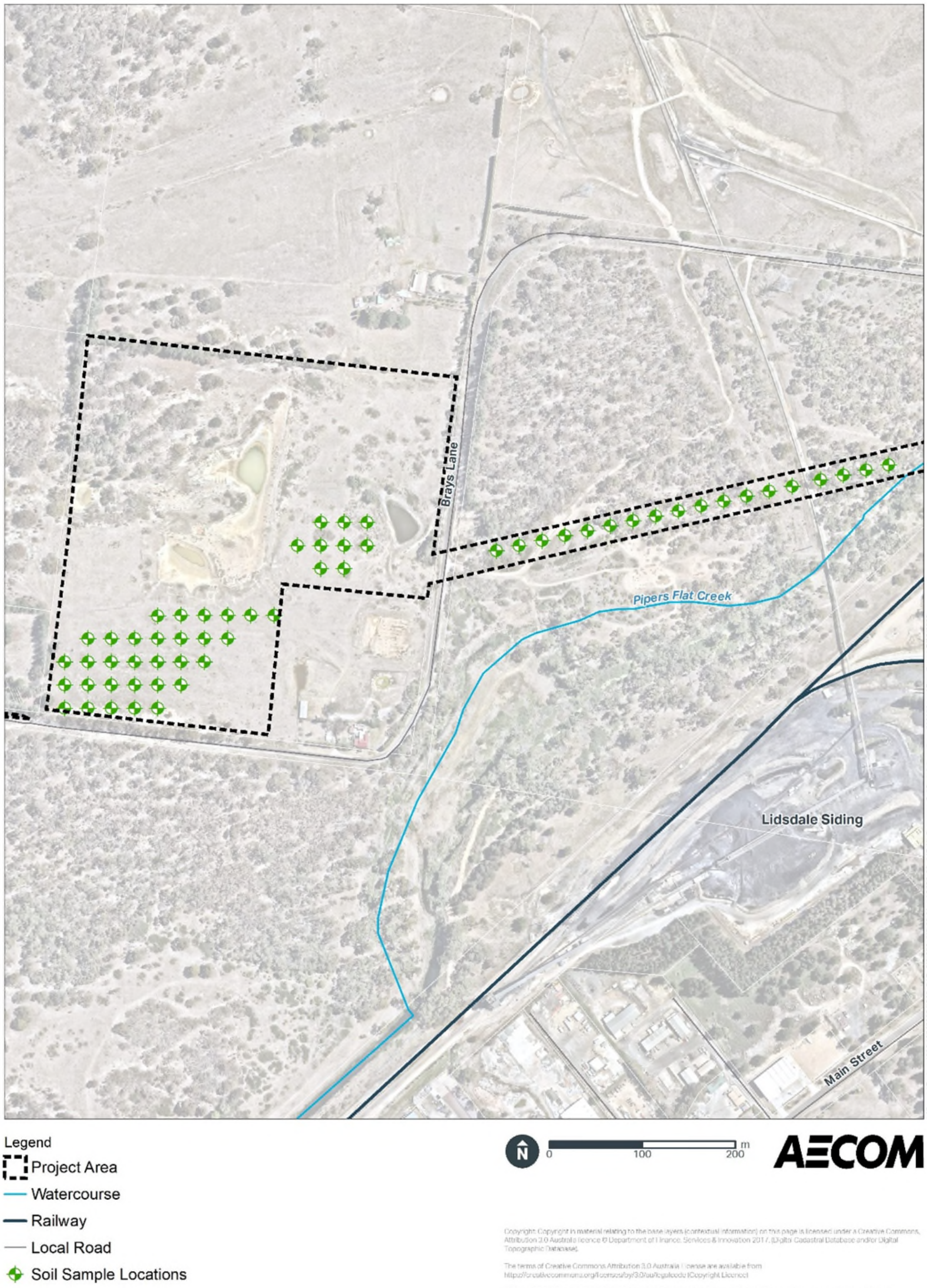
The susceptibility of land to erosion is related to the amount of stabilising vegetation, topography, and soil types. Soil samples were collected at six locations on the Site, as shown on **Figure 12-2**. Soil samples were collected from the surface and at any changes in soil profile in these locations.

The soil landscapes identified within the Project Area are known to be predominantly acidic (pH between 5.5-7.5) with moderate to very high erosion potential (King 1993).

The particle size distribution of the soil samples found a significant portion of large grain sizes, with sand accounting for 22-54% of samples' grain size distribution. Murphy (1984) indicates that soils with a sand percentage of 65% or greater have high erosivity. This suggests that the soils within the Project area are not highly erodible.

Additionally, areas considered to be steep or highly erodible are those with a slope equal to or greater than 18 degrees. An increased risk of slope instability, landslide and erosion may be associated with areas where the slope exceeds 18 degrees. According to the DPE Landslide Risk Mapping, the Project would mostly disturb areas on the Site where the natural slope is less than 18 degrees. This conclusion is supported by the results of topographical survey which show that most of the southern part of the Site has a slope of less than 10 degrees, with the north-western corner containing steeper ridgelines. Other isolated areas around the Site associated with the existing dams are also steeper in nature.

Vegetation in the Project Area is primarily limited to grassy species, with the exception of a small stand of trees in the north-western corner of the Site and where the new transmission line would be established immediately east of Brays Lane (refer to **Chapter 8 Biodiversity**).



Source: Imagery © Nearmap, 2020.

Figure 12-2 Soil sample locations

12.3.3 Groundwater

Aquifer occurrence

A review of available groundwater assessments undertaken within close proximity to Project Area indicate that there is a shallow unconfined aquifer in the vicinity of the Site and new transmission line and that there is also a deeper aquifer in the region, which outcrops north of the new transmission line location (RPS Aquaterra, 2012, NSW Department of Planning and Infrastructure, 2013).

A review of the NSW Office of Water real-time continuous water monitoring network identified eight boreholes within the vicinity of the Project. The location of these boreholes is shown on **Figure 12-3** This information has been used to understand the likely depth to the shallow unconfined aquifer that occurs in the vicinity of the Project. Of the four boreholes that had data available, the standing water level ranged from 1.64 m below ground level (BGL) at GW110520 the borehole closest to (120 m) from Pipers Flat Creek) to 3.85 m BGL at GW115010 (the borehole furthest (290 m) from the creek).

Generally, it is considered that the presence of a surface water source such a creek may also be associated with higher ground water levels in that immediate location due to local recharge of the groundwater table from the creek. As such, the possibility that groundwater may be less than 1.64 m BGL at Pipers Flat Creek has been investigated. As Pipers Flat Creek is ephemeral, water levels vary seasonally. It has been noted that the ephemeral nature of this watercourse is due to the groundwater baseflow discharge being insufficient to sustain continuous flow (RPS Aquaterra, 2012). Typical groundwater flow nearby the Project Area has been measured at about 0.0135 mega litres (ML) per day (RPS Aquaterra, 2012).

It is therefore expected that as the Site is located above 13 to 17 meters above the flood plain of Pipers Flat Creek that the groundwater table would occur at a depth greater than 10 m BGL across the Site allowing for seasonal fluctuations. Groundwater may be closer to the surface along the transmission line corridor particularly close to Pipers Flat Creek.

Groundwater quality

As noted above, the Lidsdale Siding is listed as a contaminated site notified to the EPA. Assessment at this site has identified areas that contain levels of hydrocarbons and heavy metals above the ANZECC Guidelines for Fresh and Marine Water Quality (2000). It is understood that this contamination has occurred as a result of historical spills or leakage of hydrocarbons that may have occurred over the long industrial history of the site. A review of contamination assessments undertaken at this site indicates that there may be a potential pathway for contaminated groundwater to migrate from the aquifer at this location (where some contamination has been identified) to deeper aquifers across the Project Area. However, it is considered highly unlikely the Project would intersect the deep aquifer that would occur within the Project Area.

Groundwater quality has been monitored at the nearby Lidsdale Siding as part of ongoing environmental monitoring programme. A review of publicly available reports from this location (NSW Department of Planning and Infrastructure, 2013; and Centennial 2020) show the groundwater at this location is frequently monitored for:

- PH
- Electrical conductivity
- Turbidity
- Dissolved cadmium
- Dissolved copper
- BTEX
- Dissolved iron
- Dissolved manganese
- Dissolved nickel
- Oil and Grease
- TRHs.

The results of groundwater monitoring at the Lidsdale Siding indicate:

- The aquifer underlying the Lidsdale Siding generally contains water of good quality
- Exceedances of water quality parameters are infrequent and typically comprise low exceedances of pH, electrical conductivity and dissolved copper (Centennial 2020).

Registered groundwater users

A search of registered groundwater bores from the NSW Office of Water (DPI 2021) database indicates there are eight registered groundwater bores within proximity of the Project Area as summarised in **Table 12-2**. Of these, it is presumed likely (based on available groundwater monitoring reports) that the monitoring bores (GW115010 and GW115011) are associated with the Lidsdale Siding and/or the former Wallerawang Power Station.

Only three of the identified boreholes are likely to be used for the extraction of groundwater (GW053071, GW110520 and GW115261). Of these, two are for rural / residential use (GW053071 and GW115261), however, anecdotally, it is believed that the borehole at the Site is no longer in use. Water supply for the Lidsdale Siding coal loader is sourced from a licensed groundwater extraction bore (GW110520), with the allowance for 8.5 ML a year to be extracted.

Table 12-2 Registered groundwater users near the Project Area

Bore number	Licence status	Use	Approx. distance from Project Area	Owner type
GW053071	Unknown	Irrigation	Within the Site	Private
GW101461	Unknown	Domestic	1530 m	Private
GW110437	Unknown	Test Bore	575 m	Private
GW110520	Current	Industrial	740	Private
GW115010	Unknown	Monitoring	830 m	Private
GW115011	Unknown	Monitoring	750 m	Private
GW115260	Unknown	Nil available	830 m	Nil available
GW115261	Current	Nil available	750 m	Nil available

Figure 12-3 Location of groundwater bore holes in the vicinity of the Project Area

Groundwater dependent ecosystems

A search for groundwater dependent ecosystems (GDEs) that may occur within the Project Area was undertaken using the Bureau of Meteorology's (BoM) Groundwater Dependent Ecosystems Atlas. Two plant communities that are known to be ground water dependant ecosystems are mapped as occurring within the Project Area. These include:

- Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands vegetation community. This vegetation community occurs in a small pocket at the north west of the Site, and within the vegetated area east of Brays Lane through which the transmission line would traverse. This vegetation community is also listed as an Endangered Ecological Community (EEC) under the *Biodiversity Conservation Act 2016 (NSW)*.
- Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands. This vegetation community occurs in small pockets at the north west, and south west of the Site.

Refer to **Chapter 8 Biodiversity** for more detail regarding these vegetation communities, and their distribution within the Project Area.

12.3.4 Site history

Historical aerial imagery obtained from Lot Search Aerials was reviewed to understand the potential for contaminating land uses to have occurred within the Project Area. An overview of key observations from this review of historical aerial imagery is provided as follows:

- **1954**: The Site is cleared except for vegetation in the north west corner of the Site, which while covering a larger portion of the Site, appears significantly sparser than present day. This suggests this area is also likely to have been subject to vegetation clearance despite stands of trees remaining. The two ephemeral drainage lines can be observed, largely within their present-day position, however no riparian vegetation is noted. The residential property and associated outbuildings to the south east of the Site are present. No dams have been established at this point in time. The vegetated area to the east of the Site where the new transmission line would be located is largely devoid of mature trees and the alignment of Pipers Flat Creek is different and slightly south of its current day location. The remainder of the new transmission line alignment comprises a combination of rail line and what appears to be unsealed construction access tracks. The present day Transgrid Wallerawang 330 kV substation does not exist.
- **1969**: The Project Area appears largely unchanged from 1954, with the exception of additional vegetation clearance to the north west of the Site. The Wallerawang Power Station is under construction.
- **1972**: No significant changes can be observed in comparison to the aerial photography from 1969.
- **1984**: The dam closest to the eastern boundary of the Site has been established. The rail corridor has been extended to its present-day alignment. Large stockpiles of coal can be observed in the location of the present day Lidsdale Siding. Pipers Flat Creek appears to have been modified to its present-day location. The Transgrid Wallerawang 330 kV substation has been constructed and the Wallerawang Power Station has been built.
- **1998**: Significant earthworks have occurred at the centre of the Site and the dams on the Site have been established. The Site otherwise appears to be open pasture with the present day stand of vegetation in the north western corner. The ephemeral drainage lines on the Site are no longer visually discernible on the aerial photo. The vegetated area to the east of the Site where the new transmission line would be located has regenerated and appears to be in a similar condition to present day. The coal conveyer belt to the large coal stockpiles (now Lidsdale Siding) has been established.

The above demonstrates the Site is unlikely to have supported any previously contaminating land uses, as there is no evidence of previous developments that could have contaminated the Site or pesticide or herbicide use that would be associated with extensive grazing or cropping. The same conclusion applies to the vegetated area to the east of the Site where the new transmission line would be located.

The existing rail corridor through which the new transmission line would traverse appears to have only been used as informal dirt tracks prior to being established as a rail line sometime between 1972 and 1984. As such, it is assumed that potential for contamination in this area is likely to be associated with the ongoing operation of the rail line since the 1970s. A discussion with Transport for NSW on 1 November 2021 indicated that they have no recollection of records of notable spills or contamination along this section of the rail line.

Prior to the establishment of the Transgrid Wallerawang 330 kV substation, this area appears to have been used for grazing as the 1954 imagery shows this area as being mostly cleared and containing grasses. As such, the potential for contamination at the substation site is likely to be associated with the Presence of Disturbed (xx) soil (refer to **Figure 12-1**), which may include fill materials.

12.3.5 Contamination

A review of the NSW EPA Contaminated Land Record of Notices and the List of Notified Sites was undertaken on 26 October 2021. The results of this review identified two contaminated sites notified to the EPA in close proximity to the Project Area. These included:

- The Lidsdale coal loading facility, located at Main Street, Wallerawang, about 50 m south west of the new transmission line at its closet point
- Wallerawang Power Station located at 1 Main Street, Wallerawang is adjacent to the proposed transmission line to the east.

These sites have been notified to the EPA, but no regulation is required under the *Contaminated Land Management 1997 Act (NSW)*.

The land surrounding the Project Area includes potentially contaminating activities associated with industrial, electricity generating, and agricultural land uses. Potential contamination sources are summarised in **Figure 12-4** and include:

- Rail uses along the rail line corridors
- Wallerawang power station
- Lidsdale coal loading facility (also known as the Lidsdale Siding)
- Wallerawang ash depository
- Holding tanks located on residential properties adjacent to the Site
- Wallerawang Sewage Treatment Plant
- Pine plantation located approximately 180 m to the south west of the Transgrid Wallerawang 330 kV substation.

Some of these land uses are downstream or downgradient of the Site and as such contamination is unlikely to have mobilised from these sources to the land or groundwater beneath the Site.

The transmission line corridor passes closer to a number of these sources and may also contain areas of fill. As such that part of the Project Area is more likely to have been contaminated.

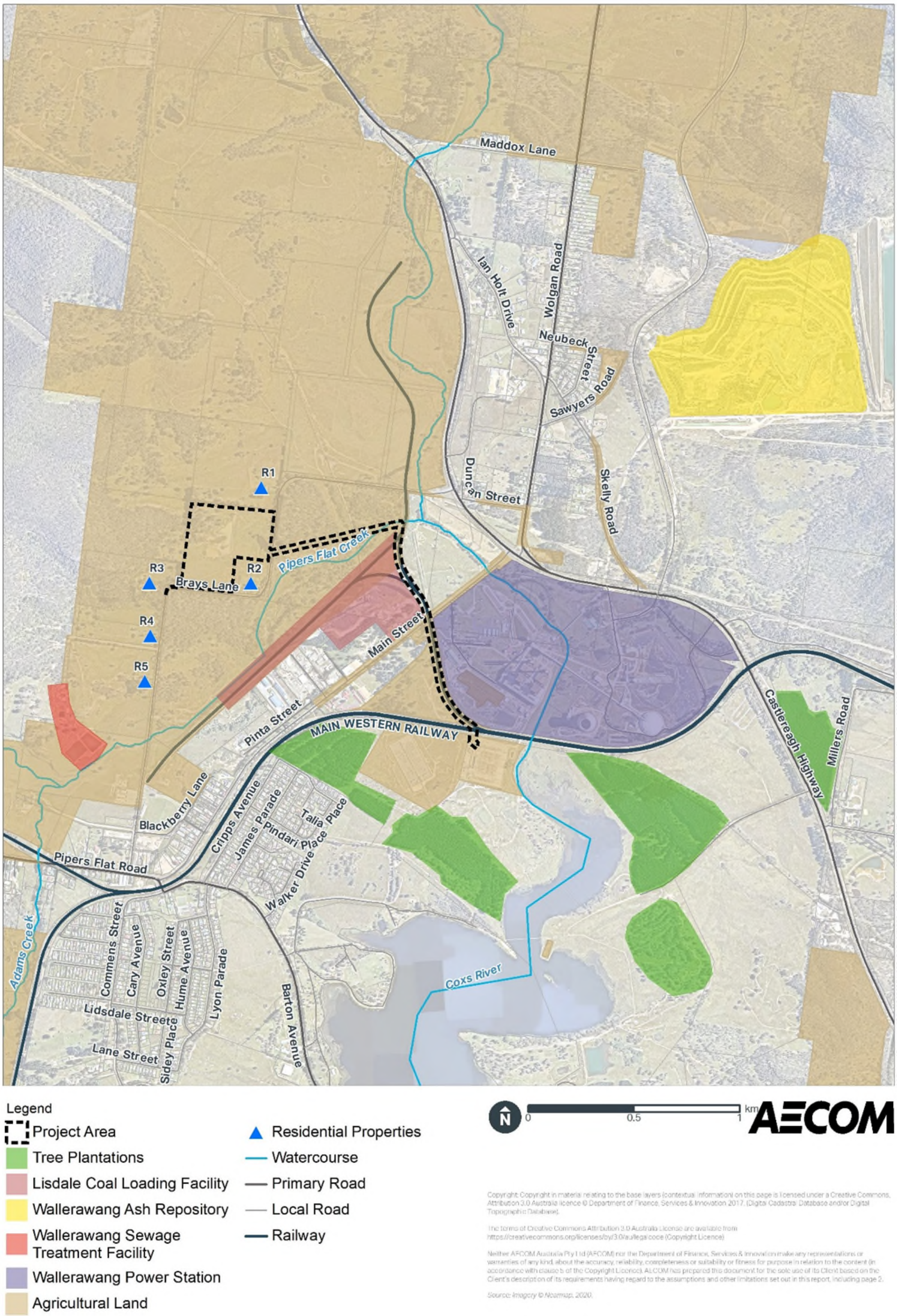


Figure 12-4 **Potentially contaminating activities surrounding the Project Area**

12.4 Potential impacts

12.4.1 Construction

Erosion

The Project would involve various earthworks at the Site to bench the land where the BESS is proposed and to install stormwater controls and a new access point on Brays Lane. These works will involve the removal of surface vegetation and the excavation, transport, storage and reuse of soils across the southern part of the Site. These activities could result in bare ground or exposed areas of soil either within excavations or as stockpiles which could be subject to erosion by wind or water. If not managed properly, erosion of exposed soil could generate dust leading to reduced air quality and soil could be mobilised in surface water flows increasing sediment loads in downstream watercourses. These potential impacts could affect people and ecological receptors to varying degrees depending on the level of erosion and sensitivity of the receptors.

Soils could also be mobilised offsite by vehicles leaving the Site if it is stuck to wheels or the undercarriages of vehicles. Similar to the erosion impacts, these soils could result in dust and sedimentation impacts.

Soil testing completed at the Site confirmed that the soils are not highly erodible. Nevertheless, if not managed correctly the erosion of soils could result in potential impacts to human and ecological receptors.

The transmission line connection would be installed either with underboring (using horizontal directional drilling (HDD)) or by trenching the cable.

Underboring is proposed to be used to install the transmission line under sensitive areas such as Pipers Flat Creek and the rail corridor. Underboring would expose minimal areas of bare soil. Some areas soil may be associated with the construction of the launch pit and receiving pit. Underboring would also produce liquid drilling waste would be collected and disposed of appropriately.

Trenching would be used where the transmission cable runs alongside the railway line. Soils along the route of the trench would be excavated and stockpiled nearby. The transmission line would be laid and the trench would be backfilled. This process of excavation and backfilling would be completed in a progressive manner to minimise the amount of material stockpiled and reduce the potential impacts related to erosion.

Minor excavation would be required to upgrade ancillary facilities at the Transgrid Wallerawang 330 kV substation switchyard, to remove and reinstate the boundary fence. However, these excavations would occur in the existing fence postholes. This would minimise contact with disturbed soil and the area of exposed soil subject to erosion.

It is considered that there is a low to moderate erosivity risk associated with the soils that occur within the Project Area. Despite the general region and its soil types being prone to high levels of erosivity, local conditions demonstrated by the soil testing and slope within the Project Area demonstrate a reduced level of erosion risk.

Standard erosion and sediment controls would employ to manage soils on the Site during construction of the BESS and the installation of the transmission line. A Soil and Water Management Plan (SWMP) would be produced which would include measures to manage soils and exposed soils. The SWMP would include a specific Erosion and Sediment Control Plan (ESCP) for the construction works at the Site to show where specific controls will be employed and to help ensure that erosion is minimised and nearby watercourses are protected. Measures within the SWMP and ESCP would be developed in line with the ‘Blue Book’ Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004) (refer to **Section 12.5**). The ESCP would be designed to ensure that surface water flows leaving the Site would have a neutral of beneficial effect on the water quality of Pipers Flat Creek.

During construction, where soil or ground is to be left exposed for more than 3 days, a soil binder would be used to help prevent water and wind induced erosion. Binders or covers would also be used on soil stockpiles where these stockpiles are to be in situ for more than 24 hours.

As works across the Project Area are completed, land that is not required for development would be rehabilitated and returned to its pre-development condition or would be landscaped as needed. In most cases this would involve revegetating areas of bare ground and exposed soils. Plant species will be chosen depending on their suitability and need with taller species being used for screening purposes, grasses for parts of the Site not required for operation of the Project and water tolerant species around the swales and wetland/dam areas. A Landscaping Plan would be developed for the Site to show the types of species that would be planted following construction of the Project. Where suitable native and endemic species would be used to Site.

Potential surface water impacts are discussed further in **Chapter 11.0 Surface water, hydrology and flooding**. Potential air quality impacts associated with dust generation during construction are discussed in **Chapter 18.0 Other matters**. **Chapter 18.0** also discusses waste management and notes that a Waste Management Plan (WMP) will be produced for the Project. This WMP would include measures to manage wastes produced during construction including liquid drilling waste.

12.4.2 Groundwater

Groundwater interference and quality

The floodplain for Pipers Flat Creek sits at an elevation of approximately 875 m AHD. The borehole closest to the creek had a standing water level of 1.64 m BGL (GW110520) and it has been noted that the ephemeral nature of Pipers Flat Creek is tied to groundwater flow and levels suggesting a close relationship between the surface water and ground water levels. The parts of the Site that are proposed for development are located at 902 to 888 m AHD, which are between 13 to 17 metres higher than the creek. On this basis it is assumed that the groundwater at the Site is located at depths greater 10 meters noting that groundwater levels can fluctuate. The foundations, footings and piles required to develop the BESS would not be deeper than 10 meters BGL. The development of the BESS and associated facilities at the Site would be unlikely to intercept or interfere with groundwater.

The *NSW Aquifer Interference Policy* (AIP) (DPI, 2012) provides a framework for the regulation, licencing and assessment of groundwater activities to meet the requirements of the *Water Management Act 2000* (WM Act). According to the *WM Act*, the definition of aquifer interference includes the following:

- The penetration of an aquifer
- The interference with water in an aquifer
- The obstruction of the flow of water in an aquifer
- The taking of water from an aquifer while carrying out mining or any other activity prescribed by the regulations
- The disposal of water taken from an aquifer while carrying out mining or any other activity prescribed by the regulations.

On this basis the development of the BESS at the Site is not expected to constitute an ‘aquifer interference activity’ as it would:

- Be unlikely to extend into the aquifer below the water table (that is, it would be unlikely to penetrate the aquifer)
- Be unlikely to interact/interfere with groundwater in the aquifer
- Be unlikely to alter or obstruct the flow of groundwater.

The underground installation of the transmission line between the Site and the Transgrid Wallerawang 330 kV substation could require the cable to be installed beneath Pipers Flat Creek and its flood plain. Groundwater in this location is likely to be closer to the surface with the closest borehole (GW110520) providing a standing water level of 1.64 m BGL. As such it is possible that groundwater could be intercepted during the installation of the transmission line. However, under the AIP, trenches and pipelines/cables that intersect the water table are listed as ‘minimal impact activities’ and as such the Project does not require assessment under the AIP.

Nevertheless, particularly along the transmission line there is the possibility that groundwater may be encountered given the seasonal fluctuations of groundwater levels, and potential for isolated local geological conditions to alter groundwater levels. Potential impacts of intercepting groundwater may include:

- Potential contamination of groundwater through exposing the groundwater table to potentially contaminated surface soils adjacent to the rail corridor and associated with nearby industrial land uses
- Potential sedimentation / increased turbidity of groundwater as a result of earthworks at the Site and the installation of the new transmission line
- Potential contamination of groundwater through escape of drilling fluid into the groundwater
- Discharging of potentially contaminated groundwater into surface water environments.

Impacts to the quality of groundwater during the construction of the new transmission line by HDD would be minimised by maintaining the physical and chemical properties of the drilling fluid used. The products selected for mixing the drilling fluid slurry would be inert (such as bentonite clay) or biodegradable (such as biopolymers or xanthan gum), many of which are certified for use in aquifers containing potable quality groundwater.

The drilling fluid would create a low-permeability barrier between the fluid in the hole and any aquifer that may be encountered. Positive pressures in the hole maintain the stability of the hole walls and mud-cake, which is only required until a pipe (that would house the new transmission line) is inserted in the hole and the aquifer is sealed off. While there may be a slight change in the hydraulic pressures (and small exchange of water until the mud cake is formed) near the open section of the hole, these would dissipate quickly in the aquifer (Khalid, M & Pao, William, 2014).

It would also be important to minimise interaction between groundwater and the drilling fluid and cuttings which would be temporarily stored at the near the launching pit. The waste fluid would be collected and stored in a tank to avoid seepage to the water table. This fluid would be disposed offsite.

The construction of the Project would employ the following standard design features and mitigation and management measures to mitigate potential impacts to groundwater:

- Avoiding the use of potentially harmful substances where practicable, including the use of ecologically harmless drilling fluid compositions
- Placing impermeable barriers between the source(s) of contamination (e.g. contaminated soil stockpiles or certain construction materials) and the natural ground and therefore water table
- Handling potentially contaminating substances such as chemicals, fuels, oils and caustic (drilling mud additive) in accordance with relevant Australia Standards and the NSW EPA’s Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007)
- Developing and implementing an adequate spill response plan that complies with relevant regulations, with spill kits located close to locations where chemicals, fuels, oils etc. may be stored.

With the implementation of the mitigation and management measures described above, the risk of groundwater contamination due to accidental spills and leaks during the construction would be low.

Changes in the groundwater quality that would lower the beneficial uses of the groundwater underlying the Project Area (including for groundwater dependent ecosystems, as discussed below), are not anticipated. The proposed mitigation measures to manage the risk of groundwater impacts are outlined in **Section 12.5**.

Registered groundwater users

As discussed above, the Project is not expected to impact the depth, flow, or water quality of the underlying aquifer. In addition, the Project does propose to extract groundwater for use in the construction of the Project. For these reasons, no impacts to registered groundwater users are anticipated during construction of the Project.

Groundwater dependent ecosystems

Groundwater dependent ecosystems occur in proximity to the Project Area (discussed further in **Chapter 8 Biodiversity**). The proposed HDD method of constructing the new transmission line in areas of environmental sensitivity would allow the Project to avoid direct physical disturbance of groundwater dependent ecosystems.

Interaction between the construction activities and overlying GDEs is unlikely if the drilling fluid is maintained in accordance with the proposed Drilling Fluid Management Plan (refer to **Section 12.5)**. This plan would be developed as part of the CEMP and would be produced to guide the environmental management of the underboring work. It would detail requirements for the drilling fluid to be comprised of environmentally benign materials, and for the mixing and use of drilling fluid use to be supervised by a suitably qualified engineer.

It is unlikely that the installation of the transmission line would change groundwater depth and quality. As such significant impacts to groundwater dependent ecosystems are unlikely.

Contamination

The Site is unlikely to be contaminated however parts of the transmission line corridor could potentially contain contaminated soils or contaminants of potential concern due to the potential presence of fill and historic uses or spills etc.

Various potentially contaminating land uses were identified to be close to the Project Area in **Section 12.3.5**. Of these land uses those that are likely to present a potential pathway between the potentially contaminating activity and the land that would be disturbed by the Project were considered to be:

- Rail uses along the rail line corridors
- Wallerawang power station
- Lidsdale coal loading facility (also known as the Lidsdale Siding)
- Wallerawang ash depository
- Holding tanks located on residential properties adjacent to the Site.

The other land uses were discounted as they are either downstream or downgradient of the Project or potential contaminants were considered unlikely to mobilise to the Project Area.

Table 12-3 identifies activities that may have resulted in potential contamination, the potential contaminants of concern related to those activities and their relevance to the Project Area.

Table 12-3 Potential contaminants within the Project Area

Activity of environmental concern	Contaminants of potential concern	Relevance to the Project Area
Use of the transmission line corridor for rail purposes, including historical use of fuel, grease and chemicals for train maintenance. Possible trace presence of asbestos in old train brake pads, and solvents used in grease.	Asbestos, Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Volatile Halogenated Compounds (VHCs), heavy metals.	Potential for contamination in surface soils due to historical and ongoing operation of rail infrastructure in the transmission line corridor. Given the area has only been used for rail operations since the 1970s and no records of major incidents have been identified, there is expected to be a low risk of encountering contamination during the transmission line works.
Potential use of imported fill along the rail line and on adjacent land,	TPH, BTEX, PAHs, OCPs, OPPs, Polychlorinated Biphenyl	Imported fill (often associated with disturbed terrain soil types) can be of unknown origin and composition. Imported fill can have the potential to contain contaminated materials.

Activity of environmental concern	Contaminants of potential concern	Relevance to the Project Area
including at the Transgrid Wallerawang 330 kV substation.	(PCBs), general rubbish, heavy metals, asbestos.	There may be a moderate risk of encountering contaminated materials during the transmission line works within areas mapped as comprising disturbed terrain.
Spillage of potentially hazardous loads from trains and carriages into the groundwater.	TPH, BTEX, PAHs, heavy metals.	Potential for contamination in surface soils and groundwater due to historical and ongoing use of the transmission line corridor as a rail facility. No records have been found that note to occurrence of hazardous spill events or rail safety incidents in the Project Area. It is considered that there would be a low risk of encountering contamination during the transmission line works as a result of this activity.
Ongoing use of septic tanks at neighbouring residential properties, adjacent to the Site.	Pathogens, faecal bacteria, phosphorus (P), nitrogen (N), organic matter (OM), suspended solids (SS), assorted household detergents and chemicals.	Potential for contamination in surface soils and groundwater due to historical and ongoing use of septic tanks in the vicinity of the Project Area. Given these properties have been constantly occupied and maintained by the landowner, it is considered unlikely that any significant septic tank leaks have occurred.
Storage and use of pesticides, fertiliser, herbicides, fuels and / or other agricultural chemicals within and adjacent to the Site.	Heavy metals, Organo-chlorine and Organo-phosphorus Pesticides (OCPs and OPPs), herbicides, pesticides, TPH, BTEX, PAHs, VOCs, VHCs.	Potential for contamination in surface soils and groundwater due to historical and ongoing agricultural land use within and adjacent to the Site, including nearby pine plantations. This is considered unlikely to occur due to the distance from the pine plantations and given the historical aerial imagery review did not identify intensive or large-scale agriculture production activities that would be associated with use of large quantities of agricultural chemicals. Anecdotally, the Site has been used by the current landholders for horse agistment which has a low contamination risk. This is also demonstrated by the review of available historical aerial imagery, where intensive agricultural activities that would introduce contaminated substances were not observed. It is considered likely that chemical application at the Site would be limited to that required for routine maintenance of a rural residential property, such as weed treatment and fertilisation of garden beds, maintained lawns, etc.

Given the conclusions presented in **Table 12-3** and the information in **Section 12.3** it is unlikely that the Site is contaminated or contains contaminants of potential concern. On this basis the land is considered suitable for the development of a BESS facility. Nevertheless, a mitigation measure for unexpected finds has been included in **Section 12.5** to ensure that the SWMP for the Site contains an approach to managing contamination if it is unexpectedly encountered during construction.

The installation of the transmission line could potentially encounter soils that may contain contaminants of potential concern. Potential receptors that may be impacted by contamination have been identified in **Table 12-4**.

Table 12-4 Potential receptors

Receptor	Within the Project Area	Outside the Project Area
Workers, passers-by and nearby properties	• Workers undertaking intrusive works in the transmission line corridor during construction and operation	• Contaminated dust migrating from ground disturbing construction activities and erosion affecting passers-by or nearby properties • Groundwater users
Ecological	• Terrestrial soil environments • Groundwater dependant ecosystems	• Pipers Flat Creek, Coxs River and downstream environment • Groundwater dependent ecosystems

The likelihood of encountering highly contaminated material during installation of the transmission line is low. However, disturbance of potentially contaminated soils could result in adverse impacts to human health and sensitive ecological receptors if not managed appropriately. Construction workers may be exposed to contamination through contact with potentially contaminated soil. Additionally, potential contamination could be mobilised by construction works via dust and erosion of sediment into downstream environments.

The northern segment of the transmission line would be underbored at a depth of 1.5 m, from a launch pit located within the Site, to a receiving pit located at the point where the transmission line turns to run north to south along the existing rail corridor. The north to south segment of the transmission line would be trenched and backfilled to install the transmission line. The trench for the proposed transmission line would be approximately 2 m wide by 1.5 m deep. This north-south segment of the transmission line may encounter potential contamination associated with the adjacent historical and ongoing use of the rail corridor. Additionally, contamination may be encountered on the previously disturbed land adjacent to and within the Transgrid Wallerawang 330 kV substation.

As noted in **Table 12-3**, there are no records of major spills or leaks along the route of the proposed transmission line. Nevertheless, certain contaminants of potential concern could be present. As such, prior to construction, soil samples would be collected where trenching is proposed and tested for contaminants of potential concern to determine presence and whether contamination levels pose a health risk to construction workers. The outcomes of this investigation would inform the measures required to manage these potential impacts. Where contaminated soils or fill are present and do not meet commercial and industrial standards, this material would be excavated, stored on an impermeable surface and covered or contained, tested to confirm its waste classification, and disposed offsite to an appropriately licenced facility. Where material is removed from the Project Area, soil of at least a commercial / industrial standard would be used to backfill the excavation.

Where water has collected in excavations, dewatering may be required. If the excavations are likely to be contaminated, where water is removed, it will be collected, contained, tested and disposed offsite to an appropriately licenced facility.

The approach to managing and disposing of contaminated soils, fill or groundwater would be detailed in the SWMP for the Project. This plan would identify areas along the transmission line corridor where trenching is proposed, if these areas are contaminated to a degree that they pose a risk to human health or ecological receptors and the measures required to manage these risks.

Accidental spills and leaks of fuels and oils from plant and equipment during construction would potentially result in unintentional contamination of the soils and groundwater within the Project Area. Measures to mitigate the risks associated with spills and leaks have been discussed in **Section 12.5**.

With the implementation of appropriate mitigation measures, the potential for accidental spills and leaks to occur during construction would be low.

Excavation required for the Project is not anticipated to generate significant amounts of waste, as the excavated material would be mostly reused within the Project Area to undertake Project works. Waste materials produced would be managed in accordance with the WMP and would be disposed of appropriately. Waste management is discussed further in **Chapter 17 Other issues**.

12.4.3 Operation

Erosion

No earthworks or materials handling is proposed as part of the typical operation of the Project. The Project will consist of a finished hardstand site for the BESS and an underground transmission line between the BESS and the Transgrid Wallerawang 330 kV substation. It is unlikely that the Site or the transmission line will result in erosion related impacts. Stormwater management at the Site is discussed further in **Chapter 11 Surface water, hydrology and flooding**.

As noted above land that is not required for development would be rehabilitated and returned to its pre-development condition or would be landscaped as needed. These areas would be managed to maintain vegetation cover to reduce the erosion and sedimentation risks from the Site.

On this basis no erosion or sedimentation impacts are expected during operation of the Project.

Groundwater

The operation of the Project is not anticipated to impact on groundwater with the exception of an increase in impermeable surfaces on the Site.

The construction of the BESS would convert approximately 7 hectares of marginal farmland into a sealed impervious surface. This would marginally reduce the area where infiltration and recharge of groundwater could occur. This impact on the groundwater table is likely to be negligible. The earthworks on the Site would include the reshaping of the existing dams onsite into a single large dam to the north of the BESS and a secondary dam to the east of the BESS, connected by a series of bioretention swales (**Figure 1-3**). These dams would continue to allow water to be retained and to percolate into the groundwater, similar to the existing conditions onsite.

Typical operations at the BESS would not involve the use or handling of chemicals, oils etc. and as such it is unlikely that spills and leaks would occur that would impact groundwater. Indeed, the BESS site would be impervious and stormwater flows would be managed to maintain the quality of water discharged from the Site (refer to **Chapter 11 Surface water, hydrology and flooding**).

As such the Project is not expected to result in adverse impacts on groundwater during operation of the Project.

Contamination

The operation of the Project is unlikely to result in significant contamination risks. Under typical operation the BESS would not require the regular use or handling of chemicals, fuels, oils etc. As such the risk of the Project causing contamination of soil or water resources is very low.

Diesel would be stored onsite to power an emergency generator and the transformers would contain oil. The diesel at the Site would be stored in line with NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007). It would be stored on an impermeable surface in a bunded area where a potential leak or spill can be contained and would not enter the Site's stormwater management system. The bund would be able to contain 110% of the volume of the diesel stored at the Site.

The transformers at the Site would be designed in line with the relevant Australian Standards for power transformers. If transformers leak the oil within them can contaminate the surround soil, groundwater and surface water resources. As such Australian Standards require that transformers are located on impermeable services with secondary containment. This secondary containment typically consists of bunding around transformers to minimise the entry of stormwater flows and to contain leaks. The transformers at the Site would be designed in line with the appropriate Australian Standards and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.

In addition to the measures noted above, spill kits will be installed across the Site close to the transformers and where diesel would be stored at the Site.

Operation of the Project would be carried out in accordance with the maintenance protocols for the Site as described in **Chapter 16 Hazards and risk**. Waste materials produced would be managed in accordance with the WMP and would be disposed of appropriately. Waste management is discussed further in **Chapter 18 Other matters**.

With appropriate mitigation measures and maintenance protocols the Project is not anticipated to result in contamination impacts during operation.

12.5 Management and mitigation measures

Section 12.4 provided an assessment of the potential impacts of the Project on soil and groundwater resources and its likelihood to result in contamination impacts. To mitigate potential impacts various measures have been identified. Management and mitigation measures that would be implemented for the Project to address potential impacts to geology, soils, contamination and groundwater are outlined in **Table 12-5**.

Mitigation measures in other chapters that are relevant to the management of soils, contamination and groundwater impacts include:

- **Chapter Chapter 11 Surface water,** flooding and water use specifically measures which address erosion and sediment control and surface water management for the Site during construction and operation
- **Chapter 16 Hazards and risk**, specifically measures which address potential spills during construction and operation
- **Chapter 18 Other matters**, specifically measures which address waste and air quality management during construction and operation.

Table 12-5 Mitigation and management measures – Geology, soils, groundwater and contamination

ID	Management and mitigation measure	Timing
SGC1	A Soil and Water Management Plan (SWMP) would be produced which would include measures to manage potential impacts related to soils, surface water flows and contamination risks. This SWMP would include: • Measures to manage erosion and stormwater including a specific Erosion and Sediment Control Plan (ESCP) for the construction works at the Site to show where specific controls will be employed and to help ensure that erosion is minimised and nearby watercourses are protected • Stockpile management procedures for segregating spoil and preventing cross-contamination of clean spoil (virgin excavated natural material or excavated natural material) with potentially contaminated soil • Measures for stockpiles and storage areas to be located near the upstream (eastern) end of the Site, to prevent any loose materials being washed away into the downstream drainage system • Procedures for handling and storing spoil, including potentially or known contaminated soil/fill in accordance with the POEO Act, and protocols for waste classification and tracking for off-site disposal • Measures to manage the unexpected interception of groundwater during construction	Construction

ID	Management and mitigation measure	Timing
	• Measures to manage unexpected contamination finds during construction • Emergency response measures including clean-up and reporting procedures. Measures within the SWMP and ESCP would be developed in line with the 'Blue Book' Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). The ESCP would be designed to ensure that surface water flows leaving the Site would have a neutral of beneficial effect on the water quality of Pipers Flat Creek.	
SGC2	Where soil or ground is to be left exposed for more than 6 days, a soil binder would be used to help prevent water and wind induced erosion. Binders or covers would be used on soil stockpiles where these stockpiles are to be in situ for more than 3 days.	Construction
SGC3	Bare ground and exposed soils across the Site would be rehabilitated and returned to its pre-development condition or would be landscaped. A Landscaping Plan would be developed for the Site to show the types of species that would be planted following construction of the Project. Where suitable native and endemic species would be used to Site.	Construction
SGC4	The following measures would be included as part of the SWMP to mitigate potential impacts to groundwater: • Impermeable barriers would be placed between the source(s) of contamination (e.g. contaminated soil stockpiles or certain construction materials) and the natural ground • Potentially contaminating substances such as chemicals, fuels, oils and caustic (drilling mud additive) will be handled and stored in accordance with relevant Australia Standards and the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007).	Construction
SGC5	Waste created during construction and operation would be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines,* appropriate segregated, contained and disposed at an appropriately licenced waste facility.	Construction, operation
SGC6	A spill response plan would be developed for the construction and operational phases of the Project. Spill kits would be located close to locations where chemicals, fuels, oils etc. are stored.	Construction, operation
SGC7	A Drilling Fluid Management Plan would be produced to guide the environmental management of the underboring work. The drilling would be undertaken by a drilling engineer who is appropriately trained and experienced. In the event that construction works intercept groundwater, the make-up of the drilling fluid would be determined by an appropriately qualified drilling fluid engineer, based on local	Construction

ID	Management and mitigation measure	Timing
	groundwater and soil geochemistry so that it forms a suitable wall cake to minimising fluid loss and exchange with local groundwater. Inert or non-contaminating additives for drilling fluids would be used. Drilling fluid additives used would be certified for use in potable aquifers (certified to American National standards Institute (ANSI)/NSF International (NSF) STD 60 Certified well Drilling Aids and well Sealants). The drilling fluid additives would be closely monitored by the drilling fluid engineer and driller so that it remains chemically stable and volumetrically balanced with the progression of the hole and, if necessary, modified to maintain stability and minimise interaction with the groundwater.	
SGC8	Prior to construction commencing, soil samples would be collected where trenching is proposed and tested for contaminants of potential concern to determine presence and whether contamination levels pose a health risk to construction workers. Soil samples should be taken in accordance with the NSW EPA (1995) *Sampling Design Guidelines.* Where contaminated soils or fill are present and do not meet commercial and industrial standards, this material would be excavated, stored on an impermeable surface and covered or contained, tested to confirm its waste classification, and disposed offsite to an appropriately licenced facility. Where backfill is required, material of at least a commercial / industrial standard would be used.	Design
SGC10	Where water is removed from excavations that are likely to be contaminated, it will be collected, contained, tested and disposed offsite to an appropriately licenced facility.	Construction
SGC11	The approach to managing contaminated soils, fill or groundwater would be detailed in the SWMP for the Project. Areas along the transmission line corridor where trenching is proposed would be identified, if these areas are contaminated and could pose a risk to human health or ecological receptors, measures required to manage these risks will be identified.	Construction
SGC12	The diesel at the Site would be stored in line with NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007). It would be stored on an impermeable surface in a bunded area where a potential leak or spill can be contained and would not enter the Site's stormwater management system. The bund would be able to contain 110% of the volume of the diesel stored at the Site.	Operation
SGC13	The transformers at the Site would be designed in line with the relevant Australian Standards for power transformers. The transformers at the Site would be designed in line with the appropriate Australian Standards and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Operation

13.0 Noise and vibration

13.1 Secretary's Environmental Assessment Requirements

Table 13-1 sets out the SEARs relevant to noise and vibration and where the requirements have been addressed in this EIS.

Table 13-1 SEARs – Noise and vibration

Relevant SEARs	
Noise	**Where addressed**
This EIS must include: • an assessment of the construction noise impacts of the development in accordance with the *Interim Construction Noise Guideline* (ICNG), operational noise impacts in accordance with the *NSW Noise Policy for Industry* (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;	The Noise and Vibration Assessment (**Appendix H**) was undertaken in accordance with the guidelines identified in the SEARs. Construction noise and vibration impacts are discussed in **Section 13.5.1**. Operational noise and vibration impacts are discussed in **Section 14.4.2**. The potential for cumulative noise impacts is considered in **Chapter 19.0 Cumulative impacts**. Management of noise and vibration impacts is discussed in **Section 14.5**.

13.2 Methodology

13.2.1 Overview

A Noise and Vibration Assessment has been undertaken for the Project to assess potential noise and vibration impacts during construction and operation of the Project. The complete report is attached in **Appendix H Noise and Vibration Assessment** with relevant sections summarised within this chapter.

The noise and vibration impact assessment involved:

- Determining the existing background noise levels at the closest residential receiver location in accordance with the *NSW Noise Policy for Industry* (NPfI)
- Determining the construction noise and vibration management levels applicable to the identified sensitive receivers in accordance with the NSW Environment Protection Authority's (EPA) *Interim Construction Noise Guideline* (ICNG) and Assessing Vibration: A Technical Guideline (AVTG)
- Determining equipment to be used, schedule of construction activities and location of construction activities
- Providing a construction noise and vibration assessment that considers the likely construction noise and vibration levels in accordance with the ICNG and AVTG and determines the likely noise impacts of additional traffic on identified sensitive receivers in accordance with the EPA's NSW *Road Noise Policy* (RNP)
- Determining the industrial project noise trigger levels applicable to identified residential sensitive receivers and other nearby receivers in accordance with the EPA's NPfI
- Establishing operational scenarios applicable to the Project
- Providing an operational noise and vibration assessment that presents the predicted noise emission levels from the operation of the Project and compares them against the established project noise trigger levels
- Predicting increases in road traffic noise levels due to vehicular movements associated with the operation of the Project, in accordance with the RNP

- Determining feasible and reasonable noise and vibration mitigation for the construction and operational stages, where required.

13.2.2 Policies and guidelines

The noise and vibration impact assessment has been completed with reference to the following policies and guidelines:

- NSW EPA Interim Construction Noise Guideline (ICNG) (NSW Environment Protection Authority (EPA), 2020)
- NSW EPA guideline As*sessing Vibration: A Technical Guideline* (AVTG) (Department of Environment and Conservation (DEC), 2006)
- The German Standard DIN 4150 Part 3-2016 Structural vibration – Effects of vibration on structures (Deutsches Institute fur Normung, 1999)
- NSW *Noise Policy for Industry* (NPfI) (NSW EPA, 2017)
- NSW EPA *Road Noise Policy* (RNP) (Department of Environment, Climate Change and Water (DECCW), 2011).

13.3 Existing acoustic environment

13.3.1 Land Use

The land surrounding the Project Area predominantly comprises agricultural, industrial and rural residential land uses. Rural residences in the surrounding agricultural land typically consist of very low-density single dwellings or homesteads, which are often set back some distance from the road, and are several hundred metres from the nearest neighbour. The nearest residential receivers to the Project are located approximately 65 m east of the Site and approximately 135 m south of the proposed transmission line.

The township of Wallerawang is located about 1.4 km south of the Site (measured from the Wallerawang Post Office) and approximately 800 m from the closest point of the transmission line corridor. Residential properties within the township of Wallerawang generally comprise low to medium density housing. Commercial receivers are also scattered across the town including hotels, cafes, property managers and offices. Wallerawang Public School and two places of worship are close to the Project Area, including St John the Evangelist Church and the Church of the Scared Heart. St John the Evangelist Church is a listed heritage item and is located opposite to the Lidsdale Siding coal loading facility and adjacent to the existing rail corridor.

In contrast to these residential, commercial and agricultural land uses, a number of industrial and extractive industry land uses are located in the vicinity of the Project Area. Surrounding industrial receivers include Wallerawang Power Station, Green Spot Manufacturers and Springvale Coal Mine. The Lidsdale Siding coal loading facility is located to the south of the Project Area.

The Project Area is located in proximity to major transport infrastructure, and is approximately 3 km from the Great Western Highway and 1 km from Castlereagh Highway. Additionally, a series of large conveyer belts cross the landscape to transport coal between coal mines, the nearby Mt Piper Power Station and Lidsdale Siding. The Main Western Railway, a freight rail line, is located within the Project Area, and intersects the transmission line corridor to the south.

Consistent with the land uses described above, attended noise measurements demonstrated that the existing acoustic environment across the Project Area ranges from being dominated by road traffic and industrial noise, to being dominated by bird calls.

13.3.2 Assessment receivers

To assist in determining noise management levels for the receivers surrounding the Project, three noise catchment areas (NCAs) were identified. The noise environment at each of the residential receivers within a NCA is considered to have a similar noise environment, considering the proximity to existing major noise sources. Each NCA is shown in **Figure 13-1**. Where the assessment indicated that noise criteria trigger levels may be exceeded within an NCA, individual residential receivers were identified. This is discussed further below.

Nearby residential receivers identified within the vicinity of the Project Area are shown on **Figure 13-2** and described in **Table 13-2**.

13.4 Methodology

Long term unattended and short term attended noise measurements were undertaken at three locations to establish the existing ambient and background noise environment at potentially affected receivers around the Project Area.

Unattended noise measurements were made using three noise loggers placed at representative locations around the Project Area. The noise loggers were placed at three noise monitoring locations, shown in **Figure 13-1** and described in **Table 13-3**.

A summary of the unattended noise level measurements is presented in **Table 13-4**.

Table 13-2 Identified residential receiver locations

ID	Location	NCA	Land use
R1	233 Brays Lane, Wallerawang, NSW 2845	1	Rural residential
R2	173 Brays Lane, Wallerawang, NSW 2845	1	Rural residential
R3	137 Brays Lane, Wallerawang, NSW 2845	1	Rural residential
R4	113 Brays Lane, Wallerawang, NSW 2845	2	Rural residential
R5	91 Brays Lane, Wallerawang, NSW 2845	2	Rural residential

Table 13-3 Noise monitoring locations

NCA	Location	Period
1	173 Brays Lane, Wallerawang, NSW 2845	4 March 2021 – 17 March 2021
2	113 Brays Lane, Wallerawang, NSW 2845	4 March 2021 – 11 March 2021
3	29 Cripps Avenue, Wallerawang, NSW 2845	4 March 2021 – 11 March 2021

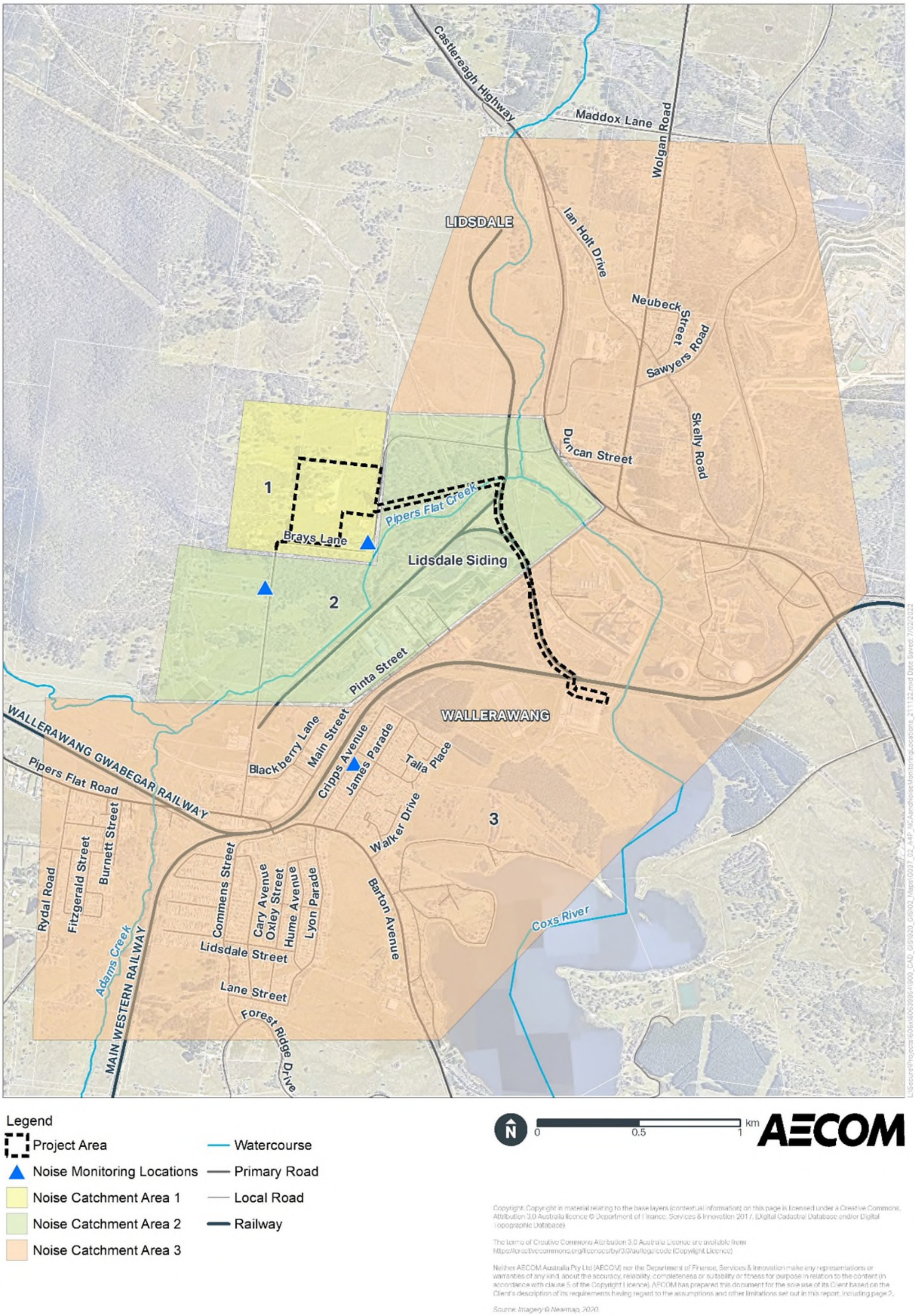


Figure 13-1 Noise catchment areas (NCAs) and noise monitoring locations

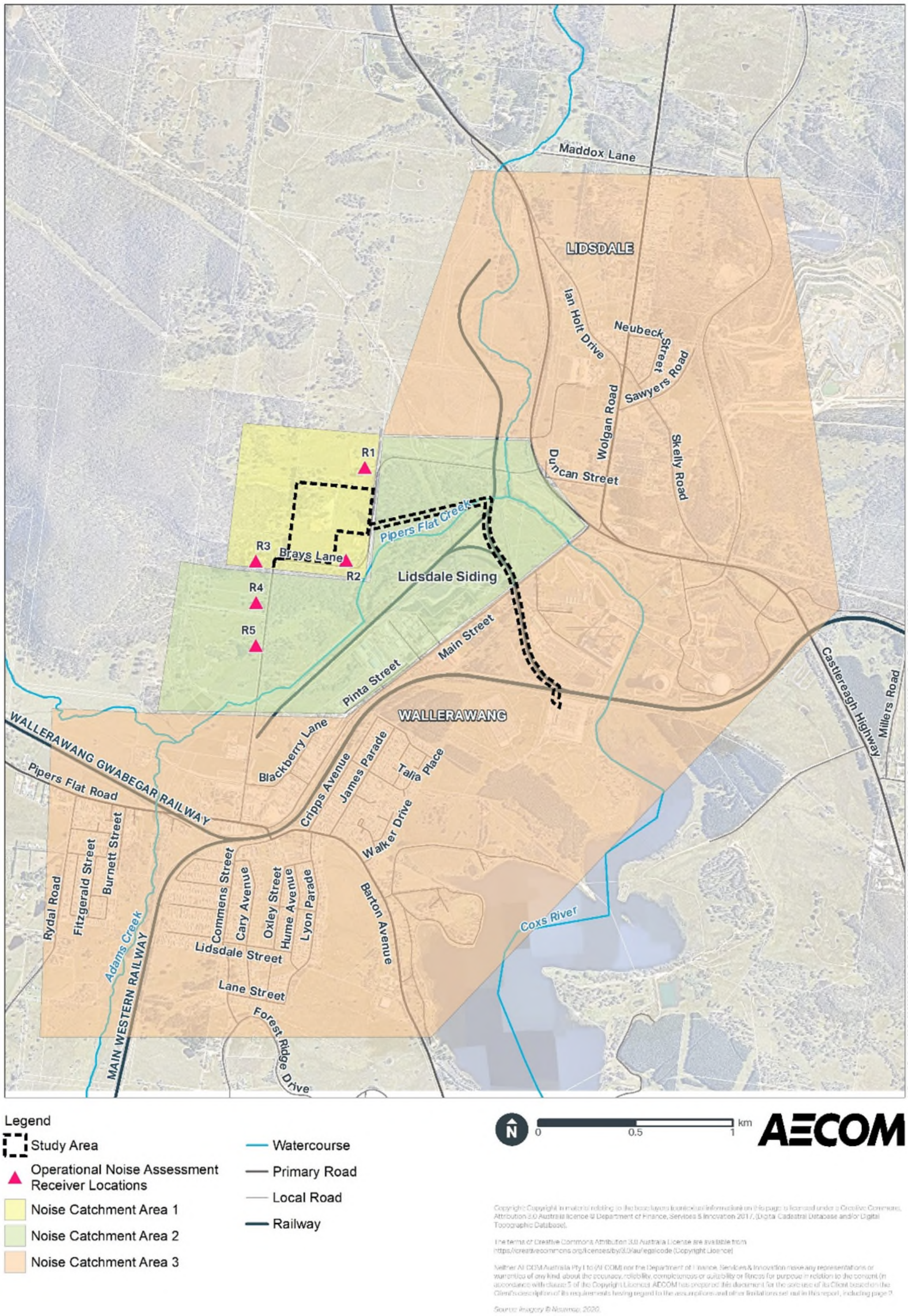


Figure 13-2 Residential receiver locations near the Project

Table 13-4 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

NCA	Measurement Data	L_{Aeq} Ambient Noise Levels, dB(A)			L_{A90} Background Noise Levels, dB(A)		
		Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
1	Thu Mar 4 2021	54	33	-	-	-	-
	Fri Mar 5 2021	51	47	48	37	29	0
	Sat Mar 6 2021	50	47	46	36	35	23
	Sun Mar 7 2021	48	46	49	29	30	29
	Mon Mar 8 2021	49	46	47	36	36	26
	Tue Mar 9 2021	51	41	48	-	-	27
	Wed Mar 10 2021	48	44	49	31	32	37
	Thu Mar 11 2021	47	46	49	33	-	30
	Fri Mar 12 2021	43	45	38	21	26	24
	Sat Mar 13 2021	50	54	53	28	47	28
	Sun Mar 14 2021	42	35	49	-	20	32
	Mon Mar 15 2021	60	65	58	40	53	35
	Tue Mar 16 2021	52	43	64	-	34	-
	Wed Mar 17 2021	42	-	66	-	-	-
	Overall	52	55	58	35 (33)[2]	33	30 (29)[2]
2	Thu Feb 4 2021	46	38	35	-	26	-
	Fri Feb 5 2021	43	40	38	30	-	24
	Sat Feb 6 2021	45	41	36	-	-	25
	Sun Feb 7 2021	42	37	32	-	-	-
	Mon Feb 8 2021	43	38	36	31	-	27
	Tue Feb 9 2021	46	38	36	32	26	26
	Wed Feb 10 2021	43	42	37	28	-	29
	Thu Feb 11 2021	44	52	36	30	-	-
	Overall	44	44	36	35 (30)[2]	30 (26)[2]	30 (26)[2]
3	Thu Mar 4 2021	54	52	42	-	36	-
	Fri Mar 5 2021	51	53	46	33	35	-
	Sat Mar 6 2021	58	41	48	-	-	28
	Sun Mar 7 2021	53	-	50	-	-	-
	Mon Mar 8 2021	52	-	51	-	-	-
	Tue Mar 9 2021	52	-	51	-	-	-
	Wed Mar 10 2021	56	-	55	-	-	-
	Thu Mar 11 2021	60	-	61	-	-	-
	Overall	56	51	54	35 (33)[2]	36	30 (28)[2]

Notes:

1. *Day: 7am to 6pm (Monday – Saturday) and 8am to 6pm (Sunday and Public holidays);*
   Evening: 6pm to 10pm; Night: 10pm to 7am (Monday – Saturday) and 10pm to 8am (Sunday and Public holidays)
2. *Where the rating background level is found to be less than 35 dB(A) during the daytime then it is set to 35 dB(A). Where is it found to be less than 30 dB(A) during evening or night-time then it is set to 30 dB(A) in accordance with NSW NPfI*

Attended noise measurements were conducted on 4 March 2021 over 15 minute periods, using a sound level meter. The measurements were taken at each of the noise monitoring locations outlined above.

Observations from the attended noise measurements are outlined in further detail in **Appendix H Noise and Vibration Assessment**.

13.4.1 Construction noise assessment approach

Construction hours

Standard construction hours are defined in as follows in the ICNG:

- Standard Hours: 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday

- Out of Hours: before 7 am and after 6 pm Monday to Friday, before 8 am and after 1 pm Saturday, and all Sunday and public holidays.

While it is anticipated that work would primarily take place during standard construction hours, some works may be required to be undertaken outside of standard hours. Where this would be required, this would occur Monday to Saturday, 6am to 6pm. Where work outside of standard hours may be required, they would be considered on a case by case basis, and would be planned such that no equipment used would exceed the noise affected level.

A strong justification would typically be required for works outside the recommended standard hours. Feasible and reasonable work practices would be applied to ensure the noise affected level is not exceeded. With the application of feasible and reasonable mitigation measures, it is not anticipated that the works occurring outside of standard work hours would exceed the noise affected level. Where there is the potential for out of hours works noise is more than 5 dB(A) above the noise affected level, consultation with nearby residents would be undertaken (refer to **Table 13-5**). No night-time works would be required.

Construction noise criteria

Construction noise impacts have been assessed in accordance with the ICNG. The ICNG identifies noise management levels (NMLs) for residential and other sensitive land uses.

As the proposed works are expected to continue for a period of more than three weeks and are within relatively close proximity to noise sensitive receivers, a quantitative assessment, based on representative construction scenarios, has been carried out for the Project.

Noise levels resulting from construction activities are predicted at nearby noise sensitive receivers using environmental noise modelling software and compared to the NMLs. For residential receivers, where an exceedance of the noise management levels is predicted, the ICNG advises that receivers can be considered 'noise affected'. Where construction noise levels at the receiver reach 75 A-weighted decibels (referred to as 'dB(A)'), residential receivers are considered to be 'highly noise affected'. If construction noise levels are predicted to exceed NMLs, potential noise impacts would be managed by implementing feasible and reasonable mitigation measures.

The NMLs recommended by the ICNG for residential receivers are shown in **Table 13-5**.

Table 13-5 Construction noise management levels – Residential receivers (NSW EPA, 2000)

Time of day	NML, $L_{Aeq\ (15min)}$, dB(A)[1]	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:

Time of day	NML, $L_{Aeq\ (15min)}$, dB(A)[1]	How to apply
		1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Notes:

1. *Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.*

Table 13-6 presents the NMLs applicable to residential receivers for the Project in accordance with the ICNG based on the rating background levels (RBL) determined following background noise monitoring (refer to **Section 13.4**).

Table 13-6 Construction noise management levels – Residential receivers

Noise catchment area	Period	RBL, L_{A90} dB(A)	Standard hours noise management levels, $L_{Aeq,15min}$, dB(A)	Out-of-hours noise management levels, $L_{Aeq,15min}$, dB(A)
1	Day	35	45 (75 – highly noise affected level)	40
	Evening	33	-	38
	Night	30	-	35
2	Day	35	45 (75 – highly noise affected level)	40
	Evening	30	-	35
	Night	30	-	35
3	Day	35	45 (75 – highly noise affected level)	40
	Evening	36	-	41
	Night	30	-	35

Table 13-7 presents the NMLs applicable to non-residential receivers as identified in the ICNG.

Table 13-7 Construction noise management levels – Non-residential receivers

Land use	External noise levels, $L_{Aeq\ (15\ min)}$ (applies when properties are in use)
Place of worship	40 dB(A)
Classrooms at schools and other educational Institutions - Internal	45 dB(A)
Classrooms at schools and other educational Institutions - External	55 dB(A)[1]
Active recreation areas	65 dB(A)
Passive recreation areas	60 dB(A)
Industrial premises	75 dB(A)
Commercial premises (including cafes, bars, restaurants, retail stores and hotels)	70 dB(A)

Notes:

1. *This external noise management level is based upon a 45 dB(A) internal noise management level and a 10 dB(A) reduction from outside to inside through an open window*

Sleep disturbance during construction

Construction activities would not involve night-time works. Intensive noise generating equipment would not be utilised outside of standard construction hours. As such, the impacts of construction activities on sleep disturbance have not been assessed.

Construction noise modelling

The following representative construction scenarios were modelled for the construction noise assessment:

- Enabling works
- Civil, structural, mechanical, electrical works and transmission connection
- Commissioning
- Demobilisation.

The equipment and associated sound power levels (SWL) modelled as part of the four construction scenarios are shown in **Table 13-8**.

Sound power levels were obtained from published datasets in Australian Standard AS2436-2010, *Guide to noise control on construction, demolition and maintenance sites*, BS5228: Part 1 2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise* and AECOM's database. All equipment is assumed to be in good working order.

Modelling of the construction scenarios was completed using SoundPLAN version 8.2 (industry standard) noise modelling software. Standard weather conditions were applied. Further details of the modelling and assumptions are outlined in the **Appendix H Noise and Vibration Assessment**.

Table 13-8 Construction phases and equipment

Phase	Equipment/Activity	Percentage time on	'A' Weighted SWL dB(A)
Enabling works	Front end loaders	100	107
	Dump trucks	100	105
	Road trucks	100	108
	Water trucks	100	104
	Excavators	33	93
	Graders	100	106
	Light commercial vehicles	100	108
	Compactors and rollers	33	107
	Overall	**-**	**115**
Civil, structural, mechanical, electrical works and transmission connection	Front end loaders	100	104
	Road trucks	100	108
	Graders	100	108
	Concrete trucks and pumps	100	106
	Elevated work platforms	100	95
	Cranes / crane truck	20	104
	Concrete saws and grinders	33	110
	Dump trucks / tipper truck	100	105
	Excavators	33	93
	Scrapers	100	108
	Compactors and rollers	33	102
	Scrapers	100	108
	Backhoe	100	97
	Water trucks	100	113
	Light commercial vehicles	100	106
	Generators	100	94
	Directional drill rig	33	103
	Overall	**-**	**118**
Commissioning	Light commercial vehicles	100	106
	Elevated work platforms	100	98
	Cranes	100	104
	Generators	100	94
	Overall	**-**	**109**
Demobilisation	Road trucks	100	108
	Water trucks	100	104
	Light commercial vehicles	100	106
	Backhoe	100	97
	Compactors and rollers	100	107
	Overall	**-**	**119**

13.4.2 Construction vibration assessment approach

When assessing vibration there are two components that require consideration: the potential for structural damage from vibration, and the potential for disruption to human comfort. The potential impacts during vibration intensive works have been assessed assuming a vibratory roller, piling rig or jackhammer could be used within the Project Area, as these would be the most vibration-intensive construction equipment proposed. Further detail on the criteria established for assessing construction vibration impacts is provided in the following sections.

Structural damage

At present, no Australian Standards exist for the assessment of building damage caused by vibration. The German Standard DIN 4150 and British Standard BS 7385-2 provide recommended maximum levels of vibration, below which vibration is considered insufficient to cause building damage. These are referred to as 'structural damage safe criteria' and are presented in **Table 13-9** and

Table 13-10 respectively. In this assessment, DIN 4150 structural damage safe criteria have been adopted for heritage items, whilst criteria for commercial/residential items have been taken from BS 7385.

Table 13-9 Structural damage safe criteria (DIN 4150) for building vibration (Peak particle velocity)

Group	Type of structure	At foundation – Less than 10 Hz	At foundation – 10 Hz to 50 Hz	At foundation – 50 Hz to 100 Hz[1]	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:
1. *At frequencies above 100 Hz, the values given in this column may be used as minimum values*

Table 13-10 BS 7385-2: Transient vibration guide values for cosmetic damage

Group	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures	50 mm/s at 4 Hz and above	

Group	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
	Industrial and heavy commercial buildings		
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Human comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline A*ssessing Vibration: A Technical Guideline* (AVTG) is based on Vibration Dose Values (VDVs). The vibration dose value accumulates the vibration energy received over the daytime and night-time periods. Maximum and preferred vibration dose values for intermittent vibration arising from construction activities are listed in **Table 13-11**. The vibration dose value criteria are based on the likelihood that a person would comment adversely on the level of vibration over the entire assessment period.

Table 13-11 Preferred and maximum vibration dose values for intermittent vibration (m/s1.75)

Location	Daytime (7am – 10pm)		Night-time (10pm – 7am)	
	Preferred	Maximum	Preferred	Maximum
Critical areas[1]	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops[2]	0.8	1.6	0.8	1.6

Notes:

1. *Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. Places where sensitive equipment is stored or delicate tasks are undertaken require more stringent criteria than the residential criteria specified above*
2. *Examples include automotive repair shops, manufacturing or recycling facilities. This includes places where manufacturing, recycling or repair activities are undertaken but do not require sensitive or delicate tasks.*

13.4.3 Operational noise assessment approach

Operational noise was assessed in accordance with the NPfI. The NPfI sets out a procedure to determine project noise trigger levels for proposed development(s) based on existing acoustic conditions. The project noise trigger level provides a benchmark for assessing a proposal, to determine potential noise impacts to receivers and to inform the application of feasible and reasonable noise management measures. The assessment procedure for industrial noise sources has two components that must be considered:

- Controlling **intrusiveness** noise impacts in the short term for residences
- Maintaining noise level **amenity** for residences and other land uses.

For residential receivers the project noise trigger levels represent the lower (i.e. more stringent) of the intrusive or amenity noise levels. The project noise trigger levels are detailed further below.

Intrusive Noise Levels

The NPfI states that the noise from any single noise source should not be greatly above the prevailing background noise level. Industrial noise sources are generally considered acceptable if the A-weighted equivalent continuous sound pressure level of noise from the source, measured over a 15 minute period ($L_{Aeq,15\ min}$) does not exceed the Rating Background Level (RBL) by more than 5 dB(A) for the period under consideration.

The RBL is the background noise level to be used for assessment purposes and is determined by the methods given in the NPfI.

The measured RBLs were below the minimum assumed RBLs in the NPfI. Therefore, the minimum assumed RBLs provided in the NPfI for day, evening and night periods were adopted for this assessment. The applicable RBL and the respective intrusive criteria for the Project, for the day, evening and night periods are provided in **Table 13-12**.

Table 13-12 Rating background levels and intrusive noise levels

Location	Period	RBL (L_{A90}), dB(A)	Intrusiveness criteria (RBL+5), dB(A)
NCA 1 Residential Receivers	Day	35	40
	Evening	33	38
	Night	30	35
NCA 2 Residential Receivers	Day	35	40
	Evening	30	35
	Night	30	35
NCA 3 Residential receivers	Day	35	40
	Evening	35[1]	40
	Night	30	35

Notes:

1. *The NPfI notes that the community generally expects a greater control of noise during the evening and night as compared to the day time. Therefore the evening RBL is set to no more than that for the daytime.*

Amenity Noise Levels

To limit continuing increases in noise levels from new or expanding development, the NPfI recommends maximum ambient noise levels depending on the particular locality and land use. This is termed the amenity noise levels.

The project amenity level for residential receivers is equal to the recommended NPfI amenity noise level for the applicable land use minus 5 dB(A). The project amenity level is then converted to a 15 minute period by adding 3 dB(A). For non-residential receivers the NPFI identifies applicable amenity levels.

The project amenity levels for residential and non-residential receivers are provided in **Table 13-13**.

Table 13-13 Project Amenity Noise Levels

Type of receiver	Indicative noise amenity area	Time of day	Recommended amenity noise level[1], dB(A)	Project amenity noise level, dB(A)	
			$L_{Aeq\ (period)}$	L_{Aeq} (period)	$L_{Aeq\ (15\ minute)}$
NCA 1 Residential receivers	Rural[2]	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38
NCA 2 Residential receivers	Rural[2]	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38
NCA 3 Residential receivers	Rural[2]	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38
Commercial premises	All	When in use	65	65	68
School classroom[3]	All	When in use	45	45	48
Place of worship[3]	All	When in use	50	50	53
Childcare[3]	All	When in use	45	45	48

Notes:

1. *Specified in Table 2.2 of the Noise Policy for Industry*
2. *The indicative noise amenity area was determined to be 'Rural' in accordance with Table 2.3 of the Noise Policy for Industry*
3. *External noise levels are based on internal criteria with a 10 dB(A) reduction from outside to inside through an open window.*

Project Noise Trigger Level

The Project Noise Trigger Levels for residential receivers are summarised in **Table 13-14** below comprising the lower of the intrusive and amenity noise levels. The Project Noise Trigger Levels for non-residential receivers comprise the amenity levels per the NPfI.

Table 13-14 Project Noise Trigger Levels

Location	Time of day	Project noise trigger levels[1] L_{Aeq}, dB(A)
NCA 1	Day	40
	Evening	38
	Night	35
NCA 2	Day	40
	Evening	35
	Night	35
NCA 3	Day	40
	Evening	40
	Night	35
Commercial premises	When in use	68
Place of worship	When in use	53
Community hall	When in use	58
School classroom	When in use	48

Notes:

1. These criteria represent the lower of the intrusive and amenity criteria presented in Table 13-12 and Table 13-13 respectively.

Tonal penalty

Certain characteristics of a noise source have the potential to make it more annoying. For example, a source that is tonal, intermittent, or contains dominant low-frequency content can cause greater annoyance than other noise at the same noise level. The NPfI provides additional guidance and criteria for assessing noise emissions from sources with annoying characteristics. Penalties of up to a maximum of 10 dB(A) may be applied where the subject noise has such characteristics at the receiver.

The noise spectrum at the closest receiver, 173 Brays Lane, was analysed to determine if any tonality penalties were applicable, in line with the NPfI. There were no “annoying characteristics” such as tonality, intermittency, irregularity or dominant low-frequency content. As a result, no penalties were applied.

Sleep disturbance during operation

Potential sleep disturbance impacts during operation have been assessed with reference to the NPfI. The NPfI requires the potential for sleep disturbance to be assessed by considering maximum noise level events during the night-time period. Where the Project’s night-time noise levels at a residential location exceed the following screening levels a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB(A), whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB(A), whichever is the greater.

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in **Table 13-21**.

Operational Assessment receivers

Assessment receivers for the operational noise assessment are identified on **Figure 13-2** and described in **Table 13-2**. These have been selected as representative locations of the potentially worst affected receivers during operation of the Project. Demonstrating compliance with project noise trigger levels at these receivers is anticipated to result in compliance of the relevant criteria at receivers located further from both the Site and the Project Area.

Operational Noise Modelling

Noise levels due to the operational activities at the Site were predicted to nearby noise sensitive receivers using SoundPLAN version 8.2 (industry standard) noise modelling software. The operational noise levels were predicted using an implementation of CONCAWE[1] algorithms in the SoundPLAN noise propagation software. The noise modelling process was iterative to determine feasible and reasonable noise mitigation measures which would minimise noise levels at nearby residential receivers.

Both standard and noise enhancing meteorological conditions were considered, with the following parameters:

- Standard meteorological conditions – Pasquill-Gillford stability category D with wind speed up to 0.5 m/s at 10 m
- Noise enhancing meteorological conditions – Pasquill-Gillford stability category D with wind speed up to 3 m/s at 10 m, and/or stability category F with winds up to 2 m/s at 10 m.

The noise modelling included: ground topography, buildings and structures, all sources behave as point sources, and ground absorption.

The noise model considers significant noise sources and locations, screening effects, receiver locations, ground topography and noise attenuation due to geometrical spreading, air absorption, ground absorption and the effects of the prevailing weather conditions. The noise model was based on ground topography, and indicative plant equipment sound power levels. All predicted noise levels are free field and 1.5 m above ground level at the most-affected point within a residential property boundary within 30 m of the nearest facade.

Reasonable and Feasible Acoustic Design

Reasonable and feasible acoustic design measures were considered throughout the design process to mitigate noise impacts. These measures were informed by the outcomes of the operational noise modelling which was undertaken to test the efficacy of the proposed noise management measures (e.g. noise walls).

A number of approaches were considered to reduce noise impacts to the closest residential receivers. **Table 13-15** below presents the noise mitigation measures considered and whether they were found to be feasible and reasonable or not. For Options 1 and 2 under 'Mitigation at source' and 'Mitigation in the transmission path' noise modelling was undertake to test the efficacy of these options.

Following this process, the proposed arrangement of the battery enclosures was revised to provide a more suitable distance between battery enclosures and nearby receivers. Noise barriers were modelled surrounding each battery enclosure and each high-voltage (HV) transformer. Noise barriers were assumed to be 10 m high and located at 8 m from the megapacks and 20 m from the HV transformers. The barriers were assumed to be acoustically absorptive with a sound absorption coefficient of 0.8 on the sides facing the equipment. Ultimately these changes were found to be effective and provide a reasonable and feasible solution to minimise operational noise impacts at nearby receivers.

1 CONCAWE – The oil companies' international study group for conservation of clean air and water – Europe (established in 1963) Report 4/81 "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities".

Table 13-15 'Feasible and reasonable' mitigation decision-making matrix

Mitigation option	Feasible mitigation test	Reasonable mitigation test	Justification for adopting or disregarding this option
Mitigation at source			
Option 1: Consider equipment with 'low' sound power levels. This applies to battery packs and transformers.	Feasible	Reasonable due to: reduction in source noise levels total cost of noise mitigation	Adopted
Option 2: Layout of the Site optimised to reduce noise emissions	Feasible to an extent considering operational constraints	Reasonable due to: reduction in source noise levels and total cost of noise mitigation	Adopted
Option 3: Reducing operations during the evening	Not feasible during the evening due to high demand from electricity consumers.	Not reasonable during the evening period.	Rejected due to not being feasible or reasonable
Mitigation in the transmission path to the receiver			
Option 1: Noise barrier located around perimeter of site	Feasible	Not reasonable due to: lack of acoustic performance	Rejected due to not being reasonable
Option 2: Noise barrier located close to equipment	Feasible	Reasonable due to reduction in noise levels at receivers and total cost of mitigation at about $18 million	Adopted
Option 3: Enclosure or partial enclosure	Feasible	Not reasonable to: operational requirements/constraints total cost of mitigation which would likely exceed $20 million	Rejected due to not being reasonable
Mitigation at the receiver			
Option 1: Engage in further consultation with receivers to discuss mitigations measures	Feasible	Reasonable	Adopted
Option 2: Provide mechanical ventilation (such as fans or air-conditioning to allow for indoor air circulation while windows are closed) where residual exceedances are marginal	Feasible	Reasonable due to: reduction in internal noise levels a receivers. Total cost of noise mitigation acceptable.	Adopted

13.5 Impact assessment

13.5.1 Construction

Construction noise assessment

The results of the construction noise impact assessment are summarised below. **Table 13-16** presents the number of residential properties within the identified NCAs where the NMLs may potentially be exceeded.

Table 13-16 Number of residential buildings where noise levels may exceed NMLs - Day

Phase	Exceedance of NML			Highly affected >75 dB(A)
	1-10 dB	11-20 dB	>20 dB	
Enabling works	1	3	1	0
Civil, structural, mechanical, electrical works and transmission connection	86	5	1	0
Commissioning	3	1	0	0
Demobilisation	2	3	0	0

Table 13-16 shows that noise levels during all construction phases and activities are expected to exceed the noise management levels at some residential receivers. The modelled noise impacts for the two phases with the most exceedances are depicted in **Figure 13-3** for enabling works and **Figure 13-4** for the civil, structural, mechanical, electrical and transmission connection works. During the Project's construction phases during the day, the civil, structural, mechanical, electrical and transmission connection works stage is predicted to cause a large number of exceedances. The majority of exceedances are within the 1-10 dB exceedance band. Exceedances within the 1-10 dB exceedance band would largely occur during the civil, structural, mechanical, electrical and transmission connection works. The 86 exceedances of 1-10 dB that would occur during this phase are demonstrated on **Figure 13-4** and would be limited to:

- Isolated rural residential receivers closest to the Site and the proposed transmission line
- Residential areas directly to the south of the Site in the township of Wallerawang
- Residential areas to the north east of the proposed transmission line.

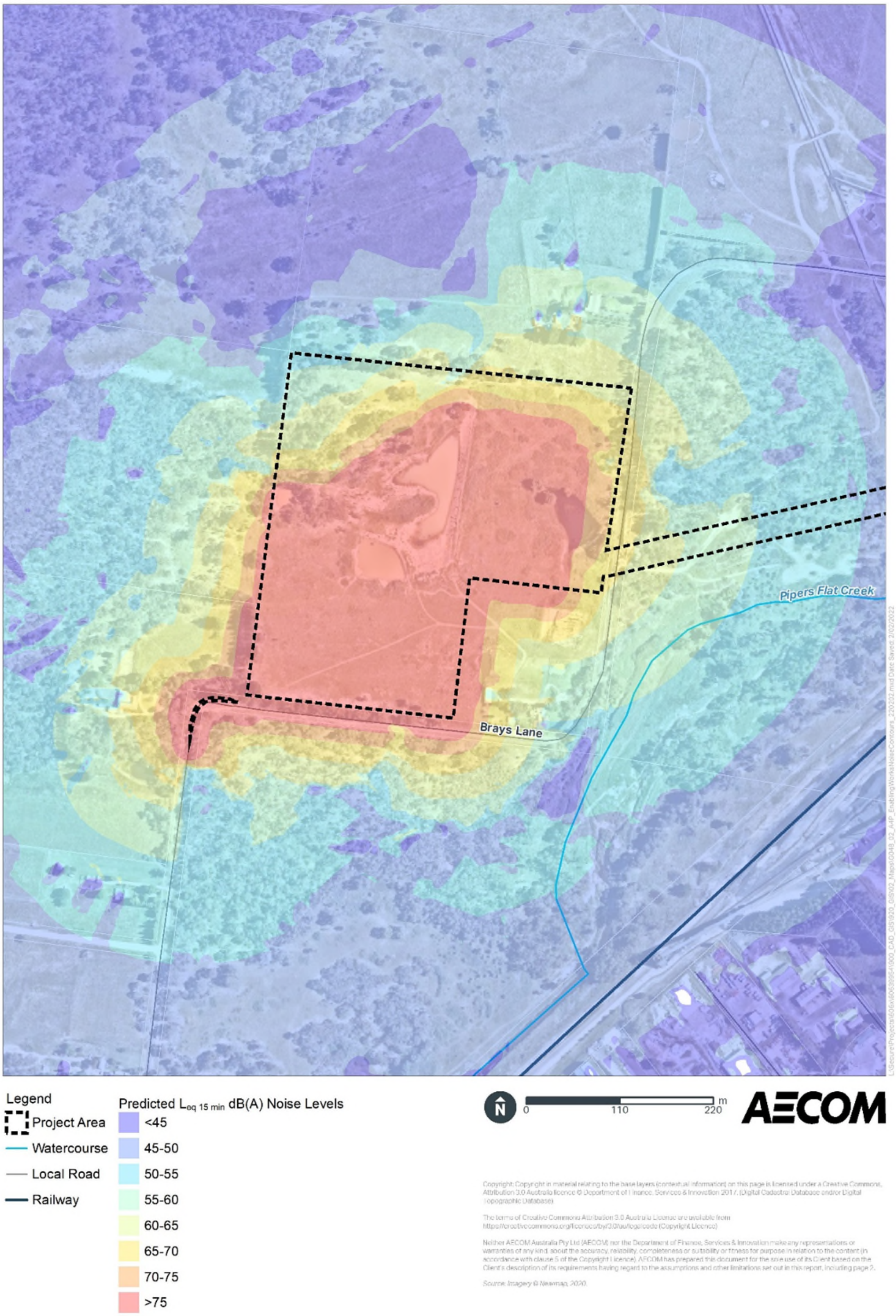


Figure 13-3 **Construction scenario 1. Enabling works modelled noise impacts**

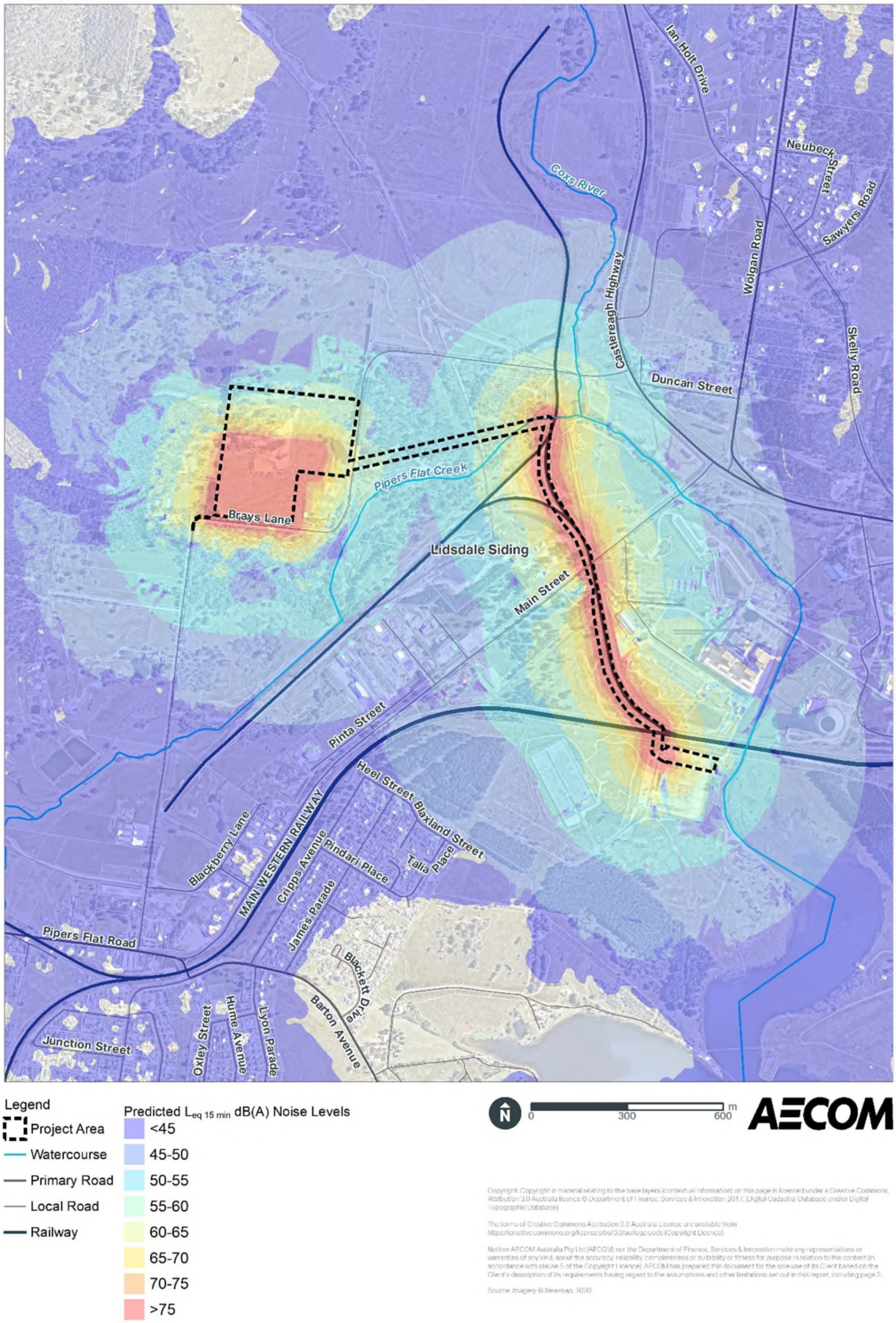


Figure 13-4 Construction scenario 2. Civil, structural, mechanical, electrical and transmission connection works modelled noise impacts

The civil, structural, mechanical, electrical works and transmission connection phase would be the most noise intensive construction phase with the greatest number of receivers affected. However, the duration of the impacts to receivers would not occur throughout the entirety of this phase. Works to complete the proposed transmission line would progressively move along the transmission line corridor, meaning that impacts to individual affected receivers affected by these works would not last for the entire duration of the phase.

The predicted exceedances for the enabling works, commissioning and demobilisation would impact on the rural residences located closest to the Project Area, to the north, south east and south west of the Site.

Given that the assessment approach is conservative by assuming that all equipment in each construction phase is operating at once, the predicted exceedances are considered to present a worst-case scenario. Appropriate noise mitigation measures would be implemented to manage potential impacts.

Twelve exceedances within the 11-20 dB band are predicted to occur at isolated rural residences located closest to the Project Area, five of these would be located nearby the Site and the remainder would be located in the small residential estate to the south west of the proposed transmission line (at and near Blaxland Street, Wallerawang) and at isolated rural properties to the north of the transmission line (at and near Duncan Street, Wallerawang). Most of these would occur during the civil, structural, mechanical, electrical works and transmission connection phase. As noted above, the assessment assumptions are conservative. Appropriate noise mitigation measures would be implemented to manage potential impacts.

Two exceedances greater than 20dB, but below the highly affected category of >75dB(A) are expected to occur at the rural residence to the south east of the Site (the non-associated receiver located at 173 Brays Lane (R2)). This exceedance would occur only during the enabling works, and the civil, structural, mechanical, electrical works. A noise contour map for construction scenario 1 (enabling works) and construction scenario 2 (civil, structural, mechanical, electrical and transmission connection works) is presented in **Figure 13-3**.and **Figure 13-4** , respectively. Appropriate noise mitigation measures would be implemented to manage potential impacts.

None of the construction phases are expected to result in noise levels which exceed the ‘highly noise affected’ level of 75 dB(A) for residential receivers. Feasible and reasonable mitigation measures would be detailed in the Construction Noise and Vibration Management Plan (refer to **Section 13.6**).

Construction noise – non-residential receivers

The activities associated with the construction phases for the Project are expected to result in noise levels which comply with the noise management levels at non-residential receivers during the day as shown in **Table 13-17** below.

Table 13-17 Number of non-residential buildings where noise levels may exceed NMLs

Phase	Exceedance of NML		
	1-10 dB	11-20 dB	> 20 dB
Enabling works	0	0	0
Structural, civil, mechanical, electrical works and commissioning	0	0	0
Finishes and demobilisation	0	0	0
Transmission connection	0	0	0

Construction traffic noise

Construction traffic noise was assessed with reference to the RNP, which provides the methodology for assessment and the threshold for noise mitigation. To assess traffic noise impacts the RNP requires that an initial screening is undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB.

Where the predicted noise increase is 2 dB or less, no further assessment is required and noise mitigation at residential receivers is not required. Where the predicted noise level increase is greater than 2 dB, and the predicted road traffic noise level exceeds the road category specific criterion, noise mitigation is considered for those residential receivers affected.

Construction of the Project is expected to be undertaken in phases. Each phase would require trucks to deliver materials to the Project Area as well as the use of light vehicles carrying construction workers. To assess the impact of construction traffic it has been assumed that up to 20 heavy vehicles and 50 light vehicles would access the Project Area during peak construction periods.

Construction vehicles are proposed to access the Project Area from Brays Lane via the Great Western Highway and the Castlereagh Highway (further detail on access routes is provided in **Chapter 14 Transport and access**).

The historical annual average daily traffic (AADT) at the TfNSW sample classifier Station Id 99084 and Station Id 99001 have been obtained. TfNSW sample classifier Station Id 99084 is located on the Castlereagh Highway, east of the Site and TfNSW sample classifier Station Id 6015 is located on the Great Western Highway, west of the Site. The Wallerawang town centre approximately 6 km from the Site.

In order to estimate the current background traffic flows of the road network near the Site the average annual background growth rates at each of these station locations was calculated using the traffic flows observed over the available years preceding.

Taking into consideration the existing traffic volumes on the Castlereagh Highway and the Great Western Highway, construction traffic to the Project Area is predicted to increase noise levels by less than 1 dB. Therefore, the potential impact would be very minor and would comply with Project acoustic requirements.

Given that the increase in noise levels would be less than 2 dB, in accordance with the RNP, noise mitigation at residential receivers would not be required to mitigate construction traffic noise impacts.

Construction vibration assessment

During construction, the most vibration-intensive equipment proposed to be used would include a vibratory roller, piling rig and jackhammer. With the implementation of minimum working distances of these items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. The separation distance between the Project Area and the nearest receivers is sufficient for vibration levels to be compliant with both the human comfort and cosmetic damage criteria.

Construction assessment conclusion

Construction noise modelling showed that residential noise sensitive receivers are predicted to exceed the construction noise management levels during the day. Construction noise is predicted to primarily impact rural residential receivers closest to the Site and the proposed transmission line during all phases of construction. Residential areas to the south west and north east of the township of Wallerawang would also be impacted during the construction phase, although for a shorter duration due to the nature of the construction of the transmission line, which would occur progressively along the alignment. Reasonable and feasible mitigation measures would be implemented during the works and detailed within a Construction Noise and Vibration Management Plan to minimise noise impacts. Noisy construction works would typically be confined to standard construction hours unless otherwise agreed to by DPE. This would build-in respite for surroundings receivers during the most sensitive periods (night-time and weekends) for the duration of construction. None of the construction is expected to result in noise levels which exceed the ‘highly noise affected’ level of 75 dB(A) for residential receivers and no exceedances are predicted at non-residential receivers.

With the implementation of minimum working distances of high impact items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. Furthermore, the potential traffic noise impact on residential receivers would be negligible.

Potential construction noise and vibration impacts of the Project would be manageable with the implementation of standard mitigation measures (refer to **Section 13.6**). A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP to guide the management of potential impacts during construction.

13.5.2 Operation

Operational noise assessment

During operation, noise sources from the Project would include the batteries, inverters and transformers. A 10 m noise barrier with sound absorptive lining would be constructed around the battery enclosures and the HV transformers. In order to assess a reasonable worst-case operational scenario, it is assumed that the proposed equipment within the Site would operate in two modes:

1. at full capacity, during the daytime and evening periods, seven days per week, and
2. at reduced capacity, during the night-time period, seven days per week.

Given that the evening and night-time residential project noise trigger levels are the most stringent, the worst-case operational scenarios were assessed during these periods.

Operational noise impacts at non-residential receivers were based on the full capacity operational scenario and compared with the relevant noise trigger levels for non-residential receivers.

Predicted operational noise levels for the most affected residential receivers are summarised in **Table 13-18**, **Table 13-19** and **Table 13-20**.

Table 13-18 Operational noise levels at closest residential receiver locations – Daytime period

ID	Residential receiver address	NCA	Project noise trigger levels, $L_{Aeq,15min}$, dB(A)	Predicted Operational noise level, $L_{Aeq,15min}$, dB(A) (with level of exceedances)	
				Standard met conditions	Noise enhancing met conditions
R1	233 Brays Lane, Wallerawang	1	40	40	42 (+2)
R2	173 Brays Lane, Wallerawang	1	40	39	40
R3	137 Brays Lane, Wallerawang	1	40	39	41 (+1)
R4	113 Brays Lane, Wallerawang	2	40	33	35
R5	91 Brays Lane, Wallerawang	2	40	30	33

Table 13-18 indicates that during the daytime period, under standard meteorological conditions, noise levels from the operation of the Site comply at all residential receivers. Under noise enhancing meteorological conditions the criteria are exceeded by up to 2 dB at one receiver and by 1 dB at another receiver. These exceedances are considered negligible in accordance with the NPfI.

Table 13-19 Operational noise levels at closest residential receiver locations – Evening period

ID	Residential receiver address	NCA	Project noise trigger levels, $L_{Aeq,15min}$, dB(A)	Predicted Operational noise level, $L_{Aeq,15min}$, dB(A) (with level of exceedances)	
				Standard met conditions	Noise enhancing met conditions
R1	233 Brays Lane, Wallerawang	1	38	40 (+2)	42 (+4)
R2	173 Brays Lane, Wallerawang	1	38	39 (+1)	40 (+2)
R3	137 Brays Lane, Wallerawang	1	38	39 (+1)	41 (+3)
R4	113 Brays Lane, Wallerawang	2	35	33	35
R5	91 Brays Lane, Wallerawang	2	35	30	33

Table 13-19 indicates that during the evening period, under standard meteorological conditions, noise levels from the operation of the Site comply at most receivers, with exceedances of up to 2 dB at three receivers. According to the NPfI, an exceedance of 2 dB is considered to be negligible. Under noise enhancing meteorological conditions the criteria are exceeded by up to 4 dB at the same three receivers. According to the NPfI, an exceedance of up to 4 dB, where the exceedance is below the amenity criteria ($L_{Aeq\ (15minutes)}$ = 43 dB for NCA 1) is considered to be marginal.

Table 13-20 Operational noise levels at closest residential receiver locations – Night-time period

ID	Residential receiver address	NCA	Project noise trigger levels, $L_{Aeq,15min}$, dB(A)	Predicted Operational noise level, $L_{Aeq,15min}$, dB(A) (with level of exceedances)	
				Standard met conditions	Noise enhancing met conditions
R1	233 Brays Lane, Wallerawang	1	35	37 (+2)	39 (+4)
R2	173 Brays Lane, Wallerawang	1	35	37 (+2)	38 (+3)
R3	137 Brays Lane, Wallerawang	1	35	37 (+2)	39 (+4)
R4	113 Brays Lane, Wallerawang	2	35	31	33
R5	91 Brays Lane, Wallerawang	2	35	29	31

Table 13-20 indicates that during the night-time period, under standard meteorological conditions, noise levels from the operation of the site comply at most receivers with exceedances of up to 2 dB at three receivers. According to the NPfI, an exceedance of 2 dB is considered to be negligible. Under noise enhancing meteorological conditions the criteria are exceeded by up to 4 dB at three same receivers. According to the NPfI, an exceedance of up to 4 dB, where the amenity criteria is also exceeded ($L_{Aeq\ (15minutes)}$ = 38 dB for NCA 1) is considered to be a moderate impact.

Treatment of the three residential receivers worst affected properties would be carried out in line with the NPfI (NSW EPA, 2017) to address residual impacts. The three properties on Brays Lane are predicted to experience a marginal to moderate impact (≥ 3 but ≤ 5 dB above the project trigger levels) during the noise-enhancing meteorological conditions during both evening and night-time periods and would therefore qualify for treatment. These properties are:

- 233 Brays Lane, Wallerawang (R1)
- 173 Brays Lane, Wallerawang (R2)
- 137 Brays Lane, Wallerawang (R3).

Ongoing detailed design would continue to seek opportunities to further reduce noise impact at the three residential receivers. If required following detailed design, treatment of the three residential receivers worst affected properties would be carried out in line with the NPfI (NSW EPA, 2017) to address residual impacts. The three properties on Brays Lane are predicted to experience a marginal to moderate impact (≥ 3 but ≤ 5 dB above the project trigger levels) during the noise-enhancing meteorological conditions during both evening and night-time periods and would therefore qualify for treatment. These properties are:

- 233 Brays Lane, Wallerawang (R1)
- 173 Brays Lane, Wallerawang (R2)
- 137 Brays Lane, Wallerawang (R3).

Treatment would comprise the provision of mechanical ventilation and/or comfort conditioning systems. This would allow windows to be closed without compromising internal air quality/amenity. As the exceedance of the trigger levels is both during the evening and night-time periods, the treatment would apply to bedrooms and living rooms. If treatment were to be installed, it would be installed before the Project becomes operational.

Sleep disturbance

The predicted L_{Aeq} and L_{Amax} levels are presented in **Table 13-21** and it can be seen that there are no exceedances of the sleep disturbance criteria under noise enhancing weather conditions. Therefore, there would also be no exceedances under neutral weather conditions.

Table 13-21 Sleep disturbance assessment – noise enhancing weather conditions

ID	Residential receiver address	NCA	Sleep disturbance screening levels		Predicted operational noise level, $L_{Aeq,15min}$, dB(A)	
			$L_{Aeq,15min}$, dB(A)	L_{Amax}, dB(A)	$L_{Aeq,15min}$, dB(A)	L_{Amax}, dB(A)
R1	233 Brays Lane, Wallerawang	1	40	52	39	<44
R2	173 Brays Lane, Wallerawang	1	40	52	38	<43
R3	137 Brays Lane, Wallerawang	1	40	52	39	<44
R4	113 Brays Lane, Wallerawang	2	40	52	33	<38
R5	91 Brays Lane, Wallerawang	2	40	52	31	<36

Operational traffic noise

Operational traffic noise was assessed with reference to the RNP. To assess traffic noise impacts the RNP requires that an initial screening is undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB.

The Site would be mostly unmanned once operational and as such no traffic movements would normally be produced. Intermittently, when maintenance is required, up to six light vehicles would visit the Site during a typical-case day. It is understood that heavy vehicles are not anticipated to regularly access the Site during operation.

Due the very small number of vehicles that would be required to access the Site during operation, the potential impact would be very minor and would comply with Project acoustic requirements.

Operational vibration assessment

Operational vibration is not expected to be an issue as a result of the Project as the operational activities would not involve vibration generating activities that would create significant vibration levels at nearby sensitive receivers or adjacent properties. Therefore, an assessment of the operational vibration impacts is not required.

Operational assessment conclusion

Results of the noise modelling showed that, with the noise barriers incorporated into the design, the operation of the Project complies with the established project noise trigger levels at most residential receivers. Marginal to moderate exceedances of the trigger levels have been predicted for three residential receives under both standard and noise-enhancing meteorological conditions.

Appropriate at-property noise mitigation measures are recommended for these three receivers as outlined in **Section 13.6** to mitigate this residual impact.

The impact of operational traffic noise generated by the Site is considered acceptable according to the RNP.

13.6 Management and mitigation measures

The noise assessment is considered to be a conservative prediction of noise impacts. The Project is expected to comply with the relevant NMLs for most residential receivers during the construction stage. Exceedances have been found at properties in close proximity to the Project Area. It is likely that actual impacts would be less severe than predicted impacts, under realistic conditions where not all equipment would be in use simultaneously.

Although the NMLs are only likely to be marginally exceeded at residential receivers, reasonable and feasible noise mitigation measures and work practices would be implemented. Where receivers are predicted to be 'noise affected' the ICNG states that all feasible and reasonable works practices should be applied to meet the NMLs. It is recommended that a Construction Noise and Vibration Management Plan (CNVMP) as part of the Construction Environmental Management Plan (CEMP) be prepared prior to commencing construction activities at the Site.

A detailed design for the Project has not been completed and at this stage the construction program and method is subject to ongoing development. Once the design has been developed further and a CNVMP for the Project would be developed alongside the wider construction environmental management documents. This would help ensure that mitigation measures and conditions of consent are accurately tailored to the planned construction activities.

Details of construction noise and vibration mitigation measures and management practices which would be considered in the CNVMP are detailed below.

The CNVMP would include the following:

- The objectives of the CNVMP
- Performance criteria and key performance indicators to measure the success of plan
- Legislative requirements including reference to relevant conditions of consent and management and mitigation measures
- Identification of nearby residences and other sensitive land uses
- Description of approved construction hours
- Description and identification of all construction activities, including work areas, equipment and duration
- A summary of the activities that are likely to cause impacts related to noise and vibration and the potential impacts identified in the SSD application documentation (including the EIS)
- A list of the measures (generic and specific) that would be implemented to minimise noise and vibration impacts including performance criteria alongside information on who is responsible for each measure, and the frequency and/or timing that applies to each measure would also be detailed
- A complaint handling process
- An outline of the noise and vibration monitoring requirements that would be implemented to meet legislative requirements and the performance criteria alongside information on who is responsible for monitoring and the frequency and/or timing that applies
- Overview of community consultation required for identified high impact works.

The Construction Noise and Vibration Management Plan would also include relevant Conditions of Consent. Noise and vibration mitigation measures which would be considered in the CNVMP are detailed below in **Table 13-22**.

Table 13-22 Mitigation and management measures – Noise and vibration

ID	Mitigation measure	Timing
NV1	A Construction Noise and Vibration Management Plan would be prepared for the Project. This plan would include management and monitoring measures to be implemented to mitigate and manage noise and vibration impacts which could occur during construction. This plan would outline: • The objectives of the CNVMP • Performance criteria and key performance indicators to measure the success of plan • Legislative requirements including reference to relevant conditions of consent and management and mitigation measures • Identification of nearby sensitive receivers • Description of approved construction hours • Description and identification of all construction activities, including work areas, equipment and duration • A summary of the activities that are likely to cause impacts related to noise and vibration and the potential impacts identified in the SSD application documentation (including the EIS) • A list of the measures that would be implemented to minimise noise and vibration impacts including performance criteria alongside information on who is responsible for each measure, and the frequency and/or timing that applies to each measure would also be detailed • A complaint handling process • An outline of the noise and vibration monitoring requirements • Overview of community consultation required for identified high impact works.	Pre-construction
NV2	A noise monitoring program would be implemented for the duration of the construction works and would focus on the use of high noise generating plant (e.g. jack hammering, rock breaking).	Construction
NV3	During construction, sensitive receivers that may be affected by noise impacts from the Project would be notified (by letterbox drop or equivalent) 7 days in advance of works that may affect their property. The proponent would set up and operate a project website, project infoline, community complaints and enquiries hotline during construction. Community and stakeholder meetings would be undertaken as required.	Construction
NV4	All construction works would receive an induction prior to commencing work that would include information on measures and approaches to reduce noise during works. Measures to be discussed as part of this induction and to be employed during the construction works include: • No swearing or unnecessary shouting or loud stereos/radios on Site. • No dropping of materials from height, throwing of metal items and slamming of doors.	Construction

ID	Mitigation measure	Timing
	• Where practicable avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver. • Where practicable, identifying opportunities to maximise the distance between noisy plant and adjacent sensitive receivers • Shutting down or throttling down plant used intermittently • Turning off plant and vehicles when not in use • Where practicable, directing noise-emitting plant away from sensitive receivers.	
NV5	Vibration intensive work would not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	Construction
NV6	Construction would be carried out during the standard daytime working hours as defined by the ICNG unless: - otherwise agreed to by DPE under an approved out-of-hours work protocol, or - the works are low noise generating works that can be demonstrated to meet NMLs	Construction
NV7	Quieter and less vibration emitting construction methods would be identified during detailed design and employed if feasible and reasonable.	Construction
NV8	Equipment would be regularly inspected and maintained to help ensure it is in good working order.	Construction
NV9	The noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels.	Construction
NV10	Noise emissions should be considered as part of the selection process for construction equipment and plant.	Construction
NV11	Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on construction vehicles and mobile plant regularly used within the Project Area where practical during standard hours and at all times outside standard hours.	Construction
NV12	Where practicable: • Loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers • Delivery vehicles to be fitted with straps rather than chains for unloading. • Vehicle movements would be scheduled during less sensitive times.	Construction
NV13	All equipment would be maintained and operated in an efficient manner, in accordance with manufacturer's specifications, to reduce the potential for adverse noise and vibration impacts.	Construction
NV14 (This is also provided in measure HH2)	To avoid structural damage occurring, if feasible high vibratory construction methods would not be used within 50 m of St John the Evangelical Church.	Construction

ID	Mitigation measure	Timing
	Should high vibratory methods be required within 50 m of the church, these works would not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	
NV15	Ongoing detailed design would continue to seek opportunities to further reduce the noise impact at the three residential receivers (137 (R3), 173 (R2) and 233 (R1) Brays Lane). If required following detailed design, treatments at these three properties would be discussed with the property owners and would comprise the provision of mechanical ventilation and/or comfort conditioning systems in line with the NPfI (NSW EPA, 2017) to address residual impacts.	Pre-construction

14.0 Traffic and access

A Traffic Impact Assessment (TIA) was prepared for the Project and is provided in **Appendix I Traffic Impact Assessment Report**. This chapter summarises the assessment of potential construction and operational impacts of the Project on traffic and access and outlines environmental management and mitigation measures to avoid or reduce impacts.

14.1 Secretary's Environmental Assessment Requirements

Table 14-1 sets out the SEARs relevant to traffic, transport and access and where the requirements have been addressed in this EIS.

Table 14-1 SEARs – Traffic and access

Relevant SEARs	
Transport	**Where addressed**
This EIS must include: An assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation	Construction traffic impacts are assessed in **Section 14.4.1** and operational traffic impacts are assessed in **Section 14.4.2**.
An assessment of the likely transport impacts to the site access route (including, but not limited to Brays Lane and Castlereagh Highway) site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance	Potential impacts to the Site access routes, secondary access points, road capacity and road safety are assessed in **Section 14.4.1** and **Section 14.4.2**.
A cumulative impact assessment of traffic from nearby developments	The potential for cumulative traffic impacts from nearby developments is assessed in **Chapter 19 Cumulative impacts**.
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.	Management and mitigation measures are included in **Section 14.5**.

14.2 Methodology

A traffic and access impact assessment has been undertaken for the Project to assess potential traffic, transport and access impacts during the construction and operation of the Project. The complete assessment is attached in **Appendix I (a) Traffic Impact Assessment Report** with relevant aspects summarised within this chapter.

A separate Route Study Analysis has also been prepared which reviews the movement of overmass and oversized vehicles to and from the Site. This analysis is provided in **Appendix I (b) Route Study**. This study includes swept path diagrams for the movements of the larger vehicles onto and along Brays Lane.

The traffic and access impact assessment involved:

- Establishing the existing traffic and access conditions near the Project Area, as well as the active transport and public transport networks near the Site. This was informed by the following:
  - A desktop assessment based on available aerial photography and other GIS mapping information
  - Traffic volumes obtained from the Transport for NSW sample classifiers located on the Castlereagh Highway and Great Western Highway

- Confirming the location of access points, anticipated vehicle movements and likely routes during the construction of the Project
- Undertaking a qualitative assessment of the potential impacts of the Project on the local traffic and transport environment during construction and operation of the Project. Given that traffic volumes within the vicinity of the Project Area during peak construction periods are anticipated to be low (refer to **Section 14.3**), it was concluded that a qualitative assessment would be appropriate to assess the road network performance with the Project, and network modelling was therefore not required
- Identifying the likely impacts or access constraints for heavy vehicles.
- Identifying mitigation measures to manage potential impacts.

The following guidelines were considered during the preparation of the traffic and access impact assessment:

- Guide to Traffic Management – Part 3: Traffic Studies and Analysis (Austroads, 2020)
- Guide to Traffic Generating Developments Version 2.2 (RTA, 2002)
- Technical Direction TDT2013/4a – Guide to Traffic Generating Developments (Roads and Maritime Services, 2013)
- Guide to Traffic Management – Part 12: Integrated Transport Assessments for Developments (Austroads, 2020) and the complementary Roads and Maritime Supplement (RMS Austroads Guide Supplements, RMS, 2013).

These guidelines provide an overview of available methods for undertaking transport studies and analyses, aspects of traffic generation considerations relating to developments, and guidance on identifying, assessing and mitigating traffic impacts.

14.3 Existing environment

14.3.1 Road network

The road network in the vicinity of the Site that is likely to be used to access the Project includes Brays Lane, Castlereagh Highway, Main Street, Pipers Flat Road, James Parade, Barton Avenue and Great Western Highway. A description of each of these roads is provided below.

The proposed construction routes for the Project along with major roads surrounding the Project are shown on **Figure 14-1**.

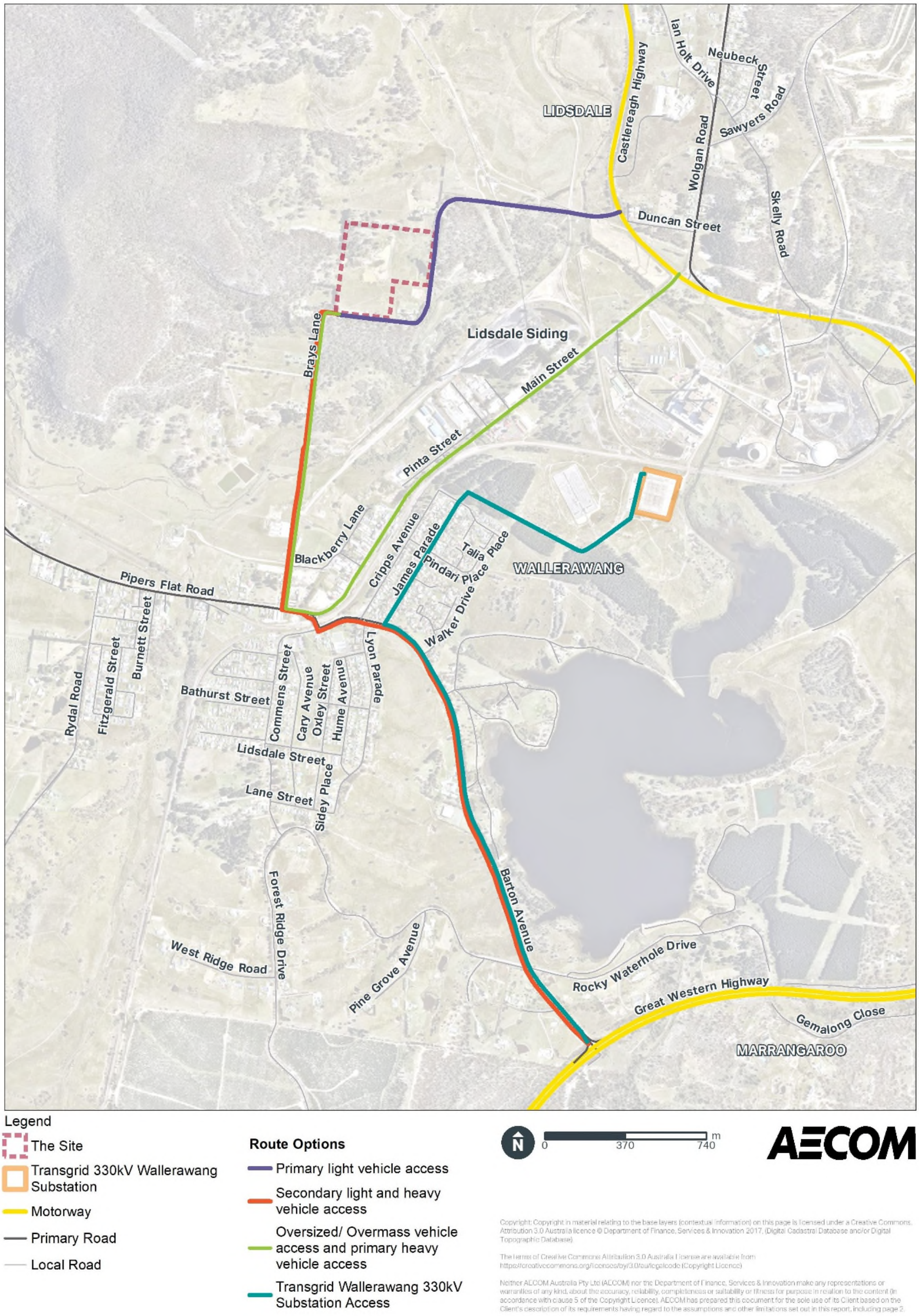


Figure 14-1 Proposed construction traffic routes

Brays Lane

Brays Lane provides access to the Site. Brays Lane is fed by the Castlereagh Highway to the north and Pipers Flat Road to the south. No other formal roads can be accessed from Brays Lane. Brays Lane is an undivided carriageway with a sign posted speed limit of 50 km per hour.

Brays Lane is a local road generally aligned in a north-south direction. In addition to the Site, Brays Lane provides access to the few residential properties with frontages on Brays Lane, and mostly rural residential land uses. It also provides informal access (in the form of an unsealed and unnamed small dirt track) to the nearby coal conveyer belt which also crosses above Brays Lane, about 140 m from its intersection with the Castlereagh Highway. A roadside convex mirror is provided to provide forward visibility around the blind corner.

No formal parking or footpaths are provided on either side of the road.

Castlereagh Highway

Castlereagh Highway is a classified State Road (State Road 18) generally aligned in a north-south direction north of the Site. The highway connects South West Queensland in the north to the Northwest Slopes, Orana and Central West regions of New South Wales in the south. The highway connects to Brays Lane north of the Site. Near the Site the highway is an undivided carriageway, with one lane in each direction. The posted speed limit is 80 km per hour for vehicles travelling southbound and 100 km per hour for vehicles travelling northbound. No parking or footpaths are provided on either side of the highway.

Main Street

Main Street is a local road generally aligned in a north-south direction near the Site. The road connects to Castlereagh Highway in the north and Pipers Flat Road in the south. The road is an undivided carriageway, with one lane in each direction and some turning lanes at intersections. The posted speed limit is 50 km per hour in each direction. Parking on both sides and footpaths on one of side road are provided within the town centre.

Pipers Flat Road

Pipers Flat Road is a local road aligned in an east-west direction near the Site. The road provides access to the Portland town centre to the west and the Wallerawang town centre to the east. The road connects to Barton Avenue in the east. The road is an undivided carriageway, with one lane in each direction and some turning lanes at intersections. The posted speed limit is 50 km per hour in each direction near the town centres and 100 km per hour outside of the town centres. There are very limited footpaths to cater for pedestrians on one of side road. While there are no ‘no parking’ or ‘no stopping’ signs along this road, on-street parking on the road verges would be limited (due to the condition of the road verges).

James Parade

James Parade is a local road generally aligned in a north-south direction. The road connects to Barton Avenue in the south and to the unnamed road that provides access to the Transgrid Wallerawang 330 kV substation in the north. The road is an undivided carriageway, with one lane in each direction. The posted speed limit is 50 km per hour in each direction. There are no footpaths along this road. Parking is provided on either side of the road in the form of informal, untimed parking.

Barton Avenue

Barton Avenue is a local road generally aligned in a north-south direction. The road connects to Pipers Flat Road in the north and Great Western Highway in the south. The road is an undivided carriageway, with one lane in each direction and some turning lanes at intersections. Closer to its intersection with the Great Western Highway, the posted speed limit is 80 km per hour. Closer to the township of Wallerawang, the posted speed limit becomes 50 km per hour in each direction. Where Barton Avenue runs past Wallerawang Public School, 40 km per hour speed limits apply during standard school-zone hours (8:00 am to 9:30 am and 2:30 am to 4:00 pm on school days). There are very limited footpaths to cater for pedestrians on one side of the road, and a school crossing zone is located outside the public school. While there are no ‘no parking’ or ‘no stopping’ signs along this road, on-street parking on the road verges would be limited (due to the condition of the road verges).

Great Western Highway

Great Western Highway is a classified State Road (State Road 5) generally aligned in an east-west direction south of the Site. The highway connects Sydney in the east to Bathurst in the west. The highway connects to Barton Avenue south of the Site. Near the Site the highway is a divided carriageway, with two lanes in each direction separated by a large median. The posted speed limit is 110 km per hour in each direction. No parking or footpaths are provided on either side of the highway.

14.3.2 Traffic demand and growth rates

The Project is located in a regional area, characterised with low traffic volumes and therefore there are no significant trip attractors or generators located near the Site. Traffic demand of the road network near the Project Area has been obtained based on publicly available information taken from the TfNSW sample classifier located on Castlereagh Highway east of the Site (Station Id 99084) and traffic count location on the Great Western Highway, west of the Site (Station Id 99001).

Station Id 99084 is located approximately 6 km (or about 6 minutes drive) east of the Site. Station Id 99001 is located on the Great Western Highway, west of the Site and the Wallerawang town centre. This classifier is located approximately 14 km (or about 17 minutes drive) from the Site. Given the regional nature of the Project Area, the traffic flows observed at these station locations are considered representative of the traffic levels of the road network near the Project Area. The historical annual average daily traffic (AADT) at the Station Id 99084 and Station Id 99001 have been obtained the results are shown in **Appendix I (a) Traffic Impact Assessment Report**.

For the Castlereagh Highway, the data indicates that the average annual increase in background traffic over the available five years is around 2.48%. For the Great Western Highway, this data indicates that the average annual increase in background traffic over the eight years is around 1.07%.

In order to estimate the current background traffic flows of the road network near the Site, namely at the Castlereagh Highway, the average annual background growth rate of 2.48% was calculated using the traffic flows observed at the sample classifier location (Station Id 99084) in 2012. **Table 14-2** provides an estimate of traffic flows during 2021 along the Castlereagh Highway, east of the Site. The estimates indicate that that the average combined AADT on the Castlereagh Highway in 2021 is likely to be approximately 6,076 vehicles. Traffic counts indicate that peak period flows nearby the Project Area for the morning peak are between 6am and 7am and for the afternoon peak between 3pm and 4pm.

In order to estimate the current background traffic flows of the road network near the Site at the Great Western Highway, the average annual background growth rate of 1.07% was calculated using the traffic flows observed at Station Id 99001 in 2019. **Table 14-3** provides an estimate of traffic flows during 2021 along the Great Western Highway, near to the Site. The estimates indicate that that the average combined AADT on the Great Western Highway in 2021 is likely to be approximately 8188 vehicles. Traffic counts indicate that peak period flows nearby the Project Area for the morning peak are between 6am and 7am and for the afternoon peak between 3pm and 4pm.

The traffic flows included in **Table 14-2** and **Table 14-3** are likely to best represent a worst-case scenario for the existing background traffic of the road network near the Site.

Table 14-2 Estimate of current traffic flows on the Castlereagh Highway near the Site

Castlereagh Highway				
Year	Direction	AADT [1]	AM Peak[2] (8am-9am)	PM Peak[2] (3pm-4pm)
2012	Southbound	2,468	68	274
	Northbound	2,616	282	173
	Combined	5,084	350	447
2021	Southbound	3,077	85	342
	Northbound	3,262	352	216
	Combined	6,340	436	557

1. AADT shown is in vehicles.
2. Traffic volumes are based on traffic flows at Station ID 99084 in 2012.

Table 14-3 Estimate of current traffic flows on the Great Western Highway near the Site

Great Western Highway				
Year	Direction	AADT [1]	AM Peak[2] (8am-9am)	PM Peak[2] (3pm-4pm)
2019	Eastbound	4049	1024	1102
	Westbound	4052	911	1226
	Combined	8101	1935	2328
2021	Eastbound	4092	1035	1114
	Westbound	4095	921	1239
	Combined	8188	1956	2353

Notes:

1. *AADT shown is in vehicles.*
2. *Traffic volumes are based on traffic flows at Station ID 99001 in 2019.*

14.3.3 Road network performance

Austroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis Methods (the Guide) provides the information on capacity analysis for interrupted flow facilities. Interrupted flow facilities are facilities on which traffic flow conditions are subject to the influence of fixed elements such as traffic signals, stop signs, give-way signs, roundabouts or other controls which cause traffic to stop periodically, irrespective of the total amount of traffic; examples include urban streets, unsignalised and signalised intersections.

The Guide sets out typical mid-block capacities for various types of urban roads with interrupted flow. According to this guidance, the mid-block capacity of the Castlereagh highway would be in the order of 900 passenger car (pc) per hour (pc/h) per traffic lane based on urban roads with interrupted flows, with clearway conditions for kerb lanes.

Peak-period mid-block traffic volumes may increase to 1200 to 1400 pc per hour per lane on any approach road where provisions have been made to limit traffic flow disruptions such as at the Great Western Highway in the vicinity of Wallerawang. As the Great Western Highway provides two lanes in each direction in the vicinity of Wallerawang, peak-period mid-block traffic volumes may be between 2400 and 2800 pc per hour in each direction.

The Guide also provides instruction for capacity analysis for uninterrupted flow facilities. Uninterrupted flow facilities are facilities on which traffic flow conditions are the result of interactions between vehicles in the traffic stream, and between vehicles and the geometric characteristics of the road. In uninterrupted flow facilities, there are no fixed elements external to the traffic stream, such as traffic signals, stop signs, give-way signs, roundabouts, etc, that cause interruptions to traffic flow.

The Guide provides guidance on the assessment of capacity for single-lane traffic flow without overtaking and assumes a linear relationship between the average speed and the density of vehicles. The theoretical capacity of the Castlereagh Highway and Great Western Highway per available lane is presented in **Table 14-4**.

Table 14-4 Typical theoretical mid-block capacities per lane for urban roads with uninterrupted flows

Location	Direction	Capacity (pc/h)
Castlereagh Highway	Southbound	2,857
	Northbound	2,286
Great Western Highway	Eastbound	3,143
	Westbound	3,143

The mid-block capacity (based on urban roads with uninterrupted flows) as indicated in **Table 14-4** would be in excess of 2,200 pc per hour per traffic lane for the Castlereagh Highway and 3,100 for the Great Western Highway. Noting the Great Western Highway is a 2-lane carriageway in each direction near Wallerawang, the capacity here would be greater. The assessment of Castlereagh Highway and Great Western Highway based on the Guide for both interrupted and uninterrupted flow facilities indicate that a conservative peak hour mid-block capacity would be 900 pc per hour and 2,400 and 2,800 pc per hour, respectively, for each direction.

The existing year 2021 traffic volumes, provided in **Table 14-2** and **Table 14-3** show Castlereagh Highway has an estimated 85 to 352 vehicles during the AM or PM peak hour for each direction. For the Great Western Highway, 2021 traffic volumes have been estimated between 911 to 2,328 vehicles during the AM or PM peak hour for each direction.

As such, both the Castlereagh Highway and the Great Western Highway have sufficient capacity to accommodate current traffic flows observed on the road. Therefore, it was concluded that intersection modelling is not required to assess road network performance.

14.3.4 Road safety

TfNSW provides interactive crash and casualty statistics by LGA which was reviewed to obtain a general understanding of crash statistics in close proximity of the Site. These interactive crash statistics provided an overview of all crashes for the four-year period between 2015 and 2019 (TfNSW, 2021).

The review of the crash data indicates that only a small proportion of crashes occurred near the Site location and on the road network immediately surrounding the Site.

One crash occurred on Brays Lane, resulting in serious injury and a vehicle veering off the carriageway during a bend into an object / parked vehicle. Two crashes occurred on Main Street, resulting in moderate injury and serious injury. The two crashes were a result of a collision of two vehicles at an intersection and a vehicle veering off the carriageway into an object / parked vehicle.

Outside these locations, a relatively larger proportion but small number of crashes occurred on the State Roads (i.e. Castlereagh Highway and Great Western Highway), that provide connections to the Wallerawang town centre.

14.3.5 Public transport

The Site has generally limited public transport services due to the low population density, current land uses and consequently low demand for public transport services. However, the wider area around Wallerawang town centre has a considerable public transport network comprising of rail and bus services connecting the surrounding town centres and Sydney.

Regional coaches operate from Wallerawang town centre. Buses also operate within the town centre, serving the local catchments. Coach services operate at the Wallerawang town centre, connecting the town centre to Lithgow, Coonabarabran, Gulgong, Orange, Parkes and Bathurst. Regional trains service Lithgow, linking it to the wider regional network and Sydney.

A number of bus routes operate at Wallerawang, connecting the town centre to the local and regional network.

Lithgow Buslines is a part of the Buslines Group, a local bus operator, and operates two bus routes in the area. The bus services that operate in and around the Wallerawang town centre are:

- Route 600: Lithgow to Portland via Wallerawang and Return

- Route 636: Bathurst to Lithgow via Wallerawang, Portland & Meadow Flats.

14.3.6 Active transport

There are no walking and cycling facilities in the immediate vicinity of the Project Area. Given the nature of the land uses surrounding the Project Area (primarily consisting of agricultural land uses with some low-density residential areas), the provision of footpaths is limited. Walking and cycling facilities are primarily provided within the Wallerawang town centre.

14.4 Impact assessment

14.4.1 Construction

This section details the following considerations during construction of the Project:

- The likely construction access routes
- The volumes of heavy and light vehicles which would access the Project per day
- Potential impacts to the performance of the surrounding road network
- Potential impacts to parking availability and access to nearby properties
- Potential impacts to road safety as a result of additional vehicles on the road network during construction
- Potential impacts to public transport services and active transport (pedestrian and cyclist) routes.

Construction access routes

The majority of light vehicles associated with the construction traffic are expected to access the Site via the Castlereagh Highway and Brays Lane. Between this intersection and the proposed Site access driveway, Brays Lane only provides access to the informal unsealed road used to access the existing rail corridor and coal conveyer belt, and two residential properties. The majority of traffic travelling to the township of Wallerawang via the Castlereagh Highway would typically exit the Highway at the Main Street intersection and head towards the centre of Wallerawang and would not use Brays Lane for this purpose.

Heavy vehicles (up to 20 per day during peak construction) would be required for the delivery of construction equipment, removal of spoil (if required) and the delivery of the various Project components, including small pre-fabricated elements.

Oversized / over mass vehicles are expected to be required to deliver large pre-fabricated elements for the construction of the Project. This is likely to include eight (8) oversized vehicles to transport the transformers, crane, switch rooms and control room to the Site. The transformers are expected to weigh approximately 180 tonne (T) each. The crane would be about 22 m long, 3.6 m wide and 4.2 m high and weight about 96 T. The control room and switch rooms would be about 23 m long x 4.5 m wide x 4 m high and would weigh about 60T.

The majority of the heavy vehicles (up to B-doubles) and all of the oversized / over mass vehicles would access the Site via the Castlereagh Highway / Main Street intersection and then turn onto Main Street Wallerawang before connecting to Pipers Flat Road and Brays Lane. Some heavy vehicles (up to B-doubles) may access the Site from the Great Western Highway / Barton Avenue intersection and travel onto Barton Avenue, and Pipers Flat Road, and then to Brays Lane, and the Site. As the Castlereagh Highway and Great Western Highway are approved B-double routes they are considered to be in an appropriate condition to accommodate heavy vehicles required of the construction of the Project.

The location of each of these potential construction access routes is shown on **Figure 14-1**.

A Route Study has been prepared for the Project to assess the suitability of the proposed construction traffic routes (Rex J Andrews Engineered Transportation, 2021). This study is attached as **Appendix I (b) Route Study** and has been based on the successful implementation of the transportation of oversized and overmass elements during the recent decommissioning of the Wallerawang Power Station, as investigated and recommended by Rex J Andrews Engineered Transportation. As noted in the Route Study, the Castlereagh Highway and Great Western Highway are classified as 25/26m B-double routes. Barton Avenue, Main Street and Pipers Flat Road are approved routes with travel conditions.

The Route Study focused on the movement of the largest proposed oversized / overmass vehicles. It reviewed the movement of these vehicles from the Port of Newcastle and Port Kembla to the Castlereagh Highway / Main Street intersection and completed a more detailed analysis on the route from this intersection to the Site via Main Street, Pipers Flat Road and Brays Lane. This analysis included swept path analysis where warranted. The analysis concluded that:

- the proposed oversized / overmass vehicles could safely travel from the Port of Newcastle to the Main Street / Pipers Flat Road intersection with no specific controls
- the proposed oversized / overmass vehicles could safely travel from Port Kembla to the Main Street / Pipers Flat Road intersection however the vehicles would be limited to 5 m in height and 80 T in weight
- the following special access measures would be required to allow for the egress of oversized / over mass vehicles:
  - Main Street onto Pipers Flat Road (right hand turn) – A spotter would be required to guide the loads through this section of road
  - Pipers Flat Road onto Brays Lane (right hand turn) -– A spotter would be required to guide the loads through this section of road
  - Brays Lane - A crescent shaped, 240 square metre area located at the corner of Brays Lane just before the proposed site entrance would be cleared of vegetation and gravel or road base would be laid down to allow for oversize / overmass vehicles to turn this corner (refer to **Figure 14-2**). Vegetation removal and trimming would be kept as minimal area as possible to allow for safe egress of vehicles. Disturbed areas would be rehabilitated and revegetated following construction in consultation with Lithgow City Council
  - Brays Lane - There are two culverts on Brays Lane that may not have the existing weight capacity for heavy loads. If the culverts are determined to not be suitable for oversized / over mass vehicles to pass over then measures such as the use of temporary bridging beams may be required. These measures would be confirmed in the Traffic Management Plan (TMP) for the Project.

Figure 14-2 **Anticipated location extent of compacted gravel or roadbase (shown in yellow)**

The two culverts on Brays Lane would be checked for capacity to carry the heavier loads required. If these culverts cannot support the axle loads of the heavier vehicles, then temporary bridging beams would be used to cross the culverts. An example of a temporary bridging beam is shown in **Appendix I (b) Route Study**.

The installation of the temporary bridging beams would be undertaken in consultation with Lithgow City Council. As detailed in **Table 6-2**, Council have not expressed any concern regarding the installation of the temporary bridging beams. The temporary bridging beams would be removed as soon as practical. The installation of the temporary bridging beams would be very short in duration, and would not be expected to result in long term changes to the existing condition of Brays Lanes or the culverts. Once complete, the bridging beams would be removed, and the road and culverts would be checked to confirm they were not damaged and are of the same condition and integrity as they were prior to the oversized movements.

With the implementation of suitable measures to accommodate the egress of heavy and over-sized vehicles on local roads, and given that traffic volumes associated with the Project are low, the Project is not anticipated to have a significant impact on the condition of existing haulage routes.

No temporary diversions are proposed to accommodate the construction of the Project. If required, the potential locations of temporary diversions would need to be identified through a TMP. Road Occupancy Licence (ROL) and Traffic Control Plans (TCP) would also be prepared, as required.

These movements are not expected to affect access to Brays Lane. However, during the time that oversize/overmass vehicles are travelling along Brays Lane, the free movement of traffic along the southern section of Brays Lane may be temporarily restricted as a result of the temporary traffic control measures (such as traffic controllers/ spotter). Brays Lane provides access to both Wallerawang and the Castlereagh Highway so residents and business owners would still be able to access the wider road network. Residents and business owners along Brays Lane would be consulted prior to oversized movements occurring.

Construction traffic volumes

Traffic generated by construction vehicles, including construction trucks and construction workers, is expected to fluctuate depending on the Project construction phase. The following maximum vehicle numbers are anticipated during the peak of construction, which would be about two months in duration:

- Up to 250 construction workers per day would be accessing the Project Area during peak construction periods of the Project (these workers would access the Site by no more than 50 light vehicles a per day and the remainder would be transported to Site in a shuttle bus)
- Up to 20 heavy vehicles per day are anticipated on average to access the Project Area during the construction period.

Construction activities are proposed to be carried out over 11 hours per day. Assuming construction heavy vehicle movements are equally distributed across the day, it is most likely that around two heavy vehicles would access the Site per hour, on average, during the peak construction period.

In addition, the construction workforce is likely to be sourced locally, and shuttle buses would be considered, if required, to transport construction workers from the town centre to the Project Area, further reducing the impacts of the Site on the surrounding road network.

Road network

Construction of the Project is expected to commence late 2022 and take approximately 12 months to complete. As such, it is assumed that peak construction would occur in 2023.

The traffic flows for the peak construction year in 2023 without the Project construction traffic were based on the existing traffic flows determined for 2021 outlined in **Section 14.3.2**, using an annual average background traffic growth rate of around 2.48% for the Castlereagh Highway and 1.07% for the Great Western Highway. The anticipated peak background traffic flows in 2023 without the Project are presented in **Table 14-5**.

Table 14-5 2023 peak construction traffic flows on the Castlereagh Highway east of Wallerawang

Road	Direction	2023 AADT [1]	2023 AM Peak (8am-9am)	2023 PM Peak (3pm-4pm)
Castlereagh Highway	Southbound	3,232	89	359
	Northbound	3,426	369	227
	Combined	6,658	458	585
Great Western Highway	Eastbound	4225	1069	1150
	Westbound	4228	951	1273
	Combined	8454	2019	2429

Notes:

1. *AADT shown is in vehicles.*

Traffic generated by construction vehicles, including construction trucks and construction workers would likely fluctuate depending on the construction stage, the peak of which would be about two months in duration.

In order to consider a worst-case scenario for assessing the construction traffic impacts, it is assumed that all construction worker vehicles arrive during the same peak hour. This would represent 70 additional vehicles during each peak hour.

As the peak hour mid-block capacity of Castlereagh Highway and Great Western Highway (in each direction) is over 2400 pc per hour, and over 3100 pc per hour, respectively (based on the capacity analysis provided in **Section 14.3.3**), there would be sufficient capacity to accommodate the construction traffic on these roads (when comparing likely traffic flows for the 2023 scenario provided in **Table 14-5**).

On a typical day, given that construction activities are proposed to be carried out over 11 hours per day and assuming construction heavy vehicle movements are equally distributed across the day, around two heavy vehicles would access the Site during peak hours.

Given the existing capacity of the Castlereagh Highway and Great Western Highway, and the existing limited use of Brays Lane in particular, the addition of the proposed volumes of construction traffic to the local road network during the peak period of construction is not expected to significantly impact local traffic. In addition, the construction workforce is likely to be sourced locally, and shuttle buses would be used, as required, to transport construction workers from an additional parking area close to the town, to the Project Area, further reducing potential impacts on the surrounding road network. As such, local traffic impacts on Brays Lane as a result of construction are expected to be minor, short-term and temporary. A Construction TMP, would be prepared for implementation during the construction of the Project to manage minor impacts to traffic during construction.

Traffic approaching the Castlereagh Highway / Brays Lane intersection from the north would be required to turn right into Brays Lane. Traffic queuing to turn right across an intersection has the potential to interrupt traffic flow by halting the traffic in the direction of travel while waiting for a safe gap in oncoming traffic. However, as a dedicated passing lane is provided at this intersection for traffic to navigate around vehicles turning right into Brays Lane delays as a result of right-turning traffic onto Brays Lane is not anticipated at this intersection.

A Route Study has been prepared for the Project to assess the suitability of the proposed construction traffic routes (Rex J Andrews Engineered Transportation, 2021). As noted in the Route Study, the Castlereagh Highway and Great Western Highway are classified as 25/26m B-double routes. Barton Avenue, Main Street and Pipers Flat Road are approved routes with travel conditions.

The Route Study identified the sections of road close to the Site that would require special access measures to allow for the egress of oversized / over mass vehicles and this is discussed above in Section **14.4.1**.

As the Castlereagh Highway and Great Western Highway and are approved B-double routes they are considered to be in an appropriate condition to accommodate heavy and oversized / over mass vehicles required of the construction of the Project.

With the implementation of suitable measures to accommodate the egress of heavy and over-sized vehicles on local roads, and given that traffic volumes associated with the Project are low, the Project is not anticipated to have a significant impact on the condition of existing haulage routes.

No temporary diversions are proposed to accommodate the construction of the Project. If required, the potential locations of temporary diversions would need to be identified through a TMP. Road Occupancy Licence (ROL) and Traffic Control Plans (TCP) would also be prepared, as required.

Access and parking

Some short-term localised impacts have the potential to occur at the access to the Site off Brays Lane in the form of delays to road users. These potential impacts would be temporary and localised, and likely only affect one road user at a time due to the low traffic levels on Brays Lane.

For works that would be required to be undertaken in the road corridor (such as utility connections) these would be carried out such that one lane would remain open at all times. As such road access is not expected to be impacted by these works.

No impacts are anticipated at the access gate point to the rail corridor, located off Main Street that would be used to access the proposed transmission line corridor or at James Parade (which can be used to access the Transgrid Wallerawang 330 kV substation) due to low construction traffic volumes likely to be generated by this work.

Access points, including the main access off Brays Lane, would be reviewed during subsequent design stages to ensure construction vehicles can safely enter the Site and turning paths can safely be accommodated on Site.

Construction of the Project would require a workforce of up to 250 workers during peak construction periods. During construction, parking would be provided for up to 50 light vehicles within the Site. Overflow parking for workers would be provided at a location that would be determined in consultation with Lithgow City Council. The selection of this site would seek to minimise local parking impacts to the community. If required, shuttle bus movements would be considered from the Wallerawang town centre to the Site to limit car parking impacts on the road network immediately surrounding the Site. No parking of construction workers vehicles would be permitted along the verges of Brays Lane.

The Project would not impact access to properties near the Site during the construction. Consultation with property owners and tenants along Brays Lane would be undertaken to notify them of oversized vehicle movements to the Site from the south. During this time some restrictions to movements on Brays Lane may be likely, however Brays Lane provides access to the north so access to and from these properties would still be possible.

Road safety

During the course of the construction period, about eight (8) oversized / over mass vehicles would be required to transport pre-fabricated elements to the Site. These volumes are low, especially when compared with the traffic volumes on key arterial roads connecting to the Site.

A review of crashes on the road network immediately surrounding the Site that are likely to be used for access by construction vehicles indicates that there is a low incident rate. There was a serious injury crash recorded in 2016, which involved a run-off road crash at a bend on Brays Lane during the hours of darkness. Construction workers accessing the Site would be provided with information on driving conditions along Brays Lane and would be made aware of this previous crash.

Given the lack of pedestrian and cyclists facilities, low population, and low traffic counts in the vicinity of the Project, there is a low risk of construction vehicles interacting with pedestrians, cyclists and motorists on the road network surrounding the Site, including when construction vehicles are entering and exiting the Site.

Potential impacts on road safety for all users during construction would be mitigated through the implementation of measures documented within a TMP, as discussed in **Table 14-6**.

Public Transport

Bus services at the Wallerawang town centre would continue to operate as normal during construction activities and bus routes would not be impacted during the construction of the Project, given construction activities would be mostly within the Site. No changes to bus stop locations are anticipated as a result of the Project.

Active transport

During construction, works would be undertaken in a manner to ensure pedestrian and cyclist routes around the Project are maintained. However, given there are very limited existing walking or cycling facilities bordering the Project Area, temporary disruptions are not anticipated. Therefore, the Project is not anticipated to impact the operation of existing cycling or walking facilities.

While unlikely to be required, appropriate signage, line marking and/or traffic controllers would be positioned to notify pedestrians and cyclists of temporary arrangements. Impacts during construction would be managed through measures contained within a TMP. The local community would be notified in advance of planned works which would impact pedestrian or cycle infrastructure.

14.4.2 Operation

The Project is anticipated to require up to six staff members during the operational stage on an intermittent basis. Heavy vehicles are not anticipated to regularly access the Site during operation, with heavy vehicle access only required for maintenance work or battery unit replacements, on the rare occasion that this is required. As a result, the traffic generation during operations would be very low, and as such is not expected to impact the road network surrounding the Site.

Up to eight car parking spaces would be provided once the Project is operational. Given up to six employees would be present on-site intermittently, the amount of parking proposed to be provided for the Project is considered appropriate. As such, the Project is not forecast to impact the availability of parking.

14.5 Management and mitigation measures

Table 14-6 outlines the management and mitigation measures that would be implemented to manage transport and access impacts during construction of the Project.

Given that no operational impacts are likely due to low staffing requirements, management and mitigation measures have not been identified for the Project during operation.

Table 14-6 Mitigation and management measures

ID	Mitigation measure	Timing
T1	A Construction Traffic Management Plan (TMP) would be prepared, in consultation with Lithgow City Council and other relevant stakeholders. The TMP would include: • Details of the transport route to be used for all development-related traffic • Details of the temporary onsite construction car park • Details of the measures that would be implemented to minimise traffic impacts during construction including: - Temporary traffic controls, including detours, signage etc. - Notifying the local community along Brays Lane about development-related traffic impacts - Procedures for receiving and addressing complaints from the community about development-related traffic - Minimising potential for conflict with other road users as far as practicable, including preventing queuing on the public road network.	Construction
T2	The TMP would include the following measures: • Vehicle access to and from the Site would be designed and managed to minimise safety risk to pedestrians, cyclists and motorists and to provide that construction vehicles can safely enter the Site. All trucks would enter and exit the Site in a forward direction where this is feasible. Truck deliveries would be scheduled to arrive at Site outside of peak periods, where this is feasible, to minimise traffic impacts on the surrounding network during the peak periods • Near the Site access, appropriate signage, line marking and/or traffic control measures would be used to direct and guide pedestrians, cyclists and motorists past the Site during high usage times. • Construction workers accessing the Site will be provided with information on driving conditions along Brays Lane. • No construction worker parking along Brays Lane would be allowed. • Where parking on the Site would be exceeded, additional measures to reduce parking demand (e.g. shuttle buses) would be implemented. Overflow parking for workers would be provided at a location that would be determined in consultation with Lithgow City Council. The selection of this site would seek to minimise local parking impacts to the community. • No temporary diversions are proposed to accommodate the construction of the Project. However, if required, the potential locations of temporary diversions would need to be identified in the TMP. Road Occupancy Licence (ROL) and Traffic Control Plans (TCP) would be prepared, as required. • Spotters would be used to guide oversized / over mass loads as required (as per recommendations detailed in **Appendix 1 (b) Route Study**) and vegetation trimming on Brays Lane would be carried out to allow for safe egress. • Brays Lane - A crescent shaped, 240 square metre area located at the corner of Brays Lane directly opposite the site entrance would be	Construction

ID	Mitigation measure	Timing
	cleared and compacted gravel or roadbase would be provided to allow for oversize / overmass vehicles to turn this corner during construction .This area would be rehabilitated and revegetated following construction. • If the culverts on Brays Lane are determined to not be suitable for the weight of heavier loads, temporary bridging beams would be used. The installation of temporary bridging beams or another suitable measure would be undertaken in consultation and with the approval with Lithgow City Council under the Roads Act 1993 and would be removed as soon as practical. • Reference to or inclusion of the approach to consulting with the residents and business owners along Brays Lane prior to oversized vehicles movements occurring. This consultation would occur at least 14 days prior to these movements occurring.	

15.0 Land use

This chapter provides an assessment of the land use impacts associated with the Project.

15.1 Secretary's Environmental Assessment Requirements

Table 15-1 sets out the SEARs relevant to land use and where the requirements have been addressed in this EIS.

Table 15-1 SEARs – Land use

Relevant SEARs	
Land	**Where addressed**
This EIS must include: • an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: - a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights; - a soil survey to determine the soil characteristics and consider the potential for 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: - 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; and - assessment of impact on agricultural resources and agricultural production on the site and in the surrounding lands.	• An assessment of the potential impacts to agricultural land is discussed in **Section 15.4** • A soil survey to determine the soil characteristics and consider the potential for erosion to occur is discussed in **Chapter 12 Geology, soils, groundwater, and contamination** • Cumulative impacts are discussed in **Chapter 19 Cumulative impacts.** • An assessment of the potential impacts with existing land uses and zoning provisions is covered in **Section 15.4** • An assessment of the compatibility of the development is discussed in **Appendix J Land Use Conflict Risk Assessment** in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide, which is summarised in this chapter • An assessment of impact on agricultural resources and agricultural production on the Site and in the surrounding lands is discussed in **Section 15.4**.

15.2 Methodology

A Land Use Conflict Risk Assessment (LUCRA) has been prepared for the Project (refer to **Appendix J**). The purpose of a LUCRA is to identify land use compatibility and potential conflict between neighbouring land uses, and the identification of conflict avoidance or mitigation measures. This land use assessment chapter has incorporated the findings of the LUCRA.

The LUCRA has been developed with reference to Living and Working in Rural Areas – A handbook for managing land use conflict issues on the NSW North Coast (Learmonth et al. 2007) ('the Handbook), as well the Land Use Conflict Risk Assessment Guide (NSW Department of Primary Industries, 2011) ('the Land Use Guide').

This land use assessment chapter has been prepared using the following methodology:

- All Lot and DP numbers for parcels of land in which the Project would be directly located were identified and recorded using Lot and DP data available at the NSW Planning Portal Spatial Viewer (DPIE, 2021)

- An overview of the existing environment with respect to land use and planning controls that apply to the Project was undertaken. This was based on a review of existing land use zoning provisions from the Lithgow Local Environmental Plan 2014 (Lithgow LEP), aerial imagery and other relevant environmental planning instruments (EPIs) and publicly available spatial data that maps the occurrence of agricultural land (and land capability), flood prone land, Crown lands, mining, quarries, and mineral or petroleum rights within the Project Area
- Information about proposed land use changes and associated activities was collected, surrounding land uses and the Site's environmental characteristics
- The potential land use conflict level was assessed using a risk level evaluation approach
- Risk mitigation strategies were developed, which in turn informed the development of appropriate mitigation measures for the Project with respect to land use.

The results of the LUCRA have been incorporated into this chapter and have been used to provide an assessment of the potential impacts of construction and operation on existing land uses in and around the Proposal.

15.3 Existing environment

15.3.1 Land use

The Site is located at Lot 4 Deposited Plan (DP) 751651. The Project would involve the installation of a transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation. The Transgrid Wallerawang 330 kV substation is located at Lot 91 of DP 1043967. The transmission line would traverse the following lots:

- Lot 8 and Lot 9 DP 252472
- Lot 2 DP 108089
- Lot 1 DP 108089
- Lot 10 DP 1168824
- Lot 1115 DP 1204803
- Lot 91 DP 1043967.

The land on which the Site is located is privately owned. The new transmission line is mostly located on land currently owned by Transport for NSW and managed by John Holland for the purpose of operating and maintaining the existing rail line. A small portion of this alignment would also cross Brays Lane and Main Street, which are managed by Lithgow City Council as local roads. The Transgrid Wallerawang 330 kV substation is located on land owned by Transgrid[2].

The Project is located in an area which is characterised by the dominant land uses of agriculture, industry, electricity generating infrastructure and mining. The land uses surrounding the Project Area are generally represented on **Figure 1-1** and **Figure 1-2** and are described in more detail below.

The rural and agricultural characteristics of the Project Area include open cleared pastures with pockets of established mature vegetation, and small dams. Residences in the Project Area typically consist of very low-density single dwellings or homesteads, which are often setback some distance from the road, and several hundred metres from the nearest neighbour. Some nearby properties are used for low density grazing activities and horse and livestock agistment.

The township of Wallerawang is located about 1.4 km south of the Site (measured from the Wallerawang Post Office) and approximately 800 m from the closest point of the transmission line corridor. Residential properties within the township of Wallerawang generally comprise low to medium density housing, with associated infrastructure including schools, sporting fields, places of worship, community centres and clubs, shops, etc.

[2] Also legally referred to as NSW Electricity Networks Operations Pty Limited as Trustee for the NSW Electricity Networks Operations Trust.

In contrast to these rural, residential and agricultural land uses, a number of industrial and extractive industry land uses are present close to the Project Area. Wallerawang Power Station is located about 1.5 km south east of the Site and adjacent to the proposed transmission line corridor. Wallerawang Power Station was a large coal-fired electrical power station. The power station has been decommissioned, however it still comprises two 500 MW steam turbine generators. Until recently the large ventilation stacks at the power station could be viewed from the Site and represented a significant feature within the surrounding area. The two 175-metre tall ventilation stacks were demolished on 24 November 2021.

Lidsdale Siding coal loading facility is located to the south of the Site (about 400 m). A series of large conveyer belts cross the landscape to transport coal between coal mines, the nearby Mt Piper Power Station and Lidsdale Siding. Wallerawang ash repository is located about 2 km east of the Site.

The transmission line would pass under the coal conveyer belt described above. Excluding this element, the Project would otherwise not be located on land used directly for mining or quarrying activities. As described in social impact assessment provided in **Chapter 18 Other matters**, the Project is not expected to impact the ongoing operation of the conveyer belt during construction or operation. As such, this has not been considered further as part of this assessment.

In addition to the above, the Project would not:

- Include mining activities, nor have impact on nearby mining activities (refer to the social impact assessment provided in **Chapter 18 Other matters**
- Be undertaken within an area with existing mineral or petroleum rights
- Be located on any area mapped as Crown lands.

As such, these items have not been considered further as part of this assessment.

15.3.2 Land use zoning

The Project is located within the Lithgow LGA, which is subject to the application of the Lithgow LEP. The Lithgow LEP aims to make local environmental planning provisions for land in the region in accordance with the relevant standard environmental planning instrument under Section 3.20 of the EP&A Act.

The land use zones on which the Project would be located are shown on **Figure 2-2**. A summary of land use zones on which the Project would be located is provided in **Table 15-2**.

Table 15-2 Summary of landuse zones associated with the Project

Landuse zone	Property details	Project elements within landuse zone	Objectives of landuse zone
RU1 – Primary production	Lot 4 DP 751651 Lot 8 and Lot 9 DP 252472 Lot 1 DP 108089 Lot 91 DP 1043967 Lot 2 DP 108089.	The Site (and all associated elements as shown on **Figure 4-1**) Transmission line corridor	• Encourage sustainable primary industry production by maintaining and enhancing the natural resource base • Encourage diversity in primary industry enterprises and systems appropriate for the area • Minimise the fragmentation and alienation of resource lands • Minimise conflict between land uses within this zone and land uses within adjoining zones • Minimise the environmental and visual impact of development on the rural landscape • Provide for recreational and tourist development and activities of an appropriate type and scale that do not

Landuse zone	Property details	Project elements within landuse zone	Objectives of landuse zone
			detract from the economic resource, environmental or conservation value of the land • Maintain or improve the water quality of receiving water catchments.
SP2 – Rail infrastructure	Lot 9 DP 252472 Lot 1115 DP 1204803	Transmission linecorridor	• Provide for infrastructure and related uses • Prevent development that is not compatible with or that may detract from the provision of infrastructure • Maintain or improve the water quality of receiving water catchments.
IN1 – General industrial	Lot 1 DP 108089	Transmission line corridor	• Provide a wide range of industrial and warehouse land uses • Encourage employment opportunities • Minimise any adverse effect of industry on other land uses • Support and protect industrial land for industrial uses • Maintain or improve the water quality of receiving water catchments.

15.3.3 Agricultural resources and soil characteristics

A review of the Land and Soil Capability Mapping of NSW was undertaken to understand the likely capability of the Site to sustain agricultural land uses.

The Site is mapped as comprising Class 4, Class 5, and Class 8 land and soil capability whereby:

- Class 4 denotes moderate to severe soil limitations
- Class 5 denotes severe limitations for high impact land management uses such as cropping
- Class 8 denotes extreme soil limitations.

As such, it is considered that the likely capability of the Site to sustain agricultural land uses at present would be moderate to very low.

As noted above the current use of the Site is for occasional grazing which align with the land and soil capability mapping classes for the land. The Site has limited agricultural value and this land use is widely available across the region.

A review of soil mapping and subsequent soil testing was undertaken to determine the soil characteristics and consider the potential for erosion to occur. In terms of landuse impact, soil erosion and sedimentation impacts have the potential to affect the production value and ongoing viability of agricultural lands.

Soils within the Project Area have been mapped by King (1993) as belonging to the Cullen Bullen (cb), Lithgow (li), Pipers Flat (pf) and Disturbed (xx) soil landscapes. Soils within the Project Area are discussed in detail in **Chapter 12 Geology, soils, groundwater, and contamination**. The erodibility of these soil types are defined by King (1993) as follows:

- Cullen Bullen (cb) - Slow to moderate
- Lithgow (li) – Slow to high
- Pipers flat (pf) - High

- Disturbed (xx) - Erosion varies greatly according to site characteristics. In the Project area, locations mapped as Disturbed (xx) are generally topsoiled and stabilised by a good ground cover (such as grasses). In this instance disturbed soils have few erosion problems.

Soil testing completed at the Site and within the vegetated area to the east of Brays Lane through which the proposed transmission line would be located (discussed in detail in **Chapter 12 Geology, soils contamination and groundwater**) have confirmed that the soils are not highly erodible.

15.3.4 Flood prone land

According to the Lithgow LEP flood mapping, the Project is not located on any land designated as flood prone land by Lithgow City Council. **Appendix G Water Cycle Management Study** provides an assessment of the flood risk associated with the Project. The results of this assessment indicated that the construction and operation of the Project is not expected to increase flood risks.

Therefore, it is considered that with regard to flood prone land, impacts to land use are not expected as a result of the Project. Flood prone land has not been considered further as part of this assessment.

15.4 Potential impacts

15.4.1 Construction

The Project would result in varying levels of disturbance during the construction phase. Land use conflicts are discussed in detailed in **Appendix J Land Use Conflict Risk Assessment**.
Land uses and land use zonings

RU1- Primary production

During construction, agricultural activities would cease in areas within the Site required for access and construction activities. Fencing around the construction areas at the Site would allow grazing to occur on land not required for construction. Land use conflicts during construction to surrounding grazing activities are expected to be minor, resulting a mixture of permanent (e.g. where the BESS is proposed) and temporary (e.g. where the construction laydown area is proposed) loss of grazing land. Given the low number of animals grazing the land (estimated at one horse), this loss of grazing land is unlikely to result in land use conflicts.

Surrounding agricultural operations on adjacent lands would also not be significantly affected during construction. No access across other agricultural lands are required and no works are proposed so direct impacts are unlikely. Indirect impacts resulting from construction noise and traffic could occur but these are unlikely to be significant given the marginal nature of the grazing land around the Site. Mitigation and management measures (refer to **Section 15.5** below) would help ensure impacts to nearby agricultural activities are managed appropriately.

At the Wallerawang Transgrid 330 kV substation, the Project would be consistent with the existing land use. Works would be confined to the existing substation boundaries and would therefore not require any property acquisition or land use changes. As such, impacts on land use associated with the substation upgrades are not anticipated.

SP2 – Rail infrastructure facility and IN1 – General industrial

After crossing Pipers Flat Creek, the transmission line would travel south east, running along the easement of the rail corridor (including its crossing of Main Street) before connecting to the Wallerawang Transgrid 330 kV substation. The railway easement intersects both SP2 – Rail infrastructure and IN1 – General Industrial land use zones. The railway infrastructure is a country freight line, and trains would be infrequent.

Where required, track possessions would be utilised for the underboring activities required to install the transmission line underneath the railway. All works undertaken in the rail corridor would be subject to any access conditions set forth by Transport for NSW.

There are a number of existing utilities that run along the same easement. Indeed, it is typically preferable to have different linear infrastructure following similar corridors to ensure that other land is not sterilised or impacted by various easement constraints. In addition, any impacts on areas through which the proposed transmission line would be installed would be temporary during construction and the land would be returned to its original condition (as far as practicable) following construction.

On this basis impacts on land use associated with installing the transmission line within the railway easement would be minimal.

Lease agreements

Depending on landowner requirements at construction, it is anticipated that agreements for the temporary use of the land for construction would be required. This could be in the form of a lease/licence or Deed of Agreement. The relevant landowners would be consulted with throughout the project planning process.

Utilities

Potential impacts to utilities during construction include planned disruption and restoration, relocation of utilities and the potential for utilities to be damaged during excavation works. These events could result in service interruption to residences and businesses and associated economic impacts and, in the event a utility is damaged, risks to public and worker safety. Where utility connections are required, these would be within the Project Area, mainly within the road reserve of Brays Lane. All utility connections would be undertaken in accordance with any required approvals and licences, including those required under the *Roads Act 1993*.

Traffic disruptions

Construction works would be managed to minimise impacts to vehicular, public and active transport networks. This is discussed further in **Chapter 14 Traffic and access**. Considering the works within the road reserve would be temporary and providing the traffic mitigation measures outlined in the Construction Traffic Management Plan for the Project are implemented, impacts on property and land use from construction traffic are expected to be temporary and minor.

Agricultural resources and production

Construction activities would remove existing ground cover in certain locations and expose and disturb soils, potentially decreasing their stability and increasing their susceptibility to erosion, thus limiting the potential use of land for agricultural purposes. The susceptibility of soils to erosive forces is dependent on their properties, namely texture, structure and dispersibility.

There is a low to moderate erosivity risk associated with the soils that occur within the Project Area. Despite the general region and its soil types being prone to high levels of erosivity, local conditions demonstrated by the soil testing and slope within the Project Area demonstrate a reduced level of erosion risk.

Other construction activities involving direct ground disturbance would primarily be limited to:

- Establishment of a temporary construction-site compound including temporary site offices, parking and laydown areas and worker facilities
- Ground compaction and earthworks for the construction of the hardstand area required for the BESS and associated operational infrastructure including the transformers / substation, noise walls, internal roads, boundary fencing, new buildings, water tanks and parking area
- Construction of stormwater controls and rearrangement of existing dams
- Installation of the underground transmission line.

Soil compaction would occur where hardstand areas and internal access roads are created, reducing soil permeability. This would increase run off and the potential for concentrated flows, which may contribute to erosion. However due to the relatively small area of land that would be subject to soil compaction, and with limited topographic relief across the Site, runoff containing sediment is considered to be readily manageable and unlikely to cause impacts to waterways or nearby agricultural land. In addition, a number of stormwater controls would be implemented as part of the Project to mitigate this risk (refer to **Chapter 12 Geology, soils groundwater and contamination** and **Chapter 11 Surface water, hydrology and water use**).

Priority weeds are plants classified under the *Biosecurity Act 2015* as presenting a biosecurity risk to the State or a particular region. It is likely that a number of priority weeds either present or may have the potential to be encountered during construction of the Project.

The increase in construction vehicle movements associated with the Project would have the potential to facilitate the spread of weeds which can impact land productivity. Suitable management measures have been identified for implementation during construction to prevent the potential spread of weeds further afield (in areas where more intensive agriculture practices may occur). By implementing these measures, the overall weed impact associated with construction is expected to be minimal.

The construction of the Project would result in the loss of a potential greenfield site. However, the Site represents only small parcel of land in the regional context of the Project location. In addition, the land itself is isolated between Brays Lane and other existing rural -residential land uses. The Site is therefore not considered to be a viable site for intensive agricultural land purposes under existing conditions.

The land is currently used as marginal grazing land for a limited number of animals. The loss of up to 7 ha of this land to the BESS is not likely to significantly impact the agricultural resource of the local area given the numerous alternative grazing lands available in the local area. The remaining part of the Site, approximately 9.5 ha, would be returned to its current land use and would likely be used for grazing.

The expected impact on agricultural land uses during construction is considered to be negligible given the nature of the Project and the existing mixed-use nature of the surrounding landscape.

Subdivision

As discussed in **Chapter 4 Project description**, the Project would involve the subdivision of Lot 4 DP 751651 to delineate the BESS facility from the remaining land, including the existing residential land use. Following subdivision of the Lot, the area occupied by the operational BESS would be about 7 hectares (ha) in size (and would constitute the new Lot 5). The remaining 9.5 ha would be returned to the existing property owner (Lot 4). The proposed subdivision is shown on **Figure 4-4**.

Historically the local area characteristically had various square and rectangular lots that would form around creeks, railways and roads. A number of lots that were previously large parcels of land have been subdivided to accommodate new uses, particularly around the Wallerawang Power Station. **Appendix F Statement of Heritage Impact** shows the historical lot boundaries close to and including the Site.

Since the land was subdivided in the 1800s various subdivisions have occurred to a number of the neighbouring lots, many of which have been to separate land from a rural / residential use from an infrastructure (e.g. roads, railway, water etc.) or industrial use (e.g. power stations, substations etc.).

The proposed subdivision of Lot 4 would be for a similar purpose to separate the proposed BESS facility from the remaining lands within the lot which would continue to be used for rural residential uses. The boundaries of the subdivision have been designed to allow the part of the lot outside the BESS facility to remain as a contiguous unit that provides access between the residential property in the south eastern corner and the rest of the grazing land (including access to the onsite dams). As such the subdivision would not result in severance issues and would not affect access from the existing property and Brays Lane. The grazing activity that currently occurs at the lot would be able to continue following construction of the Project and subdivision.

Land Use Conflict Risk Assessment

A LUCRA has been prepared for the Project and is provided in **Appendix J**. The LUCRA identified and ranked a number of potential land use risks associated with the construction of the Project. The key land use risks identified for the construction of the Project were:

- Generation of dust affecting human health and amenity
- Loss of the scientific, historic and aesthetic Aboriginal cultural heritage value associated with the stone quarry site (GWB-STQ1-21)
- Exceedance of noise management levels during construction, affecting human amenity
- Spread of high-priority weeds into neighbouring properties

- Contamination, erosion or sedimentation of watercourses resulting in a degradation of watercourse health and quality, in-turn affecting the health of neighbouring livestock or licensed users using nearby watercourses as a water source
- Increased heavy vehicle movements resulting in road safety issues for people, and other vehicles
- Degradation of local access roads through consistent heavy vehicle movements, resulting in road conditions that may cause damage to other vehicles or compromise road safety.

Mitigation measures have been identified for the impacts related to each of these risks. These are described in **Appendix J Land Use Risk Conflict Assessment** as well as the following chapters of the EIS:

- **Chapter 18 Other matters – Air quality**
- **Chapter 9 Aboriginal heritage**
- **Chapter 13 Noise and vibration**
- **Chapter 8 Biodiversity**
- **Chapter 11 Surface water, flooding and water use**
- **Chapter 12 Geology, soils, groundwater and contamination**
- **Chapter 14 Traffic and access**.

Additional mitigation measures not described in these chapters have been presented in **Section 15.5** below. Implementation of these mitigation measures would result in residual risks being acceptable.

15.4.2 Operation

Land uses and land use zoning

As discussed in **Chapter 5 Strategic and statutory context** the construction and operation of a BESS for electricity generating works is permissible with consent in an area zoned RU1- Primary Production. The impact on land use would be minor due to the relatively small footprint of the Site. The land use objectives of RU1 Primary production, as described in the Lithgow LEP, are outlined below alongside a discission as to whether the Project supports or conflicts with these objectives.

Table 15-3 Land use zoning objectives

RU1 zone objectives	Discussion
Encourage sustainable primary industry production by maintaining and enhancing the natural resource base	The Project would not conflict with this objective. The land has moderate to extreme soil limitations with regards to its value as agricultural land. It is not located on an area that is subject to a mining lease and is not used for forestry. The existing natural resource base of the LGA would be largely maintained.
Encourage diversity in primary industry enterprises and systems appropriate for the area	The Project would not conflict with this objective. Indeed, indirectly, the Project could help support this objective by helping to secure a reliable source of electricity for future primary industries in the LGA and beyond.
Minimise the fragmentation and alienation of resource lands	The Project would not conflict with this objective as it is not impacting resource lands.
Minimise conflict between land uses within this zone and land uses within adjoining zones	The Project is not directly adjacent to other land use zones and would not cause a conflict between land use zones.

RU1 zone objectives	Discussion
Minimise the environmental and visual impact of development on the rural landscape	The Project would introduce a new industrial element in the landscape which would be visible to neighbouring residents and users of Brays Lane. The Project would also have the potential to result in environment impacts. The potential for these impacts to occur is discussed in detail in **Chapter 8** to **Chapter 18**. **Chapter 20 Environmental management** provides the full suite of management measures that have been developed to minimise the visual and environmental impacts of the Project. With the implementation of these management measures, the Project would meet this objective. The Site is largely screened from the majority of nearby sensitive visual receivers
Provide for recreational and tourist development and activities of an appropriate type and scale that do not detract from the economic resource, environmental or conservation value of the land.	The Project would not conflict with this objective and it does not involve recreational or tourist development.
Maintain or improve the water quality of receiving water catchments.	The Project would not conflict with this objective. The Project is unlikely to contaminate stormwater flows. **Chapter 11 Surface water, hydrology and flooding** assesses the potential impacts of the Project on surrounding water quality. The Project would not contaminate stormwater flows and would meet NorBE requirements. Therefore the Project would support this objective.

The Project consists of the BESS facility and associated plant and buildings and the transmission line.

During operation, the proposed transmission line would be underground and located in an existing infrastructure corridor. As such it is unlikely to adversely impact the existing road, rail and substation land uses.

The BESS facility would be located at the Site and would be surrounded by various rural land uses including some homesteads, grazing land and land containing native vegetation. The BESS facility would sit within a broader landscape that includes these uses as well as various extractive industries, power generation and electricity transmission uses. The operation of the BESS would be unlikely to significantly impact how the surrounding land is currently used. Whilst marginal noise increases would be expected from the Project alongside localised visual impacts, neighbouring lands used for grazing or residential purposes would be able to be used for these purposes once the Project is operational. On this basis the operation of the Project is unlikely to impact the land uses surrounding the Site.

Lease agreement

Depending on the requirements to allow for the ongoing maintenance of the BESS during operation, it is anticipated that a long term agreement to allow for access and maintenance of the dams and surrounding vegetation within the final asset protection zone for the Project would be required. This could be in the form of a lease/licence or Deed of Agreement. The relevant landowners would be consulted with throughout the planning process.

Utilities

During operation no relocation of utilities is proposed. As such no service interruption to residences and businesses are expected. The Project would be a mostly unmanned facility with only about 5 to 6 workers attending intermittently to conduct routine maintenance works. As such, the Project is not expected to burden the utility network during operation

Traffic disruptions

During operation the Project would be a mostly unmanned facility with only about 5 to 6 workers attending intermittently to conduct routine maintenance works. As such, traffic impacts during operation are not expected.

Agricultural resources and production

Whilst marginal noise increases would be expected from the Project alongside localised visual impacts, neighbouring lands used for agricultural or residential purposes would be able to be used for these purposes once the Project is operational.

No earthworks or materials handling is proposed as part of the typical operation of the Project. The Project will consist of a finished hardstand site for the BESS and an underground transmission line between the BESS and the Transgrid Wallerawang 330 kV substation. It is unlikely that the Site or the transmission line will result in erosion related impacts. Stormwater management at the Site is discussed further in **Chapter 11 Surface water, flooding and water use**.

On this basis the operation of the Project is unlikely to impact the agricultural resources surrounding the Site.

Land Use Conflict Risk Assessment

A LUCRA has been prepared for the Project and is provided in **Appendix J**. The LUCRA identified and ranked a number of potential land use risks associated with the operation of the Project. The key land use risks identified for the operation of the Project were:

- Potentially adverse impacts upon the existing visual amenity of surrounding residents and road users
- Operation noise generated by electrical plant associated with the BESS resulting in marginal exceedances at residential receivers
- Contamination, erosion or sedimentation of watercourses resulting in a degradation of watercourse health and quality, in-turn affecting the health of neighbouring livestock or licensed users using nearby watercourses as a water source.

Mitigation measures have been identified for the impacts related to each of these risks. These are described in **Appendix J Land Use Risk Conflict Assessment** as well as the following chapters of the EIS:

- **Chapter 18 Other matters – visual**
- **Chapter 13 Noise and vibration**
- **Chapter 11 Surface water, flooding and water use**
- **Chapter 12 Geology, soils, contamination and groundwater.**

Additional mitigation measures not described in these chapters have been presented in **Section 15.5** below. Implementation of these mitigation measures would result in residual risks being acceptable.

15.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to land use are listed in **Table 8-11**. Where measures are captured under different environmental matters they have not been repeated here.

Table 15-4 Mitigation and management measures – Land use

ID	Mitigation measure	Timing
LU1	Affected landowners/occupants will be provided with advance notification of project construction schedules and changes to access arrangements or any short-term traffic disruptions.	Construction
LU2	Rehabilitation of the Site to its pre-development condition as best practicable following decommissioning. A rehabilitation plan would be discussed with Lithgow City Council and agreed prior to the undertaking of decommissioning works.	Decommissioning
LU3	Where works are to be carried out in close proximity to utilities, consultation will be undertaken with the relevant utility provider to determine safety and network integrity requirements.	Construction

16.0 Hazard and risks

16.1 Secretary's Environmental Assessment Requirements

Table 16-1 sets out the SEARs relevant to hazard and risk and where the requirements have been addressed in this EIS.

Table 16-1 SEARs – Hazard and risk

Relevant SEARs	
Hazards	**Where addressed**
This EIS must include: • an assessment of potential hazards and risks including but not limited to assessment of bushfire risk against the RFS *Planning for Bushfire Protection 2019*, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*; and • a Preliminary Hazard Analysis prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* and *Multi-Level Risk Assessment*.	• The bushfire risk assessment is detailed in **Chapter 17 Bushfire** • The electromagnetic fields have been discussed in **Section 16.4.2** of this chapter • The Preliminary Hazard Analysis is available in **Appendix K Preliminary Hazard Analysis** and summarised in this chapter.

16.2 Methodology

16.2.1 Preliminary Hazard Analysis

Preliminary risk screening

The objective of risk screening as per the Multilevel Risk Assessment (MLRA) guideline document (DoP 2011) is to determine whether a proposed development or facility is considered as potentially hazardous as per the definition provided in the MLRA. Development proposals that are classified as potentially hazardous industry must undergo a rigorous Preliminary Hazard Analysis (PHA) as per the requirements set in the *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* (HIPAP 6) to determine the risk to people, property and the environment.

The risk screening process in the MLRA considers the type and quantity of hazardous materials storage and the distance of the storage area to the nearest site boundary; the expected number of transport movements associated with hazardous material; and other types of hazards, as identified below:

- Hazardous materials are defined within the guidelines as substances that fall within the classification of the Australian Dangerous Goods Code (National Transport Commission 2020), i.e. have a dangerous goods (DG) classification. Detail of the DG classification is typically obtained from the materials' safety data sheet (SDS). The screening threshold in the MLRA methodology presents the quantities, below which it can be assumed that significant risk to adjacent land use is very unlikely. As such, those aspects of a proposed development that are unlikely to present significant risk to adjacent land use can be filtered out from the rest of the PHA.

- Other types of hazards are evaluated following the definitions in the MLRA, and include: material incompatibility, reactivity and instability; hazardous wastes; hazardous activities or process conditions; known past incidents (and near misses) in similar industries; and environmental sensitivity in the local area.

Preliminary hazard analysis

A PHA has been prepared for the Project by using qualitative methods (Level 1 qualitative risk assessment) to assess the adequacy of controls put in place. The aim is to demonstrate that the Project can be developed with the associated risks kept as low as reasonably practicable (ALARP) and to ensure appropriate land use safety planning can be achieved. The PHA has been developed in accordance with HIPAP 6.

The PHA has been prepared to assess potential hazards and risk associated with the Project, including:

- Risk from reactions and fires associated with electrical infrastructure and flammable material, including spontaneous ignition from a battery runaway reaction
- Environmental risk from spills causing land contamination
- Health and safety risk to the community and to staff and contractors from major, high consequence process safety incidents.

The PHA follows a risk management framework shown in **Figure 16-1**, and presented in the list below:

- Establish the context of the PHA, including background, scope, aim and methodology of the PHA and a description of the Project
- Risk screening, classification and prioritisation of potential hazards and risk factors associated with the Project
- Detailed hazard identification and risk analysis and assessment of the Project in the context of this PHA. To define the hazardous incidents potentially associated with the BESS and associated infrastructure, analyse the consequences should an incident occur, evaluate the proposed risk treatment and evaluate the risk against the established risk criteria
- Summarise findings from the analysis and provide recommendations.

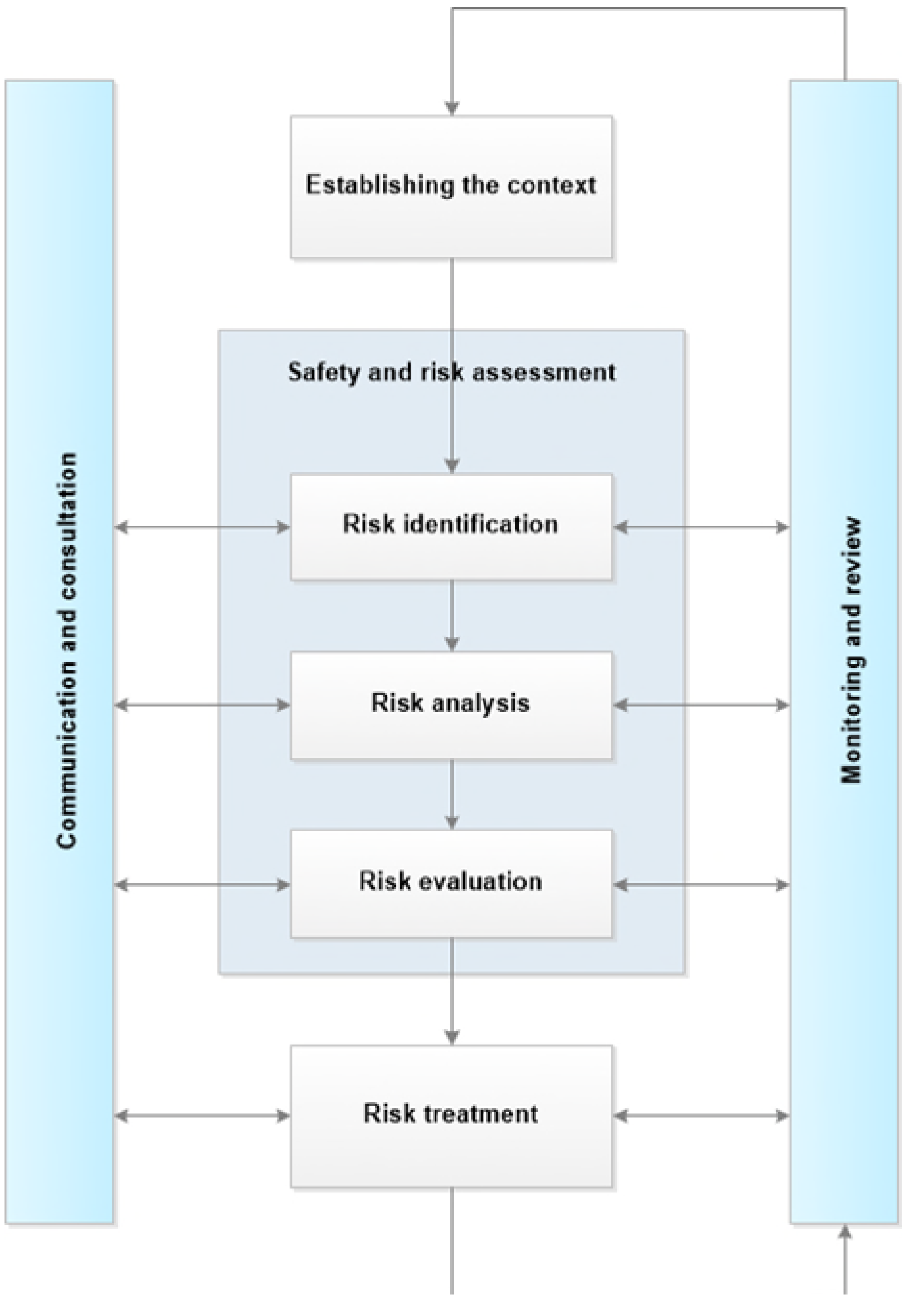


Figure 16-1 Risk management framework (Planager 2021)

Risk criteria

The risk criteria used in the PHA has been created with the *Risk criteria for land use planning* (HIPAP 4). Where the hazard has the potential for effects outside of the Site, the consequence levels in the risk matrix apply to both the workers onsite and the community within range of the effect. The risk matrix is detailed in **Table 16-2**, the risk rating ranges from low where the risk is considered acceptable to very high where the activity or task must not proceed, further details available in **Appendix K Preliminary Hazard Analysis**.

Table 16-2 Risk Matrix (Source: Planager 2021)

Likelihood			Consequence				
		Frequency (per year)	Notable event	Medium	Serious	Major	Catastrophic
			No physical injury/work stress or environmental consequence	Medical treatment/First aid injury or environmental clean up	Serious injury – life threatening injury or serious environmental damages	Permanent disability or major environmental damage	Fatal injury, existential treat, or environmental destruction
Likely	Event can reasonably be expected to occur a few times of the expected lifetime	0.5-1+	Moderate	High	Very high	Very high	Very high
Occasional	Conditions may allow the consequences to occur at the facility during its lifetime	0.5-0.1	Moderate	High	High	Very high	Very high
Seldom	Exceptional circumstances may allow consequences to occur during the facility's lifetime	0.1-0.01	Low	Moderate	High	High	Very high
Unlikely	Reasonable to expect it will not occur in this facility. Has occurred several times in similar industry	1×10^{-4}-0.01	Low	Low	Moderate	High	High
Remote	Has occurred once or twice within industry	1×10^{-4}-1×10^{-6}	Low	Low	Low	Moderate	High
Rare	Rare or unheard of	< 1×10^{-6}	Low	Low	Low	Moderate	Moderate

16.2.2 Electromagnetic fields assessment

An assessment of electromagnetic fields (EMF) has been undertaken to understand the EMFs likely to be generated during operation of the Project and their potential to impact workers and the public.

The EMF predictions for the Project have been compared to the reference levels for human exposure to EMFs as outlined in the *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* from the International Commission on Non-Ionizing Radiation Protection (ICNIRP, 2010).

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), a Federal Government body whose responsibilities include protecting the health and safety of people and the environment, from Extremely Low Frequency EMF, have adopted the ICNIRP 2010 Guidelines for use in Australia. The ARPANSA guidelines have also been considered as part of this assessment.

16.3 Existing environment

The Site is mostly used for horse grazing, with majority of vegetation on the Site consisting of pasture grasses, a small area of mature vegetation, and a series of small man-made dams.

The Geoscience earthquake risk map (2021) indicate a moderate earthquake risk at the Site. The Australian Standard AS 1170 Part 4 would apply ensure structural integrity of the project in accordance with the local earthquake hazard requirements.

The Project Area is not located within a known mapped mine subsidence district.

The Bureau of Meteorology lightning-ground flash density (BoM 2021) indicate 3 to 4 flashes per km^2 per year (20 to 25 thunder day per km^2 per year), which is similar to that in the Sydney region. The Australian Standard AS/NZS 1768 Part 4 would apply for the design and installation of the Project to ensure protection of persons and property from the hazards of lightning in the local area.

Chapter 17 Bushfire details the hazards and risk associated with bushfires. The Project is on bushfire prone land and is considered in a landscape with moderate bushfire threat.

16.4 Impact assessment

16.4.1 Preliminary risk screening

The results for the MLRA screening for the Project were:

- 0 threshold exceedances for storage of hazardous materials
- 0 threshold exceedances for transport of hazardous materials
- 3 threshold exceedances for other types of hazards, detailed in **Table 16-3** below.

Table 16-3 Risk screening threshold exceedances for other matters

Other types of hazards	Results of the screening	Proposal exceeds SEPP33 threshold
Incompatible, reactive or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition	Runaway reaction associated with Li-ion batteries has occurred in other similar industry in the past	Yes: potential exists for runaway reaction in a battery cell which may become a precursor for a battery fire
Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries	Runaway reaction associated with Li-ion batteries has occurred in other similar industry in the past	Yes: past incidents have occurred in BESS leading to a major incident involving battery cells and battery enclosures
The nature of the hazards that the environment will be exposed to, and the likely response of the environment to such a hazard, and	Information available for the Project is such that environmental pollution	Yes: subject to selection of battery manufacturer and detailed design

Other types of hazards	Results of the screening	Proposal exceeds SEPP33 threshold
the reversibility of any hazardous impact	cannot be ruled out at the concept design stage	

In light of an assessment against the other types of hazards, it is evident that there are some risks which are relevant to the Project. On this basis, a PHA has been prepared for the Project and contained in **Appendix K Preliminary Hazard Analysis**.

16.4.2 Preliminary hazard analysis

Hazard identification

A hazard identification exercise was undertaken in accordance with the HIPAP 6 methodology to identify all reasonably foreseeable hazards and associated events that may arise during the operation of the Project. The following factors were considered in order to determine the key potential hazardous incident associated with construction and operation of the Project:

- Project infrastructure, location, workforce, local environment, adjacent land use
- Materials and energies, properties and associated hazards
- Type of equipment and known major incidents that have occurred in similar facilities
- Recent developments in research and standards for BESS (Australia and internationally)
- Construction, commissioning, operation and maintenance activities and potential threats
- External factors (bush fire, lightning, land slide, earthquake, strong winds, dust storm etc).

Risk evaluation

A risk evaluation was conducted as part of the PHA to consider whether the level of risk associated with the identified hazards generally meets acceptable risk criteria.

Where a hazard has the potential for offsite effects, the consequence levels in the risk matrix are applied to both onsite works and any people offsite who are within the range of the effect. A Level 1 qualitative evaluation was undertaken to ensure that offsite risks are eliminated or prevented and where that is not possible, controlled. In addition to meeting the qualitative criteria, risk minimisation and use of best practice must be demonstrated.

Classification of consequences and likelihoods of each of the identified hazardous events was captured as part of the PHA (refer to **Appendix K Preliminary Hazard Analysis**). The outcome of the risk assessment is summarised in **Table 16-4**.

Table 16-4 Identified hazards associated with the Project and the associated risk level

No.	Potential Hazard/ Impact	Risk
1	Impact at Project infrastructure enclosure during construction due to: • Toppling of major lifting equipment • Dropping of equipment during heavy lift • Failure to manage traffic etc. Leading to injury and initiation of hazardous incidents 5 to 7 below	Moderate
2	Hitting above / underground services (e.g. transmission line) leading to injury, fire, environmental damage and propagation to neighbouring plant and equipment	Moderate
3	Injury due to loss of control during construction work including: during work at height, confined space, slip-trip-fall, trench / pit collapse, bites (snakes, spiders, mosquitos), struck by, electrocution, high pressure equipment, hoses, pumps & rotating equipment, cutting, grinding	Moderate
4	Injury or environmental damage or damage to property (including initiation of bushfire) due to failure to manage vehicular access, laydown areas, excavations, water & sediment, containment of fuels, oils, grout, corrosive liquids, pesticides, hot works, security breach etc.	Moderate

No.	Potential Hazard/ Impact	Risk
5	Thermal runaway in the battery, e.g. due to: • Imbalanced charge • Mechanical failure (cell defect, crush, damage) • Overtemperature as a result of building management system (BMS) / heating, ventilation, and air conditioning (HVAC) failure, propagation from nearby fire including bushfire or electrical infrastructure failure. Leading to: • Fire, explosion and generation of toxic gases • Potential for injury and property damage • Potential propagation to surrounding grassland.	Moderate
6	Loss of containment of pollutant material from the BESS (e.g. the cooling water from the HVAC system) or from the transformers or the transmission line's landing gantries due to: • Mechanical failure • Damage • Abnormal heating. Leading to release of pollutant material and potential for hazardous exposure and environmental pollution.	Low
7	External event impacts Project infrastructure including from: • Bush/grass fire • Natural event (lightning strike, wind, flood) • Impact by onsite vehicular traffic • Vandalism, security breach with subsequent initiation of hazardous incidents 1 to 4 above.	Moderate
8	Electrical fault at electrical equipment (inverters, step-up transformers, substation, transmission line and gantries) causing • Fire • Arc flash • Pressure wave • Toxic combustion products • Burns and injury • Exposure to intense light/ noise • Exposure to voltage • Pollution • Injury or potential for propagation to adjacent infrastructure and areas (e.g. surrounding grassland).	Moderate

The identified hazards 1, 5 and 6 are associated with the BESS and form the focus of the PHA. Hazards 2, 3, 4 and 7 are typical of any construction activity and 8 is typical for development of electrical infrastructure associated with inverters, step-up transformers, substations, transmission lines and gantries.

Fire

Of the identified risks, a fire associated with the BESS is deemed the worst-case scenario. Such a fire may be initiated through a thermal runaway or an electrical fault inside the battery, or potentially from an external event such as a nearby fire or impact/crushing of the battery.

A battery fire would generate heat, toxic gas and combustion products. A major fire associated with a BESS technically has the potential to propagate to areas outside of the Project Area and initiate a brush/bushfire. It may affect the nearby land uses including the nearby residents.

Measures will be taken to mitigate the potential for an external event to result in this hazard eventuating. These are detailed in **Chapter 17 Bushfire**.

Pollution

Loss of containment of pollutant and/or irritant from the BESS (cooling water from the batteries) may occur during operation of the Project. The consequences of this event include pollution of the ground and potential run-off into local receiving waters. However, the quantities of potential pollutants are likely to be relatively minor.

The detailed design stage would need to ensure that the risk of a spill and runoff into local surface waters and groundwater systems or ground pollution, or hazardous exposure to personnel and emergency services is eliminated where possible or reduced to low risk if elimination is not possible.

16.4.3 ALARP Principles

It is concluded that the Project can be managed in accordance with the established risk criteria and in accordance with ALARP principles. Most hazards can be prevented by employing a combination of common measures, including following all applicable AS/NZ Standards, separation distances and setbacks, physical protection and control systems measures.

Mitigation measures are available, to reduce the severity of the hazards should they occur, including specific secondary containment, (as built into the battery enclosure), and the BESS operational training. Provided the commitment for safety and environmental protection, and the recommendations in the PHA are adhered to, the risk profile for the BESS is consistently within the *Low* or *Moderate* risk ranking and ALARP can be established.

16.4.4 Exposure to electromagnetic fields (EMF)

Operation of the Project may lead to exposure to EMF at any electrical infrastructure at the BESS and the 330 kV transmission line. While operational, electrical equipment produces an electric and a magnetic field. The electric field is associated with the voltage of the equipment and the magnetic field is associated with the amperage. In combination, these fields cause energy to be transformed along electrical wires. Importantly, the electric and magnetic fields associated with electrical equipment, whilst interrelated, are not dependant on each other. As a result, they can exist independently.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is concerned with occupational, residential and general public exposure to both electric and magnetic fields. The recommendations in published ARPANSA Standards are based on published scientific literature and international guidance. ARPANSA are responsible for developing the standards specifying the limits of human exposure to EMFs in Australia.

ARPANSA 2002 states that there is no established scientific evidence that exposure to EMF causes adverse health effects. Notwithstanding, EMF has been considered as a potential event that may be associated with the operation of the Project.

Typical values of magnetic fields measured near powerlines and substations provided in **Table 16-5**, have been taken from the EMFs.info webpage (https://www.emfs.info/) which is owned and maintained by National Grid, the electricity transmission company in England and Wales. This webpage functions as the EMFs information site for the whole of the UK electricity industry.

Table 16-5 Typical values of magnetic fields near powerlines and substations (Source: https://www.emfs.info/)

Source	Location of measure	Range of measurement milligauss (mG)
Substation	At substation fence	1 – 8
Transmission line (HV)	Directly underneath	10 – 200
Transmission line (HV)	At edge of easement	2 – 50
400 kV underground cable (stronger than proposed transmission line of 330 kV)	1 m above ground level	24
	20 m from source	1
BESS	Outside battery enclosure	1 – 8

The limits in the ARPANSA Standard are closely aligned with the ICNIRP guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), which are endorsed by the World Health Organization (WHO). The 2002 ARPANSA were updated in 2016 and have adopted the international guideline published by ICNIRP in 2010. The reference levels set out in the guideline are derived from the levels at which interactions with the central nervous system are established. The reference levels established by the ICNIRP and adopted by ARPANSA are provided in **Table 16-6**. For comparison, ten milligauss (mG) equal one microTesla (µT).

Table 16-6 ARPANSA limits – electric and magnetic fields, (2002, updated 2016)

Field type	Public limits		Occupational limits	
	Magnetic Field (µT rms)	Electric Field (volts per meter rms)	Magnetic Field (µT rms)	Electric Field (volts per meter rms)
Reference Levels for Time Varying Fields at 50 Hz (AC)	100	5,000	500	10,000
Guidance Levels for Static Fields (DC)	56,600	14,100	283,000	28,300

The magnitude of the EMF at a location is inversely proportional to the distance from the current carrying elements. As such, increasing the distance between the conductor and the receiver is a valid approach to managing EMF exposure.

The closest public receiver to the Site is the property at 173 Brays Lane (R2). The residential building on the property is approximately 60 m from the Site boundary and is likely to be around 90 m from the nearest source of electromagnetic fields (allowing for Asset Protection Zones and other infrastructure such as internal roads and noise walls). The closest public receiver from the proposed transmission line is the St John the Evangelist Church which is located around 30 m from the rail corridor.

A number of operational and maintenance buildings are also proposed at the Site. The precise location of these buildings would be confirmed at detailed design, however these buildings would not be permanently occupied and would only be used on an intermittent basis.

Large static magnetic fields such as those presented in **Table 16-6**, are associated with large magnets, typically found in medical equipment (such as MRI or NMR equipment) and are in excess of the range of measurements provided in **Table 16-5**. As such, static magnetic fields associated with the Project would not be close to limit specified by the ARPANSA guidelines.

Given the nominated separation distances between the BESS and the transmission line from sensitive receivers, installation of the transmission line underground, and the low levels of EMFs expected to be produced by the Project (refer to **Table 16-5**), the Project is not likely to have an impact with regards to EMF exposure to workers or the public. It is considered unlikely that the EMF generated by the Project would exceed the ICNIRP and ARPANSA occupational and public exposure reference levels. Consequently, the risk of EMF exposure is likely able to be managed in line with ALARP principles.

The detailed design for the Project would consider the ARPANSA Standard (2016) and ICNIRP guideline (2010) to ensure that EMFs from the Project are acceptable to onsite and offsite receivers.

16.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address hazards and risks are listed in **Table 16-7**.

While large-scale BESS' such as the Project are relatively new in Australia, there are numerous Australian Codes and Standards and protocols that would apply. These Australian Codes and Standards would be considered in the detailed design for the Project. A likely list of those that would be considered is provided in **Appendix K Preliminary Hazard Analysis**.

Table 16-7 Mitigation and management measures

ID	Mitigation measure	Timing
HR1	Hazards and risk would be minimised in line with the following measures (including measures HR2 to HR25) unless a subsequent hazard and risk assessment agreed with DPE confirms that these measures are not required: • The separation distance between infrastructure within the Site is to be determined in accordance with Codes and Standards and manufacturer's recommendations so that the preferred strategy of allowing a fire in one battery enclosure, inverter or transformer to burn without the risk of propagating to other infrastructure can be maintained without the need for external firefighting • The separation distance within the Site is to be determined in accordance with Codes and Standards and manufacturer's recommendations to allow safe escape from the Project in case of a fire • Applicable Australian Standards requirements will be adhered to in the design and tested the BESS. Where relevant, the design, operation and maintenance of BESS would also adhere to applicable International Standards for major BESS developments • Procurement of a battery system that is certified to an internationally recognised method for evaluating thermal runaway fire propagation in the Site, proving that a credible fire within a battery rack or enclosure would not propagate to other battery enclosures • Detailed firefighting response and need for fire water containment should be assessed and reported (for example in the format of a Fire Safety Study) following development approval, for review by the DPE, FRNSW and the RFS • Measures to prevent a leak from occurring at the Site, and/or containing a spill of pollutant from the BESS, should be addressed in the detailed design phase for the Project • The specific risk associated with the location of the residents close to the Project must be integrated into the fire safety of this site, including evacuation plan in case of a major incident associated with the Project. Neoen's internal rule, based on other installations, is to provide a typical exclusion zone of 25 metre radius during a fire and to evacuate to a distance as advised by the manufacturer chosen to deliver the Project– this should be integrated into emergency response plan and communicated with emergency services.	Detailed design, construction, operation
HR2	Equipment would be procured from reliable and internationally recognised supplier with proven track-record	Construction
HR3	Equipment would be installed by Contractors following Neoen's internal requirements for Contractor management, Permit to Work, control of modifications and other established systems	Construction
HR4	All installation and maintenance would be performed by trained persons using Safe Work Method Statements	Construction, operation
HR5	The BESS would follow rigorous Management of Change process throughout its life. This would include management of protective systems including trips and alarms within the Battery Management System	Operation
HR6	Induction of all personnel would occur prior to works commencing on Site	Construction, operation

ID	Mitigation measure	Timing
HR7	Electrical safety best-practice would be in place during construction and installation as well as during commissioning and operation of the electrical equipment forming part of this Project	Construction, operation
HR8	Permit to Work, including hot work permits would be in place during construction and installation as well as during commissioning and operation of the equipment forming part of this Project	Construction, operation
HR9	Preventative maintenance practices would be put in place, including maintenance schedules and calibration of equipment, instruments and sensors, APZ, vegetation control within the BESS, thermography and other Non-Destructive Testing	Construction and operation
HR10	Impact barriers would be installed to prevent damage of infrastructure and equipment from vehicles and heavy machinery	Construction
HR11	Where required warning signs would be installed as per Code and Standards requirements, including Dangerous Goods signage and High/Medium voltage warnings (including arc flash)	Construction, operation
HR12	Earthing of electrical equipment would be established	Construction, operation
HR13	Need for lightning protection would be determined in accordance with Neoen requirements and Australian Codes at the detailed design stage	Design, construction
HR14	The BESS would be housed within a secure fenced area. Onsite security protocols would be developed. Temporary fences would be installed during construction where appropriate.	Construction, operation
HR15	Battery Management System would be installed, including voltage control, charge/discharge current control and temperature monitoring to battery manufacturer's specifications. Automatic safety shut-down function would be initiated in case of safe limits exceeded	Construction, operation
HR16	Secondary detection would be installed in the enclosure, to manufacturer’s recommendations (e.g. smoke/heat) so that, if there is a fire, smoke or excessive temperature the information would be transferred to the BESS control room	Construction, operation
HR17	Alarms would be available to provide hazard warning on operations upset conditions, and fault conditions would be transmitted to permanently staffed control room located remotely. The offsite control room would be permanently staffed and operators would be able to manually shut down and isolate a battery enclosure/group of battery enclosures	Construction, operation
HR18	The batteries would be housed within dedicated enclosures. Non-essential emergency response personnel entry during a hazardous event such as a run-away would be prevented	Construction, operation
HR19	BESS and transformer enclosure venting would be achieved to reduce concentrations inside the enclosures as per requirements in Codes and Standards	Construction, operation
HR20	Escape from the BESS and substation would be assured in accordance with any relevant Code requirements	Construction, operation
HR21	Explosion venting and venting of toxic or flammable gases, would be achieved as per Codes and Standards and in accordance with manufacturer’s instructions. This includes both BESS enclosures and transformers	Construction, operation

ID	Mitigation measure	Timing
HR22HR22	The need for fire suppressant inside the battery enclosures, and any need for fire water at the BESS (e.g. hydrants and hoses), would be determined during detailed design and through consultation with FRNSW and RFS	Detailed design, construction, operation
HR23	The risk of seismic activity, dust storm and severe winds would to be integrated into the design for this BESS, through the application of the relevant Australian Standards	Detailed design
HR24	APZ would be established in accordance with the Bushfire Assessment or as otherwise agreed through consultation with FRNSW and RFS.	Detailed design, construction
HR25	The detailed design for the Project would consider the ARPANSA Standard (2016) and ICNIRP guideline (2010) to demonstrate that EMFs from the Project are acceptable to onsite and offsite receivers.	Detailed design

17.0 Bushfire

17.1 Secretary's Environmental Assessment Requirements

Table 17-1 sets out the SEARs relevant to the bushfire assessment and where the requirements have been addressed in this EIS.

Table 17-1 SEARs – Hazard and risks (Bushfire)

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Hazards	**Where addressed**
This EIS must include: • an assessment of potential hazards and risks including but not limited to assessment of bushfire risk against the RFS *Planning for Bushfire Protection 2019*, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;*	• Potential hazards and risks associated with the Project including assessment of electromagnetic fields or the proposed grid connection infrastructure against the ICNIRP's *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* are addressed in **Chapter 16 Hazards and risk**. • This chapter outlines the bushfire threat assessment undertaken against the RFS *Planning bushfire protection 2019* (PBP). The application of PBP is summarised in **Section 17.2**, an assessment of potential bushfire hazards and risks is provided in **Section 17.4** with the management and mitigation measures detailed in **Section 17.5**.

17.2 Methodology

Planning for Bushfire Protection (2019)

Planning for Bush Fire Protection 2019 (PBP) (NSW Rural Fire Service, 2019) establishes the regulatory framework for development within bushfire prone land and relevant bushfire protection measures. Most development proposals on land identified as bushfire prone require assessment in accordance with PBP however certain exemptions apply to SSD projects. Nevertheless, the SEARs have requested that an assessment of bushfire risk against PBP is completed.

The aim and objectives of PBP are to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.

The document provides detailed bushfire provisions for various types of development focusing on residential and vulnerable uses such as schools, hospitals, aged care etc. The Project is considered 'other development' under the PBP, which includes industrial, commercial and infrastructure development. The PBP does not include specific provisions for 'other development' (as for residential and other sensitive land use), rather requires the development to address the aim and objectives of PBP.

The Bushfire Threat Assessment prepared for the Project and attached in **Appendix L Bushfire Threat Assessment** includes an analysis of the hazard, threat and subsequent bushfire risk to the Project consistent with the PBP and provides recommendations that satisfy the aims and objectives of the PBP. The PBP requires an assessment of hazard and specifies bushfire protection measures for the type of hazard and proposed class of development. There are many different types of measures which can be grouped into six categories listed below:

- Asset Protection Zones (APZ)
- Building construction and design (related to Bushfire Attack Level (BAL))
- Access arrangements

- Water supply and installation of utilities
- Landscaping and vegetation management
- Emergency management arrangements.

Each measure or group of measures is considered important to address particular components of risk; however, in order to address the overall bushfire risk on a site, all six bushfire protection measures must be addressed. The bushfire protection measures and risk assessment have informed the development of mitigation measures for the Project (refer to **Section 17.5**.).

Methodology

A Bushfire Threat Assessment has been completed for the Project to assess potential bushfire impacts. The complete report is attached in **Appendix L Bushfire Threat Assessment** with relevant aspects summarised within this chapter.

The bushfire assessment involved:

- Reviewing the existing environment within and surrounding the Project though GIS analysis and publicly available data including Planning for Bushfire Protection (RFS, 2019), aerial mapping and detailed GIS analysis.
- Analysing the potential hazards, threats and bushfire risks to the Project through a landscape wide assessment of the bushfire risk and review of the Lithgow Bush Fire Risk Management Plan 2020
- Determining the Bushfire Attack Level (BAL) based on vegetation and slope analyses in accordance with PBP
- Recommending bushfire protection measures to address identified risk in accordance with PBP.

To determine the BAL, the following steps were taken in accordance with the methodology in the PBP:

- Determine vegetation formation in all directions around the building to a distance of 140 metres
- Determine the effective slope of the land from the building for a distance of 100 metres
- Determine the relevant Forest Fire Danger Index (FFDI) for the council area in which the development is to be undertaken
- Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall of an asset
- Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables in PBP.

17.3 Existing environment

This section provides an overview of the bushfire prone land mapped within the Project Area and surrounding area. This section also describes the existing environment in relation to parameters which may potentially impact on, or be impacted by bushfire, including terrain, vegetation, and fire weather and history. These parameters have been used to inform the likely bushfire behaviour and threat.

Bushfire prone land

According to the NSW Rural Fire Service 2021 bushfire prone land map data, the Project Area is located on bushfire prone land (BPL). A review of available aerial photography and observations from site-inspections indicate that the grasslands within and surrounding the Site are not currently managed.

According to the NSW Rural Fire Service 2021 bushfire prone land map data, much of the Site is mapped as Category 3 BPL and the proposed transmission line corridor traverses Category 1 BPL. Category 1 BPL surrounds the Site. BPL is considered an area of land that can support a bushfire or is likely to be subject to bushfire attack. The extent of these BPL boundaries relative to the Site can be seen in **Appendix L Bushfire Threat Assessment**.

The grassland surrounding the Site is designated as being bushfire prone and able to carry a bushfire. As such, the unmanaged grassland areas at the Site have been treated within the Bushfire Hazard Assessment as a hazard.

Terrain

Slope and terrain are important factors in determining the direction and rate of bushfire spread, as steeper slopes can significantly increase the rate of spread of fires.

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux. The land within and surrounding the Site experiences an upslope from the western side around to the northeast, with a downward slope from the east to the southwest. The highest gradient is an 8.2 degrees upslope at the north-northeast of the Site.

Vegetation and fuel

Bushfire fuel is the vegetative material in the landscape that burns during a bushfire. Bushfire behaviour is influenced by fuel load, and the availability of the fuel which is mostly determined by the arrangement of the fuel and its moisture content.

The land surrounding the Site is grassland and Southern Tableland Dry Sclerophyll Forest. Further detail on the vegetation within and surrounding the Project Area is provided in **Chapter 8 Biodiversity**.

Fire weather and history

The bushfire season in regional around the Project Area generally runs from October to March, although commencement has been declared as early as August. Days of elevated fire danger are frequent and mostly occur during August to April. Dry electrical storms and north-westerly winds are common during the fire season and the area surrounding the Site has a history of bushfires. Substantial bushfires can and do occur in the area. While not having been subject to direct bushfire attack, the Site and surrounds has a history of high intensity and very large bushfires.

17.3.1 Risk assessment

Bushfire prone land

As described above, the Site is located on BPL as the surrounding grasslands are not managed, which may enable a bushfire. The BPL Map (NSW Rural Fire Service 2021) creates a trigger for the consideration of bushfire matters for new development.

Landscape Scale Bushfire Assessment

The Blackash Landscape Scale Assessment Tool (LSAT) considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape. The Landscape Scale Bushfire Assessment risk assessment for the Project is detailed in **Table 17-2**. The LSAT outcome rates the Project's bushfire risk as a moderate threat, where it is subject to extreme landscape scale bushfire risk.

Table 17-2 Landscape scale bushfire risk assessment for the Project (Source: Blackash 2021)

Parameter	Landscape scale threat rating	Landscape scale threat rating description
Vegetation Location	Extreme	Bushfire can approach from more than one aspect and fires have hours or days to grow and develop before impacting and/or site is surrounded by unmanaged vegetation.
Bushfire behaviour	Extreme	Extreme bushfire behaviour is very likely due to the broader landscape.
Separation	High	Hazard separation between extreme bushfire hazard and buildings of 20-50m.
Landscape vegetation threat	High	The type and extent of vegetation beyond 150 m is likely to result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to site.
Evacuation	High	Evacuation to alternate location that provides life safety refuge is 200m – 10km.
Isolation	High	Pinch points that are likely to restrict access along evacuation routes for short periods (15-30 mins) and carry fire across roads.
Shelter	Moderate	Access is readily available to a place that provides shelter from bushfire. This will often be surrounding developed area.
Access	Moderate	Access to a public road network with multiple access / egress routes

17.4 Impact assessment

17.4.1 Construction

Onsite ignitions

Construction activities pose risks for on-site ignitions which may result in a fire escaping to the surrounding land. These mainly arise from hot work, fire risk work, vegetation clearing and management and use of vehicles on site.

Hot work (activities involving high temperatures) and fire risk work (activities involving heat or with the potential to generate sparks) from construction activities may cause fire ignition. These works would be managed under a Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger. Certain construction activities, including hot works, are prohibited by law on any day declared to be a Total Fire Ban (TOBAN).

Occupational fire risk

The local region around the Project Area has a history of significant bushfires and the Project Area could be subject to bushfires during construction. Bushfires can be caused by a variety of factors, including sparks from construction equipment and machinery and electrical incidents such as fallen power lines. In addition, the Site its relatively remote and only has Brays Lane (which provides one exit north via the Castlereagh Highway and one exit south via the Great Western Highway) for access in case of a fire. Given the risk these conditions present it is recommended that:

- A Bushfire Emergency Management and Evacuation Plan be developed for the construction phase of the Project which outlines stop work procedures and evacuation routes. The bushfire evacuation procedure within this plan would be completed in accordance with NSW RFS *Guide to Developing a Bushfire Emergency Management and Evacuation Plan* (2014).
- Non-essential works be postponed on days with Fire Danger Rating (FDR) of Severe or greater.

These measures would help to reduce the risk to construction personnel from an out-of-control bushfire impacting the Site or access and egress routes.

Asset Protection Zone

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a building or an asset of value. The purpose of the APZ is to reduce the possibility of radiant heat and ember attack, and consequential losses during a bushfire event. The APZ separates the building from the hazard and is designed to minimise the presence of fuels which could burn in a fire NSW RFS (RFS, 2012).

To help mitigate these risks, the construction area within the Site would be managed as an APZ to reduce the fuel available to burn on the Site.

17.4.2 Operation

Onsite ignitions

Hot work and fire risk work from maintenance activities may cause fire ignition. These works would be managed under an operational Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger. The Hot Work and Fire Risk Work procedure would be included in the OEMP or similar.

Disruption to power supply if the site is impacted by fire

In a worst case scenario, a fire may be initiated through a thermal runaway or an electrical fault inside the battery, or potentially from an external event such as a nearby fire or impact/crushing of the battery. A battery fire would generate heat, toxic gas and combustion products. A major fire associated with a BESS has the potential to propagate to areas outside of the BESS facility and initiate a bushfire. Bushfires can damage or destroy transmission lines, other critical infrastructure or the transmission network which can cause a power outage.

To mitigate these risks measures and controls have been identified and are presented in **Section 17.5** below. These include designing, constructing and operating the Project in line with relevant standards, allowing for and maintaining access for firefighting services and including provisions for firefighting equipment onsite.

APZ maintenance

A BAL assessment was conducted and the results are discussed in **Appendix L Bushfire Threat Assessment**. The BAL assessment was based on the current boundary of the BESS facility and assumed that that all vegetation within the BESS facility would be managed as an APZ. The final BAL would be determined during detailed design. It is expected that structures such as the proposed noise walls would help attenuate / reduce the radiant heat received by the battery enclosures and transformers.

The tolerable risk of radiant heat at the assets would be determined during detailed design. Subsequent mitigation strategies depending on the vulnerability of the proposed assets would then be put into place. The actual location of heat-sensitive components within the BESS facility would not be confirmed until detailed design.

Ongoing vegetation management would be in accordance with the Operational Vegetation Monitoring and Management Procedures which would include routine inspections of the Project. Ongoing management would fall under an inspection and maintenance program, which would include identification, recording, prioritisation and rectification of defects. These vegetation management standards are essential to maintain the safe and effective functioning of the transmission connection, and to minimise the risk of fire ignition from vegetation coming into close proximity to the BESS facility.

APZs would be managed in accordance with RFS *Standards for Asset Protection Zones* to provide minimal ground fuel to support a fully developed bushfire.

Emergency management during operation

For the reasons discussed above the following measures have been recommended to help avoid or manage bushfire risks related to onsite staff:

- A Bushfire Emergency Management and Evacuation Plan be developed for the operational phase of the Project which outlines stop work procedures and evacuation routes. The bushfire evacuation procedure within this plan would be completed in accordance with NSW RFS *Guide to Developing a Bushfire Emergency Management and Evacuation Plan* (2014).

- Non-essential works be postponed on days with Fire Danger Rating (FDR) of Severe or greater.

These measures would help to reduce the risk to construction personnel from an out-of-control bushfire impacting the Site or access and egress routes.

In addition, the design, operation and maintenance of the Project would need to consider and provide vegetation management within the asset protection zone at the BESS facility that should mitigate the impact of uncontrolled bushfire up to an FFDI of 100.

17.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to hazard and risk are listed in **Table 17-3**.

Table 17-3 Mitigation and management measures

ID	Mitigation measure	Timing
BF1	The construction area within the Site would be managed as an Asset Protection Zone (APZ) in broad alignment with Appendix 4 of Planning for Bushfire Protection 2019 and the NSW Rural Fire Service's document 'Standards for asset protection zones'.	Construction
BF2	Vulnerable buildings and/or critical assets would be constructed to appropriate BAL levels in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959).	Construction
BF3	During construction: • A minimum static water supply of 20,000 litres would be available at the Site for firefighting purposes • A 65 millimetres metal Storz outlet with a gate or ball valve shall be provided as an outlet on each of the tanks • The water tank, if located above ground, shall be of a non-combustible material • Underground tanks shall have an access hole of 200 millimetres to allow tankers to refill direct from the tank. A hardened ground surface for truck access would be supplied within 4 metres of the access hole. • All associated above ground fittings to the tank shall be non-combustible. • Firefighting equipment would be maintained at and/or accessible to all active construction site during the declared bushfire danger season, and site personnel trained in its use.	Construction
BF4	Separate Bushfire Emergency Management and Evacuation Plans would be developed for the construction and operational phases of the Project. These plans would outline stop work procedures and evacuation routes. The bushfire evacuation procedure within each plan would be completed in accordance with NSW RFS Guide to Developing a Bushfire Emergency Management and Evacuation Plan (2014).	Construction and operation
BF5	Around the perimeter and within the Site there will be access for Category 1 fire appliances such as appropriate passages and clearances for fire trucks.	Construction
BF6	Non-essential construction or operational works (such as maintenance) be postponed on days with Fire Danger Rating (FDR) of Severe or greater.	Construction and operation

ID	Mitigation measure	Timing
BF7	Relevant works would be managed under a Hot Work and Fire Risk Work procedure. Where necessary essential hot works may be completed on a day declared to be a Total Fire Ban (TOBAN) providing it complies with the Hot Work and Fire Risk Work procedure exemption from the NSW RFS.	Construction and operation
BF8	The BESS facility would be managed as an APZ in broad alignment with Appendix 4 of 'Planning for Bushfire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'.	Operation
BF9	Access for Category 1 fire appliances would be maintained around the perimeter of the BESS facility and to and from the BESS facility.	Operation

18.0 Other matters

A risk assessment was undertaken in **Chapter 7 Environmental scoping** to determine the key matters and prioritise the scope of work for each environmental matter. Consistent with the outcome of the risk assessment summarised in **Table 7-1**, the following matters were considered low priority:

- Social and economic
- Waste management
- Air quality.

Commensurate with the low level of risk, each matter has been briefly discussed in this chapter. For consistency, the discussion of each matter is presented in the format detailed in **Section 7.4**; albeit consolidated.

Initially, impacts relating to landscape and visual had been considered a low priority for the assessment, however as the Project design has developed through the EIS process, the inclusion of noise walls has meant that this matter is now moderate priority. As such, this matter has been afforded an increased level of investigation.

18.1 Secretary's Environmental Assessment Requirements

Table 18-1sets out the SEARs relevant to visual, socio-economic, and waste impacts and where the requirements have been addressed in this EIS.

Table 18-1 SEARs – Other matters

Relevant SEARs	
Visual	**Where addressed**
This EIS must include: • including a detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the project (including transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas, air traffic and road corridors in the public domain and provide details of measures to mitigate and/or manage potential impacts (including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners);	An assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the Project is addressed in **Section 18.2**. Details of measures to mitigate and/or manage potential impacts associated with visual impacts is addressed in **Section 18.6**. An outline of the key principals of a future landscape plan has been provided in **Section 18.2**.
Socio-economic	
This EIS must include: • an assessment of the likely impacts on the local community, any demands on Council infrastructure and a consideration of the construction workforce accommodation	**Section 18.3.3** assess the likely impacts on the local community during construction and operation. **Section 18.3.2** outlines the demands upon Council infrastructure whilst **Section 18.3.3** assess the likely impacts on the Council infrastructure. Accommodation considerations are discussed in **Section 18.3.2**.

Relevant SEARs	
Waste	
This EIS must: • 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	• **Section 18.4.4** identifies the potential waste impacts of the Project. • **Table 18-12** identifies the potential construction waste types and indicative quantities, the NSW EPA Waste Classification and the proposed handling, treatment and/or disposal methods. • Potential waste sources during operation are discussed in **Section 18.4**. Given that waste generation during operation would be minimal, waste sources have not been quantified. • Management and mitigation measures to manage, reuse, recycle and safely dispose of waste are included in **Section 18.6**.

18.2 Visual

18.2.1 Methodology

The visual impact assessment for the Project has involved:

- Identifying the existing visual conditions of the Project Area and surrounds, including sensitive receivers
- Undertaking a desktop study to identify the Project's level of visibility, its ability to be accommodated within the surrounding landscape, and potential for visual impacts during construction and operation
- Two site visits to collect photos of views to the Site in order to confirm the desktop study results and to determine the appropriate viewpoints / receivers from which photomontages would be developed
- Developing photomontages for the most likely affected receivers to illustrate the likely visual changes from viewpoints of nominated receiver locations (shown on **Figure 18-10**, **Figure 18-12** and **Figure 18-14**)
- Assessing potential visual impacts of identified receptor groups during the construction and operation of the Project in accordance with **Table 18-2**
- Identifying management and mitigation measures to minimise the potential impacts to visual amenity.

Table 18-2 Visual impact rating matrix (adapted from Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape institute & I.E.M.A, 2013)

Sensitivity	Magnitude of change			
	High	**Moderate**	**Low**	**Negligible**
High	High	High-moderate	Moderate	Negligible
Moderate	High-moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

The new transmission line component of the Project would be constructed underground using a combination of trenching and underboring technologies. Underboring would be used to install the transmission line from the Site, under Brays Lane, through the vegetated area to the east of Brays Lane, and under Pipers Flat Creek to the existing rail corridor. Trenching would be used to install the transmission line adjacent to the rail corridor. Trenching would occur progressively along the transmission line corridor, and disturbed areas would be backfilled and restored to their former condition as soon as practicable.

During operation, the transmission line would be underground and would not be visible within the surrounding landscape. As such the visible elements of the Project would primarily include those associated with the construction and operation of the BESS, within the Site. Therefore, this visual impact assessment has focused on the Site, as this area would be the source of potential visual impacts. The construction of the transmission line has been assessed with regards to visual impacts but is not considered in detail for the operational impacts of the Project.

18.2.2 Existing environment

Landscape context

The Project is located in the Central Tablelands of NSW, in the suburb of Wallerawang, about 110 kilometres west of Sydney. Wallerawang is located in the Lithgow City Local Government Area (LGA). The Project is located in an area which is characterised by its dominant land uses of agriculture, industry, infrastructure and mining.

The township of Wallerawang is comprised of low to medium density housing, with associated infrastructure including schools, sporting fields, places of worship, community centres and clubs, shops, etc. At the time of the 2016 census, Wallerawang had a population of about 1,980 people (ABS, 2016). The Site is located about 1.4 km north of the centre of the township of Wallerawang (measured from the Wallerawang Post Office).

The more rural characteristics of the area around the Project include open cleared pastures (some used for low density livestock and horse agistment), areas of remanent and regenerated vegetation (including stands of trees), low density rural residential properties, small dams and associated ephemeral drainage lines and creeks. Ridgelines around the Project Area are predominantly forested and include areas of State Forest.

In contrast to these rural, residential and agricultural land uses, a number of industrial, energy producing and extractive industry land uses are present in the landscape surrounding the Project Area including:

- Lidsdale coal loading facility (also referred to as Lidsdale Siding) located about 400 metres south of the Site
- The former Wallerawang Power Station located about 1.5 kilometres south-east of the Site
- Wallerawang Ash Repository located about two kilometres east of the Site
- Pinedale Mine located about 3.3 km north-west of the Site
- Springvale Colliery located about 3.5 kilometres east of the Site
- Mount Piper Power Station located about 4 km north-west of the Site.

Further illustrating the industrial, energy producing and extractive industry land uses surrounding the Project Area, a series of large, aerial conveyer belts and large above ground pipes cross the landscape surrounding the Project. These conveyer belts and pipelines provide connections between (listed from west to east) the Mount Piper Power Station, Pinedale Mine, Lidsdale Siding, and Springvale Colliery.

Since its construction in the late 1950s, the Wallerawang Power Station has dominated the local landscape, being visible from a number of locations across the town and broader area and resulting in the construction of ancillary infrastructure such as transmission lines and substations further adding to the mixed / rural industrial character of the region. The power station closed in 2014 but remains as a dominant feature of the landscape. The exhaust stacks at the Wallerawang Power Station were demolished in November 2021. The remaining two turbine cooling towers at the Wallerawang Power Station can be viewed from the Site and across the surrounding landscape.

Several above-ground transmission lines and large aerial gantries and towers are present in the surrounding landscape including a number that surround and connect to the Transgrid Wallerawang 330 kV substation.

The Main Western Railway Line and the Gwabegar Railway Line run through, and adjacent to the township of Wallerawang. The old Wallerawang Train Station located within the township of Wallerawang formerly serviced the Main Western Railway Line, however this service no longer operates to this station. The Gwabegar Railway Line continues to be operational for freight rail only. This rail network provides an important freight connection to Mudgee and Gwabegar. The Gwabegar Railway Line is located generally east of the township of Wallerawang and comprises the rail corridor in which the new transmission line would be located.

The Castlereagh Highway and Great Western Highway introduce further linear infrastructure through the landscape.

The closest visual receptors to the Site include three residential properties (233 Brays Lane(R1), 173 Brays Lane (R2) and 137 Brays Lane (R3)) and road users of Brays Lane. These visual receptors are discussed in more detail below, under ‘Project visibility’.

Landuse zoning

The Project is subject to the provisions set out in the Lithgow LEP 2014. Under the Lithgow LEP 2014, the Site is zoned as RU1 Primary Production and the transmission line corridor would cross the RU1 Primary Production; IN1 General Industrial; and SP2 Infrastructure landuse zones. Refer to **Chapter 15 Land use** for further detail regarding the landuse zones that occur within the Project Area.

Hydrology and topography

The topography of the Project Area is typical of the local area, encompassing rolling terrain and floodplain, as well as severely disturbed landform elements.

A topographical survey of the Site was undertaken on 17 June 2021. The Site has a mostly gently undulating topography. Two broad ridgelines traverse the Site, with the more prominent of the two occupying the north-western portion of the property. The highest parts of the Site associated with these ridgelines occur in the north western and south western corners and are between about 900 metres and 910 metres Australian Height Datum (m AHD). The lowest part of the Site is along the central and south eastern boundary at about 880 m AHD. To the east of the Site, the proposed transmission line is located within the existing rail corridor which is relatively flat, varying between 878 m to 881 m AHD across the Project Area.

Pipers Flat Creek is the closest waterway to the Site, located about 50 metres to the east. Pipers Flat Creek is a tributary of the Cox River. The Cox River is located about two kilometres north of the Site. Other mapped and named major waterways in the vicinity of the Site are shown on **Figure 11-1** and include:

- Lake Wallace (part of Cox River)
- Adams Creek.

A series of small farm dams are located on the Site. These dams appear to be fed and linked by ephemeral drainage lines that run through the Site, generally entering the Site on its western boundary and exiting to the east, eventually draining to Pipers Flat Creek.

Further detail regarding the hydrology and topography of the Project Area and surrounds can be found in **Chapter 11 Surface water, flooding and water use** and **Chapter 12 Geology, soils, groundwater and contamination**, respectively.

Vegetation

Land within the Site consists predominantly of cleared grazing (pasture) land, comprising of grasses and small pasture shrubs and weeds. A small area of mostly mature native vegetation occurs at the north western portion of the Site, and along the eastern boundary of the Site, adjacent to Brays Lane (for a distance of about 205 m). At the southern boundary of the Site, Brays Lane is tree-lined with mostly native species (for a distance of about 225 m). This existing presence of roadside vegetation provides some screening between road users and the Site. At the western boundary of the Site, the vegetation comprises pasture vegetation, however the neighbouring property has established dense boundary plantings of mature trees that provide some existing screening between the Site and this nearby residence.

The area to the east of the Site through which the transmission line would be installed comprises relatively dense, mature, regenerated native vegetation largely consisting of trees. This area has been subject to historical clearing and ongoing disturbance. A number of informal dirt tracks and walking trails criss-cross through this area and evidence of illegal dumping in this location has been observed during site inspections. A similar area dense, mature woodland is located on an area to the immediate south of the Site.

Where the transmission line would be located within the rail corridor and connect to the Transgrid Wallerawang 330 kV substation, vegetation consists of grasses, which are mainly exotic species.

Heritage

A detailed Statement of Heritage Impact assessment has been prepared for the Project and is summarised in **Chapter 10 Historic heritage**. As summarised in the Historic heritage chapter, a number of items listed on the NSW State Heritage Register and the Lithgow LEP 2014 as being of local non-Aboriginal heritage value can be found within township of Wallerawang. The closest item of heritage significant to the transmission line would be the Church of St John the Evangelist (I112), located on main street, immediately adjacent (south west) of the Project in this location. No items of non-Aboriginal heritage value are located within view of the Site.

A detailed Aboriginal Cultural Heritage Assessment Report has been prepared for the Project. This report identified that all known Aboriginal heritage sites nearby or within the Project Area and subsurface in nature, and no scar trees, art works, grid-stone groves etc. occur. As such, no visual impacts with regards to Aboriginal heritage are expected as a result of the construction or operation of the Project, and has not been considered further in this assessment.

Landscape character zone (LCZ)

A Landscape Character Zone (LCZ) is best described as an area, or component of a landscape area, that is relatively homogeneous in character, sharing broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns and aesthetic attributes. Assessment of landscape character impact deals with the effect of change on the landscape, the aesthetic and the distinctive character of a particular LCZ. The two primary factors used to determine the extent of impact to a particular LCZ include:

- Sensitivity - Susceptibility of the landscape to change
- Magnitude - A combination of the scale, extent and duration of a change.

The sensitivity of a landscape is based upon the extent to which it can accept change of a particular type and scale without adverse impacts upon its character or value. Sensitivity is based on:

- Inherent landscape value, that is; its condition, perceptual qualities and cultural importance
- Likely congruency of the proposed change, that is; the extent to which the Project may ‘fit’ or be ‘absorbed’ into the landscape.

The magnitude of change depends on factors such as the extent of:

- Loss, change or addition of any feature or element
- The duration over which the landscape effects would be felt, e.g. short, medium or long term − change to the landscape itself or one nearby that affects its character
- The quality and extent of the concept design solution.

These individual criteria listed above are combined to achieve a landscape sensitivity and magnitude rating using a qualitative ratings guide and matrix table as shown in **Table 18-2**.

Two LCZs have been identified within the study area:

- LCZ 1: Rural residential: characterised by predominantly large residential lots on gently undulating land. The built form includes detached dwellings and large sheds. There is a mix of native trees and vegetation scattered throughout cleared paddocks. The spatial form is mostly enclosed due to vegetation and topography with some elevated areas having a sense of openness with views to distant forested ranges

- LCZ 2: Industrial landscape: characterised by electricity generation and transmission, open cut coal mining and transport between Springvale Colliery, Mt Piper Power Station Springdale Coal Services, and Lidsdale Siding. The value of this landscape lies with its utility rather than having scenic cultural or recreational landscape values.

The key area of focus considered for this assessment was within a two kilometre offset from the Project, beyond which the combined effects of intervening landform, built form and vegetation substantially limit impacts.

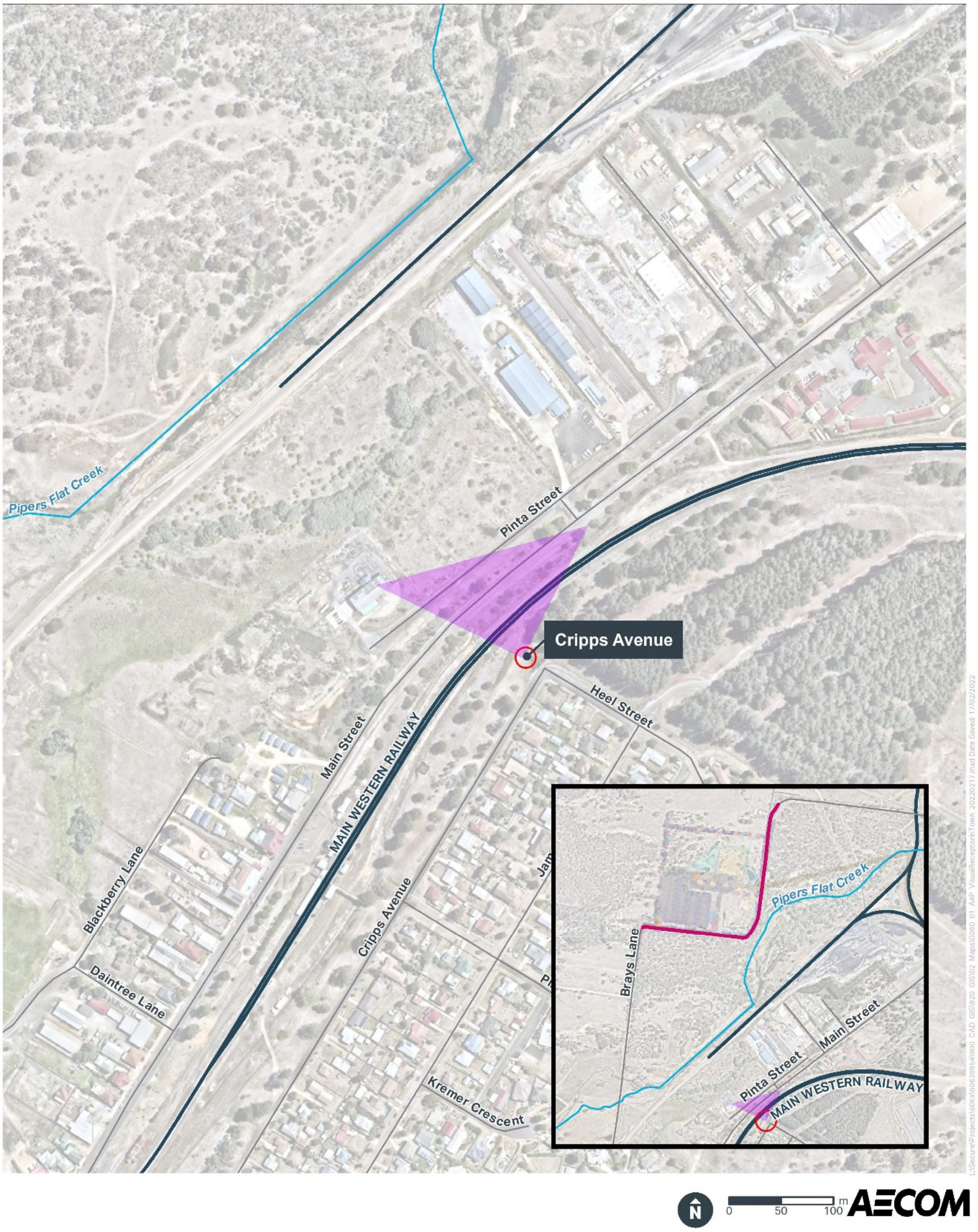
Project visibility and visual receptors

Generally, sensitive visual receptors may include:

- Users participating in outdoor passive recreational activities
- Communities where development results in changes in the landscape setting or valued views enjoyed by the community
- An area of high frequency and range of users
- Residents with views affected by the Project from their homes and living spaces.

The southern boundary of the Site is bordered by a section Brays Lane that runs east to west. This part of Brays Lane runs just to the south of a ridgeline with the wooded slope to the south heading towards Wallerawang and the gentle slope to the north consisting of the Site. The south facing slope turns to face the south east and then the east following the gradient influenced by Pipers Flat Creek. These areas between Pipers Flat Creek and the Site include mature woodland vegetation. Behind the Site to the west are wooded ridgelines and to the north fields with mature stands of trees.

The topography and vegetation of the land surrounding the Site, particularly to the south and south east, effectively screens the Site from the residential areas of Wallerawang, to such an extent that it cannot be seen from the town. This conclusion was confirmed reviewing the photographs taken from Cripps Avenue towards the Site (refer to **Figure 18-1** and **Figure 18-2**) against the modelled height and position of the key built elements of the Project. This review demonstrated that the existing topography, as well as intervening vegetation and structures associated with the township of Wallerawang fully screen the Project from receptors at this location. Similarly, views taken from 233 Brays Lane (R1) (which at 894 m AHD is at the elevation to the Site which is located at between 880 and 910 m AHD) looking towards the township (refer to **Figure 18-11**) demonstrate that the township is not viewable from this location and elevation, as only the elevated coal loader associated with the Lidsdale siding is discernible in this image.



Source: Imagery © Nearmap, 2020.

Visual Receptor
Viewpoint
Photomontage Location
Photomontage Viewpoint

Figure 18-1 Location of visual receptor photo taken from Cripps Avenue in the township of Wallerawang

Figure 18-2 View from Cripps Avenue to the Site

Outside Wallerawang, the Site is visible to a lesser or greater extent from three residential receptors along Brays Lane, namely 233 Brays Lane (R1), 173 Brays Lane (R2) and 137 Brays Lane (R3). The location of each of these receptors is shown on

Figure 18-3. Photographs were taken from inside these premises towards the Site to understand the extent to which the Site may be visible from each of these residential receptors. These are provided below in **Figure 18-4**, **Figure 18-5**, and **Figure 18-6**. As demonstrated in these photographs, 137 Brays Lane (R3) would have near fully obstructed views of the Site, while 173 Brays Lane (R2) and 233 Brays Lane (R1) would have partially obstructed views of the Site.

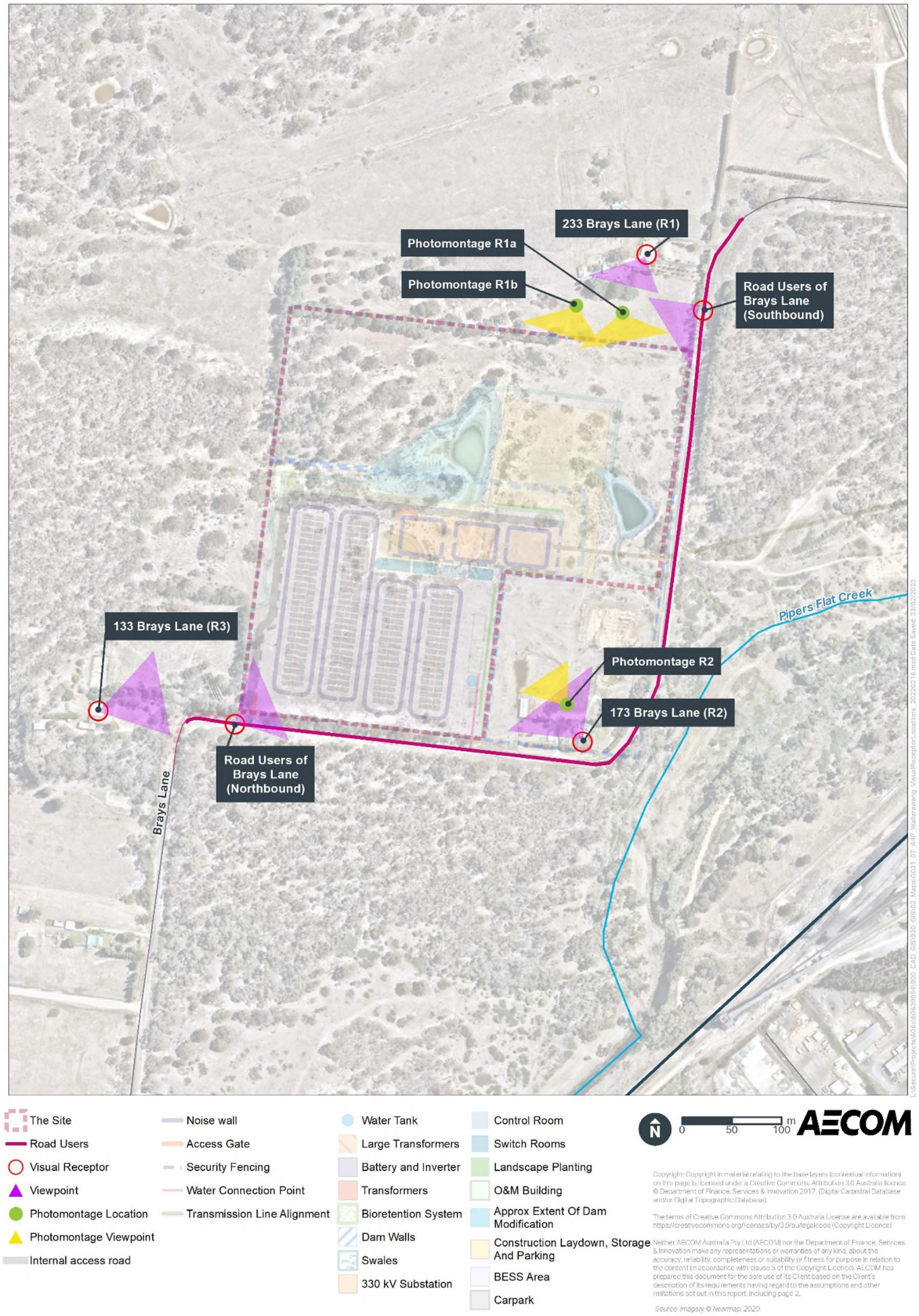


Figure 18-3 Location of visual receptors and photomontages at the Site

Figure 18-4 View from 233 Brays Lane (R1) to the Site

Figure 18-5 View from 173 Brays Lane (R2)

Figure 18-6 View from 137 Brays Lane (R3)

The Site is also visible to people driving vehicles along Brays Lane. Photographs were taken from Brays Lane towards the Site to understand the extent to which the Site may be visible by road users. The location from which these photographs were taken in shown on **Figure 18-1**.

The view presented in **Figure 18-7** is considered to be representative of the view of the Site for southbound travellers on Brays Lane. This view presented in **Figure 18-8** is considered to be representative of the view of the Site for northbound travellers on Brays Lane.

As demonstrated in **Figure 18-7** and **Figure 18-8**, road users of Brays Lane would have partially obstructed views of the Site, due to the presence of existing intervening roadside vegetation.

Figure 18-7 View towards the Site travelling south bound on Brays Lane

Figure 18-8 View towards the Site travelling north bound on Brays Lane

On the basis of the above, the visual receptor types considered in this assessment were:

- Residential receptors: residents are typically interested in the outlook from their properties and have a sense of proprietary interest in their local environment. Residents typically have regular and prolonged viewing opportunities, so are considered likely to have a high level of sensitivity to the proposed change All of the viewpoints assessed take into account any curtilage surrounding each residence which may be considered an extension to the dwelling for domestic or social activities. Questions regarding visual impacts were raised by nearby residents during consultation activities (refer to **Section 6.4.2**)
- Road users: road users on Brays Lane may generally have only a passing interest in the quality of their surroundings as they are travelling through the landscape. This is especially applicable on Brays Lane due to it being a local road of little scenic importance in the context of the region. In addition, the Project would comprise only a small component of the landscape through which a road user on Brays Lane would be travelling. Drivers would be expected to have much of their attention focussed on road conditions and so are considered to have moderate to low sensitivity to change. Local road users may have a moderate level of sensitivity to change, given the potential for a sense of proprietary interest in their local environment.

Panoramic photographs looking towards the Site were taken from locations within 233 Brays Lane (R1) and 173 Brays Lane (R2) to be used to develop photomontage representations of the likely view of the Project from land within these properties. To represent a conservative scenario, photographs selected for the photomontages were taken from location on the property which had a more direct view of the Site, as shown on

Figure 18-3.

The sensitivity of visual receptors and existing views to a proposed change is dependent on:

- Location and context of the receptor location
- Expectations and activity of the receptor
- Type and number of receptors
- Quality of the existing view
- Temporal duration of the view.

As discussed above, four visual receptors have been identified as relevant to this assessment, namely the residential properties at 137 (R3), 173 (R2) and 233 (R1) Brays Lane as well as people in vehicles driving along Brays Lane. The sensitivity of each of these receptors will differ based on the factors outlined above. This is discussed further below:

- 137 Brays Lane (R3). This property is located to the west of the Site with the main property building approximately 125 m from the Site boundary. The current landowner of the Site occupies this property. Large amounts of mature screening vegetation exists along the western boundary of the Site and between the Site boundary and the property such that views from this property to the Site are broken and non-existent in places. This receptor is considered to have a low level of sensitivity given the heavily screened views to the Site and the landowner consent for the Project
- 173 Brays Lane (R2). This property is located on the same lot as the Site in the south eastern corner. The main residential property is located approximately 90 m from the Site boundary. Around the residential property are a number of other agricultural and storage buildings as well as occasional mature trees which provide screening between the residential property and the Site. The current landowner of the Site owns and rents this property. This receptor is considered to have a low level of sensitivity given the landowner consent for the Project
- 233 Brays Lane (R1). This property is located to the north of the Site with the main property building approximately 80 m from the Site boundary and around 265 m from the nearest proposed part of the Project. Some agricultural buildings and mature vegetation exists between the property and the Site, and on the Site boundary which would incumber views particularly to the south west. This property also has views to the Wallerawang Power Station, coal conveyer belt and existing 330 kV transmission lines and support structures. This receptor is considered to have a moderate level of sensitivity given they are slightly elevated above the Site and that views to the Site are partially broken by vegetation
- People in vehicles along Brays Lane. Drivers and passengers in vehicles using Brays Lane will have transient views of the Site. These views would be broken up by vegetation along the Site boundary. Brays Lane is mainly used for low volume, local traffic movements. This receptor group is considered to have a low level of sensitivity given their transient nature.

18.2.3 Impact assessment

Construction

The key construction activities that may be visible from areas surrounding the Project include:

- Civil / earthworks involved in the preparation of the Site, including any stockpiling of excavated materials
- Ground disturbance works required for the installation of the new transmission line
- Hardstand areas required for laydown and storage of construction materials
- Temporary site facilities such as parking, toilets, fencing, hoardings, and amenities
- Temporary site access roads for construction vehicles
- Plant, equipment and vehicles required for the construction of the Project (refer to **Chapter 4 Project description** for further detail).

Construction activities and equipment would be temporarily visible to visual receptors located close to the Site and those who may have line of sight to the construction of the new transmission line within the existing rail corridor.

While earthworks would be undertaken to bench the Site, areas of exposed soil would be paved or established with a hardstand compacted surface (such as gravel) as soon as practical, and wherever possible, surrounding groundcover would be retained. Stockpiling of excavated materials would be temporary in nature. Areas of earthworks and stockpiling would be subject to dust control measures that would aim to minimise airborne dust that could affect local visibility.

As described in **Chapter 4 Project description**, a dedicated construction laydown and storage area would be established at the north east of the BESS facility. Following the completion of construction, this area would be returned to as close as its existing condition as practical. As such, visual impacts associated with construction equipment laydown and storage is expected to be temporary.

Construction at the Site would be visible to the four main visual receptors (137 (R3), 173 (R2), 233 (R1) Brays Lane and Brays lane vehicle users). The construction works for the BESS facility would be limited to the Site and would be relatively short in duration (approximately twelve months). The change in views during construction from the three residential receptors would be dependent on existing screening but could be large given the scale of the works. Views to the Site from vehicle users on Brays Lane would also change but be less obvious than to stationary receptors. Overall, whilst a change would occur, the temporary nature of the construction works, the low number of receptors impacted, and the existing screening around the Site mean that a moderate and/or low level of visual impact is expected.

With regards to the construction of the new transmission line within the existing rail corridor, the visual compatibility of construction activities with the surrounding industrial uses present in the area are likely to be generally acceptable. In addition, construction of the new transmission line in this location would take place progressively along the alignment, and disturbed areas would be reinstated as soon as practicable, limiting the duration of construction works in any one location. As such, the magnitude of this change would be low. As the sensitivity of the view from within the rail corridor would be similarly low, visual impacts associated with the construction of the new transmission line within the existing rail corridor would be considered low.

Operation

Visual impacts

The most visibility prominent elements of the Project during operation are:

- 10 m high noise walls surrounding the battery enclosures and new transformers
- Dam walls
- Two operations and maintenance buildings (about 5 m high, 12 m wide and 25 m long)
- Three switch and one control room (about 7 m high, 4.5 m wide and 23 m long)
- Two 45 kL metal water tanks
- New driveway and access road (about 10 m wide) on the southern boundary of the Site
- Security fencing around the perimeter of the BESS and the substation at the Site.

An assessment of landscape character impacts arising from the Project of the two identified landscape character zones has been undertaken to determine the significance of potential changes to the character of the landscape.

For LCZ 1, the sensitivity of this landscape to change is considered to be Moderate and the magnitude of change as a result of the Project in the context of this LCZ is also Moderate. As such, the overall significance of landscape character effect as a result of the Project is found to be Moderate for LCZ 1. The detailed rationale and results of this assessment are provided in **Table 18-3**.

For LCZ 2, the sensitivity of this landscape to change is considered to be Low and the magnitude of change as a result of the Project in the context of this LCZ is also Low. As such, the overall significance of landscape character effect as a result of the Project is found to be Low for LCZ 2. The detailed rationale and results of this assessment are provided in

Table 18-4.

Table 18-3 Landscape character impact assessment – LCZ 1

Landscape Character Zone 1 – Rural residential
Anticipated change to LCZ: The Project would occur adjacent to the property boundary of the three identified residential receptors (located at R1, R2 and R3). The Project would comprise a contrasting element within visual proximity of these adjacent rural residential properties.
= Sensitivity to change: Moderate
Susceptibility to change: This LCZ predominantly consists of rural agricultural landholdings and townships in an undulating topography interspersed with extractive industry, electrical and transport infrastructure. Throughout the area of Wallerawang and surrounds, it is common for rural residential landscapes to be interspersed with industrial and electricity generating land uses. An example of this is demonstrated by the coal conveyer belt that intersects rural residential land uses surrounding the

Landscape Character Zone 1 – Rural residential
Project Area and various transmission infrastructure. Other extractive industry, transport and power generation uses are also found across this LCZ.
Value of LCZ: The LCZ is very typical of the area surrounding the Site and while it forms part of the core fabric of the landscape, is not considered to be of unique or exceptional value.
= Magnitude of change: Low
Size/scale: The scale of change in the landscape would be low given the size of the LCZ, the similar landscape nearby and across the region, the limited views to the Site and the presence similar infrastructure across the local area. The Project would introduce a large and uncharacteristic form into a rural residential setting, however the magnitude of this change to the LCZ as a whole would be small and limited to three residential receivers and users along Brays Lane. In addition, where practical (with regards to fire safety requirements) the Project is expected to be partially screened with a pallet of native vegetation and the noise walls would be designed such that they are as visually recessive as possible. This may include constructing or painting the noise walls in a colour that blends more discretely with the surrounding vegetation.
Geographical extent: There would be little change to the overall landscape due to the small area of the LCZ affected by the Project, and the existing patch-work occurrence of rural residential, electricity generating and industrial land uses surrounding the Project Area.
Duration/ reversibility: The Project has an initial design life of 20 years with components anticipated to be replaced or upgraded, as required with the potential to extend the life beyond 20 years.
= Significance of landscape character effect: Moderate-low

Table 18-4 Landscape character impact assessment - LCZ 2

Landscape Character Zone 2 – Industrial
Anticipated change to LCZ: The Project would be consistent and complimentary with the utilitarian nature of its surroundings such as Springvale Colliery, Wallerawang Power Station, Springdale Coal Services, and Lidsdale Siding. The Project would introduce a new BESS within the proximity of this LCZ.
= Sensitivity to change: Low
Susceptibility to change: The sensitivity of this LCZ is low due to the existing industrial land uses of coal mining, coal processing and electricity generating works around this location.
Value of LCZ: Given the industrial nature of this LCZ, it has little cultural importance, although it does represent an employment opportunity for the local community.
= Magnitude of change: Low
Size/scale: The Project would result in the addition of new electricity infrastructure within the landscape.
Geographical extent: There would be little change to the overall landscape due to the small area of the LCZ affected by the Project in the context of the LCZ
Duration/ reversibility: The Project has an initial design life of 20 years with components anticipated to be replaced or upgraded, as required with the potential to extend the life beyond 20 years.
= Significance of landscape character effect: Low

Three photomontages were developed to understand the likely views of the Site during operation from 173 Brays Lane (R2) and 233 Brays Lane (R3). These photomontage images were developed using photographs taken from an area on the property boundary that was determined to have largely open views to the Site. These views are not considered to be typical of view from the residences in question, rather they were chosen to represent a worst-case scenario of views from the property. These three photomontages are shown on **Figure 18-10**, **Figure 18-12** and **Figure 18-14**.

Figure 18-9 Existing view from photomontage location at 173 Brays Lane (Photomontage R2)

Figure 18-10 Photomontage from 173 Brays Lane (R2) (Photomontage R2)

Figure 18-11 Existing view from photomontage location at 233 Brays Lane (R1) (Photomontage R1a)

Figure 18-12 Photomontage from 233 Brays Lane (R1) (Photomontage R1a)

Figure 18-13 Existing view from photomontage location at 233 Brays Lane (R1) (Photomontage R1b)

Figure 18-14 Photomontage from 233 Brays Lane (R1) (Photomontage R1b)

During operation, the significance of visual impacts as a result of the Project for the four identified visual receptors is summarised in **Table 18-5**. The likely visibility of the proposed elements of the Project during operation from surrounding areas has been assessed in terms of direction and likely extent of the viewable field. This assessment provides a general visual envelope for each identified visual receptor. The extent of the view directions shown on **Figure 18-9** to **Figure 18-14**are indicative only, do not consider the impacts of intervening vegetation cover that would likely obstruct views and have been provided for context.

Table 18-5 Operational visual impacts to identified receptors

Receptor	Anticipated change to view	Sensitivity to change	Magnitude of change	Significance of visual effect
Residential (233 Brays Lane – R1)	As demonstrated on **Figure 18-12** and **Figure 18-14**, the BESS facility would introduce a new large built form at the Site. The BESS facility would be partially seen from this residential property as they are slightly elevated above the Site, however there is an existing vegetation planting on the southern boundary of this property which effectively screens views to the Site from the residential premises, as demonstrated in **Figure 18-6**. Views from this receptor are around 265 m from the BESS facility and would be significantly intercepted by the existing vegetation at the property and the proposed screening vegetation in front of the visually recessive noise wall. Views from this receptor include other industrial built form elements such as the coal conveyer belts, coal hopper located at the Lidsdale Siding, and transmission lines. The screened views to the Site and the presence of other industrial elements in the viewshed for this property mean that magnitude of change is considered low.	Moderate	Low	Moderate-low
Residential (173 Brays Lane – R2)	As demonstrated on **Figure 18-10**, the Site would be partially seen from the residential property. Views would be partially intercepted by existing structures on this property including a series of existing sheds / storage rooms, and existing vegetation. In addition, screening vegetation in front of the noise walls would be provided where possible. The establishment of screening vegetation at boundary of the BESS area would be subject to bush fire safety limitations that typically require minimum spacings between plantings to reduce the potential for flames to travel across tree canopies. It is therefore likely that this receptor would have broken views of the noise walls from their property. Nevertheless	Low	Moderate	Moderate-low

Receptor	Anticipated change to view	Sensitivity to change	Magnitude of change	Significance of visual effect
	the proximity of the property to the BESS facility means that the magnitude of change is likely to be moderate.			
Residential (137 Brays Lane – R3)	As demonstrated on **Figure 18-4**, this receptor does not currently have a direct view of the Site due to the presence of intervening dense vegetation plantings. As such there would be limited change to the existing view from the receptor as a result of the Project. This receptor may be able to view the changes to the Site from the entrance to their property however it is considered that this portion of their property is used for entry and exit only. Overall given the obstructed views to the Site from the receptor the magnitude of the change is considered low.	Low	Low	Low
Road users	As demonstrated on **Figure 18-7** and **Figure 18-8**, potential receivers driving along Brays Lane would only have occasional views of the Site and the Project. The Project would result in large new structures on the Site which would be visible from vehicle users but only during their time passing along Brays Lane when it is adjacent to the Site. Views would be partially intercepted by tree plantings that would be established adjacent to the proposed transformers, and the existing vegetation that lines Brays Lane. The magnitude of the change is considered low.	Low	Low	Low

Night lighting

A small number of localised light sources from residential dwellings are located in close proximity to the Project, though these are unlikely to be visually prominent. Lights from vehicles travelling along local roads provide temporary and periodic sources of light.

The introduction of a new light source has the potential to impact visual amenity at night-time and can be a source of nuisance to affected receivers. The categories of potential view locations that could be affected by night lighting include residential receptors and road users. Lighting is more likely to be noticeable from exterior areas surrounding residences rather than from inside residential dwellings where at night-time, room lights tend to reflect and mirror internal views in windows, or curtains and blinds tend to be drawn.

The Project would operate as a mostly unattended facility and as such no constant light outputs during the operation of the Project is expected. Night lighting for the Project would be limited to security motion-sensor activated lighting. As such, sources of light during the operation of the Project would be few, and very intermittent. The Project would also introduce noise walls and landscaped screening vegetation making the Site, and any security lighting, less visible to nearby residential receptors.

Night-time lighting associated with the Project is unlikely to have a significant visual impact on road users travelling along the local road. This is because lighting is anticipated to be limited to sensor security lighting and the proposed the duration of visibility would tend to be occasional and temporary.

The potential for visual impacts to identified receivers as a result of night lighting is expected to be negligible. Mitigation measures have been identified to manage this potential impact (refer to **Section 18.6**).

Over shadowing

The Project would involve the installation of 10 metre high noise walls. Where tall structures are constructed nearby existing premises, there is the potential for overshadowing to occur that can affect the visual amenity at the receiver's property.

The noise walls would be located close to the battery enclosures and transformers inside the BESS facility. The main residential property at the closest receptor (173 Brays Lane (R2)) is located approximately 90 m from the Site boundary. Given this distance, overshading impacts are not expected to occur as a result of the Project.

Glint and glare

Glint is defined as a momentary flash of light, while glare is defined as a more continuous source of excessive brightness relative to the ambient lighting (Federal Aviation Administration (FAA), 2018).

The Project would comprise the establishment of a BESS at the Site. Typically, a BESS is not expected to have the same capacity for glint and glare impacts as a project such as a solar farm. An example of what a typical BESS looks like is provided in **Figure 18-15**. This image is of the Neoen BESS located in Hornsdale, South Australia.

Figure 18-15 Example of typical BESS units (source: https://www.britishgas.co.uk/business/blog/tesla-mega-battery-activated-in-south-australia)

Generally, the materials used to construct a BESS are not designed to reflect or capture light and can be compared in reflectivity to the materials used to construct a cladded warehouse.

Parameters used to measure the potential for glint and glare are:

- Solar Absorptance (SA), which is the fraction of the total incident solar radiation that is absorbed by the surface
- Solar Reflectance Index (SRI), which is a measure of the surface's ability to reflect solar heat, with 0 being a standard black surface, and 100 being a standard white surface.

The batteries would be enclosed in a NEMA 3R enclosure. The enclosures are composed of metal, but are coated in a white powder, to reduce the reflectivity of the raw metal. A typical white powder coating would have an SA = 0.34 and SRI = 79. Meaning that while the majority of solar energy is reflected, it is not the level expected from a highly reflective white surface.

The potential for glare from the batteries would be mitigated by the noise walls which would be coated in a dappled, matte grey finish. The darker, matte colour would reduce the glare and reflectivity of the noise walls.

The cladding for the buildings would be the colour “surfmist”, which has an SA = 0.32, and SRI = 82. Meaning that while the majority of solar energy is reflected, it is not the level expected from a highly reflective white surface. The cladding would be typical building materials and finishes that are matte or non-reflective. The Project is not expected to result in any glint or glare related issues.

The closest airports to the Site are Katoomba Airport, located approximately 38 km south east of the Site, and Bathurst Airport, located approximately 38 km west of the Site. Given these distances, airports, and air traffic are not considered a potential visual receptor for the Project.

Considering the above, it is considered highly unlikely that the Project would result in glint and glare impacts that would affect air traffic.

18.2.4 Conclusion

Overall visual impacts as a result of the construction of the Project are expected to be low.

During operation, the Project would introduce a new industrial element to the existing landscape at Brays Lane. In the context of the broader area surrounding the Site, rural residential land uses coexist alongside industrial and electricity generating land uses, and as such the visual impact of the Project is anticipated to be low.

With regards to the four visual receptors assessed in **Table 18-5**, the visual impact for two is moderate-low and two is low. For the visual receptor at 173 Brays Lane (R2), while some intercepting vegetation and existing structures would break up the view, the view to the proposed BESS and surrounding noise walls would only be partially obstructed. To minimise the visual impact to this receiver, the noise walls would be designed to be visually recessive and would be painted or coloured to blend more discreetly into the existing landscape. Screening vegetation plantings would also be provided to further reduce the visual impact to this receptor and other the potentially affected receptors.

A Landscape Plan would be developed for the proposed screening vegetation plantings during detailed design that would consider the fire safety requirements of the Site as a priority. As such the ultimate spacings of trees and selection of species would be in line with fire safety requirements. The Landscape Plan would also be developed in consultation with the nearby residents and other relevant stakeholders, as required.

18.3 Social and economic

18.3.1 Methodology

The following steps have been taken to analyse the social and economic impacts of the Project:

- Identification of relevant legislation, policies and guidelines
- Identifying the Study Area within which the Project may result in potential social impacts
- Identifying the social indicators with the potential for social and economic change resulting from the Project
- Carrying out a desktop review of social indicators and other relevant data in order to create an understanding of the current demographic profile of the community
- Carrying out community and stakeholder engagement to seek feedback on community views and concerns
- Predicting and analysing the extent and nature of potential social impacts (both positive and negative) and evaluating their significance

- Preparation and consideration of appropriate avoidance, minimisation, mitigation and management measures
- Identification of residual and cumulative impacts of the Project.

Both positive and negative social impacts have been qualitatively analysed in this assessment. This assessment has employed a standardised matrix (**Table 18-6**) approach to the assessment of social impacts with consideration the potential **magnitude** of impact (effect on social environment) and the **sensitivity** level of the receiver (the community and economy of the local and regional area). Definitions of magnitude and sensitivity are available in **Appendix M Social Impact Assessment**.

Table 18-6 Social impact significance matrix

		Magnitude level			
		Negligible	Low	Moderate	High
Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Low	Moderate-Low	Moderate
	Moderate	Negligible	Moderate-Low	Moderate	High-Moderate
	High	Negligible	Moderate	High-Moderate	High

The scale of the social impact Study Area for the Project has been selected based on its likely area of social influence and consideration of the broader, more regional-scale impacts. This aims to account for social aspects such as employment and other economic opportunities facilitated by the Project.

Specifically, the social impact Study Area considers the following geographic areas, each defined by the Australian Bureau of Statistics (ABS) as a 'Statistical Area Level 2' (SA2):

- Lithgow Region SA2
- Lithgow SA2.

The geographic extent of the above SA2 areas (Study Area) are is shown in **Figure 18-16**. The Project is located in the Lithgow Region SA2, though to more accurately outline the social environment of the area, the Lithgow SA2 has also been included.

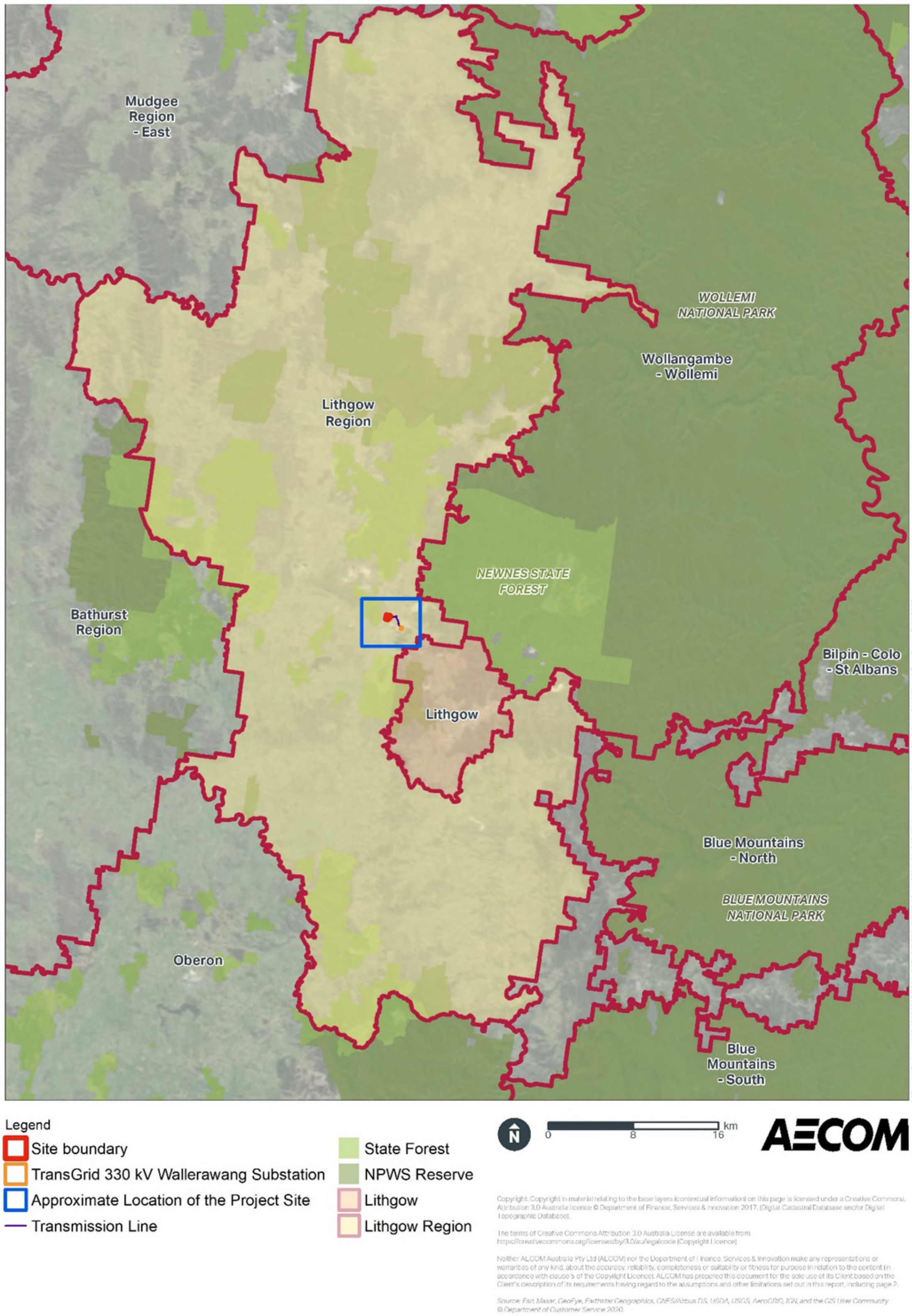


Figure 18-16 Social Impact Study Area

18.3.2 Existing environment

Population and demographic profile

The demographic and employment profile of the social impact Study area is informed by the 2016 Census (ABS, 2021). This forms the social baseline against which potential impacts of the Project are assessed. To provide context, the data from the study area have been compared to the whole of NSW.

The population and demographic profile of the Lithgow Region, Lithgow and NSW are identified in **Table 18-7** below.

Table 18-7 Key demographic characteristics of the social impact Study Area and all of NSW in 2016 (ABS 2021)

Key demographic	Lithgow Region SA2	Lithgow SA2	NSW
Statistics	2016	2016	2016
Median age	45.8	43.1	38
Total Resident Population (no. persons)	8,262	12,818	7,480,228
Population aged <15 (no. persons)	1,173	2,146	1,386,330
%^	14.20%	16.74%	18.53%
Population aged 15+ (no. persons)	7,089	10,672	6,093,914
%^	85.80%	83.26%	81.46%
Population aged 65+ (no. persons)	1,702	2933	1,217,646
%^	20.60%	22.88%	16.27%
Indigenous population (no. persons)	414	793	216,176
%^	5.0%	6.2%	2.9%
Speaks a language other than English at home (no. persons)	1638	305	735,563
%^	4.2%	5.7%	26.5%

Percentages may not add to 100% due to rounding
^percentage of total resident population for each geographical location

Employment

The employment status and median weekly household income is identified in **Table 18-8** below for Lithgow Region, Lithgow and NSW in 2016.

Table 18-8 Labour force characteristics (ABS 2021)

Key demographic	Lithgow Region SA2	Lithgow SA2	NSW
Statistics	2016	2016	2016
Total Labour Force (no. people)	3,504	4,946	3,605,872
Employed full time	1,970	2,660	2,134,521
%^	56.3%	53.8%	59.2%
Employed part time	1,091	1,587	1,071,151
%^	31.2%	32.1%	29.7%
Employed away from work*	214	277	174,654
%^	6.1%	5.6%	4.8%
Unemployed	225	423	225,546
%^	6.1%	8.6%	6.3%
Median weekly household income	$1,123	$919	$1,486

**Employed full time or part time, but away from work at the time of the 2016 Census*
^percentage of total labour force for each geographical location

Approximately 11% of the jobs in Lithgow Region were within the health care and social assistance sector in 2016. Comparable figures for Lithgow and NSW are 12.3% and 12.49% respectively. The largest employers in the Social impact Study Area are in mining, accommodation and food services and public administration and safety industries (refer to **Appendix M Social Impact Assessment** for the data table).

Social infrastructure

Social infrastructure refers to the facilities, structures and services that support the physical, social, cultural or intellectual development or welfare of the community.

Given the rural nature of the surrounding area, social infrastructure in the vicinity of the Site is limited and as such a search radius of two kilometres from Wallerawang town centre has been used when outlining social infrastructure facilities that may be affected in the area (shown on **Figure 18-17**).

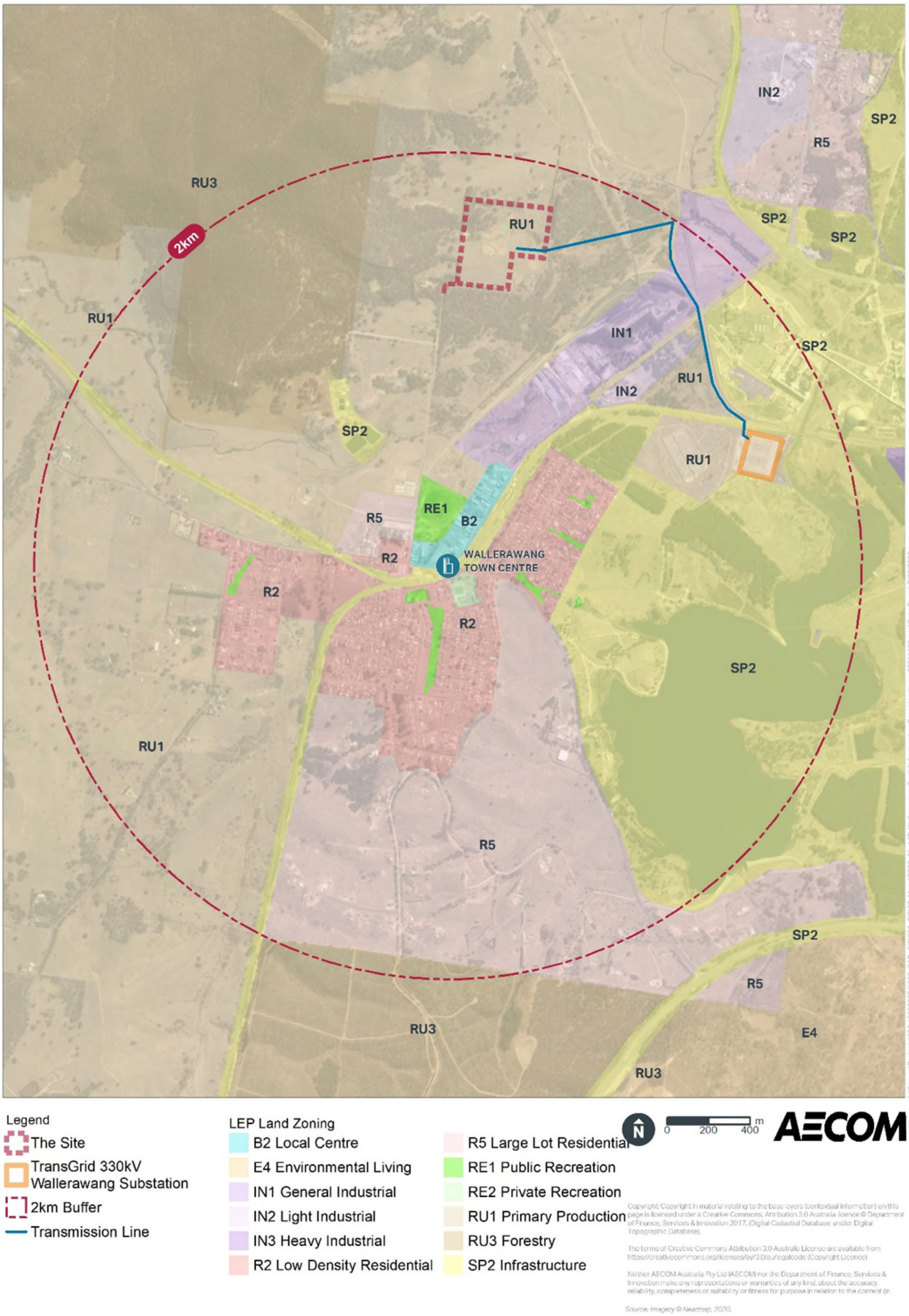


Figure 18-17 Area of relevant social infrastructure in consideration of social impact and LEP land use zones

Social infrastructure in the two kilometre radius of Wallerawang is listed below in **Table 18-9**.

Table 18-9 Social infrastructure in the Study Area

Social infrastructure	Facilities
Educational facilities	• Wallerawang Public School • Pied Piper Preschool
Health, medical and emergency services	• Central West Occupational Health & Rehabilitation Services • Dr S Kamalaharan & Associates
Places of worship	• St John the Evangelist Church • Church of the Sacred Heart
Sporting and recreational facilities	• Wallerawang Oval • Wallerawang Bowling Club
Local Centre	• Bakery • Butcher • Fuel station • Post office • City council • Retail • Restaurant • Hairdresser • Pharmacy • Grocer • Newsagent • Industrial businesses • Emergency Service Hubs
Accommodation	• Black Gold Motel • Royal Hotel • Commercial Hotel Wallerawang • Private short term accommodation (Airbnb)
Public transport	• Bus

The community members that utilise the social infrastructure may experience temporary access issues and traffic delays during the construction phase. This is discussed further in **Section 18.3.3**.

Council infrastructure

The likely demands on council infrastructure from the Project are outlined in **Table 18-10**.

Table 18-10 Demand on council infrastructure

Council infrastructure	Project's demand for council infrastructure
Potable water	A connection to the Lithgow City Council's potable water supply would be established for operational use. Water used during construction would be transported to the Site until a connection to the potable water supply is established.
Roads	Roads would be utilised during construction to transport materials and the workforce to the Site. Vehicle routes from the Castlereagh Highway would be subject to a dilapidation survey prior to construction and (at a minimum) once construction is completed. This would seek to identify where the Project may have affected local roads and if any remedial action is required.
Sewage	The Project would not be connected to an existing sewer network. A Water holding tank would be installed to collect sewer waste at the Site during operation.

Council infrastructure	Project’s demand for council infrastructure
Stormwater	No connection to an external stormwater system is required. Stormwater management measures are in place for run off/discharge into Pipers Flat Creek, discussed in **Chapter 11 Surface water, hydrology and water use**.
Waste	During construction, the Project has the potential to produce waste from a number of waste streams including: excess spoil; green/vegetation waste; packaging materials associated with items delivered to Site; sewage wastes; and general office and domestic wastes. A Construction Waste Management Plan would be implemented during construction and all waste generated during construction would be removed as required. It is not anticipated that construction waste management activities for the Project would pose a significant risk to the environment or human health. During operation, the BESS would be mostly unmanned and as such, waste would be limited to occasional maintenance waste and domestic waste from workers. This waste would be taken offsite by the workers.

Potential impacts on council infrastructure are discussed in **Section 18.3.3**. Overall impacts on council’s infrastructure would be related to water and roads.

Accommodation

Accommodation and hospitality services (food and accommodation services) are expected to receive a short-term influx in demand, creating a positive economic impact.

A range of short-term accommodation options are available within 20 kilometres of the Project.

While it is not expected that the Propjet would provide accommodation for workers during construction, the local area has the accommodation capacity should this be required. It is expected that the temporary accommodation demands of the Project would not place undue strain on accommodation in the area such as to affect the supply for other visitors to the area.

Community consultation

Neoen has carried out various consultation activities to inform the Project. Details of the engagement activities that have been carried out to date, and ongoing and planned consultation activities are in **Chapter 6 Stakeholder and community engagement**.

The key themes relevant to social impacts raised by stakeholders and community members across the consultation period included:

- Job impacts
- Visual impact
- Noise impacts.

The key themes raised are addressed in **Section 18.3.3**. Overall, the community feedback was largely positive to the introduction of the BESS (and associated infrastructure).

18.3.3 Impact assessment

Construction

The potential impacts below in **Table 18-11** summarises the predicted social and economic impacts associated with the Project. The direct and indirect impacts are defined as change to the existing social baseline that are directly resulted to the Project. Stakeholder and community feedback have also been reviewed and considered to provide insight into community perception, values and concerns in relation to social impacts.

Table 18-11 Potential construction impacts

Impact	Impact summary
Amenity impacts	
Traffic and access	Construction of the Project would introduce additional traffic volumes on local roads and may potentially affect travel times causing minor traffic disruptions. Some short-term localised impacts have the potential to occur at the access to the Site off Brays Lane in the form of minor delay to occasional road users. These potential impacts would be temporary and localised, and likely only affect one road user at a time due to the low traffic levels on Brays Lane. The works for the transmission line may require temporary lane closures and subsequent disruptions to traffic flows at Main Street. To manage and minimise the risk, excavations across Main Street would be undertaken in such a way as to minimise traffic and access impacts. Including, maintaining one lane for traffic flow in each direction during the works. In addition, installation for the transmission line would be undertaken progressively along the alignment and disturbed areas would be backfilled and rehabilitated as soon possible, to minimise the duration of any impacts in any one location. Further information is available in **Chapter 14 Traffic and access**. To minimise local parking impacts to the community, parking would be provided onsite. When the onsite carpark reaches capacity, a designated overspill carpark for workers would be provided, they would then be bussed to the Site. Based on the nature of the Project's likely traffic impacts, the magnitude of impact is considered to be low. The sensitivity of the receptors affected by the impact are considered to be low due to the low traffic volumes on local roads. As such the overall significance of impact would be a low negative impact.
Noise and vibration	Exposure to noise and vibration has the potential to create nuisance, intrude on daily activities or the enjoyment of activities, interfere with conversation and memory, disrupt sleep and rest patterns and create or exacerbate health concerns. At the Site, there are four nearby residential receivers that may be impacted by the noise as a result of construction works. The construction of the transmission line may introduce vibration impacts at one sensitive receiver (St John the Evangelist Church) as it is about 30 m from the transmission line corridor. Reasonable and feasible mitigation measures would be implemented during construction to limit construction noise and vibration to nearby sensitive receivers. Further information is available in **Chapter 13 Noise and vibration**. Based on the nature of the noise and vibration impacts, the magnitude of impact is considered to be moderate. The sensitivity of the receptors affected by the impact are considered to be high (being residential properties and a place of worship). As such the overall significance of impact would be a high-moderate negative impact.
Visual	Construction of the Project would result in temporary visual impacts. This may affect nearby residents' enjoyment of their private spaces and potentially lead to a degree of stress or anxiety. The main receptors would be road users who pass the Site and / or transmission line corridor or people who can see the Site from their neighbouring properties. Visual impacts would arise primarily from the presence of construction activity, equipment, workers and plant / machinery. This impact would be largely mitigated through appropriate controls such as hoarding to screen construction activity, progressive rehabilitation of disturbed areas, and construction areas would be maintained in a tidy condition throughout construction. Further information available in **Section 18.2**.

Impact	Impact summary
	Based on the nature of the visual impacts, the magnitude of impact is considered to be low. The sensitivity of the receptors affected by the impact are considered to be moderate. As such the overall significance of impact would be moderate-low negative impact.
Air quality	During construction, activities such as earthworks and the use of construction machinery have the capacity to generate dust and exhaust emissions. Nuisance dust has the potential to affect nearby residents and sensitive receivers, particularly those with respiratory illnesses, potentially increasing stress and anxiety. There are very few sensitive receivers that are likely to be affected by the change in air quality due to the low density of dwellings within the surrounding rural landscape, and their separation from the Site. There are two residential receivers at the Site, as well as St John the Evangelist Church along the transmission line which may be affected during construction. Standard mitigation measures would be implemented during construction. Further information available in **Section 18.5**. Based on the nature of the air quality impacts, the magnitude of impact is considered to be low. The sensitivity of the receptors affected by the impact are considered to be low. As such the overall significance of impact would be low negative impact.
Sense of place	
Sense of place	The Lithgow Region and Lithgow are characterised by the dominant land uses of agriculture, industry, infrastructure, mining and some tourism. Wallerawang's community has a strong connection to the Wallerawang Power Station and nearby mines as it had provided a livelihood through multiple generations. During construction there would be a change to amenities that could affect the sense of place in the local community. The increase in traffic and workers could lead to the perceived loss of the small community feel of the town, potentially leading to people not socialising or utilising social infrastructure. During installation of the transmission line under Main Street, the increase in noise and vibration, visible construction works and changes to air quality may affect the community's ability to carry out normal tasks or feel comfortable in their own town. The temporary influx of workers may be perceived as a shift in the culture and demographic of the community through the introduction of new people and increase in traffic volumes. However, given the industrial nature of the area it is expected that the region would be accustomed to the arrival of construction and other temporary workers at various times. The change in energy production from coal mining practices to renewable energy may be contentious as the production of non-renewable energy has been a part of the history of the Study Area. Nonetheless, the community response to the Project has been largely positive with an understanding that renewable energy is the way forward. With respect to impacts on sense of place, the magnitude of impact is considered to be low. The sensitivity of the receptors affected by the impact are considered to be moderate (being community members). As such the overall significance of impact would be a moderate-low negative impact.

Impact	Impact summary
Economic	
Economic	Construction activity can benefit the local economy with associated economic stimulus from increased expenditure at local businesses through purchases made by construction workers, and indirect employment and expenditure through the provision of goods and services required for construction. With respect to economic impacts, the magnitude of impact is considered to be moderate. The sensitivity of the receptors affected by the impact are considered to be low (being community members). As such the overall significance of impact would be a low-moderate positive impact.
Access and connectivity	
Property access	During construction at the Site, the residents on the Lot would have full access to their dwellings and yards at all times. A separate entrance for construction traffic would be established in the south-west corner of the Site. The construction of the transmission line is not anticipated to restrict access to any property. The overall significance of impact would be negligible as there will be no access issues.
Road, rail and public transport	Bus services in the social impact Study Area are unlikely to be affected during construction. Bus services in Wallerawang would continue to operate as normal during construction and bus routes are not anticipated to need to be diverted. With respect to transport impacts, the overall significance of impact would be negligible as there are no anticipated impacts to road, rail and public transport.
Culture	
Aboriginal heritage	The Project is part of a much larger cultural landscape for the Aboriginal community. This landscape includes a number of highly significant cultural sites and the Project has the potential to affect the current Aboriginal cultural value of the area. Two Aboriginal archaeological sites have been found within the Project Area, comprising a subsurface artefact scatter and a subsurface stone quarry. Proposed ground disturbance activities within the Project Area are anticipated to result in a near-complete loss of value for the stone quarry and no loss of value for artefact scatter. An Aboriginal Cultural Heritage Assessment Report (**Appendix D Aboriginal Cultural Heritage Assessment Report**) was completed for the Project in consultation with registered aboriginal parties including with respect to the identification of mitigation and management measures. The assessment determined that there would be a low cultural heritage impacts from the Project because there will only be a loss of 0.02% of the regions potential Aboriginal archaeological resource. Further information available in **Chapter 9 Aboriginal heritage**. Overall, the Project is unlikely to affect the current Aboriginal cultural value of the area.
Historic heritage	The history and heritage of an area can form the identity of the community who live amongst it. The social impact Study Area has been heavily influenced and somewhat defined by the mining and industrial history. There are a 11 historic heritage items in the Study Area; a detailed list is available in **Chapter 10 Historic heritage**. There are no anticipated impacts from construction of the Site as there are no heritage listed items or archaeological sites within at least 700 metres. St John the Evangelist Church is around 35 metres west of where the proposed transmission line would be constructed. Protective measures, such as not using vibratory methods nearby, are proposed to would avoid impacts to the building.

Impact	Impact summary
	Subject to the implementation of appropriate protective measures during construction, no impacts to the historic heritage of the social impact Study Area is anticipated.
Other	
Health and wellbeing	Impacts to the health and wellbeing of people who work, visit and live in the local area may arise from direct impacts and/or indirect impacts from construction. Changes to amenity during construction may result in stress associated with loss of sleep (due to noise and vibration impacts) and decreased feelings of safety (associated with increased interactions between construction vehicles and pedestrians, and reduced sightlines as result of construction hoarding). The influx of construction workers and potentially anti-social behaviour could create a perceived increase in crime or perceived increase in job insecurity. To address these potential impacts Neoen would maintain regular communication with Council, surrounding residents and stakeholders prior to and during construction to understand their concerns and identify measures that could be applied. Based on the nature of the impacts on health and wellbeing, the magnitude of impact is considered to be low. The sensitivity of the receptors affected by the impact are considered to be low (given the industrial nature of the area). As such the overall significance of impact would be a low negative impact.
Changes to demographic profile	The Project would aim to source labour from the local area, but some labour is likely to be sourced from outside of the local area. This may result in a temporary change to the demographics of Wallerawang particularly during the peak of construction when it is anticipated that 250 workers would be required for two months. This influx of construction works would be temporary and whilst it may change the demographics during this time, this has not been raised as a concern during the community or stakeholder consultation undertaken to date. Given the temporary nature of the construction worker increase, the magnitude of impacts are considered to be low. The sensitivity of the receptors affected by the impact are considered to be negligible (given that this issue has not be raised to date). As such the overall significance of impact would be negligible.
Council infrastructure	During construction, impacts to council infrastructure may affect the wider community if a particular asset is unable to be used. Where construction works are required within the road corridor, these would be agreed with Council in advance as part of any Road Opening Licence (ROL) application and approval. Excavations would be undertaken in a manner to minimise traffic and access impacts, which would include, maintaining one lane for traffic flow in each direction during the works. In addition, a dilapidation survey prior to construction and (at a minimum) once construction is complete to help identify damage caused by Project traffic to local roads. This would help ensure that damage is identified and remedied if necessary. With respect to council infrastructure, the magnitude of impacts are considered to be low. The sensitivity of the receptors affected by the impact are considered to be negligible. As such the overall significance of impact would be negligible impact.

Operation

The Project would be an unmanned facility that is managed remotely. Between five to six employees would be required to attend the BESS facility periodically for maintenance activities. Therefore, there are no anticipated operational related social impacts from the Project for: traffic and access, air quality, access and connectivity, culture and the demographic profile.

Noise and visual amenity impacts for nearby receptors would be expected during operation and these impacts may be a concern for nearby residents. These impacts are expected to be moderate-low given the capacity of the noise environment to absorb the marginal noise increases and the largely screened views of the BESS facility for nearby residential properties.

18.3.4 Conclusion

Overall, the Project would result in social and economic benefits, including assisting in improving the security, resilience and sustainability of NSW’s electricity grid, support for further renewable energy projects, job creation and generation of income within the community. The Project has the potential to affect amenity (traffic and access, noise and vibration, visual and air quality), sense of place, the local economy, access and connectivity, culture, health and wellbeing, the local demographic profile and council infrastructure. These potential negative impacts range from low to high-moderate and would be appropriately addressed through the implementation of various management and mitigation measures (refer to **Section 18.6**).

18.4 Waste

18.4.1 Methodology

A qualitative desktop assessment has been carried out to estimate waste types and quantities, to identify potential impacts, and to identify appropriate management measures. This involved:

- Identifying potential waste generating activities during construction and operation
- Estimating the likely waste streams and volumes, including bulk earthworks and spoil balance
- Identifying the likely classification of waste streams in accordance with relevant legislation and guidelines
- Describing proposed management and handling techniques for key waste streams, including waste storage and collection, minimisation and re-use.

18.4.2 Waste management framework

The waste types and quantities estimated in this chapter are indicative and have been identified for the purpose of determining potential waste management options. Although the quantities of waste actually generated by the Project may differ from the estimates made, the identified waste management options are likely to be appropriate for the final waste quantities.

The *Protection of the Environment Operations Act 1997* (POEO Act) is the primary piece of legislation for waste management and recycling in NSW. The POEO Act establishes the procedures for environmental control, and for issuing environment protection licences (EPLs) covering issues such as waste.

Under the POEO Act 'waste' is defined as:

a. *"any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment*
b. *any discarded, rejected, unwanted, surplus or abandoned substance*
c. *any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance*
d. *any processed, recycled, reused or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations*
e. *any substance prescribed by the regulations to be waste.*

   A substance is not precluded from being waste for the purposes of this Act merely because it is or may be processed, recycled, re-used or recovered."

The Protection of the Environment Operations (Waste) Regulation 2014 (POEO Waste Regulation) regulates matters such as the obligations of consignors (producers and agents), transporters, and receivers of waste, in relation to waste transport licensing and tracking requirements within NSW.

The aim of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) includes "*to encourage efficient use of resources, reduce environmental harm, and reduce waste generation in accordance with the principles of ecologically sustainable development.*" To meet the objectives of the Act, waste management options must be considered and selected in accordance with the following hierarchy:

- Avoidance of unnecessary resource consumption
- Recovery of resources (including reuse, reprocessing, recycling and energy recovery).

To support the waste management hierarchy, the NSW Waste Avoidance and Resource Recovery Strategy 2014 -21 (NSW EPA, 2014b) provides a framework and targets for waste management and recycling in NSW. Targets established under this strategy include:

- Avoiding and reducing the amount of waste generated per person in NSW
- Increasing recycling rates to 70% for municipal solid waste, 70% for commercial and industrial waste, and 80% for construction and demolition waste
- Increasing waste diverted from landfill to 75%
- Managing problem wastes better and establishing 86 drop-off facilities and services across NSW.

In NSW, waste is classified in accordance with the Waste Classification Guidelines 2014 (NSW EPA, 2014a) (the ‘Waste Classification Guidelines’). Waste classification helps those involved in the generation, treatment and disposal of waste, with instruction that assists them in appropriately managing the environmental and human health risks associated with their waste, in accordance with the POEO Act and its associated regulations.

Part 1 of the Waste Classification Guidelines provides advice and directions on classifying waste to achieve appropriate management of all waste types. Many waste types are pre-classified under the POEO Act and do not require testing. However, if a waste is not pre-classified, it may need to be tested to determine its classification.

Waste material generated from the Project would be classified in accordance with these guidelines. The following waste classifications are likely to be relevant to the Project:

- Liquid waste
- Pre-classified waste, including:
  - General solid waste (putrescible)
  - General solid waste (non-putrescible)
  - Restricted solid waste
  - Hazardous waste.

There is a potential for special waste to be encountered where works would be conducted in the existing rail corridor (refer to **Chapter 12 Geology, soils, groundwater and contamination**). However, it is considered the potential for this would be low, and any volumes of special waste, if encountered, are likely to be minimal.

At a local level, development within the Lithgow LGA is subject to the controls specified in the Lithgow Development Control Plan 2021 (DCP). Section 2.9.2 of the DCP includes general controls relating to waste management for larger developments, including the requirement that open areas for waste storage be screened from public view and suitable provision be made for the storage and disposal of trade wastes and refuse such that it does not interfere with the amenity of the area.

18.4.3 Existing environment

The residents occupying Brays Lane would have their residential waste removal needs met by Lithgow City Council, who provides a weekly general waste collection service. It also offers a variety of programs including recycling, e-waste and household chemical waste collection / drop off facilities, and regular pick ups of bulky and green waste to help the community manage waste issues.

Lithgow City Council currently operates four landfills and five waste transfer stations. The Lithgow Solid Waste Facility is located 10 kilometres south-east of the Site and is Council’s only facility in the LGA to accept commercial and demolition waste. The accepted waste types relevant to the Project are as follows:

- Green waste
- Building waste
- Putrescible waste
- Commercial waste
- Demolition waste
- Asbestos waste.

Liquid waste is not accepted at any Lithgow City Council sites, therefore other facilities would have to be identified.

18.4.4 Impact assessment

Construction

Construction of the Project has the potential to produce the following waste streams:

- Excess spoil through clearance activities and earthworks
- Small amounts of contaminated fill where excavation would occur within the rail corridor
- Vegetation from the removal and trimming of shrubs and trees
- Packaging materials associated with items delivered to Site, such as pallets, crates, cartons, plastics and wrapping materials
- Wastes produced from the maintenance of construction equipment and machinery, including liquid wastes from cleaning, repairing and maintenance
- Sewage wastes generated through the use of worker's facilities, such as toilets. During construction, portable toilets would be used to provide onsite toilet facilities. These would be serviced as required, and waste would be disposed of offsite at a processing location
- General office and domestic wastes, such as paper and food wastes.

A summary of the anticipated construction waste types is provided in **Table 18-12**, along with the likely waste classifications and the proposed handling, treatment and disposal methods.

Table 18-12 Potential construction waste types, classifications and management methods

Waste types	NSW EPA Waste Classification	Indicative volume	Proposed handling, treatment and/or disposal method
Sewage	Liquid waste	>1000 litres per week during the peak of construction	Transport / pump-out for offsite disposal into existing sewer system
Fuels, lubricants and chemicals	Hazardous waste	Minimal	Offsite disposal at a licenced facility
Clean soils	General solid waste (non-putrescible)	Minimal	Onsite re-use where possible. Where not possible, clean fill would be re-used on other project site/s or at a re-purposing facility. Spoil may be stockpiled on the Site (in the construction laydown, storage and parking area) prior to re-use or disposal
Contaminated soils	To be classified subject to results of testing	Unknown. If encountered, anticipated to be minimal	A Soil and Water Management Plan (SWMP) would be produced which would include measures for handling and storing spoil, including potentially or known contaminated

Waste types	NSW EPA Waste Classification	Indicative volume	Proposed handling, treatment and/or disposal method
			soil/fill in accordance with the POEO Act, and protocols for waste classification and tracking for off-site disposal.
Excavated natural materials or virgin excavated natural material	General solid waste (non-putrescible)	Minimal	Onsite re-use of topsoil for landscaping of the Site; off-site beneficial re-use or send to landfill site. Spoil may be stockpiled on-site (in the construction laydown, storage and parking area) prior to re-use or disposal.
Green waste	General solid waste (non-putrescible) (garden waste)	Minor clearing volumes	Separated, some chipped and stored on-site for landscaping, remainder to transported to landscape suppliers or for off-site recycling.
General construction waste	General solid waste (non-putrescible)	Minimal	Off-site recycling and disposal.

Potential impacts associated with construction waste likely to be generated by the Project include:

- Spoil directed to landfill due to inadequate recycling and re-use
- Waste being unnecessarily directed to landfill, for example due to inadequate handling classification and disposal of waste on-site
- Contamination of soil, surface and/or groundwater from the inappropriate excavation, storage, transport and disposal of liquid and solid waste
- Risks to human health from the handling, storage, transport and disposal of contaminated waste generated by the Project
- Increased presence of pests due to incorrect storage, handling and transport of wastes.

As shown in **Table 18-12** all waste generated during construction would be removed or reused as required. In order to avoid potential issues associated with odour generation, decreased visual amenity and creating environments that attract animals/pest species (e.g. rats and mice), waste removal would occur at regular intervals, or sooner as and when required.

With the implementation of a Construction Waste Management Plan and other management and mitigation measures provided in **Section 18.6** it is not anticipated that construction waste management activities for the Project would pose a significant risk to the environment or human health.

Operation

The operational phase of the Project is anticipated to generate the following broad waste streams:

- BESS facility operational equipment waste
- Site office waste
- Domestic waste/waste generated by workers.

General and recycling waste generation would primarily occur in the office and amenities area. Given that operation of the Project would employ between five to six employees that would only be required to attend the Site periodically for maintenance activities, waste generated by workers would be minimal.

Waste generated by the operation of the BESS, such as end of life and defective battery cores would be handled either through a separate contract for chemical waste collection and recycling or by returning packaging materials to the product suppliers.

With the implementation of the management measures provided in **Section 18.6** it is not anticipated that operational waste management activities for the Project would pose a significant risk to the environment or human health.

18.4.5 Conclusion

Overall, the waste generated would be minor, and would be adequately managed by the management and mitigation measures proposed (refer to **Section 18.6**).

18.5 Air quality

18.5.1 Methodology

A qualitative desktop assessment has been carried out to estimate the potential air quality impacts associated with the construction and operation of the Project. This involved:

- Reviewing the legislation for air pollution and air quality in NSW
- Identifying potential air pollution generating activities during construction and operation
- Describing the proposed management techniques for key air pollutants during construction and operation.

18.5.2 Existing environment

Air Quality Index

The background air pollution at the Site has been characterised through ambient monitoring undertaken by the DPE and available at their air quality data services webpage (https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-explorer). The monitoring stations closest and most representative of the Site is the Bathurst Bureau of Meteorology (BOM) monitoring site (located at the Bathurst Sewage Treatment Plant) approximately 45 kilometres west of the Site. The monitoring site is, despite the distance, an appropriate source of data because the landscape of Bathurst is similar to that of the Site's landscape. It is noted however that Wallerawang does comprise more local industrial and electricity generating land uses.

This station measures a range of pollutants relevant to this study including:

- Fine particles less than 2.5 micrometres in diameter ($PM_{2.5}$)
- Fine particles less than 10 micrometres in diameter (PM_{10}).

Data from the Bathurst monitoring station have been extracted from the DPE online air quality data explorer portal and summarised in **Table 18-13**. The results of the fine particles from the monitoring site, are all of 'good' air quality.

Table 18-13 Bathurst monitoring station air quality data

Pollutant	Averaging period	Concentration (µg/m^3)			
		01/01/2020	01/07/2020	01/01/2021	01/07/2021
$PM_{2.5}$	1 hour average	1.8	18.8	4.0	10.4
PM_{10}	1 hour average	7.5	13.5	17.5	11.2

National Pollutant Inventory

The air quality of the Project Area is influenced by the agricultural and industrial land uses surrounding the Project. The operation of heavy industry nearby, including Springvale colliery, Lidsdale coal loading facility and Wallerawang ash depository are likely to be the key contributors to the air quality of the local area.

A search was conducted of the Australian Department of the Environment and Energy National Pollutant Inventory on 4 November 2021. The inventory identified three registered sources of air pollution near the Project:

- Lidsdale Coal Loading Facility, less than 1 kilometre south east of the Site

- Springvale Colliery, about 3.5 kilometres to the east of the Site
- Western Coal Services, over 3.5 kilometres north of the Site
- Mt Piper Power Station, about 4 kilometres to the north west of the Site.

Review of available data

Given the discrepancy of existing land uses between the Bathurst and Wallerawang regions, a search for publicly available air quality monitoring reporting was conducted. This search identified that Energy Australia are required to provide monthly air emission reports for the nearby Mount Piper Power Station in accordance with its EPL obligations.

The monitoring undertaken by Energy Australia records monthly concentrations of: Nitrogen Oxides, Sulphur Dioxides (SO_2) and Oxygen (O2). Energy Australia also provides the 2021 observations for solid particles, Carbon Dioxide, Cadmium, Mercury, Hydrogen, Chloride, Fluorine, Chlorine, Sulfuric Acid Mist, and Sulphur Trioxide (as SO_3), Volatile Organic Compounds as propane equivalent.

The Energy Australia Mount Piper Power Station Monthly Environmental Monitoring Data Report for period 1 – 31 October 2021 was reviewed (Energy Australia, 2021). This report provides both the required monthly observations and the 2021 observations. Air quality motoring results for this reporting period indicate that only one air quality non-compliance occurred during 2nd quarter of 2021, where solid particles were recorded at 120 mg/m^3, an exceedance of 70 mg/m^3. Excluding this exceedance, air quality at Mount Piper Power Station was good and no other non-compliances are recorded in this report.

Climate

For the purposes of assessing the climate at the Site, the general climate data for Wallerawang has been assessed using the Bureau of Meteorology station located at Marrangaroo (Defence) (ID Number: 63308), around seven kilometres south-east of the Site.

The warmest temperatures recorded occur between November and March, with the warmest average maximum temperatures for the year 2020 occurring in January (29.4°C). The coldest temperatures are recorded in the winter months, with the lowest average minimum temperature occurring in July and (11.7°C). The highest average rainfall for the year 2020 was recorded in February (201.8 mm), whilst June is the driest month (33.8 mm).

The wind conditions were recorded at Mount Boyce AWS (ID Number 063292) around 30 kilometres southeast from the Site. Wind speeds are typically highest during autumn and lowest in spring.

Sensitive receivers

The Project Area is in a rural residential area with a small number of nearby residential receivers. The closest sensitive receivers to the Site include the following residential receivers:

- 233 Brays Lane, Wallerawang, NSW 2845 (R1)
- 173 Brays Lane, Wallerawang, NSW 2845 (R2)
- 137 Brays Lane, Wallerawang, NSW 2845 (R3)
- 113 Brays Lane, Wallerawang, NSW 2845 (R4)
- 91 Brays Lane, Wallerawang, NSW 2845 (R5)

The location of these nearby receivers relative to the Site is shown on **Figure 4-2**.

The proposed transmission line corridor would traverse the vegetated area to east of Brays Lane before turning south to follow the existing rail corridor to the Transgrid Wallerawang 330 kV substation. Sensitive receivers located along the transmission line corridor would be limited to St John the Evangelist Church which is located adjacent to the rail corridor at Main Street, Wallerawang.

18.5.3 Impact assessment

Construction

During construction, dust would potentially be generated by earthwork activities such as levelling and grading, excavation and trenching, as well as from vehicle movement on unsealed roads during dry weather.

Additionally, dust emissions and fuel emissions could be generated from vehicles transporting workers to and from the Site, trucks delivering construction materials and machinery, such as excavators, graders and diesel generators.

Disturbed areas at the Site would be stabilised with gravel or similar or rehabilitated as soon as practicable. Various measures such as water sprays and soil fixants would be used to help reduce the likelihood of dust being created and mobilised offsite. A formal access road would be provided on the Site during construction to limit the need for vehicles to travel on unsealed surfaces. The trenching works to install the transmission line would take place progressively along the transmission line corridor and all disturbed areas would be progressively backfilled and stabilised, limiting the potential for errant dust impacts.

All heavy vehicles, plant and machinery would be subject to regular maintenance checks to make sure operating optimally. In addition, vehicles, plant and machinery would not be permitted to idle when not in use.

Given the above, the air quality impacts during the construction phase are not considered to be significant. It is considered that potential construction air quality impacts would be manageable through the implementation of standard air quality management measures, including dust suppression methods.

Operation

During operation, localised dust may potentially be generated from vehicles travelling to carry out routine inspection works and maintenance activities. To minimise dust generation, the internal access road would be constructed using a hardstand material. The impacts on local and regional air quality due to dust through the operational phase is expected to be negligible.

A key environmental benefit of the Project is that it enables greater renewable integration by providing storage, energy firming and improving system strength. As such the Project would help reduce emissions of greenhouse gasses (GHG) that would otherwise be generated from conventional thermal power plants. The reduction in GHG emissions would have a positive impact on climate change and help facilitate the transition to a more diversified energy mix where renewable energy plays a larger part in providing electricity in line with NSW government policies and strategies.

18.5.4 Conclusion

The potential air quality impacts would be minor and would be adequately managed by the management and mitigation measures proposed (refer to **Section 18.6**).

18.6 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential visual, social and economic, waste and air quality impacts are listed in **Table 18-14**.

Table 18-14 Mitigation and management measures – Land use

Impact	Mitigation measure	Timing
Visual		
V1	During detailed design of the Project, a review of materials and colour finishes for noise walls and other visible built components of the Project would be completed to further reduce potential visual impacts where practicable.	Detailed design
V2	Lighting of the Site would be designed in accordance with AS 4282:2019 Control of the obtrusive effects of outdoor lighting.	Detailed design
V3	Construction hoarding would be used as needed to minimise visual impacts, where reasonable and feasible.	
V4	A Landscape Plan would be developed in consultation with the three affected visual residential receptors and other relevant stakeholders. The plan would comply with any fire safety requirements that are identified during detailed design. The Landscape Plan would be implemented as soon as practicable during construction to ultimately provide screening vegetation for the operation of the Project.	Detailed design, construction and operation
V5	Operational noise walls would be sensitively designed to blend into the surrounding landscape. Existing property boundary screening vegetation would be maintained as far as possible and additional planting would occur post construction to provide vegetation screening of the Site.	Operation
V6	Screening vegetation would be maintained throughout the operation of the Project to provide visual filtering and screening of the BESS facility	Operation
Social and economic		
SE1	A Community and Stakeholder Engagement Plan would be developed and implemented for the construction of the Project. This plan would detail the communication objectives of the plan and would outline how Neoen would consult and inform residences close to the Project and the wider Wallerawang community regarding key milestones or potential impacts related to the Project. The plan would describe where information of the Project is available, would contain a complaints management procedure and contact details for the person responsible for managing and resolving complaints.	Construction
SE2	All businesses, residential properties and other key stakeholders affected by the Project would be notified at least five working days prior to commencement of construction. The notification would include: • Details of the Project • Construction period and construction hours Complaint and incident reporting and how to obtain further information.	Construction
SE3	Complaints received from the community would be recorded, monitored and acted upon in a timely manner.	Construction

Impact	Mitigation measure	Timing
SE4	Access to properties including businesses and social infrastructure would be maintained throughout construction of the Project. Temporary measures such as traffic control would be used as needed to enable this to occur.	Construction
SE5	A dilapidation survey prior to and following construction (at a minimum) would be completed to identify any damage caused by construction traffic to local roads. Any damage identified would be remedied, if necessary	Construction
SE6	Local services and materials would be prioritised for the Project as far as practical.	Construction
Waste		
W1	As part of the CEMP, a Waste Management Plan (WMP) would be prepared. The WMP would: • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Incorporate any relevant waste disposal requirements • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Specify protocols for classification of waste materials for off-site disposal or assessment under a resource recovery exemption • Set out processes for disposal, including on-site transfer, management and the necessary associated approvals/permits. Waste generated would be regularly removed from Site, in order to avoid potential issues associated with odour, visual amenity and attracting animals/pest species • Outline procedures for waste generated within the Project Area to be segregated at source and suitably stored in designated waste management areas within the Project Area • Include material tracking measures to track waste and recyclables generated from the Project and removed from the Project Area.	Construction
W2	All waste would be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (NSW EPA, 2014a). A waste classification letter would be prepared to allow for materials to be disposed off-site to a licensed landfill in accordance with NSW EPA guidelines.	Construction and operation

Impact	Mitigation measure	Timing
Air quality		
AQ1	The CEMP would include air quality management measures including measures to minimise visible dust moving offsite. Air quality measures would include that: • Daily construction activities would consider the expected weather conditions for each workday. • Approaches to minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable • Dust minimising measures on exposed surfaces would be implemented, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to reasonably minimise dust generation • Defined Site entry and exit points would be defined to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of offsite track out of dirt is identified • Heavy vehicles entering and leaving the Site would be covered to prevent material escaping during transport, where there is a risk of this occurring • Vehicles and construction equipment operating onsite are kept well maintained and turned off when not operating (minimise idling on the Site) • The handling of spoil would be minimised when excavating and loading of vehicles.	Construction

19.0 Cumulative

19.1 Secretary's Environmental Assessment Requirements

Table 19-1 sets out the SEARs relevant to cumulative impacts and where the requirements have been addressed in this EIS.

Table 19-1 SEARs – Cumulative

Relevant SEARs	
General	**Where addressed**
This EIS must include: • an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: - an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing, approved or proposed developments in the region and impacts on the site and any road upgrades, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice	• Assessment of the likely impacts of the Project on the environment are available in **Chapters 8 to 18** • Potential cumulative impacts from the Project and proposed developments are identified in **Section 19.6**
Land	**Where addressed**
This EIS must include: • an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: - a cumulative impact assessment of nearby developments	• The assessment of construction and operational land uses are available in **Chapter 15 Land use** • No cumulative impacts have been identified for existing land uses as discussed in **Section 19.6.4**
Noise	**Where addressed**
The EIS must include: • an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;	• The assessment of construction and operation noises are available in **Chapter 13 Noise and vibration** • No cumulative impacts have been identified for noise and vibration as discussed in **Section 19.6.2** • Noise management plans are available in **Chapter 13 Noise and vibration**
Transport	**Where addressed**
The EIS must include: • a cumulative impact assessment of traffic from nearby developments	• A cumulative impact has been identified for traffic, details available in **Section 19.6.3** with management measures are available in **Section 19.7**

19.2 Methodology

This assessment has been prepared to assess potential cumulative impacts of the Project when considered alongside other developments in the surrounding area.

Cumulative impacts can occur when the residual impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect on the environment, businesses or local communities. Cumulative impacts may occur when projects are constructed or operated concurrently or consecutively. Projects constructed consecutively can have construction activities occurring over extended periods of time with little or no break in construction activities.

This assessment involved:

- Outlining the residual impacts that may be associated with the construction and operation of the Project
- Identifying potentially cumulative projects within the vicinity of the Project Area
- Applying a screening process to consider the potential for the identified projects to interact with the Project
- Identifying potential cumulative impacts (if any) of the Project and nearby projects.

This cumulative impact assessment was undertaken in broad accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPIE 2021).

19.3 Residual impacts

As noted above, the first stage in the cumulative assessment process is to understand the adverse residual impacts of the Project.

The Project has had the potential to cause a number of environmental impacts. These have been grouped, assessed and discussed under different environmental matters (within **Chapters 8** to **18**).

Provided the management and mitigation measures identified in **Chapter 20 Environmental Management** are implemented and remain effective, there would be no likely residual adverse impacts for the following matters, as assessed in detail in their corresponding chapter:

- Chapter 8 Biodiversity
- Chapter 10 Historic Heritage
- Chapter 11 Surface water, hydrology and flooding
- Chapter 12 Geology, soils groundwater and contamination
- Chapter 15 Land use
- Chapter 16 Hazards and risk
- Chapter 17 Bushfire
- Chapter 18 Other matters
  - Social and economic
  - Waste
  - Air quality

To determine the likely potential for residual impacts this chapter has reviewed the following remaining matters, as assessed in detail in their corresponding chapter:

- Chapter 9 Aboriginal heritage
- Chapter 13 Noise and vibration
- Chapter 14 Traffic and access
- Chapter 18 Other matters
  - Visual

19.4 Identification of nearby projects

A search of publicly available information has been undertaken to identify existing and potential projects in the vicinity of the Project (within a 5 kilometre radius). This includes projects that are under construction, approved, or proposed. The resources used have included searching:

- Department of Planning and Environment (DPE) Major Projects Website: (https://www.planningportal.nsw.gov.au/major-projects)
- Lithgow City Council's Development Application Determination Statements: (https://council.lithgow.com/development/da-determination-statements/)
- A review of the 'current projects' of other government agencies and utility providers who may be undertaking works in the vicinity of the Project (including Transgrid, Australian Rail Track Corporation (ARTC) and Transport for NSW).

The following potentially cumulative projects were considered:

- Applications that are proposed or on exhibition
- Applications that have completed exhibition but are not yet determined
- Applications that have gained development approval but are not yet fully operational.

Where no information to the contrary has been available, local development applications and modifications to existing approvals which were determined in 2020 or earlier have been assumed to be completed and/or operational.

19.5 Screening process

Screening of the potentially cumulative projects was undertaken to investigate their potential to impact the same receptors as the Project. If the potentially cumulative projects were found not to impact the same receptors as the Project then they were screened out of the cumulative impact assessment and were excluded from any further consideration.

The screening process was completed by taking into account the following:

- Location – projects within five kilometres to the Project Area where there is potential for impacts to spatially overlap (e.g. shared use of roads for construction access).
- Timeframe and planning approval – Noting construction for the Project is proposed to commence in 2023, only projects likely to be built concurrently or consecutively with the Project have been included for further assessment. This includes projects currently under construction and/or projects that have received planning approval (as at the time of preparing the Environmental Impact Statement for the Project). Projects at a conceptual or pre-approval stage have been considered; however, they are generally not assessed in detail due to an absence of project and/or environmental impact details or development timeframes. Projects that are operational have already been considered as they form part of the existing environmental baseline for each environmental matter assessed in this EIS.
- Scale – larger scale projects identified on the DPE's Major Projects website and Lithgow City Council's development application register have been included as these are more likely to result in cumulative impacts. Very small scale projects that are typically subject to local development applications or Part 5 approval processes where exhibition is not required have not been considered.

The list of potentially cumulative projects subject to the screening process is provided in **Table 19-2**. **Figure 19-1** depicts the proposals which were included in the cumulative impact assessment, following the screening process.

Table 19-2 Screening of potentially cumulative projects

Project and status	Location relative to the Site	Proposed construction timeframe	Project details	Initial screening
Lidsdale Siding MOD 3 – Removal of Rail Unloading Restrictions Approved (03/11/2020)	800 m south-west of the Site	No construction required (modification to operation conditions of this project)	The modification has requested for the removal of the Trigger Action Response Plan to allow for coal to be received at any time within approved hours without the need for an emergency situation.	No construction is required as the modification related to a change in the operational conditions of this existing infrastructure. The modification was approved in November 2020 and into effect at the same time. As such, this operational change would have been considered as part of the environmental baseline for technical assessments completed for this EIS. On this basis this potentially cumulative project has not been considered further.
Wallerawang Battery Energy System "Greenspot" Scoping report lodged 18/02/2021 SEARs issued 18/03/2021 Currently preparing EIS	Approximately 3 km south-west	Commencement unknown Anticipated 18 month long construction period	Construction of a large-scale BESS and associated infrastructure, with a transmission line to connect to a nearby substation within the planned Greenspot 2845 Activity Hub. The Greenspot BESS would require a built area of about 10 ha The proposed location of the Greenspot BESS is shown on **Figure 19-1**.	The proposed Wallerawang Battery Energy System may have potential to result in cumulative impacts with the Project if constructed concurrently. Limited construction and operational details are available. However, in order to provide a conservative assessment, potential cumulative impacts with the Project have been considered in **Section 18.6**.

Project and status	Location relative to the Site	Proposed construction timeframe	Project details	Initial screening
Various (19) local development applications. All the listed projects have been approved through the course of 2021	19 local development applications within 5 km of the Project	None of the listed projects provide details of proposed construction timelines	• 1 x Change of use (shop to takeaway food premise) • 7 x Dwelling developments • 1 x Dwelling alteration and additions • 1 x Home business • 1 x Patio • 1 x Retaining wall • 5 x Sheds • 1 x Subdivision • 1 x Swimming pool	The 19 development applications are small in scale (generally associated with home improvements or changes to existing operations). The timing for all development applications is unknown, however it is considered likely that given the small scale of these developments, they are likely to be completed by the time the Project commences construction in 2023. Therefore they are not considered to have the potential to result in cumulative impacts, and have not been assessed further.

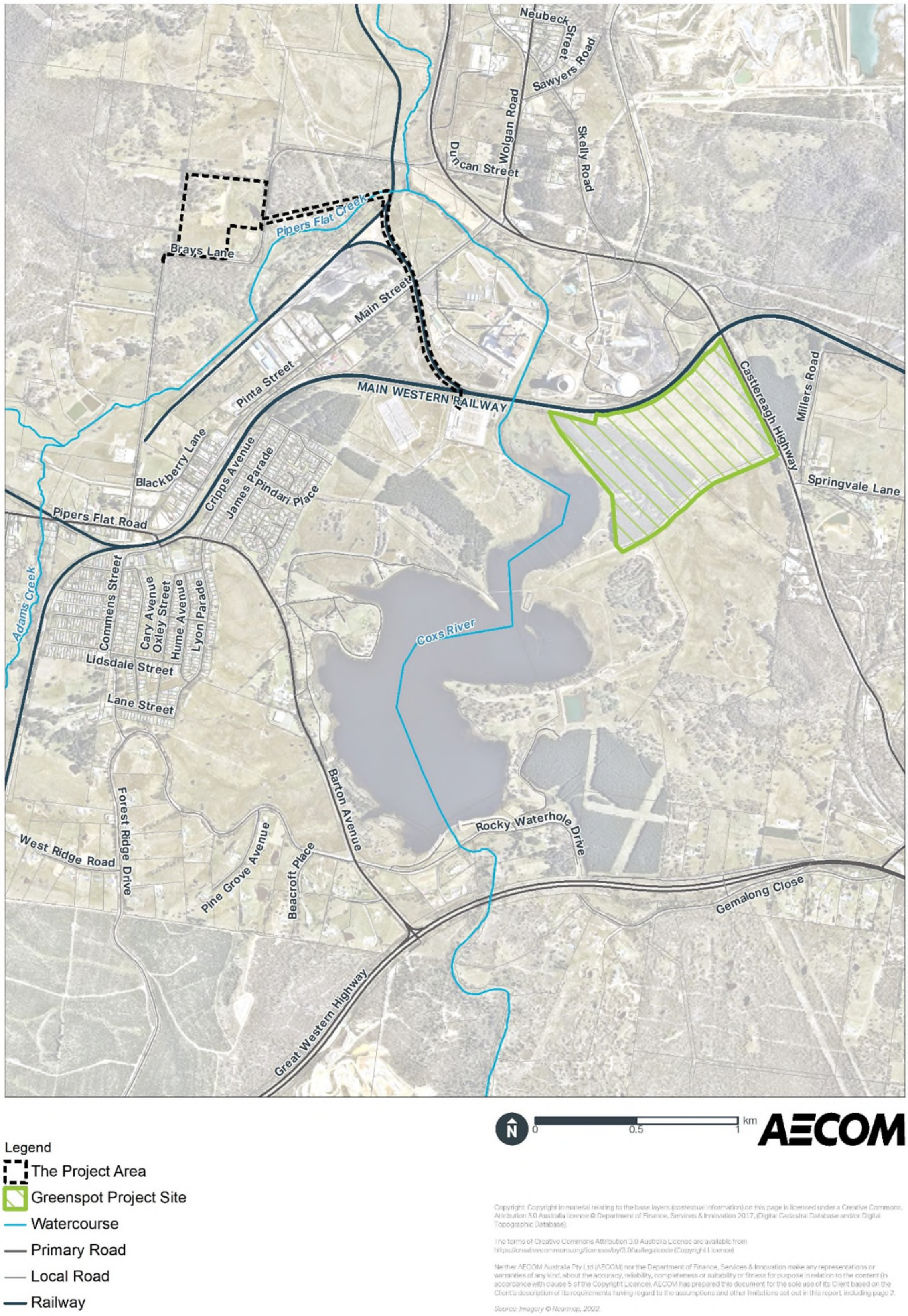


Figure 19-1 Wallerawang Battery Energy System "Greenspot" in relation to the Project

19.6 Cumulative impact assessment

Based on the initial screening, only the Wallerawang Battery Energy System project (Arcadis, 2021) potentially could result in cumulative impacts with the Project. The construction timeframes of this project have not been confirmed. Notwithstanding, the potential for similar construction timeframes as the Project has been considered in this assessment to provide an assessment of the potential worst-case cumulative impacts.

To address the given SEARs, residual impacts and following a review of the Wallerawang Battery Energy System scoping report, it has been determined that the potential residual impacts that have a potential to cause a cumulative impact with the Project are related to Aboriginal heritage, noise and vibration, traffic and access, and visual amenity. This conclusion was based on the available scoping report on the Major Projects website and the location of the project (being approximately three kilometres south-west of the Site). Other matters have not been assessed further as they have not been deemed to have a cumulative impact due to the limited residual impacts of the Project.

19.6.1 Aboriginal heritage

As identified in **Chapter 9 Aboriginal heritage**, two Aboriginal archaeological sites are recognised within the Project Area. These identified sites (the extents of which are shown on **Figure 9-1**) consist of surface and subsurface artefact scatter SU1a-A5 (in the location of the proposed transmission line between Brays Lane and the rail corridor) and surface and subsurface stone quarry site GWB-STQ1-21 (in the location of the Site).

The stone quarry GWB-STQ1-21 has been assigned moderate scientific value. The artefact scatter site SU1a-A5, has been assigned low scientific value and is considered to be a poor example of its type. Overall, the Project Area is considered to be of low historical significance and moderate aesthetic significance.

Proposed ground disturbance activities at the Site are anticipated to result in a near-complete loss of value for stone quarry GWB-STQ1-21. Subject to appropriate measures, no loss of value for artefact scatter SU1a-A5 during the construction of the proposed transmission line. No loss to either identified site would be expected during operation.

According to the cumulative impact assessment provided in the ACHAR that has been developed for the Project (**Appendix D Aboriginal Cultural Heritage Assessment Report**), two avenues for assessing the cumulative impact of the Project on Aboriginal heritage can be pursued, namely:

- A comparison, using the results of searches of the AHIMS database, of the identified Aboriginal archaeological record of the Aboriginal heritage study area with that of the surrounding region, defined here as an arbitrary 30 x 30 kilometres (900 km^2) area centred on the study area
- The use of existing environmental data sources to identify the potential for stone quarries comparable to GWB-STQ1-21 to exist within the broader region.

A review of AHIMS data indicates that artefact scatter SU1a-A5 currently represents 0.5% of the extant open artefact resource of the Aboriginal heritage study area. In contrast, no Aboriginal stone quarries have been registered within the study region to date, however, it has been concluded that proposed impacts to GWB-STQ1-21 would constitute a moderate adverse impact. Other site types present within the study area but not represented within the study area include rockshelters, scarred trees, grinding grooves, PADs, burials, rock art sites and stone arrangements.

A review of existing environmental data sources has also been undertaken to identify the potential for stone quarries comparable to GWB-STQ1-21 to exist within the broader study region. This review found that many favourable environmental contexts that have the potential for Aboriginal stone quarries comparable to GWB-STQ1-21 exist.

Based on the above, the Project has been to determined to have a very minimal impact on the region's overall Aboriginal archaeological record.

The Wallerawang Battery Energy System scoping report stated the presence of one Aboriginal heritage artefact is of low significance and there are two potential archaeological deposits on the project site.

As such, although there may be residual Aboriginal heritage impacts from the two projects, it not expected that the Project would create a significant cumulative impact to Aboriginal heritage due to the considered significance of GWB-STQ1-21, and the low likelihood that the two projects would have a significant impact on the region's overall Aboriginal archaeological record.

19.6.2 Noise and Vibration

As identified in **Chapter 13 Noise and vibration**, the noise impacts range from marginal to moderate, while there are no expected vibration impacts.

During construction, some noise exceedances are predicted for residential receivers, but only during standard construction hours, therefore allowing for periods of respite during highly sensitive periods (night time and weekends). None of the construction noise is expected to result in noise levels which exceed the 'highly noise affected' level of 75 decibels for residential receivers and no exceedances are predicted at non-residential receivers. The implementation of minimum working distances of vibration intensive equipment to sensitive receivers such as St John the Evangelist Church along the transmission line, therefore no adverse impacts from vibration intensive works are anticipated. The potential traffic noise impact on residential receivers is considered negligible.

During operation, marginal to moderate exceedances of the trigger levels have been predicted for three residential receives under both standard and noise-enhancing meteorological conditions. Appropriate noise barrier with sound absorptive lining at the Site would be implemented and at-property noise mitigation measures are recommended for these three receivers to mitigate this residual impact.

Although there are residual impacts from the Project, the impacts are localised to a small area around the Site with the furthest affected receiver being 400 metres away. Due to the similarity in projects, it can be expected that similar noise and vibration impacts are to occur during the Wallerawang Battery Energy System project. Therefore, it is not expected that the two projects would affect the same sensitive receivers, hence there are no anticipated cumulative noise and vibration impacts from the construction and operation of the BESS facilities and associated infrastructure.

Should construction of the Project and the Wallerawang Battery Energy System occur concurrently, there may be the potential for an increase in noise emissions related to construction traffic in the area. A mitigation measure to address this potential cumulative impact has been provided in **Section 19.7**.

19.6.3 Traffic and access

As identified in **Chapter 14 Traffic and access**, the up to 50 light vehicles and 20 heavy vehicles per day are expected to be added to the local road network during the peak construction period of the Project (which is expected to last for about two months). Assuming construction heavy vehicle movements are equally distributed across the day, it is most likely that around two heavy vehicles would access the Site per hour, on average, during the peak construction period. In addition, the construction workforce is likely to be sourced locally, and shuttle buses would be considered, if required, to transport construction workers from the town centre to the Project Area, further reducing the impacts of the Site on the surrounding road network.

The existing capacity of the Castlereagh Highway and Great Western Highway has been found to have the existing and forecast capacity to easily accommodate the proposed peak construction volumes, and local traffic impacts on Brays Lane as a result of construction are expected to be minor, short-term and temporary.

Heavy vehicles (B-doubles) and oversized / over mass vehicles would travel up Castlereagh Highway, then turn onto Main Street Wallerawang before connecting to Pipers Flat Road and Brays Lane to access the Site. The following sections of road within 20 km of the Site that would require special access measures to allow for the egress of oversized / over mass vehicles:

- Main Street onto Pipers Flat Road (right hand turn) – A spotter would be required to guide the loads through this section of road
- Pipers Flat Road onto Brays Lane (right hand turn) -– A spotter would be required to guide the loads through this section of road
- Brays Lane - Vegetation trimming is likely to be required at the corner of Brays Lane at the Site entrance to allow for the passage of loads. There are two culverts on Brays Lane that may not

have the existing weight capacity for heavy loads. If the culverts are determined to not be suitable for the weight of heavier loads, a temporary bridge (e.g. in the form of bridging beams) could be installed over the existing culverts to protect them and to provide the appropriate weight capacity. A spotter would also be required to guide the loads through this section of road and traffic supervisors / controllers would be required to control local traffic as oversized / over mass vehicles pass through.

These movements are not expected to affect access to Brays Lane, but during these movements along the southern section of Brays Lane may be restricted. Brays Lane provides access to both Wallerawang and the Castlereagh Highway. Residents and business owners along Brays Lane would be consulted prior to oversized movements occurring.

With the implementation of suitable measures to accommodate the egress of heavy and over-sized vehicles on local roads, and given that traffic volumes associated with the Project are low, the Project is not anticipated to have a significant impact on the condition of existing haulage routes.

A Construction TMP, would be prepared for implementation during the construction of the Project to manage minor impacts to traffic during construction.

The scoping report for the Wallerawang Battery Energy System identified a need for heavy vehicles for the delivery of material relevant to this project and light vehicles for construction staff. This would lead to a temporary increase in the traffic on Castlereagh Highway, the Great Western Highway, Main Street, and an unnamed dirt road just south of the proposed project site during the construction period. Due to the similarities in both projects, it can be anticipated that the construction traffic impact would be similar, therefore also having a low traffic impact.

Should construction of the Project and the Wallerawang Battery Energy System occur concurrently, there may be an increase in traffic on the Castlereagh Highway and on Main Street Wallerawang in particular.

As identified above, the highway has capacity to accommodate the increased traffic from both the Project and the Wallerawang Battery Energy System project. As such no significant cumulative traffic impacts would be expected on this road.

With regards to construction traffic on Main Street Wallerawang, while construction traffic for the Project accessing this road would be limited to heavy and oversized / overmass vehicles, consultation between proponents and contractors for the Wallerawang Battery Energy System project and Great Western Battery project would be undertaken to gain an understanding of project timing and traffic movements to avoid potential cumulative traffic impacts where possible.

During operation, traffic generated by the Project would be negligible as very infrequent maintenance required and, therefore, would not contribute meaningfully to cumulative traffic impacts.

19.6.4 Visual amenity

As identified in **Chapter 18 Other matters - Visual**, the Project may impact the visual amenity during construction however this is expected to be a short term impact. During operation the Project could have a moderate impact on two nearby receivers.

The Wallerawang Battery Energy System project could be expected to have a similar visual impact as they are very similar projects, during construction and potentially during operation.

The two projects would be located about 3 kilometres from each other. Given this distance the two projects are not visible at the same time by any one receiver as they are shielded from each other by the intervening topography, vegetation, and built structures associated with the township of Wallerawang and existing industrial infrastructure. As such, the projects are not considered to be in the same viewshed as one another, hence cumulative impacts are not expected for visual amenity.

19.7 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential cumulative impacts are listed in **Table 19-3**.

Table 19-3 Mitigation and management measures – Cumulative

Impact	Management and mitigation measures	Timing
CU1	Consultation between proponents and contractors for the Wallerawang Battery Energy System project and Great Western Battery project would be undertaken to gain an understanding of project timing and traffic movements to avoid potential cumulative traffic impacts where possible.	Construction

20.0 Environmental management

20.1 Secretary's Environmental Assessment Requirements

Table 20-1 sets out the Secretary's Environmental Assessment Requirements (SEARs) relevant to environmental management and where the requirements have been addressed in this EIS.

Table 20-1 SEARs – Environmental management

Relevant SEARs	
Environmental management	**Where addressed**
This EIS must include: • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS	**Section 20.2** describes the overarching approach to environmental management during construction and operation of the Project. **Table 20-2** provides a consolidated summary of the proposed management and mitigation measures that would be implemented for the Project, as described throughout this EIS.

20.2 Proposed environmental management approach

The overarching approach to environmental management during the construction and operation of the Project is guided by the following:

- Management and mitigation measures
- Construction Environmental Management Plans (CEMPs) and sub-plans (refer to **Section 20.2.2**)
- Operational environmental management plan or system (refer to **Section 20.2.3**).

20.2.1 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential environmental and social impacts are listed in **Table 20-2**.

Table 20-2 Management and mitigation measures

ID	Management and mitigation measure	Timing
General		
G1	Neoen would prepare and implement a CEMP and sub-plans for the Project, which include the measures outlined in this table, relevant conditions of consent and the relevant requirements of other approvals.	Construction
G2	Neoen would appoint an Environmental Management Representative to monitor the implementation of all environmental management measures. The EMR would ensure that conditions of consent and management and mitigation measures are being met or effectively applied during construction and that the work is being carried out in accordance with the CEMP and other relevant requirements.	Construction
G3	Community engagement would be maintained throughout the construction of the Project. A specific email address, dedicated phone number and online forum would be set up to receive and address questions, comments and concerns from the community.	Construction

ID	Management and mitigation measure	Timing
Biodiversity		
B1	A Biodiversity Management Plan would be prepared for the Project. This plan would include management and monitoring measures to be implemented to mitigate potential biodiversity impacts which could occur during construction. The following measures would be included in the plan: • Appropriate exclusion fencing would be installed to the boundary of the retained vegetation and any construction areas where there is some potential for accidental encroachment. This would include appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' to protect areas of biodiversity value. • No Go Zones or similar would be identified in site inductions and communicated to all construction personnel. • Internal fencing / barricades are to be used to establish Tree Protection Zones (TPZs) around retained individual native trees (ie biodiversity values that are not part of existing 'No Go Zones') in accordance with the Standards Australia Committee (2009). • All construction site perimeter fencing is to be of a design that excludes terrestrial fauna, so as to minimise the risk of Koala ingress to the construction site. • All material stockpiles, vehicle parking and machinery storage should be located within the areas proposed for clearing, and not in areas of native vegetation that are to be retained. Weed and pathogen management measures including weed hygiene protocols for personnel, machinery and construction materials entering and exiting construction areas to minimise risk of weed and pathogen introduction and spread.	Pre-construction
B2	All vegetation is to be inspected immediately prior to removal, by a qualified ecologist, to confirm absence of resident fauna.	Construction
B3	Measures to minimise light pollution impacts (adapted from Part 4 (good lighting design principles) of the Dark Sky Planning Guideline (DPE 2016)), would be implemented as appropriate. The following measures would be considered: • Installing light fitting shields with an opaque cover, mounted horizontally across the top of the lighting module to allow only the downward projection of light • Directing lights downwards and avoid reflecting light skywards • Utilising low beam angles that are close to vertical where possible to minimise light glare. Security lighting within the construction site would be minimised and is to be oriented such that light spill	Construction, operation

ID	Management and mitigation measure	Timing
	beyond the subject land and in to patches of retained vegetation is minimised.	
B4	Dam dewatering is to be undertaken during the dam works to ensure that fauna within the dams is salvaged and relocated by an appropriately experienced ecologist (an ecologist would only be required on site when dam water levels are below 1/3 capacity).	Construction
B5	Selection and retention of suitable logs (>10 centimetres diameter only) and hollows for placement within retained native vegetation adjoining the subject land.	Construction
B6	Where appropriate native vegetation cleared from the subject land would be mulched for re-use on the Site to stabilise bare ground.	Construction
B7	Offsetting requirements of this Project would be met as determined by the BAM Calculator following detailed design.	Detailed design
Aboriginal heritage		
AH1	An Aboriginal Cultural Heritage Management Plan (ACHMP) would be prepared for the Project. This would guide the management of Aboriginal cultural heritage within the Project area for the duration of the Project. The ACHMP would be subject to periodic review to ensure that all management policies are being adhered to and are working effectively.	Detailed design
AH2	An archaeological salvage program incorporating surface collection and manual open area excavation would be conducted for the stone quarry site, GWB-STQ1-21. Salvage activities within GWB-STQ1-21 would be undertaken in accordance with the salvage methodology provided in **Appendix M** of the ACHAR	Prior to construction
AH3	High-visibility fencing should be installed along the boundary of the SU1a-A5 site and be actively maintained throughout the construction phase of the Project. The location of SU1a-A5 should be clearly defined within the CEMP and any associated plans as an 'environmental no go zone'. Should Neoen and/or its contractors require use of the vehicle track within SU1a-A5, alternative access arrangements should be investigated and detailed in the ACHMP	Prior to construction
AH4	An Unexpected Aboriginal Heritage Finds Procedure (UAHFP) would be included in the ACHMP to cover the unanticipated discovery, at any point outside of the GWB-STQ1-21 salvage program, of an actual or potential Aboriginal heritage item for which Neoen does not have an existing management process in place. The procedure should cover all Aboriginal objects (as defined by the NPW Act), including human skeletal remains.	Detailed design

ID	Management and mitigation measure	Timing
AH5	Provisions regarding appropriate consultation protocols with RAPs should be incorporated into the ACHMP. Contact details and preferred contact methods for each RAP, as well as other relevant stakeholders, should be specified.	Construction
AH6	The Project's standard environmental site induction would include an Aboriginal heritage component. At a minimum, this would outline current protocols and responsibilities with respect to the management of Aboriginal cultural heritage within the Project Area (including the unexpected finds protocol) and provide an overview of the diagnostic features of potential Aboriginal sites and objects	Construction
AH7	Any Aboriginal archaeological works carried out under the ACHMP for the Project would be prepared to a standard comparable to that required by the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW. Printed and/or digital copies of any associated reports should be made available to RAPs upon request.	Construction
AH8	The proposed transmission line would be installed beneath artefact scatter SU1a-A5 using underboring (the method of Horizontal Directional Drilling would likely be used). The launch pit, receiving pit and any associated works or activities related to these 'pits' would be located outside of the SU1a-A5 site.	Construction
AH9	The Addendum ACHAR study area would be subject to a visual inspection prior to the commencement of ground disturbing works within this area. The inspection should be undertaken by a field team consisting of a qualified archaeologist and minimum of one RAP field representative.	Construction
AH10	Any Aboriginal objects identified during the visual inspection referenced in AH9 would be subject to surface collection as part of the archaeological salvage program for impacted stone quarry site GWB-STQ1-21 (45-1-2853). Any such objects would be considered to comprise part of GWB-STQ1-21. If required, the boundary for GWB-STQ1-21 should be revised and updated in the Aboriginal Heritage Information Management System (AHIMS) database.	Construction
AH11	Contractors engaged to complete the proposed works should be made aware of the nature and location of previously recorded Aboriginal sites GWB-STQ1-21 (45-1-2853) and Brays Lane AS1 (45-1-2799), both of which are located in the immediate vicinity of the Addendum ACHAR study area.	Construction
AH12	An 'environmental no go zone' would be clearly defined within the CEMP and associated plans over the area identified by Biosis (2017) as Brays Lane AS1 (45-1-2799) shown on **Figure 9-1**.	Construction

ID	Management and mitigation measure	Timing
Non-Aboriginal heritage		
HH1	The CEMP would include a stop works procedure for unexpected finds in the unlikely event that intact archaeological relics or deposits are encountered.	Construction
HH2 (This is also provided in measure NV14)	To avoid damage occurring, where feasible high vibratory construction methods would not be used within 50 m of St John the Evangelical Church. Should high vibratory methods be used within 50 m of the church, these will not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around 1m, from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	Construction
Surface water, flooding and water use		
SW1	A Soil and Water Management Plan (SWMP) would be prepared for the Project in accordance with the requirements and principles of the Managing Urban Stormwater – Soils and Construction, Volume 1 (the Blue Book) (Landcom 2004), Volume 2A (DECC1 2008 a) and Volume 2D (DECCW 2008b). This plan would include management and monitoring measures to be implemented to mitigate the potential surface water quality impacts which could occur during construction. This plan would outline: • The objectives of the SWMP • Performance criteria and key performance indicators to measure the success of plan • Legislative requirements including reference to relevant conditions of consent and management and mitigation measures • A summary of the activities that are likely to cause impacts related to soil and water and the potential impacts identified in the SSD application documentation • A summary of the proposed approach to managing potential impacts • A list of the measures that would be implemented to meet the legislative requirements and the performance criteria alongside information on who is responsible for each measure and the frequency and/or timing that applies to each measure • An outline of the monitoring requirements that would be implemented to meet the legislative requirements and the performance criteria alongside information on who is responsible for monitoring and the frequency and/or timing that applies • Information on reporting requirements and the approach to corrective actions. The principal performance criteria for the Project during construction would be to ensure that surface water flows leaving the Site or worksites along the	Pre-construction

ID	Management and mitigation measure	Timing
	transmission line corridor have a neutral of beneficial effect on the water quality of Pipers Flat Creek and/or Coxs River.	
SW2	Where existing drainage lines are to be impacted during construction, an alternate (diversion) path, of equal capacity, would be established at the start of the construction works.	Construction
SW3	Areas established within the Project Area for stockpiling would be planned, operated, and decommissioned in accordance with the RTA Stockpile Site Management Guideline 2011 and the Blue Book (Landcom, 2004).	Construction
SW4	The rehabilitation of disturbed areas would be undertaken progressively as construction stages are completed, and in accordance with the Blue Book (Landcom, 2004).	Construction
SW5	Following the installation of the transmission line, all trenched areas would be backfilled, grassed areas would be re-established in accordance with the Blue Book (Landcom, 2004).	Construction
SW6	Following the completion of the construction work, the construction laydown area would be broadly returned to the pre-development conditions in accordance with the Blue Book (Landcom, 2004). Any channels installed to divert flows around the laydown area during the construction phase would be removed and a vegetated swale would be established to broadly follow the natural contours of the land between Dam 4 and the Dam 5 spillway following the completion of construction.	Constructed
SW7	Consistent with the SWMP, control measures would be implemented to minimise risks associated with erosion and sedimentation and entry of materials to drainage lines and waterways. Controls that would be considered, include: • Identification of upslope run-on waters from undisturbed areas of catchment and diversion of these around un-stabilised areas of the Site • Sediment management devices, such as fencing, hay bales or sandbags, coir logs and graded or lined earth or sandbag diversion bunds and banks • Measures to divert, capture and/or filter water prior to discharge, such as drainage diversion channels and sediment sumps or traps • Scour protection and energy dissipaters at locations of high erosion risk • Installation of measures at key work entry and exit points to minimise movement of material onto adjoining roads, such as rumble grids or wheel wash bays, or regular sweeping • Location and storage of construction materials, fuels, and chemicals, including controls where possible would be managed in accordance with	Construction

ID	Management and mitigation measure	Timing
	Managing urban stormwater: soils and construction (the Blue Book). Controls may include: - Cover before significant weather events - Bunds - Diversion of offsite flows away from storage - Stabilised laydowns - Storage clear of frequently flooded low-lying areas Stabilisation of the surface of batters and drains, including temporary works and diversions.	
SW8	A Spill Management Procedure would be prepared and implemented during construction. This procedure would form part of the CEMP (or one of its subplans). The Spill Management Procedure would address, but not necessarily be limited to: • Management of chemicals and potentially polluting materials • Specialist containment, security and bunding requirements • Maintenance of plant and equipment • Emergency management, including notification, response, and clean-up procedures Spill kits would be located close to locations where chemicals, fuels, oils etc. are stored.	Construction
SW9	Discharge of potentially contaminated runoff, originating from the construction site, would not occur without prior treatment or testing, and/or necessary approvals. Surface water would be managed in accordance with the Blue Book (Landcom, 2004). If potentially contaminated water cannot be treated onsite, then it would be collected, tested and disposed offsite at an appropriately licensed facility.	Construction
SW10	Regular monitoring of weather and rainfall conditions would be conducted to identify severe weather warnings and potential flood conditions for the Project Area. Procedures would be included in the CEMP to cease work and secure equipment to ensure safety of workers prior to and during potential flood conditions.	Construction
SW11	The stormwater and drainage design for the Site would be finalised at detailed design. Water sensitive urban design (WSUD) measures would be incorporated into the drainage design to treat surface water before discharging to the receiving waterway. Stormwater treatment devices would be used to ensure a Neutral or Beneficial Effect (NorBE) on runoff water quality. A bioretention system is proposed, but other options may be considered provided that an equivalent or better performance outcome can be achieved. If a bioretention system is to be installed, the following measures would be undertaken prior to and during construction of the bioretention basin: • The design and construction of the bioretention basin would be overseen by a person with previous	Design, operation

ID	Management and mitigation measure	Timing
	experience in the construction and successful operation of these systems • Drainage systems, filtration media and vegetation would be installed in line with agreed designs • Erosion and sediment control measures would be in place during the construction phase of the Project to ensure that the bioretention systems are protected from high sediment loads • The bioretention system would be brought online at the end of the construction phase once major earthworks at the Site are complete to minimise the risk of clogging from sediments • Vegetation would be selected based on local climate and rainfall regime.	
SW12	The proposed dam modifications would be designed in accordance with any relevant guidelines, standards, and assessment and certification requirements (which may include; Dam Safety NSW guidelines (Dam Safety NSW 2021), *Dam Safety Act 2015* (NSW Government 2019) and *Dams Safety Regulation 2019 (NSW Government 2020)*) to help ensure that: • The dams meet relevant design and safety standards • Embankments are stable and unlikely to fail • Each dam has a designated and suitably designed spillway. An appropriate maintenance and inspection plan is in place.	Design, operation
SW13	The Site drainage would be designed to drain the BESS area to the proposed Dam 5. Dam 5 would provide attenuation for increases in peak flows that result from the Project.	Design, operation
SW14	The ground surface of the BESS area would be set at a level above the 1 % AEP flood event so that the infrastructure would not be impacted by regional flooding. The office buildings, inverters, transformers and batteries would be elevated above surface level on concrete pads to protect them from potential local flooding impacts.	Design, operation
SW15	Operational maintenance requirements for bioretention systems would include: • Monitoring for scour and erosion • Monitoring for and regular removal of accumulated litter, fine sediment, pests and debris • Weed removal and plant re-establishment to maintain high nutrient removal efficiency • Monitoring overflow pits for structural integrity and blockage If clogging or contamination is observed, replacement of vegetation and the filter media layer may be required.	Operation

ID	Management and mitigation measure	Timing
SW16	Where feasible, runoff would be collected from buildings into rainwater tanks at the Site and used during operation as needed.	Operation
SW17	Wastewater collected onsite would be periodically removed by a licensed waste contractor.	Construction, operation
Geology, soils, contamination and groundwater		
SGC1	A Soil and Water Management Plan (SWMP) would be produced which would include measures to manage potential impacts related to soils, surface water flows and contamination risks. This SWMP would include: • Measures to manage erosion and stormwater including a specific Erosion and Sediment Control Plan (ESCP) for the construction works at the Site to show where specific controls will be employed and to help ensure that erosion is minimised and nearby watercourses are protected • Stockpile management procedures for segregating spoil and preventing cross-contamination of clean spoil (virgin excavated natural material or excavated natural material) with potentially contaminated soil • Measures for stockpiles and storage areas to be located near the upstream (eastern) end of the Site, to prevent any loose materials being washed away into the downstream drainage system • Procedures for handling and storing spoil, including potentially or known contaminated soil/fill in accordance with the POEO Act, and protocols for waste classification and tracking for off-site disposal • Measures to manage the unexpected interception of groundwater during construction • Measures to manage unexpected contamination finds during construction • Emergency response measures including clean-up and reporting procedures. Measures within the SWMP and ESCP would be developed in line with the ‘Blue Book’ Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). The ESCP would be designed to ensure that surface water flows leaving the Site would have a neutral of beneficial effect on the water quality of Pipers Flat Creek.	Construction
SGC2	Where soil or ground is to be left exposed for more than 3 days, a soil binder would be used to help prevent water and wind induced erosion. Binders or covers would be used on soil stockpiles where these stockpiles are to be in situ for more than 24 hours.	Construction

ID	Management and mitigation measure	Timing
SGC3	Bare ground and exposed soils across the Site would be rehabilitated and returned to its pre-development condition or would be landscaped. A Landscaping Plan would be developed for the Site to show the types of species that would be planted following construction of the Project. Where suitable native and endemic species would be used to Site.	Construction
SGC4	The following measures would be included as part of the SWMP to mitigate potential impacts to groundwater: • Impermeable barriers would be placed between the source(s) of contamination (e.g. contaminated soil stockpiles or certain construction materials) and the natural ground Potentially contaminating substances such as chemicals, fuels, oils and caustic (drilling mud additive) will be handled and stored in accordance with relevant Australia Standards and the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007).	Construction
SGC5	Waste created during construction and operation would be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines,* appropriate segregated, contained and disposed at an appropriately licenced waste facility.	Construction, operation
SGC6	A spill response plan would be developed for the construction and operational phases of the Project. Spill kits would be located close to locations where chemicals, fuels, oils etc. are stored.	Construction, operation
SGC7	A Drilling Fluid Management Plan would be produced to guide the environmental management of the underboring work. The drilling would be undertaken by a drilling engineer who is appropriately trained and experienced. In the event that construction works intercept groundwater, the make-up of the drilling fluid would be determined by an appropriately qualified drilling fluid engineer, based on local groundwater and soil geochemistry so that it forms a suitable wall cake to minimising fluid loss and exchange with local groundwater. Inert or non-contaminating additives for drilling fluids would be used. Drilling fluid additives used would be certified for use in potable aquifers (certified to American National standards Institute (ANSI)/NSF International (NSF) STD 60 Certified well Drilling Aids and well Sealants). The drilling fluid additives would be closely monitored by the drilling fluid engineer and driller so that it remains chemically stable and volumetrically balanced with the progression of the hole and, if necessary,	Construction

ID	Management and mitigation measure	Timing
	modified to maintain stability and minimise interaction with the groundwater.	
SGC8	Prior to construction commencing, soil samples would be collected where trenching is proposed and tested for contaminants of potential concern to determine presence and whether contamination levels pose a health risk to construction workers. Soil samples should be taken in accordance with the NSW EPA (1995) *Sampling Design Guidelines.* Where contaminated soils or fill are present and do not meet commercial and industrial standards, this material would be excavated, stored on an impermeable surface and covered or contained, tested to confirm its waste classification, and disposed offsite to an appropriately licenced facility. Where backfill is required, material of at least a commercial / industrial standard would be used.	Design
SGC10	Where water is removed from excavations that are likely to be contaminated, it will be collected, contained, tested and disposed offsite to an appropriately licenced facility.	Construction
SGC11	The approach to managing contaminated soils, fill or groundwater would be detailed in the SWMP for the Project. Areas along the transmission line corridor where trenching is proposed would be identified, if these areas are contaminated and could pose a risk to human health or ecological receptors, measures required to manage these risks will be identified.	Construction
SGC12	The diesel at the Site would be stored in line with NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook (DECC, 2007). It would be stored on an impermeable surface in a bunded area where a potential leak or spill can be contained and would not enter the Site's stormwater management system. The bund would be able to contain 110% of the volume of the diesel stored at the Site.	Operation
SGC13	The transformers at the Site would be designed in line with the relevant Australian Standards for power transformers. The transformers at the Site would be designed in line with the appropriate Australian Standards and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Operation
Noise and vibration		
NV1	A Construction Noise and Vibration Management Plan would be prepared for the Project. This plan would include management and monitoring measures to be implemented to mitigate and manage noise and vibration impacts which could occur during construction. This plan would outline: • The objectives of the CNVMP	Pre-construction

ID	Management and mitigation measure	Timing
	• Performance criteria and key performance indicators to measure the success of plan • Legislative requirements including reference to relevant conditions of consent and management and mitigation measures • Identification of nearby sensitive receivers • Description of approved construction hours • Description and identification of all construction activities, including work areas, equipment and duration • A summary of the activities that are likely to cause impacts related to noise and vibration and the potential impacts identified in the SSD application documentation (including the EIS) • A list of the measures that would be implemented to minimise noise and vibration impacts including performance criteria alongside information on who is responsible for each measure, and the frequency and/or timing that applies to each measure would also be detailed • A complaint handling process • An outline of the noise and vibration monitoring requirements Overview of community consultation required for identified high impact works.	
NV2	A noise monitoring program would be implemented for the duration of the construction works and would focus on the use of high noise generating plant (e.g. jack hammering, rock breaking).	Construction
NV3	During construction, sensitive receivers that may be affected by noise impacts from the Project would be notified (by letterbox drop or equivalent) 7 days in advance of works that may affect their property. The proponent would set up and operate a Project website, project infoline, community complaints and enquiries hotline during construction. Community and stakeholder meetings would be undertaken as required.	Construction
NV4	All construction works would receive an induction prior to commencing work that would include information on measures and approaches to reduce noise during works. Measures to be discussed as part of this induction and to be employed during the construction works include: • No swearing or unnecessary shouting or loud stereos/radios on Site. • No dropping of materials from height, throwing of metal items and slamming of doors. • Where practicable avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver.	Construction

ID	Management and mitigation measure	Timing
	• Where practicable, identifying opportunities to maximise the distance between noisy plant and adjacent sensitive receivers • Shutting down or throttling down plant used intermittently • Turning off plant and vehicles when not in use Where practicable, directing noise-emitting plant away from sensitive receivers.	
NV5	Vibration intensive work would not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	Construction
NV6	Construction would be carried out during the standard daytime working hours as defined by the ICNG unless: • Otherwise agreed to by DPE under an approved out-of-hours work protocol, or • The works are low noise generating works that can be demonstrated to meet NMLs	Construction
NV7	Quieter and less vibration emitting construction methods would be identified during detailed design and employed if feasible and reasonable.	Construction
NV8	Equipment would be regularly inspected and maintained to help ensure it is in good working order.	Construction
NV9	The noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels.	Construction
NV10	Noise emissions should be considered as part of the selection process for construction equipment and plant.	Construction
NV11	Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on construction vehicles and mobile plant regularly used within the Project Area where practical during standard hours and at all times outside standard hours.	Construction
NV12	Where practicable: • Loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers • Delivery vehicles to be fitted with straps rather than chains for unloading. Vehicle movements would be scheduled during less sensitive times	Construction
NV13	All equipment would be maintained and operated in an efficient manner, in accordance with manufacturer's specifications, to reduce the potential for adverse noise and vibration impacts.	Construction
NV14 (This is also provided	To avoid structural damage occurring, if feasible high vibratory construction methods would not be used within 50 m of St John the Evangelical Church.	Construction

ID	Management and mitigation measure	Timing
in measure HH2)	Should high vibratory methods be required within 50 m of the church, these works would not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective.	
NV15	Ongoing detailed design would continue to seek opportunities to further reduce the noise impact at the three residential receivers (137 (R3), 173 (R2) and 233 (R1) Brays Lane). If required following detailed design, treatments at these three properties would be discussed with the property owners and would comprise the provision of mechanical ventilation and/or comfort conditioning systems in line with the NPfI (NSW EPA, 2017) to address residual impacts.	Pre-construction
Transport and access		
T1	A Construction Traffic Management Plan (TMP) would be prepared, in consultation with Lithgow City Council and other relevant stakeholders. The TMP would include: • Details of the transport route to be used for all development-related traffic • Details of the temporary onsite construction car park • Details of the measures that would be implemented to minimise traffic impacts during construction including: - Temporary traffic controls, including detours, signage etc. - Notifying the local community along Brays Lane about development-related traffic impacts - Procedures for receiving and addressing complaints from the community about development-related traffic Minimising potential for conflict with other road users as far as practicable, including preventing queuing on the public road network.	Construction
T2	The TMP would include the following measures: • Vehicle access to and from the Site would be designed and managed to minimise safety risk to pedestrians, cyclists and motorists and to provide that construction vehicles can safely enter the Site. All trucks would enter and exit the Site in a forward direction where this is feasible. Truck deliveries would be scheduled to arrive at Site outside of peak periods, where this is feasible, to minimise traffic impacts on the surrounding network during the peak periods	Construction

ID	Management and mitigation measure	Timing
	• Near the Site access, appropriate signage, line marking and/or traffic control measures would be used to direct and guide pedestrians, cyclists and motorists past the Site during high usage times. • Construction workers accessing the Site will be provided with information on driving conditions along Brays Lane. • No construction worker parking along Brays Lane would be allowed. • Where parking on the Site would be exceeded, additional measures to reduce parking demand (e.g. shuttle buses) would be implemented. Overflow parking for workers would be provided at a location that would be determined in consultation with Lithgow City Council. The selection of this site would seek to minimise local parking impacts to the community. • No temporary diversions are proposed to accommodate the construction of the Project. However, if required, the potential locations of temporary diversions would need to be identified in the TMP. Road Occupancy Licence (ROL) and Traffic Control Plans (TCP) would be prepared, as required. • Spotters would be used to guide oversized / over mass loads as required (as per recommendations detailed in **Appendix 1 (b) Route Study**) and vegetation trimming on Brays Lane would be carried out to allow for safe egress. • Brays Lane - A crescent shaped, 240 square metre area located at the corner of Brays Lane directly opposite the site entrance would be cleared and compacted gravel or road base would be provided to allow for oversize / overmass vehicles to turn this corner during construction .This area would be rehabilitated and revegetated following construction. • If the culverts on Brays Lane are determined to not be suitable for the weight of heavier loads, temporary bridging beams would be used. The installation of temporary bridging beams or another suitable measure would be undertaken in consultation and with the approval with Lithgow City Council under the Roads Act 1993 and would be removed as soon as practical. Reference to or inclusion of the approach to consulting with the residents and business owners along Brays Lane prior to oversized vehicles movements occurring. This consultation would occur at least 14 days prior to these movements occurring.	

ID	Management and mitigation measure	Timing
Landuse		
LU1	Affected landowners/occupants will be provided with advance notification of project construction schedules and changes to access arrangements or any short-term traffic disruptions.	Construction
LU2	Rehabilitation of the Site to its pre-development condition as best practicable following decommissioning. A rehabilitation plan would be discussed with Lithgow City Council and agreed prior to the undertaking of decommissioning works.	Decommissioning
LU3	Where works are to be carried out in close proximity to utilities, consultation will be undertaken with the relevant utility provider to determine safety and network integrity requirements.	Construction
Hazards and risk		
HR1	Hazards and risk would be minimised in line with the following measures (including measures HR2 to HR25) unless a subsequent hazard and risk assessment agreed with DPE confirms that these measures are not required: • The separation distance between infrastructure within the Site is to be determined in accordance with Codes and Standards and manufacturer's recommendations so that the preferred strategy of allowing a fire in one battery enclosure, inverter or transformer to burn without the risk of propagating to other infrastructure can be maintained without the need for external firefighting • The separation distance within the Site is to be determined in accordance with Codes and Standards and manufacturer's recommendations to allow safe escape from the Project in case of a fire • Applicable Australian Standards requirements will be adhered to in the design and tested the BESS. Where relevant, the design, operation and maintenance of BESS would also adhere to applicable International Standards for major BESS developments • Procurement of a battery system that is certified to an internationally recognised method for evaluating thermal runaway fire propagation in the Site, proving that a credible fire within a battery rack or enclosure would not propagate to other battery enclosures • Detailed firefighting response and need for fire water containment should be assessed and reported (for example in the format of a Fire Safety Study) following development approval, for review by the DPE, FRNSW and the RFS • Measures to prevent a leak from occurring at the Site, and/or containing a spill of pollutant from the BESS, should be addressed in the detailed design phase for the Project	Detailed design, construction, operation

ID	Management and mitigation measure	Timing
	The specific risk associated with the location of the residents close to the Project must be integrated into the fire safety of this site, including evacuation plan in case of a major incident associated with the Project. Neoen's internal rule, based on other installations, is to provide a typical exclusion zone of 25 metre radius during a fire and to evacuate to a distance as advised by the manufacturer chosen to deliver the Project– this should be integrated into emergency response plan and communicated with emergency services.	
HR2	Equipment would be procured from reliable and internationally recognised supplier with proven track-record	Construction
HR3	Equipment would be installed by Contractors following Neoen's internal requirements for Contractor management, Permit to Work, control of modifications and other established systems	Construction
HR4	All installation and maintenance would be performed by trained persons using Safe Work Method Statements	Construction, operation
HR5	The BESS would follow rigorous Management of Change process throughout its life. This would include management of protective systems including trips and alarms within the Battery Management System	Operation
HR6	Induction of all personnel would occur prior to works commencing on Site	Construction, operation
HR7	Electrical safety best-practice would be in place during construction and installation as well as during commissioning and operation of the electrical equipment forming part of this Project	Construction, operation
HR8	Permit to Work, including hot work permits would be in place during construction and installation as well as during commissioning and operation of the equipment forming part of this Project	Construction, operation
HR9	Preventative maintenance practices would be put in place, including maintenance schedules and calibration of equipment, instruments and sensors, APZ, vegetation control within the BESS, thermography and other Non-Destructive Testing	Construction, operation
HR10	Impact barriers would be installed to prevent damage of infrastructure and equipment from vehicles and heavy machinery	Construction
HR11	Where required warning signs would be installed as per Code and Standards requirements, including Dangerous Goods signage and High/Medium voltage warnings (including arc flash)	Construction, operation
HR12	Earthing of electrical equipment would be established	Construction, operation
HR13	Need for lightning protection would be determined in accordance with Neoen requirements and Australian Codes at the detailed design stage	Design, construction

ID	Management and mitigation measure	Timing
HR14	The BESS would be housed within a secure fenced area. Onsite security protocols would be developed. Temporary fences would be installed during construction where appropriate.	Construction, operation
HR15	Battery Management System would be installed, including voltage control, charge/discharge current control and temperature monitoring to battery manufacturer's specifications. Automatic safety shut-down function would be initiated in case of safe limits exceeded	Construction, operation
HR16	Secondary detection would be installed in the enclosure, to manufacturer's recommendations (e.g. smoke/heat) so that, if there is a fire, smoke or excessive temperature the information would be transferred to the BESS control room	Construction, operation
HR17	Alarms would be available to provide hazard warning on operations upset conditions, and fault conditions would be transmitted to permanently staffed control room located remotely. The offsite control room would be permanently staffed and operators would be able to manually shut down and isolate a battery enclosure/group of battery enclosures	Construction, operation
HR18	The batteries would be housed within dedicated enclosures. Non-essential emergency response personnel entry during a hazardous event such as a run-away would be prevented	Construction, operation
HR19	BESS and transformer enclosure venting would be achieved to reduce concentrations inside the enclosures as per requirements in Codes and Standards	Construction, operation
HR20	Escape from the BESS and substation would be assured in accordance with any relevant Code requirements	Construction, operation
HR21	Explosion venting and venting of toxic or flammable gases, would be achieved as per Codes and Standards and in accordance with manufacturer's instructions. This includes both BESS enclosures and transformers	Construction, operation
HR22	The need for fire suppressant inside the battery enclosures, and any need for fire water at the BESS (e.g. hydrants and hoses), would be determined during detailed design and through consultation with FRNSW and RFS	Detailed design, construction, operation
HR23	The risk of seismic activity, dust storm and severe winds would to be integrated into the design for this BESS, through the application of the relevant Australian Standards	Detailed design
HR24	APZ would be established in accordance with the Bushfire Assessment or as otherwise agreed through consultation with FRNSW and RFS.	Detailed design, construction

ID	Management and mitigation measure	Timing
HR25	The detailed design for the Project would consider the ARPANSA Standard (2016) and ICNIRP guideline (2010) to demonstrate that EMFs from the Project are acceptable to onsite and offsite receivers.	Detailed design
Bushfire		
BF1	The construction area within the Site would be managed as an Asset Protection Zone (APZ) in broad alignment with Appendix 4 of Planning for Bushfire Protection 2019 and the NSW Rural Fire Service's document 'Standards for asset protection zones'.	Construction
BF2	Vulnerable buildings and/or critical assets would be constructed to appropriate BAL levels in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959).	Construction
BF3	During construction: • A minimum static water supply of 20,000 litres would be available at the Site for firefighting purposes • A 65 millimetres metal Storz outlet with a gate or ball valve shall be provided as an outlet on each of the tanks • The water tank, if located above ground, shall be of a non-combustible material • Underground tanks shall have an access hole of 200 millimetres to allow tankers to refill direct from the tank. A hardened ground surface for truck access would be supplied within 4 metres of the access hole. • All associated above ground fittings to the tank shall be non-combustible. Firefighting equipment would be maintained at and/or accessible to all active construction site during the declared bushfire danger season, and site personnel trained in its use.	Construction
BF4	Separate Bushfire Emergency Management and Evacuation Plans would be developed for the construction and operational phases of the Project. These plans would outline stop work procedures and evacuation routes. The bushfire evacuation procedure within each plan would be completed in accordance with NSW RFS Guide to Developing a Bushfire Emergency Management and Evacuation Plan (2014).	Construction and operation
BF5	Around the perimeter and within the Site there will be access for Category 1 fire appliances such as appropriate passages and clearances for fire trucks.	Construction
BF6	Non-essential construction or operational works be postponed on days with Fire Danger Rating (FDR) of Severe or greater.	Construction and operation
BF7	Relevant works would be managed under a Hot Work and Fire Risk Work procedure. Where necessary essential hot works may be completed on a day declared to be a Total Fire Ban (TOBAN) providing it	Construction and operation

ID	Management and mitigation measure	Timing
	complies with the Hot Work and Fire Risk Work procedure exemption from the NSW RFS.	
BF8	The BESS facility would be managed as an APZ in broad alignment with Appendix 4 of 'Planning for Bushfire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'.	Operation
BF9	Access for Category 1 fire appliances would be maintained around the perimeter of the BESS facility and to and from the BESS facility.	Operation
Visual		
V1	During detailed design of the Project, a review of materials and colour finishes for noise walls and other visible built components of the Project would be completed to further reduce potential visual impacts where practicable.	Detailed design
V2	Lighting of the Site would be designed in accordance with AS 4282:2019 Control of the obtrusive effects of outdoor lighting.	Detailed design
V3	Construction hoarding would be used as needed to minimise visual impacts, where reasonable and feasible.	
V4	A Landscape Plan would be developed in consultation with the three affected visual residential receptors and other relevant stakeholders. The plan would comply with any fire safety requirements that are identified during detailed design. The Landscape Plan would be implemented as soon as practicable during construction to ultimately provide screening vegetation for the operation of the Project.	Detailed design, construction, operation
V5	Operational noise walls would be sensitively designed to blend into the surrounding landscape, where reasonable and feasible. Existing property boundary screening vegetation would be maintained as far as possible and additional planting would occur post construction to provide vegetation screening of the Site.	Operation
V6	Screening vegetation would be maintained throughout the operation of the Project to provide visual filtering and screening of the BESS facility	Operation
Social and economic		
SE1	A Community and Stakeholder Engagement Plan would be developed and implemented for the construction of the Project. This plan would detail the communication objectives of the plan and would outline how Neoen would consult and inform residences close to the Project and the wider Wallerawang community regarding key milestones or potential impacts related to the Project. The plan would describe where information of the Project is available, would contain a complaints management procedure and contact details for the person responsible for managing and resolving complaints.	Construction

ID	Management and mitigation measure	Timing
SE2	All businesses, residential properties and other key stakeholders affected by the Project would be notified at least five working days prior to commencement of construction. The notification would include: • Details of the Project • Construction period and construction hours Complaint and incident reporting and how to obtain further information	Construction
SE3	Complaints received from the community would be recorded, monitored and acted upon in a timely manner.	Construction
SE4	Access to properties including businesses and social infrastructure would be maintained throughout construction of the Project. Temporary measures such as traffic control would be used as needed to enable this to occur.	Construction
SE5	A dilapidation survey prior to and following construction (at a minimum) would be completed to identify any damage caused by construction traffic to local roads. Any damage identified would be remedied, if necessary	Construction
SE6	Local services and materials would be prioritised for the Project as far as practical.	Construction
Waste management		
W1	As part of the CEMP, a Waste Management Plan (WMP) would be prepared. The WMP would: • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Incorporate any relevant waste disposal requirements • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Specify protocols for classification of waste materials for off-site disposal or assessment under a resource recovery exemption • Set out processes for disposal, including on-site transfer, management and the necessary associated approvals/permits. Waste generated would be regularly removed from Site, in order to avoid potential issues associated with odour, visual amenity and attracting animals/pest species • Outline procedures for waste generated within the Project Area to be segregated at source and suitably stored in designated waste management areas within the Project Area Include material tracking measures to track waste and recyclables generated from the Project and removed from the Project Area.	Construction

ID	Management and mitigation measure	Timing
W2	All waste would be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (NSW EPA, 2014a). A waste classification letter would be prepared to allow for materials to be disposed off-site to a licensed landfill in accordance with NSW EPA guidelines.	Construction, operation
Air quality		
AQ1	The CEMP would include air quality management measures including measures to minimise visible dust moving offsite. Air quality measures would include that: • Daily construction activities would consider the expected weather conditions for each workday. • Approaches to minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable • Dust minimisation measures on exposed surfaces would be implemented, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to reasonably minimise dust generation • Defined Site entry and exit points would be defined to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of offsite track out of dirt is identified • Heavy vehicles entering and leaving the Site would be covered to prevent material escaping during transport, where there is a risk of this occurring • Vehicles and construction equipment operating onsite are kept well maintained and turned off when not operating (minimise idling on the Site) The handling of spoil would be minimised when excavating and loading of vehicles.	Construction
Cumulative		
CU1	Consultation between proponents and contractors for the Wallerawang Battery Energy System project and Great Western Battery project would be undertaken to gain an understanding of project timing and traffic movements to avoid potential cumulative traffic impacts where possible.	Construction

20.2.2 Construction Environmental Management Plan

A CEMP would be prepared by for the Project. The CEMP would address the relevant requirements of the planning approval documentation (including mitigation measures and conditions of consent). The CEMP would include sub-plans for the management of environmental matters where more detail is required. Subplans are identified in **Section 20.2.1**.

20.2.3 Operational Environmental Management

Environmental performance during operation of the Project would be managed by the implementation of an operational environmental management plan (OEMP) or similar. The OEMP would be prepared to be consistent with the conditions of consent.

The OEMP would detail how the management and mitigation measures identified in **Section 20.2.1** would be implemented and achieved during operation and would specify the environmental management practices and procedures to be followed. The OEMP would include the following:

- A description of activities to be undertaken during operation
- Statutory and other obligations, including approvals, consultations and agreements required from authorities and other stakeholders
- The relevant measures included in **Section 20.2.1**
- Overall environmental policies, guidelines and principles to be applied to operation
- A description of the roles and responsibilities, including relevant training and induction to ensure that employees are aware of their environmental and compliance obligations
- An environmental risk analysis to identify the key environmental performance issues associated with the operation phase
- Details of how environmental performance would be managed and monitored.

21.0 Project evaluation and justification

21.1 Overview

This chapter outlines the justification for the Project given the likely impacts and the merits of the Project as a whole, alongside addressing relevant legislative requirements.

In response to the SEARs:

- The objects of the EP&A Act are considered in **Section 21.3**. **Section 20.2.1** details how the principles of ecologically sustainable development have been applied to the Project
- **Section 21.4** includes an evaluation of the merits of the Project as a whole, including discussion of how the Project is in the public interest and reasons why it should be approved.

21.2 Ecologically sustainable development

21.2.1 The principles

This section provides a review of the Project, its impacts, and associated safeguards against the principles of ecologically sustainable development (ESD) in accordance with the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and the and the *Protection of the Environmental Administration Act 1991* (NSW). The principles, as listed in clause 7(4) of Schedule 2 of the EP&A Regulation, are as follows:

*a. the **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by—*

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options

*b. **inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations*

*c. **conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration*

*d. **improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services such as—*

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The following sections provide an overview of the principles and how they have been applied to the Project.

21.2.2 Precautionary principle

The precautionary principle deals with certainty in environmental and technical decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

An EIS is a public process which examines the potential effects of the Project. Therefore, the EIS process is considered precautionary in nature. The requirement to assess the impacts of the Project is a form of regulation designed to identify and address uncertainty about the effects of these activities.

This EIS has been prepared by suitable experienced professionals in their respective fields and has identified and assessed the potential environmental impacts of the Project. The assessment of the potential impacts of the Project is considered to be consistent with the precautionary principle. The assessments undertaken in the EIS are consistent with accepted scientific and assessment methodologies and have considered relevant statutory and agency requirements. Where there has been uncertainty in the prediction of impacts through the EIS process, a conservative approach was adopted to ensure the worst-case scenario was predicted in the assessment of impacts. For example, the noise and vibration assessment has conservatively assessed that all operational equipment on the Site would be operating concurrently, 24 hours a day, seven days a week. It has also presented a conservative scenario for construction noise assuming most plant and equipment would operate at once. In addition, the water quality assessment has demonstrated that the Project can achieve an overall sustainable neutral or beneficial effect (NoRBE) on water quality with the delivery of an appropriately sized bioretention system.

The Project has evolved to avoid impacts where possible, and to reflect the findings of the assessments undertaken. Appropriate management and mitigation measures have been developed to minimise potential environmental impact. Taking these measures into account, it is considered that there would be no threat of serious or irreversible damage to the environment as a result of the Project.

21.2.3 Inter-generational equity

Inter-generational equity requires that the present generation pass onto the next generation an environment that does not limit the ability of those future generations to attain a quality of life at least equal to that of the current generation.

Energy storage has emerged as a key enabler for the decarbonisation of the Australian electrical system. Energy storage allows greater penetration of intermittent renewable energy sources while maintaining network stability and security. The Project would support the transition to renewables through the delivery of a grid-scale battery to resolve system strength issues caused by intermittent renewable supply and the flow on impacts for renewable generation.

The Project would also provide storage, regulation and firming capacity to the NEM and improve the security, resilience and sustainability of NSW's electricity grid. By providing these grid services, the Project would help support greater renewable investment, delivery, and integration, and may reduce reliance on conventional fossil fuel sources. These benefits would help reduce greenhouse gases but would also mean that future generations can connect to this part of the grid.

This EIS has assessed the type and extent of potential impacts caused by the Project. The Project incorporates a range of management and mitigation measures to minimise potential impacts on the environment. These measures aim to maintain the environmental conditions within and surrounding the Project such that detrimental impacts do not affect the future health, diversity and productivity of the environment.

21.2.4 Conservation of biological diversity and ecological integrity

Biological diversity relates to the breadth and variety of life. Ecological integrity refers to maintenance of the relationships, dependencies and services supplied by all lifeforms and the physiochemical environment to each other. The conservation of these elements is critical to the proper functioning of natural environments and the biosphere in general. This principle asks that conservation of biological diversity and ecological integrity should be a fundamental consideration for a project.

During the development of the Project a number of measures were taken to avoid potential impacts on biodiversity which would help maintain biological diversity and ecological integrity.

These include:

- Safeguarding the mature vegetation in the north west corner of the Site

- Committing to use an underboring technique to install the transmission line under the mature woodland area and protected riparian corridor between Brays Lane and the rail corridor
- Incorporating swales across the Site to increase habitat connectivity
- Designing the stormwater system to ensure that surface water discharges would have a NorBE.

These measures would avoid impacts to threatened biota and more ecologically valuable communities.

A biodiversity assessment has been undertaken by qualified specialists to assess the ecological values within the Project Area and surrounds, determine whether the Project is likely to have an impact on threatened biodiversity (refer to **Appendix C Biodiversity Development Assessment Report** and **Chapter 8 Biodiversity**). Through the proposed management and mitigation measures it is concluded that the Project would not have a significant adverse impact on the biological diversity or ongoing ecological integrity of the locality. The Project is clearing only low condition vegetation, and avoidance of clearing impacts would continue to be a key focus during detailed design. The Project would also include obtaining biodiversity credits to offset potential impacts.

21.2.5 Improved valuation and pricing of environmental resources

This ESD principle is premised on an assumption that all resources should be appropriately valued and that the value of environmental resources should be considered alongside any economic or cost benefit analysis for the life of the Project.

The Project would provide value to the local and State economy while not compromising the natural value of the local environment and the services it provides. With the implementation of management and mitigation measures, the Project would result in no significant impact to the environment, while supporting the reliability of energy supply of the NSW’s electricity grid and storage and firming capacity to the NEM.

The Project incorporates a range of management and mitigation measures to minimise potential impacts on the environment. The costs associated with these measures have been incorporated into the capital investment and operating costs of the Project.

21.2.6 Compatibility with the Principles of ESD

In preparing the Project, emphasis has been placed on the avoidance of impacts through careful design as well as management and mitigation measures to minimise potential negative environmental, social and economic impacts. This has included the consideration of the principles of ESD. The Project is considered to be compatible with the principles of ESD.

The design and construction methodology would continue to be developed with these objectives in mind and would continue to consider the input of stakeholders and the local community.

21.3 Objects of the *Environmental Planning and Assessment Act 1979*

Consideration has been given to the consistency of the Project with the objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as outlined in the following sections.

a. to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State’s natural and other resources

The Project would provide employment benefits and would not result in significant adverse ecological impacts. As the electricity market moves away from coal, emerging technologies such as battery storage are increasingly needed to facilitate the transition to renewable energy generation by allowing electricity to be dispatched to the grid as needed. The Project would provide storage and firming capacity to the NEM as well as additional services to assist grid stability, including frequency control ancillary services.

b. to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment

This EIS assesses the Project and identifies the likely impacts on the environment and surrounding community. With the implementation of management and mitigation measures outlined in **Chapter 20 Environmental management**, residual impacts on the environment are anticipated to be negligible. Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby assisting to place a downward pressure on energy prices.

c. to promote the orderly and economic use and development of land

The Site is located within close proximity to key power utility infrastructure. In this location, the Project would deliver critical energy infrastructure that would support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region.

d. to promote the delivery and maintenance of affordable housing

The Project would not affect the provision or maintenance of affordable housing.

e. to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats

This EIS presents a detailed assessment of the potential environmental impacts associated with the Project. The mitigation measures outlined within this EIS would allow for the protection of the environment, including the protection and conservation of native animals and plants, threatened species, populations and ecological communities, and their habitats.

f. to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)

An Aboriginal Cultural Heritage Assessment Report has been undertaken by qualified specialists to assess the Aboriginal values within the Project Area and surrounds, determine whether the Project is likely to have an impact on Aboriginal heritage (refer to **Appendix D Aboriginal Cultural Heritage Assessment Report**).

As discussed in **Chapter 9 Aboriginal heritage** the Project would result in a near-complete, permanent loss of value for stone quarry GWB-STQ1-21. A comprehensive salvage program has been proposed to mitigate this impact. Overall, it is estimated that the Project would result in a 0.02% decline in the region's potential Aboriginal archaeological resources. On this basis, it is concluded that the impact of the Project on this resource would be negligible. Refer to **Chapter 9.0 Aboriginal heritage** for further detail.

St John the Evangelist Church, listed on the NSW State Heritage Register (Item ID: 5053347) and the Lithgow Local Environmental Plan 2014 (Item ID: I112) is located near the proposed transmission line. The curtilage of this item is adjacent to the rail corridor however the built structure of the Church is about 30 m from the transmission line.

Due to the proximity of the proposed transmission line, there may be a potential for vibratory construction activities to result in cosmetic damage to this heritage item. To avoid damage occurring, where possible high vibratory construction methodologies would not be used within 50 m of St John the Evangelical Church. Subject to the implementation of appropriate protective measures, construction of the BESS and proposed transmission line is not expected to have adverse impacts St John the Evangelist Church.

No other state or locally listed non-Aboriginal heritage items are expected to be impacted by the Project during construction or operation.

g. to promote good design and amenity of the built environment

The Project would be located in amongst a mixed-use landscape that contains a patchwork or rural-residential uses alongside industrial and electricity generating land uses. As an electricity generating works facility, the design of the Project would be suited to this landscape context.

With the implementation of proposed management and mitigation measures, the Project would not adversely affect the amenity of the surrounding built environment.

h. to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants

The Project would be constructed and maintained in accordance with applicable Australian Standards and building codes and would be designed to meet fire prevention and suppression requirements under these standards. The Project would operate in a safe and efficient manner.

i. to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State

The Project is to be assessed as SSD under Part 4 of the EP&A Act by the NSW Minister for Planning and Public Spaces or the Independent Planning Commission. Meetings have occurred with State agencies (Transport for NSW, the NSW Heritage Council and NSW DPE), and local council (Lithgow City Council). Ongoing consultation would occur with these agencies regarding the Project, and would continue through its implementation and operation, as required.

j. to provide increased opportunity for community participation in environmental planning and assessment.

Neoen has consulted with the local community and other relevant stakeholders regarding the Project, as documented in this EIS (refer to **Chapter 6.0 Consultation**). The development of the Project has considered the outcome of stakeholder consultation, and consultation with the local community would continue throughout the implementation of the Project.

The community and other stakeholders, namely adjacent neighbours, will continue to be engaged throughout the EIS process. The EIS will be placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period community members and stakeholders have the opportunity to submit feedback to NSW DPE. Community engagement will also be maintained throughout the construction of the Project. Refer to **Chapter 6 Consultation** for further details.

21.4 Project justification

As the electricity sector moves away from coal generation, emerging technologies such as battery storage, are increasingly required to facilitate the transition to renewable energy generation by allowing electricity generated from renewable sources to be dispatched to the grid as needed. Over the past decade there has been a progressive increase in installed renewable generators within the NEM. Renewable generation (in particular wind and solar) is intermittent in nature generating when wind and solar resources are available, respectively. During the same period there has been progressive retirement of thermal generators from the NEM.

Both presently and into the future, there will be a requirement to provide energy storage and firming capacity to enable the transition from thermal generation to a renewable future. The Project would provide storage and firming capacity to the NEM as well as additional services to assist grid stability including frequency control ancillary services.

Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby placing a downward pressure on energy prices. Furthermore, battery storage technologies are anticipated to be key to the development of Renewable Energy Zones under the NSW Government's *Transmission Infrastructure Strategy 2018*.

The Project would help support the existing transmission network and provide the infrastructure required to facilitate a growth in renewable energy infrastructure and development. The Project would align with key strategic energy policy for NSW, including the NSW Government's *Central West and Orana Regional Plan 2036* and *Transmission Infrastructure Strategy 2018*. Delivery of the Project would provide greater network stability in the Lithgow region, and more broadly across the NSW electricity grid.

The need for the Project and suitability of the Project Area is further detailed in **Chapter 3 Need and alternatives**. Further detail on the alignment of the project with strategic planning objectives and statutory requirements is provided in **Chapter 5 Strategic and statutory context**.

An overview of stakeholder and community consultation, and where comments have been addressed in the EIS is provided in **Chapter 6 Consultation** (refer to **Table 6-2** and **Table 6-3**). Overall the community and stakeholders remain supportive of the Project. Neoen will continue to consult with the community and key stakeholders about the Project and will address any questions or issues as they arise.

The Project has been developed with the objective of minimising potential impacts on the local and regional environment and community. The design and construction methodology would continue to be developed with these objectives in mind and would continue to consider the input of stakeholders and the local community.

This EIS provides a comprehensive and appropriate assessment of the Project and its relevant environmental, social and economic issues, both alone and cumulatively. Potential impacts have been assessed and strategies to avoid, minimise and mitigate those impacts form a key part of the Project. This EIS includes a number of commitments to manage environmental impacts during the Project (refer to **Chapter 20 Environmental management**). Provided the management and mitigation measures are implemented and remain effective, there would be no likely residual adverse impacts for the following aspects given the existing environment:

- Biodiversity
- Historic heritage
- Surface water, hydrology and flooding
- Geology, soils, contamination and groundwater
- Land use
- Hazard and risks
- Bushfire
- Other matters (social and economic, air quality, and waste management).

For the remaining aspects (Aboriginal heritage, noise and vibration, traffic and access, landscape and visual), it has been concluded that the Project could generate residual adverse impacts (albeit negligible to moderate impacts). With the implementation of the management and mitigation measures in **Chapter 20 Environmental management**, it is considered that these residual impacts would be manageable.

Furthermore, given the nature of the potential residual impacts of the Project, the potential for cumulative impacts with other projects is considered to be negligible.

Overall, this EIS has concluded that the Project should proceed as it would:

- Be located in close proximity to key power utility infrastructure and identified future growth zones with regards to investment in renewable energy infrastructure. In this location, the Project would deliver critical energy infrastructure that would support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region
- Be located on a site that when compared to other options, presents environmental impacts that are equal to or less than other available options in the surrounding area
- Provide for the advantageous, orderly and economic use of land in a landscape that has a history of power generation and transmission alongside various rural and industrial land uses
- Meet the objectives of the Project
- Satisfy the principles of ESD as described in the EP&A Regulation.

In addition, the Project's environmental performance during construction would be demonstrated by implementing the CEMP (and associated sub-plans). These plans would be designed to comply with relevant legislation and conditions of consent. They would include a range of mitigation measures developed following the environmental assessment documented in this EIS. Environmental performance during operation would be demonstrated by implementing the operational measures specified. The Project would result in several positive or beneficial environmental impacts with regards to surface water quality and flooding, socio economics, and air quality.

Taking into account the manageability of the identified impacts, the benefits of the Project would outweigh the potential impacts and the Project is considered to be in the public interest. Based on the findings detailed within this EIS, the Project is considered to be justified and is recommended to proceed subject to consent.

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