Prepared for
AGL Macquarie Pty Ltd
ABN: 18 167 859 494

Environmental Impact Statement

Tomago Battery Energy Storage System

03-Nov-2023
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Environmental Impact Statement

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Client: AGL Macquarie Pty Ltd

ABN: 18 167 859 494

Prepared by

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Declaration

<table>
<tr><th colspan="3">Project details</th></tr>
<tr><td colspan="2">Project name</td><td>Tomago Battery Energy Storage System (BESS)</td></tr>
<tr><td colspan="2">Application number</td><td>SSD-57107216</td></tr>
<tr><td colspan="2">Address of the land in respect of which the development application is made</td><td>The Project involves the construction, operation and maintenance of a Battery Energy Storage System (BESS). The proposed location of the BESS (the Site) is at 1940 Pacific Highway, which is located on Part Lot 5 and Lot 6 in Deposited Plan (DP) 1286735. The Project also involves the installation of a transmission connection between the Site and either the 132 kilovolts (kV) substation (on Lot 101 DP1125747) or the 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747).

The proposed transmission connection would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. This land allows for the connection of the BESS to either the 132 kV substation (on Lot 101 DP1125747) or the 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747).

A potential construction laydown area has been considered nearby at AGL's existing Newcastle Gas Storage Facility (NGSF) , located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of the Site.</td></tr>
<tr><th colspan="3">Applicant details</th></tr>
<tr><td colspan="2">Applicant name</td><td>AGL Macquarie Pty Ltd</td></tr>
<tr><td colspan="2">Applicant address</td><td>Level 24, 200 George Street, Sydney NSW 2000</td></tr>
<tr><th colspan="3">Details of person by whom this EIS was prepared</th></tr>
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<tr><td colspan="2">Organisation registered with</td><td>Certified Environmental Practitioner – Impact Assessment Specialism
Environment Institute of Australia and New Zealand (EIANZ)</td></tr>
<tr><td colspan="2">Declaration</td><td>The undersigned declares that this EIS:
• Has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021
• Contained all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates</td></tr>
</table>

	• Does not contain information that is false or misleading • Addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project • Identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments • Has been prepared having regard to Department's State Significant Development Guidelines – Preparing an Environmental Impact Statement • Contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principals of ecologically sustainable development • Contains a consolidated description of the project in a single chapter of the EIS • Contains an accurate summary of the findings of any community engagement • Contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	03 November 2023

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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
dB	Decibel
dB(A)	A-weighted decibels
DCP	Development Control Plan
DCCEEW	Department of Climate Change, Environment, Energy and Water
DEM	Digital Elevation Model
DP	Deposited Plan
DPE	NSW Department of Planning 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 2021*
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
ISP	Integrated System Plan
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
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area

Acronym	Definition
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
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSDA	State Significant Development Application
SWL	Sound power levels
SWMP	Surface Water Management Plan

Acronym	Definition
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*
WASMP	*Water and Soil Management Plan*
WCMS	Water Cycle Management Study
WM Act	*Water Management Act 2000*
WMP	Waste Management Plan
WSUD	Water sensitive urban design

Executive Summary

Overview

AGL Macquarie Pty Ltd (AGLM), a subsidiary wholly owned by AGL Energy Limited (AGL), seeks development consent to construct, operate, and maintain a Battery Energy Storage System (BESS) with a capacity of up to 500 megawatts (MW) and up to 2,000 megawatt hours (MWh) (the Project). The proposed location of the BESS (the Site) is at 1940 Pacific Highway, which is located on Part Lot 5 and Lot 6 in Deposited Plan (DP) 1286735. The Project would also involve the installation of a transmission connection/s between the Site and either the Transgrid Tomago 132 kilovolts (kV) substation (on Lot 101 DP1125747) or the Transgrid Tomago 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747). Both of these substations are located close to the southeastern boundary of the Site.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979 (NSW)* (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 NSW Department of Planning and Environment (DPE) on 12 May 2023. This EIS has been prepared in accordance with the *Environmental Planning and Assessment Regulation 2021*, as well as the NSW Government State significant development guidelines – Appendix B – *preparing an environmental impact statement* (DPE, 2022).

The Project

AGL is seeking development consent for a BESS facility that would store energy from the grid with the ability to release electricity during periods of high demand and provide other ancillary services. Key features of the Project would include:

- Construction and operation of a BESS with a nominal demand capacity of up to 500 MW and storage of up to 2,000 MWh (construction of the Project may be carried out in stages).
- An above ground, below ground, or a combination of both transmission connection/s between the proposed BESS and one of the neighbouring substations. The proposed transmission connections would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. The BESS would connect to either:
  - 132 kV substation located on Lot 101 DP1125747; or
  - 330 kV substation located on Lot 3 DP808004, and Lots 102 and 103 DP1125747.

Key components of the Project would include:

- Batteries located within battery enclosures and associated infrastructure including, but not limited to, inverters and a combination of high, medium and low voltage transformers
- Cabling and collector units
- High voltage substation, with associated infrastructure including high voltage transformers and other equipment to meet Generator Performance Standards (e.g., harmonic filters and/or synchronous condensers, if required)
- Connection to an existing electrical switchyard at either the 132 kV or 330 kV substation
- Temporary and permanent control, office and maintenance buildings, switch rooms, site access, internal roads, laydown areas and car parking
- Other associated and ancillary infrastructure, including for example, fire suppression, drainage and stormwater management, security fencing, lighting, and CCTV.

The Project description for which development consent is sought is provided in **Chapter 3.0 (Project description)**.

Consultation

AGL have undertaken consultation with a number of key agencies and stakeholders throughout the development of the Project to date, including:

- Government and technical stakeholders
- Landowners
- The local community.

A summary of the consultation activities completed during the preparation of this EIS is provided in **Chapter 5.0 (Engagement)** and **Appendix C (Community engagement table)**.

AGL 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

Aspect	Summary
Hazards and risk	A Preliminary Hazards Analysis (PHA) was prepared to assess potential hazards and risks 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*. A hazard identification exercise was undertaken in accordance with the HIPAP 6 methodology to identify reasonably foreseeable hazards and associated events that may arise during the operation of the Project. The hazard events identified from the exercise included: • Fire in a battery enclosure, (e.g. due to an uncontrolled runaway reaction or decomposition within the lithium-ion batteries at the BESS) has the potential to be harmful to people in the area and to lead to propagation to nearby infrastructure • Environmental impact if there is a spill from the battery enclosure, transformers, or landing gantries, e.g. cooling medium or oil • Arc flash or fire associated with electrical equipment including transformer oil and electrical cabling has the potential to be harmful to people nearby and lead to propagation to nearby infrastructure • Exposure to electromagnetic fields has the potential to be harmful to people in the area and to lead to propagation to nearby infrastructure • Locating the Project near or in proximity to neighbouring vulnerable or potentially hazardous facilities or utilities may initiate a propagation incident, as follows: - Construction across the AGL high pressure natural gas pipeline may result in damage to the pipeline and a release of flammable gas - Locating the temporary construction laydown area at the NGSF may cause impact between the Project and the NGSF. In addition, the Tomago

Aspect	Summary
	Sandbeds are vulnerable to any degree of pollution and require protection - General hazards associated with the natural hazards and the nearby industrial area and specific hazards associated with the Toll warehouse and the Pacific Highway (M1). 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 is considered rare.
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 the potential biodiversity impacts would occur during construction from clearing of native vegetation and removal of habitat for flora and fauna. The Project would result in the removal of 14.1 hectares (ha) of native vegetation, 11.3 ha of which represents the BC Act listed Threatened Ecological Community (TEC) Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions. The Project would require the removal of: • 14.1 ha of Common Planigale habitat (assumed present) • 1.7 ha of Netted Bottlebrush habitat only, no individuals removed • 10.7 ha of Southern Myotis habitat • 0.2 ha of *Pterostylis chaetophora* habitat. The Project would also result in the loss of 14 hollow-bearing trees. The construction and operation of the Project would 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 229 ecosystem credits and 414 species credits would be required to offset residual impacts. Mitigation measures would help to minimise the potential impacts to biodiversity values that remain present within the Project Area.
Water	A Surface Water and Flooding Assessment (SWAFA) has been prepared for the Project to assess potential impacts relating to surface water, flooding and water use. During construction, surface water flows would be managed to avoid sediments and 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. A bioretention system has been proposed as part of the Project to treat the surface water flows from the BESS facility. This bioretention system would be used in conjunction with other treatments such as rainwater tanks, interceptors, and gross pollutant traps.

Aspect	Summary
	The operation of the Project is not anticipated to impact on groundwater except for an increase of 9.7 ha of impermeable surfaces on the Site. This may result in localised decreases in groundwater levels due to a reduction in recharge to groundwater aquifers. During operation, potable water would be supplied directly to the Site from a new connection to Council's municipal supply system on Old Punt Road. This would service the Site office building and other amenities. It would also supply water to the fire services system. The water supply demand for the Site would be minimal as it would be operated remotely, with staff only required onsite periodically. Associated infrastructure, including transmission lines, would not be impacted by flooding in all events up to and including the PMF event, as the associated infrastructure is positioned along the natural ridgeline, which is set above peak flood levels.
Soils and contamination	*Erosion* Ground disturbance works during construction would include excavation, transport, storage and reuse of soils across the Site, underboring, and trenching. Given the land capability within the Project Area is identified as moderate to low. No significant geotechnical constraints have been noted. Construction activities have the potential to destabilise soils and cause erosion which may result in impacts to surrounding water and air quality. These would be mitigated in line with the SWMP within the CEMP. 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 desktop assessment and site survey undertaken by Aurecon (2019) identified potential areas of environmental contamination (AECs) including septic tanks, residential compound, dumped waste, and three separate areas of stockpiled material. However due to the compulsory acquisition of land between the Site and the Pacific Highway by TfNSW, the AECs containing the septic tanks, and residential compound is now located outside of the Site. According to the Aurecon report the other potential areas of environmental contamination do not contain any contaminants of potential concern (COPC), with the exception of the dam The contaminants of potential concern related to the dam AEC (Aurecon, 2019d) include: • Copper • Chromium • Lead • Zinc. The COPC detected at elevated concentrations in surface water were considered by Environmental Strategies to likely to be naturally occurring background levels rather than contamination and/or pollution. Parts of the Project Area may be located within areas which contain contaminated soils or contaminants of potential concern due to the historic uses, existing stockpiling or spills. Based on historical land use, there is potential for contamination to be encountered across the Project Area. Of the AECs recorded, the residential compound, dumped waste, and stockpiled material were assessed as having the potential to cause ecological or human health risks, due to the presence of polycyclic

Aspect	Summary
	aromatic hydrocarbons (PAHs) in the contaminated material (Aurecon, 2019). 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. Land that is not required for the operation of the Project would be rehabilitated and returned to its pre-development condition or would be landscaped, as needed.
Traffic and transport	A Traffic Impact Assessment Report (TIA) has been prepared for the Project to assess potential traffic, transport and access impacts during construction and operation of the Project. During the construction and operation phases, the Pacific Highway, Old Punt Road and Tomago Road would be the main transport routes to the Site. A peak of up to 200 construction staff would be required during construction of the Project. At times, this number could be significantly less depending on the works being undertaken. Up to 33 heavy vehicles a day may need to attend the Site during construction. A Construction Traffic Management Plan (CTMP) would be prepared in consultation with Port Stephens Council and TfNSW to mitigate potential traffic impacts. During operation, the Project is anticipated to require up to six staff members, on an intermittent basis. As a result, the traffic generation during operation would be very low, and as such is not expected to impact the road network surrounding the Site.
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. No residential receivers during construction are expected to experience noise levels above the construction noise management level. As such, no residential receivers are expected to be affected. The activities associated with the construction components for the Project are expected to exceed the noise management levels at one industrial premises directly adjoining the Site during the daytime. 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 2 dB(A) during peak construction period for a worst case scenario. Therefore, the potential traffic noise impact on residential receivers would be negligible and not noticeable. Given the low number of staff required for operation, minimal traffic movement generation is expected as a result of the operation of the BESS. Therefore, noise impacts arising from operational traffic would not occur and be less than 2 dB(A). Operational noise impacts for receivers are considered negligible with only a 2dB(A) exceedance at a residential receiver located over 600 m away from the Project Area. The Noise Policy for Industry (NPfI) denotes that an exceedance of 2dB(A) is undiscernible from the existing background environment.

Aspect	Summary
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. Key considerations in the assessment included: • Extent and continuity of vegetation • Topography • Prevailing winds • Potential fire run and areas likely to be impacted by the fire • Impact on evacuation routes to safer places considering road networks, distances, and landscape factors • Location and exposure of the development to bushfire • Ability to seek bushfire shelter onsite or at alternative locations • Extent of neighbourhood-scale damage the bushfire may produce. Potential impacts relating to bushfire during construction include onsite ignitions, which may result in a fire escaping to the surrounding land, and occupational fire risk, being the risk of workers being caught by out-of-control bushfire impacting the Site. Potential impacts relating to bushfire during operation include onsite ignitions, occupational fire risk, disruption to power supply if the Site is impacted by fire, and loss of critical infrastructure. A Bushfire Emergency Management and Evacuation Plan would be prepared to manage the potential impacts during construction and operation of the Project.
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 six Aboriginal archaeological sites. Two sites would be partially impacted, and four sites would be wholly impacted. A comprehensive salvage program has been proposed to mitigate this impact. No further loss would be expected during operation. 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.
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.

Aspect	Summary
Air quality	Air quality impacts are only likely during construction. Construction works are likely to generate dust emissions from the movement of vehicles, heavy machinery, and ground disturbance works, particularly during dry conditions. Other impacts include emissions generated from site vehicles, trucks, water carts, diesel generators, and certain machinery used onsite such as excavators and graders. 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 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.
Non-Aboriginal heritage	Non-Aboriginal heritage impacts were considered through conducting a desktop assessment and leveraging the Non-Aboriginal Heritage Assessment (ERM 2019) prepared for the Site. Based on this assessment there were no registered or known significant historic (non-Aboriginal) heritage sites in or near the Project Area. The historical background assessment contained within NAHA, concluded that there may have been evidence of early agricultural activities, timber harvesting, fence lines, tracks and evidence of rudimentary outbuildings, such as sheds previously located within the Project Area. Given the long-term pastoral grazing and ongoing site disturbance associated with the installation of and maintenance of the transmission lines through sections of the Project Area, it is unlikely that there are substantial historical remains from the historical activities on the Site.
Visual amenity	A qualitative Visual Impact Assessment (VIA) for the Project was undertaken. This assessment was informed by the technical assessment for the NPS project and visual and landscape information provided in the M1 Pacific Motorway extension to Raymond Terrace (SSI-7319) (M1 Extension Project). The construction of the Project would be screened and not visible to most visually sensitive receptors. Motorists passing the Site on the Pacific Highway or Old Punt Road may briefly glimpse the construction activities and note the change in land use, however these views would be transient and in keeping with construction of other developments in the immediate area. The construction works for the BESS facility would be limited to the Site and would be relatively short in duration. Overall, whilst a change would occur for motorists passing the Site, the temporary nature of the construction works, the low sensitivity of receptors impacted, and the existing screening around the Site mean that a low level of visual impact is expected. Once constructed, the tallest piece of Project infrastructure would be the lightning rods above the high voltage transformers. These narrow rods would extend up to around 20 m above the ground. The high voltage transformers within the substation would have a height of approximately 10 m. Whilst the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. The Project would be located on a long stretch of industrial type development stretching from Heatherbrae, Tomago through to Hexham. Given the context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings, such as Tomago Aluminium Smelter, NGSF, Transgrid substations, Pacific Highway, electrical transmission and distribution lines, Grahamstown Water Treatment Plant, the Kooragang Island Port, and the other industrial areas in and around Tomago. On this basis the sensitivity of the landscape to this change is considered low given the existing characteristics of the local area.

Aspect	Summary
Waste management	Waste expected to be generated during construction includes vegetation (from clearing of weeds, trees, and shrubs), wastewater, construction waste, and demolition materials generated form the removal of existing infrastructure (e.g., fencing). A Construction Waste Management Plan would be prepared and implemented as part of the CEMP for the Project and would outline ways to optimise resource efficiency and waste management during construction. During operation, the Project is likely to generate operational equipment waste (e.g., replaced battery modules, used transformer oil), onsite office waste, and waste generated by workers.

Justification of the Project

The Project involves the development and operation of a large-scale BESS with a capacity of up to 500 MW and up to 2,000 MWh. The Project would be within the NSW Government declared Hunter and Central Coast Renewable Energy Zone (REZ) and would function to smooth out fluctuations in electricity supply from intermittent power sources (for example, solar and wind energy), providing system security and other network services.

The Project would provide environmental, social, and economic sustainability benefits to NSW as the Project would facilitate a deeper penetration of intermittent renewable energy within the National Energy Market (NEM). At a regional level, the Project would contribute to the regional economy through increases in direct and indirect business turnover, value add, household income and job creation.

The Project would result in environmental and social impacts as identified throughout the EIS, which would be managed through the mitigation and management measures described throughout, such that the Project would not result in significant environmental or social impacts.

The Project would achieve the following overall benefits:

- Alignment with Commonwealth, NSW electricity policies and strategies, and regional plans
- Contribution to the overall storage capacity of the NEM and provide greenhouse gas benefits by increasing the surplus of electricity generated from renewable sources that are intermittent (such as solar and wind)
- Improvements to network reliability by providing back-up power during network disruptions
- Decreases to average prices by smoothing out price differences.

It is considered that the environmental, social, and economic benefits for the local, regional and NSW communities far outweigh the negligible impacts that would result from the development and operation of the Project and that the Project should be approved.

1.0 Introduction

1.1 Overview

AGL Macquarie Pty Ltd (AGLM), a subsidiary wholly owned by AGL Energy Limited (AGL), seeks development consent to construct, operate, and maintain a Battery Energy Storage System (BESS) with a capacity of up to 500 megawatts (MW) and up to 2,000 megawatt hours (MWh) (the Project). The proposed location of the BESS (the Site) is at 1940 Pacific Highway, which is located on Part Lot 5 and Lot 6 in Deposited Plan (DP) 1286735. The Project would also involve the installation of a transmission connection between the Site and either the 132 kilovolts (kV) substation (on Lot 101 DP1125747) or the 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747). Both of these substations are located close to the southeastern boundary of the Site.

Figure 1.7-1 shows the regional context around the Site and **Figure 1.7-2** shows the Site itself within the immediate context. The Site, construction laydown areas (including at the Newcastle Gas Storage Facility (NGSF)), and the transmission connection/s corridors constitute the Project Area (refer to **Figure 1.7-3**).

BESS projects are considered electricity storage projects and are defined as '*electricity generating works*' under *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) as a building or place used for the purpose of electricity storage. Clause 2.36 of Transport and Infrastructure SEPP states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed non-residential zone. The Site is located within the E4 General Industrial land use zone, which is a prescribed non-residential zone under clause 2.35 of Transport and Infrastructure SEPP. On this basis, the Project is permissible with development consent on the Site.

Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) defines development that is State Significant Development (SSD) and notes that development can be declared as such by an Environmental Planning Instrument (EPI). Under the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP), '*electricity generating works'* are deemed to be SSD if they have a capital investment value (CIV) of more than $30 million. The Project is defined as '*electricity generating works*' and based on projects of a similar type and scale, the Project will have a CIV significantly greater than $30 million and is therefore considered SSD.

Section 4.12(8) of the EP&A Act states that a development application for SSD is to be accompanied by an Environmental Impact Statement (EIS) prepared by or on behalf of the applicant in the form prescribed by the regulations. Section 190 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) sets out the form of an EIS, Section 191 requires that the EIS comply with the SEARs for the Project, and Section 192 details the content of the EIS.

SEARs were issued by the Secretary of the NSW Department of Planning and Environment (DPE) on 12 May 2023 and have been summarised in **Appendix A (SEARs table)**. This EIS has been prepared in accordance with the EP&A Regulation, as well as the NSW Government State significant development guidelines – Appendix B – *preparing an environmental impact statement* (DPE, 2022). The structure of this EIS is further detailed in **Section 1.7**.

1.2 The Project

1.2.1 Background to the Project

AGL Energy Limited (AGL) previously obtained Critical State Significant Infrastructure Approval (SSI No. 9837) to construct and operate a 250 MW gas fired peaking power station (referred to throughout this document as the Newcastle Power Station, NPS) at the Site in 2018. The approved NPS was proposed off Old Punt Road, Tomago located within Part Lot 5 and Lot 6 DP1286735 (formerly Lot 2 and 3 in DP 1043561 prior to subdivision of this land as a result of a compulsory acquisition by Transport for NSW (TfNSW) pursuant to a Government Gazette notice for the M1 Extension Project (SSI-7319)), with the gas and electrical transmission lines traversing a number of adjacent parcels of land. More information on the NPS has been provided in **Section 1.5**.

The decision whether to proceed with development of the NPS continues to be reviewed by AGL based on future plans, as stated under AGL's Climate Transition Action Plan (CTAP) (2022). AGL's CTAP was produced to assist the transition to a low carbon emissions based economy, consistent with *Australia's Long Term Emissions Reduction Plan* (DCCEEW, 2022), *NSW Renewable Energy Action Plan* (NSW Trade and Investment, 2013), *NSW Climate Change Policy Framework* (Office of Environment and Heritage, 2016), and *Hunter Regional Plan 2041* (Department of Planning and Environment, 2022).

AGL is therefore exploring the alternative of installing a BESS at the Site. In alignment with AGL's CTAP and the *Hunter Regional Plan 2041*, the development and operation of a BESS would support a net zero emissions economy, align with the objectives of the Hunter-Central Coast Renewable Energy Zone, and help mitigate energy security risks to the east coast electricity market following the recent closure of the Liddell coal-fired power station. Further information regarding the Hunter Regional Plan 2041 and other policies that have influenced AGL's consideration of alternatives to the NPS are provided in **Section 2.3**.

A range of strategies have been employed through project conception, development and delivery, with the aim of avoiding, minimising and offsetting potential impacts associated with the Project. These include:

a. Site selection has included identifying a site for the BESS close to two existing substations to minimise potential impacts related to the transmission connection.

b. The position of the BESS and transmission connection within the Project Area was planned to minimise impacts to surrounding sensitive environmental receivers. These included:

    1. Avoidance of the restricted area of the Tomago Sandbeds, a subterranean water aquifer maintained by Hunter Water Corporation (HWC)

    2. Collaboration with ecologists to select areas for development within the Project Area that would minimise biodiversity impacts and clearing

    3. Positioning of the BESS facility on a topographic high point above the flood planning level to minimise the risk of construction activities causing impacts to water quality in the unlikely event of a flood. Further details of sensitive environmental receivers are provided in **Section 2.4.2**.

c. The proposed transmission connection route/s were selected after consultation with landowners, TfNSW, and other parties to determine the preferred alignment that ensures potential construction impacts are minimised.

d. The Project is proposed as an alternative to the NPS which was considered a controlled action (EPBC 2019/8425) under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act). The Project's scale is significantly less than the NPS and as such the magnitude and type of potential impacts on Matters of National Environmental Significance (MNES) are also reduced or avoided entirely. As a pro-active and precautionary measure, a referral was made to the Department of Climate Change, Environment, Energy and Water (DCCEEW) in May 2023 to determine whether the Project constitutes a controlled action. DCCEEW determined on, 14 September 2023 that the Project does not constitute a Controlled Action under the EPBC Act.

1.2.2 Project objectives

The objectives of the Project are:

- Provide firming capability to support existing and new renewable energy projects in the Hunter and Central Coast Renewable Energy Zone (REZ) and throughout the Australian National Electricity Market (NEM)
- Support the transition of the closed Liddell Power Station site to an Integrated Energy Hub for the Hunter region
- Support and maintain economic development and social licence for renewable energy within NSW by providing reliable and dispatchable electricity during periods of peak demand
- Where applicable, provide dynamic voltage control and other network services to help correct and/or stabilise the wider transmission network.

1.2.3 Key features of the Project

To satisfy Project objectives, AGL is seeking development consent for a BESS facility that would store energy from the grid with the ability to release electricity during periods of high demand and provide other ancillary services. Key features of the Project would include:

- Construction and operation of a BESS with a nominal demand capacity of up to 500 MW and storage of up to 2,000 MWh (construction of the Project may be carried out in stages).
- An above ground, below ground, or a combination of both transmission connection/s between the proposed BESS and one of the neighbouring substations. The proposed transmission connections would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. The BESS would connect to either:
  - 132 kV substation located on Lot 101 DP1125747; or
  - 330 kV substation located on Lot 3 DP808004, and Lots 102 and 103 DP1125747.

Key components of the Project would include:

- Batteries located within battery enclosures and associated infrastructure including, but not limited to, inverters and a combination of high, medium and low voltage transformers
- Cabling and collector units
- High voltage substation, with associated infrastructure including high voltage transformers and other equipment to meet Generator Performance Standards (e.g., harmonic filters and/or synchronous condensers, if required)
- Connection to an existing electrical switchyard at either the 132kV or 330kV Transgrid substation (**Figure 1.7-3**)
- Temporary and permanent control, office and maintenance buildings, switch rooms, site access, internal roads, laydown areas and car parking
- Other associated and ancillary infrastructure, including for example, fire suppression, drainage and stormwater management, security fencing, lighting, and CCTV.

The Project description for which development consent is sought is provided in **Chapter 3.0 (Project description)**.

1.3 Project location and description

1.3.1 Regional context

The Project is located within Port Stephens Local Government Area (LGA), in the Hunter region of NSW. The Port Stephens LGA has an area of 979 square kilometres (km^2) and in 2021 Australian Bureau of Statistics (ABS) census the population was estimated to be 76,414. The closest town centre to the Project Area is Raymond Terrace, approximately 5 kilometres (km) to the northwest. The Project Area is located approximately 15 km northwest of the Newcastle CBD. **Figure 1.7-1** shows the location of the Project Area within the broader regional context.

The surrounding land uses bordering the Project area are zoned as SP1 Special Activities and SP2 Infrastructure to the north, E4 General Industrial to the east, E4 General Industrial and C2 Environmental Conservation to the south, and RU2 Rural Landscape and SP2 Infrastructure to the west. The nearest residential zoning is located approximately 3 km west of the Site, on the opposite side of the Hunter River in Beresfield.

The main employment industries within Port Stephens LGA are manufacturing, public administration, and retail. The Tomago Aluminium Smelter is located immediately east of the Project Area. Other services within the surrounding area include the Department of Defence, Royal Australian Air Force (RAAF) Base Williamtown, and the Newcastle Airport.

Major transport routes within the local area are the Pacific Highway, which is adjacent to the Site and the New England Highway approximately 2.3 km south of the Site at its nearest point.

The Ramsar-listed Kooragang Nature Reserve and Hunter Wetlands Centre are approximately 2.7 km south-southeast of the Site.

The gazetted area of the Tomago Sandbeds, a subterranean water aquifer maintained by HWC, is adjacent to the eastern boundary of the Site. Part of the proposed transmission connection would be within the bounds of the Tomago Sandbeds gazetted area, but outside of the restricted area.

1.3.2 The Site

The Site is located on Part Lot 5 and Lot 6 DP1286735, parts of which have been compulsorily acquired by TfNSW pursuant to a Government Gazette notice for the M1 Extension Project (SSI-7319) (**Figure 1.7-2**). Therefore, the Site will soon be bounded to the north by Lots 20 and 21 DP1286735 which consist of vacant land previously used for rural activities and a vacant derelict single storey residential dwelling which will be demolished by TfNSW for the M1 Extension Project. In the future, Lots 20 and 21 DP1286735 will be developed as part of the M1 Extension Project (refer to **Section 2.5** for further details on the M1 Extension Project).

The Site is within the Port Stephens LGA and is located on land zoned E4 General Industrial under the *Port Stephens LEP 2013* (Port Stephens LEP). Old Punt Road borders the Site to the southeast and an existing general industrial precinct is located immediately adjacent to the south of the Site. Vacant rural land borders the Site to the west and northeast.

The Site has previously been used for rural activities, including grazing and agricultural purposes. Some isolated trees have been retained on the Site, while patches of native vegetation are generally confined to the boundaries. The land is relatively flat, with a slight gradient towards the east and west. A number of access paths have been cleared across the Site.

1.3.3 Project Area

The Project Area constitutes the Site, transmission connection/s corridors (as required to connect the BESS to either the nearby 132 kV or 330 kV Transgrid substations), construction laydown areas within the Site, and a construction laydown area nearby, possibly at AGL’s existing NGSF approximately 1.7 km northeast of the Site.

The Site for the BESS facility is located off Old Punt Road, Tomago (as described in **Section 1.3.2**).

The proposed transmission connection would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. This land allows for the connection of the BESS to either the 132 kV substation (on Lot 101 DP1125747) or the 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747). These substations are located to the southeast of the Site.

A potential construction laydown area has been considered nearby at AGL’s existing NGSF, located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of the Site. The area is hardstand (as part of the construction of the NGSF) and has been used as a contractor carpark from time to time. No clearing or earthworks are required to use the existing laydown area at the NGSF for the purposes of the Project.

A figure showing the extent of the Project Area is provided in **Figure 1.7-3**.

1.4 The Applicant

Proudly Australian for more than 185 years, AGL supplies energy and other essential services to residential, small and large scale businesses and wholesale customers. AGL operate Australia’s largest private electricity generation portfolio, with a total installed capacity of 10,330 MW. This accounts for approximately 20% of the total generation capacity within Australia’s National Electricity Market (NEM).

AGL is an Australian publicly listed company involved in the generation and retailing of electricity and gas for residential and commercial use. AGL generates energy from a range of sources, including thermal power, natural gas, gas storage, and from renewables, including wind, hydroelectricity and solar. AGL is the largest Australian Securities Exchange (ASX)-listed investor in renewable energy and markets its natural gas, electricity and energy-related products and services to approximately 4.3 million customers.

AGLM is owned by AGL and forms a key component of the company’s existing generation portfolio. The AGLM landholding and generation assets were acquired from the former NSW Government owned

Macquarie Generation in September 2014. AGLM is the applicant for this Project. Refer to **Table 1.4-1** for further details.

Table 1.4-1: Applicant details

Item	Details
Applicant	AGL Macquarie Pty Limited
Address	Level 24, 200 George Street, Sydney NSW 2000
ABN	18 167 859 494

1.5 Related developments

The Minister for Planning and Public Spaces granted AGL approval for the Newcastle Power Station (NPS) on 15 March 2021 (SSI 9837). The NPS was declared Critical State Significant Infrastructure (CSSI) on 12 December 2018 under Section 5.13 of the EP&A Act. The NPS was declared CSSI by the Minister for Planning and Public Spaces due to its potential to:

- Increase the dispatchable energy capacity of NSW and help to mitigate significant short to medium term energy security risks to the east coast electricity market due to the scheduled closure of the Liddell coal-fired power station in 2022/2023.
- Facilitate NSW's transition to a low carbon emissions-based economy, consistent with the NSW Renewable Energy Action Plan and NSW Climate Change Policy Framework.
- Increase competition in the electricity market and attract additional investment and jobs in NSW.

The NPS was approved to be located across approximately 90.59 hectares (ha), on Lots 5, 6, 20, 21 and 28 DP1286735 (previously known as Lots 2 and 3 DP1043561) (the NPS site), and Lots 7, 8, 9, 18, 19, 24, 25 and 26 DP1286735, Lots 1201 and 1202 DP1229590 (a number of these lots were previously known as Lot 4 DP10434561 and Lot 202 DP1173564) (electrical transmission lines and gas pipelines).

AGL is exploring an alternative to the construction and operation of the approved NPS, through the development of a BESS (i.e. the Project that is the subject of this EIS). Given that the Project and the NPS propose to occupy the same Site (refer to **Section 2.2.2**), they would not both be able to be developed. On this basis, AGL would only develop one of the proposed options, being either:

- The Project that is the subject of this EIS, or
- The approved NPS (SSI 9837).

AGL expects that the development consent granted for the Project would be appropriately conditioned requiring the proponent to clearly nominate prior to construction commencing whether it would proceed with the development, construction and operation of either the BESS Project or the approved NPS project.

1.6 Site restrictions

A request for Title information for the Project Area was ordered on the 13 December 2022 through NSW Land Registry Services. The results of the request confirmed the presence of the following easements and restrictions relevant to the Project (illustrated in **Figure 1.7-4**):

a. Easement for drainage of water affecting the whole lot burdening Lot 7 DP1286735 (formerly Lot 4 DP1043561) and benefitting Lots 1201 – 1203 DP1229590 (formerly Lot 201 DP1173564)

b. Proposed easement for electricity purposes 60 m wide burdening Lot 8 DP1286735 (formerly Lot 202 DP1173654) shown on DP637481

c. Easement for transmission line 45 m wide burdening Lot 8 DP1286735 (formerly Lot 202 DP1173564) shown on DP639421

d. Easement for electricity purposes 80 m wide and variable width burdening Lot 8 DP1286735 (formerly Lot 202 DP1173564, and created by instrument AE342644)

e. Easement for transmission line outlets variable width burdening Lot 8 DP1286735 (formerly Lot 202 DP1173564, and created by instrument AE342644)

f. Right of carriageway 8, 10 and 20 wide and variable width burdening Lot 8 DP1286735 (formerly Lot 202 DP1173564, created by instrument AE342644).

Easements (a) through (f) are each intercepted by the Project Area and impose restrictions in terms of constructability and design of infrastructure outside the BESS Site.

In addition to the abovementioned easements, there are two locations within the Project Area that are TfNSW Temporary Lease Areas. One is located in Part Lot 5 DP1286735 within the Site, abutting the land acquired by TfNSW on Lot 20 DP1286735. The other temporary lease location falls within the Project Area on the eastern side of Old Punt Road (Refer to **Figure 1.7-4**).

1.7 Purpose and structure of this environmental impact statement

The purpose of this EIS is to provide a detailed description of the Project to allow an assessment of its potential impacts, including a description of the existing environment and assessment of potential direct, indirect and cumulative impacts. This EIS also identifies measures and strategies to be implemented to avoid, minimise, mitigate, offset and/or monitor potential impacts.

This EIS has been prepared to address the requirements issued by the Secretary on 12 May 2023. These have been summarised in **Appendix A (SEARs table)**.

In accordance with the NSW Government State significant development guidelines –Appendix B – *preparing an environmental impact statement* (DPE, 2022), the structure of the EIS is outlined in **Table 1.7-1**.

Table 1.7-1: Structure and content of the EIS

Chapter	Description
Summary	Concise description of the proposed works, environmental assessments, and findings of the EIS
Chapter 1.0: Introduction	Provides a brief description of the Project and relevant background information
Chapter 2.0: Strategic context	Provides the strategic context, and explains the need for the Project
Chapter 3.0: Project description	Provides a summary of the Project, including the key components of the Project, design requirements and alignments
Chapter 4.0: Statutory context	Outlines the statutory requirements and approvals required to support the Project
Chapter 5.0: Consultation	Outlines the consultation activities undertaken to date, key issues raised and how these have been addressed
Chapter 6.0: Assessment of Impacts	Provides the results of the environmental assessments and outlines appropriate mitigation measures.
Chapter 7.0: Justification and conclusion	Provides a conclusion to the EIS, including justification for the Project and whether the Project achieves the objectives
Chapter 8.0: References	Summarises the supporting material that was referenced in preparing this EIS

The EIS is supported with several appendices, which have been listed in **Table 1.7-2**.

Table 1.7-2: Supporting material

Appendix	Description
Appendix A – Content to address SEARs	Supporting studies and information for the assessment of Project alternatives
Appendix B – Statutory compliance table	Identifies all relevant statutory requirements for the Project and indicates where they have been addressed

Appendix	Description
Appendix C – Community engagement table	Identifies the key issues raised during community engagement and indicates where these issues have been addressed
Appendix D – Proposed Mitigation Measures	Table that provides a list of proposed mitigation measures to reduce potential impacts
Appendix E - Aboriginal heritage technical report	Technical report providing a detailed analysis of the Aboriginal heritage within the region and potential impacts
Appendix F – Traffic and transport technical report	Technical report providing a detailed analysis of the traffic and transport within the region and potential impacts
Appendix G – Social Impact Assessment	Technical report providing a detailed analysis of the potential social benefits and impacts of the project
Appendix H – Biodiversity Development Assessment Report	Technical report providing a detailed analysis of the biodiversity within the region and potential impacts
Appendix I – Bushfire Threat Assessment	Technical report providing a detailed analysis of the bushfire risk within the region and potential impacts
Appendix J – Preliminary Hazard Analysis	Technical report providing a detailed analysis of the potential hazards associated with the Project
Appendix K – Noise Assessment	Technical report providing a detailed analysis of the noise and vibration within the region and potential impacts
Appendix L – Hydrology Assessment	Technical report providing a detailed analysis of the surface water, groundwater, and hydrology within the region and potential impacts
Appendix M – Land Use Conflict Risk Assessment	Technical report providing a detailed analysis of land use compatibility and potential conflict between neighbouring land uses

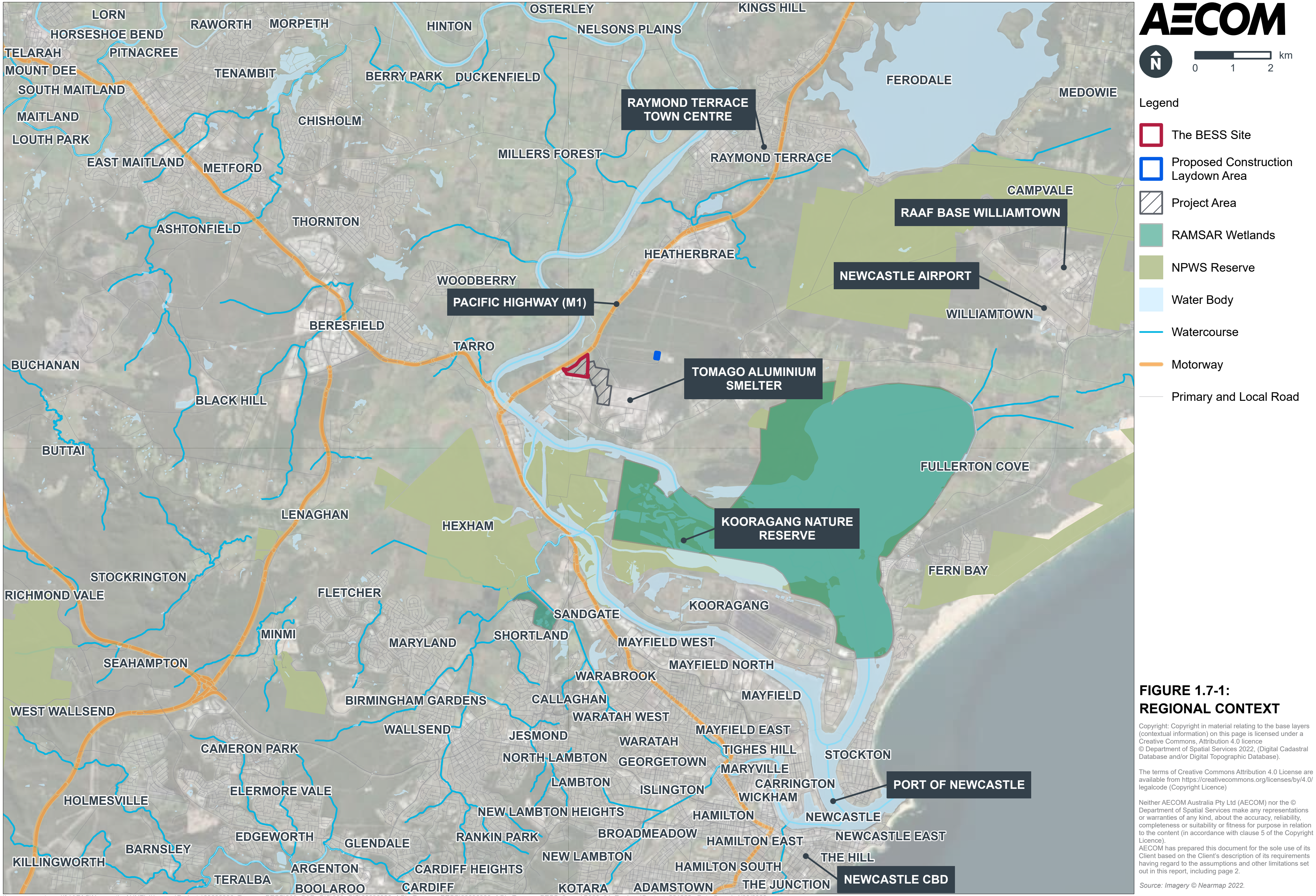
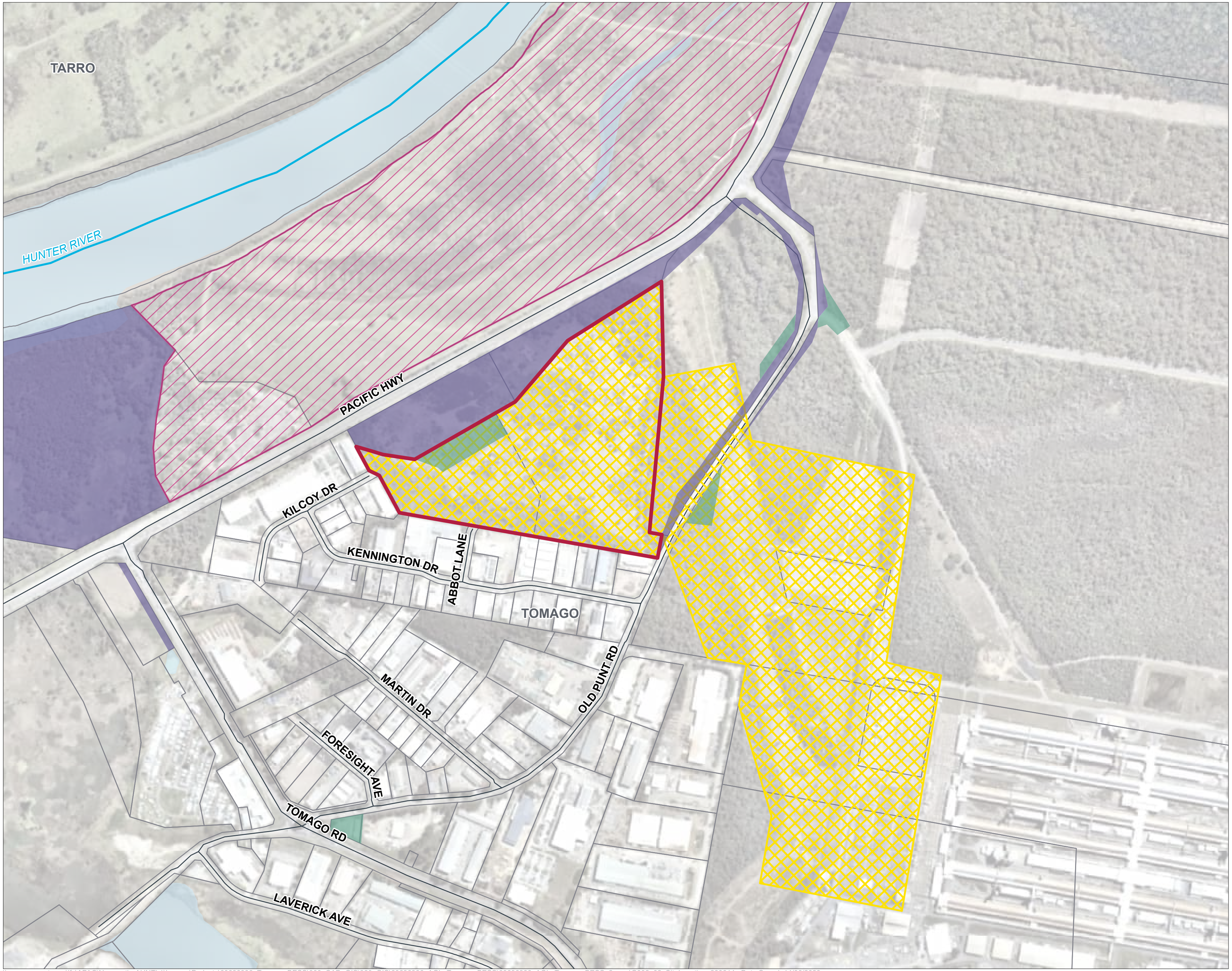


FIGURE 1.7-1:
REGIONAL CONTEXT

Source: Imagery © Nearmap 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G003_01_RegionalContext_221222 Date Saved: 4/08/2023



AECOM

N

0 100 200 m

Legend

- The BESS Site
- Project Area
- Cadastral Boundary
- Water Body
- Watercourse
- Road

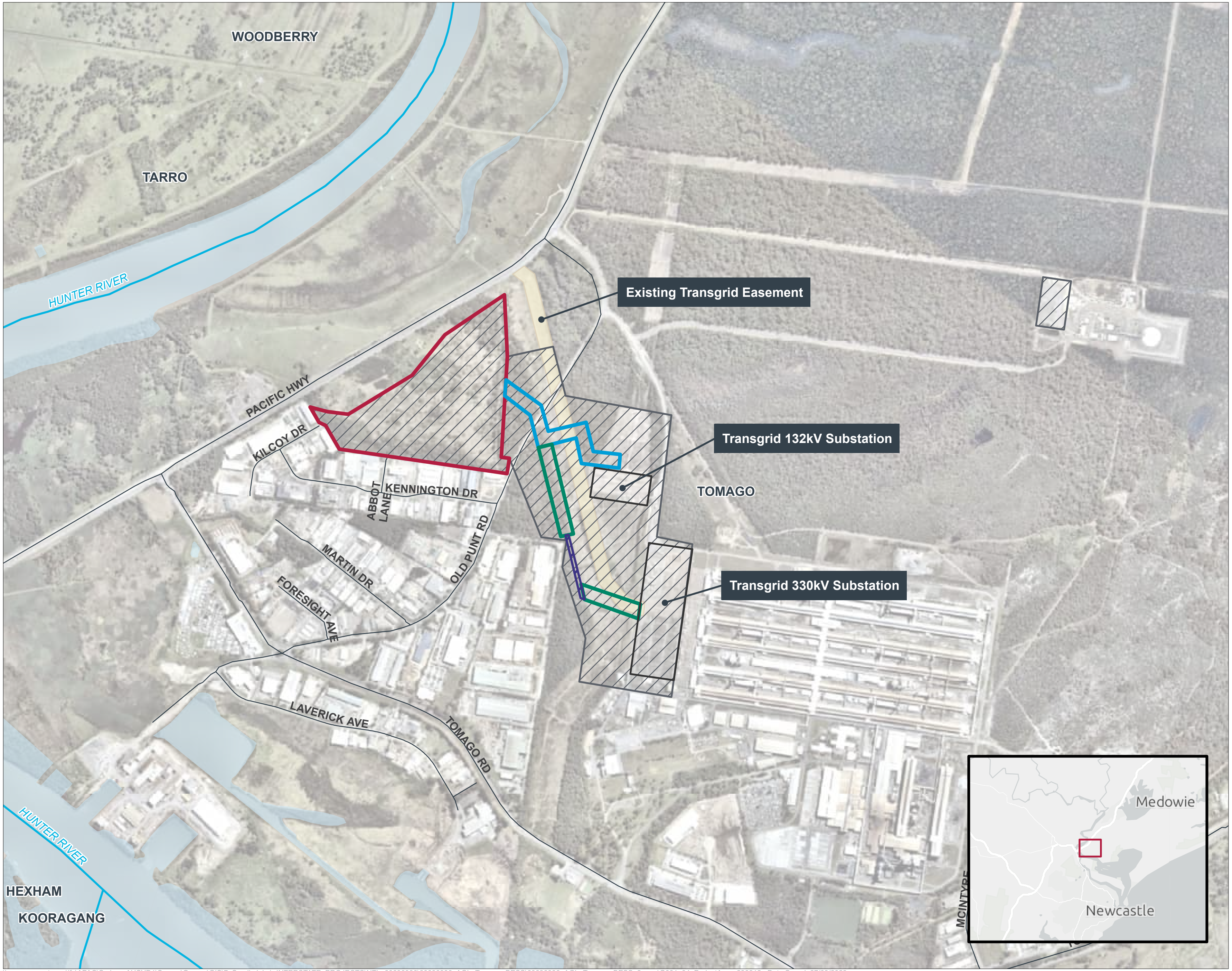
Properties Impacted by TfNSW Acquisiton or Temporary Lease

- Land Acquired by TfNSW
- TfNSW Temporary Lease Area
- Project Land Owned by TfNSW

FIGURE 1.7-2: THE SITE

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G002_02_SiteLocation_230614 Date Saved: 14/06/2023



AECOM

m
0 200 400

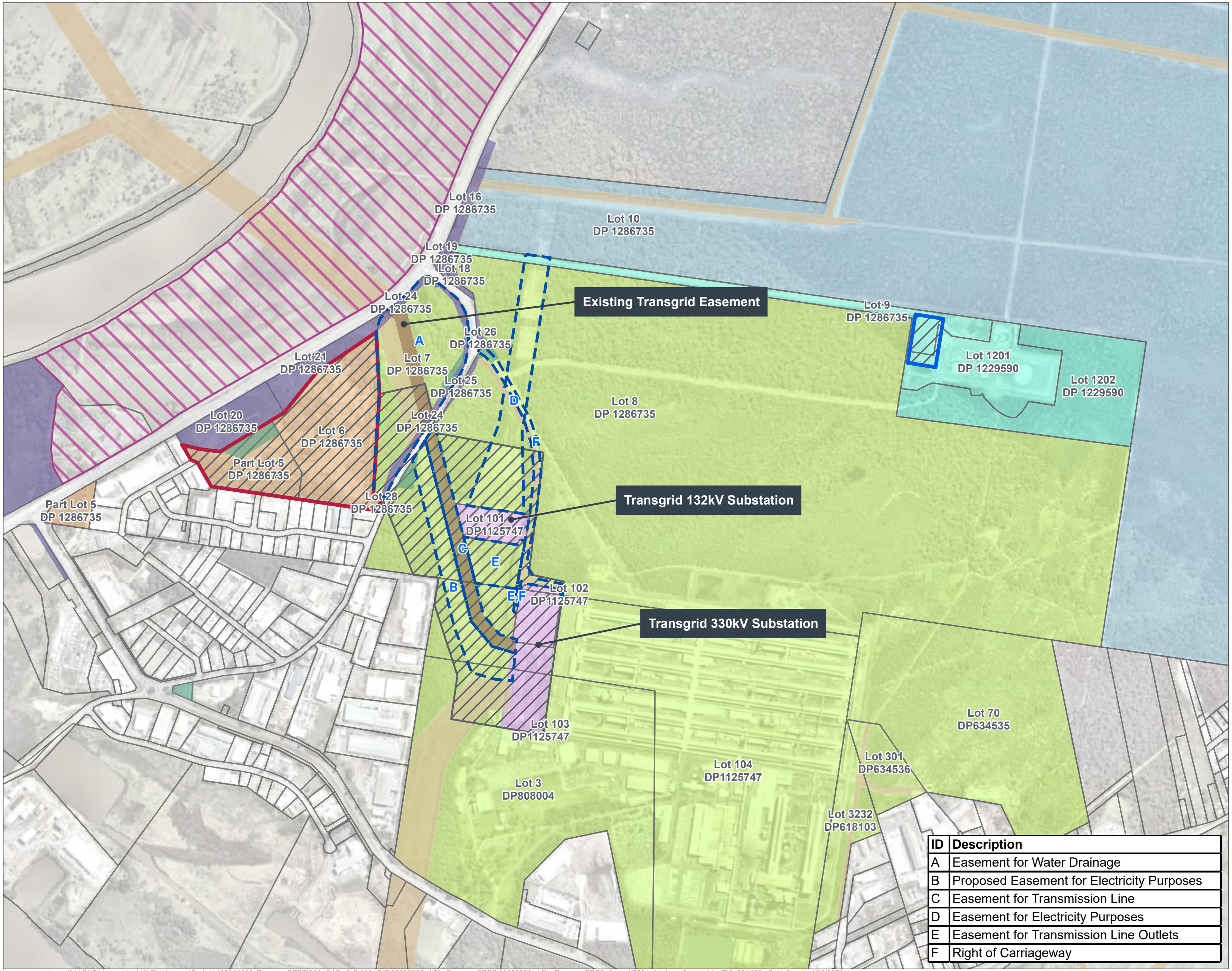
Legend

- The BESS Site
- Project Area
- Substation Location
- Proposed Transmission Corridor Connection No. 1
- Proposed Transmission Corridor Connection No. 2
- Alternative 132kV Line Easement Possible Underground Section
- Transmission Line Easement
- Water Body
- Watercourse
- Road

FIGURE 1.7-3: PROJECT AREA

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Sydney-AUSYD1\Secure\Groups\GIS\7_Small_Jobs_INTERSTATE_PROJECTS\NTL_60696986\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G001_04_ProjectArea_230912 Date Saved: 27/09/2023



ID	Description
A	Easement for Water Drainage
B	Proposed Easement for Electricity Purposes
C	Easement for Transmission Line
D	Easement for Electricity Purposes
E	Easement for Transmission Line Outlets
F	Right of Carriageway

AECOM

N

0 200 400 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Known Easements and Restrictions
- Transmission Line Easements
- Undefined Easements

Land Owner

- AGL Energy Limited
- AGL Macquarie Pty Ltd
- Hunter Water Corporation
- Tomago Aluminium Company
- Transgrid

Properties Impacted by TfNSW Acquisiton or Temporary Lease

- Land Acquired by TfNSW
- TfNSW Temporary Lease Area
- Project Land Owned by TfNSW

FIGURE 1.7-4: LAND OWNERSHIP AND EASEMENTS

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G004_04_LandOwnership_EIS_230803 Date Saved: 4/08/2023

2.0 Strategic context

2.1 Justification of the Project

Three factors determine the need for the Project:

1. Transition to renewable energy
2. Closure of existing coal-fired generators
3. Projected shortfall of generation capacity.

Each key factor is discussed in **Sections 2.1.1**, **2.1.2**, and **2.1.3**. **Section 2.1.4** further describes how firming technologies, such as BESS, are part of the solution for providing sustainable, reliable, and affordable electricity for NSW now and into the future.

2.1.1 Transition to renewable energy

The NSW Government and the Australian Government have developed plans to reach a goal of net zero greenhouse gas emissions by 2050. These plans include (but are not limited to) NSW's *Net Zero Plan Stage 1: 2020 – 2030* (NSW Government, 2020) and Australia's *Long Term Emissions Reduction Plan* (DCCEEW, 2022). Stage 1 of the NSW Net Zero Plan defines the State's top net zero priority as driving the uptake of proven emissions reduction technologies, including firmed renewable generation, such as energy storage technologies and batteries (DPIE, 2020).

The uptake of energy storage technologies and batteries will support renewable energy generation developments by allowing more of this generation to be dispatched to the NEM when required. This will help unlock the full potential of wind and solar resources within NSW. The development of a BESS will support NSW's transition to renewable energy and provide a versatile and sustainable solution to grid stability for the region.

2.1.2 Closure of existing coal-fired generators

In recent years, there has been a rapid closing of coal-fired generators in Australia due to the costs associated with maintaining and repairing this aging infrastructure. In NSW, three of four remaining coal-fired generators are set to reach the end of their technical lives and are expected to close by 2035 (AEMO, 2023). The Liddell Power Station, which was NSW's fifth coal-fired generator, recently closed in April 2023 (AGL, 2023). Without the development of alternative sources of electricity generation, including dispatchable generation, the removal of coal-fired generation from the NEM will result in unplanned outages, reduced available capacity, and impacts to the reliability of the NEM.

The closure of the coal-fired generators presents an opportunity for electricity demand to align with net-zero goals, by transitioning to renewable technologies such as wind, solar, and battery systems. However, if not managed appropriately, the closure of coal-fired generators could result in a shortfall of affordable, reliable, and secure electricity for residents and businesses in NSW.

2.1.3 Projected shortfall of generation capacity

The *NSW Electricity Infrastructure Roadmap* (AEMO, 2022) is the State's policy framework that co-ordinates investment in generation, storage, and firming infrastructure to transform and deliver benefits to NSW's electricity system, making it cheaper, cleaner and more reliable (DPIE, 2020). The NSW Government has appointed the Australian Energy Market Operator (AEMO) as the Energy Security Target (EST) Monitor for the Electricity Infrastructure Roadmap. As part of this responsibility, AEMO produce EST Monitor Reports to assess whether forecast firm capacity in NSW is sufficient to meet the EST defined in the *Electricity Infrastructure Investment Act 2020* (NSW) for each of the next 10 financial years (AEMO, 2022).

The latest EST Monitor Report was released in October 2022 and forecasts an EST breach (short-fall in generation capacity to meet projected demands) in 2025-26 to 2026 (refer to **Figure 2.1-1**). A breach is again forecast from 2029-30 onwards following the expected closure of Vales Point Power Station (AEMO, 2022). Breaches are indicated by the negative MW values. **Figure 2.1-1** shows AEMO's central scenario forecast for the 10-year EST outlook. In the Central scenario, there is a 10% probability of exceeding maximum demand with an increase in residential usage and an increase in the rate of electrification (fuel switching from other fuels to electricity). This increased demand is somewhat abated with a forecast increase in distributed solar energy systems (AEMO, 2022).

Figure 2.1-1: Central scenario, assessment of the EST [1]

2.1.4 Firming technologies as a solution to balance the transition to renewable energy

The electricity market is transitioning from a fossil fuel (mainly coal) generators to a system of widely dispersed, relatively small-scale renewable generators. Challenges facing this transition include an ageing coal-fired generation fleet that is being decommissioned over the coming years and a projected short-fall of generation capacity in the next two to three years. As a result, there is a need to transition the electricity network to reliable, low carbon and low-cost forms of generation supported by electricity storage technologies to maintain a power system that is reliable, secure, and affordable.

Currently, wind and solar are the cheapest and cleanest forms of new electricity generation. However, the ability of these technologies to dispatch electricity depends on the weather and time of day. The nature of wind and solar generation creates a need for ‘firming’ or ‘back-up’ capacity from battery energy storage systems, pumped hydro, and gas-peaking generators to fill supply gaps. Renewables, firmed by dispatchable technologies, are the lowest cost form of new reliable electricity generation for the NEM.

By delivering a BESS, the Project would improve the firming capacity of the regional energy supply, enable a smoother transition to renewable energy, and lower the projected shortfall of generation capacity from the closure of coal-fired generators.

Batteries are becoming an integral part of the electricity market's response to the withdrawal of coal fired power stations from the market and as such are playing an increasingly important role by providing firm capacity to support intermittent renewable generation, whilst improving the strength and reliability of the network.

2.2 Project benefits and alternatives considered

2.2.1 Project benefits

The Project is expected to significantly benefit the State and the local community. Key benefits include:

- Improved network security and increased storage within NSW

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[1] *Source: October 2022, Energy Security Target Monitor Report (AEMO, 2022)*

- Alignment with Commonwealth and NSW policy positions (discussed in **Section 2.3**)
- Support for increased renewable power generation during daytime peak periods, placing downward pressure on wholesale electricity prices in accordance with the Integrated System Plan (ISP)
- Creation of up to approximately 200 direct jobs during Project construction phase, and up to approximately six jobs during operation.

2.2.2 Project alternatives

Alternatives to the Project have been considered at a site and overall project level. These considerations would continue to be developed throughout the Project design stages to ensure necessary requirements are met, and can avoid or minimise any potential environmental, social and/or economic impacts. Following a constraints and opportunities analysis, the following alternatives have been considered:

- The “do nothing approach”
- Site location alternatives
- BESS technology and provider alternatives.

Each alternative is explored in further detail below.

The “do nothing” approach

The ‘do nothing’ approach would involve not constructing and operating a BESS at, or near, Tomago. This option would likely result in potential energy disruption issues, noting the recent closure of Liddell Power Station and the future planned closure of Bayswater and Eraring coal-fired power stations. Without the Project, the projected future increase in demand for energy throughout the Port Stephens area (and broader Hunter Region) would not be adequately addressed. The ‘do nothing’ option would not meet the objectives of the Project or the demands on the NEM and is therefore not considered a feasible option.

Site location

As discussed in **Section 1.2.1**, the Site has been the subject of an EIS and was subsequently granted approval (SSI 9837) for the NPS. The attributes of the selected Site that make the location optimal for development of a project for “electricity generating works” (including storage) remain pertinent to this Project. Many of the key location requirements for battery energy storage exist at this selected Site, including:

- Proximity to the high voltage electricity transmission network and high electricity demand centres
- Capacity of the transmission network to deliver electricity stored without constraint
- Availability of suitably zoned land with compatible existing land uses surrounding the Site
- Access for the delivery of heavy construction loads
- Availability of skilled construction and operational workforce.

A range of potential sites for the Project were investigated. This review of sites considered key selection parameters including, siting of the BESS near a point of energy generation, as well as the option to construct the BESS close to a point of energy distribution. Constructing the Project in proximity to the existing Transgrid substation (either the 132 kV or 330 kV) would likely reduce disruptions to energy supply, thus aiming to achieve the Project objectives of enhancing the use, reliability and efficiency of renewable energy within the newly established Hunter and Central Coast REZ.

BESS technology

Alternative options for the most suitable battery technology for the Project to meet capacity and other requirements are currently being determined. The preferred option currently being considered consists of Lithium-Ion batteries in the form of containerised or otherwise enclosed units. The typology (i.e., battery chemistry) and layout of the battery energy storage units would be confirmed during the design process.

2.3 Consistency with government plans and policies

The installation of a BESS at the Site will assist with the energy transition to sustainable renewable energy sources as described in **Section 2.1.1**. This approach aligns with existing government plans and policies from a commonwealth, state, and regional perspective. A summary of all relevant plans and policies the Project is consistent with are described below.

2.3.1 Australia's Long Term Emissions Reduction Plan

Australia's whole-of-economy Long-Term Emissions Reduction Plan is focussed on technology and sets out how Australia will achieve net zero emissions by 2050 (DCCEEW, 2022). One of the key principles of the plan is keeping energy prices down with affordable and reliable power. The plan outlines how government will:

- Drive down the cost of low emissions technologies (including battery storage)
- Deploy these technologies at scale
- Help regional industries and communities seize economic opportunities in new and traditional markets
- Work with other countries on the technologies needed to decarbonise the world's economy.

The Technology Investment Roadmap (TIR) is the foundation of the Long-Term Emissions Reduction Plan and sets a process to develop and deploy low emissions technologies (including battery storage). By focusing government investment, it aims to make these emerging technologies cost competitive with existing high emission technologies (DCCEEW, 2022b). Importantly, the TIR includes a requirement to prepare Low Emissions Technology Statements (LETS), which review, refine and evaluate the government's investment in low carbon emission technologies (DCCEEW, 2021).

The current LETS (2021) includes energy storage as an existing priority technology for government investment. Specifically, the LETS indicates that broad deployment of electrical energy storage will facilitate further integration of low-cost solar and wind electricity in the grid. The LETS states that energy storage will provide network security services and a source of reliable, dispatchable electricity. This should help reduce pressure on electricity prices by meeting peaks in consumer demands.

The Project would be consistent with the principles of the high priority technologies outlined in the Long-Term Emissions Reduction Plan, as stated above.

2.3.2 Integrated System Plan

The ISP is a whole-of-system plan that provides a coordinated generation and transmission investment plan to transition the NEM over the next 30 years. AEMO updates the ISP every two years and the most recent ISP for the NEM was published in June 2022.

Under the 'Step Change' scenario, identified in the 2022 ISP as the most likely scenario, the NEM will need to cater for significant investment in generation capacity, storage, firming generation and transmission augmentation as coal generation withdraws through to 2050.

The 2022 ISP predicts under the Step Change scenario that withdrawal of 23 GW of coal capacity will occur (14 GW by 2030) and 45 GW / 620 GWh of new battery and hydro storage (distributed and utility scale), able to respond to a dispatch signal, will be required to help firm the renewable energy sources entering the market. There will also be an increased need for the network to shift electricity from where it is produced to where it is needed to maximise the value of geographic diversity and efficiently share resources across the NEM.

The Sydney Ring project in the ISP aims to increase the transfer capacity into the Sydney, Newcastle and Wollongong areas by approximately 5,000 MW. It has been identified to have an immediate commencement to support the Renewable Energy Zone (REZ) development in the NSW Electricity Infrastructure Roadmap and maintain reliability of supply for NSW consumers.

The Sydney Ring project is an actionable NSW project for delivery in 2027-2028, having been a future ISP Project in the 2020 ISP and an actionable ISP project in the Draft 2022 ISP.

The Sydney Ring project is predicted to contribute roughly $3.4 billion in net market benefits and will assist in maintaining reliability of supply for NSW consumers following the closure of coal power stations in the Newcastle area. Based in Tomago near Newcastle, this grid scale energy storage system would provide additional grid security within the NEM following the decreased reliance on coal-fired electricity generation, and aligns with the objectives of the Sydney Ring project.

2.3.3 NSW Electricity Strategy

The NSW Electricity Strategy is the NSW Government's plan for a reliable, affordable, and sustainable electricity future. The strategy outlines three approaches for the NSW government to meet these objectives:

- Support the market to deliver reliable electricity at the lowest price, while protecting the environment
- Set an EST to ensure that the State has sufficient generation capacity to cope with unexpected generator outages during periods of peak demand, such as during heat waves, and
- Ensure the State has sufficient power to deal with an electricity emergency if one arises.

The strategy outlines the cheapest and most efficient way to develop a modern and complex energy system to replace coal-fired generators is to build a mix of low-cost renewables, gas-fired generators and other storage options, such as batteries and pumped hydro. The Project, being a grid scale energy storage system, would support the transition of the NSW energy grid to a modern complex energy system in line with the objectives of the NSW Electricity Strategy.

2.3.4 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: co-ordinating 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* was passed in late 2020. The Project is wholly in keeping with the vision of the NSW Electricity Infrastructure Roadmap in that 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 negligible additional emissions.

AGL has a clearly articulated plan to achieve decarbonisation of its generating assets by 2050 wholly aligned with the NSW Climate Change Policy Framework and consistent with the Climate Transition Action Plan (AGL, 2022). This Project is a key component of AGL's plans to manage the transition to decarbonisation and net-zero emissions while responding to the requirements of the market in relation to reliable and affordable electricity.

2.3.5 Hunter Regional Plan 2041

The Hunter Regional Plan 2041 (the Regional Plan) is a 20-year land use plan prepared under the EP&A Act (Department of Planning and Environment, 2022). The Regional Plan applies to the nine Local Government Areas (LGAs) of the Lower Hunter (including Port Stephens), as well as the Councils within the Upper Hunter. The Regional Plan sets the strategic land use framework for continued economic growth and diversification in one of Australia's most diverse and liveable regions. The plan aims to unlock sustainable growth opportunities and investments, as well as housing choice and lifestyle opportunities to retain the Hunter's position as a leading regional economy in Australia. The Regional Plan includes four principles, which include:

- Growth – Support a net zero emissions economy and foster employment growth, competitiveness and innovation
- Community – Promote places to be together by weaving nature into our towns and cities which have welcoming and safe streets and public spaces
- Resilience – Reduce risks associated with place-based shocks and stresses to improve the community's ability to withstand, recover from and adapt to changes and become more resilient
- Equity – Ensure communities are safe and healthy with residents having opportunities for economic advancement, housing choices and a secure retirement.

To support the delivery of these core principles, the Regional Plan contains nine objectives, which are enforced through several strategies. Of relevance to this Project is Objective 1 and Objective 7, being:

- Objective 1: *"Diversify the Hunter's mining, energy and industrial capacity"*
- Objective 7: "*Reach net zero and increase resilience and sustainable infrastructure".*

Each objective, and the relevance to the Project, is described in further detail below.

Objective 1: Diversify the Hunter's mining, energy and industrial capacity

The Hunter is an economic powerhouse, driven by the mining, energy and manufacturing sectors. The Hunter-Central Coast is one of at least five REZs in NSW. The development of the REZ will take advantage of existing transmission infrastructure, transport links, water resources and a skilled workforce. To support the delivery of the Hunter and Central Coast, the Regional Plan includes Strategy 1.2, which states:

> *Following completion of the Hunter REZ, local strategic planning should consider:*
>
> - *Opportunities to leverage new employment in related manufacturing and energy intensive industries that benefit from proximity to the energy infrastructure within the REZ*
> - *The proximity of sensitive land uses to ensure sensitive land uses do not encroach on activities within the REZ.*

The Project is located in close proximity to two substations owned and operated by Transgrid and is within the Tomago Industrial precinct (discussed in **Section 1.1**). The Project would support the energy requirements of future employment growth in the area, contributing to further industrial development of the Tomago area and achieving the objectives of the Hunter REZ. Being within an existing industrial setting and close to transmission infrastructure ensures the Project is consistent with Objective 1 under the Regional Plan.

Objective 7: Reach net zero and increase resilience and sustainable infrastructure

The *NSW Electricity Infrastructure Roadmap* sets out the NSW Government's 20-year plan for the generation, storage, firming and transmission infrastructure needed for clean, cheap and reliable power (discussed above in **Section 2.2**). The Regional Plan supports the delivery of the *NSW Electricity Infrastructure Roadmap* through the identification of opportunities to grow emerging industries in areas ready to accommodate this change. The areas identified within the Regional Plan include:

- Liddell and Bayswater power stations regionally significant growth area
- **Tomago industrial area** (emphasis added), and
- Eraring Power Station.

The Project is located at 1940 Pacific Highway, within the Tomago Industrial Area (refer to **Figure 1.7-3**). The Project, being a grid scale energy storage system, would support the transition of the NSW energy grid to a modern complex energy system in line with the objectives of the *NSW Infrastructure Roadmap* and Objective 7 of the Regional Plan.

2.3.6 Greater Newcastle Metropolitan Plan 2036

The Greater Newcastle Metropolitan Plan 2036 (GNMP) sets out strategies and actions that will drive sustainable growth across the LGAs (including Port Stephens LGA), which together make up Greater Newcastle. Furthermore, the GNMP helps to achieve the vision set in the Regional Plan (discussed in **Section 2.2**) for the Hunter to be the leading regional economy in Australia with a vibrant new metropolitan city at its heart.

The GNMP identifies Tomago as a catalyst area with an immediate focus for employment and infrastructure investment. A target of 700 additional jobs by 2036 would see local employment increase from 7,800 to 8,500 jobs. The GNMP recognises Tomago industrial area as a significant advanced manufacturing and industrial area. The Project would support the energy requirements of future employment growth in the area, contributing to further industrial development of the Tomago area and achieving the objectives of the GNMP.

2.4 Key features of the Project Area and surrounds

2.4.1 Environmental Context

Biodiversity

The Project Area is located on a small ridge in a relatively flat landscape between 4 to 16 m above sea level. It is located on the boundary of two bioregions – the Sydney Basin Region to the west and North Coast Region to the east. The Project Area consists of large previously cleared areas with some remnant and managed native vegetation, managed grassland/shrubland, and a small portion of wetland (located at the southern boundary of the Site) each with varying degrees of condition and disturbance history. Refer to **Figure 2.6-1** for an overview of the biodiversity values within the Project Area. The Ramsar listed Hunter Wetlands National Park is approximately 2 km south of the Site. Seven plant community types (PCTs) were surveyed to be present within and surrounding the Project Area (Kleinfelder, 2019). They include:

- PCT 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest
- PCT 1646: Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast
- PCT 1071: *Phragmites australis and Typha orientalis* coastal freshwater wetlands of the Sydney Basin
- PCT 1725: Swamp Mahogany – Broad-leaved Paperbark – Swamp Water Fern – Plume Rush swamp forest on the coastal lowlands of the Central Coast and Lower North Coast
- PCT 1235: Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion
- PCT 1724: Broad-leaved Paperbark – Swamp Oak Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
- PCT 1568: Blackbutt - turpentine – Sydney Blue Gum mesic tall open forest on ranges of the Central Coast.

The 2019 Biodiversity Development Assessment Report (BDAR) identified two PCTs within the Project Area: PCT 1590 and PCT 1646. One Endangered Ecological Community (EEC), '*Lower Hunter Spotted Gum – Ironbark Forest'*, was previously identified within the Project Area (Kleinfelder, 2019). The field survey undertaken by Kleinfelder to inform the BDAR (2019) identified 138 flora species (109 native and 29 exotic), including three threatened species, being:

- *Eucalyptus parramattensis subsp. Decadens (Earp's Gum)*
- *Maundia triglochinoides*
- *Grevillea parviflora subsp. Parviflora.*

Importantly, however, only three individual *Eucalyptus parramattensis subsp. Decadens* (Earp's Gum) were recorded within the Project Area. These trees form part of a much larger population which occurs to the east and south of the NGSF that is located to the northeast of the Project Area.

During the field surveys, Kleinfelder also identified a total of 45 fauna species (43 native and two introduced), including five threatened species (one bird and four mammals). The fauna identified comprised 21 bird, 19 mammal, four amphibian and one reptile species. The threatened fauna species identified and potential habitat for these species included:

- Masked Owl (*Tyto novaehollandiae*)
- Little Bentwing bat (*Miniopterus australis*)
- Eastern freetail bat (*Mormopterus norfolensis*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*) (potential species habitat only).

Despite extensive surveys, no koalas have been observed on the Site for over 12 years. The potential habitat trees are scattered, non-preferred species on industrial land, and should not be broadly affected by the Project. Additional biodiversity surveys have been completed to support the production of a BDAR for this Project. Details regarding the outcomes of the BDAR are discussed in **Chapter 6.0 (Assessment of impacts), Section 6.3.**

Soils and contamination

The Project is mapped under the Port Stephens LEP as predominantly Class 4 Acid Sulfate Soils (ASS) where there would be a low risk of ASS above 4 m below ground level.

The Project is located within the northern section of the Sydney Basin. The Australian Soil Map Classification (DPE, 2020) identifies soils in the vicinity of the Project Area as being Dermsols, which generally have structured B2 horizons, and are a heavy, sandy loam with a clay content of up to 15%.

The geology of the surrounding area comprises of sandstone and siltstone with underlying coal seams. The soil landscape of the Project Area, as identified in the eSpade viewer (DPE, 2022), is mainly mapped 'Beresfield' landscape, and the northern boundary of the Site is mapped as 'Tea Gardens'. Both landscapes are known for seasonal water logging and for being highly acidic.

A review of the EPA register of notified contaminated sites (2022) indicates there are two contaminated sites within 1 km of the Project, including RZM Pty Ltd and Balcombe Sweat Furnace.

Hydrology

The Project is located within the Hunter Valley alluvial aquifer formation, and within the Hunter River Catchment 'Estuary Zone' where the Lower Hunter Water Plan (2014) applies. The hydrogeology of the locality is characteristic of clays, silts, sands and gravels, and a shallow water table.

A groundwater specialist study (Aurecon, 2019a) identified a portion of the Site is located within the south-western edge of the Tomago Sandbeds catchment area. The Tomago Sandbeds are a natural groundwater aquifer which is recharged by rainfall infiltration and supplements the potable water supply for the Newcastle region. This groundwater catchment zone is the same catchment zone as the Ramsar listed Kooragang Nature Reserve. However, based on existing studies (Aurecon, 2019a), the groundwater flow from the Site is not expected to flow toward the Ramsar listed wetlands.

Existing groundwater boreholes identified the geology beneath the Project Area is dominated by bedrock, and the groundwater flow has a low migration rate. Existing assessment indicates the groundwater depth within the Project Area is 1.5 m below ground level (mbgl). There are a few areas within the Project Area mapped with high to medium potential for Groundwater Dependant Ecosystems (GDEs) which may rely on shallow groundwater availability (BoM, 2022).

Existing assessments (Environmental Strategies, 2018) identified various water quality characteristics within groundwater samples across the Project Area including:

- Detection of several chemicals of potential concern (CoPC)
- High concentrations of copper
- Elevated chromium and zinc levels

- Electrical conductivity indicated groundwater was fresh to brackish
- pH levels were generally low ranging from 3.4 to 5.

Surface water

The Site is located approximately 500 m south-east of the Hunter River, a major low-land meandering estuarine river which discharges into the Tasman Sea through Newcastle Port. The surrounding land uses to the Hunter River and within the Hunter River catchment are generally disturbed or cleared landscapes comprising of rural, mining, industrial and urban developments.

The surface water and hydrology assessment identified several adjacent industrial sites south of the Project with potential sources of contamination (Aurecon, 2019b). Existing surface water quality data (Aurecon, 2019b) suggests the water quality within the surrounding wetland ponds and drainage lines typically comprise of:

- High inorganic nutrient levels
- High concentration of dissolved metals (zinc, copper, manganese)
- Fine suspended materials (including total organic carbon).

The Project Area is approximately 2 km south-east of the Hunter Estuary Wetland, which is Ramsar listed. There is Resilience and Hazards SEPP mapped Coastal Wetlands located approximately 400 m west of the Project Area, which align with the Hunter River. The Port Stephens LEP also contains mapped areas of wetland. There is a small portion of wetland within the southern border of the Site. A Surface Water Impact Assessment (SWIA) has been prepared for the Project, which is discussed in **Chapter 6.0 (Assessment of impacts), Section 6.7**.

Flooding

The Project Area is located at 4 m to 16 m Australian height datum (AHD). Surface water flows from the highest point in the northern part of the Site to a drainage line on either side (south to southwest, and northeast) as identified in existing studies (Aurecon, 2019b). Neither drainage line directly flows into the Hunter River. One discharges through a LEP mapped wetland and the other flows to or into the surrounding industrial estate stormwater drainage toward the Hunter River (refer to **Figure 2.6-3**).

The Hunter River is the main flooding risk to the locality during high rainfall events, with one of largest recorded flooding events in 1955 having a peak flood level of 4 m AHD (Aurecon, 2019b). A small portion of the southern and northern extents of the Site are located within the Port Stephens LEP Flood Planning area, characterised with a low to moderate flood hazard (refer to **Figure 2.6-1**).

Aboriginal Heritage

The Project is located within the Worimi Local Aboriginal Land Council area. The Site has been cleared and disturbed in the past, however, as it is at a relatively high point in the landscape, and given there are waterways nearby, there is the potential for Aboriginal heritage to be present.

The investigation area for the electrical transmission routes includes undisturbed areas and existing cleared easements.

A search of the Aboriginal Heritage Information System (AHIMS, 2022) for the Project Area in December 2022 identified 20 registered Aboriginal Sites within the map extent, some of which are located within the Project Area.

The Site was extensively surveyed as part of the NPS EIS process. Existing assessment (ERM, 2019) identified various isolated finds, artefacts and a Potential Archaeological Deposit (PAD) within the Site. Furthermore, the identified cultural heritage items were not considered to hold more than a low social, historical or aesthetic significance for local Aboriginal People. An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared for the Project, which is discussed in **Chapter 6.0 (Assessment of impacts), Section 6.9**

Noise and Vibration

The existing ambient noise sources are from vehicles on the Pacific Highway, Tomago Road and Old Punt Road, aircraft using Newcastle Airport, Tomago Aluminium Smelter and from local community activity and surrounding biodiversity. Most of the land uses surrounding the Project Area include industrial or road infrastructure.

Possible sensitive receivers to the construction and operation of the Project are:

- Industrial receivers around 5 km of the Project Area
- Residential and temporary accommodation receivers (not on residentially zoned land) from 450 m, on the far side of the existing Industrial Estate
- From 1.2 km a mix of residential, commercial and industrial receivers in various suburbs including Heatherbrae, Woodberry, Tomago and Hexham; these receivers are generally located on the far side of the Pacific Highway.

A Noise and Vibration Assessment (NVIA) has been prepared for the Project, which is discussed in **Chapter 6.0 (Assessment of impacts), Section 6.7.**

Traffic and Transport

The Project is located adjacent to the Pacific Highway (M1). The Project Area is accessible from Old Punt Road. The Pacific Highway (M1) forms part of the major transport connection between Sydney and Queensland. Tomago Road is a State road, which connects Nelson Bay Road and the Pacific Highway (M1), and Old Punt Road provides access to the Tomago industrial precinct from the Pacific Highway (M1) and Tomago Road. **Figure 2.6-3** shows the local network that surrounds the Project Area and the indicative access points (primary and secondary) to the Site. Upgrades to be undertaken by TfNSW to the Pacific Highway (M1) along the northern boundary of the Project Area have been recently approved. The potential cumulative impacts associated with this upgrade are discussed in **Section 2.5**.

The surrounding road network was identified in a Traffic Impact Assessment for the NPS (SECA Solution, 2019), which noted:

- There are no dedicated pedestrian or cycling facilities on the local roads
- There is no formal on street/off-street parking near the Project Area
- Historically, the intersections nearby the Project Area on the Pacific Highway have a low number of collision incidents
- The Pacific Highway (M1) and Old Punt Road (including the intersection) is designed to cater for oversized and over mass vehicles
- Hunter Valley Bus Service (140) is the only bus service that operates between Raymond Terrace and Newcastle
- The nearest railway station is 2.3 km away at Hexham.

SECA Solution (2019) previously assessed the performance of the intersection at the Pacific Highway and Old Punt Road in respect of the NPS, and summarised the following observations:

- The intersection is controlled by signals with a right turn into and out of Old Punt Road which is controlled on demand.
- Current delays and congestion are very low.
- At peak periods generally between 7 am and 8 am, southbound traffic can queue up to 300 m. This queue dissipates within one phase of the signals with this only occurring every 3-4 minutes typically in the peak periods. The traffic signal timings at this location are vehicle activated and the signal timings adjust to reflect the varying traffic demands through this intersection.
- The queue for the right turns in and out of Old Punt Road, are typically one vehicle only. All vehicles tend to clear the lights in one phase.

A Traffic and Transport Impact Assessment (TTIA) has been prepared for the Project, which is discussed in **Chapter 6.0 (Assessment of impacts), Section 6.6** and includes an assessment of cumulative traffic impacts with the M1 Extension Project.

Bushfire

Bush fire prone land (BFPL) is land that is identified by the local council that can support or is subject to bushfires that requires specific management strategies to reduce the risk of bushfire occurrence or spread. The Project would be located on land that is mapped as BFPL by Port Stephens Council, under the Port Stephens LEP. No relevant fire history has been recorded at the Site.

The Project Area is mapped as BFPL Category 1 across Lot 7 DP 1286735 and towards the eastern and southern boundaries of Lot 6 DP 1286735 which includes a vegetation Buffer Zone towards its centre. A Bushfire Threat Assessment (BTA) has been prepared for the Project, which is discussed in **Chapter 6.0 (Assessment of impacts), Section 6.8.**

2.4.2 Surrounding land uses and sensitive receivers

Residential

There is no residentially zoned land in the Project Area. The nearest residentially zoned land is approximately 3 km west of the Project at Woodberry in the Maitland LGA. The nearest residentially zoned land in the Port Stephens LGA is approximately 5 km north of the Project at Heatherbrae. **Figure 2.6-4** shows the locations of sensitive receivers within 1 km of the Project Area.

There is a single unoccupied dilapidated residential dwelling adjacent to the Site, on Tomago Road near its intersection with the Pacific Highway. This existing dilapidated residential dwelling is located on land that has been recently compulsorily acquired by TfNSW for the M1 Extension Project. There is another occupied residence on Tomago Road, currently owned by Tomago Aluminium Company Pty Ltd (TAC) which is located approximately 500 m southwest of the Project Area on land zoned C2 Environmental Conservation. There is also a residence associated with the Motto Farm Stud approximately 1.4 km north of the Project on land zoned RU2 Rural Landscape. Sweetwater Grove, an over 55s residential village is located approximately 700 m south from the Project Area on the opposite side of the Tomago Industrial estate.

Industrial land and infrastructure

Major industrial infrastructure near the Project includes AGL's NGSF, Transgrid's switchyards and associated transmission and distribution lines, and the Tomago Aluminium Smelter. These are all located on land zoned E5 General Industrial under the Port Stephens LEP.

A range of other industries within the E5 General Industrial zoned land and within proximity of the Project includes:

- Transportation and haulage
- Metal fabrication and galvanising
- Manufacturing
- Commercial construction
- Petrochemical
- Self-storage.

Land to the northeast of the Site is zoned SP1 Special Activities under the Port Stephens LEP. This land is owned by HWC and is zoned SP1 Special Activities which is a zone designed to protect the water catchment areas.

The Pacific Highway runs adjacent to the Site to the north within an area zoned SP2 Infrastructure under the Port Stephens LEP. Land zoned SP2 Infrastructure provides for infrastructure (and related uses). The land located to the west of the Site is currently reserved for the future development of the M1 Extension Project.

Recreational and environmental land

There is no recreational or environmental land within the Project Area. The nearest recreational zoned land is the Hunter River, approximately 500 m northwest of the Project Area. The Hunter River is zoned W2 Recreational Waterway under the Port Stephens LEP. Publicly accessible sites located in the Tomago and Motto-Farm areas include the Hunter Region Botanic Gardens and the Hunter Wetlands

National Park. The Botanic Gardens are approximately 800 m north of the Project Area and the nearest point of the National Park is approximately 2 km to the south of the Project Area.

The nearest environmental zoning is land to the west adjacent to the Hunter River, zoned C2 Environmental Conservation. The objective of the C2 Environmental Conservation land use zone is to protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values, and to prevent development that could have an adverse effect on those values. The Project Area is not anticipated to impact on recreational or environmental conservation land.

Agricultural land

There is no agricultural land in the Project Area. Land to the north and west of the Project Area is zoned RU2 Rural Landscape under the Port Stephens LEP and is currently being used for grazing. This land is located between the Hunter River and the Pacific Highway, on the other side of the highway from the Site. The objective of this zoning is to provide for agricultural land uses, encourage primary industry production, and maintain the rural landscape character.

2.5 Cumulative impacts

Searches of the DPE Major Projects database were undertaken on 15 December 2022 and 30 June 2023 to identify SSD and SSI projects within the vicinity of the Project that may be relevant for the cumulative impact assessment. The projects that were identified are discussed in **Table 2.5-1**. A detailed assessment of cumulative impacts has been undertaken in **Chapter 6.0 (Assessment of impacts), Section 6.17**.

Table 2.5-1: Relevant existing/future projects for cumulative impact assessment

Project	Assessment stage	Relevance
Newcastle Power Station	Determination	AGL received approval to construct and operate the Newcastle Power Station on the Site (SSI-9837) in March 2021. The relationship between the Project and the NPS has been discussed in **Section 1.5**. No cumulative impacts would occur.
M1 Extension Project	Determination	The M1 extension to Raymond Terrace (SSI-7319), and associated interchange with Old Punt Road, would result in significant changes to local traffic flows. The extensions would likely see traffic volumes along the Pacific Highway decrease significantly, with an improvement in the operational efficiency of the existing intersections of Tomago Road and Old Punt Road with the Pacific Highway (M1). A portion of land owned by AGL has been compulsorily acquired by TfNSW. This acquisition will not impact the Project Area. The land that has been acquired is Lots 20 and 21 in DP1286735 which is being acquired by TfNSW to construct an interchange between Old Punt Road and the Pacific Highway (M1). As part of the M1 Extension Project, TfNSW has agreed to provide to AGL a secondary emergency access point for the Project. Parts of the Project Area and land adjacent to Old Punt Road (which overlap the existing transmission line easement) have also been compulsorily acquired by TfNSW for the same purposes of the M1 Extension Project. The Site will be situated outside of the area subject to the recent compulsorily acquisition by TfNSW.

Project	Assessment stage	Relevance
Tomago Resource Recovery Facility	SEARs Issued on 20 March 2023	Recycled Concrete Products Pty Ltd (RCP) submitted a Scoping Report to DPE to request SEARs for a resource recovery facility at 509 Tomago Road, Tomago. The resource facility would be capable of receiving and processing up to 250,000 tonnes of general solid waste (non-putrescible) per year consisting of construction waste such as soils, concrete, bricks and tiles. Heavy vehicle transport routes for the RCP project are likely to occupy Tomago Road, which could result in a cumulative impact on traffic on this road if the construction programs for the Project and RCP project overlap. The potential for a cumulative traffic impact will be confirmed following a review of the traffic impact assessment for the resource facility, which is not yet available.

The Project may generate cumulative noise and traffic impacts with the M1 Extension Project, especially during construction of both projects. The noise and traffic assessments included in **Chapter 6.0 (Assessment of impacts)** and **Sections 6.7** and **0** respectively, take into consideration potential cumulative impacts. These were assessed in accordance with the *Cumulative Impacts Assessment Guidelines for State Significant Development Projects* (DPE, 2021).

2.6 Agreements

Land adjacent to the northern boundary of the Site is the subject of a recent compulsory acquisition by TfNSW for the M1 Extension Project. The acquisition of this land will not affect the Project as there is sufficient space on the Site to accommodate the Project.

The BESS facility would be located on land that is owned by AGL. The electrical transmission corridor is proposed to be located on land owned by TAC, which would be accessed by agreement between TAC and AGL). In addition, the transmission corridor is required to traverse Old Punt Road, a local road managed by Port Stephens Council. Where the Project interfaces with the M1 Extension Project, AGL will work with TfNSW to ensure the transmission connection/s works align with TfNSW's activities.

Finally, the Project requires connection to either the 132 kV or 330 kV substation, both of which are managed by Transgrid. **Figure 1.7-4** shows the Project relative to the land ownership within and outside the Project Area.

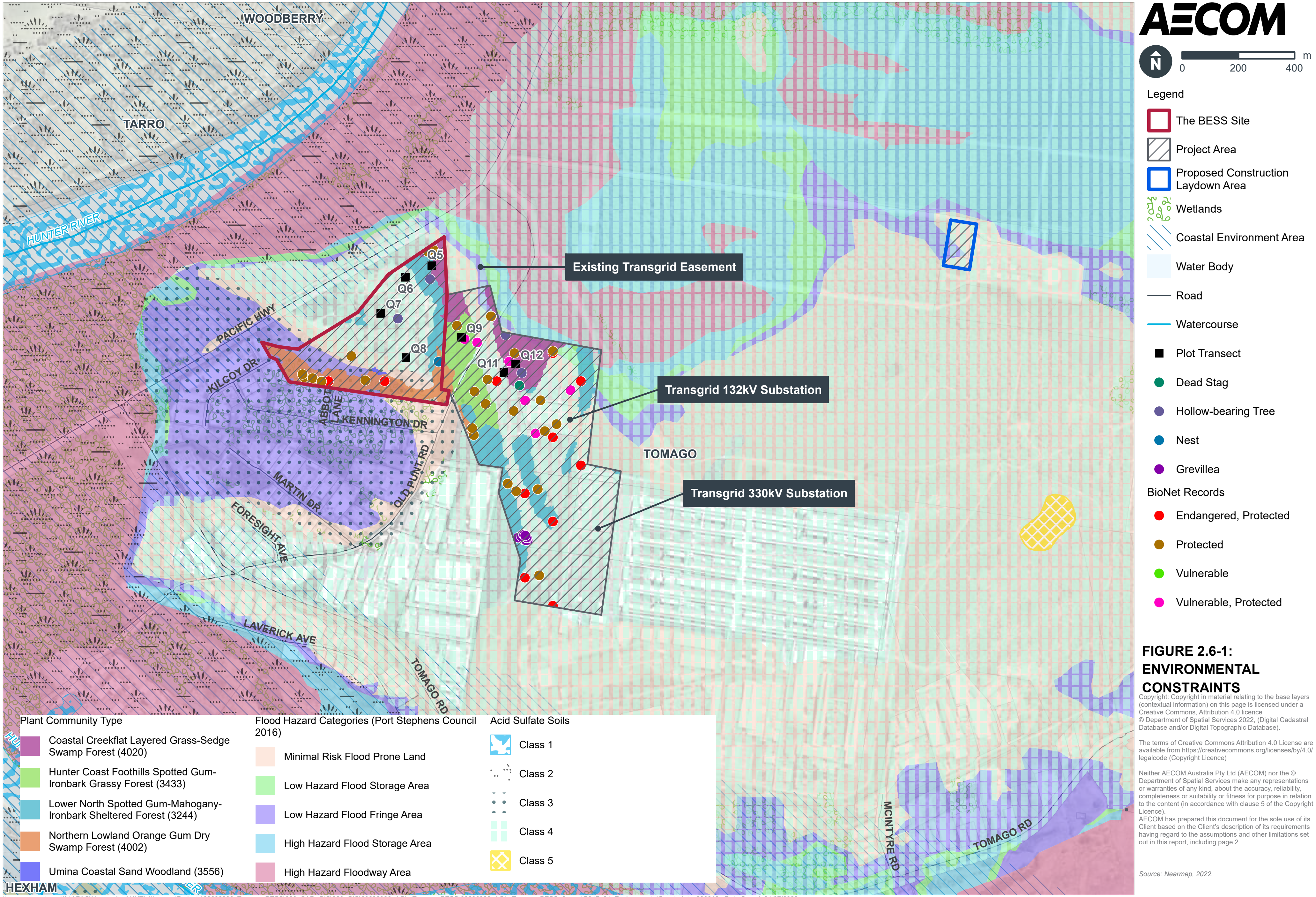

FIGURE 2.6-1: ENVIRONMENTAL CONSTRAINTS

Source: Nearmap, 2022.

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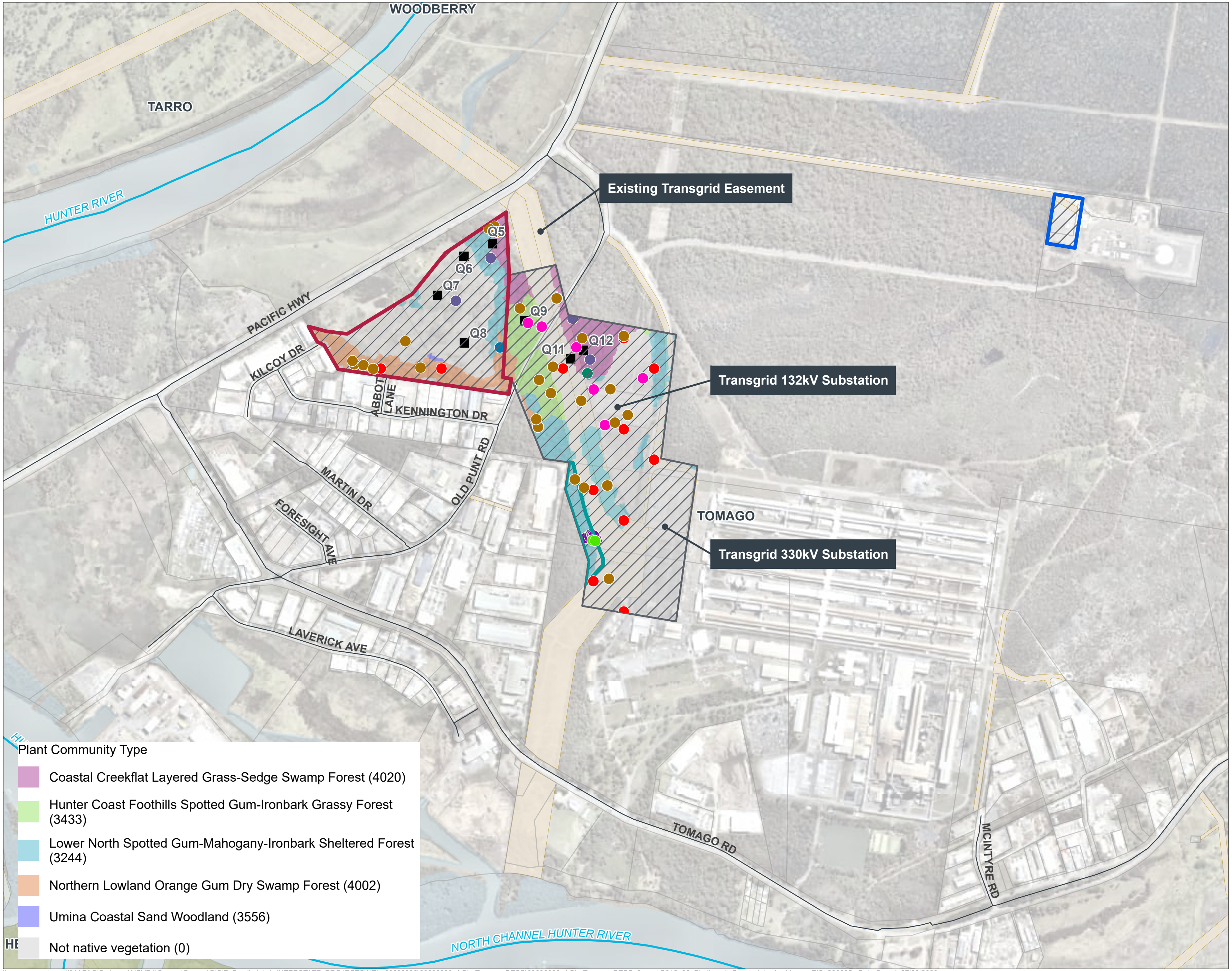

0 200 400 m

Legend

- The BESS Site
- Project Area
- Proposed Construction Laydown Area
- Avoidance Area
- NPWS Reserve
- Water Body
- Existing Transmission Line Easement
- Cadastral Boundary
- Watercourse
- Road
- Plot Transect
- Dead Stag
- Hollow-bearing Tree
- Nest
- Grevillea

BioNet Records

- Endangered, Protected
- Protected
- Vulnerable
- Vulnerable, Protected

FIGURE 2.6-2: BIODIVERSITY AVOIDANCE AREA

Source: Nearmap, 2022.

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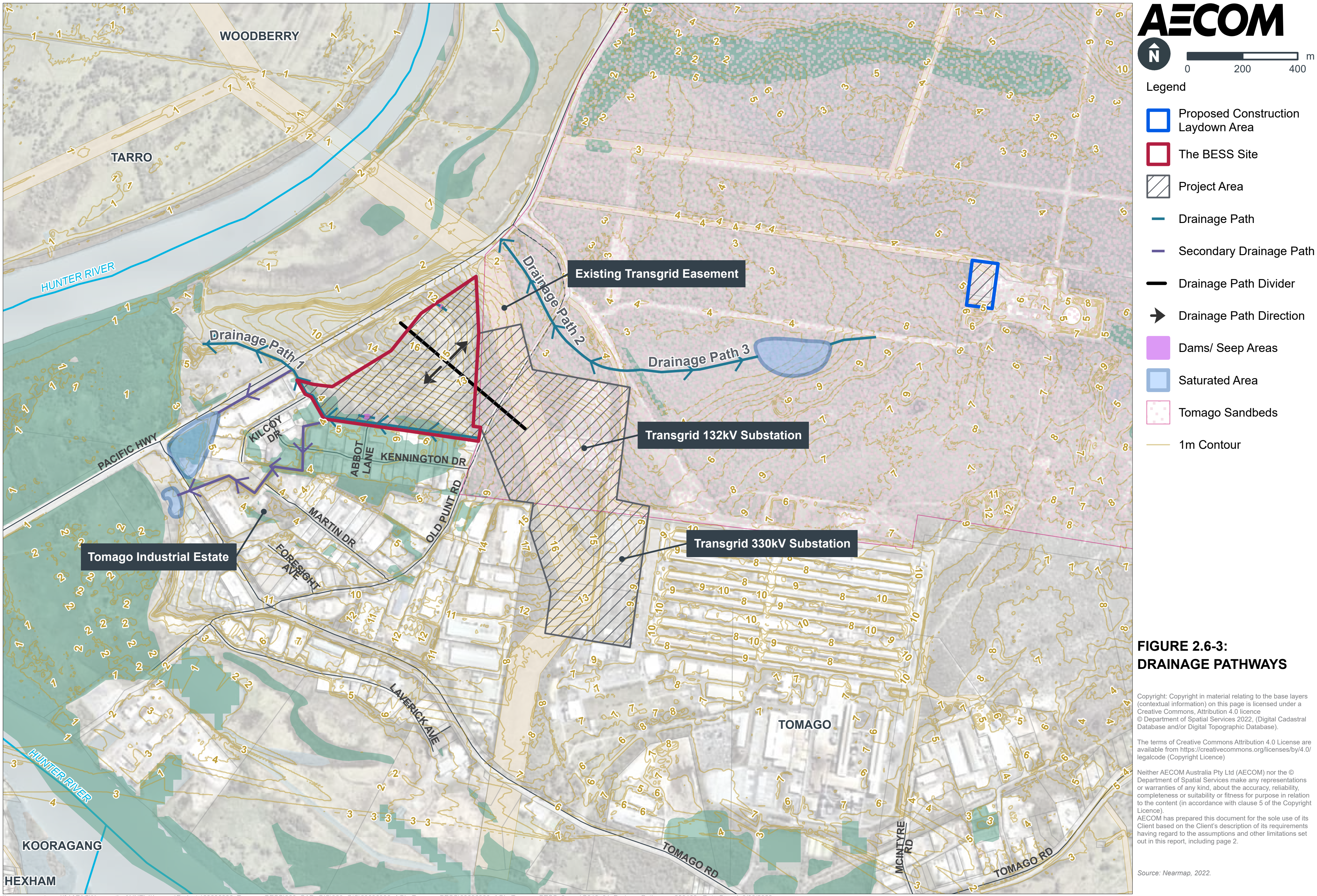

FIGURE 2.6-3: DRAINAGE PATHWAYS

Source: Nearmap, 2022.

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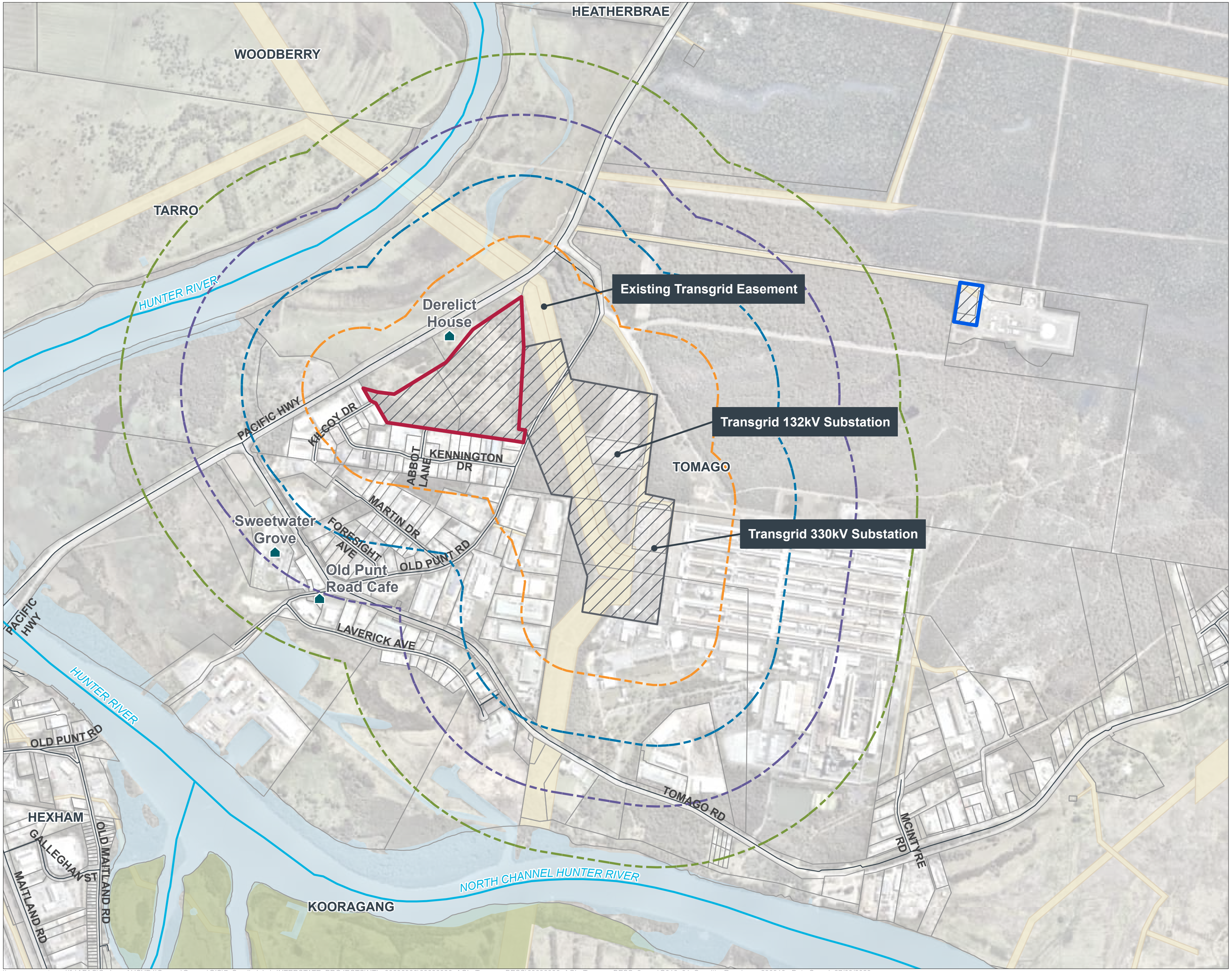


AECOM

N

0 200 400 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- 250m Buffer
- 500m Buffer
- 750m Buffer
- 1000m Buffer
- Cadastral Boundary
- Transmission Line Easement
- NPWS Reserve
- Water Body
- Watercourse
- Road
- Sensitive Receivers

FIGURE 2.6-4: SURROUNDING SENSITIVE RECEIVERS

Source: Nearmap, 2022.

3.0 Project description

3.1 Project overview

The Project comprises a BESS facility that would store energy from the grid with the ability to release electricity during periods of high demand and provide other ancillary services.

Key features of the Project would include (but not be limited to):

- Construction, operation and maintenance of a BESS with a nominal capacity of up to 500 MW and up to 2,000 MWh on Part Lot 5 and Lot 6 of DP1286735. Construction of the Project may be carried out in stages.
- An above ground, below ground, or a combination of both, transmission connection/s between the proposed BESS and one of the neighbouring substations.
- The proposed transmission connection/s could consist of one or a number of cables. The transmission connection/s would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. The BESS would connect to either:
  - Transgrid 132 kV Tomago Substation located on Lot 101 DP1125747; or
  - Transgrid 330 kV Tomago Substation located on Lot 3 DP808004, and Lots 102 and 103 DP1125747.

A summary of the key features of the Project is provided in **Table 3.1-1**.

Table 3.1-1: Overview of the Project

Project	Tomago Battery Energy Storage System (BESS)
Key features	• Construction and operation of a BESS with a capacity of up to 500 MW and up to 2,000 MWh; and • Connection of the BESS via transmission infrastructure to either: - Transgrid 132 kV Tomago Substation located on Lot 101 DP1125747; or - Transgrid 330 kV Tomago Substation located on Lot 3 DP808004, and Lots 102 and 103 DP1125747.
Proposed development	• Batteries located within battery enclosures and associated infrastructure including (but not limited) to inverters and a combination of high, medium and low voltage transformers • Cabling and collector units • Substation/s with associated infrastructure including high voltage transformers and other equipment to meet Generator Performance Standards (e.g., harmonic filters and/or synchronous condensers, if required) • Connection to an existing electrical switchyard at either the 132 kV or 330 kV substation • Temporary and permanent control room/s, office and maintenance buildings, warehouses, switch rooms, site access, internal roads, laydown areas and car parking • Other associated and ancillary infrastructure, including, for example, fire suppression, drainage and stormwater management, security fencing, lighting, and CCTV.
Project Area	The Project Area is shown in **Figure 3.1-1**. The Project Area includes the Site (as described below), the transmission connection corridor options, and the construction laydown area at the NGSF.
Site	The Site is at 1940 Pacific Highway, Tomago (being Part Lot 5 and Lot 6 in DP 1286735).

Project	Tomago Battery Energy Storage System (BESS)
Transmission connection corridor	The proposed transmission connection/s would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004.
Grid connection	An electricity transmission line/s is proposed to connect the BESS to Australia's National Electricity Market (NEM). The transmission connection would be installed either above or below ground (or a combination of both). The transmission connection would connect the BESS to either: • Transgrid 132 kV Tomago Substation; or • Transgrid 330 kV Tomago Substation. Works to connect the transmission line/s and associated infrastructure to the BESS substation and to either the 132 kV or 330 kV substation would also be required as part of this Project.
Access	During construction and operation, vehicular access to the Site would be via a new access point off Old Punt Road. Adequate parking would be provided onsite for the operation of the Project. A secondary access point will be available in the northern corner of the Site to provide emergency access and egress to the M1 Pacific Highway on ramp once the M1 extension to Raymond Terrace project (SSI-7319) is constructed. An agreement between AGL and TfNSW was made in February 2023 which confirmed TfNSW would provide an emergency access and egress track for the Project (the secondary access). As such, this secondary access arrangement does not form part of this Project.
Construction	
Construction activities	Construction works would involve: • Enabling works • Civil, structural, mechanical and electrical works • Transmission connection works • Commissioning • Demobilisation. A construction laydown area would also be provided on the Site, as well as an additional laydown area within the nearby NGSF located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of 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 listed under the following activities: • Enabling works: - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Water trucks - Excavators - Graders - Compactors - Light vehicles - Chainsaws - Tractors - Woodchippers/mulchers - Diesel generators. • Civil, structural, mechanical and electrical works: - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Excavators

Project	Tomago Battery Energy Storage System (BESS)
	- Graders - Scrapers - Compactors - Water trucks - Concrete trucks and pumps - Elevated work platforms - Cranes - Concrete saws and grinders - Compacters and rollers - Scrapers - Backhoe - Light vehicles, heavy rigid and articulated trucks (including multi trailer), low loaders - Diesel generators. • Transmission connection: - Excavators - Backhoe - Compactors - Water trucks - Light vehicles - Horizontal directional drilling rig - Elevated work platforms - Cranes - Chainsaws - Woodchippers/mulchers - Diesel generators. • Commissioning: - Elevated work platforms - Cranes - Light vehicles - Diesel generators. • Demobilisation: - Heavy vehicles including road trucks - Water trucks - Backhoe - Cranes - Compactors - Light vehicles - Diesel generators. • Maintenance equipment: - Elevated work platforms - Cranes - Chainsaws - Tractors - Light vehicles - Woodchippers/mulchers - Diesel generators.
Construction duration	Construction of the Project is intended to commence in Q2 2026 and take approximately 36 months to complete. The commencement and timing may change depending on market demand.
Construction workforce	Up to 200 construction workers (at peak) would be required. These workers would be preferentially sourced locally where appropriate skill sets are available.

<table>
<tr><th>Project</th><th>Tomago Battery Energy Storage System (BESS)</th></tr>
<tr><td>Construction hours</td><td>The construction activities would be primarily carried out during the following times of day:
Monday to Saturday 7:00 am to 6:00 pm
Sunday 8:00 am to 1:00 pm
NSW Public holidays 8:00 am to 1:00 pm.
Activities that may be undertaken outside of aforementioned hours would be completed in accordance with an Out of Hours Works procedure and include:
Receipt of deliveries
Emergency situations where work is required to prevent harm to persons, property and environment
Testing and commissioning.</td></tr>
<tr><td>Construction traffic volumes</td><td>Up to 200 light vehicles and 33 heavy vehicles are expected per day during the peak construction period.</td></tr>
<tr><td colspan="2">Operation</td></tr>
<tr><td>Operational life expectancy</td><td>The BESS is intended to have an operational life of up to 50 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe.</td></tr>
<tr><td>Operational workforce</td><td>It is anticipated that the Project would require up to approximately six staff during operation on an intermittent basis.</td></tr>
<tr><td>Security</td><td>Up to a 3 m high security fence would be constructed around the perimeter of the BESS facility. All access to the Site would be controlled through an access point off Old Punt Road. An emergency access/egress gate would be provided along the northern boundary of the Site.</td></tr>
<tr><td>Typical operating scenario</td><td>The BESS is expected to cycle once per day and be available to provide ancillary services 24 hours a day, seven days a week to the NEM when required.</td></tr>
<tr><td>Services and infrastructure</td><td>Existing services and utility infrastructure in the vicinity of the Site would, where required, be extended, adapted and augmented to meet the demands of the Project.</td></tr>
</table>

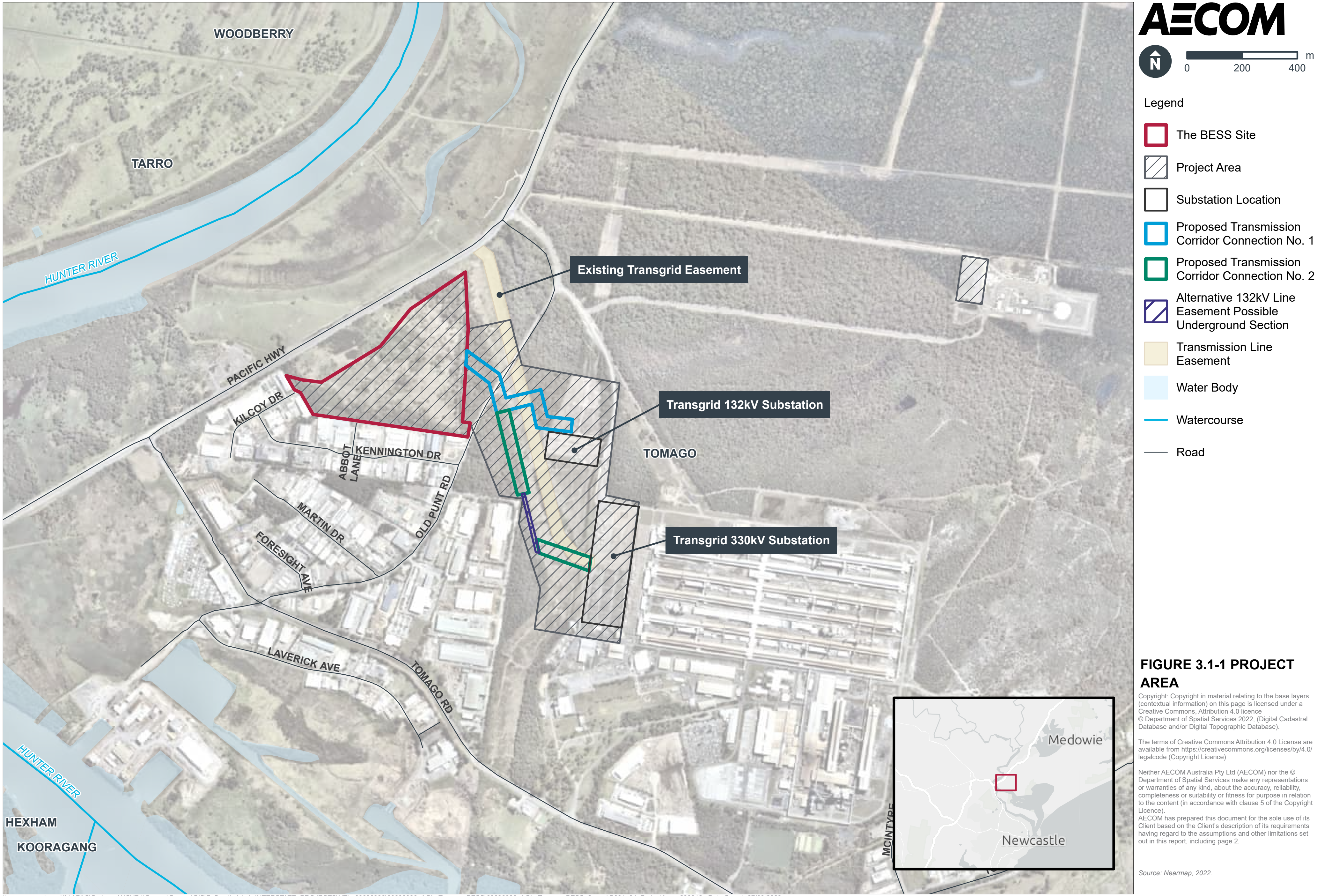


FIGURE 3.1-1 PROJECT AREA

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Sydney-AUSYD1\Secure\Groups\GIS\7_Small_Jobs_INTERSTATE_PROJECTS\NTL_60696986\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G001_04_ProjectArea_230912 Date Saved: 27/09/2023

3.2 Project Description

3.2.1 Battery energy storage system and plant

While the BESS technology provider is yet to be determined, the BESS is likely to consist of containerised or stacked batteries with associated control systems, inverters, heating, ventilation and air conditioning units, transformers, transmission connection infrastructure, and control and switch rooms.

The battery units would be up to 4 m in height and have a footprint of approximately 3 m by 12 m each. Each battery unit is expected to be arranged in groups that consist of lithium-ion battery cells, inverters, medium voltage (MV) transformers, associated control systems, heating, air or liquid cooling, ventilation and air conditioning (HVAC) units. Each battery modular unit is to be mounted on concrete footings or compacted gravel. An indicative site concept layout has been provided in **Figure 3.6-1**.

An office building, control rooms, switch rooms, warehouses and workshop areas would also be included as part of the Project. The office building would be designed to have a maximum building height of 4.5 m, whereas the control room, switch rooms and warehouse would be constructed to a maximum height of 8 m.

The Site would include a substation that would primarily comprise up to three transformers. This onsite substation would be separated by fencing from the rest of the BESS facility. The maximum height of the infrastructure (i.e., the lightning rods) within the substation is expected to be 20 m. The main transformers within the onsite substation would have a height of approximately 10 m. The onsite substation will connect the BESS facility to the proposed transmission connection.

The batteries would be connected to a Battery Management System which would provide 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.

3.2.2 Access, circulation and parking

Primary access to the Site during construction and operation would be via a new access point off Old Punt Road (refer to **Figure 3.6-1**). A secondary access point would be available in the northern corner of the Site to provide emergency access and egress to the M1 Pacific Highway on ramp once the M1 extension to Raymond Terrace project (SSI-7319) is constructed.

An agreement between AGL and TfNSW was made in February 2023 which confirmed TfNSW would provide an emergency access and egress track for the Project (the secondary access). As such, this secondary access arrangement does not form part of this Project.

As shown on **Figure 3.6-1**, an internal road would be provided to enable vehicular access around the Site. Adequate parking would be provided onsite for the operation of the Project. The amount of parking provided in the final design would be consistent with the expected low operational staffing requirements.

3.2.3 Transmission connection

The transmission connection would be installed either above ground, below ground, or a combination of both. If the connection is installed below ground it could be in one or a number of trenches. The transmission connection would connect the BESS to either:

- Transgrid 132 kV Tomago Substation, or
- Transgrid 330 kV Tomago Substation.

The proposed transmission connection/s would require the construction of associated infrastructure, including potentially a transmission line/s landing gantry at the Site and connections at the preferred substation. The transmission connection would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004.

Soils along the route of these trenches would be excavated and stockpiled nearby, or within the designated construction laydown areas for the Project. The transmission connection cables would be laid, and the trenches backfilled. This process of excavation would be completed in a progressive manner to minimise the amount of material stockpiled and to reduce the potential impacts related to erosion.

3.2.4 Security

A security fence with security lighting would be constructed around the perimeter of the BESS facility. Access to the BESS facility is expected to be controlled by security gates to facilitate authorised access only.

3.2.5 Services and infrastructure

Table 3.2-1 summarises the existing service infrastructure in proximity to the Site and the expected amendments that may be required to service the Project.

Table 3.2-1: Infrastructure services

Infrastructure	Amendment/connection requirement
Stormwater	Discussed in **Section 3.2.6**.
Potable water	Potable water would be supplied directly to the Site from a new connection to the existing municipal supply on Old Punt Road. This would service the site office and other amenities.
Sewer	Amenities, waste drains (within the ancillary infrastructure) and sewage would be collected onsite and trucked offsite.
Electricity	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 aboveground network that services other businesses at Tomago Industrial Area.
Telecommunications	Telecommunication infrastructure will be provided to the Site, including connection of fibre optic cabling to the control building and O&M building.
Fire services	Fire water will be provided to the Site via the existing potable water network in Old Punt Road. In addition to direct connection to the reticulated water services, the Site will include provision for a minimum of 20,000 litres (L) for firefighting purposes.

Figure 3.6-2 shows the existing service infrastructure in proximity to the Site.

3.2.6 Stormwater management

A preliminary/concept Surface Water Management Plan (SWMP) is included in **Appendix L (Surface water and flooding assessment)**. This plan would be further developed and refined during later design stages. The SWMP would be included as part of the Operational Environmental Management Plan (OEMP).

Finished surface levels across the developed area of the Site would aim to maintain existing catchments and flow patterns, such that surface water flows across the Site would continue to drain to both northern and south-eastern discharge points. On this basis, for the purpose of stormwater management, the Site would be split into two halves, and each half would have its own surface water drainage/quality treatment system with appropriate controls to mitigate potential adverse impacts.

The general surface water measures proposed to be included are:

- An internal drainage system, including:
    - an underground (piped) drainage network with capacity to capture and convey surface water runoff in frequent storm events (typically the 10% annual exceedance probability (AEP) or larger)
    - an overland drainage network to safely convey flows exceeding the capacity of the underground drainage network, in all events up to and including the 1% AEP event

- permanent catch drains and/or diversion channels to keep external, 'clean' water separate from 'dirty' runoff generated within the Site.

- Rainwater tanks for collecting runoff from buildings and for reuse (e.g., for irrigation).
- Water sensitive urban design (WSUD) measures at numerous areas across the Site to treat surface water flows and promote infiltration. Such measures may include permeable paving, buffer strips, ponds.
- Combined oil and grease interceptor/gross pollutant trap. This system is used to facilitate the removal of most entrained oils and greases, suspended solids and attached metals carried by stormwater runoff. Wet sump oil and grease separator would also capture any small to medium spill that occurs on the hardstand area.
- Bioretention system for the treatment of nutrients and other pollutants. Treated discharge from the wet sump oil and grease separator would be discharged into a bio-retention system. Bioretention systems consist of selectively vegetated areas with enhanced filter media. Stormwater runoff is slowly filtered through the enhanced filter media, where physical and bio-chemical processes facilitate the removal and breakdown of common stormwater contaminants. Filtered stormwater would be collected and discharged to the natural depression downstream. The base of the bio-retention filter media would be lined such that it would be separated from the groundwater system. Modelling results indicated that a total bioretention filter media area in the order of 1,800 m^2 for the whole Site would be required to achieve these NorBE objectives.
- Onsite detention (OSD) system (tank or basin) to attenuate Site runoff and limit post development discharge rates back to pre-development rates.
- Outlet control measures such as scour protection and energy dissipators to prevent scouring downstream of the Site.
- Water quality monitoring procedures to ensure the above measures can achieve the required level of treatment.

3.3 Project construction

3.3.1 Overview

It is anticipated that up to 200 construction staff would be required to construct the Project.

Construction works would be likely to involve:

- Installation of erosion and sediment controls and site fencing
- Installation and maintenance of environmental controls
- Development/upgrade of site access and internal/external access roads
- Civil works to form the BESS pad, substation area/s, craneage hardstands, stormwater management system and construction laydown areas
- Concrete works associated with equipment and building foundations/footings, including placement of pre-cast concrete panels
- Trenching and installation of cables at the BESS and substation
- Connections to surrounding utilities as required
- Structural works to support BESS facilities
- Construction of supporting structures, e.g., office building, workshop, switch rooms and warehouse
- Delivery, installation and electrical fit-out of BESS and transformers
- Construction of transmission connection between BESS and the preferred substation including works to connect to the substation
- Testing and commissioning activities

- Removal of construction equipment and rehabilitation of construction areas.

Construction of laydown areas would also be required on land in proximity to the Site. In addition to laydown areas within the Site, there is potential for an additional laydown area within the NGSF located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of the Site (**Figure 3.6-3**). The area within the NGSF was previously cleared as part of the construction of the NGSF and was used as a contractor carpark. No additional clearing or earthworks are required to establish the laydown area.

3.3.2 Construction

The construction program would be undertaken broadly in accordance with the following stages.

Enabling works

Enabling works for the Project would be carried out to prepare the Site for construction and would be likely to include:

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

Civil, structural, mechanical and electrical works

Following the enabling works, the following works would be likely to be completed:

- Site drainage and underground services would be installed
- Concrete foundations and slabs for the battery enclosures, site facilities and ancillary components would be formed
- Construction of internal site roads, consisting of either compacted gravel or road base
- Minor earthworks and site levelling to form a suitable BESS pad onsite to ensure a suitable development footprint and establishment of site access
- Construction, installation and connection of aboveground civil, mechanical and electrical plant equipment and structures, including battery enclosures, connection infrastructure, formal access and circulation, as well as ancillary site facilities and site security
- Internal fit out of site office and control room, which may progress in several stages over an extended period
- Delivery and installation of BESS facility components.

Transmission connection

Construction of transmission connection is likely to include:

- Enabling works and clearing of the land corridor and works areas between the Site and preferred substation
- If installed above ground, installation of supporting and tension structures (poles), stringing of conductors (wires), and connection to the preferred substation to within the substation switchyard
- If installed below ground, excavation of trenches, installation of cables, backfilling trenches, and connection to the preferred substation within the substation switchyard. Horizontal direction drilling may also be required in specific locations.

Commissioning

This would include testing and general commissioning activities to confirm the correct operation of Project components. This will ensure that the Project is operating in accordance with the necessary performance requirements, including the Generator Performance Standards and any other AEMO requirements.

Demobilisation

Following completion of the construction activities, the disturbed areas onsite and within the transmission connection corridor would be recontoured and landscaped, if deemed necessary. Temporary construction facilities and equipment would be removed.

3.3.3 Materials, stockpiling and laydown areas

Materials, stockpiling and laydown areas would be designated prior to construction with identified locations for the following:

- Spoil handling and storage
- Dangerous goods storage
- Workshop and equipment storage
- Onsite parking
- Construction compounds with site offices and staff amenities
- Site access and egress.

Laydown areas would be located on the Site during construction and would also be required on land near the Site. Additional areas offsite that may be used for the stockpiling or laydown of materials would have the necessary permits or approvals for this purpose.

The temporary construction laydown area would consist of an open-air, ground level laydown, possibly covered with temporary roofing to protect stored equipment. There would be no underground storage of material. There may be a need for a temporary hut or small building.

There is an allowance for an additional laydown area at the NGSF located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of the Site (refer to **Figure 3.6-3**). The area has been previously cleared as part of the construction of the NGSF and was used as a contractor carpark at that time. No additional clearing or earthworks are required to establish this laydown area. Access to the NGSF construction laydown area will utilise the existing road network from Old Punt Road. No upgrades to Old Punt Road are required to utilise the NGSF as a construction laydown area.

The location of these areas would be outlined within the construction contractor's Construction Environmental Management Plan (CEMP) prior to the commencement of construction.

3.3.4 Construction program

An indicative schedule for construction is provided in **Table 3.3-1**.

Table 3.3-1: Indicative construction schedule

Task/stage	Date/ duration
Enabling works	2026
Civil, structural, mechanical and electrical works	Mid-Late 2026 – Early 2027
Transmission connection	Late 2026 – Early 2027
Commissioning	Early 2027 – Mid 2027
Demobilisation	2028

3.3.5 Construction equipment and vehicles

An indicative list of the plant and equipment that would be used to construct the Project is provided in **Table 3.3-2**. The equipment list would be further refined during detailed design.

Table 3.3-2: Indicative plant and equipment for construction

Equipment to be used during construction	
Enabling works and prefabrication	
Front end loaders	Excavators
Dump trucks	Graders
Road trucks	Compactors
Water trucks	Heavy vehicles
Light vehicles	Chainsaws
Tractors	Woodchippers/mulchers
Diesel generators	Flood lights
Structural, civil, mechanical and electrical works	
Front end loaders	Dump trucks
Road trucks	Excavators
Graders	Scrapers
Concrete trucks and pumps	Compactors and rollers
Elevated work platforms	Scrapers
Cranes (either an All-Terrain Crane, or 400 tonne Crawler Crane)	Backhoe
Concrete saws and grinders	Diesel generators
Water trucks	Light vehicles
Heavy vehicles	Flood lights
Transmission connection	
Excavators	Elevated work platforms
Backhoe	Cranes
Compactors	Chainsaws
Water trucks	Woodchippers/mulchers
Light vehicles	Horizontal directional drilling rig
Diesel generators	Flood lights
Commissioning	
Elevated work platforms	Diesel generators
Cranes	Light vehicles
Flood lights	
Finishes and demobilisation	
Road trucks	Backhoe
Water trucks	Compactors
Light vehicles	Diesel generators

3.3.6 Construction workforce and traffic

It is anticipated that a peak of up to 200 construction staff would be required during construction; however, at times this number could be less depending on the works being completed.

A new access into the Site would be constructed off Old Punt Road southeast of the Site. This new access would be used for construction, operation and maintenance. An internal access road shown on **Figure 3.6-1** would also be provided for construction traffic to navigate to the construction laydown, storage and parking area/s. These areas would be used for vehicular parking and deliveries.

Up to 33 heavy vehicles a day may need to attend the Site during construction. 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. These heavy vehicles could arrive and leave Site at any point during the day, however, it is likely that they may arrive in the mornings. Parking for heavy vehicles would be provided at the Site and the NGSF construction laydown area. In addition to these heavy vehicles, oversized and over mass vehicles (OSOM) are expected to be required to deliver large, prefabricated elements for the construction of the Project (e.g. onsite substation transformers, switch rooms).

The construction workforce would likely use light vehicles. A peak of 200 construction staff would conservatively result in up to 200 light vehicles driving to and from the Site each day during the morning (AM) period and afternoon (PM) period, respectively.

During construction, some parking would be provided within the Site in the construction and storage, laydown and parking area shown on **Figure 3.6-1**. Overspill parking for workers would be provided at the NGSF construction laydown area. A Construction Traffic Management Plan (CTMP) would be prepared as part of the CEMP and would be implemented prior to the commencement of construction. This CTMP would demonstrate where parking would be provided and how workers would be transported to and from Site.

No parking of worker's vehicles (light or heavy) would occur along the verges of Old Punt Road or on other public roads in the vicinity of the Project Area unless required for safety or security reasons.

3.3.7 Construction hours

The construction activities would be primarily carried out during the following times of day:

- Monday-Saturday 7:00 am to 6:00 pm
- Sunday 8:00 am to 1:00 pm
- NSW Public holidays 8:00 am to 1:00 pm.

Activities that may be undertaken outside of standard construction hours would be undertaken in accordance with an Out of Hours Works procedure and include:

- Receipt of deliveries
- Emergency situations where work is required to prevent harm to persons or property
- Testing and commissioning.

3.4 Operation

3.4.1 Operational activities

The operation of the Project would likely involve the following:

- Operation, maintenance, testing and management of equipment
- General office activities
- Receipt of goods
- Waste removal
- General site maintenance (e.g. care of groundcover).

3.4.2 Operational plant and equipment

Table 3.4-1 provides an indicative list of plant and equipment that would be used to maintain the Project and the Site.

Table 3.4-1: Indicative plant and equipment for operation

Equipment to be used during operation	
Maintenance activities	
Chainsaws	Light vehicles
Tractors	Woodchippers and mulchers
Elevated work platforms	Cranes
Diesel generators	

3.4.3 Operational workforce and hours

Once constructed, the Project would operate 24 hours a day, seven days a week. It is anticipated that the Project would require up to approximately six staff during operation on an intermittent basis. The BESS would typically be managed remotely and staffed as required during both planned and unplanned maintenance periods. The Site would accommodate approximately 10 light vehicle parking spaces during the operational phase.

3.5 Decommissioning

The BESS is intended to have an operational life of up to 50 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 (including poles and wires) would be removed and re-purposed where possible and land rehabilitated and recontoured, if and as required. During the decommissioning of the Project, the batteries would either be disposed of, repurposed or recycled at a licensed disposal facility.

3.6 Capital Investment Value

A Capital Investment Value (CIV) report has been prepared by a suitably qualified Quantity Survey in accordance with the SEARs. The CIV report would be provided to DPE as part of the State significant development application submission requirements. The CIV report has confirmed that the CIV for the project exceeds $30 million. On this basis, the Project is considered SSD, which is explained further in **Section 4.2.2**.

FIGURE 3.6-1: TOMAGO BESS CONCEPT SITE LAYOUT SITE PLAN

Source: Nearmap, 2022.

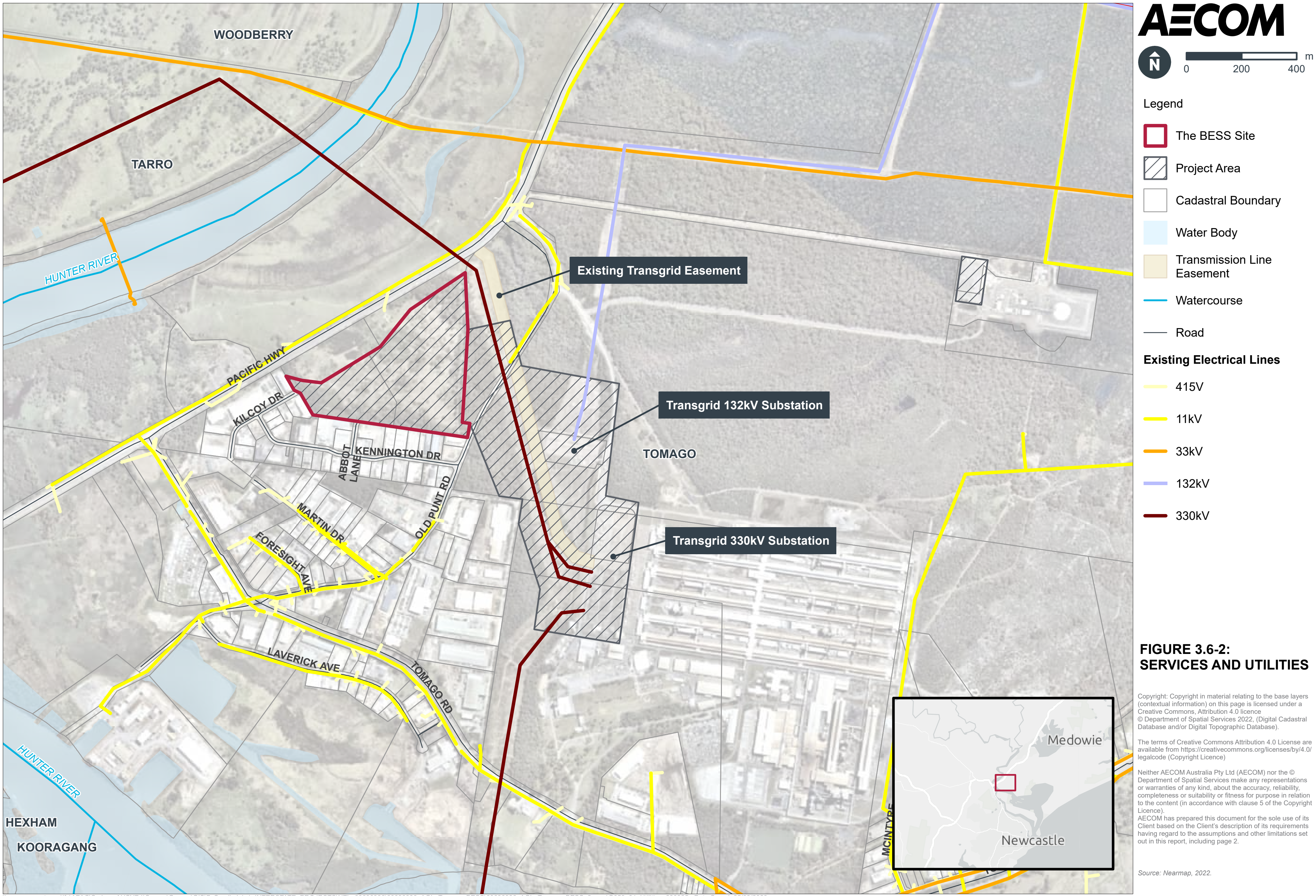


FIGURE 3.6-2:
SERVICES AND UTILITIES

Source: Nearmap, 2022.

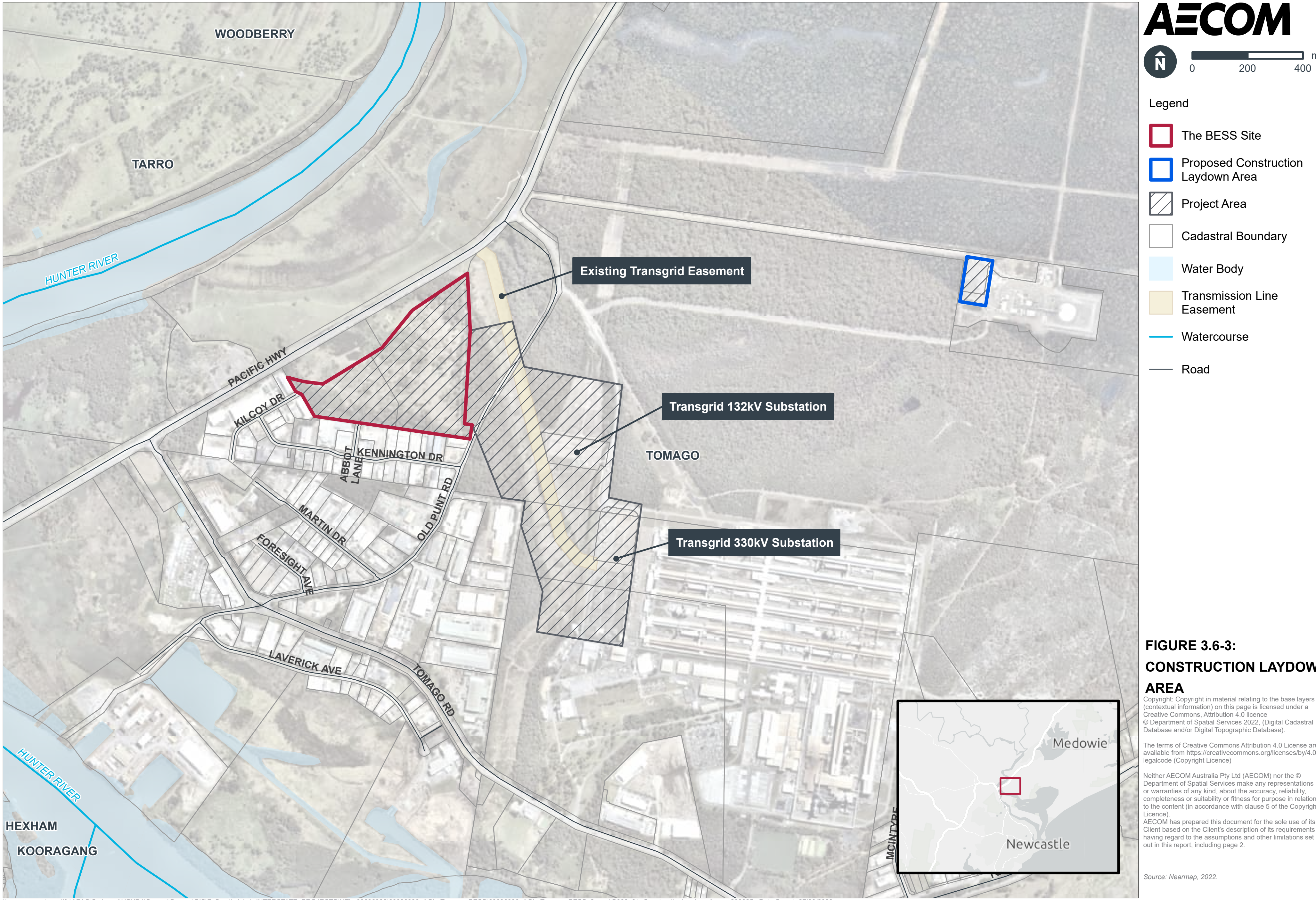


FIGURE 3.6-3: CONSTRUCTION LAYDOWN AREA

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Sydney-AUSYD1\Secure\Groups\GIS\7_Small_Jobs_INTERSTATE_PROJECTS\NTL_60696986\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G060_01_ConstructionLaydownAreas_230925 Date Saved: 27/09/2023

4.0 Statutory Context

4.1 Introduction

This chapter outlines the relevant statutory requirements for the Project. Specifically, it identifies:

- The relevant planning pathway under which approval is sought
- Relevant state approvals (outlining approvals that are not required for approved State Significant Development (SSD) and approvals that are required and that should be granted substantially consistent with the consent for the approved SSD project)
- Mandatory matters for consideration, including relevant state and local environmental planning instruments
- Relevant Commonwealth approvals.

A summary of the statutory requirements for the Project is provided in **Table 4.1-1**, with further detail provided in **Section 4.1.1** to **Section 4.3.4**. A detailed assessment of the statutory requirements is addressed in the relevant sections of the environmental impact assessment presented in **Chapter 6.0** (**Assessment of Impacts)** and a statutory compliance table is provided in **Appendix B (Statutory compliance table)**.

Table 4.1-1: Summary of statutory requirements

Category	Requirement
Power to grant approval	The Project is considered SSD, in accordance with Division 4.7 of the EP&A Act (refer to **Section 4.2.2**). In line with section 4.5 of the EP&A Act, the consent authority for the Project would be the NSW Minister for Planning or the Independent Planning Commission (in the case of greater than 50 public objections to the application, local council objection, or reportable political donations made by the proponent in the two years prior to determination).
Permissibility	The Project Area is located on land that is zoned E4 General Industrial by the Port Stephens Local Environmental Plan (LEP). The Project is characterised as "*electricity generating works*" is permissible by virtue of the application of clause 2.36 of the Transport and Infrastructure State Environmental Planning Policy (SEPP) (refer to **Section 4.3.1**)
Other approvals	The following secondary approval is required to support the Project: • A consent under section 138 of the *Roads Act 1993* (discussed in **Section 4.3.3**). No other approvals are required under NSW legislation. For the avoidance of doubt: • An environment protection licence under the *Protection of the Environment Operations Act 1997* is not required on the basis that the works do not entail a scheduled activity by reference to Schedule 1 of the Act (refer to **Section 4.3.3**) • An approval under the *Coal Mine Subsidence Compensation Act 2017* is not required on the basis that the Project is not within a mine subsidence district.
Pre-condition to exercising the power to grant approval	Pre-conditions to grant of development consent include consideration of matters discussed in further detail in **Section 4.1.1**, and **Table 4.1-2**.

Category	Requirement
Mandatory matters for consideration	Pursuant to Section 1.7 of the EP&A Act, the *Biodiversity Conservation Act 2016* (the BC Act) is a mandatory matter for consideration. Section 7.9 of the BC Act provides that any application under Part 4 of the EP&A Act for SSD must be accompanied by a BDAR unless the Planning Agency Head and Environment Agency Head determine that the development is not likely to have any significant impact on biodiversity values (discussed further in **Section 4.3.1**).

4.1.1 Pre-conditions to grant of development consent

Table 4.1-2: Pre-conditions to grant of development consent

Statutory reference	Pre-condition	Assessment
State Environmental Planning Policy (Resilience and Hazards) – section 3.7	Section 3.7 of *State Environmental Planning Policy (Resilience and Hazards) 2021*(Resilience and Hazards SEPP) requires consideration of relevant circulars and guidelines in consideration of whether a proposed development represents potentially hazardous or offensive development. Where a conclusion is reached that a project is either, or both, a potentially hazardous or offensive development, a Preliminary Hazard Analysis (PHA) must be prepared for the project.	The Project has not been assessed as potentially hazardous or potentially offensive development, however the SEARs require a PHA to be completed (refer to **Section 6.2** and **Appendix J (Preliminary Hazard Analysis)**). This PHA concludes that there were no observed offsite impacts and that the Project does not exceed the acceptable risk criteria. A range of recommendations are provided in **Section 6.2.4** and **Appendix D (Compilation of mitigation measures)**.
State Environmental Planning Policy (Resilience and Hazards) – section 4.6(1)(b)	A consent authority must be satisfied that the land is suitable in its contaminated state - or will be suitable, after remediation - for the purpose for which the development is proposed to be carried out.	The Contamination Assessment (Aurecon 2019) prepared for the formerly approved NPS confirmed that the Site is suitable in its contaminated state to be used for the proposed purpose (i.e. the Project). Further discussion is provided in **Section 6.5**.
Port Stephens LEP 2013	The LEP sets out the environmental planning provisions applicable to the Port Stephens LGA and is administered by Port Stephens Council	Discussion around the relevance of provisions under the LEP are discussed in **Table 4.3-2**.

4.2 Environmental Planning and Assessment Act 1979

4.2.1 Overview

The EP&A Act and the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) provide the framework for land use planning and development control in NSW. The EP&A Act and the EP&A Regulation is supported by several Environmental Planning Instruments (EPIs), including State SEPPs and LEPs.

Part 4 of the EP&A Act establishes a framework for assessing development that requires consent and categorises development 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.

4.2.2 Planning approval pathway

BESS projects are considered electricity storage projects defined as '*electricity generating works*' under Transport and Infrastructure SEPP as a building or place used for the purpose of electricity storage. Section 2.36 of the Transport and Infrastructure SEPP states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed non-residential zone. The Site is located within the E4 General Industrial land use zone, which is a prescribed non-residential zone under section 2.35 of the Transport and Infrastructure SEPP. On this basis, the Project is permissible with development consent on the Site.

Division 4.7 of the EP&A Act defines development that is State Significant Development (SSD) and notes that development can be declared as such by an EPI. Pursuant to the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP), '*electricity generating works*' are deemed to be SSD if they have a Capital Investment Value (CIV) of more than $30 million. This Project has a CIV in excess of $30 million.

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.".* Part 8, Division 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'*. Environmental assessment requirements are typically sought through a request for SEARs submitted to the DPE. This EIS has been prepared in line with Section 173 of the EP&A Regulation to address the requirements issued by the Secretary on 12 May 2023. These have been summarised in **Appendix A (SEARs table)**.

In line with section 4.5 of the EP&A Act, the consent authority for the Project would be the NSW Minister for Planning or the Independent Planning Commission (in the case of greater than 50 public objections to the application, local council objection, or reportable political donations made by the proponent in the two years prior to determination). 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.

Sections 4.41 and 4.42 of the EP&A Act identify authorisations that are not required for a SSD, and authorisations that cannot be refused, if necessary, for carrying out a SSD, respectively. From the authorisations listed under section 4.42, only consent under Section 138 of the *Roads Act 1993* would be required as Project would require a new access point to connect the facility to the road network at Old Punt Road (a local road managed by Port Stephens Council). Port Stephens Council would be the roads authority for the section 138 consent. The location of this access to Old Punt Road has been discussed with Port Stephens Council (refer to **Appendix C (Engagement table)**). A summary of the approval requirements that may relate to the Project has been provided in **Table 4.1-1**.

4.3 Mandatory considerations

Mandatory considerations for the Project are summarised within this section.

4.3.1 State Environmental Planning Policies

The following SEPPs are considered relevant to the Project:

- *State Environmental Planning Policy (Planning Systems) 2021*
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021*
- *State Environmental Planning Policy (Resilience and Hazards) 2021*
- *State Environmental Planning Policy (Transport and Infrastructure) 2021*
- *State Environmental Planning Policy (Sustainable Buildings) 2022.*

Each relevant SEPP is discussed in further detail below.

State Environmental Planning Policy (Planning Systems) 2021

As discussed in **Section 4.2.2**, the Project is declared as SSD under clause 2.6 of the *State Environmental Planning Policy (Planning Systems) 2021*(Planning Systems SEPP). Furthermore, clause 2.10 of this SEPP states that Development Control Plans (DCPs) do not apply to SSDs.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

The chapters of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) relevant to the Project, include:

- Chapter 2 Vegetation in non-rural areas
- Chapter 3 Koala habitat protection 2020
- Chapter 4 Koala habitat protection 2021.

The application of each chapter is discussed in further detail below.

Chapter 2 Vegetation in non-rural areas

Chapter 2 of the Biodiversity and Conservation SEPP relates to vegetation in non-rural areas. The aims of Chapter 2 are the protection of the biodiversity values of trees and other vegetation in non-rural areas of the State and the preservation of the amenity of non-rural areas of the State through preserving trees and other vegetation.

The Biodiversity and Conservation SEPP applies to Port Stephens LGA, and land use zones contained under section 2.3, which includes land zoned E4 General Industrial.

Section 2.6(1) of this SEPP states that '*a person must not clear vegetation in any non-rural area of the State to which Part 3 (now Part 2.3) applies without the authority conferred by a permit granted by the council*'*.* In addition, Section 2.6(2) further states that '*a person must not clear native vegetation in any non-rural area of the State that exceeds the biodiversity offset scheme threshold without the authority conferred by an approval of the Native Vegetation Panel under Part 2.4.'*

Part 2.3 of the Biodiversity and Conservation SEPP applies to vegetation in any non-rural area of the State that is declared by a development control plan to be vegetation to which [Part 2.3] applies. As discussed above, the Project constitutes SSD and as such the development control plan does not apply. By extension, the requirement to consider vegetation under the Port Stephens Council Development Control Plan (DCP) is not applicable.

Chapter 3 Koala habitat protection 2020

The aim of Chapter 3 under the Biodiversity and Conservation SEPP is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of population decline. As stated in section 3.3, this Chapter of the SEPP applies only to land zoned RU1 Primary Production, RU2 Rural Landscape and RU3 Forestry, within LGAs specified in Schedule 2 of Chapter 4 of the Biodiversity and Conservation SEPP. The Project Area is zoned E4 General Industrial. As such, the provisions contained under Chapter 3 of the Biodiversity and Conservation SEPP do not apply to the Project.

Chapter 4 Koala habitat protection 2021

The aim of Chapter 4 under the Biodiversity and Conservation SEPP is to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. As stated in section 4.4, Chapter 4 of the Biodiversity and Conservation SEPP applies to each LGA listed in Schedule 2, which includes Port Stephens LGA.

Port Stephens Council prepared a Comprehensive Koala Plan of Management, which was published in June 2002 (Port Stephens Council, 2002). As Port Stephens Council has an approved Koala management plan in place, reference is made to section 4.8 of the Biodiversity and Conservation SEPP, which provides guidance regarding the *"development assessment process – approved koala plan of management for land".*

Of interest to this Project is section 4.8(2), which states:

> *(2) the council's determination of the development application must be consistent with the approved koala plan of management that applies to the land*.

As mentioned in **Section 4.2.2**, pursuant to section 4.5(a) of the EP&A Act, the consent authority for the Project is the Minister for Planning (or Independent Planning Commission). When considering the application of Chapter 4 of the Biodiversity and Conservation SEPP, section 4.8(2) refers to "*Council's determination*". By virtue of the Minister for Planning being the relevant consent authority, a *prima facie* interpretation of section 4.8 infers that SSD is exempt from the application of Chapter 4 of the Biodiversity and Conservation SEPP.

Notwithstanding the above, impacts to koalas and potential habitat species would be considered in accordance with the requirements of the BC Act; with the outcomes addressed in this EIS and supported through the production of a BDAR.

State Environmental Planning Policy (Resilience and Hazards) 2021

The objective of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) is to provide state-wide planning approach to resilience and hazards. The chapters of Resilience and Hazard SEPP relevant to the Project, include:

- Chapter 2 Coastal management
- Chapter 3 Hazardous and offensive development
- Chapter 4 Remediation of land.

The application of each chapter is discussed in further detail below.

Chapter 2 Coastal management

The aim of this chapter is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objectives of the *Coastal Management Act 2016*.

There is a portion of land within the western corner of the Site that is mapped as land within the Coastal Environment Area (**Figure 4.3-1**). The part of the Site mapped as Coastal Environment Area is part of the 'exclusion zone' within the Site and is not intended to be developed. Nevertheless an assessment has been undertaken against the matters of consideration contained under section 2.10 of the Resilience and Hazards SEPP and provided in **Table 4.3-1**.

Table 4.3-1: Coastal environment area matters of consideration

Matters of consideration	Compliance
Division 3 Coastal Environment Area **Section 2.10 Development on land within the coastal environment area** **1) The consent authority must consider whether the proposed development is likely to cause an adverse impact on:**	
a) The integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment	The Project is not expected to adversely impact on the biophysical, hydrological and ecological environment. However, hydrology has been discussed further in **Section 6.3**, **Section 6.4 and Section 7.3**
b) Coastal environmental values and natural coastal processes	The development is bound to the north by the M1 Pacific Highway, and to the south by industrial land uses. Therefore, the proposal is not expected to adversely impact coastal environmental values or processes.

Matters of consideration	Compliance
c) The water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014*), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1	The Project is not located in proximity to any of the sensitive coastal lakes identified in Schedule 1. Notwithstanding, an assessment has been undertaken pursuant to the NorBE requirements, with the results presented in **Section 6.4**.
d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms	The Project is expected to have adverse effects on native vegetation and fauna and their habitats. This is achieved through the avoidance of land (i.e., exclusion area) mapped as being impacted as a coastal environment area. Any potential indirect impacts will be minimised where possible, and appropriate offsets have been identified. **Section 6.3**further details biodiversity impacts, offsets, and mitigation measures.
e) Existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability	There is an existing fence around the perimeter of the Site, and the Site is not a public open space.
f) Aboriginal cultural heritage, practices and places	There are six Aboriginal sites within the Project Area, however these are all located outside of the land mapped as the coastal environment area. **Section 6.9** summaries the impacts and mitigation strategies that is afforded to Aboriginal heritage. Ultimately, this would result in the preparation of an Aboriginal Cultural Heritage Management Plan (ACHMP).
g) The use of the surf zone	N/A

Chapter 3 Hazardous and offensive development

The aim of this chapter is to ensure that in considering any development application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact (among others).

Part 3 under Chapter 3 of the Resilience and Hazards SEPP applies to industrial developments that are considered “*potentially hazardous or offensive industry*”. The definition of a potentially hazardous industry and potentially offensive industry is provided in section 3.2 of the Resilience and Hazards SEPP. Development applications for development that constitutes a potentially hazardous industry must be accompanied by a PHA.

For development proposals classified as ‘*potentially hazardous industry*’ the SEPP (and DPE's *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (January 2011)) establish a test by way of a preliminary screening assessment and PHA to determine the risk to people, property and the environment.

A Preliminary Screening Assessment was undertaken in accordance with the SEPP (and DPE's *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (January 2011)), with the findings provided in **Section 6.2**. Based on the screening assessment, the materials considered to be dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail that would be stored and transported to the Site do not exceed the SEPP 33 thresholds. Notwithstanding the outcome of the screening assessment, DPE requested that the Project be accompanied by a PHA. In response to the SEARs, a PHA has been prepared to identify potential hazards from the Project and assess the associated level of risk. The complete report is attached in **Appendix J (Preliminary Hazard Analysis)** with relevant sections summarised in **Section 6.2**.

Chapter 4 Remediation of Land

The objective of Chapter 4 is to provide a state-wide planning approach to the remediation of contaminated land, where the purpose of remediation of contaminated land is to reduce the risk of harm to human health or any other aspect of the environment. Pursuant to section 4.6(1), "a *consent authority must not consent to the carrying out of any development on land unless-*

> *(a) it has considered whether the land is contaminated, and*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose."*

Furthermore section 4.6(2) states that "*before determining an application for consent to carry out development that would involve a change of use on any of the land specified under subsection (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land guidelines.*".

Section 6.5 details the risk of existing contamination within the Site and potential for the Project to result in contamination impacts to any receiving environments. A Soils and Contamination Specialist Study (Contamination Assessment) was completed by Aurecon Australasia Pty Ltd (2019) for the NPS. This included land within the majority of the Project Area. The assessment included a review of contaminated materials and acid sulfate soils (ASS), potential risks to human health and the receiving environment, and mitigation measures to minimise potential risks.

The Contamination Assessment (summarised in **Section 6.5**) confirmed that the Site is suitable to support the Project, thereby complying with the requirement under section 4.6(2) of the Resilience and Hazards SEPP.

State Environmental Planning Policy (Transport and Infrastructure) 2021

The objective of the Transport and Infrastructure SEPP is to provide state-wide planning approach to facilitate the effective delivery of infrastructure across the State. Chapter 2 of the Transport and Infrastructure SEPP TI is relevant to the Project.

Chapter 2 Infrastructure

The aim of Chapter 2 of the Transport and Infrastructure SEPP is to facilitate the effective delivery of infrastructure across the State. The Site is zoned E4 General Industrial under the Port Stephens LEP. This land use zone is defined as a '*prescribed non-residential zone'* for the purpose of electricity generating works. Under section 2.36 of the Transport and Infrastructure SEPP, the Project is considered permissible with consent at the Site.

Section 2.48 of the Transport and Infrastructure SEPP relates to determination of development applications that are likely to affect an electricity transmission or distribution network. Specifically, section 2.48(1) states that "*this section applies to a development application… for development comprising or involving any of the following:*

(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-

  a. *Within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or*

  b. *Immediately adjacent to an electricity substation, or*

  c. *Within 5m of an exposed overhead electricity 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."*

Before determining an application to which section 2.48 relates, 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.*

The Project would involve development partially within an existing electricity easement, as well as connection to an existing substation (either Transgrid's 132 kV or 330 kV substation, refer to **Chapter 3.0 (Project description)**). Throughout the preparation of the EIS, consultation with the electricity supply authority (Transgrid) has been undertaken (refer to **Chapter 5.0 (Engagement)**). Furthermore, it is noted that following lodgement of the SSD application, DPE will provide the EIS to Transgrid for comment.

State Environmental Planning Policy (Sustainable Buildings) 2022

The objective of the Sustainable Buildings SEPP is to provide state-wide planning approach to encourage the design and construction of more sustainable buildings across NSW. Chapter 3 of the Sustainable Buildings SEPP is relevant to the Project.

The application of this Chapter is discussed in further detail below.

Chapter 3 Standards for non-residential development

The aim of Chapter 3 of the Sustainable Buildings SEPP is to encourage the design and construction of non-residential buildings. The Site is zoned E4 General Industrial under the Port Stephens LEP. This land use zone is defined as a '*prescribed non-residential zone'* for the purpose of electricity generating works. Pursuant to section 3.2 of the Sustainable Buildings SEPP "*the consent authority must consider whether the development is designated to enable the following:*

(a) *the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,*

(b) *a reduction in peak demand for electricity, including through the use of energy efficient technology,*

(c) *a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,*

(d) *the generation and storage of renewable energy,*

(e) *the metering and monitoring of energy consumption,*

(f) *the minimisation of the consumption of potable water.*

As stated in **Section 4.2.2**, the Project is characterised as "*electricity generating works*". The Project is expected to enable 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. As described in **Section 3.2**, the battery enclosures do not require water for cooling, as this can be achieved through an electrically operated HVAC system. As stated in **Section 6.16**, reuse of materials during construction and demolition activities would be prioritised where possible. Otherwise, waste would be transported to an offsite recycling or disposal facility.

4.3.2 Port Stephens Local Environmental Plan

The Project Area is located on land that is zoned E4 General Industrial by the Port Stephens LEP (refer to **Figure 4.3-2).** The objectives of the E4 General Industrial land use zone, as stated in the LEP are:

- *To provide a wide range of industrial and warehouse land uses*
- *To encourage employment opportunities*
- *To minimise any adverse effect of industry on other land uses*
- *To support and protect industrial land for industrial uses.*

As stated in **Section 4.2.2**, the Project is characterised as "*electricity generating works*", which is not listed as a type of development that is permissible with consent under the LEP. However, permissibility for the Project is achieved through the application of section 2.36 of the Transport and Infrastructure SEPP.

In addition to permissibility, the following principal development standards and local provisions under the LEP have been considered:

- Clause 4.1 Minimum subdivision lot size
- Clause 4.3 Height of buildings
- Clause 4.4 Floor space ratio
- Clause 5.10 Heritage conservation
- Clause 5.21 Flood planning
- Clause 7.1 Acid sulfate soils
- Clause 7.8 Drinking water catchments
- Clause 7.9 Wetlands.

A discussion of these provisions and the relevance to the Project has been provided in **Table 4.3-2**.

Table 4.3-2: LEP provisions

LEP provision	Compliance
Clause 4.1 Minimum subdivision lot size	The Site has a minimum lot size of 40 hectares (ha) under the LEP (refer to **Figure 4.3-3**). The Project does not involve subdivision. As such, the matters of consideration contained under clause 4.1 of the LEP will not apply to the Project.
Clause 4.3 Height of buildings	The Site does not have a maximum building height under the LEP. As such, this principal development standard does not apply to the Project. No further consideration is afforded to clause 4.3 of the LEP.
Clause 4.4 Floor space ratio	The Site does not have a floor space ratio under the LEP. As such, this principal development standard does not apply to the Project. No further consideration is afforded to clause 4.4 of the LEP.
Clause 5.10 Heritage conservation	The Site is not mapped to contain any objects, items or sites of heritage significance under the LEP. Notwithstanding however, the EIS is supported by an Aboriginal Cultural Heritage Assessment Report (ACHAR) provided in **Appendix E (Aboriginal Cultural Heritage Assessment Report)** and discussed further in **Section 6.9**.

LEP provision	Compliance
Clause 5.21 Flood planning	The Site is mostly located above the flooding planning level, with the southern extent comprising minimal risk flood prone land and low hazard flood fringe area (refer to **Figure 4.3-4**). **Chapter 2.0 (Strategic context)** provides further discussion regarding the environmental context of the Site with regards to potential flooding impacts. The EIS is supported by a surface water impact assessment (including a flood assessment, refer to **Appendix L (Surface Water and Flooding Assessment)**), which is discussed further in **Section 6.4**.
Clause 7.1 Acid sulfate soils	The Site is mapped under the LEP to be potentially impacted by Class 3 and 4 Acid Sulfate Soils (ASS) (as shown in **Figure 4.3-5**). A Contamination Assessment (Aurecon 2019) has been previously prepared for the Site to support the formerly approved NPS Project, which considered the potential impact to ASS. Further details regarding the nature of ASS present throughout the Project Area is discussed in **Section 6.5.** Ultimately, the potential impacts from ASS during construction would be managed through the preparation and implementation of Acid Sulfate Soil Management Plan (ASSMP) prior to the commencement of construction activities.
Clause 7.8 Drinking water catchments	The eastern boundary of the Site constitutes the boundary of the drinking water catchment as mapped under the LEP (being the Tomago Sandbeds). While the Site is not impacted by this provision, the transmission connection/s would traverse across land that is mapped within the drinking water catchment (refer to **Figure 4.3-6**). Potential impacts to the mapped drinking water catchment relate to construction activities only (being the installation of the transmission connection/s). These impacts are temporary and will be managed through the implementation of a CEMP.
Clause 7.9 Wetlands	The land along the southern boundary of the Site is mapped under the LEP as 'wetlands' (refer to **Figure 4.3-7**). The area mapped as wetlands under the LEP is excluded from the development footprint, as such no further consideration is afforded to this requirement under the LEP.

4.3.3 Relevant NSW Legislation

Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was established to provide land rights to Aboriginal persons, as well as provide for representative Aboriginal Land Councils to vest land in those Councils. The ALR Act established the NSW Aboriginal Land Council (NSWALC) and a network of over 120 Local Aboriginal Land Councils (LALCs). LALCs constituted under the ALR Act can make claims in respect of '*claimable Crown land*'. Noting that the lots within the Project Area are privately owned (with exception to the Council road reserve) it is unlikely that there is an active Aboriginal Land Claim over the Project Area.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Environment and Heritage Group of the DPE, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Chief Executive responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places'. An Aboriginal Heritage Impact Permit (AHIP) 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 AHIP 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.

Fisheries Management Act 1994

The *Fisheries Management Act* 1994 (FM Act) provides for the protection and conservation of aquatic species and their habitat throughout NSW. No predicted habitat for threatened aquatic species is mapped on the DPI spatial data portal within 5 km of the subject land, nor considered to contain habitat that could support entities listed under the FM Act. However, the Hunter River is mapped as Key Fish Habitat (KFH). The Project has the potential to indirectly impact this KFH through adverse changes in water quality and quantity; however, management measures developed to mitigate the identified risks, as would be specified in the CEMP and OEMP, mean the potential for the Project to impact upon KFH protected under the FM Act is considered low and not assessed further in this report.

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 (or are prescribed by the regulations). A controlled activity approval for this Project would not be required by virtue of Section 4.41 of the EP&A Act. This section of the EP&A 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 EP&A Act does not remove the requirement for obtaining an aquifer interference approval. Separate exemptions under the *Water Management (General) Regulation 2018* may apply to the requirement for an aquifer interference approval or water access licence.

Protection of the Environment Operations Act 1997

The objects of the POEO Act contained in section 3 include to rationalise, simplify, and strengthen the regulatory framework for environment protection. Chapter 3 of the POEO Act outlines the specific circumstances under which an 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 Schedule 1 lists general electricity works as a scheduled activity where they exceed the capacity to generate 30 MW. The Project does not involve the generation of electricity. Instead, the Project stores and releases electricity that has already been generated elsewhere. Accordingly, an EPL is not required for the Project.

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 of the CLM Act. A search of the NSW EPA contaminated land database (undertaken on 21 August 2023) confirmed that the Project Area is not listed as a notified contaminated site under the CLM Act. A qualitative assessment is provided in **Section 6.5**, which details the risk of existing contamination within the Site and potential for the Project to result in contamination impacts to any receiving environments.

Section 60 of the CLM Act also includes a ‘duty to notify’ where significant contamination is identified. This section would be relevant if any previously unidentified contamination is encountered that exceeds notification thresholds.

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(2) of the BC Act states that a development application for SSD is to be accompanied by a 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) of the BC

Act, which denotes that the EIS, which accompanies any such application, is to include the biodiversity assessment required by the SEARs.

A BDAR has been undertaken for the Project. The BDAR is provided in **Appendix H (Biodiversity Development Assessment Report)** with relevant aspects discussed in **Section 6.3**. An impact assessment was undertaken in the BDAR in accordance with the Biodiversity Assessment Method (BAM) 2020, 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.

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 zones and associated ecosystem offset credit requirements are shown in **Section 6.3.4**. Following the implementation of the management and mitigation measures provided in **Appendix D (Compilation of mitigation measures)**, the Project is considered consistent with the objectives of the BC Act.

Roads Act 1993

An objective of the *Roads Act 1993* (Roads Act) is to confer certain functions (in particular, the function of carrying out road work) on TfNSW and on other roads authorities, among others. Section 7 of the Roads Act defines the respective road authorities depending on the classification of the road. Of relevance to this Project is Old Punt Road, which is a local road under the Roads Act. The Council of a LGA 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*. The Project would require works within road reserve areas. In addition, construction of the transmission connection/s that crosses over or under Old Punt Road may require consent under Section 138. Consultation with Port Stephens Council will continue with respect to the consent required for works within the Old Punt Road corridor.

Heritage Act 1977

The *Heritage Act 1977* (NSW) aims, among other things, to promote an understanding of heritage, encourage conservation and provide for protection of NSW State heritage. No heritage items were identified under the NSW State Heritage Register or Port Stephens LEP within the Project Area.

4.3.4 Commonwealth Legislation

Airports Act 1996 and Airports (Protection of Airspace) Regulations 1996

The *Airports Act 1996* (Airports Act) and *the Airports (Protection of Airspace) Regulation 1996* (Airports Regulation) establish a framework for the protection of airspace at and around airports. As the Newcastle Airport and RAAF Williamtown base do not meet the definition of "airports" to which Part 12 of the Airports Act applies, the Airports Act and Airports Regulation do not apply to the Newcastle Airport.

Notwithstanding the above, the Project would involve the potential use of temporary cranes during construction. Guidance related to the operation of cranes and tall structures in the vicinity of Newcastle Airport is provided by the Civil Aviation Safety Authority (CASA), pursuant to AC 139-07(2) – CASA Advisory Circular – Reporting of Tall Structures (Advisory Circular). The Advisory Circular provides instructions to seek approval from the Air Base Command Post (ABCP) to erect a crane or tall structure (exceeding 30 m above ground level) within 15 km of Newcastle Airport. The Project Area is located approximately 10 km south-west of Newcastle Airport. As such, the requirements of the Advisory Circular will be considered.

Pursuant to section 9 of the Advisory Circular, all applicants are to provide a completed application to the ABCP at least two business days prior to the intended use of the crane or erection of the tall structure.

AGL will consult with the ABCP with respect to the potential impact on the Newcastle Airport and Williamtown RAAF base operations that may result from the use of cranes during Project construction.

Environment Protection and Biodiversity Conservation Act 1999

Section 18 of the *Environment Protection and Biodiversity Act 1999* (EPBC Act) requires a proponent of a development or activity to obtain approval from the Commonwealth Minister for the Environment when undertaking an activity which will have, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES). MNES include threatened species and ecological communities listed under the EPBC Act.

If the Project is likely to significantly impact on a MNES, a referral to the Commonwealth Minister for the Environment is be required to determine whether the Project is a controlled action or can be undertaken in a particular manner to adequately mitigate potential impacts. If the Project constitutes a controlled action the activity is subject to further assessment before a determination is made by the Commonwealth Minister for the Environment regarding whether the activity can be carried out (generally subject to conditions).

A search of the EPBC Act Protected Matters Search Tool was undertaken on 16 August 2023 for a 10 km buffer around the Project Area. The search identified one Wetland of International Importance, seven threatened ecological communities, 95 threatened flora and fauna species, and 77 listed migratory species with potential to occur within 10 km of the Project Area.

The results of the Protected Matters search for MNES within 10 km of the Project Area is provided in **Table 4.3-3**. The Protected Maters search report can be viewed in **Appendix H (Biodiversity development assessment report)**.

Table 4.3-3: MNES within 10 km of the Project Area

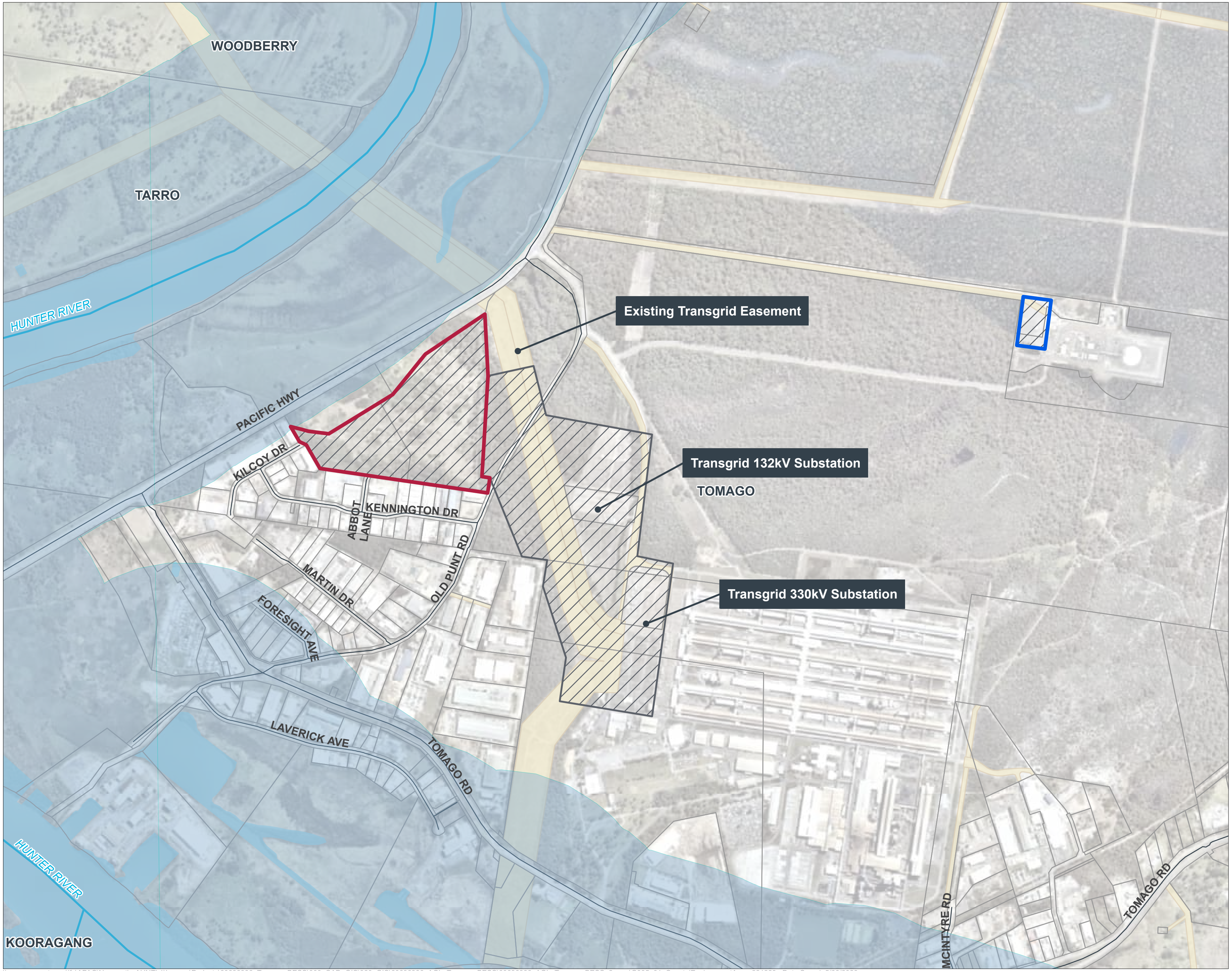
MNES	MNES within 10km of the Project Area
World Heritage Properties	None
National Heritage Place	None
Wetlands of International Importance	1
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	7
Listed Threatened Species	95
Listed Migratory Species	77

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. An EPBC referral for the Project was submitted in April 2023. Department of Climate Change, Environment, Energy and Water (DCCEEW) determined on 14 September 2023 that the Project does not constitute a Controlled Action under the EPBC Act.

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 continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. The NT Act also makes provision for Indigenous Land Use Agreements (ILUA) to be formed, as well as a framework for notifying native title stakeholders for certain future acts on land where native title has not been extinguished.

A search of the National Native Title Tribunal Register was undertaken on 12 December 2022 using the National Native Title Tribunal online system. The search returned no active or historic claims associated with the Project Area. As all land within the Project Area is either freehold or the subject of a ‘previous exclusive possession act’, native title rights will not be impacted by the Project.



Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Coastal Environment Area
- Water Body
- Easement
- Cadastral Boundary
- Watercourse
- Road

FIGURE 4.3-1: COASTAL ENVIRONMENT AREA

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G005_01_CoastalEnvironmentArea_221223 Date Saved: 5/06/2023

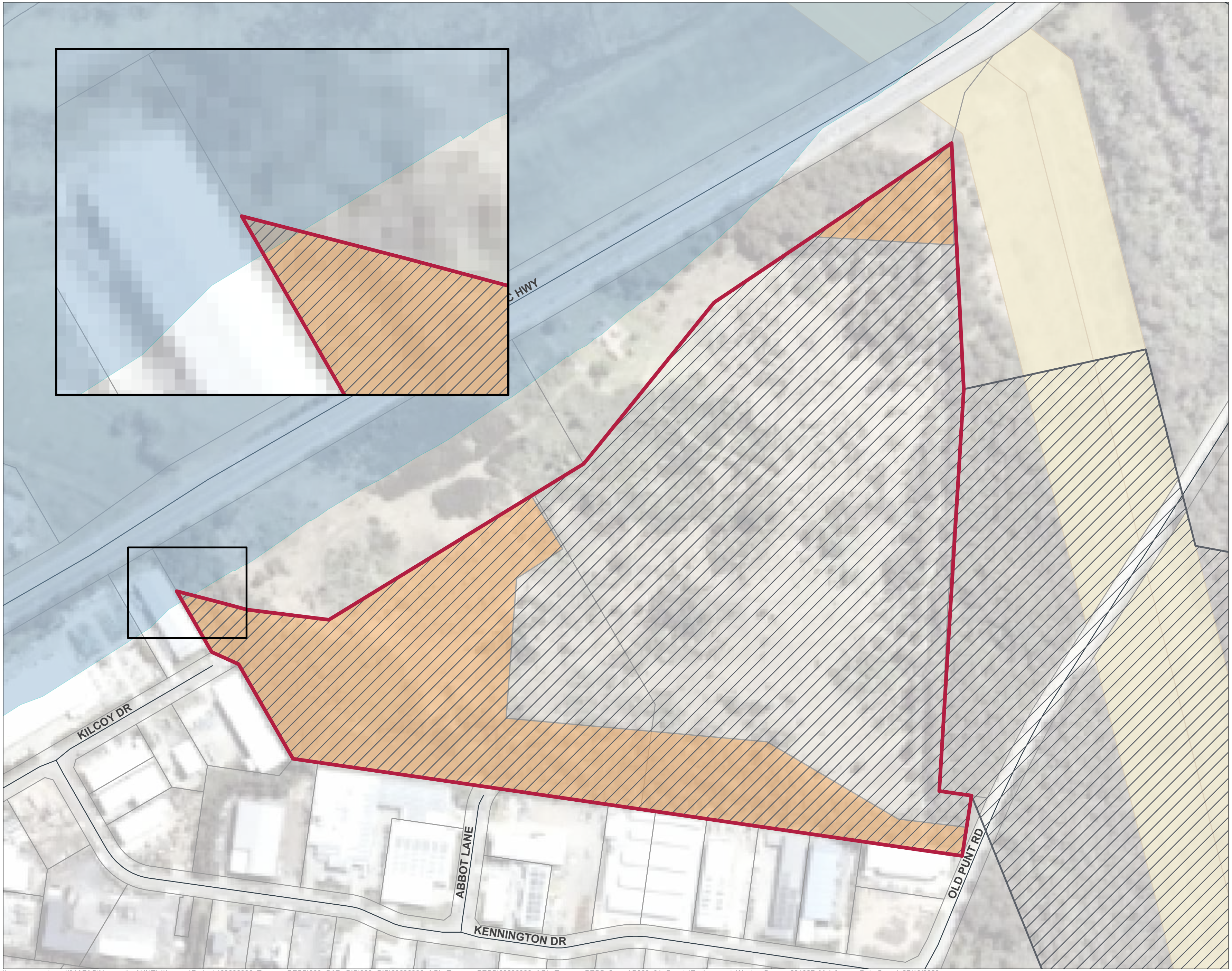
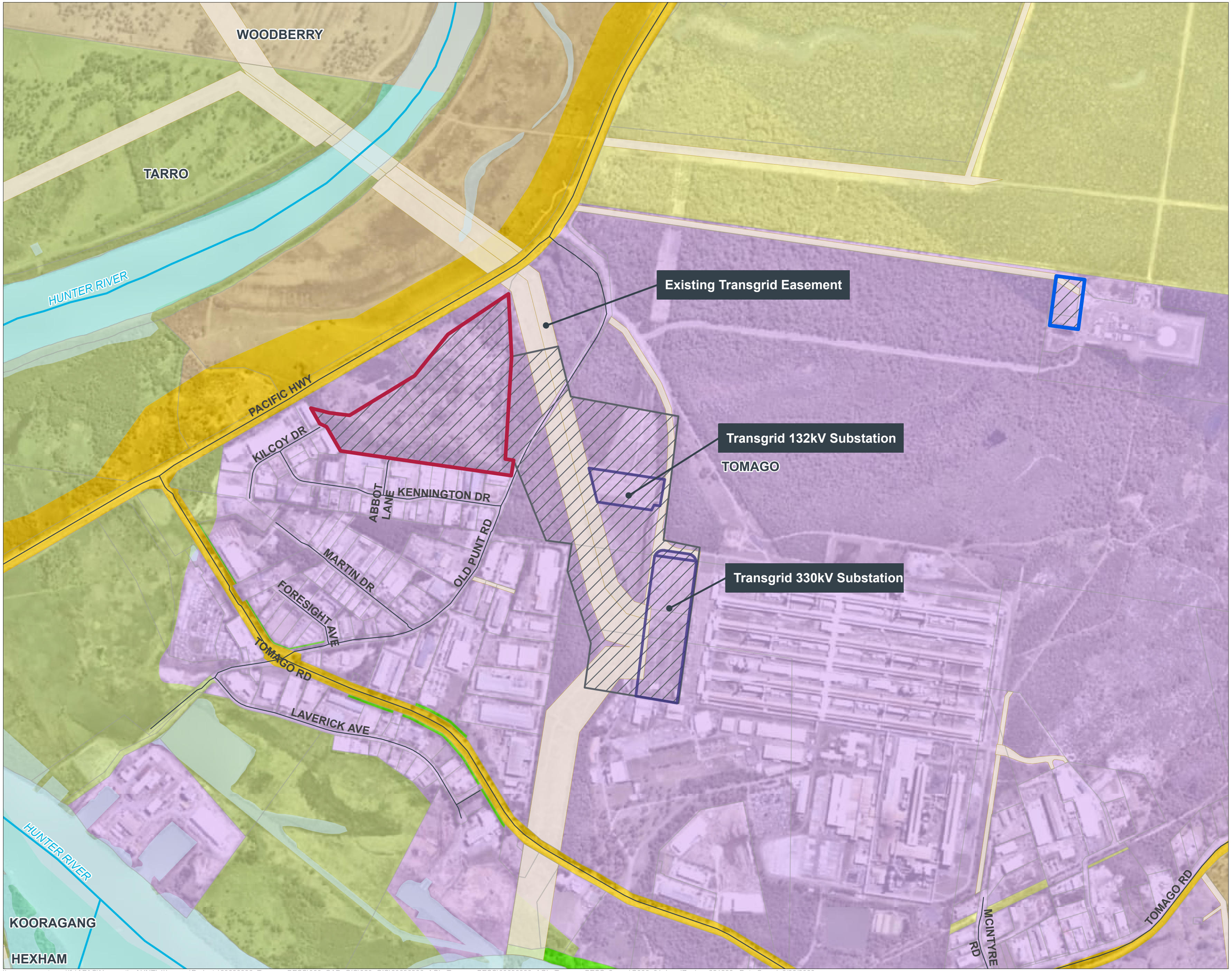


FIGURE 4.3-1b: COASTAL ENVIRONMENT AREA

Source: Nearmap, 2023.



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Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Substations
- Cadastral Boundary
- Water Body
- Transmission Line Easement
- Watercourse
- Road

Land Zones

- E4 General Industrial
- RE1 Public Recreation
- RU1 Primary Production
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- W2 Recreational Waterways
- C2 Environmental Conservation

FIGURE 4.3-2: LAND ZONING MAP

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G006_01_LandZoning_221223 Date Saved: 6/06/2023

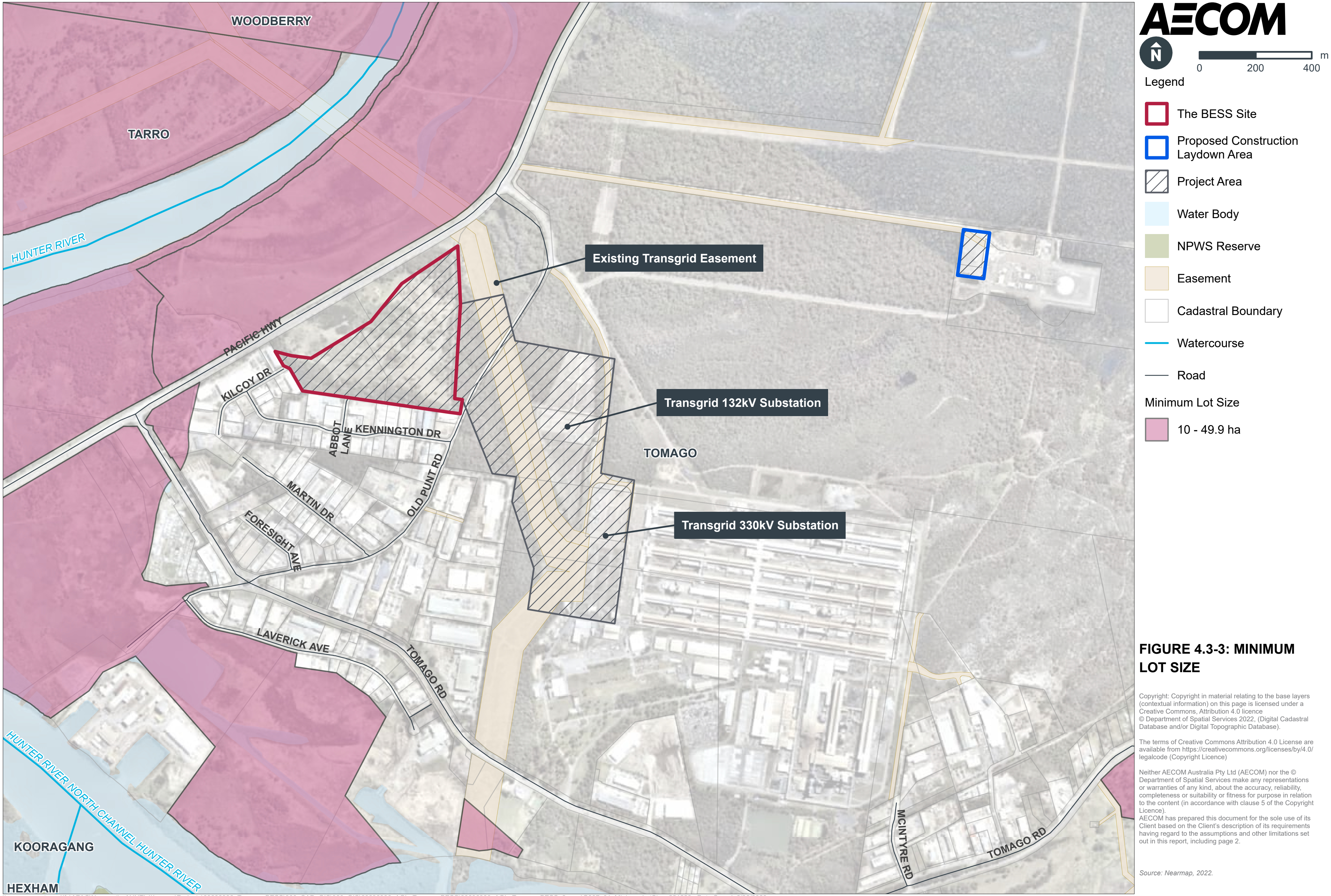

FIGURE 4.3-3: MINIMUM LOT SIZE

Source: Nearmap, 2022.

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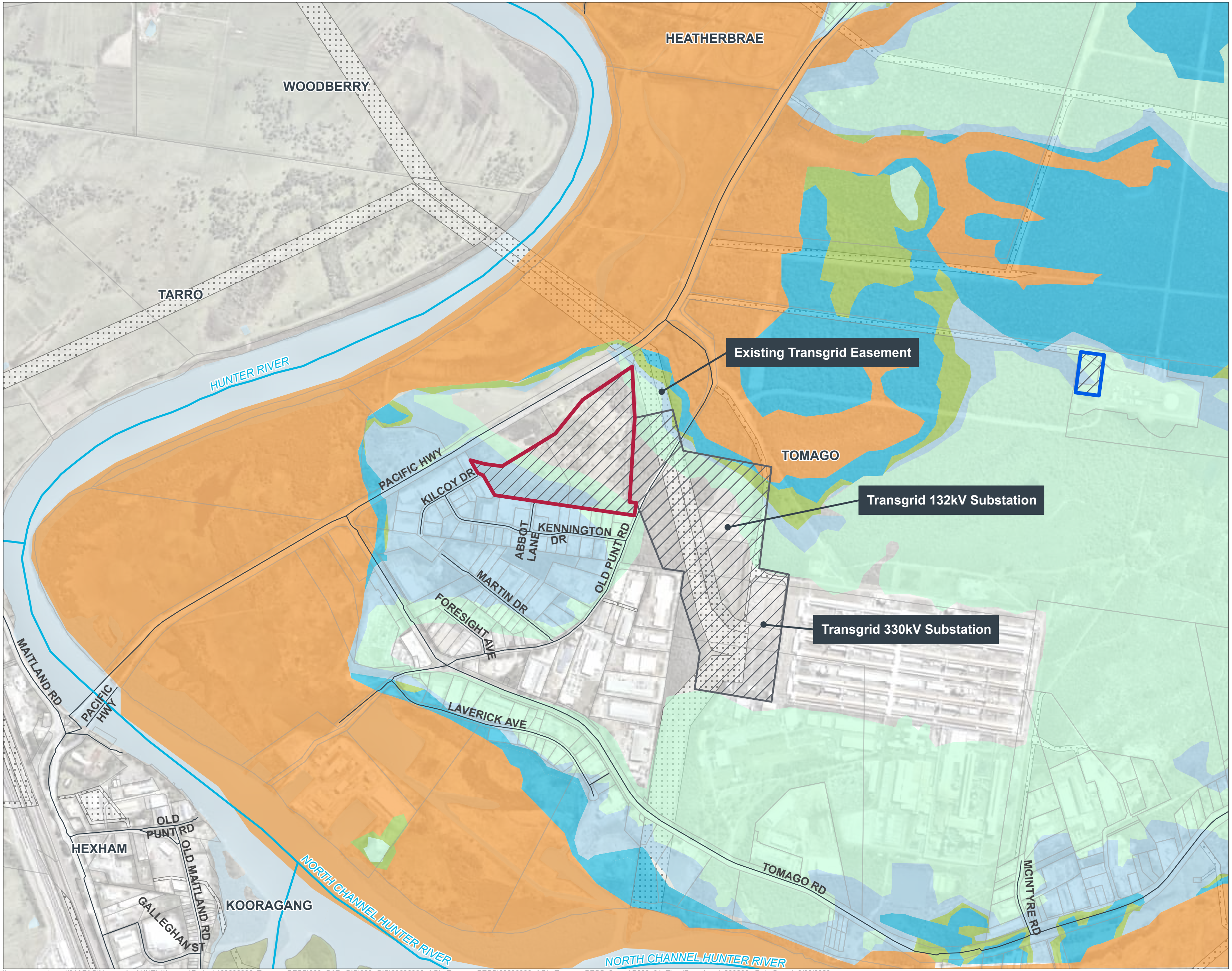

AECOM

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Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Water Body
- NPWS Reserve
- Easement
- Watercourse
- Road

Flood Hazard Categories (Port Stephens Council 2016)

- Minimal Risk Flood Prone Land
- Low Hazard Flood Storage Area
- Low Hazard Flood Fringe Area
- High Hazard Flood Storage Area
- High Hazard Floodway Area

FIGURE 4.3-4: FLOOD PRONE LAND

Source: Nearmap, 2022, Port Stephens Council.

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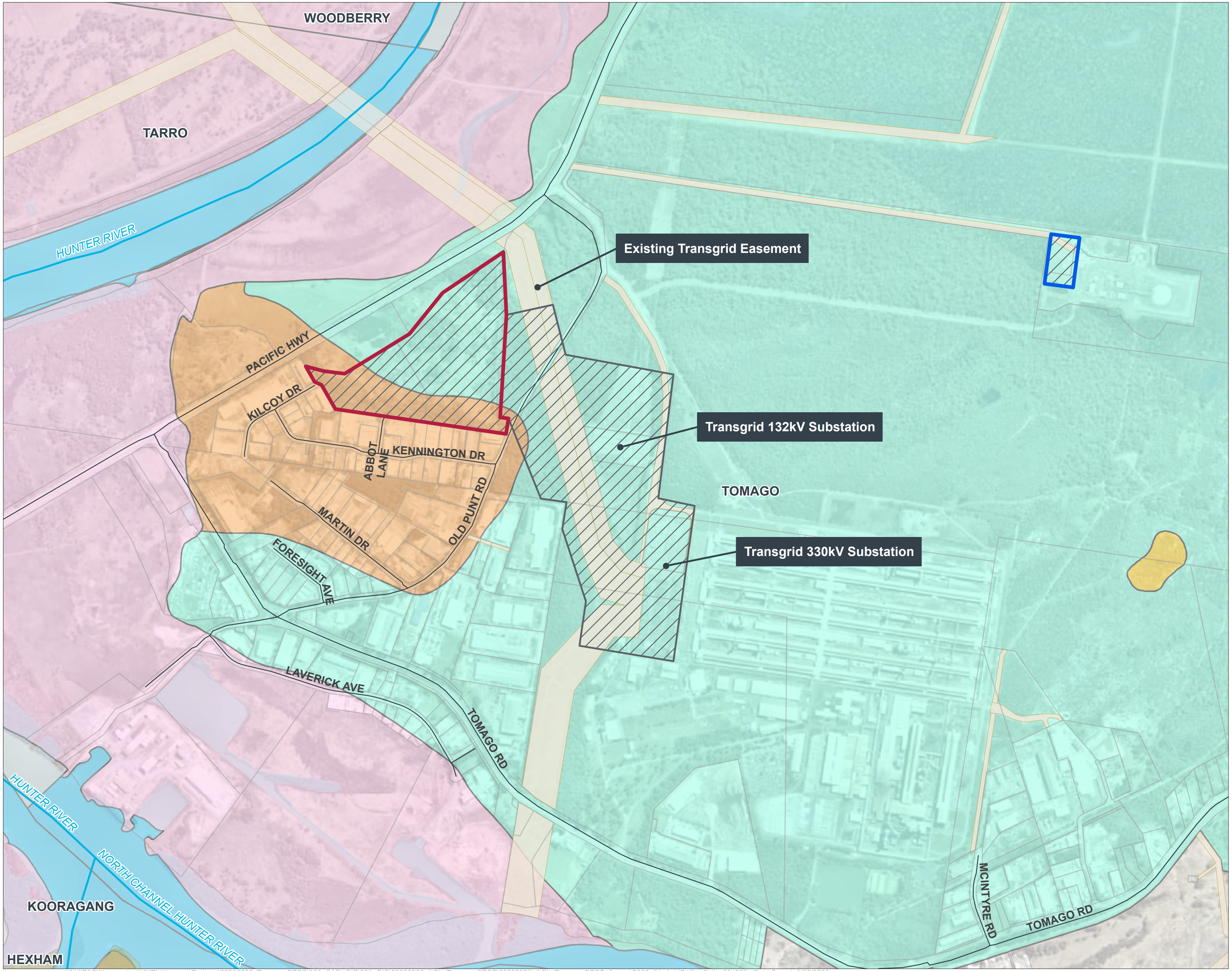

AECOM

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Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Water Body
- NPWS Reserve
- Easement
- Cadastral Boundary
- Watercourse
- Road

Acid Sulfate Soils

- Class 1
- Class 2
- Class 3
- Class 4
- Class 5

FIGURE 4.3-5: ACID SULFATE SOILS

Source: Nearmap, 2022.

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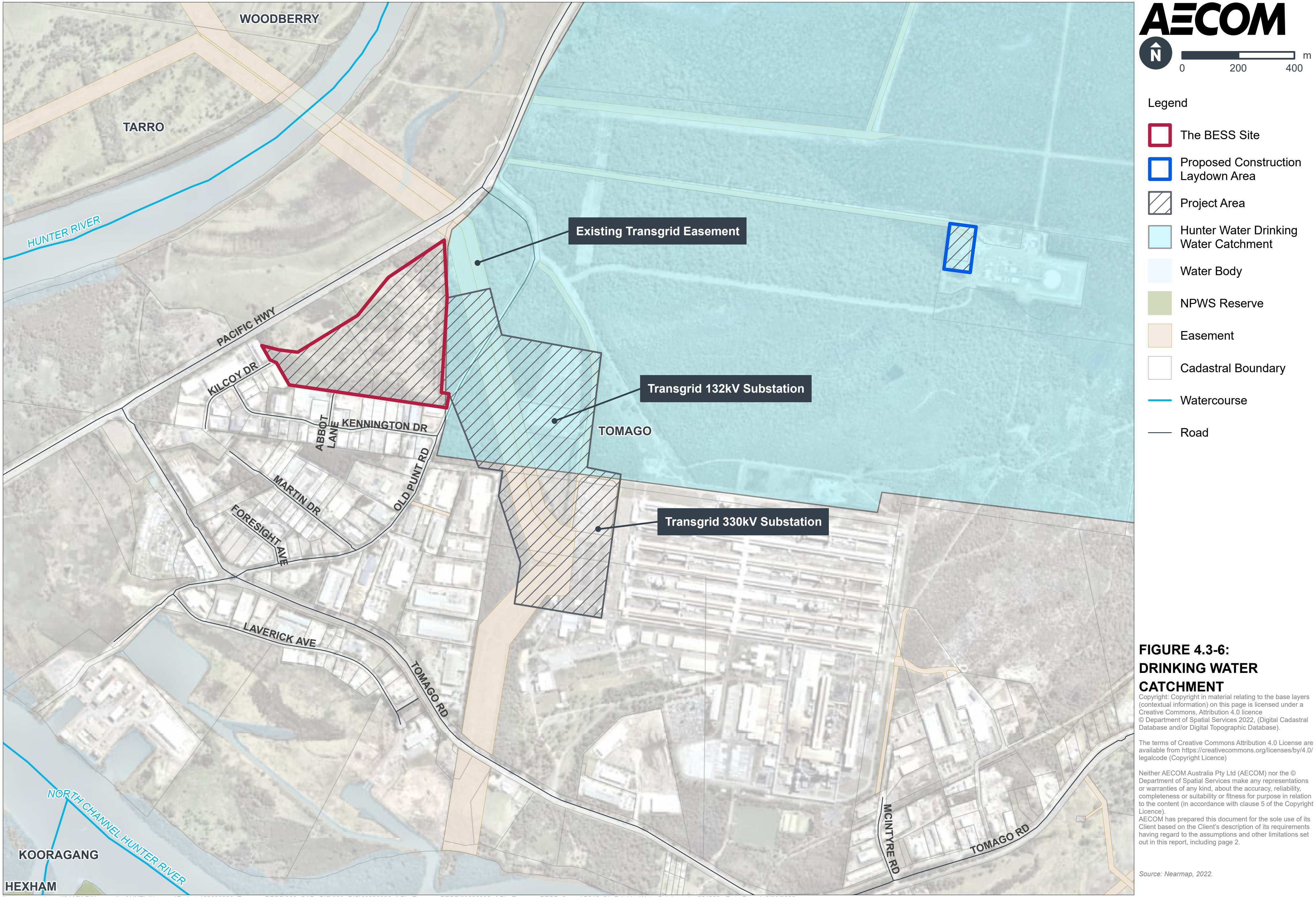

FIGURE 4.3-6: DRINKING WATER CATCHMENT

Source: Nearmap, 2022.

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AECOM

N

0 200 400 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Wetlands
- Water Body
- Easement
- Cadastral Boundary
- Watercourse
- Road

FIGURE 4.3-7: WETLANDS

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G011_01_Wetlands_221223 Date Saved: 6/06/2023

5.0 Engagement

5.1 Introduction

AGL has established and seeks to maintain authentic relationships with the community and interested stakeholders through consultation and effective communications. This is to ensure the community are meaningfully included during the feasibility, planning and development phases. AGL has been and will continue to inform the local community and stakeholders at key milestones of the Project's progression, demonstrating AGL's commitment to transparency and accountability.

The Project is not expected to generate significant stakeholder interest due to the anticipated low level of impact in an existing industrial area. AGL has strong existing relationships with key local stakeholders due to ongoing community relations activities from the Newcastle Power Station (NPS) project (SSI-9837), and AGL's NGSF near the Site. Stakeholder engagement has been and will continue to be targeted to inform neighbours and key local stakeholders of the assessment process, outcomes and anticipated Project activities.

5.2 Community and Stakeholder Engagement Plan

A Community and Stakeholder Engagement Plan (CSEP) has been developed for the Project and is provided in **Appendix C (Engagement table)**. 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 provides that a stakeholder register will be set up, maintained and updated throughout the lifecycle of the Project. This register details key stakeholders including landholders, neighbours, local community, government and businesses.

5.3 Overview of engagement

5.3.1 Identification of stakeholders

Preliminary stakeholder identification for the Project involved desktop research and review of the stakeholder engagement activities for the NPS and NGSF. Stakeholders were identified as those that may be interested in or possibly affected by the Project. Project stakeholders are listed in **Table 5.3-1**.

If approved, stakeholders will continue to be identified and consulted during all phases of the Project, namely the construction, operation, and decommissioning and rehabilitation phases of the Project.

Table 5.3-1: Community stakeholders consulted to date

Stakeholder group	Stakeholders
Government and technical stakeholders	
Federal Government Departments	Department of Climate Change; Environment, Energy and Water (DCCEEW)
	Department of Defence (DoD)
	Civil Aviation Safety Authority (CASA)
NSW Government Stakeholders	NSW Department of Planning and Environment (DPE)
	NSW Rural Fire Service NSW (RFS)
	Fire and Rescue NSW (FRNSW)
	Transport for NSW (TfNSW)
	Hunter Water Corporation
	Biodiversity Conservation Division (BCD)

Stakeholder group	Stakeholders
Elected representatives	Local federal member for Paterson
	Local state member for Port Stephens
Media	Newcastle Herald
	Radio 2HD
Transmission Network Service Provider (TNSP)	Transgrid
Future easement owner	Tomago Aluminium
Local Government	Port Stephens Council (PSC)
	Maitland City Council (MCC)
	Newcastle City Council (NCC)
Wider community	
Community group	AGLM Community Dialogue Group
Business group	Hunter Business Chamber
	Newcastle Airport Pty Ltd.
Indigenous groups	Worimi Local Aboriginal Land Council
	Wahroonga Aboriginal Group
Wildlife groups	Newcastle Wildlife Corporation
	Port Stephens Koalas Management Group (PSC)
	Hunter Botanic Gardens
Neighbouring premises	Tomago and Heatherbrae residents (including Sweetwater Grove)
	Tomago businesses

5.3.2 Stakeholder engagement activities and responses

AGL have consulted with relevant stakeholders throughout the development of the Project to date. Stakeholders were engaged using a range of tools and techniques including face to face meetings, online meetings, phone calls, phone messages, emails, handouts and surface mail. Details of consultation with the relevant Government and non-Government stakeholders is summarised in **Appendix C (Engagement table)**.

5.4 Key issues raised during engagement

Several key issues were raised by stakeholders during the preparation of the Scoping Report and the EIS. The key issues during raised during engagement activities, and the location of where the issue is addressed in the EIS, is provided in **Table 5.4-1**.

Table 5.4-1: Summary of issues raised during stakeholder and community engagement

Issue Category	Key issue raised	Location addressed in EIS
Project benefits	Local jobs and business opportunities	**Chapter 2.0 (Strategic context), Section 6.10**
Project benefits	Secure energy for the grid	**Chapter 2.0 (Strategic context)**
Heritage	Surveying indigenous heritage	**Section 6.9**
Hazard & risk: fire	Access, water storage, hazard separation and management	**Section 6.2**
Environment: water	Surface water, stormwater and flooding	**Section 6.4**
	Site water supply	**Section 3.0 (Project description)**
Environment: Landscaping and visual	Screening and landscaping	**Section 6.14**
Environment: fauna	Local species, hollows in trees	**Section 6.3**
Environment: amenity	Noise and visual	**Section 6.7, Section 6.14**
Transmission: connections	Land and easements	**Chapter 4.0 (Statutory context)**
Roads	Land and easements	**Chapter 4.0 (Statutory context)**

5.5 Ongoing engagement

5.5.1 Engagement during Exhibition of the EIS

Community and stakeholder engagement activities will continue during public exhibition of the EIS. Following lodgement and acceptance of the EIS, DPE will publish the EIS online via the Major Projects Planning Portal and exhibit the EIS in accordance with the requirements in the EP&A Act and the EP&A Regulation.

Stakeholders interested in the Project will have the opportunity to make a formal submission on the Project via DPE's Major Projects Planning Portal.

AGL will also continue to independently consult stakeholders during and following the EIS exhibition period, via engagement mechanisms similar to those outlined in **Appendix C (Engagement table)**.

5.5.2 Engagement following exhibition of the EIS

Written submissions received during the EIS exhibition period will be forwarded by DPE to AGL for consideration and review. After reviewing the submissions, AGL will prepare a Submissions Report documenting the submissions received and AGL's response.

The submissions report will be made publicly available on the DPE major projects website.

AGL will keep stakeholders and the community informed of the availability of the submission report by:

- Publishing a media release on the project website, and
- Sending formal email correspondence to stakeholders and community members registered on the stakeholder database.

5.5.3 Future Engagement

Following Project approval, engagement with key stakeholders would continue throughout the construction and operation phases using methods similar to those outlined in **Appendix C (Engagement table)**.

6.0 Assessment of Impacts

6.1 Environmental scoping for the Project

6.1.1 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 Tomago Battery Energy Storage System Scoping Report (AECOM, 2023) (refer to **Section 6.1.2**)
- Site visits
- Receipt of the SEARs for the Project (refer to **Appendix A(SEARs table)**)
- Consultation with government agencies, community groups and other stakeholders (refer **Chapter 5.0 (Engagement)**)
- A review of relevant legislation, planning policies and guidelines (refer to **Chapter 4.0 (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 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 matters 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 matters have been determined to be key issues, requiring a more detailed assessment irrespective of the outcomes of environmental risk screening.

6.1.2 Tomago Battery Energy Storage System Scoping Report

The initial environmental scoping process for the Project was documented in the Tomago Battery Energy Storage System Scoping Report (AECOM 2023). This Scoping Report was prepared to request SEARs for the Project from DPE.

The Scoping Report identified potential impacts from 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:

- Aboriginal Heritage – as a result of the potential impacts from land clearing and construction of infrastructure in proximity to known Aboriginal sites.

- Biodiversity – in relation to the potential for the Project to require vegetation removal and the potential for introduction and spread of invasive species and weeds.
- Hazard and risk –DPIE has adopted the approach that the assessment of BESS Projects are 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).
- Noise and vibration – as a result of the potential construction and operation impacts of the Project on the existing noise environment.
- Soils, groundwater and contamination – as a result of excavations, earth movement, vegetation removal and vehicle movement, potential for chemical and fuel spills during construction and operation, and transport of pollutants offsite by contaminated groundwater (including potentially the Tomago Sand Beds).
- Surface water and flooding– in relation accidental spill or discharge of chemicals or hydrocarbons, erosion of soil and sedimentation through runoff and transport of eroded sediments to waterways, and the potential for flooding during construction of the transmission connection to result in erosion and associated water quality impacts.
- Traffic and access – in relation to the addition of heavy vehicles and construction traffic on local roads.

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

6.1.3 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
- Non-Aboriginal heritage
- Surface water and flooding
- Geology, soils, contamination and groundwater
- Noise and vibration
- Traffic and access
- Hazards and risk
- Visual amenity
- Land use
- Social and economic
- Waste
- Air quality.

6.1.4 Prioritisation of potential matters

A risk assessment was undertaken to determine the key matters 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 matters raised in submissions and feedback received from relevant stakeholders and the public.

Table 6.1-1 outlines the key potential environmental matters in relation to the Project.

Table 6.1-1: Prioritisation of assessment matters

High Priority Matters	Medium Priority Matters	Low Priority Matters
• **Section 6.3** Biodiversity • **Section 6.4** Surface water and flooding • **Section 6.7** Noise and vibration. • **Section 6.2** Hazards and risk	• **Section 6.5** Soils, groundwater and contamination • **Section 6.6** Traffic and transport • **Section 6.9** Aboriginal heritage	• Other matters - Social and economic (**Section 6.10**) - Air quality (**Section 6.11**) - Non-Aboriginal Heritage (**Section 6.13**) - Visual amenity (**Section 6.14**) - Land use (**Section 6.15**) - Waste (**Section 6.16**)

6.1.5 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.

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 relating 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 4.0 (Statutory context)** of this EIS.

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 and surrounding 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. Cumulative impacts have been assessed separately (refer to **Section 6.17**), in accordance with DPE's *Cumulative Impact Assessment Guidelines for State Significant Development Projects* (October 2022).

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 **Appendix C (Engagement table)**.

6.2 Hazards and Risks

A Preliminary Hazard Analysis (PHA) has been prepared to identify potential hazards related to the Project and assess their associated risk. The PHA is attached in **Appendix J (Preliminary Hazard Analysis)** with relevant sections summarised within this chapter.

6.2.1 Methodology

Preliminary Risk Screening

State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) outlines the approach used in NSW for identifying hazards and assessing the associated risk of industrial development projects. Through this policy, the permissibility of a project is linked to its safety and pollution control performance. The Resilience and Hazards SEPP applies to any projects that fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'; or as requested by the DPE. Clause 3.12 of the Resilience and Hazards SEPP requires developments that are classified as potentially hazardous to prepare a PHA to determine the risk to people, property, and the biophysical environment at the proposed location and in the presence of controls.

DPE's Hazardous and Offensive Development Application Guidelines (Applying SEPP 33, DoP 2011) outline the steps to be taken in determining whether a project is potentially hazardous or offensive. It provides a list of threshold levels for the storage and transport of dangerous goods. Where the amount of material to be stored or transported exceeds that threshold, the Resilience and Hazards SEPP is considered to apply to the project and a PHA is required to support the development application.

Preliminary Hazard Analysis

The PHA has been prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 4 – Hazard Analysis* (HIPAP 4), and *Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis* (HIPAP 6). The objective of the PHA is to identify and understand potential hazards from the development and the associated risk from each hazard. The hazard analysis process encompassed qualitative methods (Level 1 qualitative risk assessment) to assess the adequacy of the proposed Project controls. The aim of the PHA was to determine if the Project can be developed with the associated hazards kept 'as low as reasonably practicable' (ALARP), and to ensure appropriate land use safety planning. The PHA followed a series of sequential steps (as detailed within HIPAP 6) in the assessment of potential hazards associated with the Project. These steps were:

1. Identification of hazards
2. Frequency assessment – an assessment of likelihood of each hazard scenario
3. Consequence assessment – an assessment of the effect of each hazard scenario
4. Risk assessment resulting from the combination of frequency and consequence of creditable risk scenarios
5. Identifying risk levels at identified receivers and land use locations in the vicinity of the Project
6. Comparison of the outcomes of the risk assessment with established risk criteria to establish compliance or recommend appropriate risk controls.

A detailed description of the PHA methodology is provided in Section 3 of **Appendix J (Preliminary Hazard Analysis)**.

Risk analysis criteria

The risk criteria used in the PHA was developed using HIPAP 4. Where the hazard has the potential for effects outside 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 shown in **Table 6.2-1**, where the risk ranges from low where the risk is considered acceptable, to very high where the activity or task must not proceed.

Table 6.2-1: Hazard risk assessment (sourced from Planager, 2023)

Likelihood			Consequence				
			Notable event	**Medium**	**Serious**	**Major**	**Catastrophic**
		Frequency (per year)	No physical injury/work stress or environmental consequences	Medical treatment/first aid injury/environmental clean up	Serious injury – life threatening injury or serious environmental damage	Permanent disability or major environmental damage	Fatal injury, existential threat, or environmental destruction
Likely	Event can reasonably be expected to occur a few times of the expected lifetime	0.5 or more	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	$< 1 \times 10^{-6}$	Low	Low	Low	Moderate	Moderate

6.2.2 Existing environment

The Project Area is located around 2 km from the closest land with residential zooming in the LEP. The closest sensitive receivers are Sweetwater Grove and Old Punt Road Café around 600 m southwest of the Project Area.

Parts of the Project Area are located in category one bushfire prone land with areas of vegetation buffer. Existing studies (Aurecon, 2019) identify certain local vegetation communities as 'bushfire fuel'. The Project Area also consists of other infrastructure and remnant or regenerated native bushland. **Section 6.8** discusses bushfire hazards further.

There are no known mapped mine subsidence districts within the Project Area.

A construction laydown area has been proposed at the existing hardstand area adjacent to the NGSF. The NGSF is a Major Hazard Facility under the *Work Health and Safety Act 2011 (NSW)*. It is connected to the wider gas supply network by pipelines, one of which crosses the transmission connection corridor.

6.2.3 Impact assessment

Preliminary risk screening

The risk screening assessment contained within Section 5 of the PHA was performed to determine, which potentially hazardous scenarios need further assessment in accordance with the DPE multi-level risk assessment (MLRA) guideline (DPE, 2011). In accordance with the MLRA guidelines, the PHA included a risk screening assessment for:

- Storage of hazardous materials
- Transport of hazardous materials
- Other types of hazards.

The results for the risk screening assessment are presented in Table 8 and 9 of the PHA (refer to **Appendix J (Preliminary Hazard Analysis)**). Based on the screening assessment provided in Table 8 to Table 9 in the PHA, it was concluded that materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored and transported to the Site do not exceed the guideline thresholds.

The 'other risk factors' that are considered relevant to this Project have been summarised in **Table 6.2-2**. Further detail is provided in Table 10 of the PHA.

Table 6.2-2: Other types of hazards that exceed the Applying SEPP 33 threshold

Other types of hazards	Results of the screening	Assessment against the Applying SEPP 33 threshold
Types of activities the dangerous goods and otherwise hazardous materials are associated with (storage, processing, reaction) – if different to the scenarios summarised in Table 8 and 9 of the PHA	There is a potential for impacts between the temporary construction laydown area and the NGSF.	There was an exceedance in the Applying SEPP 33 threshold due to the potential for interactions between the NGSF and the temporary construction laydown area.
Incompatible, reactive, or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition	Runaway reaction associated with lithium-ion batteries has occurred in other similar industries in the past. Hydrogen release possible under fault conditions resulting in a potential fire/explosion hazard. If toxic gas is released in a battery fire, then toxic exposure may occur.	There was an exceedance in the Applying SEPP 33 threshold due to the potential for runaway reaction within battery cells, which may become a precursor for a battery fire.

Other types of hazards	Results of the screening	Assessment against the Applying SEPP 33 threshold
Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries	Runaway reaction associated with lithium-ion batteries has occurred in other similar BESS facilities in the past. Damage to high pressure pipelines during construction activities has occurred in the past.	There was an exceedance in the Applying SEPP 33 threshold due to past runaway reaction incidents at similar BESS sites and due to the potential damage to the existing AGL gas pipeline during construction.
The Project may threaten the particular qualities of the environment (for example, the likely presence of rare or threatened species, water courses)	The Project is not expected to significantly impact threatened ecological community, rare or threatened species, or watercourses. During construction the NGSF would be used as a temporary construction laydown area and this location is located on land within the mapped Tomago Sandbeds.	There was an exceedance in the Applying SEPP 33 threshold due the use of the NGSF car park as a temporary construction laydown area, being located within the Tomago Sandbeds area.

The results in Table 8 and 9 of the PHA show that the expected storage and transportation of hazardous materials would not exceed the relevant risk screening threshold. On the basis of storage and transport alone, the Project would not be considered *potentially hazardous* in line with the definition outlined in SEPP Resilience and Hazards (refer to dotted blue arrow in Figure 13 in the PHA). The application of relevant codes and standards would be sufficient to mitigate identified risks and no further assessment in the form of a PHA would be required[2].

Notwithstanding the above, given the exceedances against the Applying SEPP 33 criteria summarised in **Table 6.2-2**, a PHA has been prepared for the Project in accordance with HIPAP 6.

Preliminary Hazard Analysis

Hazard identification

A hazard identification exercise was undertaken in accordance with the HIPAP 6 methodology (refer to Section 3 in the PHA) to identify reasonably foreseeable hazards and associated events that may arise during the operation of the Project. The hazard events identified from the exercise included:

- Fire in a battery enclosure, (e.g. due to an uncontrolled runaway reaction or decomposition within the lithium-ion batteries at the BESS) has the potential to be harmful to people in the area and to lead to propagation to nearby infrastructure
- Environmental impact if there is a spill from the battery enclosure, transformers, or landing gantries, e.g. cooling medium or oil
- Arc flash or fire associated with electrical equipment including transformer oil and electrical cabling has the potential to be harmful to people nearby and lead to propagation to nearby infrastructure
- Exposure to electromagnetic fields has the potential to be harmful to people in the area and to lead to propagation to nearby infrastructure
- Locating the Project near or in proximity to neighbouring vulnerable or potentially hazardous facilities or utilities may initiate a propagation incident, as follows:
  - Construction across the AGL high pressure natural gas pipeline may result in damage to the pipeline and a release of flammable gas

[2] Reference to Codes and Standards relates to Appendix 1 of the PHA contained din Appendix J

- Locating the temporary construction laydown area at the NGSF may cause impact between the Project and the NGSF. In addition, the Tomago Sandbeds are vulnerable to any degree of pollution and require protection
- General hazards associated with the natural hazards and the nearby industrial area and specific hazards associated with the Toll warehouse and the Pacific Highway (M1).

Risk assessment

A risk assessment 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 the hazard has the potential for offsite effects, the consequence levels in the risk matrix are applied to both onsite and offsite works for people who are in range of the effects. The outcome of the hazard risk assessment is summarised in **Table 6.2-3**. A detailed risk assessment of hazardous events is provided in the PHA (refer to **Appendix J (Preliminary Hazard Analysis)**).

Table 6.2-3: Hazard risk assessment

No.	Potential hazard/ impact	Risk (onsite)	Risk (offsite)
1	Fire or deflagration in a battery enclosure due to: • Thermal runaway within a battery cell propagating to another area (cell, module, rack) within the enclosure • Electrical system failures (damage to wiring, fuse or breaker failure) • Mechanical failure (mishandling, rodents). This may lead to injury, or fatality.	Moderate	Low
2	Release of liquid material resulting in environmental pollution. Liquid materials include: • Cooling water from battery enclosures • Oil in the transformers • Materials used during the construction phase and during maintenance activities at the operational Site • Fire water if used during a fire on the Site.	Low	Low
3	Arc flash caused by a short circuit or fault. Arc flash may result in: • Environmental damage • Human Injury • Melted metal, fires or explosions.	Moderate to low	Low
4	Fires involving transformer oil or electrical cable insulation may result in local injury or asset damage, such as respiratory injury or impaired vision.	Low	Low
5	Exposure to electric and magnetic fields associated with the voltage and current of the equipment. This may result in serious injury or illness.	Low	Low
6	Construction of the Project may cause hazard impacts between the Project and the AGL high pressure pipeline used to transport flammable natural gas for the NGSF. The Project has the potential to damage the pipeline and release flammable gas.	Moderate	Low
7	Construction of the Project may lead to potential impacts between the Project and the NGSF such as: • Hazard incidents at the temporary construction laydown area for the Project may impact on the NGSF or the Tomago Sandbeds • Potential bushfire has an impact on the temporary construction laydown • Hazard incident at the NGSF that may impact on the construction laydown for the Project. Impacts may lead to major injury or serious environmental damage.	Moderate	Low
8	Construction and maintenance activities for the transmission line may cause damage to the Transgrid HV transmission line and cause injury to exposure to high voltage.	Moderate	Moderate to low
9	Fires or explosions in nearby surrounding areas (including neighbouring bush or grassed areas and industrial estates) have the potential to damage Project infrastructure and impede human safety.	Low	Low

A summary of the key findings from **Table 6.2-3** is detailed below. The overall offsite risk is ranked low for most of the incident scenarios; however, two scenarios could rank higher:

- There is a possibility for ‘moderate’ consequences such as reduced visibility from smoke travelling over the road at the Pacific Highway (M1) if there was a fire involving the BESS. However, the likelihood of this event is considered ‘rare’.
- There is a possibility of ‘serious consequences’ including pollution of the surrounding environmentally sensitive area. This may occur from failed protocols restricting the use of polluting materials at the NGSF laydown area. With the appropriate controls in place, the likelihood is ranked ‘remote’ and could be further reduced to rare with the implementation of relevant protocols prior to construction commencing.

The overall onsite risk is ranked ‘moderate’ to ‘low’ for most of the incident scenarios. There is a possibility for ‘major’ or ‘catastrophic’ onsite consequences for the following scenarios:

- Catastrophic: scenarios which lead to high energy released as an arc flash involving electrical equipment, a leak from the high-pressure pipeline or damage to the existing Transgrid transmission infrastructure during construction. These risks are well understood and can be managed to ALARP.
- Major consequences: scenarios which cause the failure of all control mechanisms leading to a person being within proximity of the battery enclosure during a fire or other extreme event at the NGSF construction laydown area. The risk is considered to have a low likelihood of occurrence with the implementation of appropriate safeguards.

The PHA identified that the Project is not considered potentially hazardous, in accordance with the DPE’s definition based on the intended storage and transport of hazardous material (refer to **Section 6.2.3).** The potential hazards from the Project are predominantly associated with the ‘other types of hazards’ such as risk associated with the lithium-ion batteries, of environmental pollution from a spill or other pollutant, among other worst-case consequence scenarios limited within the Project. The other types of hazard are discussed below.

Fire associated with lithium-ion batteries

Of the identified risks, a fire associated with the lithium-ion battery is considered the worst-case scenario. A fire may be created by failure to manage propagation from a fire or explosion in a battery cell, module, rack or transformer. Combustion products and smoke may also affect nearby land use or emergency services.

The risk of propagation would be mitigated with sufficient separation distance between the BESS and transformers and the surrounding vegetation, and with the implementation of emergency response protocols reducing the risk to ALARP. These are detailed in **Section 6.2.4**.

Environmental pollution

Loss of containment of a pollutant and/or irritant from the BESS (such as cooling water from the batteries, transformer oil or construction material) may affect the Project or adjacent land use.

The detailed design phase would need to address 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 by eliminating the risk where possible or by reducing to a low risk if elimination is not possible. This would be achieved through the development of appropriate ALARP mitigation measures in accordance with Australian Standards and Codes.

Electrical hazards and arc-flash in electrical equipment

Operation of the BESS may lead to electrical hazards and arc flash. AGL have extensive experience with the operation of electrical systems and would implement stringent measures in accordance with the Australian Codes and Standards for the control of electrical and arc flash hazards to a level that is ALARP.

Electromagnetic field

The Project may lead to the creation of EMF from any electrical infrastructure at the BESS and the transmission connections. While operational, the electrical equipment produces an electric and magnetic field. Given the location of equipment away from populated areas and that maintenance personnel would only be present onsite for a short duration, the potential EMF created by the Project would not likely exceed the International Commission on Non-Ionizing Radiation Protection (ICNIRP) occupational exposure reference level (ICNIRP, 2020).

With the implementation of applicable controls including the measures related the principles of prudent avoidance, the risk associated with EMF exposure would be ALARP.

Risks from the AGL high pressure natural gas pipeline and Transgrid high voltage transmission line

The transmission connections would likely cross the AGL high pressure pipeline and the Transgrid high voltage transmission line. Provided that Transgrid and AGL requirements and appropriate Codes and Standards are adhered to, the risk would be managed to a level that is ALARP.

Other hazards

Application of Codes and Standards are generally sufficient for this Project to ensure that the risks of other hazards are managed to a level that is ALARP.

6.2.4 Management and mitigation measures

Management measures for the hazards and risk assessment are detailed in **Table 6.2-4**.

While large scale BESS projects are relatively new, there are numerous Australian Codes and Standards and protocols that would apply (refer to Appendix 1 of the PHA). **Appendix J (Preliminary Hazard Analysis)** details likely codes that would be considered during detailed design.

Table 6.2-4: Management and mitigation measures - hazards and risks

ID	Mitigation measure	Timing
HR-1	Relevant requirements in the Australian Standards will be applied for the Project, and requirements in relevant International Standards such as the US National Fire Protection Association Code NFPA855 (2023) will also be applied.	Pre-construction, construction, operation
HR-2	The BESS technology installed as part of the Project will be certified under an internationally recognised test method such as the Underwriters Limited UL 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems. Other means of demonstrating that a credible fire within a battery enclosure will not propagate to other enclosures will also be considered when procuring the BESS technology. The BESS will be equipped with an internal alarm system to notify operators of equipment and technology faults. Operators will also be responsible for maintenance and regular monitoring of the BESS infrastructure and equipment.	Pre-construction, construction, operation
HR-3	An Emergency Response Plan will be developed for the construction and operational phases of the Project. Evacuation protocols for personal not involved in an emergency response and not wearing appropriate Personal Protective Equipment (PPE) will be provided in this plan. The plan will also include details regarding the possible release of gas and a pressure release from a battery enclosure during a fire and will include details on how to communicate these hazards to first responders.	Pre-construction, construction, operation
HR-4	A Fire Safety Study for the Project will be prepared in consultation with NSW RFS and DPE during detailed design. The measures, controls, and recommendations within the Fire Safety Study will be implemented prior to commissioning of the BESS.	Pre-construction, construction, operation
HR-5	The detailed design of the BESS facility will consider the hazards associated with deflagration and will minimise this risk associated with this hazard to ALARP.	Pre-construction, construction, operation

ID	Mitigation measure	Timing
HR-6	Measures to prevent leaks from the BESS and transformers, and for containing spills if they occur, will be identified in the detailed design phase and implemented during construction and operation of the Project as relevant.	Pre-construction, construction, operation
HR-7	The person-in-charge of the AGL gas pipeline will be consulted on the design of the transmission connection and will be provided relevant studies (including the alternating current (AC) induction study) relating to works in proximity to or crossing the pipeline in order to provide comment and safeguard the integrity of the pipeline.	Pre-construction, construction, operation
HR-8	Materials or substances that could potentially pollute the Tomago Sandbeds aquifer or impact on the NGSF will not be stored at the temporary construction laydown area at the NGSF. Fuels, lubricants, oils, corrosive liquids, battery enclosures or lithium-ion battery modules will not be stored at the NGSF construction laydown area.	Pre-construction, construction
HR-9	The person-in-charge of the AGL gas pipeline will be consulted to confirm weight restrictions for vehicles and plant crossing the buried pipeline. Vehicles or plant that exceed the weight limit would only be able to cross the pipeline if appropriate controls to protect the pipeline have been agreed person-in-charge of the AGL gas pipeline.	Pre-construction, construction, operation
HR-10	Security, access and egress to/from the temporary construction laydown area at the NGSF will be determined during detailed design once the need for the location and the types of materials to be stored there has been confirmed.	Pre-construction, construction
HR-11	The asset protection zone (APZ) established at the NGSF will be reviewed once the need for the temporary construction laydown area and the types of materials to be stored there has been confirmed.	Pre-construction, construction

6.3 Biodiversity

6.3.1 Overview

This section provides a summary of potential biodiversity impacts associated with the Project and the mitigation measures to reduce potential biodiversity impacts. This section summarises the BDAR produced by Biosis (Biosis 2023), included as **Appendix H (Biodiversity development assessment report)**.

6.3.2 Methodology

The objectives of the BDAR were to:

- Apply the Biodiversity Assessment Methodology (BAM) (DPIE 2020a) to describe and assess the potential impacts of the Project on the ecological values within and around the Project Area
- Determine whether the Project is likely to have an impact on threatened biodiversity listed under the BC Act and the EPBC Act
- Identify appropriate mitigation measures and quantify associated biodiversity offsetting requirements.

The Site overlaps with the proposed location of the approved Newcastle Power Station (NPS) (SSD - 9837). A BDAR was produced by Kleinfelder Australia Pty Ltd (Kleinfelder) in 2019 to support the EIS for the NPS. This BDAR assessed the ecological values of the NPS site and nearby surrounding area. Field survey to support the NPS BDAR was undertaken from August 2018 to March 2019 was able to be used in place of certain surveys for the BDARfor this Project. On this basis, survey data from the NPS BDAR provided to Biosis and has been supplemented by additional surveys where necessary.

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

Stage 1 – Biodiversity assessment (existing conditions)

Stage 1 identifies the biodiversity values on land, focusing on the landscape context, vegetation integrity, and habitat suitability for threatened species.

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. An assessment of landscape features was undertaken for the Project. Landscape features were used to identify biodiversity values that are important for the Project to inform the habitat suitability for threatened species.

Field survey

A systematic biodiversity assessment was conducted from December 2022 to September 2023. An area larger and inclusive of the Project Area (referred to as the Subject land) was surveyed in accordance with the BAM (DPIE 2020a), which involved:

- The identification and mapping of Plant Community Types (PCTs)
- Undertaking floristic plots within each vegetation zone in accordance with the BAM (DPIE 2020a)
- 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 Surveying Threatened Plants and Their Habitats (DPIE 2020b) as far as practicable in areas of the Subject land outside the NPS BDAR survey area
- Incidental observations using the “random meander” method (Cropper 1993)
- Identification of previous and current factors threatening the ecological function and survival of native vegetation
- An assessment of the natural resilience of the vegetation

- 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, tracks, scratches and diggings)
- Targeted surveys for select threatened fauna species (refer to **Table 6.3-4**).

Stage 2 – Impact assessment (biodiversity values):

Stage 2 applied the avoid, minimise and offset hierarchy to assess direct, indirect and prescribed impacts associated with the Project. Offset requirements are determined for residual impacts on biodiversity values. In general, these are measured as ecosystem credits or species credits.

6.3.3 Existing environment

Landscape features

A summary of the landscape features of Project Area is provided in **Table 6.3-1**.

Table 6.3-1: Landscape features

Landscape features	Description
Interim Biogeographic Regionalisation for Australia (IBRA) bioregions and subregions	The assessment area straddles two IBRA Bioregions and subregions: • The Sydney Basin IBRA bioregion and the Hunter IBRA subregion • The NSW North Coast IBRA bioregion and Karuah Manning subregion.
Rivers, streams, estuaries, and wetlands	The Project Area is located within the Hunter Local Land Services (LLS) Region and the Hunter River catchment. The closest river-mouth is the Hunter River (Newcastle Harbour) located approximately 13 km to the southeast of the Project Area. There is no Key Fish Habitat as mapped within the Subject land. The nearest recognised wetland is the Hunter River which is designated as an estuarine wetland. This wetland generally incorporates Kooragang Nature Reserve which is listed on the Directory of Important Wetlands (DOIW) and located 1.6 km southeast and downstream of the Project Area. Kooragang Nature Reserve forms part of the broader Ramsar listed Hunter Estuary Wetlands, which was listed under the Ramsar convention as it: • Supports three species that are nationally and internationally listed, including Estuary Stingray *Dasyatis fluviorum*, Green and Golden Bell Frog *Litoria aurea* and Australasian Bittern *Botaurus poiciloptilus* • Is an important foraging and roosting site for migratory shorebirds and supports waterbirds at critical stages in their life cycles, including breeding, migration stop-over, roosting and drought refuge • Regularly supports more than 1% of the population of Eastern Curlew *Numenius madagascariensis* and Red-necked Avocets *Recurvirostra novaehollandiae.*
Habitat connectivity	The Project Area is situated on the south-east edge of a much larger, predominantly contiguous, patch of native vegetation. Connectivity to surrounding vegetation is interrupted by small disconnects such as roads and easements associated with powerlines and fire trails. Connectivity with vegetation outside the Project Area is greatest to the northeast, where, with the exception of small breaks, connectivity of native bushland is maintained through to reserved lands (Tilligerry

Landscape features	Description
	State Conservation Area) and further afield to the east. As such, the Project Area can be said to be part of a significant, connected area of habitat. However, the Project Area cannot be said to be part of a recognisable of vital corridor as minimal connectivity is present.
Geological features	There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the Project Area or within the assessment area.
Areas of outstanding biodiversity value	There are no areas of outstanding biodiversity or biodiversity values mapped within the Project Area.
NSW (Mitchell) geological Landscape	The Project Area occurs within the Sydney - Newcastle Barriers and Beaches Mitchell Landscape (Mitchell 2002).
Hydrology	The Project Area, in particular the Site, is situated on a topographic high point located approximately 500 m south-east of the Hunter River, a major low-land meandering waterway. Due to its elevated surface, the Site is unlikely to receive surface water from surrounding areas, including the Hunter River during flood events. The Project Area is located within the Hunter Valley alluvial aquifer formation, and within the Hunter River Catchment. A groundwater specialist study (Aurecon, 2019) identified a portion of the Project Area is located within the south-western edge of the Tomago Sandbeds catchment area. This groundwater catchment zone is the same catchment zone as the Ramsar listed Hunter Estuary Wetlands. However, based on existing studies, the groundwater flow from the Site is not expected to flow toward the Ramsar listed wetlands.

Native vegetation

The Project Area supports 30.1 hectares of native vegetation in varying condition. The Site has been historically used for rural activities, including grazing and agricultural purposes. A number of bitumen, dirt and gravel access paths have been cleared across the Site. Some isolated and small patches of trees have been retained within the centre of the Site however mature vegetation is absent from the majority of the Site. Most areas of better condition naïve vegetation are confined to the northern, eastern, and southern boundaries of the Site.

The majority of the proposed transmission connection corridors are densely vegetated and in good condition, with the exception of a few pockets of dense weed ingress and modified/managed areas containing the existing Transgrid easement. The native vegetation within the Transgrid easement varies markedly in native diversity and cover from predominantly native to predominantly exotic.

Native vegetation extent

Figure 6.3-2 shows the native vegetation extent recorded within the Project Area, as assessed during field investigations undertaken in December 2022 and February 2023. The figure includes all areas of native vegetation (native groundcover and areas with canopy) within the Project Area. Areas not shown as native vegetation cover within **Figure 6.3-2** are cleared or support non-native vegetation.

Non-native vegetation

4.6 hectares of the Project Area has been mapped as non-native vegetation as these areas either contain no or very minimal native vegetation that could be reliably allocated as a PCT. The bulk of non-native vegetation occurs within the Site as exotic grasslands or areas dominated by woody weeds such as Radiata Pine *Pinus radiata* and Lantana *Lantana camara*.

Plant Community Types (PCTs)

One PCT was assessed as present within the Project Area, namely PCT 1590: *Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest*. The extent of this PCT is shown in **Figure 6.3-3**.

Threatened Ecological Communities (TEC)

Vegetation within the Project Area was found to represent one TEC listed under the NSW BC Act. This TEC, *Lower Hunter Spotted Gum Ironbark Forest* (Plant Community Type (PCT) 1590) *in the Sydney Basin and NSW North Coast Bioregions* (Lower Hunter Spotted Gum Ironbark Forest) does not have a commensurate listing under the EPBC Act. This PCT occurs in varying condition states within the subject land from naturally structured forest to derived native shrubland (DNS) and derived native grassland (DNG). This TEC occupies 11.3 ha in the Development footprint (refer to **Figure 6.3-4**).

Threatened species

Predicted species (ecosystem credit species)

A list of predicted species (ecosystem credit species) expected to occur within the Project Area is presented in **Table 6.3-2**. 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 6.3-2: Ecosystem credit species (predicted species) with potential to occur within the Project Area

Species name	Common name
Anthochaera phrygia	Regent Honeyeater (Foraging)
Callocephalon fimbriatum	Gang-gang Cockatoo (Foraging)
Calyptorhynchus lathami	Glossy Black-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
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)
Hieraaetus morphnoides	Little Eagle (Foraging)
Hirundapus caudacutus	White-throated Needletail
Lathamus discolor	Swift Parrot (Foraging)
Lophoictinia isura	Square-tailed Kite (Foraging)
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat
Miniopterus australis	Little Bent-winged Bat (Foraging)
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)
Neophema pulchella	Turquoise Parrot
Ninox connivens	Barking Owl (Foraging)
Ninox strenua	Powerful Owl (Foraging)

Species name	Common name
Petaurus australis	Yellow-bellied Glider
Petroica boodang	Scarlet Robin
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)
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)

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. Species credit species with the potential to occur within the Project Area have been either assumed present or were the subject of a targeted survey.

A detailed assessment of potential for occurrence, and potential for impact, for all relevant species credit species is presented in **Appendix H (Biodiversity Development Assessment Report)**.

Threatened Flora

Habitat for threatened flora within the centre of the Site is lacking due to historical land use including significant weed ingress, grazing and agriculture. Patches that are exclusively exotic, or where few natives occur, have been mapped as non-native vegetation and are not considered to provide habitat for threatened flora. Open areas mapped as derived native grassland are also degraded such that threatened flora are considered unlikely to occur.

Relatively less historical disturbance has occurred on the periphery of the Site and where the proposed transmission connection corridors extend south-east towards Old Punt Road. In these areas, more intact and naturally structured native vegetation with a more resilient native seedbank is present.

A summary of targeted flora survey results is provided in **Table 6.3-3**.

Table 6.3-3: Summary of targeted flora survey results

Species name	Common name	Survey result	Species polygon (ha) / Count of individuals
Callistemon linearifolius	Netted Bottle Brush	Recorded by Biosis.	4 individuals
Cryptostylis hunteriana	Leafless Tongue Orchid	Not recorded	-
Cynanchum elegans	White-flowered Wax Plant	Not recorded	-
Eucalyptus glaucina	Slaty Red Gum	Not recorded	-
Eucalyptus parramattensis subsp. *decadens**	-	Recorded by Kleinfelder but not within the Subject land of this assessment. Not recorded by Biosis.	-
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	Recorded by Biosis, 116 stems. Recorded by Kleinfelder but not within the Subject land of this assessment.	0.51 ha
Prostanthera cineolifera	Singleton Mint Bush	Not recorded	-
Pterostylis	-	Not recorded by Kleinfelder, assumed	2.8 ha

Species name	Common name	Survey result	Species polygon (ha) / Count of individuals
chaetophora		present by Biosis outside NPS BDAR survey area.	
Rutidosis heterogama	Heath Wrinklewort	Not recorded	-
Tetratheca juncea	Black-eyed Susan	Not recorded	-

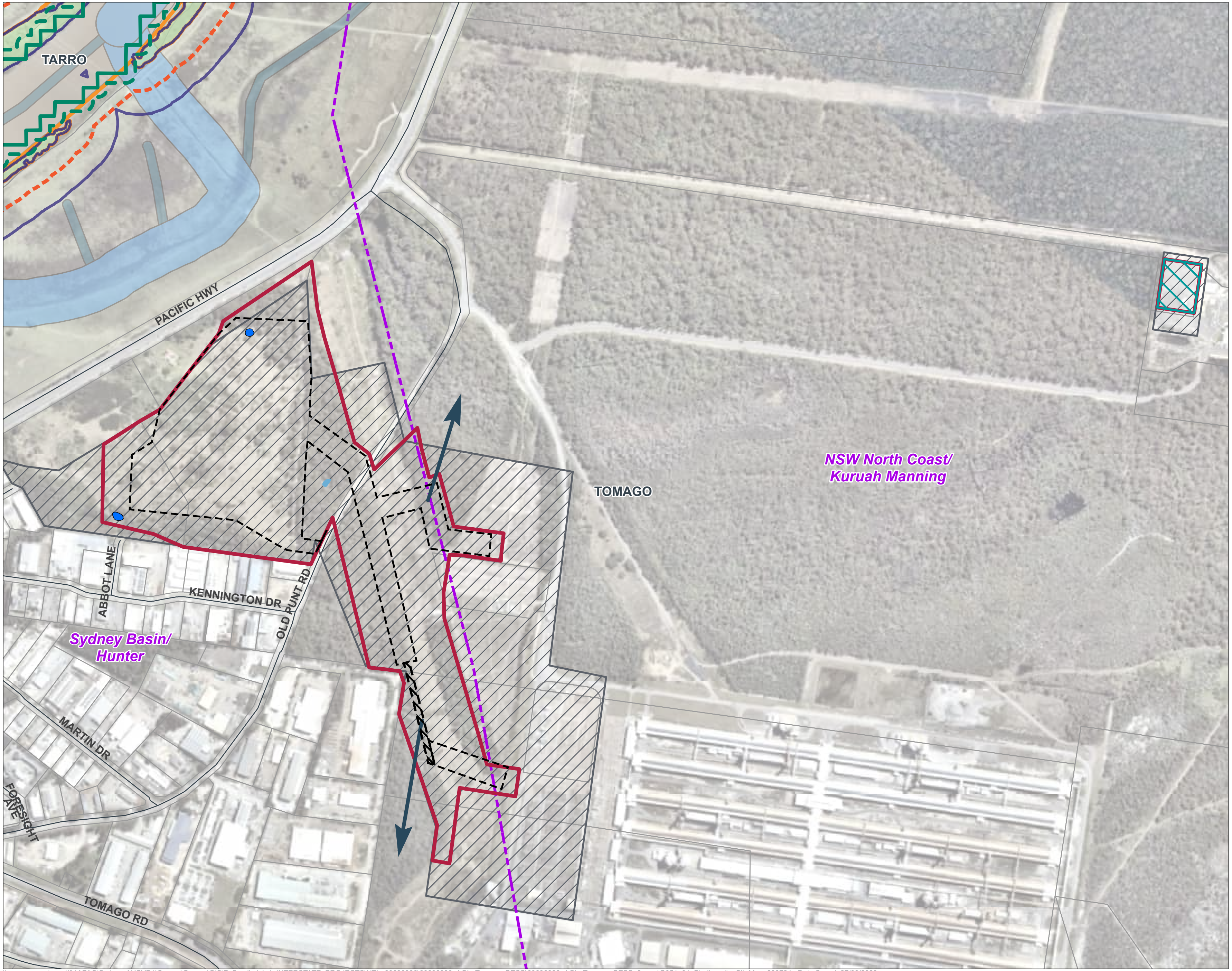
Threatened fauna

A fauna habitat assessment was undertaken to determine whether the vegetation to be impacted by the Project contained microhabitats suitable to support species credit species. Targeted fauna surveys were completed for the species listed in **Table 6.3-4** below.

Table 6.3-4: Summary of targeted fauna survey results

Species name	Common name	Survey results	Species Polygon (ha)
Tyto novaehollandiae	Masked Owl	Not recorded	-
Ninox connivens	Barking Owl	Not recorded	-
Ninox strenua	Powerful Owl	Not recorded	-
Callocephalon fimbriatum	Gang-gang Cockatoo	Not recorded	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	Not recorded	-
Dromaius novaehollandiae - endangered population	Emu	Not recorded	-
Burhinus grallarius	Bush Stone-curlew	Not recorded	-
Phascolarctos cinereus	Koala	Not recorded	-
Petauroides volans	*Southern Greater Glider*	Not recorded	-
Petaurus norfolcensis	*Squirrel Glider*	Not recorded	-
Phascogale tapoatafa	Brush-tailed Phascogale	Not recorded	-
Cercartetus nanus	Eastern pygmy-possum	Not recorded	-
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Almost certain	-
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Almost certain	-
Miniopterus australis	Little Bent-winged Bat	Almost certain	-
Miniopterus orianae oceanensis	Eastern Bent-winged Bat	Almost certain	-
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Almost certain	-
Scoteanax rueppellii	Greater Broad-nosed Bat	Almost certain	-
Chalinolobus dwyeri	Large-eared Pied Bat	Probable	-
Myotis macropus	Southern Myotis	Probable	18.45 ha

Species name	Common name	Survey results	Species Polygon (ha)
Vespadelus troughtoni	Eastern Cave Bat	Species Group (unable to distinguish between species)	-



AECOM

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Legend

- Biosis Investigation Area
- Project Area
- Development Footprint
- Laydown Area
- Underground
- Cadastral Boundary
- IBRA Region/Sub-region
- Dam (Biosis, 2023)
- Water Body (Biosis, 2023)
- Habitat Connectivity
- Road

HydroLine Stream Order Buffers

- 1
- 9

Resilience and Hazards SEPP

- Coastal Wetlands

Wetlands/ Estuaries

- Riparian Buffers - Important Wetlands
- Local Wetlands
- Rippparian Buffers - Local Wetlands
- Estuaries
- Riparian Buffer - Estuaries

FIGURE 6.3-1: SITE MAP

Source: Nearmap, 2022.

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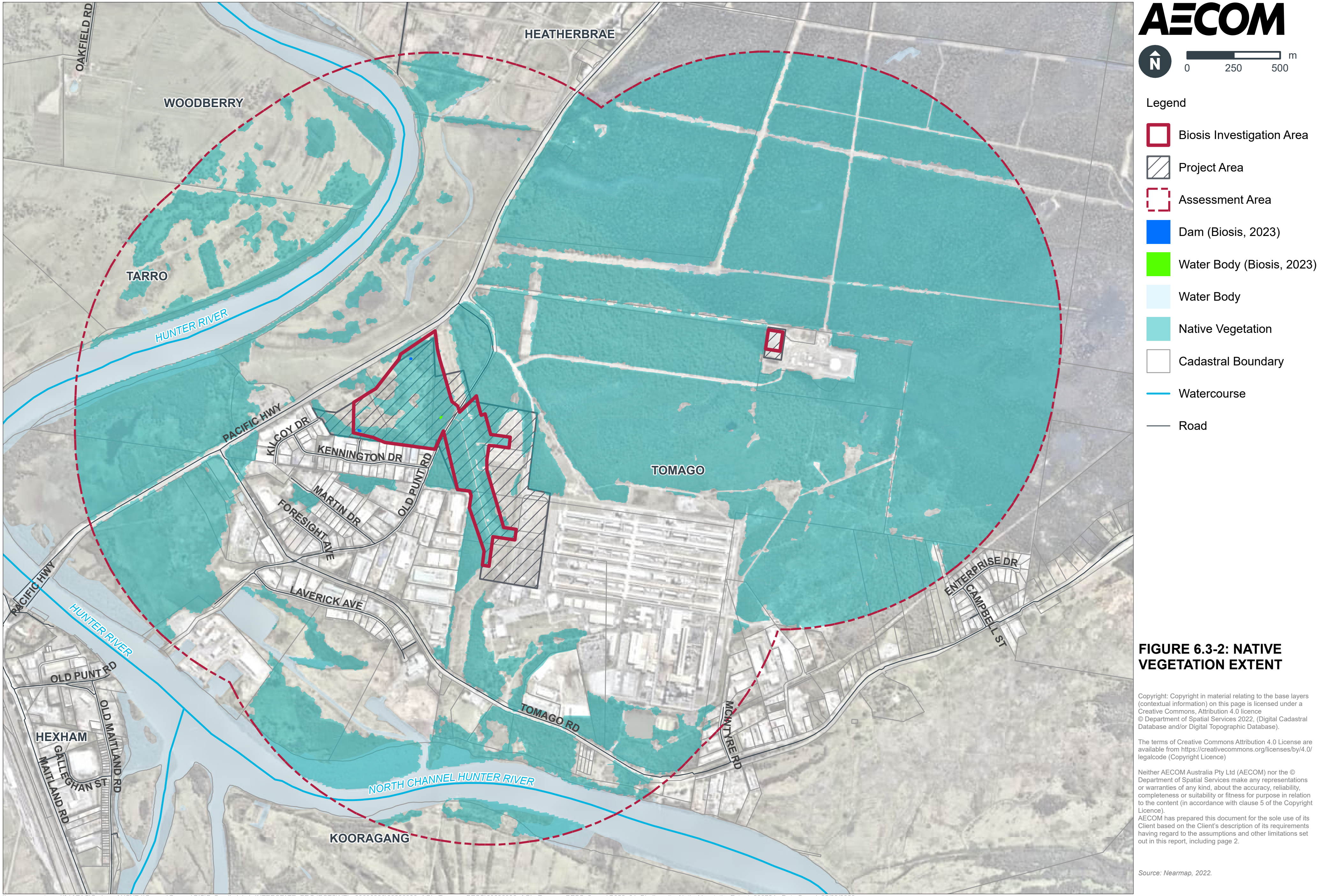

FIGURE 6.3-2: NATIVE VEGETATION EXTENT

Source: Nearmap, 2022.

FIGURE 6.3-3: VEGETATION WITHIN THE SUBJECT LAND

Source: Nearmap, 2022.

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AECOM

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0 100 200 m

Legend

- Biosis Investigation Area
- Project Area
- Development Footprint
- Underground
- Dam (Biosis, 2023)
- Water Body (Biosis, 2023)
- Water Body
- Cadastral Boundary
- Road

Plant Community Type and Condition

- 1590,Forest_High
- 1590,Forest_Moderate
- 1590,DNS_High
- 1590,DNS_Moderate
- 1590,DNG

Threatened Ecological Community

- Lower Hunter Spotted Gum Ironbark Forest (BC Act)

FIGURE 6.3-4: THREATENED ECOLOGICAL COMMUNITIES WITHIN THE SUBJECT LAND

Source: Nearmap, 2022.

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6.3.4 Impact assessment

The Project has the potential to result in direct and indirect impacts on biodiversity values. The majority of impacts on biodiversity would occur during construction from the clearing of native vegetation and removal of habitat for a limited range of flora and fauna. To understand these potential impacts and measures to avoid or mitigate them, this section provides:

- A description of how biodiversity impacts have been avoided, where possible
- An assessment of the potential direct, indirect and prescribed impacts during construction
- An assessment of the potential direct and indirect impacts during operation.

These points are discussed further below.

Actions to avoid/minimise Project impacts

In accordance with the BAM, the Project aimed to avoid, mitigate and offset impacts on biodiversity values. Measures to avoid and minimise impacts have been considered and are detailed in **Table 6.3-5**.

Table 6.3-5: Avoidance and minimisation of impact

Avoidance and minimisation components	Action	Outcome	Timing
Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology.	Investigate modes or technologies that would avoid or minimise impacts on biodiversity values.	Given the nature of the Project, no modes or technologies are available that would avoid or minimise impacts to biodiversity within the Site. A section of the transmission connection/s corridor would constructed using underground methods to avoid a noted area of high biodiversity value (Small-flower Grevillea).	Project design
Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.	Route selection of the proposed transmission connections has considered sensitive biodiversity values.	A section of the transmission connection corridor would be constructed using underground methods to avoid a noted area of high biodiversity value (Small-flower Grevillea).	Project design
Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	A range of potential locations for the Project were investigated.	Site location was chosen as it is located close to the high voltage electricity transmission network and the BESS could also be located within an area of historical disturbance and diminished ecological value.	Project design
Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.	Locating the BESS within the available lot boundaries.	The positioning of the BESS has been designed to take advantage of existing cleared areas, non-native vegetation or lower condition native vegetation. Fringing native vegetation in higher condition has largely been avoided.	Project design

Avoidance and minimisation components	Action	Outcome	Timing
Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design.	Utilising project design to avoid areas of highest biodiversity value.	An avoidance area has been included in the project design whereby direct impacts and prescribed impacts would be avoided.	Project design
Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal.	Conduct surveys to identify site constraints and opportunities to avoid and minimise.	The population of Small-flower Grevillea and associated habitat identified within the subject land has been avoided by switching transmission connection construction from above ground to underground within the relevant area.	Project design

Construction

Direct impacts

The Project would result in the removal of 14.1 ha of native vegetation, 11.3 ha of which represents the BC Act listed TEC *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*. The Project would also result in the removal of:

- 14.1 ha of Common Planigale habitat (assumed presence)
- 1.7 ha of Netted Bottlebrush habitat only, no individuals removed
- 10.7 ha of Southern Myotis habitat
- 0.2 ha of *Pterostylis chaetophora* habitat (assumed present).

These impacts would be permanent and would occur from the outset of the development. Mitigation measures would help to minimise the potential impacts to biodiversity values that remain.

Loss of hollow-bearing trees

The Project would result in the loss of 14 hollow-bearing trees. Most hollows (12) are 20 centimetres (cm) or smaller, however, two are large (> 30 cm). These hollows provide denning, sheltering and breeding for various hollow dependent native fauna.

Indirect impacts

Potential indirect impacts arising from the construction of the Project are outlined in **Table 6.3-8**.

Table 6.3-6: Assessment of indirect impacts during construction

Indirect impact	Likelihood and consequences
Inadvertent impacts on adjacent habitat or vegetation	Impacts to adjacent vegetation during construction phase can 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 adjacent retained habitats.
Reduced viability of adjacent habitat due to edge effects	The potential for the Project to significantly or substantially increase edge effects to adjacent vegetation and habitats is considered low. Vegetation present within and adjacent to the Project is largely already subject to moderate to high levels of edge effects, and efforts have been made to minimise and avoid impact to vegetation in higher ecological condition and parts of large, connected areas.
Reduced viability of adjacent habitat due to noise, dust or light spill	It is predicted that the adjacent habitat would be impacted by noise, dust and light spill, during construction and operation of the Project. During construction, this would be managed via measures outlined in a CEMP. Increased light spill during operation can affect microbat activity. Effects vary from positive, such as an increase in prey items (insects) to negative whereby bats may not fly through overly lit areas rendering adjacent habitat no longer viable. Although there is uncertainty, given the threatened microbat species recorded are often detected in urbanised areas, it is reasonable to assume that they are in some way resilient to light pollution, and any impacts are not likely to be substantive.
Transport of weeds and pathogens from the site to adjacent vegetation	Weeds occurring within the development footprint are common with those occurring within adjacent vegetation to be retained. Increased transport of pathogens and weeds is unlikely to occur but would be managed by biosecurity measures outlined in the CEMP.
Increased risk of starvation, exposure and loss of shade or shelter	The 14.1 ha of vegetation removal proposed would constitute a loss of foraging resources, however, this is not considered likely to increase the risk of starvation for these species when the broad extent of available habitat within the assessment area is taken onto account. The Project would also remove sheltering resources for hollow-dependent microbats (14 trees). While the removal of sheltering vegetation is a small proportion of the commensurate habitats available within the assessment area, the removal of potential roost/sheltering sites is a more adverse impact, but not one that is likely to result in mortality of individuals.
Loss of breeding habitats	14 hollow-bearing trees would be removed by the Project. Threatened species that may use these hollows based on surveyed results include all the hollow-dependent microbats listed. Indirect impacts associated with the loss of breeding habitats are not considered likely to be substantial or significant to any locally occurring threatened, or non-threatened, microbat species.
Trampling of threatened flora species	The known distribution of Small-flower Grevillea is well within the avoidance area such that trampling of this species is considered unlikely. Similarly, for both Black-eyed Susan and *Pterostylis chaetophora*, there are no impacts proposed within their assumed distributions and they are not known to occur within the NPS BDAR survey area. Netted Bottlebrush has been recorded at four locations, all outside the development footprint. The CEMP would include actions relating to pre-clearing surveys and protocols, such that the risk of trampling threatened flora

Indirect impact	Likelihood and consequences
	is further decreased and overall considered negligible.
Inhibition of nitrogen fixation and increased soil salinity	Future excavations or soil disturbance resulting from the development of the Project would be largely restricted to areas having undergone significant previous disturbance As such it is considered unlikely that the future development of the Project would result in substantial changes to the level of nitrogen fixation or soil salinity within the Project Area.
Fertiliser drift	The Project does not include the use of fertilisers.
Rubbish dumping	Potential for this direct impact to occur is considered negligible. Appropriate measure for the management of construction related rubbish would be detailed in the CEMP.
Wood collection	The Project is unlikely to increase access to retained vegetation, beyond current access capacity. Unauthorised access and collection of wood is expected to be minimal.
Removal and disturbance of rocks, including bush rock	The Project Area does not support bush rock.
Increase in predators	Potential for this indirect impact to occur is considered negligible.
Increase in pest animal populations	Potential for this indirect impact to occur is considered negligible.
Changed fire regimes	Potential for this indirect impact to occur is considered negligible, and the requirements for legislated bushfire hazard reduction and asset protection would be implemented during construction and operation of the Project.
Disturbance to specialist breeding and foraging habitat, e.g. Beach nesting for shorebirds	The Project Area is not within any Important Habitat mapping.
Fragmentation of movement corridors	The Project Area is connected to significant areas of native vegetation to the northeast and provides linkages to habitat along the Hunter River to west and south. Development of the Site and installation of permanent fencing would mean that fauna would be unable to move through the western portion of the Project Area as they currently do. Realistically, this would only be a hindrance to less mobile, ground dwelling fauna. East of Old Punt Road and north of the Tomago 132 kV Substation, the current disconnect between tree canopies either side of the existing Transgrid easement is over 100 m and likely to prevent traversal of strictly arboreal mammals. Therefore, an increase of 45 m through construction of the transmission connections is not thought to introduce a new barrier to movement for such fauna. Due to the proposed avoidance area, south of the Tomago 132 kV Substation the present level of connectivity would be largely maintained.

Prescribed impacts

The assessment of prescribed biodiversity impacts is summarised in **Table 6.3-7**.

Table 6.3-7: Identification of prescribed impacts

Prescribed impact	Assessment
Karst, caves, crevices, cliffs, rocks and other geological features of significance	The Project Area does not contain any karst, caves, crevices, cliffs, rocks and other geological features of significance. This prescribed impact is not discussed further.
Occurrences of human-made structures and non-native vegetation	The Project Area does not contain any human-made structures. Non-native vegetation is present in the form of exotic grasslands and patches of woody exotics (Lantana and Radiata Pine). This predominantly occurs within the Site and would be removed. Non-native vegetation is not in sufficient quantities, nor contains a particular resource to be considered important to the recorded or assumed present threatened fauna species.
Corridors or other areas of connectivity linking habitat for threatened entities	The Project Area does not form part of a recognised wildlife corridor, but it is situated such that it serves as a link to habitats along the Hunter River to the west and south, and to extensive areas of habitat and reserved lands to the northeast. While the Project would diminish local connectivity, this is unlikely to prevent genetic exchange of the threatened entities known or assumed to inhabiting the Project Area and broader assessment area.
Water bodies or any hydrological processes that sustain threatened entities	The Project Area contains three waterbodies, two dams and one potential natural sink that inundates and fills during times of sufficient rainfall. Of these water bodies, the northern most dam within the Site may be filled in. The remaining two water bodies would not be directly impacted. The removal of one waterbody equates to a very small reduction in local foraging habitat for Southern Myotis and is unlikely to have discernible impact on the persistence of the local population of the species. With mitigation and management measures in place, there would be a low risk of water quality impacts on surface water receptors during construction and operation of the Project. Similarly, a significant change in current hydrological processes is not anticipated. As such a negligible impact is expected.
Where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community	It can reasonably be expected that the potential for vehicle strikes can be effectively managed though driver awareness training on the potential for fauna to occur, as well as on-site measures such as reduced speed limits and signage. As such, the Project is not expected to result in substantial or significant impacts associated with vehicle strikes.

Impacts to Groundwater Dependent Ecosystems (GDEs)

Previous surface water and groundwater monitoring across the Project Area and surrounding areas indicated that naturally occurring and ambient chemical substances in the environment (i.e., not attributed to previous activities at the Site) generally exceeded the recommended concentrations for metals and other water quality indicators. It expected that the Project would a achieve, through the implementation of a CEMP and OEMP, a Neutral or Beneficial Effect (NorBE) on water quality and would help to maintain (or improve) the quality of local groundwater as better quality surface water would seep into local groundwater sources. It is therefore unlikely that impacts to GDEs through groundwater contamination would occur.

For further details on the assessment of impacts on GDEs see **Appendix H (Biodiversity Development Assessment Report)**.

Operation

Potential indirect impacts arising from the operation of the Project are outlined in **Table 6.3-8**.

Table 6.3-8: Indirect impacts during operation

Indirect impact	Likelihood and consequences
Inadvertent impacts on adjacent habitat or vegetation	Impacts to adjacent habitat or vegetation during operational phase can be prevented or minimised through the implementation of an OEMP detailing environmental protection measures, strict water quality practices and stormwater controls, and by ensuring lighting is directed towards the developed area, rather than towards the adjacent retained habitats.
Reduced viability of adjacent habitat due to edge effects	The potential for the Project to significantly or substantially increase edge effects to adjacent vegetation and habitats is considered relatively low. Vegetation present within and adjacent to the development footprint is largely already subject to moderate to high levels of edge effects, and efforts have been made to minimise and avoid impact to vegetation in higher ecological condition and parts of large, connected areas.
Reduced viability of adjacent habitat due to noise, dust or light spill	Increased light spill during operation can affect microbat activity. Effects vary from positive, such as an increase in prey items (insects) to negative whereby bats may not fly through overly lit areas rendering adjacent habitat no longer viable. Although there is uncertainty, given the threatened microbat species recorded are often detected in urbanised areas, it is reasonable to assume that they are in some way resilient to light pollution, and impacts are not likely to be substantive.
Transport of weeds and pathogens from the site to adjacent vegetation	Weeds occurring within the Project Area are common with those occurring within adjacent vegetation to be retained. Increased transport of pathogens and weeds is unlikely to occur but would be managed by biosecurity measures outlined in the OEMP.
Fragmentation of movement corridors	The Project Area is connected to significant areas of native vegetation to the northeast and provides linkages to habitat along the Hunter River to west and south. Development of the Site and installation of permanent fencing would mean that fauna would be unable to move through the western portion of the Project Area as they currently do. Realistically, this would only be a hindrance to less mobile, ground dwelling fauna. East of Old Punt Road and north of the Tomago 132 kV Substation, the current disconnect between tree canopies either side of the existing Transgrid easement is over 100 m and likely to prevent traversal of strictly arboreal mammals. Therefore, an increase of 45 m through construction of transmission connection/s is not thought to introduce a new barrier to movement for such fauna. South of the 132 kV Tomago Substation, due to the avoidance area, the present level of connectivity will be largely maintained.

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.

Offsetting

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 requiring offsets, not requiring offsets, and not requiring assessment are shown in **Figure 6.3-6**.

Impacts to native vegetation (ecosystem credits)

Table 6.3-9 provides a summary of the ecosystem credit offsets required for the Project. **Table 6.3-10** provides a summary of the ecosystem credits required for the Project with respect to the two transmission route options.

Table 6.3-9: Offsets required (ecosystem credits)

Vegetation zone	Area (ha)	Impact	VI score	Offset required	TEC	HBTs	Credit requirement
1590_Forest_High	4.3	Clearance	58.4	Yes	Yes	Yes	126
1590_Forest_Moderate	2.3	Clearance	41.9	Yes	Yes	Yes	48
1590_DNS_High	1.2	Clearance	36.9	Yes	Yes	No	22
1590_DNS_Moderate	3.6	Clearance	18.5	Yes	Yes	No	33
1590_DNG	2.9	Clearance	7.2	No	No	No	0

Table 6.3-10: Offsets required (ecosystem credits) for the BESS and per transmission option

Vegetation zone	Impact	VI score	BESS plus Option 1 (132 kV substation connection)	BESS plus Option 2 (330 kV substation connection)
1590_Forest_High	Clearance	58.4	94	105
1590_Forest_Moderate	Clearance	41.9	44	48
1590_DNS_High	Clearance	36.9	15	9
1590_DNS_Moderate	Clearance	18.5	31	33
1590_DNG	Clearance	7.2	0	0

Impacts to threatened species and their habitat

As outlined in Section 9.2.2 of the BAM an offset is also required for the impacts of projects on threatened species that requite species credits. **Table 6.3-11** provides a summary of the species credit offsets required for impacts from the Project, and **Table 6.3-12** provides a summary of the species credit offsets required for each transmission connection route option.

Table 6.3-11: Offsets required (species credits)

Species	Vegetation zone	Habitat condition (vegetation integrity score) loss	Area (ha)	Biodiversity risk weighting	Total credit requirement
Common Planigale	1590_Forest_High 1590_Forest_Moderate 1590_DNS_High 1590_DNS_Moderate 1590_DNG	58.4 41.9 36.9 18.5 7.2	4.3 2.3 1.2 3.6 2.9	2.00	239

Species	Vegetation zone	Habitat condition (vegetation integrity score) loss	Area (ha)	Biodiversity risk weighting	Total credit requirement
Southern Myotis	1590_Forest_High 1590_Forest_Moderate 1590_DNS_High 1590_DNS_Moderate 1590_DNG	58.4 41.9 36.9 18.5 7.2	3.0 1.9 0.5 3.0 2.2	2.00	173
Pterostylis chaetophora	1590_DNS_Moderate	41.9	0.2	2.00	2

Table 6.3-12: Offsets required (species credits) for BESS and per transmission option

Species	Vegetation zone	Biodiversity risk weighting	BESS plus Option 1 (132 kV substation connection)	BESS plus Option 2 (330 kV substation connection)
Common Planigale	1590_Forest_High 1590_Forest_Moderate 1590_DNS_High 1590_DNS_Moderate 1590_DNG	2	193	205
Southern Myotis	1590_Forest_High 1590_Forest_Moderate 1590_DNS_High 1590_DNS_Moderate 1590_DNG	2	162	165
Pterostylis chaetophora	1590_DNS_Moderate	2	0	2

Impacts on MNES

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on MNES protected under the Act. A summary of potential impacts on MNES is provided in **Table 6.3-13**.

Table 6.3-13: Potential impacts on MNES

Matter of NES	Potential for significant impact
Threatened species	Unlikely. Small-flower Grevillea and its habitat are within the avoidance area and would not be impacted. Habitat would be removed for other threatened fauna species that may, but are not known, to occur. However, the habitat that would be removed is abundant in the Tomago area, diminishing the relative impact of the Project.
Threatened ecological communities	None
Migratory species	Unlikely. The proposed habitat removal does not include crucial life-history habitat. Similar habitat is plentiful within the locality.
National Heritage Places	None
Wetlands of international importance (Ramsar sites)	Unlikely. Though there is likely to be connectivity between the Project Area and Hunter Estuary Wetlands through groundwater and surface water, the CEMP and OEMP would contain specific measure to ensure water quality is not impacted. Chief of these would be the target of the Project achieving a NorBE on water quality discharges.

AECOM

0 100 200 m

Legend

- Biosis Investigation Area
- Project Area
- Development Footprint
- Underground
- Cadastral Boundary
- Dam (Biosis, 2023)
- Water Body (Biosis, 2023)
- Water Body
- Indirect Impact Zone
- Road

FIGURE 6.3-5: INDIRECT IMPACTS

Source: Nearmap, 2022.

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FIGURE 6.3-6: PRESCRIBED IMPACTS

Source: Nearmap, 2022.

6.3.5 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 6.3-14**.

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 biodiversity impacts include:

- **Section 6.4** 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
- **Section 6.5** Soils and contamination, specifically measures which address erosion and sediment control for the Site and transmission line corridor during construction and operation
- **Section 6.16** Other issues, specifically measures which address waste and dust during construction and operation.

Table 6.3-14: Measures to mitigate and manage impacts

ID	Mitigation measure	Timing
BD-1	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 and construction.
BD-2	A Biosecurity Management Plan prepared as part of the Project's CEMP/OEMP is recommended and will prevent the spread of weeds and pathogens, and other biosecurity items into or out of the impact area upon implementation.	Pre-construction and construction.

ID	Mitigation measure	Timing
BD-3	All material stockpiles, vehicle parking and machinery storage, and other ancillary works are to be located within areas considered impacted within the current assessment and not be located within retained vegetation outside the impact area unless an updated impact assessment is undertaken.	Construction
BD-4	Establishment of construction fencing to minimise the risk of fauna entering the construction zones • Restriction of all construction traffic and machinery to 30 km/h and erection of signage informing personnel of this restriction.	Pre-construction, construction and post-construction.

6.4 Hydrology

6.4.1 Overview

A Surface Water and Flooding Assessment (SWAFA) has been prepared for the Project and is provided in **Appendix L (Surface Water and Flooding Assessment)**. This chapter summarises the assessment of potential construction and operational impacts of the Project on surface water, flooding and water use. It also outlines environmental management and mitigation measures to avoid or reduce impacts.

6.4.2 Methodology

A surface water and flooding assessment has been undertaken for the Project by AECOM (2023). The surface water and flooding assessment report is provided as **Appendix L (Surface Water and Flooding Assessment)** with relevant sections summarised within this chapter.

The groundwater assessment was undertaken using existing assessments and reports for the Project Area and publicly available desktop information. The groundwater assessment is documented within this chapter.

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

- A review of relevant legislation, policies and guidelines to inform the assessment and management of surface water, groundwater and flooding, including:
  - *Water Management Act 2000 (NSW)*
  - *State Rivers and Estuaries Policy 1993 (NSW)*
  - *Coastal Management Act 2016 (NSW)*
  - *Protection of the Environment Operations Act 1997 (NSW)*
  - *NSW Aquifer Interference Policy (2012)*
  - *The NSW Groundwater Protection Policy (1998)*
  - *The NSW Groundwater Dependent Ecosystem Policy (2002)*
  - *Hunter Water Regulation 2015*
  - *Port Stephens LEP 2013*
  - *Port Stephens DCP 2023*
  - *National Water Quality Management Strategy* (Department of Agriculture and Water Resources, 2018)
  - *Protecting Our Drinking Water Catchments – Guidelines for Development in the Drinking Water Catchments* (Hunter Water, 2017)
  - *Guidelines for Controlled Activities on Waterfront Land (2018)*
  - *Neutral or Beneficial Effect on Water Quality Assessment Guidelines* (Water NSW, 2022)
  - *Water Sensitive Development Strategy Guidelines – Port Stephens Council* (BMT WBM, 2011)
  - *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004)
  - *Australian Runoff Quality – A guide to Water Sensitive Urban Design* (Engineers Australia, 2006)
  - *Australian Rainfall and Runoff: A Guide to Flood Estimation* (Ball *et al*., 2019)
  - *ANZECC & ARMCANZ water quality guidelines (2000).*
- A review of existing literature and historic studies to understand the existing surface water, groundwater and flooding conditions relevant to the Project Area and wider locality, including:
  - NPS EIS (Aurecon, 2019c)
  - NPS Surface water and Flooding Assessment (Aurecon, 2019e)

- NPS Groundwater Specialist Study (Aurecon, 2019f)
- Environmental Site Assessment (ESA) Phase 1 (Environmental Strategies, 2017)
- Environmental Site Assessment (ESA) Phase 2 (Environmental Strategies, 2018)
- NGSF EIS (Coffey, 2011)
- NGSF Surface Water Assessment (Worley Parsons, 2011)
- Water monitoring program for NGSF:
  - Pre-construction phase conducted from June to December 2011 (Coffey, 2012)
  - Construction phase conducted from October to December 2012 (Coffey, 2013)
  - Operational phase conducted during September 2018 (GHD, 2018)
- Lower Hunter River Water Quality Monitoring (Swanson *et al.* 2017)
- Williamtown Salt Ash Floodplain Management Study and Plan (BMT WBM, 2017).

- A desktop review and analysis of existing information to characterise the existing environmental conditions, identify sensitive receptors, existing flood behaviour and drainage infrastructure
- Assessment of potential construction and operational impacts relating to surface water, groundwater, flooding, drainage through a review of the Project design and the baseline conditions
- Identification of appropriate mitigation and management measures to mitigate potential impacts on water related receptors and the potential impacts of the Project.

6.4.3 Existing environment

Existing climate

Information on historic regional climatic conditions were reviewed to understand how existing weather conditions are likely to influence surface water runoff, water storage and flooding. The Williamtown RAAF Base provides the nearest weather station to the Site. It has a continuous record of monthly rainfall, evaporation, and temperature data. This has been summarised in Table 5-1 and Figure 5-1 of **Appendix L (Surface Water and Flooding Assessment)**. The outcome of this review confirms that the Project is in a ‘temperate’ climate zone which is characterised by warm summers and consistent rainfall over the calendar year. Total average rainfall is 1,094 mm per annum, with the months of January to June exhibiting heavier rainfall compared to the later months of the calendar year.

Temperatures at the Site are influenced by proximity to the coastline, with moderate to warm summers and cooler temperatures in winter. Mean maximum and minimum temperatures range between 17-28°C during summer months and 9-19°C in winter months.

The regional net water balance is demonstrated through a comparison of rainfall and evaporation. The average annual evaporation is 1,736 mm per annum, exceeding the total annual rainfall. This means there is a water deficit in the region, where pools of water would experience net drying conditions in most months of the year. Net wetting conditions would only occur in May and June, where rainfall exceeds evaporation.

Catchments, watercourses and wetlands

The Project Area is located within the Hunter River catchment. The Hunter River catchment is a major coastal catchment covering a total area of 22,000 km^2. The upper reaches of the Hunter River catchment are predominantly cleared for rural activities while other areas consist of mining, industrial and urban developments. The Project is located within the low-mid estuary zone of the Lower Hunter River, which is considered a highly modified, heavily urbanised, and industrialised area.

The Hunter River is the closest river to the Project Area, located approximately 450 m northwest (refer to **Figure 6.4-2**). The Hunter River flows in a south westerly direction past the Site before heading in a south easterly direction approximately 1 km downstream of the Site, travelling under the Hexham Bridge. Beyond this bridge the Hunter River’s flow is separated by the Ramsar-protected Kooragang Wetlands. The north arm of the Hunter River flows towards Fullerton Cove and re-joins the south arm of the river just past Walsh Point before flowing past Newcastle central business district (CBD) and out to sea. The tidal limit of the Hunter River is about 40 km upstream of the Site.

The Hunter Wetlands National Park is in the order of 62 km^2 and is the largest wetland reserve within a single estuary across NSW (Swanson *et al.*, 2017). It includes the Ramsar-listed Kooragang Nature Reserve, Wetlands Centre Australia and a large area of Coastal Wetlands. The Hunter Wetlands National Park is around 2 km south of the Site. Additional areas of Coastal Wetland protected under Chapter 2 of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) are located around 500 m to the south-west of the Site. An area of LEP-listed wetlands is located adjacent to and along the southern boundary of the Site. All of these wetlands are interconnected by a network of tributaries across the Hunter River estuary. These wetlands, and their location in relation to the Project Area, are shown in **Figure 6.4-2**.

Water quality

The Hunter River has historically been subjected to significant industrial water pollution since the regulation of industrial waste did not exist before the 1970s. Untreated surface water discharge including acids, phenols, ammonium, cyanide, and heavy metals were discharged into receiving environments as common practice. Stricter regulations were introduced post 1970 by the EPA to regulate industrial discharges from large premises.

An estuary wide water monitoring program intending to gain insight into industrial pollution and its impact on the health of the Lower Hunter River estuaries (Swanson *et al.,* 2017) was reviewed to gain understanding of the baseline water quality of the Lower Hunter River. The water quality results from this program were compared against the ANZECC water quality grades and guidelines.

The main findings of the water monitoring program show that current background levels for chlorophyll-a, turbidity, ammonia, phosphate, and nitrate all generally exceed the recommended trigger values for the Lower Hunter River estuarine system. Water quality gradings also shows that the middle estuary generally has a 'fair' water quality rating, while water quality conditions are slightly more improved in the lower estuary, with a 'good' water quality rating.

The salinity of the lower Hunter River based on existing water quality tests are approximately 33 to 35 parts per thousand (ppt) due to regular tidal interactions.

Surface water and drainage

Local drainage features across the Project Area and surrounding locality are shown in **Figure 6.4-3.**

The natural ridgeline within the Site is a defining drainage feature, dividing the Site into a northern and southern half. In the northern half, surface water drains toward the northern corner, while in the southern half, surface water drains to the southern boundary of the Site.

Within the Project Area, drainage infrastructure is limited. On the Site, surface water runoff moves as shallow sheet flow intercepted by small drainage channels feeding into one of two small dams. When these dams are full, surface water continues to flow as sheet flow to the next drainage channel. Three major discharge points at the Site include (as shown on **Figure 6.4-3**):

- Northern discharge point
- Southwestern discharge point
- Southeastern discharge point.

The receiving environment of the surface water runoff from the above discharge points include the LEP-listed wetlands along the southern boundary of the Site or Hunter River flood plains, which eventually drains into the Hunter River.

Flooding

The Site is not affected during the following modelled rain events: 10% annual exceedance probability (AEP), and 1% AEP. It is important to note, however, that the southern portion of the Site is impacted by flooding during the Probable Maximum Flood (PMF) event. Flooding of the southern portion of the Site can occur in three ways:

- mainstream flooding (refer to **Figure 6.4-4a**)

- local overland flooding (refer to **Figure 6.4-4b**)
- or a combination of both (refer to **Figure 6.4-4c**).

A combination of both mainstream flooding and local overland flooding is considered the worst-case scenario. These scenarios are summarised in Section 5.7 of **Appendix L (Surface Water and Flooding Assessment)**.

Groundwater aquifer

The Project Area is located within the Hunter Valley alluvial aquifer formation, which is typically characteristic of clays, silts, sands, and gravels (Aurecon 2019, Environmental Strategies 2018, Coffey 2012 and GHD 2018). The water table within this aquifer is generally shallow and very responsive to flooding and rainfall.

The Tomago Sandbeds consist of highly permeable fine-grained sands underlain with impermeable clay and rock (Aurecon, 2019). The proposed transmission corridor is located above this aquifer and falls within the same groundwater catchment zone as the Ramsar-listed Kooragang Nature Reserve, being the Tomago Groundwater Source catchment zone.

Previous investigations determined that groundwater would likely be encountered above bedrock, between 1 mbgl and 5 mbgl – especially towards the lower, southern corner of the Site (Aurecon, 2019c & Aurecon, 2019e). Groundwater monitoring wells established for the NPS project identified low flow rates of groundwater, with a seepage rate of around 2 m per annum. Contour maps of regional groundwater produced by Woolley *et al.* in 1995 indicated groundwater within the Project Area flows to the north-northeast toward the Hunter River.

Groundwater users

The Lower Hunter River region has several drinking water catchments (DWC) where water is harvested. The DWC include rivers, dams and groundwater systems. The transmission connection corridor between the BESS and either the 132 kV or 330 kV substation is located within the Tomago Sandbeds DWC, which is a groundwater system or aquifer consisting of a clay/rock layer of fine sand. Water is stored above the impermeable clay/rock base within the sandy layer, from which water can be extracted. This aquifer acts as back-up drinking water to the nearby Grahamstown Dam providing an important source of water for the Lower Hunter River region, supplying up to 20% of annual consumption (Hunter Water, 2017).

Previous investigations completed by Aurecon (2019) identified 35 registered groundwater bores within 1 km of the Site (refer to **Figure 6.4-5**). Geological information from the nearest borehole (GW201068) indicates the top layer of sand depth is 8 m below natural ground level (bngl) and is underlain by clay down to 20 m bngl. This is typical of the Tomago Sandbeds Aquifer.

Developments located within or close to groundwater systems need to consider the possible challenges to these water sources, such as:

- Sand is highly permeable and consequently, any spills or contamination could move through to the groundwater table quickly in the form of pollutant plumes
- Lateral groundwater movement through sand can be rapid, thereby spreading any contamination and threatening drinking water supplies, even if pollution is far from the extraction bores
- Increasing areas of impervious surfaces interfere with aquifer recharge as well as increase surface water runoff which could carry contaminants.

All developments located within a DWC are required to demonstrate a Neutral or Beneficial Effect (NorBE) on water quality (WaterNSW, 2022), through the use of vegetation, erosion and sediment control, water sensitive urban design (WSUD), and safe management of potentially contaminating or hazardous materials or goods.

Groundwater dependant 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 and existing assessments (Aurecon, 2019). Previous investigations categorised the Project Area as a moderate potential GDE (refer to **Figure 6.4-5**) featuring Coastal Dune Dry Sclerophyll forests that rely on groundwater availability (Aurecon 2019c & Aurecon 2019e).

Surrounding the Project Area, the Hunter River is classed as high potential GDE and the LEP listed wetland is classed as low potential GDE. Refer to **Section 6.4** for further information regarding GDEs.

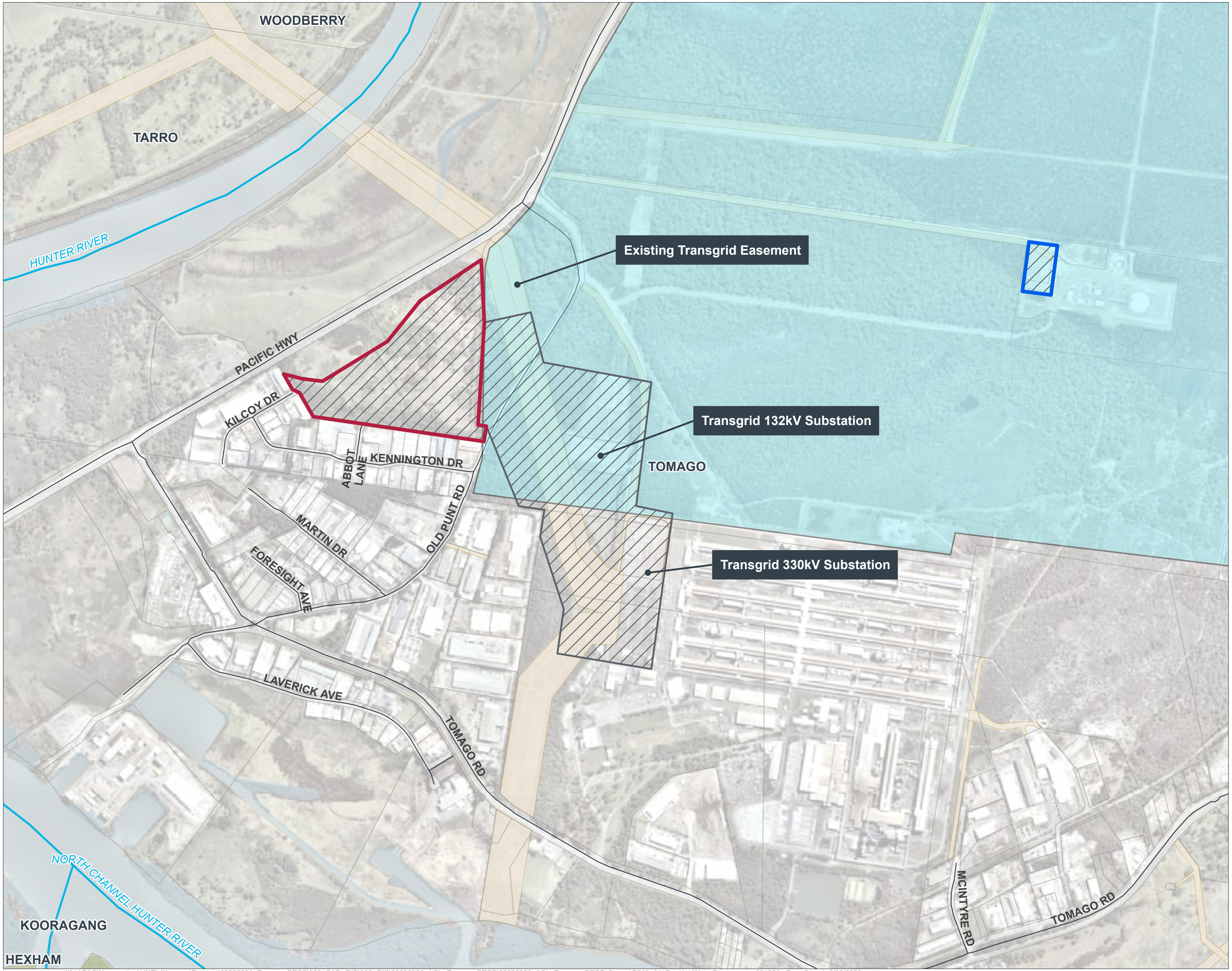
Groundwater quality

Groundwater quality has been established by reviewing the NPS project monitoring results from Environmental Strategies (2018) and other groundwater sampling programs for the NGSF (Coffey, 2011). These studies measured temperature, reduction oxidisation potential (redox), dissolved oxygen (DO), electrical conductivity (EC), pH and contaminants of potential concern (CoPC). The results of groundwater monitoring in the areas surrounding the Project Area are summarised in **Table 6.4-1**.

Table 6.4-1: Summary of existing groundwater monitoring programs

Site	Summary of findings
NPS (Environmental Strategies, 2018)	• CoPC were detected in the Areas of Environmental Concern (AEC) and within parts of the Project Area (discussed further in **Section 6.5**) • High concentrations of copper were detected in groundwater samples within the eastern area of the Site (in both background and AEC samples). As such, copper was inferred to be naturally elevated in the Site groundwater • All metals apart from nickel were found to be below the groundwater assessment criteria (GAC) outlined in the NEPM 2013 • EC levels observed indicated the groundwater is fresh to brackish • pH is low ranging 3.4 to 5.3 indicating acidic groundwater conditions.
NGSF (Coffey, 2011)	• Chromium levels were detected exceeding the Fresh Water Criteria and zinc levels were detected exceeding the Fresh Water and Marine criteria. The remaining parameters tested below the GAC, indicating a relatively pristine environment • EC levels observed indicated the groundwater under the NGSF is fresh • pH is low ranging 3.4 to 5.3 indicating acidic groundwater conditions.

The difference in groundwater results suggest the difference in groundwater quality profiles between the proposed NPS site and the NGSF site, and by extension, also across the Project Area.



AECOM

N

0 200 400 m

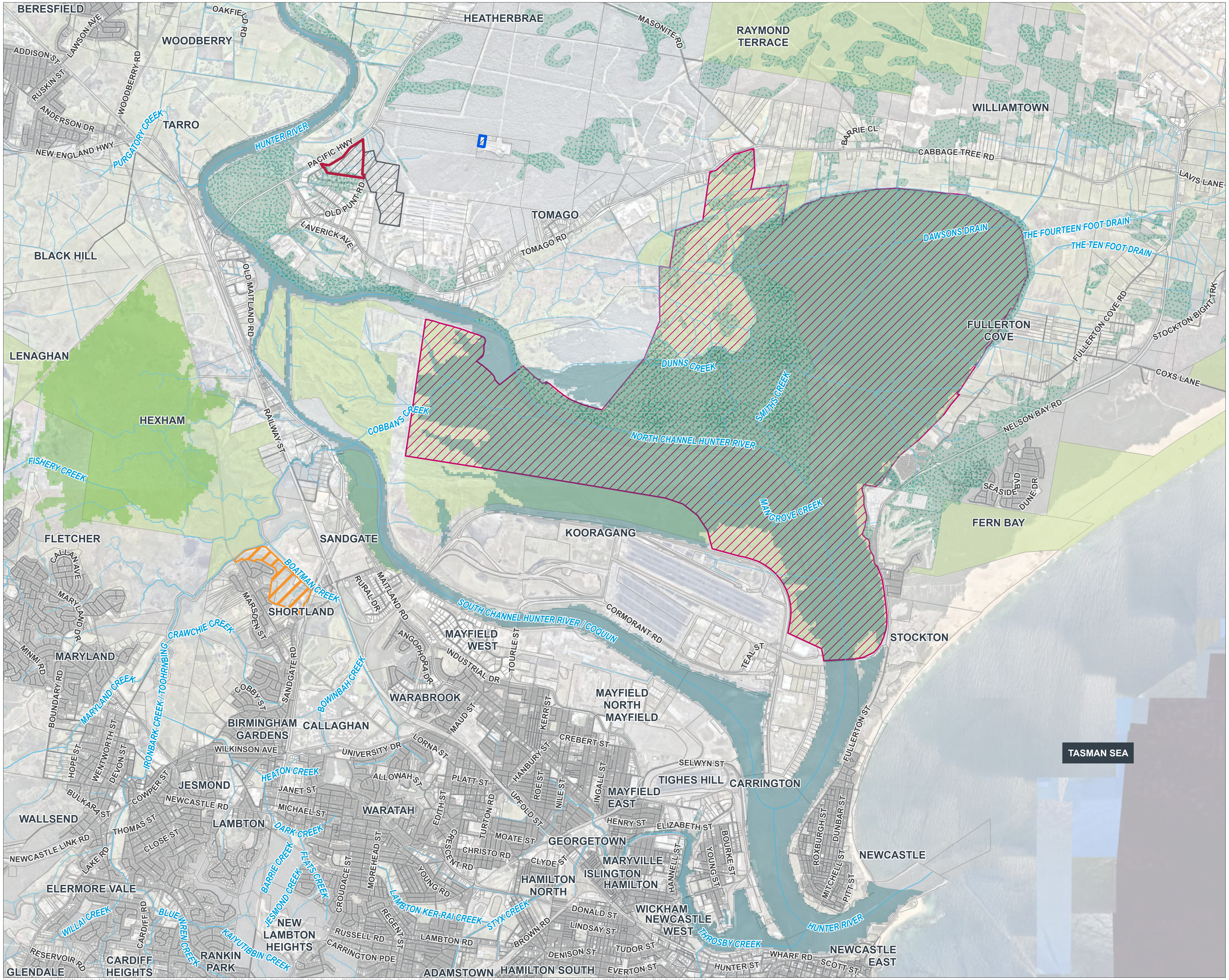
Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Hunter Water Drinking Water Catchment
- Water Body
- NPWS Reserve
- Easement
- Cadastral Boundary
- Watercourse
- Road

FIGURE 6.4-1: DRINKING WATER CATCHMENT

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_2.aprx\G010_01_DrinkingWaterCatchments_221223 Date Saved: 6/06/2023



AECOM

0 1 2 km

Legend

- The BESS Site
- Project Area
- Proposed Construction Laydown Area
- Cadastral Boundary
- Wetlands
- Estuarine Wetland
- Floodplain Wetland
- NPWS Reserve
- Watercourse / Flow Path
- Road

RAMSAR Wetlands

- Kooragang Nature Reserve
- Wetlands Centre Australia

FIGURE 6.4-2: WATERCOURSES, WETLANDS AND WATERBODIES

Source: Nearmap, 2023.

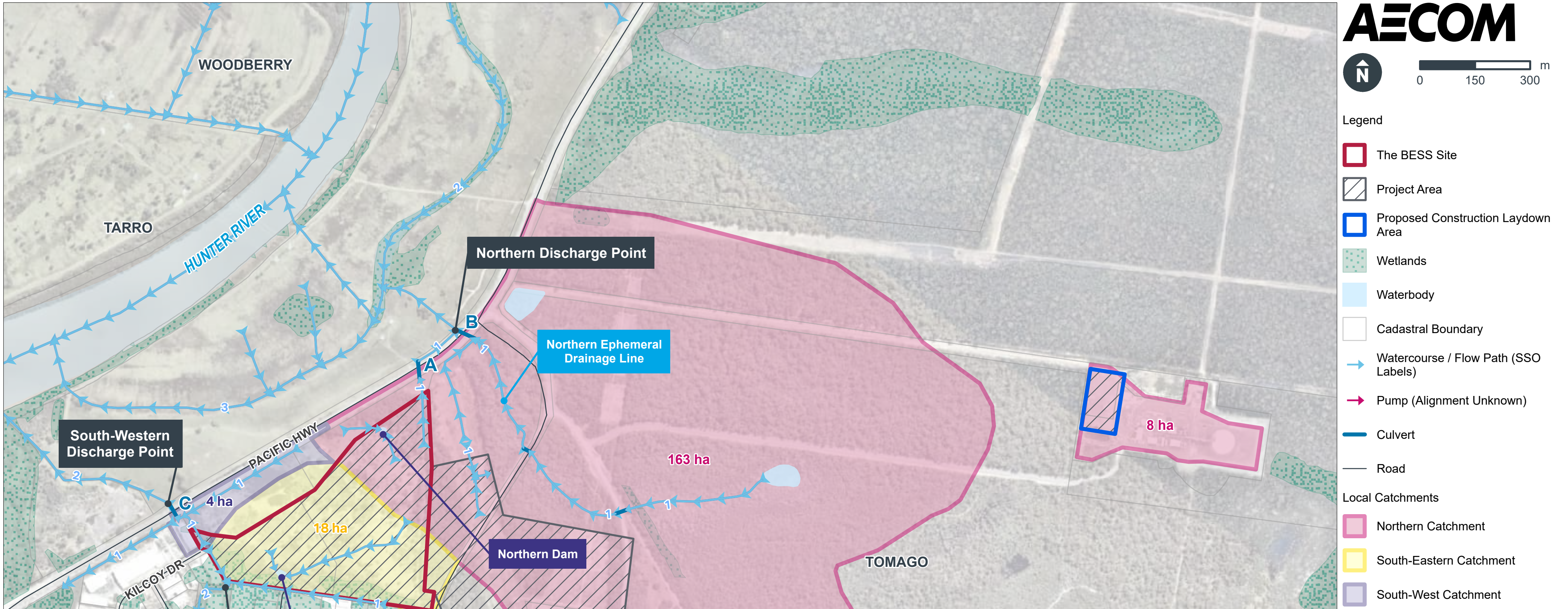


FIGURE 6.4-3: EXISTING SITE DRAINAGE

Source: Nearmap, 2023.

\\na.aecomnet.com\lfs\APAC\Newcastle-AUNTL1\Legacy\Projects\60696986_Tomago_BESS\900_CAD_GIS\920_GIS\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_Water.aprx\G003_02_A4L_Water_ExistingSiteDrainage_230817 Date Saved: 17/08/2023

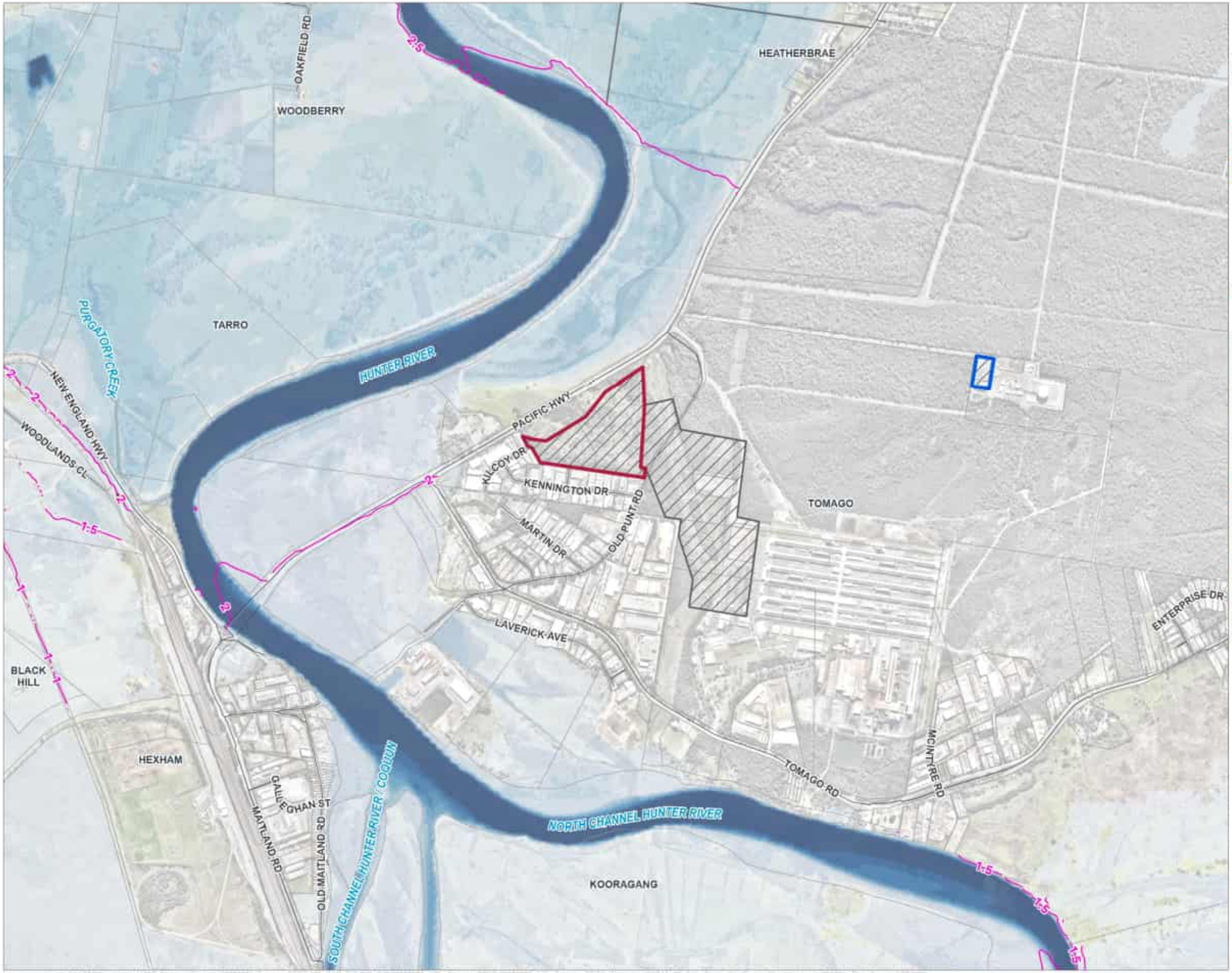
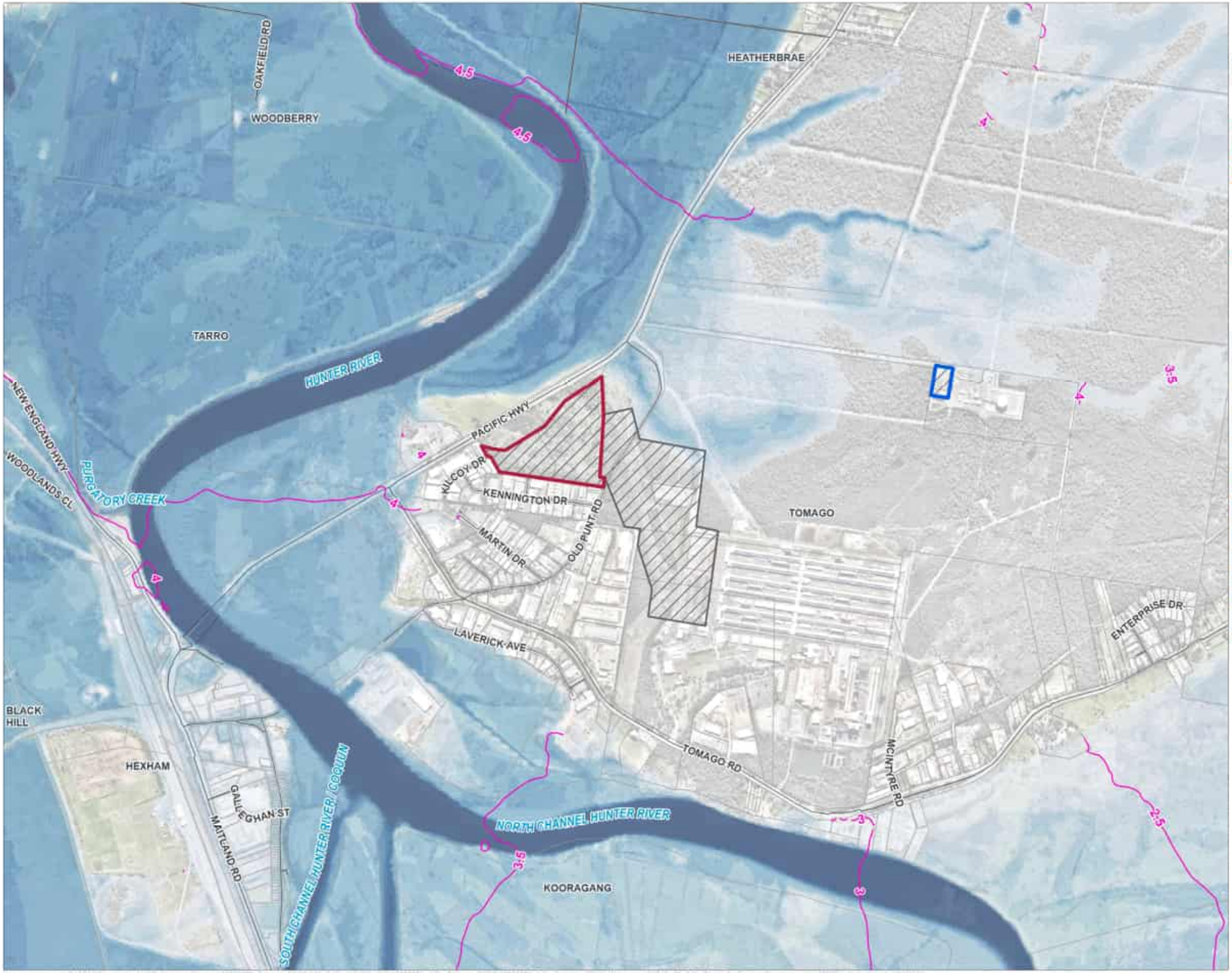


FIGURE 6.4-4A: EXISTING FLOODING LEVELS 10% AEP



AECOM

0 300 600 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- 0.5m Flood Level Contour (mAHD)
- Road

Depth of Inundation (m)

- ≤ 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2
- 2.0 - 2.5
- 2.5 - 3
- 3.0 - 3.5
- 3.0 - 4
- 4.0- 4.5
- 4.5 - 5
- > 5.0

FIGURE 6.4-4B: EXISTING FLOODING LEVELS - 1% AEP

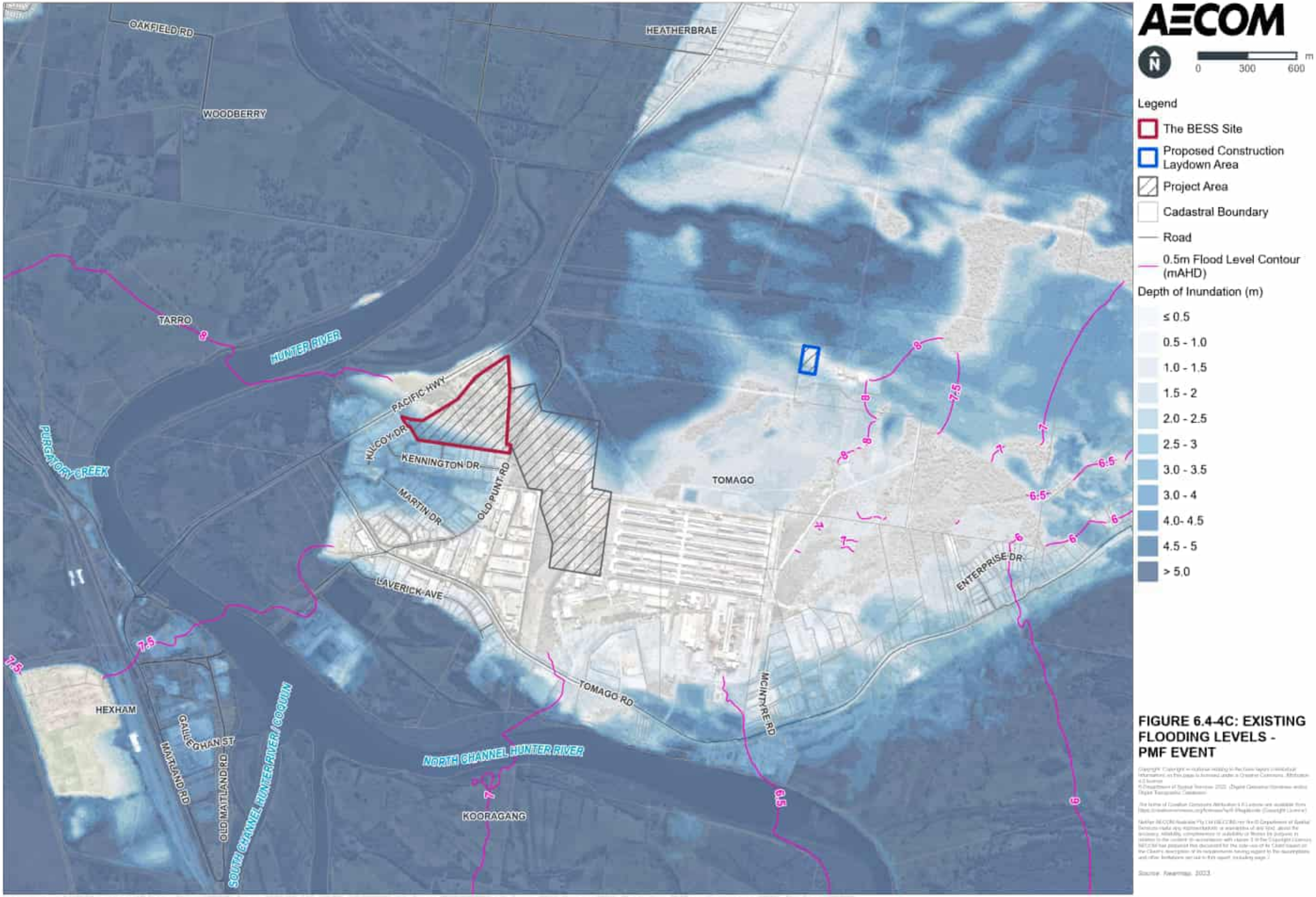


FIGURE 6.4-4C: EXISTING FLOODING LEVELS - PMF EVENT

Source: Nearmap, 2023

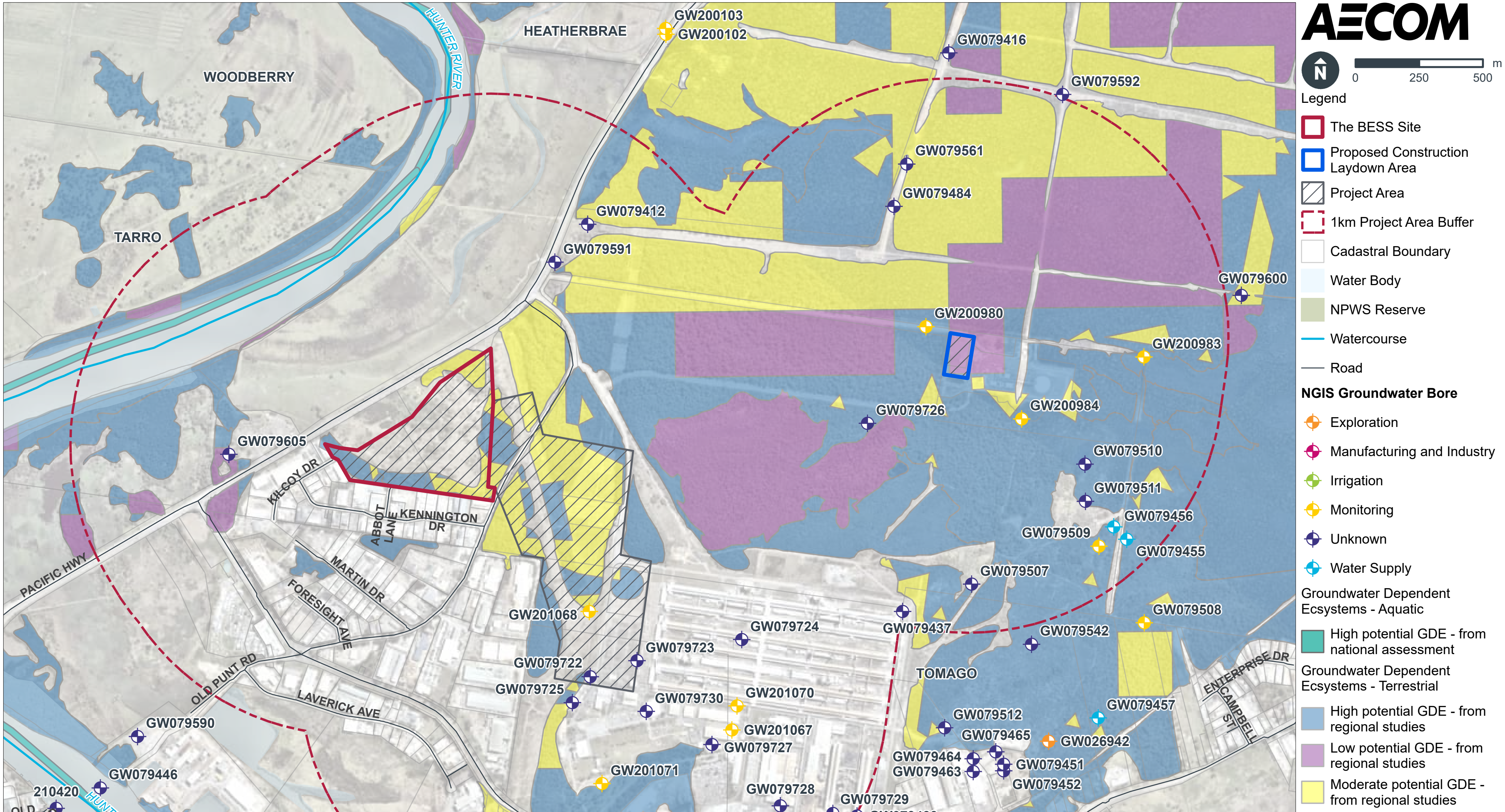


FIGURE 6.4-5: EXISTING BOREHOLES AND GDES NEAR THE PROJECT

Source: Nearmap, 2023.

6.4.4 Potential impacts

The following sections summarise the potential surface water, groundwater and flooding impacts for construction and operation of the Project.

Construction

Surface water drainage

As detailed in **Section 6.4.3**, surface water flows over the Site drain to three separate discharge points. The Site would discharge to the northern and southeastern discharge point. The catchment area that drains to the south-western discharge point is located outside of the Project Area and would not likely be impacted by the Project.

Drainage across the northern and southeastern catchments are likely to be altered by the Project during construction activities. Potential impacts include:

- Increased surface water runoff due to an increase in impervious area/compacted surfaces
- Changes to flow rates and volumes entering downstream drainage systems
- Scouring/erosion of natural waterways and wetland areas by increasing flow rates and volumes, channelising surface water (where it was previously shallow, sheet flow), and reducing vegetative cover
- Obstruction or changes in local drainage paths due to the construction of access roads and due to construction activities within the construction footprint.

Given the transmission connection corridor generally runs along the natural ridgeline and would be confined to a narrow, longitudinal footprint, it is considered unlikely that construction works along the proposed alignment would significantly alter existing drainage paths, obstruct flows, or increase runoff.

Surface water quality

Potential impacts to water quality as a result of the construction of the Project could include:

- discharge of sediment laden runoff from exposed surfaces and stockpiled materials into receiving waterways, resulting in increased turbidity and deterioration of water quality
- increased concentrations of dissolved nutrients (nitrogen and phosphorous) in surface water runoff from exposed surfaces and stockpiled materials, which has the potential to stimulate the growth of nuisance plants, algae, and cyanobacteria in downstream watercourses
- leaks or spills of chemicals, heavy metals, oils, and petroleum hydrocarbons during the use and operation of machinery, resulting in impacts to downstream ecosystems if transported via surface water runoff
- leaching and groundwater migration of chemicals, heavy metals, oils, and petroleum hydrocarbons into downstream waterbodies and wetlands due to leaks/spills
- tannin leachate from clearing and mulching, resulting in eutrophication, reduced pH levels and visual aesthetic issues
- accidental release of alkaline concrete wash water, which may cause localised soil, surface water or groundwater contamination and possible downstream ecological impacts
- construction wastes such as concrete, plasterboard, timber, and contaminated soils spreading across downstream waterways and wetlands via surface water runoff
- contaminated water runoff from excavations and/or stockpiles, or the release of contaminated water from excavations following dewatering due to the presence of contaminated or acid sulfate soils, altering pH levels, water quality and causing further soil contamination and possible downstream ecological impacts.

The risk of surface water contamination during construction would be increased in the event of an extreme flood (between 1% AEP and probable maximum flood (PMF) event), where flood waters may inundate internal drainage systems and storage facilities and mobilise contaminants into downstream waterways. However, with the implementation of the mitigation measures recommended in **Section 6.4.5**, the probability of contamination to receiving waterways would be low.

Sediments that could be mobilised from construction areas with the potential to enter the receiving waterways could cause adverse impacts to water quality. Sediment controls would be implemented during construction of the BESS and installation of the transmission connections. A Water and Soil Management Plan (WSMP) would form part of the Construction Environmental Management Plan (CEMP) for the Project. This WSMP would include a specific Erosion and Sediment Control Plan (ESCP) for the construction works at the Site to show where specific controls would be employed to help ensure that erosion is minimised, and nearby watercourses are protected. The WSMP would also include:

- a Dewatering Procedure to control the process for removing water from excavations
- a Spill Response Procedure containing measures to help prevent spills and leaks and manage them if they occur.

If the detailed design for the Project confirms that construction activities require excavation 2 m below existing ground level then the WSMP would also include an Acid Sulfate Soil Management Plan (ASSMP) to identify and manage potential impacts related to naturally occurring Acid Sulfate Soils.

With the implementation of the mitigation and management measures described in **Section 6.4.5**, impacts to the receiving waterways would be neutral or beneficial to the water quality of the receiving waters.

Flooding

Based on existing flood maps obtained from the Williamtown Salt Ash Floodplain Study and Plan, the Site and construction footprint for the Project would be located outside flood events up to and including the 1% AEP event, with allowance for climate change (BMT WBM, 2017).

Peak flood levels surrounding the Site reach up to 4.6 mAHD along the southern boundary and 5.0 mAHD along the northeastern boundary in the 1% AEP event. Given natural elevations across the Site remain above 5.5 mAHD the construction activities for the BESS would be set above the surrounding flood levels (with sufficient freeboard) in all events up to and including the 1% AEP event. The transmission line corridor would also be set above these flood levels and located a safe distance away from flood extents.

The laydown area, located at the northwestern corner of the NGSF, is also outside of the 1% AEP flood extents. Finished surface levels across the laydown area are set above an elevation of 6.2 mAHD. This achieves more than 1 m freeboard to the adjacent 1% AEP peak flood levels.

As the BESS, transmission line corridor and NGSF laydown area are located outside of the 1% AEP flood extents, there would be no earthworks within potential flood zones, and no impact on existing flooding conditions from construction works. Potential impacts on existing flooding conditions from construction works is considered unlikely.

Groundwater

Construction of the Project may result in groundwater interference and groundwater quality impact such as:

- localised decreases in groundwater levels due to a reduction in recharge to groundwater aquifers by increasing the impervious area
- potential contamination of groundwater through exposing the groundwater table to potentially contaminated surface soils or spills and leaks entering the ground.

Localised perched water may be encountered during excavation activities for the Project; however, it is not anticipated the expected shallow excavations would result in a long-term impact on regional groundwater levels. Installation of the transmission connection is unlikely to have a significant impact on existing groundwater levels due to the elevated topography along the transmission connection corridor.

The Project would minimise construction impacts to groundwater by implementing the following controls and mitigation measures:

Horizontal Directional Drilling (HDD) may be used to construct the transmission connection for the Project. Impacts to the quality of groundwater arising through the use of 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 groundwater 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 near the HDD 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 of offsite at a facility that is licensed to receive the fluid.

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 materials such as chemicals, fuels and oils 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.

During construction, groundwater would be managed in accordance with the Soil and Water Management Plan. Dewatering of water accumulated in trenches or excavated areas including groundwater, is unlikely to adversely impact the groundwater resource due to the short-term nature of the construction. This work would be completed in line with the Dewatering Procedure. Potential impacts from spills and leaks would be managed in line with the Spill Response Procedure. The mitigation measures proposed in **Section 6.4.5** would avoid or reduce potential impacts to groundwater.

Changes to the groundwater level and quality could potentially impact the groundwater used by GDEs. As groundwater is not proposed to be extracted for use in construction and impacts to groundwater quality would be minimised with appropriate safeguards, no significant impacts to groundwater users or GDEs are anticipated during the construction of the Project.

Water use

Water required for the construction of the Project would be supplied by the construction contractor. It is assumed that a temporary pipe connection to the Council's municipal water supply system, provided by Hunter Water Corporation, would be established until the permanent connection is completed. This would be completed during early works to facilitate construction. This connection would provide the primary means of supply.

Construction works would require water supply for a range of activities including excavation, dust suppression, drilling, material preparation and use, and amenities for the construction workforce.

Construction areas and access tracks would also be watered to suppress dust, at a frequency that is dependent on wind and rainfall conditions.

The water supply demand during construction would be minimal in comparison to the overall demand across the municipal supply system. Water would be extracted from the municipal supply system as a primary means of supply, up to acceptable limits, and additional demands would be met through the secondary means of supply, via onsite delivery of water. Construction demands are, therefore, expected to have negligible impact on the overall demand across the municipal supply system.

No connection to the existing, local sewerage network is available. As such, sewage from construction amenities would be collected and trucked offsite for treatment at a licensed facility. There would, therefore, be no impact on the existing capacity of the local sewerage network.

Operation

Surface water quality and drainage

It is anticipated that the Project would introduce approximately 9.7 ha of newly impervious surface across an area that was previously dominated by grassed and vegetated surfaces. The Project is also likely to alter the catchment areas for the northern and southeastern discharge points, resulting in the redirection of 1.8 ha of surface water flow from the northern discharge point to the southeastern discharge point. Without management, potential drainage impacts during operation of the Project could include:

- increased surface water runoff due to an increase in impervious area/compacted surfaces
- scouring/erosion of natural waterways and wetland areas by increasing flow rates and volumes
- changes to flow rates and volumes entering downstream drainage systems.

There will be an increase in impervious area, discharge rate and volume, the impact of which will be mitigated so as not to overload the downstream drainage systems which, if not managed could lead to flooding within other properties or an increased frequency of overtopping roads and the Pacific Highway. The nature of the discharge may also be altered from sheet flow to concentrated flows at both the northern and southeastern discharge points. Large channelised flows may direct more surface water to existing channels or culverts, which may also scour or encourage sedimentation in the process.

The water quality of Site discharges may also be impacted by the introduction of the Project and the increase in impervious surface. Without appropriate mitigation measures, the development of the BESS may result in an increase in contaminates and litter in Site runoff that would discharge to the receiving waterways. The following potential water quality impacts could occur without the implementation of appropriate mitigation measures such as:

- Storage, transport, use and handling of diesel fuel, chemicals, oils, greases, solvents, demineralisers, and firefighting products onsite has the potential to introduce surface contaminants to surface water runoff
- Runoff from roads, carparks and hardstand areas may contain low to medium levels of gross pollutants, hydrocarbons, metals, suspended sediments and nutrients
- Erosion, scouring, and sediment mobilisation from surfaces exposed to large, fast-moving flows at designated discharge points
- Leaks/spills due to overflow or failure of storage tanks and septic systems.

In addition to these potential impacts the NorBE Guidelines (Water NSW, 2022) require a 10% improvement in the pollutant loads for the proposed operation of the Project compared to the existing operation.

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 (Water NSW, 2022). 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. This bioretention system would be used in conjunction with other treatments such as rainwater tanks, interceptors, and gross pollutant traps.

MUSIC modelling for the Project was carried out in accordance with NorBE Guidelines to demonstrate compliance with the NorBE requirements through the use of the treatment train. The outcomes of this modelling are presented in **Table 6.4-2**. The results indicate that the inclusion of a biofiltration system and other treatments are sufficient to achieve a reduction of pollutant loads, so that the pollutant loads resulting from the Project would be at least 10% less than the existing scenario and achieve NorBE objectives.

Table 6.4-2: Developed Area - MUSIC modelling pollutant load results

Scenario/ Catchment	Annual Pollutant Loading (kg/yr)			
	Total suspended soils	Total phosphorus	Total nitrogen	Grass pollutants
Existing	3610	8.2	69.5	242
Proposed	995	6.2	60.2	0
Difference	-2,615	-2	-9.3	-242
% Improvement	**72**	**25**	**13**	**100**
Neutral or beneficial effect (Y/N)	**Y**	**Y**	**Y**	**Y**

Other surface water quality treatment measures proposed for the operation of the Project to avoid and mitigate surface water quality and drainage impacts include:

- an internal drainage system, including:
  - an underground (piped) drainage network with capacity to capture and convey surface water runoff in frequent storm events (typically the 10% AEP or larger)
  - an overland drainage network to safely convey flows exceeding the capacity of the underground drainage network, in all events up to and including the 1% AEP event
  - permanent catch drains and/or diversion channels to keep external, ‘clean’ water separate from ‘dirty’ runoff generated within the Site.
- water sensitive urban design (WSUD) measures across the Site to treat surface water flows and promote infiltration
- installation of a combined oil and grease interceptor/gross pollutant trap to facilitate the removal of most entrained oils and greases and suspended solids carried by stormwater runoff
- outlet control measures such as scour protection and energy dissipators to prevent scouring where the stormwater system discharges from the Site
- the implementation of a water quality monitoring program to monitor discharge from surface water runoff control facilities to help identify, manage and respond to impacts to water quality.

During operation, surface infrastructure associated with the transmission connections may include:

- access covers to cable inspection pits which are less than 1 m^2 in size
- overhead transmission lines and associated infrastructure
- a combination of both underground and overhead infrastructure.

As the access pits are small and overhead transmission connections are above the ground, it is unlikely that the installation of this infrastructure would significantly alter the quality or flow of surface water runoff during operation.

As noted above, potential surface water quality and drainage impacts would be avoided and minimised through the implementation of management and mitigation measures identified in **Section 6.4.5**. These measures and monitoring approaches would be documented within an Surface Water Management Plan (SWMP) that would form part of the Operational Environmental Management Plan (OEMP). The operation phase SWMP would include a Spill Response Procedure.

Flooding

The main flood related impacts resulting from the Project include:

- the proposed infill of a small area of the southwestern part of the Site would reduce the PMF flood storage by 10,000 m^3 (being a 7% reduction in flood storage across the Site). This change in flood storage is considered negligible across the approximate 4 km floodplain in this location
- the proposed infill of the southwestern corner may lead to localised flooding impact within the Site and surrounding areas. This may impact upon local roads and infrastructure
- the increased impervious area would increase peak discharge rates at the Site during a 1% AEP event by 1 m^3/s. This increase is considered negligible in comparison to total flow rates along the Hunter River which is calculated to be 9,400 m^3/s (BMT WBM, 2017)
- associated infrastructure, including transmission lines, would not be impacted by flooding in all events up to and including the PMF event, as the associated infrastructure is positioned along the natural ridgeline, which is set above peak flood levels
- access routes including the Pacific Highway, Old Punt Road and Tomago Road may be partially inundated during the 1% AEP and events larger than the 5% AEP event, potentially blocking safe evacuation routes from the Site during a significant flood event.

With the implementation of appropriate safeguards identified in **Section 6.4.5**, the risk of flood impacts resulting from the Project are not considered significant.

Groundwater

The operation of the Project is not anticipated to impact on groundwater except for an increase of 9.7 ha of impermeable surfaces on the Site. This may result in localised decreases in groundwater levels due to a reduction in recharge to groundwater aquifers. This impact is anticipated to be minor given the size and undeveloped nature of the overall catchment area.

Typical operations at the BESS may involve the use or handling of chemicals, and oils for maintenance activities. Typically, these activities would be conducted in bunded areas, or within areas that have spill containment and management. As such, it is unlikely that spills and leaks would occur that would impact groundwater. Where accidental spills occur, appropriate measures would minimise the risks to groundwater (refer to **Section 6.4.5**). These measures would be documented in the operational phase Spill Response Procedure.

Water use

During operation, potable water would be supplied directly to the Site from a new connection to Council's municipal supply system on Old Punt Road. This would service the Site office building and other amenities. It would also supply water to the fire services system. The battery enclosures do not require water for cooling. Cooling can be achieved through an electrically operated HVAC system.

The water supply demand for the Site would be minimal as it would be operated remotely, with staff only required onsite periodically. It is, therefore, likely to have a negligible impact on the overall demand across the municipal supply system.

Amenities, waste drains (within the ancillary infrastructure) and sewage would be collected and trucked offsite using a pump out system. There would be no new connection to the reticulated sewerage network. The Site would, therefore, not have an adverse impact on the existing capacity of the local sewerage network.

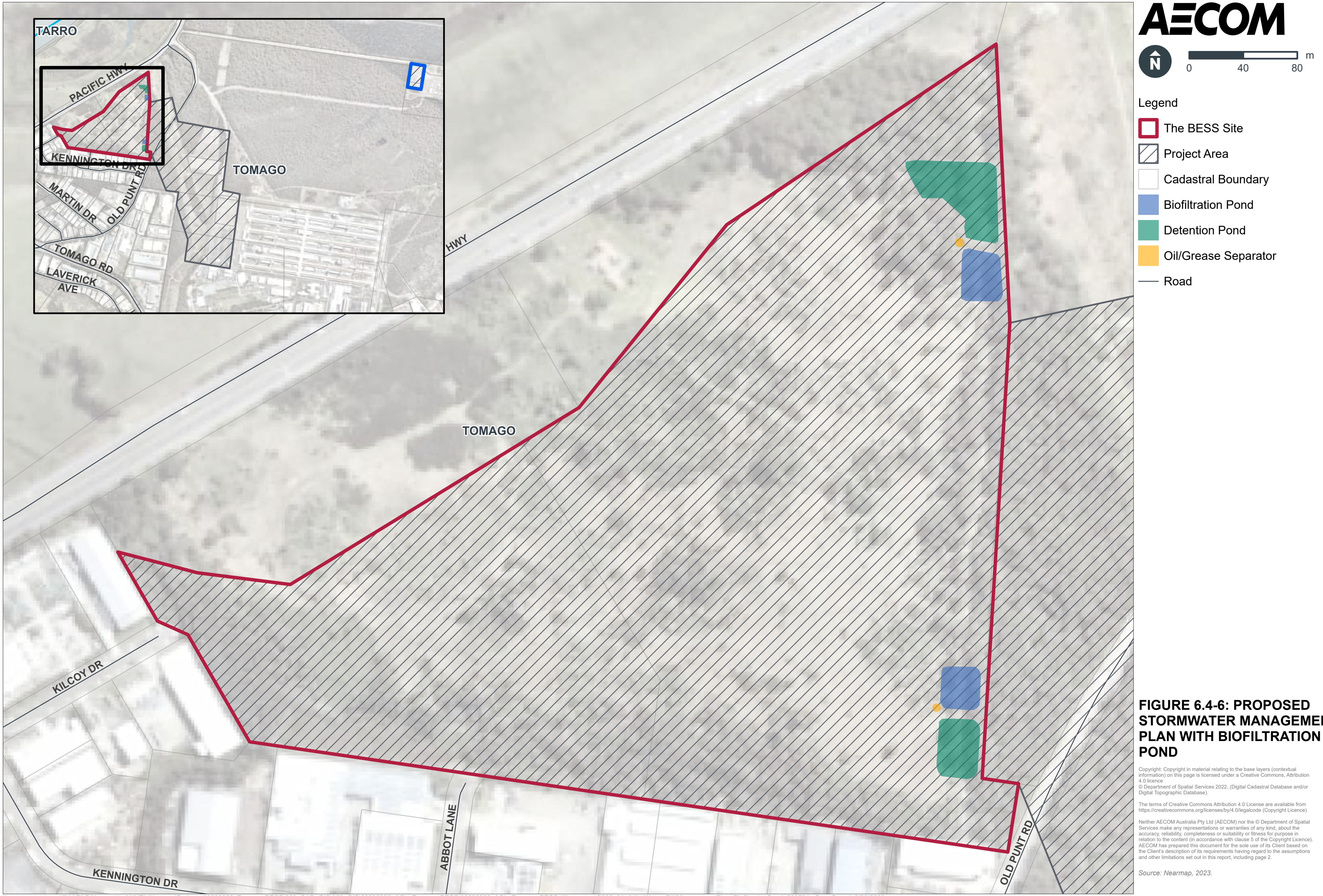


FIGURE 6.4-6: PROPOSED STORMWATER MANAGEMENT PLAN WITH BIOFILTRATION POND

Source: Nearmap, 2023.

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6.4.5 Mitigation measures

To mitigate potential impact of the Project on surface water and groundwater receptors and to avoid or reduce impacts related to flooding, various measures have been identified in **Table 6.4-3**.

Mitigation measure in other chapters that are relevant to the management of surface water, groundwater and hydrology impacts include:

- **Section 6.2** Hazards and risk
- **Section 6.3** Biodiversity
- **Section 6.5** Soils and contamination
- **Section 6.16** Waste management.

Table 6.4-3: Mitigation and management measures – Surface water, groundwater and flooding

ID	Mitigation Measure	Timing
W-1	A SWMP would be prepared as part of the Construction Environmental Management Plan (CEMP). It would include a framework for the management of soils and water during construction of the Project. The construction phase SWMP would include: 1. Surface water management strategy for containing and safely conveying surface water runoff around construction works 2. Erosion and Sediment Control Plan/s 3. Dewatering Procedure (detailed below) 4. Spill Response Procedure (detailed below) 5. Surface water discharge monitoring requirements 6. Surface water control monitoring requirements.	Pre-construction, Construction
W-2	Construction phase monitoring would occur at stormwater control measures to help satisfy regulatory requirements and identify if water quality issues are occurring as the result of construction works. Monitoring would occur upstream and downstream of the construction works. Monitoring would occur monthly and as soon as practical following rainfall events. As a minimum the following locations would be monitored during construction: 1. Northern ephemeral drainage line and southern industrial precinct channel, as designated 'background areas' 2. Sediment basins 3. Discharge points from the Site. The following parameters would be monitored: 1. pH 2. Total suspended solids (TSS) 3. Turbidity (NTU) 4. Electrical conductivity (EC) 5. Dissolved oxygen (DO) 6. Oils and grease (visual assessment).	Pre-construction, Construction

ID	Mitigation Measure	Timing
W-3	The SWMP and ESCP will be developed in accordance with the Blue Book (Landcom, 2004). Measures to be included in these plans will include: 1. Designated vehicle access tracks to reduce the risk of soil disturbance onsite and vibration grids to prevent the transportation of sediments offsite 2. Minimising the area of exposed and unstable ground surfaces by resealing or revegetating surfaces as soon as practicable 3. Clean water diversion drains to direct external, 'clean' surface water around the Site and prevent it from mixing with 'dirty' surface water runoff generated by the construction site 4. Early installation of necessary permanent drainage culverts, under access roads or wherever drainage paths are obstructed to prevent localised ponding/flooding across the site 5. Locating stockpiles and other loose materials at localised high points, away from drainage paths, and protecting these stockpiles from rainfall with geofabric or other equivalent measures 6. Installation of sediment fences, sediment traps, and contour berms to slow down flow rates and capture and contain mobilised sediments and gross pollutants carried by Site runoff 7. Scour protection and energy dissipaters along steep channels and at discharge points 8. Sediment basins near both northern and southern discharge points to store, test and manage surface water from disturbed areas onsite 9. Reuse of water stored within sedimentation basins for dust suppression and irrigation purposes.	Pre-construction, Construction
W-4	A Dewatering Procedure would be developed to control the process for removing water from excavations, storing this water, testing water (where applicable) and either releasing water into the environment or removing it from Site. The procedure will outline the testing methods, treatment options and water quality requirements to discharge the water into the receiving environment.	Construction
W-5	An Emergency Response Plan (ERP) would be prepared for the Project. The ERP would include procedures for the protection of personnel and infrastructure during extreme flood events, up to the PMF event. This plan will include: 1. Roles, responsibilities and communication procedures including emergency contacts, monitoring procedures for predicted rainfall and flood warnings 2. Requirements to monitor weather forecasts and flood warnings to enable flood preparedness procedures to be implemented ahead of potential flooding events 3. Site shutdown and flood preparedness procedures, to minimise harm to persons, plant and the environment. This would include: - Actions in the lead up to a potential flood - Actions at the time of a flood - Actions post-flood 4. Safe evacuation routes and procedures 5. Rescue procedures 6. Procedure for resuming operations 7. Reporting requirements and corrective actions.	Construction, Operation

ID	Mitigation Measure	Timing
W-6	The SWMPs for construction and operation will include a Spill Response Procedure to help avoid and manage spills of potentially hazardous substances during construction and operation. Separate procedures would be prepared for both construction and operational phases. Both procedures will include: 1. training and required personal protective equipment (PPE) requirements 2. measures for handling and storing chemicals and fuels 3. details of a program of regular inspections for spills, leaks or damages to bunds/sumps 4. spill response protocols 5. reporting procedures. Spill kits will be kept at the Site during construction and operation and close to worksites during the transmission connection installation.	Construction, Operation
W-7	The Site would include dedicated re-fuelling areas with bunded fuel and liquid storage areas to minimise the risk of potential losses of containment.	Construction
W-8	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). If the storage of liquids requires bunding, these bunded areas would have sufficient capacity, to be able to contain 110% of the volume of the liquid stored within the bund. Inspection and if required maintenance would be undertaken after significant rainfall events. Licenced contractors would be engaged to collect, transport and dispose of liquid hazardous materials, waste solvents, paints and hydrocarbon products to an appropriate offsite facility in accordance with relevant EPA guidelines.	Construction
W-9	Lined concrete washout areas would be established away from drainage paths and waterbodies. The washout capacity would be regularly checked before being used. The wash water would be left to evaporate, with dried concrete removed for recycling as required. Inspection of the capacity of the washout area and integrity of the liner would be undertaken prior to each use, and prior to rainfall events or site shut down. Wash water will be pumped out as required to maintain capacity or prior to rain events and disposed offsite as contaminated water.	Construction
W-11	If encountered, groundwater would be managed in accordance with groundwater provisions in the SWMP. These provisions would align with the Dewatering Procedure. Information and measures relating to groundwater within the SWMP will include: 1. Background groundwater quality and levels 2. Management of groundwater interference and dewatering 3. Groundwater discharge or reinjection criteria 4. Groundwater monitoring program during construction 5. Reporting requirements 6. Protocol for the investigation, notification and mitigation of identified exceedances of the groundwater quality criteria.	Construction, Operation

ID	Mitigation Measure	Timing
W-12	Any water encountered and abstracted from the Tomago Sandbeds aquifer during the transmission connection construction works would be managed in line with statutory and environmental requirements.	Construction
W-13	Sealed pavement areas should be used for refuelling and chemical storage areas to minimise the risk of spills infiltrating to groundwater.	Construction
W-14	If under-boring or Horizontal Directional Drilling (HDD) is required for the transmission connections, a Drilling Fluid Management Plan would be produced as part of the SWMP, to guide the environmental management of the HDD work. The drilling would be undertaken by an appropriately trained and experienced person. Should 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 minimise 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.	Construction
W-15	The transformers at the Site would be designed in line with the appropriate Australian Standards for power transformers and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Operation
W-16	A Surface Water Management Plan would be prepared as part of the Operational Environmental Management Plan (OEMP). It will include details on the required surface water management measures and monitoring requirements needed to manage surface water runoff within the Site and control the quality and quantity of surface water discharge into receiving environments. The plan would detail the final stormwater management approach and treatment train for the Project including the internal drainage system, bioretention system, interceptors, gross pollutant traps, scour protection and outlet control measures. The plan would include the water quality monitoring procedures to ensure the above measures can achieve the required level of treatment. The operational SWMP would also include: 1. appropriate methods for the disposal of contaminated waters at a licensed facility, including runoff generated during maintenance/cleaning activities and oily or contaminated water, to be tankered offsite and disposed of at an appropriate liquid waste facility. 2. A Spill Response Procedure that would cover: a. Fuel/chemical spill protocols - spill kits to be available and relevant workers are to be trained on response protocols b. A reporting procedure c. A register of all hazardous chemicals kept onsite.	Operation

6.5 Soils and Contamination

6.5.1 Overview

A Soils and Contamination Specialist Study (Contamination Assessment) was completed by Aurecon Australasia Pty Ltd (2019) for the NPS. The assessment included a review of contaminated materials and acid sulfate soils (ASS) in the Project Area, potential contamination risks to human health and the receiving environment, and mitigation measures to minimise potential risks. This study covers the majority of the Project Area, and it alongside the wider NPS EIS (Aurecon, 2019c), has been used to inform the soils and contamination assessment for this Project.

6.5.2 Methodology

The assessment of soils and contamination was undertaken in compliance, or with consideration to, the following relevant legislation and regulatory guidelines:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Contaminated Land Management Act 1997* (CLM Act)
- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- *Environmentally Hazardous Chemicals Act 1985* (NSW) (EHC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Port Stephens Local Environmental Plan 2013* (specifically, part 7.1 – Acid Sulfate soils)
- *Port Stephens Development Control Pla*n *2019* (specifically, part B3 Environmental Management Acid Sulfate soils)
- NSW EPA register of notified contaminated sites
- *State Environmental Planning Policy (Resilience and Hazards) 2021*
- *NSW Work Health and Safety Regulation 2017*
- *Protection of the Environment Operations (General) Regulation 2009*
- *Protection of the Environment Operations (Waste) Regulation 2005.*

The assessment included a desktop assessment of existing information and previous ground investigation reports (refer to **Section 6.5.3**). The aim of the desktop assessment was to assess the current environmental conditions of the Project Area, including soil types, land capability and potential historical contamination and undertake an assessment of potential impacts resulting from the Project related to soils and contamination.

The desktop assessment included:

- A review of publicly available Government land quality and environmental databases for soils, geology, hydrology, hydrogeology, ASS, and contaminated lands
- A review of historical contamination investigations for the Project Area, including the review of past reports to identify previous construction and operational activities relevant to soils and contamination.

These reviews were completed for the NPS site and the surrounding area to understand not only the ground conditions at the NPS site but also the features of the surrounding area. This broader review included the land within the Project Area.

A site walkover and inspection (including ground investigations) also informed the Contamination Assessment (2019). The site walkover investigated the following features:

- Surface terrain
- Surface condition
- Topography

- Vegetative cover
- Drainage pathways
- Contaminated land risk areas
- Surrounding land uses.

The site walkover was conducted for the NPS, which at the time, excluded a portion of the Project Area to the southeast. While this part of the Project Area was not inspected as part of the field survey completed by Aurecon (2019d), the broader desktop assessment of the surrounding area has confirmed the soil types and landscape, and is considered sufficient to infer the area maintains the same risk of contamination and ASS occurring as the adjacent area previously assessed for the purposes of the NPS.

6.5.3 Existing environment

An evaluation of the desktop assessment and site survey findings completed by Aurecon (2019d) has been summarised below.

Geology

The Project Area is located within the northern part of the Sydney Basin, a major structural basin containing thick PermoTriassic sedimentary sequences extending north from Batemans Bay to Port Stephens. The Newcastle 1:100 000 Geological Sheets 9232 (First Edition 1975) and the interactive geological map of NSW (accessed on 25 July 2023) indicates two geological units within the Project Area:

- Tomago Coal Measures (Pt)
- Quaternary Alluvial Soils (Qpb/Qa/Qv).

These geological units formed in the Permian and Pleistocene Quaternary periods respectively. The geology within these units typically comprises sandstone and siltstone, with underlying coal seams.

Soils and erosivity

A review of the NSW DPE Soil and Land Information online mapping system (eSPADE) identified that the Project Area is predominately situated across Beresfield and Tea Gardens (Variant a) soils. The Beresfield soils occupy mostly the centre of the Project Area, while the Tea Gardens (Variant a) soils are present along the north and northeast boundary. A third soil landscape, Millers Forest, covers a small portion of the Project Area to the south and southwest, as seen in **Figure 6.5-1**.

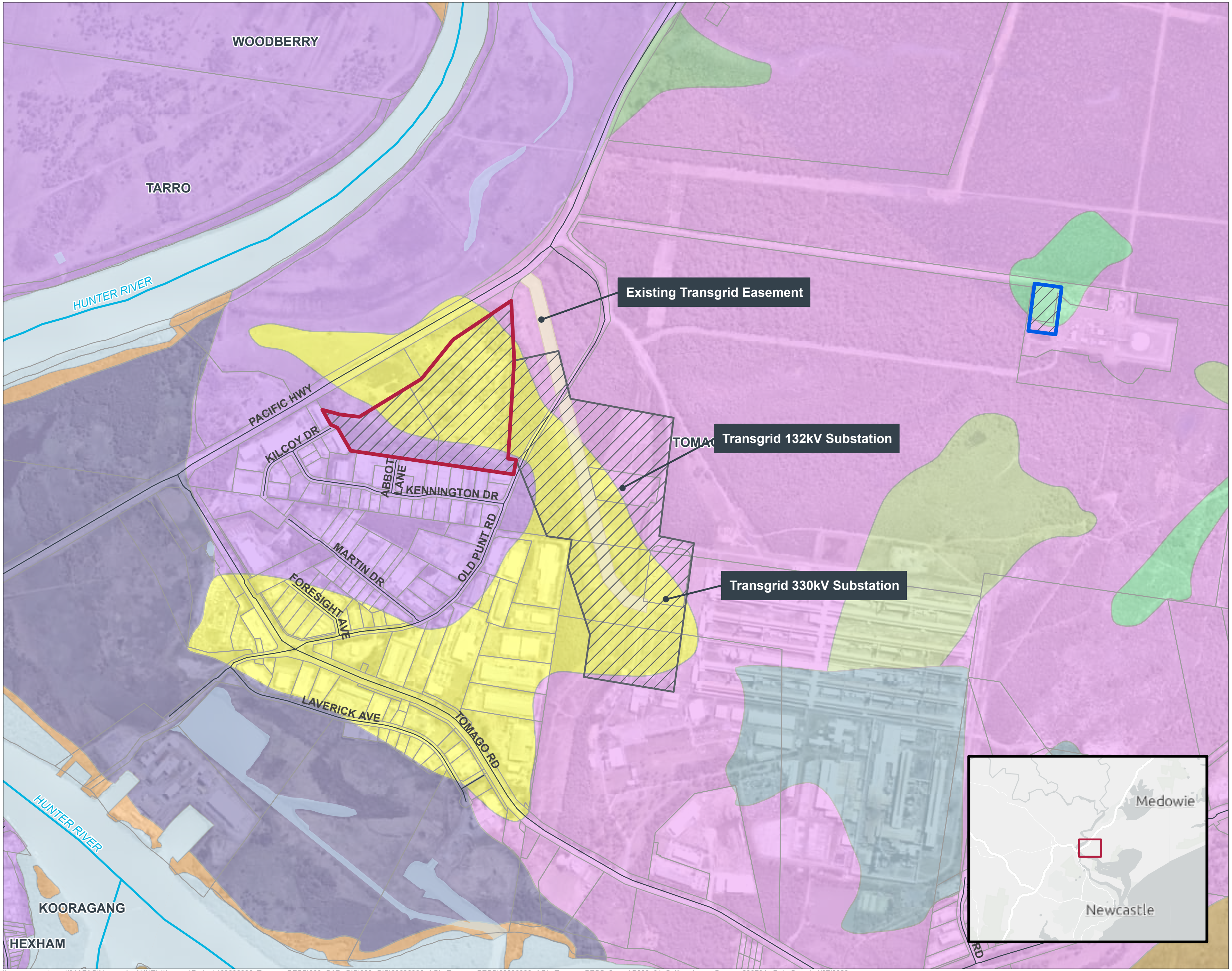
The Project infrastructure would be predominantly situated on Beresfield and Tea Gardens (Variant a) soils. Beresfield soils are an urban erosion hazard with moderate to high erodibility. These soils can suffer considerable erosion in disturbed areas if not appropriately managed. Tea Gardens soils are also susceptible to wind erosion hazards when on localised dry, sandy ridges. Erosion can be prevented with sufficient ground cover.

The Project would be on two Australian soil classifications (**Figure 6.5-2**):

- Dermosols (in the southwest and centre portions of the Project Area)
- Podosols (in the north and east portions of the Project Area).

Dermosols soils are heavy, sandy loam with a maximum clay content exceeding 15%, while Podosols have a clay field texture of 35% or more. Podosols often have open cracks throughout the year (unless conditions are moist) that are at least 5 mm wide and extend upward to the surface.

Soil fertility for the Project Area has been estimated to range from moderately high to low, as shown in **Figure 6.5-3**.



AECOM

N

0 200 400 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Water Body
- Transmission Line Easement
- Watercourse
- Road

Soil Landscapes

- Beresfield
- Blind Harrys Swamp
- Bobs Farm
- Disturbed Terrain
- Fullerton Cove
- Hexham Swamp
- Millers Forest
- Shoal Bay variant a
- Tea Gardens variant a
- Tea Gardens variant b

FIGURE 6.5-1: PROJECT AREA AND SOIL LANDSCAPE GROUPS

Source: Nearmap, 2022.

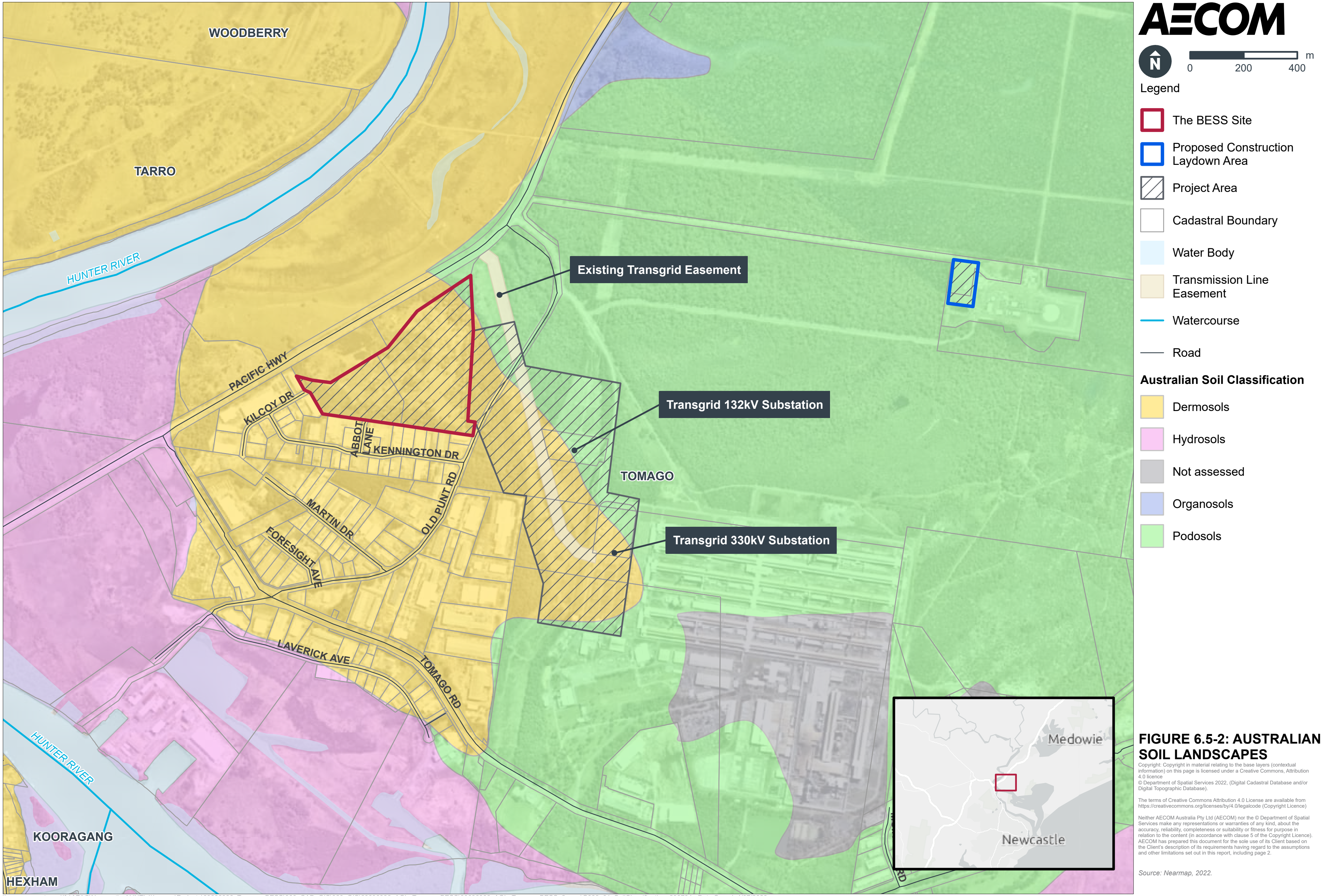


FIGURE 6.5-2: AUSTRALIAN SOIL LANDSCAPES

Source: Nearmap, 2022.

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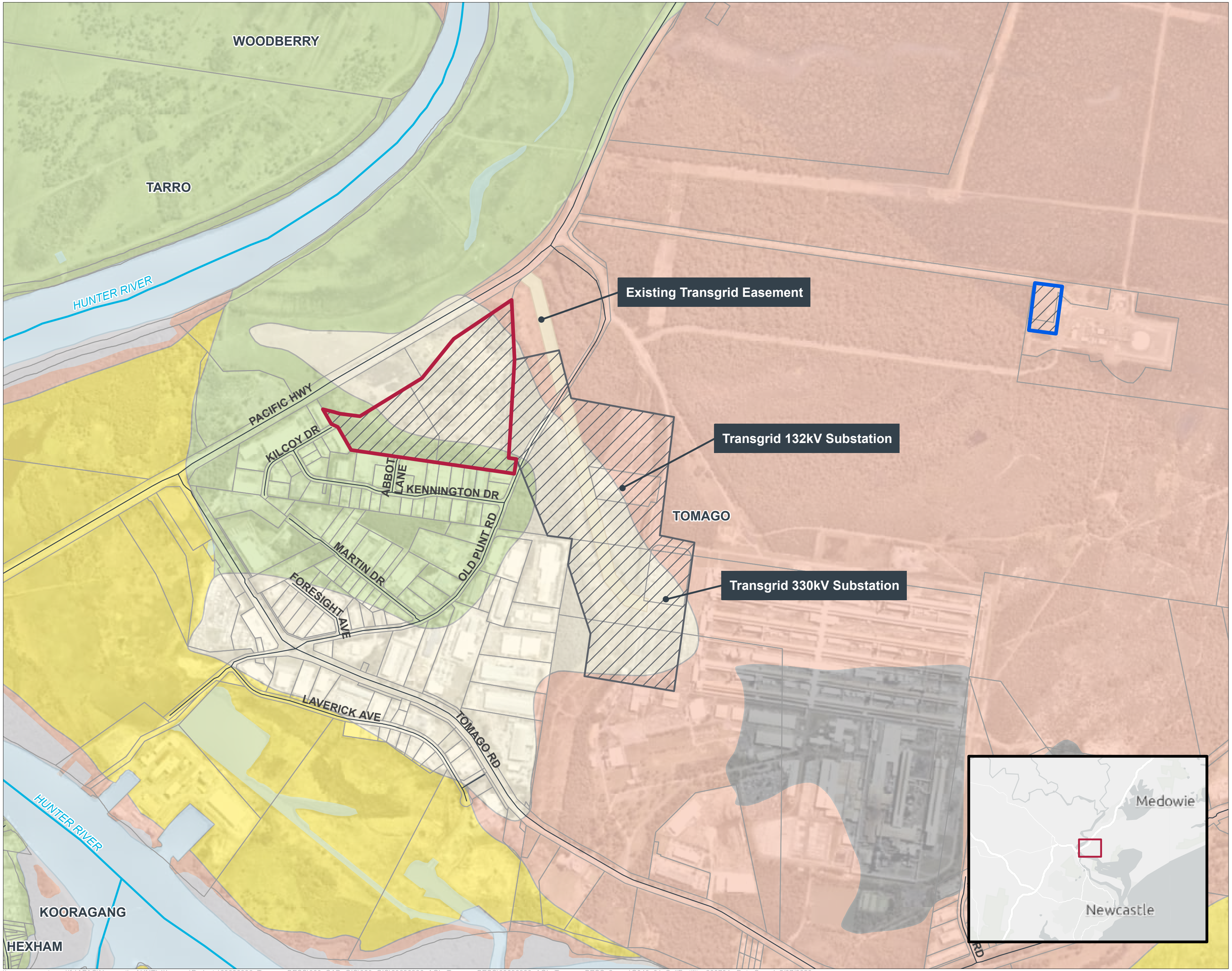

AECOM

N

0 200 400 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Water Body
- Transmission Line Easement
- Watercourse
- Road

Estimated Soil Fertility

- Low
- Moderate
- Moderately low
- Moderately high
- Not assessed

FIGURE 6.5-3: SOIL FERTILITY

Source: Nearmap, 2022.

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Land and soil capability

Land and soil capability (LSC) is the physical capacity of land to sustain a range of land uses and management practices. The classification of land is scaled from one, being very high capability land, to eight, being extremely low capability land. The Project Area is predominantly covered by Moderate capability land (LSC class four). Land capability and classifications of the Project Area is described in **Table 6.5-1** and **Figure 6.5-4**.

Table 6.5-1: Land and soil capability

Location	LSC Class	General Definition
Centre and southeast within the Project Area, where Beresfield soils occur	4	**Moderate capability land** Land has moderate to high limitations for high-impact land uses. Restricts land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment, and technology.
Small portion of the Project Area to the south and southwest, where Millers Forest soils occur	5	**Moderate-low capability land** Land has high limitations for high-impact land uses. Largely restricts land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
North and northeast boundary of the Project Area, where Tea Gardens (variant a) soils occur	6	**Low capability land** Land has very high limitations for high-impact land uses. Land use restricted to low impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.

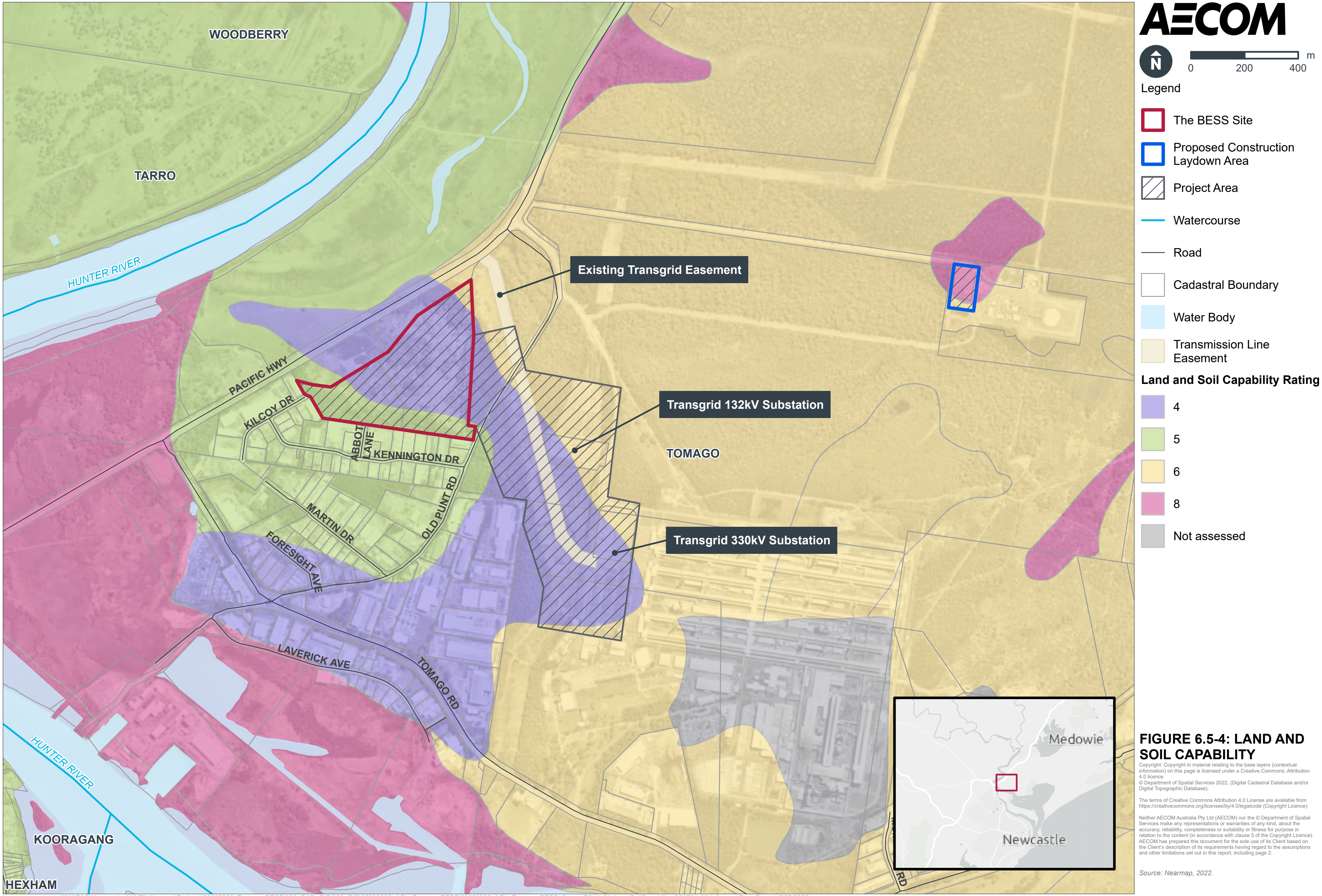

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FIGURE 6.5-4: LAND AND SOIL CAPABILITY

Source: Nearmap, 2022.

Topography

The Project Area is located on a high point adjacent to the low-lying Hunter River. On average, the Project Area sits at approximately 15 m Australian Height Datum (AHD). The lowest point is located in the southwest of the Project Area dropping to around 4-7 m AHD, while the south and southeast portion of the Project Area, including the transmission line easement, ranges between 10-16 mAHD.

Contamination

A review of the NSW EPA Contaminated Land Record of Notices and the List of Notified Sites was undertaken on 27 June 2023. The results of this review identified two contaminated sites within 1 km of the Project Area:

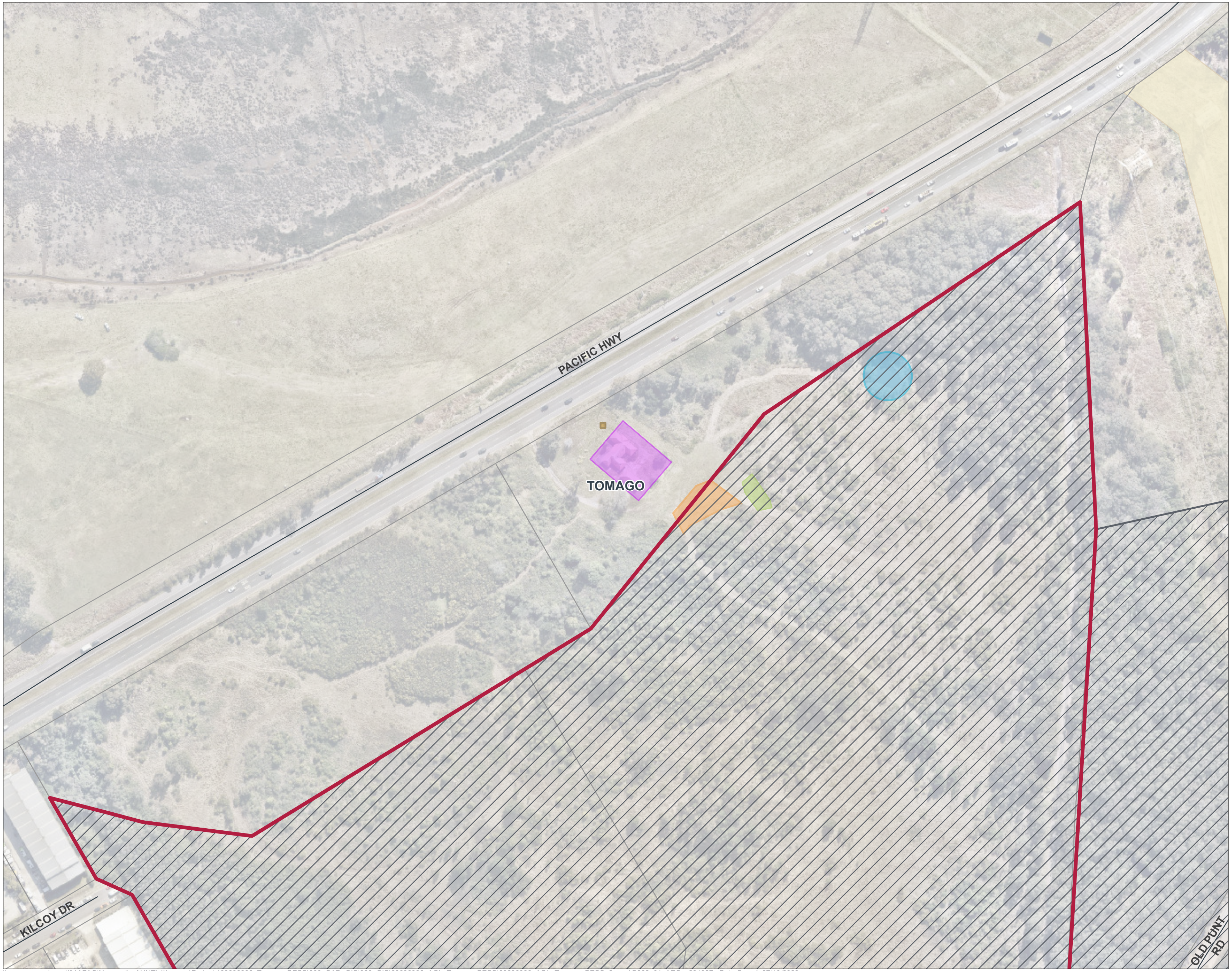
- RZM Pty Ltd – located on the opposite side of the Pacific Highway from the Project Area
- Balcombe Sweat Furnace – located south of the Project Area immediately south of Tomago Road.

These sites have been notified to the EPA, but no regulation is required under the *Contaminated Land Management Act 1997* (NSW). Both contaminated sites were determined to be hydraulically down gradient of the Project Area, meaning that contamination in the ground at these sites is unlikely to mobilise to the Project Area.

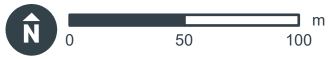
The desktop assessment and site survey undertaken by Aurecon (2019) identified potential areas of environmental contamination (AECs) including septic tanks, residential compound, dumped waste, and three separate areas of stockpiled material, as shown in **Figure 6.5-5**. However, due to the compulsory acquisition of land between the Site and the Pacific Highway by TfNSW, the AECs containing the septic tanks, and residential compound is now located outside of the Site. According to the Aurecon report the other potential areas of environmental contamination do not contain any COPC, with the exception of the dam. The contaminants of potential concern related to the dam AEC (Aurecon, 2019d) include:

- Copper
- Chromium
- Lead
- Zinc.

The COPC detected at elevated concentrations in surface water were considered by Environmental Strategies to likely to be naturally occurring background levels rather than contamination and/or pollution.



AECOM



Legend

- The BESS Site
- Project Area
- Cadastral Boundary
- Transmission Line Easement
- Road

Areas of Environmental Concern

- Abandoned Motor Vehicles
- Dam and Stockpiled Material
- Residential Compound
- Septic Tank
- Stockpiled Material / Mounds

FIGURE 6.5-5: AREAS OF ENVIRONMENTAL CONCERN

Source: Nearmap, 2023.

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Acid sulfate soils

The assessment of ASS, with reference to the eSPADE online mapping, revealed the Project Area is mostly classified as being low risk of ASS for depths less than 4 mAHD beneath the surface. A small portion of land in the southwest of the Project Area has a high risk of encountering ASS 2-4 mAHD, and a section adjacent to the northwest boundary just outside the Project Area has a high risk of ASS occurring at less than 1 mAHD. ASS elevations and associated risk across the Project Area are shown in **Figure 6.5-6**.

URS (2002) undertook laboratory testing of soil samples collected across the Site. The results indicated soils above a 1 mAHD depth were ASS free, while depths below 2 m AHD indicated the presence of potential acid sulfate soils (PASS). Additional laboratory testing undertaken for the NPS EIS had similar findings that suggested near surface soils down to a depth of 1 m below natural ground level (bngl) had negligible potential to generate ASS. These studies support the concept that deeper soils have a high potential to contain ASS, but also suggest soils greater than 2 m bngl may contain ASS.

The Port Stephens LEP 2013 provides information regarding when development consent is required for carrying out works that have the potential to disturb, expose or drain ASS. **Table 6.5-2** describes when development consent is required based on a specific class of land. Land classes for the Project Area are illustrated in **Figure 6.5-7.**

Table 6.5-2: ASS probability classes

Class of land	Works
1	Any Works
2	Works below the natural ground surface Works by which the water table is likely to be lowered.
3	Works more than 1 m bngl. Works by which the water table is likely to be lowered more than 1 m bngl.
4	Works more than 1 m bngl. Works by which the water table is likely to be lowered more than 2 m bngl.
5	Works within 500 m of adjacent Class 1, 2, 3 or 4 land that is below 5 m AHD and by which the water table is likely to be lowered below 1 mAHD on adjacent Class 1, 2, 3 or 4 land.

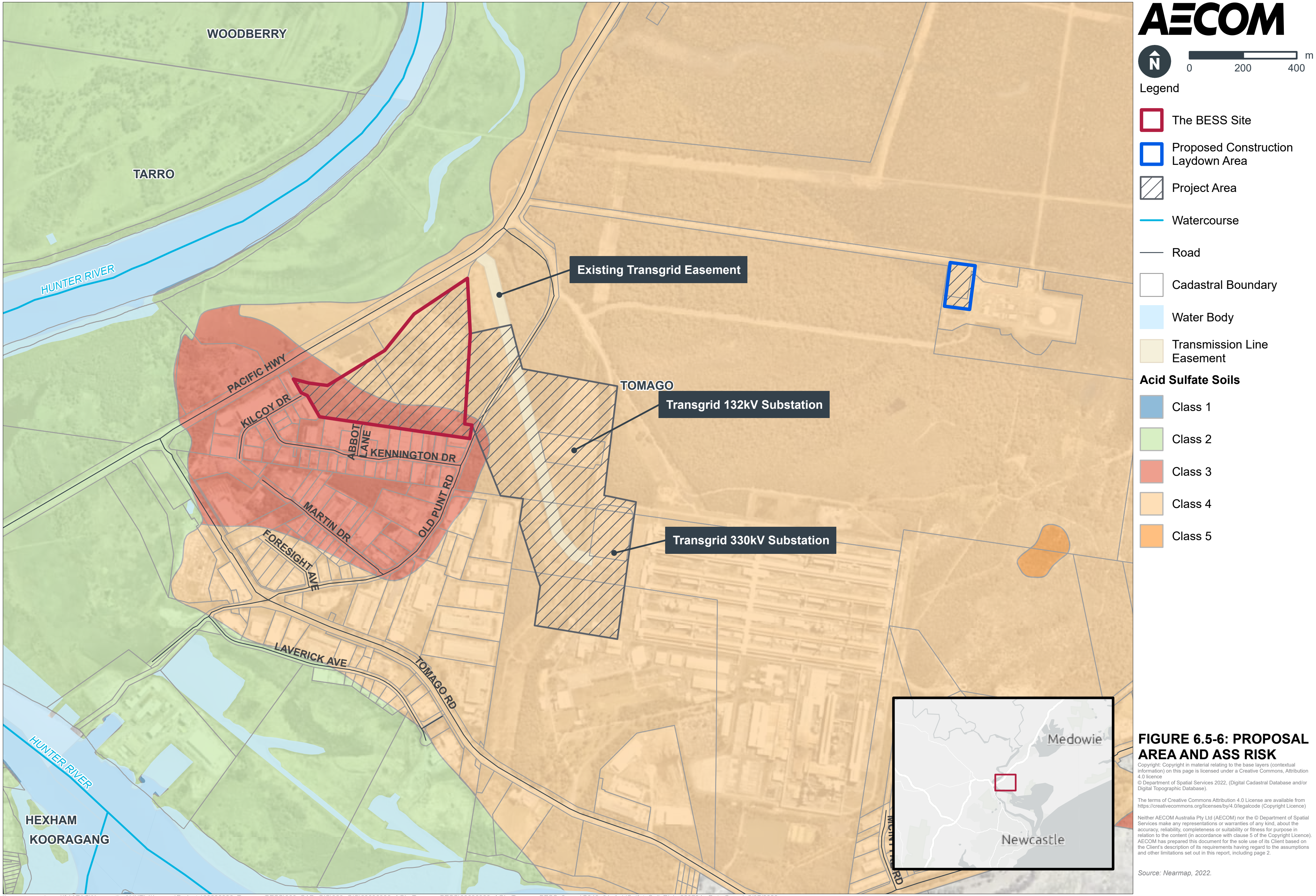

FIGURE 6.5-6: PROPOSAL AREA AND ASS RISK

Source: Nearmap, 2022.

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6.5.4 Potential impacts

Construction

Erosion

The land soil capability within the Project Area is identified as predominantly moderate, with the small portion of land along the southern boundary listed as low (refer to **Figure 6.5-4**). Given this classification no significant geotechnical constraints have been noted.

Most of the earthworks required for construction of the Project would be conducted within the BESS Site or within the footprint for the proposed transmission connection/s. These areas are primarily comprised of Beresfield and Tea Gardens soils, both of which are susceptible to erosion. Construction works for the Project would involve vegetation removal, ground disturbance, excavations, potentially benching, the transport, storage and reuse of soils, the use of heavy machinery, and other construction activities. These activities have the potential to result in the erosion of disturbed soils which may adversely impact surface water quality and air quality if not managed correctly. These impacts may affect people and ecological receptors to varying degrees depending on the level of erosion and sensitivity of the receptors.

Soils may also be mobilised offsite by vehicles leaving the Site if the soil is stuck to wheels or the undercarriages of vehicles. This may result in dust and sedimentation impacts to sensitive receptors. This impact would be minimised with the implementation of mitigation measures outlined in **Section 6.5.5** below.

The transmission connection/s would be installed either above ground, below ground or a combination of both. If required, the below ground transmission line would be installed by one or a number of trenches to connect either the 132 kV or 330 kV substation to the BESS. Soils along the route of these trenches would be excavated and stockpiled nearby, or within the designated construction laydown areas for the Project. The transmission connection cables would be laid, and the trenches backfilled. This process of excavation would be completed in a progressive manner to minimise the amount of material stockpiled and to reduce the potential impacts related to erosion.

Horizontal direction drilling (HDD) may also be considered for the installation of underground transmission connection. If this method is preferred, HDD would expose minimal areas of bare soil. Some areas bare soil may be exposed at the construction sites of the launch pit and receiving pit. Underboring would also produce liquid drilling waste which would be collected and disposed of appropriately. The identified laydown area within the Site would require vegetation clearing and associated earthworks for establishment of this area. Whereas, the use of the additional laydown area located at the NGSF site would not require any improvements. The temporary laydown areas would consist of an open-air, ground-level laydown which may or may not be covered.

With the implementation of erosion and sedimentation mitigation measures outlined in **Table 6.5-2**, associated erosion and sedimentation impacts would be minor to achieve a neutral or benefit impact (consistent with the NorBE objectives discussion in **Section 6.4.4**).

Where soils or disturbed ground is exposed for more than three days, appropriate mitigation measures would be taken, such as a soil binder 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.

Following completion of construction activities, land that is not required for the Project would be rehabilitated and returned to its pre-development condition as far as practicable or would be landscaped as needed. In most cases, this would involve revegetating areas of bare ground and soils. Plant species would be chosen depending on their suitability and need, with taller species being used for screening, and grasses for parts of the Site not required for operation of the Project.

To mitigate potential impacts from soil erosion, a Water and Soil Management Plan (WSMP) (as outlined in **Section 6.5**) would be produced, including measures to manage erosion and exposed soils. This plan would include Erosion and Sediment Control Plans (ESCPs), which would include site-specific sediment, erosion, and dust controls which would be implemented for the construction of the Project. Mitigation actions under this WSMP would be in accordance with the 'Blue Book; Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). Potential measures may include the installation of sediment basins or sediment fences, detention ponds for stormwater management, use of erosion control fabrics, or restriction of vehicle movements. With the implementation of mitigation measures, potential impacts to the nearby receiving environment related to erosion, sedimentation, and dust are unlikely to occur.

Potential surface water and groundwater impacts are discussed further in **Section 6.4**. Potential air quality impacts associated with dust generation during construction are discussed in **Section 6.11**. **Section 6.16** discusses the proposed Waste Management Plan (WMP) to manage potential waste produced during construction of the Project.

Acid sulfate soils

For earth disturbing works less than 1 m bngl, the risk of encountering ASS is considered low. For deeper earth disturbing, excavation, or dewatering works (greater than 2 m bngl), particularly within the Site location, there is a medium to high risk of encountering ASS. Potential impacts from disturbing ASS include the contamination of surface and groundwater, which is described in detail in **Section 6.5**. The nature of the BESS design requires minimal excavation, which minimises the risk of disturbing ASS at greater depths. Excavation requirements below 2 m bngl would be subject to further ground investigation during detailed design and would be managed in accordance with the Acid Sulfate Soil Management Plan (ASSMP).

ASS also has the potential to impact vegetation if spread through construction activities, such as any potential trenching for the installation of the transmission connection/s. Given the Site would be cleared of vegetation prior to construction, impacts to vegetation within the Project Area is considered unlikely. ASS impacts to vegetation would be closely monitored and managed during the rehabilitation phase (if required). All potential impacts to vegetation would be managed in compliance with the site-specific ASSMP.

Contamination

The Contamination Assessment (2017) concluded that that the AEC located within the Site are unlikely to contain CoPC for human health of ecological receptors. Whilst some elevated levels of heavy metals were present in the stormwater contained within the northern farm dam, these levels are considered to be related to background levels for the local area. On this basis, it is unlikely that construction of the Project would result in the disturbance or mobilisation of contaminated soil or contaminated materials.

Nevertheless, AEC are located close to the Site that have been found to contain CoPC. On this basis the CEMP for the Project would include an unexpected finds procedure that would outline how contaminated soils and materials would be managed on the unlikely event that they are encountered. This procedure would include reporting and notification requirements as well as an approach for the handling, storage, testing and disposal of contaminated soils and materials.

Other potential impacts include contamination from spills of fuels, chemicals or liquids used during construction. Spills or other onsite contamination resulting from construction works would be managed via measures outlined in the CEMP and specifically the WSMP. These measures would include the requirement for spill kits to be present during construction works. Other measures to manage potential impacts to soils and water would be detailed within the WSMP (**Appendix D (Management and mitigation measures)).**

Based on the above findings, with proposed mitigation actions in place the overall contamination risk is negligible.

Operation

Erosion

No earthworks or materials handling is proposed as part of the typical operation of the Project. The Project would consist of a hardstand area for the BESS and a transmission connection/s that may be either above ground, below ground, or a combination of both between the BESS and either the 132 kV or 330 kV neighbouring Transgrid substations. It is unlikely the Site or the transmission connection/s would result in erosion related impact. Stormwater management at the Site is discussed in **Section 6.3**.

Land that is not required for the operation of the Project would be rehabilitated and returned to its pre-development condition as far as practicable or would be landscaped as needed. These areas would be managed to maintain vegetation cover to minimise erosion and sedimentation risks from the Site.

As such, no erosion or sedimentation impacts are expected during operation of the Project.

Contamination

Operation of the BESS is unlikely to result in significant contamination. Typical operation of the BESS would not involve the regular handling of materials such as chemicals, fuels or oils. As such, the risk of the operation of the Project contributing to the contamination of soil and water resources is considered low.

Diesel generators would be stored onsite to power emergency generators and the transformers would contain oil. The diesel at the Site would be stored in accordance with the NSW EPA's Storing and Handling of Liquids: Environment Protection – Participants Handbook (DECC, 2007). It would be stored on an impermeable surface in a bunded area where a potential leak or spill could 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 Site.

Transformers at the Site would be designed in accordance with the relevant Australian Standards for power transformers. Contamination of soils, groundwater and surface water resources occur where transformers leak oil. As such, Australian standards require that the transformers are located on impermeable surfaces with secondary containment. The secondary containment consists of impermeable bunding with the capacity to contain 110% of the volume of oil within the transformer.

Additionally, spills kits would be installed across the Site close to transformers and diesel generators to further capture any potential accidental spills or leaks.

Operation of the Project would be carried out in line with the maintenance protocols for the Site as described in **Section 6.2**. Waste materials produced would be managed in accordance with the WMP and would be disposed of appropriately. Waste management is discussed further in **Section 6.16**.

With appropriate mitigation measures and maintenance protocols in place, the operation of the Project is not anticipated to result in contamination impacts during operation.

6.5.5 Mitigation measures

Section 6.5.4 provided an assessment of the potential impacts of the Project on soils 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 soils and contamination are outlined in **Table 6.5-3**.

Mitigation measures outlined in other chapters that are relevant to the management of soils and contamination impacts include:

- **Section 6.2** Hazards and risk, specifically measures which address potential spills during construction and operation
- **Section 6.3** Surface water, groundwater and hydrology, specifically measures which address erosion and sediment control and surface water management during construction and operation
- **Section 6.11** Air quality, specifically measures which address air quality impacts from exposed soils
- **Section 6.16** Waste management specifically measures which address soils and water waste management during construction.

Table 6.5-3: Mitigation and management measures – Soils and contamination

ID	Mitigation Measure	Timing
SC-1	Either one or more Erosion and Sediment Control Plans (ESCP) will be prepared as part of the WSMP developed in accordance with the 'Blue Book' Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). ESCPs will detail specific controls that will be employed to help ensure that erosion is minimised. This includes, but is not limited to: 1. Exposed soils and stockpile management measures 2. 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 (if required)	Pre-construction, Construction
SC-2	Further ground investigations will be undertaken to determine the presence and, if present, depth of ASS at the Site. These investigations would be used to inform the detailed design.	Pre-construction
SC-3	Where soil or ground is to be left exposed for more than three 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
SC-4	Bare ground and exposed soils across the Site would be rehabilitated and returned to its pre-development condition as far as practicable and/or would be landscaped.	Pre-construction, Construction
SC-5	The following measures would be included as part of the WSMP to mitigate potential impacts to soil and surface water: 1. Impermeable barriers would be placed between the source/s of contamination (e.g. contaminated soil stockpiles or certain construction materials) and the natural ground 2. 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).	Pre-construction, Construction, Operation
SC-6	Heavy machinery and site vehicles will be assigned allocated tracks and temporary roads for access around the Site and construction areas to minimise ground disturbance and soil erosion.	Construction
SC-7	An Acid Sulfate Soil Management Plan (ASSMP) will be a subplan to the CEMP and implemented for the construction of the Project. The ASSMP will include an evaluation of the ASS risk, clearly defined and site-specific management actions including the handling of PASS, and monitoring and reporting procedures (e.g., recording pH levels).	Construction
SC-8	An unexpected finds protocol for contaminated material will be established as part of the WSMP and include: 1. Delegation of responsibilities 2. Identification and handling procedures – General procedures for recognising and handling unexpected contaminated soils or materials 3. Reporting and notification – internal and external reporting and regulatory obligations 4. Mitigation measures – stop work procedure, containment and isolation, and consultation 5. Remediation and disposal – procedures for containing, disposing, and documenting the disposal of the contaminated material.	Construction, Operation

ID	Mitigation Measure	Timing
SC-9	Diesel 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
SC-10	Transformers would be designed in line with the relevant Australian Standards for power transformers and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Pre-construction, Construction, Operation

6.6 Traffic and Transport

6.6.1 Overview

A Traffic and Transport Impact Assessment (TTIA) has been prepared for the Project and is provided in **Appendix F** (**Traffic and Transport Impact Assessment Report)**. This chapter summarises this traffic and transport assessment and outlines relevant management and mitigation measures to avoid or minimise impacts.

The Site was previously approved for the development of the NPS (SSI-9837). The assessment of the NPS was supported by a Traffic Impact Assessment Report prepared by SECA Solution (NPS TIA). Data and modelling prepared for the approved NPS TIA has been used to inform the TTIA for the Project where applicable. Additionally, the traffic and transport assessment undertaken as part of the environmental impact assessment for M1 Pacific Highway extension to Raymond Terrace project (SSI-7319) (hereafter referred to as the M1 Extension Project) was also used to inform this TTIA.

6.6.2 Methodology

The traffic and transport impact assessment for the construction and operational phases of the Project involved:

- A review of road safety, current traffic volumes, intersection performance and public transport facilities within the vicinity of the Project
- A review of the traffic generation forecast of the Project and an assessment of the likely travel routes for Restricted Access Vehicles (RAVs) and Oversize Overmass (OSOM) vehicles from the Port of Newcastle to the Site
- A qualitative assessment of potential impacts on road network performance, on-street parking facilities, public and active transport, and road safety
- Identifying mitigation measures for managing potential impacts.

The following general guidelines and standards were considered during the preparation of this TTIA:

- Austroads, Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments
- Road and Maritime Services (RMS, currently known as TfNSW), Guide to Traffic Generating Developments
- Port Stephens Development Control Plan 2014 (DCP)
- Port Stephens Local Environmental Plan 2013 (LEP).

6.6.3 Existing environment

Road network

Key roads in the vicinity of the Project Area include the Pacific Highway, Tomago Road and Old Punt Road. These are described in **Table 6.6-1**.

Table 6.6-1: Key roads within the vicinity of the Project

Roads	Description
Pacific Highway	Pacific Highway is classified as a National highway generally running in the northeast-southwest direction north of the Project. It intersects with Old Punt Road to the north of the Site and Tomago Road to the south of the Site. The highway provides a dual carriageway, allowing for two lanes of travel in both directions, with a short lane into Old Punt Road in the westbound direction and another short lane further down the Pacific Highway into Tomago Road. Both intersections at Pacific Highway/Old Punt Road and Pacific Highway/Tomago Road are signal controlled. The posted speed limit on the Pacific Highway is 80 kilometres per hour (kph) for vehicles in the vicinity of the Site.

Roads	Description
Tomago Road	Tomago Road is a state road which connects Nelson Bay Road and the Pacific Highway. The road has a divided carriageway, providing two lanes in each direction. Tomago's southbound lanes consists of a full lane and a short lane that merges into the full lane. The northbound lanes are both channelised left turn lanes into the Pacific Highway. The posted speed limit on Tomago Road is 60 kph for vehicles in the vicinity of the Site.
Old Punt Road	Old Punt Road is a regional council owned road aligned in a north-south direction east of the Site. The road connects to the Pacific Highway approximately one km to the north of the Site and provides access to the Tomago industrial precinct from the Pacific Highway and Tomago Road. The road also provides access to the Site, the transmission connection corridor and the two nearby Transgrid substations. The road has a divided carriageway, providing one lane in each direction. The posted speed limit on Old Punt Road is 60 kph for vehicles in the vicinity of the Site.

Road safety

The Port Stephens LGA crash and casualty statistics were reviewed to obtain a general understanding of the crash statistics near the Site. The latest interactive crash statistics provided an overview of all crashes near the Project Area for the five-year period between 2017 and 2021.

Vehicle crashes that have occurred near the Site on the key roads noted above between 2017 and 2021 are shown on **Figure 6.6-1** and include:

- Three crashes on Old Punt Road to the south of the Site. One resulted in serious injury and involved a vehicle colliding into another during a right turn into the northbound lane of Old Punt Road. The other two crashes occurred at T-junctions on Old Punt Road and resulted in minor injuries.
- Nine crashes near the Project Area along Tomago Road, two resulting in serious injury, four resulting in moderate injuries and the other three being minor injuries. The two crashes resulting in serious injury involved a head on collision and the other involved a side on collision.
- A total of 17 crashes on the Pacific Highway near the Project Area. Of the 17 crashes, six resulted in non-casualty towaways, five resulted in moderate injuries, three resulted in serious injuries, and three resulted in minor injuries.

AECOM

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Legend

- Proposed Construction Laydown Area
- The BESS Site
- Project Area
- Water Body
- NPWS Reserve
- Watercourse
- Motorway
- Primary Road
- Local Road
- Primary Access Point
- Secondary Access Point

Degree of Crash

- Minor/Other Injury
- Moderate Injury
- Non-casualty (towaway)
- Serious Injury

FIGURE 6.6-1: CRASH LOCATIONS

Source: Nearmap, 2022.

Traffic volumes

Traffic volumes were extracted from the historical TfNSW traffic volume viewer for the permanent classifier previously located on Pacific Highway (**Figure 6.6-2**) west of Tomago Road. This data was used to obtain the vehicle count data and the average annual daily traffic (AADT) for each year. Due to the presence of the Tomago Road turnoff between the traffic volume classifier location and the Site, not all trips included in the classifier count would be passing the Site. However, it is expected that the traffic flows observed at this permanent classifier location would show a similar range and pattern to that likely to be observed near the Project Area access.

The historical AADT growth patterns have been determined from information collected at this classifier and presented in **Table 6.6-2**. These flows take into account holiday and seasonal variations and provide an accurate representation of background traffic flows throughout the year. The permanent counter was removed after 2021.

The average annual growth rate of traffic on Pacific Highway from 2016 to 2021 is approximately 1.13%. Traffic volume reductions were observed in 2020, and this is likely due to the potential impact of COVID pandemic.

FIGURE 6.6-2: TRAFFIC VOLUME COUNTER PERMANENT COUNTER LOCATION

Source: Nearmap, 2022.

Table 6.6-2: Historical AADT growth rate at the Permanent traffic counter T0236 on Pacific Highway

Direction	Annual average daily traffic (AADT)[3]					
	2016	2017[4]	2018	2019[3]	2020[5]	2021[3]
Northbound	23,930	-	23,823	24,258	23,147	25,443
Southbound	23,475	-	24,734	24,306	22,290	24,690
Combined	47,405	-	48,577	48,564	45,437	50,133
Annual growth rate[6] (Combined traffic)	**-**	**-**	**1.23%**	**-0.81%**	**-1.05%**	**1.13%**

As part of the Environmental Impact Assessment undertaken for the M1 Extension Project (SSI-7319), traffic count data have been collected throughout a two-week period on weekdays at the same locations in 2014 and 2017. Traffic count data indicate an annual growth rate of 1.45% on the Pacific Highway to the north of the Hunter River Bridge from 2014 to 2017. Additionally, it is suggested that Tomago Road to the east of the Pacific Highway has experienced a decrease in traffic between 2014 and 2017 with an annual growth rate of -2.67%.

Peak hour traffic volume at key intersections

Peak hour traffic volume at the key intersection of Old Punt Road and Tomago Road has been extracted from the NPS TIA. Survey results suggest the AM and PM peak hours are 6:00 am to 7:00 am and 4:00 pm to 5:00 pm, respectively.

AM and PM peak hour traffic flows at the intersection of Old Punt Road and Tomago Road and tabulated in **Table 6.6-3**. The peak traffic flow on Tomago Road to the west of Old Punt Road is eastbound during the AM peak hour with 1,198 vehicles and westbound during PM peak hour with 1,151 vehicles. For Old Punt Road to the north of Tomago Road, the peak traffic flow is 374 vehicles northbound during the AM peak hour and 357 vehicles southbound during the PM peak hour.

Table 6.6-3: AM and PM peak hour traffic flows

Location		Peak hour mid-block traffic flow	
		AM peak	PM peak
Tomago Road (West of Old Punt Road)	Eastbound	1,198	433
	Westbound	375	1,151
Old Punt Road (North of Tomago Road)	Northbound	374	104
	Southbound	89	357
Tomago Road (East of Old Punt Road)	Eastbound	808	410
	Westbound	368	804
Old Punt Road (South of Tomago Road)	Northbound	32	110
	Southbound	132	29

Intersection performance

Two relevant quantitative traffic models are discussed in the TTIA to understand existing and future intersection performance at key intersections for the Project.

[3] AADT is shown in vehicles
[4] Traffic flows for 2017 are not available for both directions
[5] 2019-2021 annual growth rate may have been affected by the COVID-19 pandemic
[6] Annual growth rate has been calculated to 2016

SIDRA Modelling

The existing operation performance of the intersection at Old Punt Road and Tomago Road was assessed as part of the NPS TIA using SIDRA Intersection 8 – a modelling software package recognised by TfNSW.

SIDRA Intersection measures the intersection level of service (LoS) being a measure of the average delay at the intersection. LoS A represents an average delay of 14 seconds or lower with “good operation” at traffic signals, give way and stop signs. LoS B represents an average delay of 15 to 28 seconds, with “good operation with acceptable delays and spare capacity” at traffic lights, give way and stop signs. The LoS scale runs from A to F with F indicating the worst intersection or road performance.

SIDRA Intersection modelling results are provided in **Table 6.6-4**. Results suggest that the intersection of Old Punt Road and Tomago Road operates at a satisfactory LoS (LoS B or better) during both AM and PM peak periods, with spare capacity to accommodate potential traffic volume increase.

Table 6.6-4: Existing intersection performance at the Old Punt Road and Tomago Road intersection (NPS TIA, 2018)

Approach	AM Peak		PM Peak	
	Level of Service (LoS)	Average delays (sec)	Level of Service (LoS)	Average delays (sec)
Tomago Road West	A	10.8	A	11.0
Old Punt Road North	B	15.0	A	9.4
Tomago Road East	A	11.4	A	12.8
Old Punt Road South	A	9.5	A	11.5
All Approaches	**B**	**15.0**	**A**	**12.8**

VISSIM Modelling

The VISSIM model is a traffic microsimulation software package which was developed for the Outer Newcastle Study[7]. This model was further developed for the M1 Extension Project.

A summary of the VISSIM modelling results at key intersections close to the Project Area is provided in **Table 6.6-5**. The results suggest that all three key intersections in the vicinity of the Project Area operate at a LoS (LoS B or better) during both AM and PM peak periods, with spare capacity to accommodate potential traffic volume increase.

Table 6.6-5: Existing intersection performance at key intersections (M12RT TTWP, 2018)

Intersection	AM Peak		PM Peak	
	Level of Service (LoS)	Average delays (sec)	Level of Service (LoS)	Average delays (sec)
Pacific Highway/Tomago Road	B	15	A	11
Pacific Highway/Old Punt Road	B	18	A	10
Old Punt Road/Tomago Road	A	4	A	1

[7] The Outer Newcastle Study was undertaken to inform the strategic design, economic analysis and prioritisation of future state road upgrades in Outer Newcastle.

Public transport

The study area has generally limited public transport services. This is assumed to be due to the low population land uses and consequential low demand for public transport services. Public transport at or near the Site is summarised below:

- The Site is not serviced by any rail services, with the nearest railway station located in Hexham approximately 2.3 km to the southwest.
- There are three bus routes near the Project: two school bus routes and one regular public access route. Bus route 140: Newcastle Interchange to Raymond Terrace, provides connection along Old Punt Road and Tomago Road.
- There are no formal pedestrian facilities providing connectivity across the local roads. Additionally, there are no existing cycling facilities provided along the local roads near the Project Area.

6.6.4 Potential impacts

Construction

This section provides a detailed overview of the traffic and transport activities associated with the construction of the Project (refer to **Table 6.6-6**), and an evaluation of the construction activities in terms of their potential to impact:

- Road network performance
- On-street parking facilities
- Public transport services and active transport (pedestrian and cyclist) routes
- Road safety.

Table 6.6-6: Traffic and transport related construction activities

T&T Element	Description
Construction workforce and traffic forecast	A peak of up to 200 construction staff would be required during construction of the Project. At times, this number could be significantly less depending on the works being undertaken. Up to 33 heavy vehicles a day may need to attend the Site during construction. Heavy vehicles would be required for the delivery of construction equipment, removal of spoil (if required) and the delivery of the various Project components. These heavy vehicles could arrive and depart the Site at any point during the day; with the majority expected to arrive in the mornings. In addition to these heavy vehicles, OSOM vehicles are expected to be required to deliver large or prefabricated elements for the construction of the Project (e.g., onsite substation transformers, switch rooms). However, it is expected that the usage of OSOM vehicles would be minimal, and the majority of deliveries would be limited to heavy vehicles up to 25 m/26 m B-Doubles. The Project may also require the use of road trains to transport large components from their initial location to the Site if Project components do not arrive at the Port of Newcastle. Any road trains utilised would transport goods via the TfNSW approved Road Train Network.
Construction laydown area	During construction, the Site would include a construction laydown area. A separate laydown area for the Project would be located at the NGSF (the NGSF construction laydown area). The proposed NGSF laydown area is located at a similar location to the previously approved east laydown area for the NPS. The proposed NGSF laydown area would be in use for up to 36 months. The NGSF laydown would be accessible via a private access road that connects with Old Punt Road, which allows for two-way traffic movements. No

T&T Element	Description
	road upgrades are anticipated to support construction traffic accessing the NGSF laydown area based on the following assumptions: • When providing delivery from the NGSF laydown area to the main construction site, vehicles would turn right out of the private haul road onto Old Punt Road and then turn right into the construction site via the new access to be provided as part of the construction of the Proposal. • No vehicles associated with the construction works would access the NGSF laydown area from the south on Old Punt Road.
Construction access and parking	Primary access to the Site during construction and operation would be via a new access point off Old Punt Road, as shown in **Figure 6.6-3**. A secondary access point would be available in the northern corner of the Site to provide emergency access and egress to the Pacific Highway on ramp once the M1 Extension Project is constructed. Internal access roads would also be provided for construction traffic to navigate to the construction laydown, storage and parking areas. During construction, some parking would be provided within the Site in the construction and storage, laydown and parking area. Overspill parking for workers would be provided at the NGSF construction laydown area. As the distance between the NGSF site and the subject site is about 1.7 km (20 mins walking distance), a shuttle bus service may be provided between the car park at the NGSF site and the Site. Parking for heavy vehicles would be provided at the Site and the NGSF construction laydown area.
Construction traffic distribution	Proposed construction access points and haulage routes are illustrated in **Figure 6.6-3**. <u>Heavy Vehicles</u> All heavy vehicles are expected to utilise the Pacific Highway/Old Punt Road intersection to access the Project Area and would therefore approach from the north. Distributions are expected to be: • 90% to/from the south along the Pacific Highway • 10% to/from the north along the Pacific Highway. <u>Light Vehicles</u> It is anticipated that the majority of the construction workforce would come from Newcastle and its surrounds and would travel to the Project Area by private and/or shared vehicles. Based on this, the traffic distribution for light vehicles is assumed to be: • 20% to/from the north – using the intersection of the Pacific Highway and Old Punt Road • 70% to/from the south along the Pacific Highway – therefore distributed equally between the intersection of the Pacific Highway and Old Punt Road, and the Pacific Highway and Tomago Road intersection • 10% to/from the east – using the intersection of Tomago Road and Old Punt Road from the south.

T&T Element	Description
Access for OSOM Vehicles	The NSW Restricted Access Vehicle (RAV) Network map has been reviewed for 25/26m B-double routes. These routes will be utilised for the delivery of construction equipment, removal of spoil (if required) and the delivery of the various Project components, including prefabricated elements. There are no restrictions for 25/26 m B-double vehicles along the proposed haulage routes, including Pacific Highway and Old Punt Road. The majority of road sections along the proposed haulage routes are NSW approved OSOM routes without restrictions. The Pacific Highway between Maitland Road and Tomago Road is approved as an OSOM route with two travel conditions. • An operator of a vehicle or combination exceeding 3.5 m wide or 25.0 m long must contact the TfNSW Pacific Highway Coordinator at least 48 hours prior to travel on the Pacific Highway between the New England Highway at Hexham and the Queensland Border. • Vehicles or combinations exceeding 3.5 m wide or 22 m long are not permitted to travel between 8:30 am and sunset on a weekend or public holiday between the Pacific Highway at Hexham and Tomago. It is expected that any requirement for OSOM vehicles accessing the Site would be governed by a Traffic Control Plan (TCP) prepared for the Project.

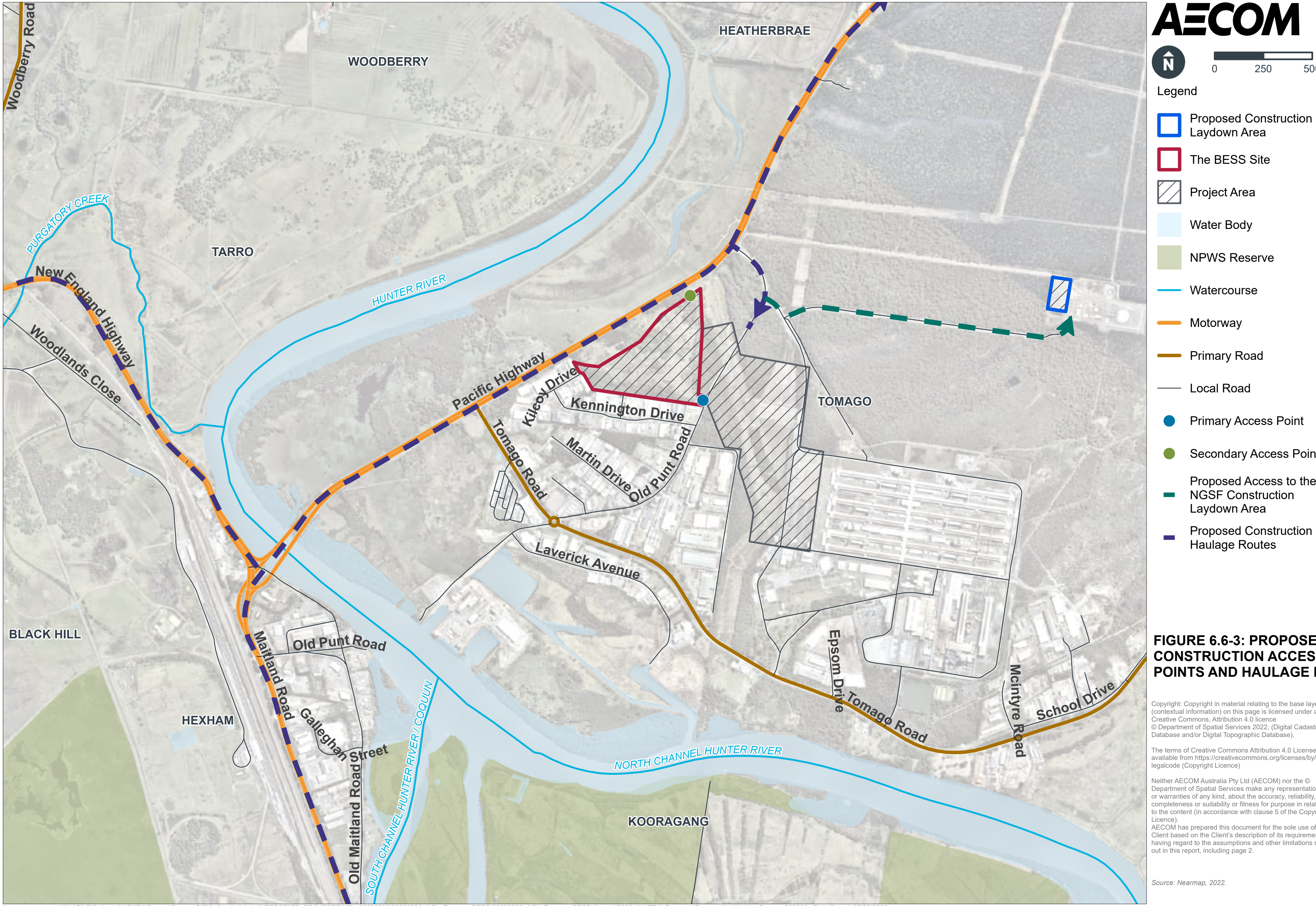


FIGURE 6.6-3: PROPOSED CONSTRUCTION ACCESS POINTS AND HAULAGE ROUTES

Source: Nearmap, 2022.

Impacts on road network performance

It is predicted that the majority of construction traffic demand would occur in the morning, coinciding with the AM peak. According to the construction activities that are likely to happen, a summary of indicative peak light and heavy vehicle movements expected during AM peak period is provided in **Table 6.6-7**.

Table 6.6-7: Construction traffic generation forecast for the Project (trips/hr) – AM peak hour

Vehicle type	Previously approved NPS TIA			The Project		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Heavy vehicles (Truck movements)	33	33	66	33	33	66
Light vehicles (Staff movements)	270	0	270	200	0	200
All vehicles	**303**	**33**	**336**	**233**	**33**	**266**

Construction traffic generation forecasts for the Project are expected to be lower than what was estimated and approved as part of the NPS TIA. Therefore, it is expected that the construction impacts of the Project will be similar or lower than that reported in the NPS TIA. As such the estimated traffic generation during construction would be acceptable and result in negligible impacts on the existing operation of the local road network. The key intersection of Tomago Road and Old Punt Road is likely to continue to operate at satisfactory LoS (LoS B or better) with sufficient spare capacity to support the proposed development, both in the short-term accommodating the higher traffic generation during construction and long term for the ongoing operation of the Project.

It is anticipated that 20 light vehicles would be accessing the NGSF laydown area in any 24 hour period. For conservative assessment, it is assumed that 10% of the daily trip generation of the NSGF laydown area would occur during the AM and PM peak hours. This would result in six vehicular trips per hour (three inbound and three outbound). Therefore, the construction trip generation of the NGSF laydown area is considered minor and would likely have a negligible impact on the operation performance of the surrounding network.

Due to low traffic generation associated with construction of the Project and the existing capacity in the surrounding road network, the Project is expected to have a minor impact on the operation of Old Punt Road. Therefore, no road upgrades are required to accommodate traffic generation associated with the Project.

Impacts on on-street parking facilities

On-street parking is not provided along the Pacific Highway, Old Punt Road and Tomago Road, which are the key roads within the vicinity of the Project Area.

Noting that sufficient parking spaces are expected to be provided for the Project in the dedicated parking areas during both construction and operation stages, the Project is not anticipated to impact on-local street parking.

Impacts on public and active transport

Bus services in the vicinity of the Project are unlikely to be impacted during construction. The operation of the Hunter Valley Bus Route 140 would not be impacted by construction activities related to the Project. No changes to bus stop locations are anticipated as a result of the Project.

During construction, noting that there is no existing dedicated walking or cycling facilities bordering the Project, appropriate signage, line marking and/or traffic controllers would be positioned to notify pedestrians and cyclists of temporary arrangements. The Project is not anticipated to result in impact to the operation of existing cycling or walking facilities.

Temporary disruptions during construction would be managed through the development of a CTMP. The community would be notified in advance of planned works through regular project notifications.

Impacts on road safety

Construction traffic volumes are expected to be moderately high during peak construction periods with up to 66 total heavy vehicle movements and 200 light vehicle movements anticipated each day. These volumes may temporarily increase traffic congestion around the Project Area and potentially cause road degradation due to heavy vehicle use.

There is a low crash and/or incident rate near the newly established access point off Old Punt Road. Construction and operation trip generation forecasts for the Project are expected to be lower than what was estimated and approved for the NPS EIS. Therefore, it is anticipated that the construction and operation impacts of the Project on road safety would be similar or lower than that reported in the NPS TIA.

Potential impacts on road safety during construction would be mitigated through the implementation of a CTMP and other management measures (refer to **Section 6.7.4** below).

Operation

The Project is anticipated to require up to six staff members during the operational stage on an intermittent basis. As a result, the traffic generation during operation would be very low, and as such is not expected to impact the road network surrounding the Site.

Impacts on on-street parking facilities

The Site would include approximately 10 light vehicle parking spaces during the operational phase, which is considered sufficient noting the expected low operational staffing requirements.

Impacts on road network performance

Heavy vehicle deliveries would be minimal during operation and the deliveries would likely occur outside of the typical road network peak hours. Accordingly, a summary of indicative peak light and heavy vehicle movements expected during AM peak and PM peak periods compared to those approved for the NPS project is provided in **Table 6.6-8**.

Table 6.6-8: Operation traffic generation forecast (trips/hr) – AM and PM peak hour

Vehicle type	Previously approved NPS			The Project		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Heavy vehicles (Deliveries)	10	10	20	1	1	2
Light vehicles (Staff/visitor movements)	23	23	46	6	6	12
All vehicles	**33**	**33**	**66**	**6**	**6**	**12**

Operation traffic generation forecasts for the Project are expected to be lower than what was estimated and approved for the NPS. Therefore, it is expected that the operational impacts of the Project would be similar or lower than that reported in the NPS TIA.

6.6.5 Mitigation measures

The environmental management measures for traffic, transport and access during the construction and operation of the Project are listed in **Table 6.7-11**. These measures would be included in a CTMP as part of the CEMP for the Project. With the implementation of these management and mitigation measures, potential impacts from the Project relating to traffic, transport and access are expected to be negligible.

Table 6.6-9: Mitigation and management measures

ID	Mitigation and management measures	Timing
T-1	Consultation would be carried out between Port Stephens Council, TfNSW, emergency services and other relevant authorities to minimise transport impacts during construction and secure additional approvals (e.g. for OSOM movements or as required under the Roads Act 1993 (NSW)).	Construction
T-2	Community consultation would be carried out and notifications would be issued in advance for proposed road, bus or pedestrian network changes through appropriate channels and forms of communication.	Construction, Operation
T-3	A Construction Traffic Management Plan (CTMP) would be prepared and include the following measures: • Vehicle access to and from the Project Area would be managed to minimise safety risk to pedestrians, cyclists and motorists. To minimise traffic impacts on the surrounding network, heavy vehicles would enter and exit the Project Area in a forward direction and outside of peak periods, where this is feasible. • Near the proposed site access, appropriate signage, line marking and/or traffic control measures would be used to direct and guide pedestrians, cyclists and motorists past the Project Area during oversized delivery and high usage times. • Workers would be encouraged to utilise the shuttle buses if deemed to be required as part of the Project or carpool. • The proposed Site access would be designed to ensure construction vehicles (including, OSOM, heavy and light vehicles) can safely enter the Site. • Heavy vehicle drivers associated with the construction work would be directed to access the site via the signal-controlled intersection of Old Punt Road and the Pacific Highway. • Potential provision of a channelised right turn treatment at the intersection of Old Punt Road with the site access, subject to further evaluation in later design stage.	Construction

6.7 Noise and Vibration

6.7.1 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 K (Noise and Vibration Assessment)** with relevant sections summarised within this chapter.

The noise and vibration impact assessment involved:

- Determining the existing background noise levels in accordance with the NSW Noise Policy for Industry, NSW Environment Protection Authority (NPfI, EPA 2017)
- Determining the construction noise and vibration management levels applicable to the identified sensitive receivers in accordance with the Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change, NSW (DECC 2009) and Assessing Vibration: A Technical Guideline (AVTG), Department of Environment and Conservation (DEC 2006)
- 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 in accordance with the EPA's NSW Road Noise Policy (RNP), Department of Climate Change, Environment and Water (DECCW 2011)
- Determining the industrial project noise trigger levels applicable to identified residential sensitive receivers and other nearby receivers in accordance with the NPfI
- Providing an operational noise and vibration assessment that presents the predicted noise emission levels from:
    - o The operation of the Project and compares them against the established project noise trigger levels
    - o Increases in road traffic noise levels due to vehicular movements in accordance with the RNP.

Construction noise assessment approach

The construction noise sources (consisting of construction plant and equipment) were modelled with all construction equipment assumed to be operating simultaneously and at the nearest point of the Project Area boundary to represent a conservative scenario. The following representative construction scenarios were modelled for the construction noise assessment alongside their combined sound power levels (SWP):

- Enabling works – 122 dB(A)
- Civil, structural, mechanical, electrical works – 120 dB(A)
- Transmission connection – 120 dB(A)
- Commissioning – 104 dB(A)
- Demobilisation – 114 dB(A).

The construction vibration assessment considered the potential for structural damage from vibration, and the potential for disruption to human comfort. Structural damage caused by vibration was assessed against German Standard DIN 4150 and British Standard BS 7385-2. Human comfort was assessed against AVTG.

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 specific noise criteria for the Project based on the requirements of the NPfI is presented in **Table 6.7-1** below.

6.7.2 Existing environment

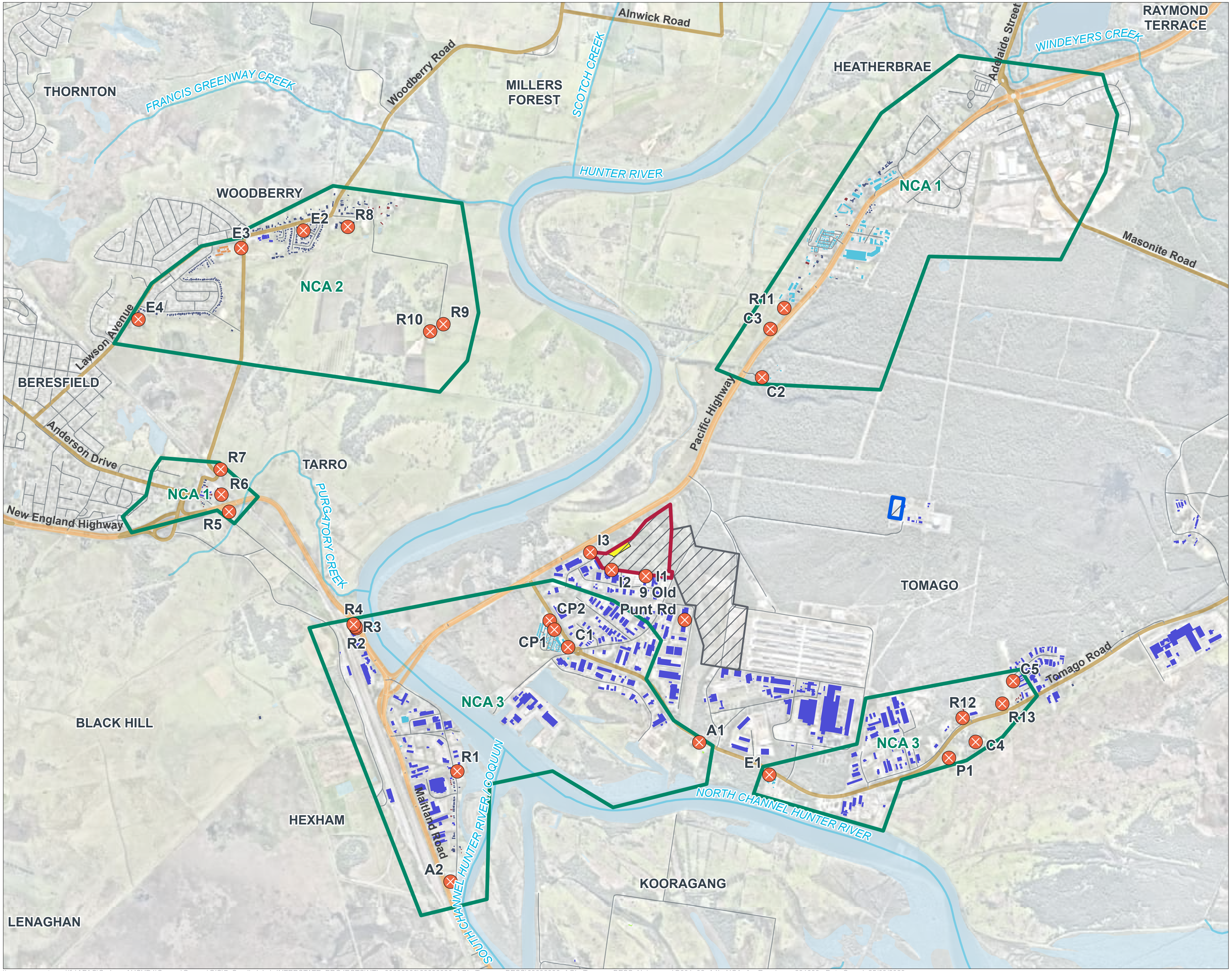
Acoustic receivers

The existing acoustic environment is largely defined by nearby industrial operations and highway traffic. **Figure 6.7-1** shows noise sensitive receivers which could potentially be affected by the Project and that have been considered in the noise assessment. The closest residential receivers are approximately 600 m to the south of the Site. Between these receivers and the Site is an existing industrial estate and other commercial and industrial land uses. Other residential areas are located in Hexham, Heatherbrae, Woodberry, and Tomago. The receiver locations for the assessment, along with the land use classification of each receiver (as defined in the NPfI), are presented in **Table 6.7-1** and shown in **Figure 6.7-1**.

Table 6.7-1: Key assessment receivers within the vicinity of the Project

Receiver	Address	Land use classification
R1, R2	'Sweetwater Grove', 819 Tomago Road, Tomago	Residential – Urban
R3	34 Old Maitland Road, Hexham	Residential – Urban
R4	209 Maitland Road, Hexham	Residential – Urban
R5	211 Maitland Road, Hexham	Residential – Urban
R6	213 Maitland Road, Hexham	Residential – Urban
R7	1 Woodlands Close, Tarro	Residential – Suburban
R8	1 Anderson Drive, Tarro	Residential – Suburban
R9	13 Woodberry Road, Tarro	Residential – Suburban
R10	14 Nilands Lane, Woodberry	Residential – Suburban
R11, R12	135 Oakfield Road, Woodberry	Residential – Suburban
R13	2171 Pacific Highway, Heatherbrae	Residential – Suburban
R14	47 School Drive, Tomago	Residential – Urban
R15	374 Tomago Road, Tomago	Residential – Urban
E1	CSNSW Hunter Training Facility	Education
E2	Dimple's Family Day Care	Education
E3	Woodberry Learning Centre	Education
E4	Samaritans Woodberry Early Learning Centre	Education
P1	Tomago House Chapel	Place of Worship
A1	Tomago Bowling Club	Active Recreation Area
A2	Hexham Bowling Club	Active Recreation Area
C1	Tomago Industrial Supplies	Commercial Premises
C2	Hunter Region Botanic Gardens	Commercial Premises
C3	Shell Coles Express Motto Farm	Commercial Premises
C4	Tomago House	Commercial Premises

Receiver	Address	Land use classification
C5	Ross Tyre Centre	Commercial Premises
I1	TS Global	Industrial Premises
I2	Euroform Industries	Industrial Premises
I3	Caravan Fix – Newcastle	Industrial Premises



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Legend
- Receiver
- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- NCAs
- TfNSW Temproary Lease Area
- Water Body
- Watercourse
- Motorway
- Primary Road
- Local Road

Building Usage
- Active Recreation
- Commercial
- Education
- Industrial
- Place of Worship
- Residential
- Shed

FIGURE 6-7.1: NOISE CATCHMENT AREAS (NCAS) AND ASSESSMENT RECEIVERS

Source: Nearmap, 2022.

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Noise monitoring

Long-term unattended measurements were previously conducted at three locations around the Site by Environmental Resources Management (ERM) Australia. The noise logging data collated by ERM (2019) established the existing ambient and background noise environment at potentially affected receivers in the vicinity of the Site. A noise monitoring baseline from 2019 is considered satisfactory for the assessment of the Project Area, given there has been no recent material changes in the surrounding land uses (primarily industrial).

Noise monitoring was conducted between 4 February and 25 February 2019. The noise loggers were placed at:

- 2171 Pacific Highway, Heatherbrae
- 135 Oakfield Road, Woodberry
- 838 Tomago Road, Tomago.

Refer to **Figure 6.7-2** for noise logging locations.

The background noise level is defined by the EPA as '*the underlying level of noise present in ambient noise… when extraneous noise is removed*'. It can include sounds that are typical features of a location and may include birds, traffic and insects. The background noise level is represented by the L_{A90} descriptor. The noise levels previously measured provide a single rated background level (RBL) for each day, evening and night period in accordance with the NPfI, for each monitoring location. A summary of the measurement data is presented in **Table 6.7-2**.

Table 6.7-2: Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Noise monitoring location	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]
L1	55	52	49	46	44	41
L2	52	52	47	37	37[2](38)	37
L3	60	57	56	52	48	41

Notes:

1. *Day is defined as 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.*
   Evening is defined as 6pm to 10pm Monday to Sunday and Public Holidays.
   Night is defined as 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.
2. *Application notes to the Noise Policy for Industry indicate that the community generally expects a greater control of noise during the evening and night as compared to the daytime. Therefore, the rating background level for the evening is set to no more than that for the daytime.*

AECOM

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Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- TfNSW Temprorary Lease Area
- Water Body
- Watercourse
- Motorway
- Primary Road
- Local Road
- Noise Logging Location

FIGURE 6-7.2: NOISE MONITORING AND SUBJECT SITE LOCATION

Source: Nearmap, 2022.

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Noise catchment areas

The construction noise and vibration study area has been divided into three distinct noise catchment areas (NCA). The noise environment at each of the sensitive receivers within a NCA is considered to have a similar noise environment to the unattended monitoring location within that NCA. Where an NCA does not have an unattended monitoring location within it, it is associated with a monitoring location most similar to it based onsite observations. As such, each of the sensitive receivers within an NCA is assigned the same background noise level and noise management level (NML). The location of each NCA is shown in **Figure 6.7-1**.

Details of the construction NMLs in each NCA are provided in **Table 6.7-3**.

Table 6.7-3: Noise catchment areas and construction noise management levels

NCA	Representative logger	Period	Rating background level, dB(A)	Construction noise management level (NML)[1,2,3]
1	L1 – NCA01	Day	46	56 (51)[3]
		Evening	44	49
		Night	41	46
2	L2 – NCA02	Day	37	47 (42)[3]
		Evening	37	42
		Night	37	42
3	L3 – NCA03	Day	52	62 (57)[3]
		Evening	48	53
		Night	41	46

Notes:
1 *Day noise management levels = RBL + 10 dB(A)*
2 *Evening/night NMLs = RBL + 5 dB(A)*
3 *Day Out of Hours Management level given in brackets = RBL + 5 dB(A), for example Saturday 1pm to 6 pm, Sundays or public holidays*

Project specific noise criteria

Based on the RBLs for each of the NCAs, the environmental noise criteria in **Table 6.7-4** would be used to assess the potential noise impacts from the operation of the Project.

Table 6.7-4: Project specific noise levels

Receiver area	Period[1]	RBL ($L_{A90, 15 min}$)	Intrusive criterion ($L_{Aeq, 15 min}$)	Amenity criterion ($L_{Aeq, Period}$)	Project specific noise criteria, (L_{Aeq})[2]
NCA01	Day	46	51	53	51
	Evening	44	49	43	43
	Night	41	46	38	38
NCA02	Day	37	42	53	42
	Evening	37	42	43	42
	Night	37	42	38	38

Receiver area	Period[1]	RBL ($L_{A90,\ 15\ min}$)	Intrusive criterion ($L_{Aeq,\ 15\ min}$)	Amenity criterion ($L_{Aeq,\ Period}$)	Project specific noise criteria, (L_{Aeq})[2]
NCA03	Day	52	57	58	57
	Evening	48	53	48	48
	Night	41	46	43	43

Notes:

1. *Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays and Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday and Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays and Public Holidays.*
2. *Project specific noise levels determined as the lowest of the intrusive and amenity criteria.*

The NPfI also requires the potential for sleep disturbance to be assessed by considering maximum noise levels events during the night-time period. The NPfI provides a method for determining project specific sleep disturbance criteria based on measured background noise levels during the night (refer to **Appendix K (Noise and vibration assessment)**). However, as the Project would operate during the night-time period and noise from the BESS and other equipment onsite is predicted to be steady-state and non-impulsive, compliance with the night-time project specific noise levels (refer to **Table 6.7-4**) will ensure compliance to relevant sleep disturbance criteria.

6.7.3 Potential impacts

Construction

Residential receivers

The results of the construction noise impact assessment are summarised below. **Table 6.7-5** presents the number of residential properties within the identified NCAs where the construction NMLs may potentially be exceeded.

No residential receivers for any construction scenario are expected to experience noise levels above the construction NML. As such, no receivers are expected to be highly noise affected.

Table 6.7-5: Number of residential buildings where noise levels may exceed NML

Phase	Number of residential buildings where noise levels may exceed NML/HAL across the study area											
	Exceedance of NMLs during ICNG standard construction hours			Exceedance of NMLs outside of ICNG standard construction hours (daytime)				Exceedance of NMLs outside of standard construction hours (night)				Highly affected > 75 dB(A)
	1-10 dB	11-20 dB	> 20 dB	1-5 dB[4]	6-15 dB[1]	16-25 dB[2]	> 25 dB[3]	1-5 dB[4]	6-15 dB[1]	16-25 dB[2]	> 25 dB[3]	
Enabling works	0	0	0	0	0	0	0	-	-	-	-	0
Civil, structural, mechanical, and electrical works	0	0	0	0	0	0	0	-	-	-	-	0
Transmission connection	0	0	0	0	0	0	0	-	-	-	-	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0	0
Demobilisation	0	0	0	0	0	0	0	-	-	-	-	0

Notes:
1. *Clearly audible*
2. *Moderately intrusive*
3. *Highly intrusive*
4. *Noticeable*

Other receivers

Table 6.7-6 presents the construction noise modelling results for non-residential receivers. It shows the number of non-residential receivers where the NMLs are likely to be exceeded during their hours of use. The activities associated with the construction components for the Project are expected to exceed the NMLs at one industrial premises directly adjoining the Site (9 Old Punt Road, Tomago) during the daytime.

Table 6.7-6: 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	-	-	-
Civil, structural, mechanical, and electrical works	-	-	-
Transmission connection	1	-	-
Commissioning	-	-	-
Demobilisation	-	-	-

Construction traffic noise assessment

The following information has been provided regarding predicted construction traffic activities during peak construction:

- 400 light vehicle movements per day
- 66 heavy vehicles movements per day.

A Traffic Impact Assessment was previously conducted by SECA Solution for Newcastle Power Station, reference R1451. The assessment included a manual traffic survey at the intersection between Old Punt Road and Tomago Road. The Traffic Impact Assessment provided AM and PM peak traffic along Tomago Road (sub-arterial road). The sum of the AM and PM peak traffic has been used to present the daily traffic flow. This approach is conservative as it ignores daily traffic outside of peak periods.

Table 6.7-7 presents the existing traffic flow on Tomago Road, maximum additional construction traffic, relative increase and daytime total traffic noise level.

The noise increase on Tomago Road is likely to be less than 2 dB(A) during the peak construction period for a worst-case scenario. Therefore, no further consideration assessment is required, in accordance with the RNP.

Table 6.7-7: Existing traffic flows and additional construction traffic

Road	Existing daytime flow		Additional average daytime flow[1]		Relative noise increase, dB(A)
	Light	Heavy	Light	Heavy	
Tomago Road (West of Old Punt Road)	2,822	335	400	66	0.7

Construction vibration assessment

Vibration may be generated by certain construction equipment. The minimum working distances of these items to offsite receivers are shown in **Table 6.7-8**. If these minimum working distances are complied with, no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic/structural damage. The closest residential receiver is more than 600 m from the Site, therefore, the Project can comply with minimum working distances at this location for residential receivers. The closest industrial receiver is approximately 25 m from the Site. These receivers may exceed human response criteria but not cosmetic damage criteria. To address this, sensitive receivers likely to be affected would be notified at least five days prior to the commencement of works associated with the scenario that may have an adverse noise or vibration impact, as described in **Section 6.7.4**.

Equipment size would be selected by the construction contractor and would consider the minimum working distances and the distance between the area of construction and the nearest receiver.

Table 6.7-8: Recommended safe working distances for vibration intensive plant

Plant	Rating/Description	Minimum working distance	
		Cosmetic damage (BS7385) Light-framed structures	Human response
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	<300 kN (Typically 7-13 tonnes)	15 m	100 m
Jackhammer	Handheld	1 m nominal	Avoid contact with structure

Operation

Operational noise levels

A reasonable worst-case operational scenario was developed to complete a conservative assessment of the potential noise impacts related to the operation of the Project. The worse-case scenario modelled assumed that all of the proposed equipment within the BESS facility would operate at full capacity, 24 hours a day, seven days a week.

The operational equipment is generally categorised as steady-state or quasi steady-state noise sources which typically produce continuous and consistent noise levels. The sound power levels for the electrical equipment were provided by the manufacturer and have been used to model the potential noise emission. The sound power level inputs presented in **Table 6.7-9** were used in the noise modelling and were assumed to be operating continuously for the entire 15 minute period.

Given that the night-time residential project noise trigger levels are the most stringent, the worst-case operational scenario has been assessed against the night-time residential project noise trigger levels. Compliance with the night-time project noise trigger levels demonstrates compliance for all residential receivers during the day and evening.

Operational noise impacts at non-residential receivers were also based on the night-time operational scenario and compared with the relevant noise trigger levels for non-residential receivers.

Table 6.7-9: Operational plant items sound power levels

Plant item/operation	Sound power level, L_{Aeq}, dB(A)
Battery (Based on GridSolv Quantum)	79
Inverter (Based on SMA Kodiak 2.0)	91
Network transformer	93[1]
Kiosk transformer	59[1]
Auxiliary transformer	56[1]
Inverter transformer	57[1]

Notes:

1 *Sound Power Level calculated using AS/NZS 60076.10:2009 Power Transformers, Part 10 Determination of Sound levels*

Predicted noise levels at nearby noise sensitive receivers are presented in **Table 6.7-10**. The predicted operational noise emissions from the Project comply with the most stringent (night-time) operational noise criteria at all locations. Both standard and noise enhancing meteorological conditions were considered, with the following parameters:

- Standard meteorological conditions – Pasquill-Gillford stability category D (neutral conditions) with wind speed up to 0.5 m/s at 10 m.
- Noise enhancing meteorological conditions – Pasquill-Gillford stability category D (neutral conditions) 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.

Only one receiver, R1 – Sweetwater Grove, could potentially have an exceedance during noise enhancing meteorological conditions; however, this exceedance is 2 dB(A) and, in accordance with the NPfI, exceedances of up to 2 dB are considered negligible. As such this exceedance would not be discernible to the average listener and would not warrant receiver-based treatments or controls.

In addition, a 5 dB penalty has been added to the inverter noise level as typical inverters may have tonal characteristics at the source. The total noise level at sensitive receivers may not be tonal due to existing background noise and environmental attenuation; however, to be conservative the inverter tonality has been included. This would be reviewed at detailed design stage.

Table 6.7-10: Predicted operational noise levels under standard and noise enhancing meteorological conditions

Noise catchment area (NCA)	Receiver	Project noise trigger levels, $L_{Aeq,15minute}$, dB(A)	Predicted L_{Aeq} noise levels, dB(A)		Compliance	
			Standard met conditions	Noise enhancing met conditions[1]	Exceedance, dB(A)	Yes/ No
NCA01	R7	38	25	28	-	Yes
	R8	38	25	28	-	Yes
	R9	38	24	28	-	Yes
	R13	38	31	35	-	Yes
	C2	65	35	39	-	Yes
	C3	65	32	36	-	Yes
NCA02	R10	38	24	27	-	Yes
	R11	38	30	33	-	Yes
	R12	38	30	33	-	Yes
	E2	40	23	26	-	Yes
	E3	40	22	25	-	Yes
	E4	40	20	23	-	Yes
NCA03	R1	43	42	45	2	Yes[2]

Noise catchment area (NCA)	Receiver	Project noise trigger levels, $L_{Aeq,15minute}$, dB(A)	Predicted L_{Aeq} noise levels, dB(A)		Compliance	
			Standard met conditions	Noise enhancing met conditions[1]	Exceedance, dB(A)	Yes/ No
	R2	43	38	42	-	Yes
	R3	43	30	34	-	Yes
	R4	43	30	34	-	Yes
	R5	43	30	33	-	Yes
	R6	43	30	33	-	Yes
	R14	43	29	32	-	Yes
	R15	43	27	30	-	Yes
	E1	40	34	37	-	Yes
	P1	40	29	32	-	Yes
	A1	55	37	40	-	Yes
	A2	55	27	31	-	Yes
	C1	65	43	46	-	Yes
	C4	65	28	31	-	Yes
	C5	65	27	30	-	Yes
	I1	70	62	64	-	Yes
	I2	70	57	59	-	Yes
	I3	70	52	55	-	Yes

Notes:

1. *Adverse weather considers the worst case of 3 m/s source to receiver wind and temperature inversions.*
2. *In accordance with the EPA Noise Policy for Industry, exceedances of up to 2 dB are considered negligible. They would not be discernible to the average listener and therefore would not warrant receiver-based treatments or controls.*

Operational road traffic noise

The BESS would have a workforce of approximately six staff during operation on an intermittent basis. Periodic asset management staff and contractors are also expected to occasionally visit the Site. Minimal traffic movement generation is expected as a result of the operation of the BESS. Therefore, noise impacts arising from operational traffic would not occur and would not increase existing road traffic noise levels by more than 2 dB(A).

6.7.4 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 all residential and most non-residential receivers during the construction stage. To manage potential noise impacts during construction, reasonable and feasible noise mitigation measures and work practices would be implemented. These measures would be outlined in a Construction Noise and Vibration Management Plan (CNVMP) which would form part of the Construction Environmental Management Plan (CEMP).

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, 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.

Noise and vibration mitigation measures to address the potential impacts of the Project identified in this assessment are outlined in **Table 6.7-11**.

Table 6.7-11: Noise and vibration mitigation and management measures

ID	Environmental safeguards	Timing
NV-1	A Construction Noise and Vibration Management Plan would be prepared as part of the Construction Environmental Management Plan. The CNVMP would identify: • 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, Construction
NV-2	All sensitive receivers likely to be affected by noise during construction would be notified at least five days prior to commencement of works associated with the scenario that may have an adverse noise or vibration impact. The notification would include details of: • The Project • Construction period and construction hours • Contact information for proposal management staff • Complaint and incident reporting and how to obtain further information.	Construction
NV-3	• All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant proposal specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.	Construction

ID	Environmental safeguards	Timing
NV-4	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Works generating high noise and/or vibration levels where feasible would be scheduled during less sensitive time periods.	Construction
N-1	The following would be implemented for deliveries to and from the Site: • Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers • Dedicated loading/unloading areas are to be shielded if close to sensitive receivers • Delivery vehicles are to be fitted with straps rather than chains for unloading, wherever possible • Construction site would be arranged to minimise the need for reversing associated with regular/repeatable movements.	Construction
N-2	Non-tonal reversing beepers (or an equivalent mechanism), where feasible and reasonable, must be fitted and used on all construction vehicles and mobile plant regularly used onsite and for any out of hours work.	Construction
N-3	In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures may be required. These measures include the following: • Monitoring • Notification (letterbox drop or equivalent) • Specific notifications • Phone calls • Individual briefings • Respite offers • Respite periods • Duration respite • Alternative temporary accommodation.	Construction

6.8 Bushfire

6.8.1 Overview

A Bushfire Risk Assessment (BRA) technical report was prepared by Blackash Bushfire Consulting Pty Ltd (Blackash) for the Project. The assessment includes an analysis of the hazard, threat, and subsequent bushfire risk to the Project and provides recommendations that satisfy the aims and objectives of the *Planning for Bushfire Protection 2019* (PBP 2019) guidelines.

6.8.2 Methodology

The BRA was prepared taking into consideration the following legislative policies, Acts, and guidelines:

- Australian Standard for Construction of Buildings in Bushfire Prone Areas (AS 3959)
- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- Guide for Bush Fire Prone Land Mapping
- ISSC 20 – Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure
- National Construction Code 2022 (NCC)
- NASH Standard for Steel Framed Construction in Bushfire Areas 2014
- Planning for Bushfire Protection 2019 (PBP 2019), NSW Rural Fire Service
- Rural Fires Act, 1997
- Standards for Asset Protection Zones, NSW Rural Fire Service.

A full description of how these policies, Acts, and guidelines were applied is provided in the BRA (refer to **Appendix I (Bushfire Risk Assessment)**).

The BRA, including a bushfire landscape assessment, was undertaken which 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 assessment included a review of the *Lower Hunter Bush Fire Risk Management Plan 2009* (RFS 2009), for information pertaining to climate and bushfire season, population, and bushfire history.

Further assessment within the BRA involved the use of Blackash's Landscape Scale Assessment Tool (LSAT), which combines quantitative and qualitative techniques scaffolded from the *Victorian Planning Permit Applications Bushfire Management Overlay – Landscape Scale Threat Assessment*. Key considerations in the assessment included:

- Extent and continuity of vegetation
- Topography
- Prevailing winds
- Potential fire run and areas likely to be impacted by a fire
- Impact on evacuation routes to safer places considering road networks, distances, and landscape factors
- Location and exposure of the Project to bushfire
- Ability to seek bushfire shelter onsite or at alternative locations
- Extent of neighbourhood-scale damage that a bushfire may produce.

Bushfire Attack Levels (BAL) were determined in accordance with PBP 2019. The methodology for determining BAL comprised the following steps:

- Step 1: Determine vegetation formation in all directions around the building to a distance of 140 m
- Step 2: Determine the effective slope of the land from the building for a distance of 100 m

- Step 3: Determine the relevant Forest Fire Danger Index (FFDI) for the council area in which the development is to be undertaken
- Step 4: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall of an asset
- Step 5: Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables in PBP 2019.

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the Site, and which determine the planning and building response of PBP 2019. A detailed assessment was undertaken to determine the bushfire hazard and likely radiant heat at the Site (refer to **Appendix I (Bushfire Risk Assessment)**).

6.8.3 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

The entire Project Area is designated as bushfire prone land (BFPL). The BFPL Map (refer **Figure 6.8-1**) shows:

- The majority of the internal area of the Site as predominantly Bushfire Vegetation Category 3 (Grassland). The eastern portion of the Site includes a strip of Bushfire Vegetation Category 1 (Forest), which extends further to the east of the Site which is mapped as Bushfire Vegetation Category 1 (Forest/Wetlands).
- The landscape surrounding the Site to the north and west are predominantly Bushfire Vegetation Category 3 (Grassland).
- The transmission lines easement traverses both Bushfire Vegetation Category 1 (Forest) and Bushfire Vegetation Category 3 (Grassland).
- The NGSF construction laydown area is impacted by the 100 m Vegetation Buffer associated with the Bushfire Vegetation Category 1 (Forest) that surrounds the area.

The grassland surrounding the Site is considered unmanaged land, and as such requires consideration and 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. A slope assessment was undertaken as part of the BRA (refer to Section 19 of the BRA). 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 ‘effective slope’ is the slope of the ground under the hazard (vegetation), not the slope between the vegetation and the asset.

The effective slope influencing fire behaviour approaching the Site has been assessed in accordance with the methodology specified within PBP 2019. This is conducted by measuring the worst-case scenario slope where the vegetation occurs over a 100 m transect measured outwards from the Site boundary. The effective slopes impacting the Site is illustrated in **Figure 6.8-2**.

Vegetation and fuel

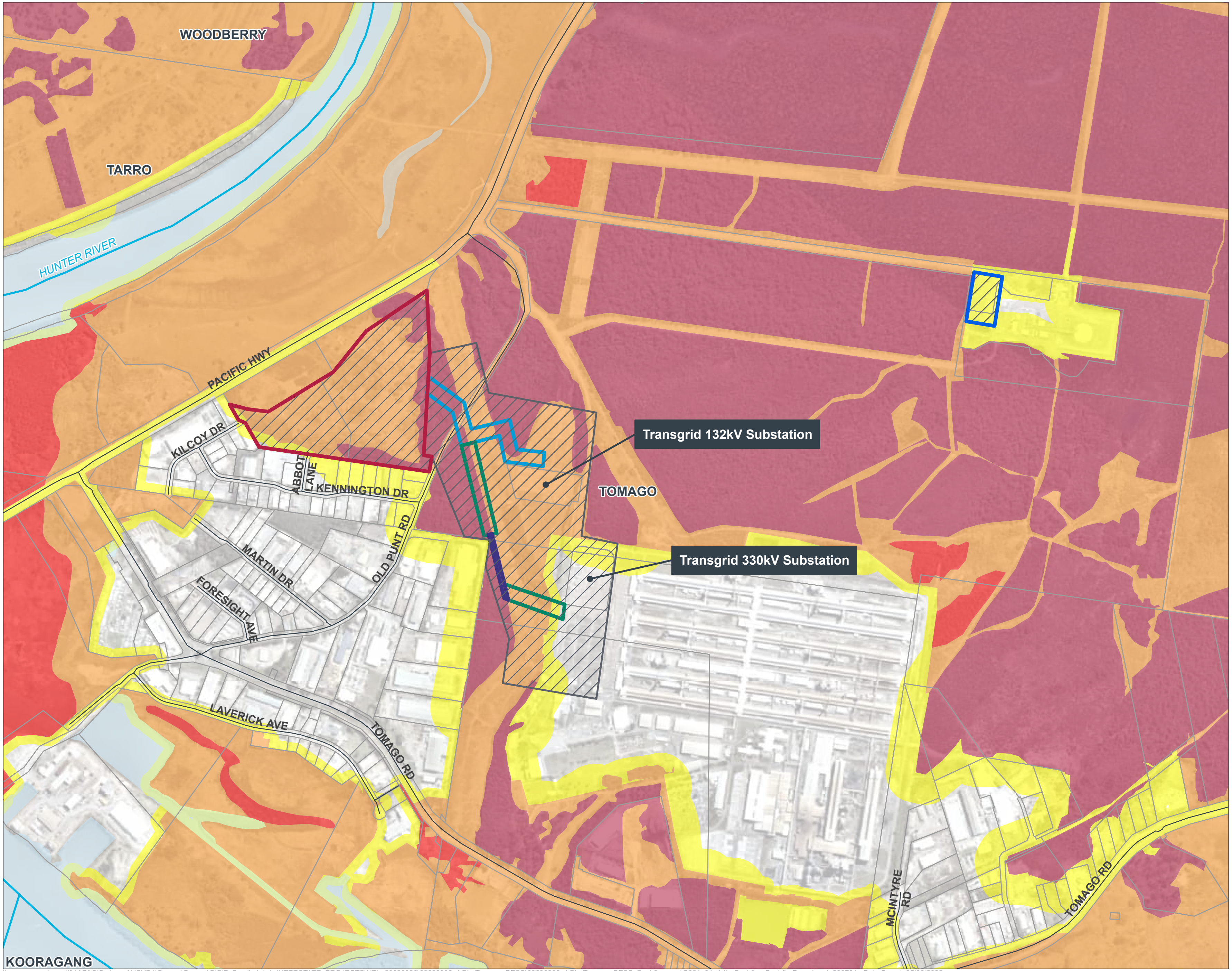
Vegetation is classified by structure or formation using the system adopted by David Keith (2004) and by the general description using PBP 2019. Vegetation types give rise to radiant heat and fire behaviour characteristics. The predominant vegetation has been determined for the Site over a distance of at least 140 m in all directions from the proposed Site boundary or key Project assets. Where a mix of vegetation types exist, the type providing the greater hazard to the Site is said to predominate. The land surrounding the Site has been assessed and the classified vegetation categorised as ‘Grassland’ and ‘Forest’ type vegetation (refer **Figure 6.8-3**).

Fire weather and history

The fire weather is dictated by PBP 2019 and assumes a credible worst-case scenario and an absence of other mitigating factors relating to aspect or prevailing winds. The Forest Fire Danger Index (FFDI) measures the degree of danger of fire in Australian vegetation.

For the purposes of PBP 2019, the FFDI required to be used for development assessment purposes is based on local government boundaries. The Site has an FFDI of 100 as required by the RFS and PBP 2019. It may be possible that days of higher FFDI may be experienced at the Site. This may result in fire situations where conditions challenge survivability of buildings and their occupants. The framework provided for by PBP 2019 was used in the BRA (Blackash, 2023) and informed this assessment.

The broader landscape in relative proximity to the Site has a history of bushfires. **Figure 6.8-4** shows the fire history in the vicinity of the Site. No fire records directly affect the Site. However, significant bushfires have been identified within a 5 km radius of the Site. Most notably, the largest bushfire within 5 km of the Site was experienced in the bushfires of 2013/2014, which burnt to the northeast of the Site.



AECOM

m
0 150 300

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Proposed 132kV Line Easement
- 330kV Line Easement Yet to be Determined
- 330kV Line Easement Possible Underground Section
- Cadastral Boundary
- Watercourse
- Road
- Water Body

Bushfire Prone Land

- Category 1
- Category 2
- Category 3
- Vegetation buffer

FIGURE 6.8-1: BUSHFIRE PRONE LAND

Source: Nearmap, 2022.

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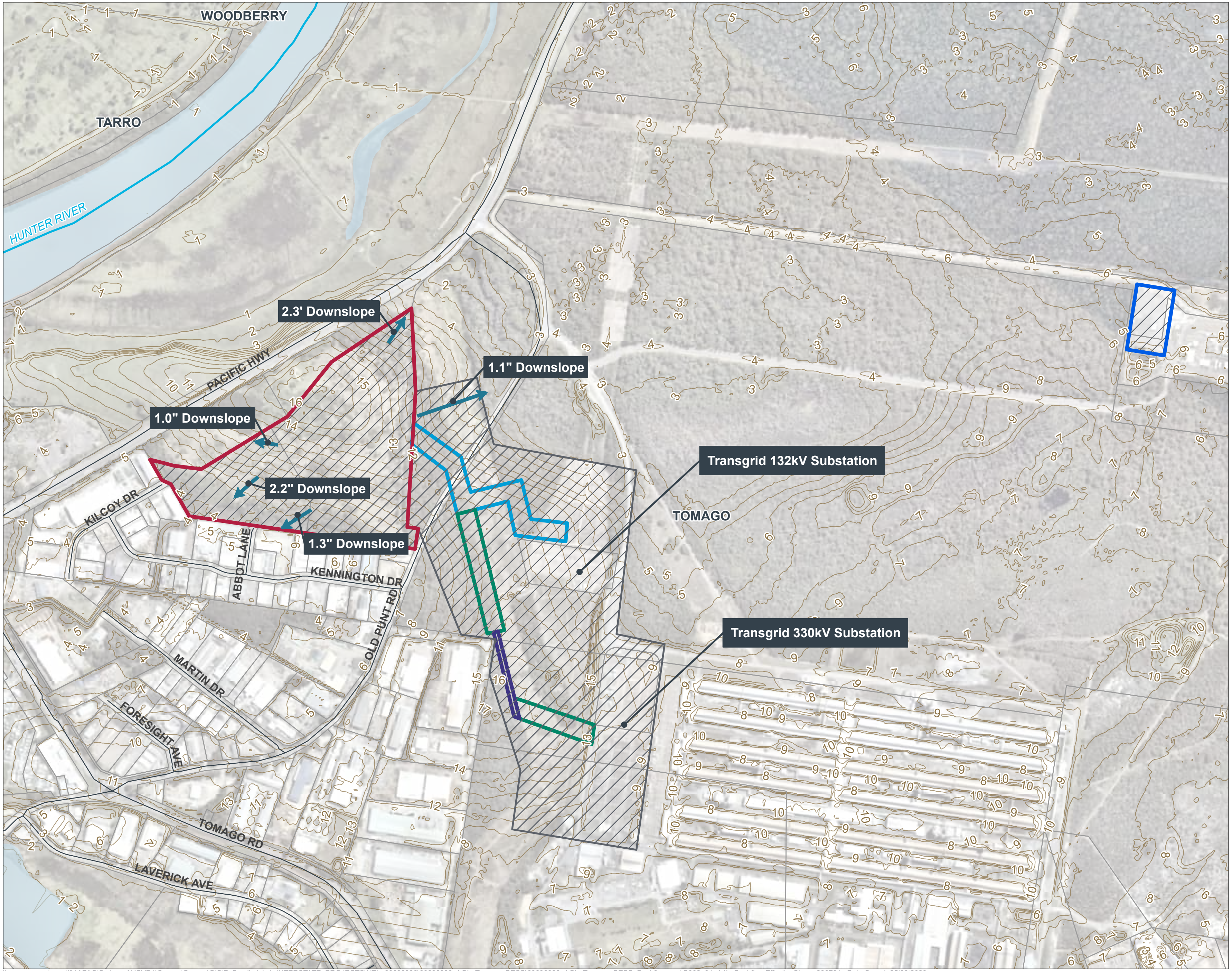

AECOM

N

0 150 300 m

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Proposed 132kV Line Easement
- 330kV Line Easement Yet to be Determined
- 330kV Line Easement Possible Underground Section
- Cadastral Boundary
- Water Body
- Watercourse
- Road
- 1m Contours

Slope Direction

- Feature

FIGURE 6.8-2: EFFECTIVE SLOPE

Source: Nearmap, 2022.

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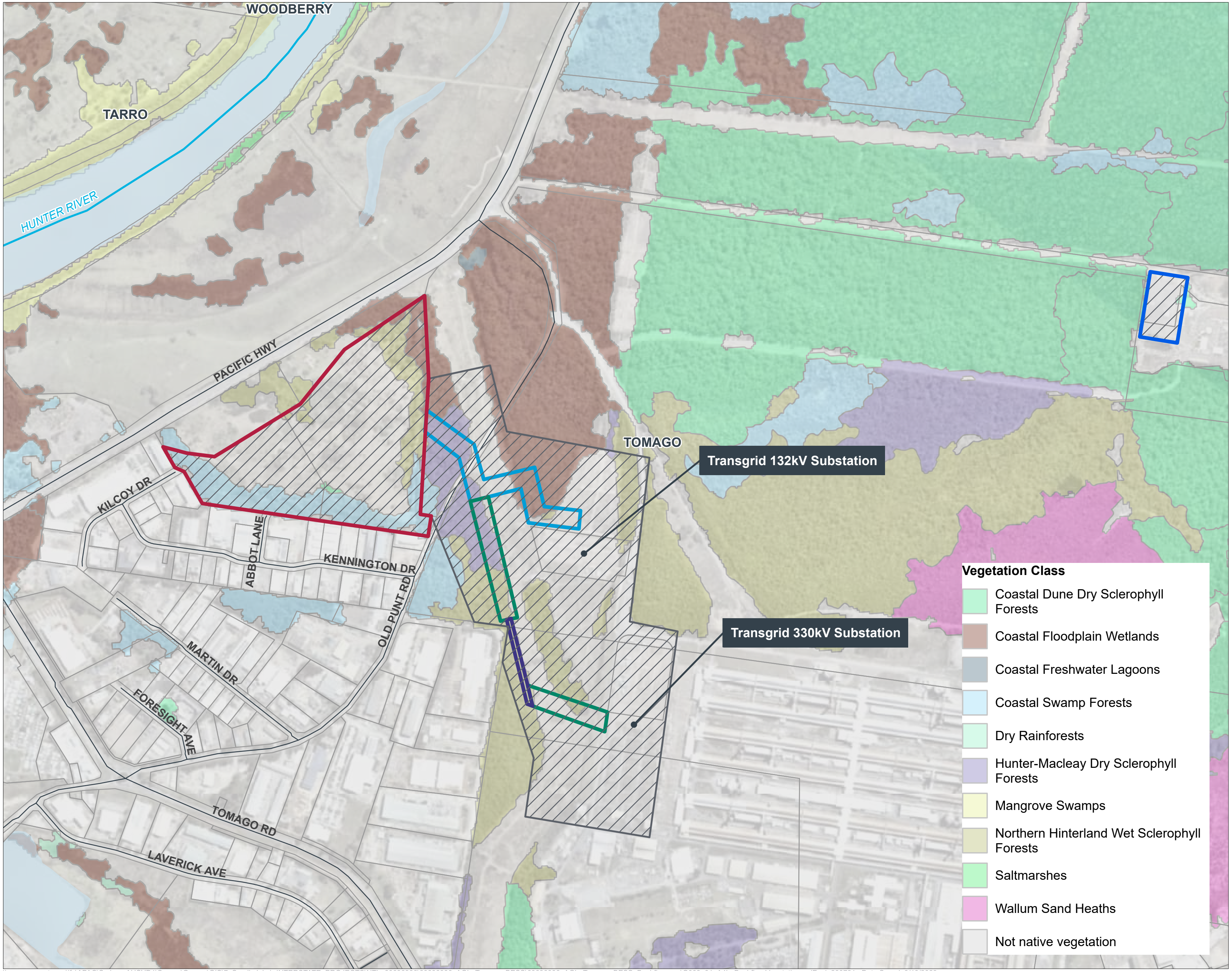


AECOM

N

0 150 300 m

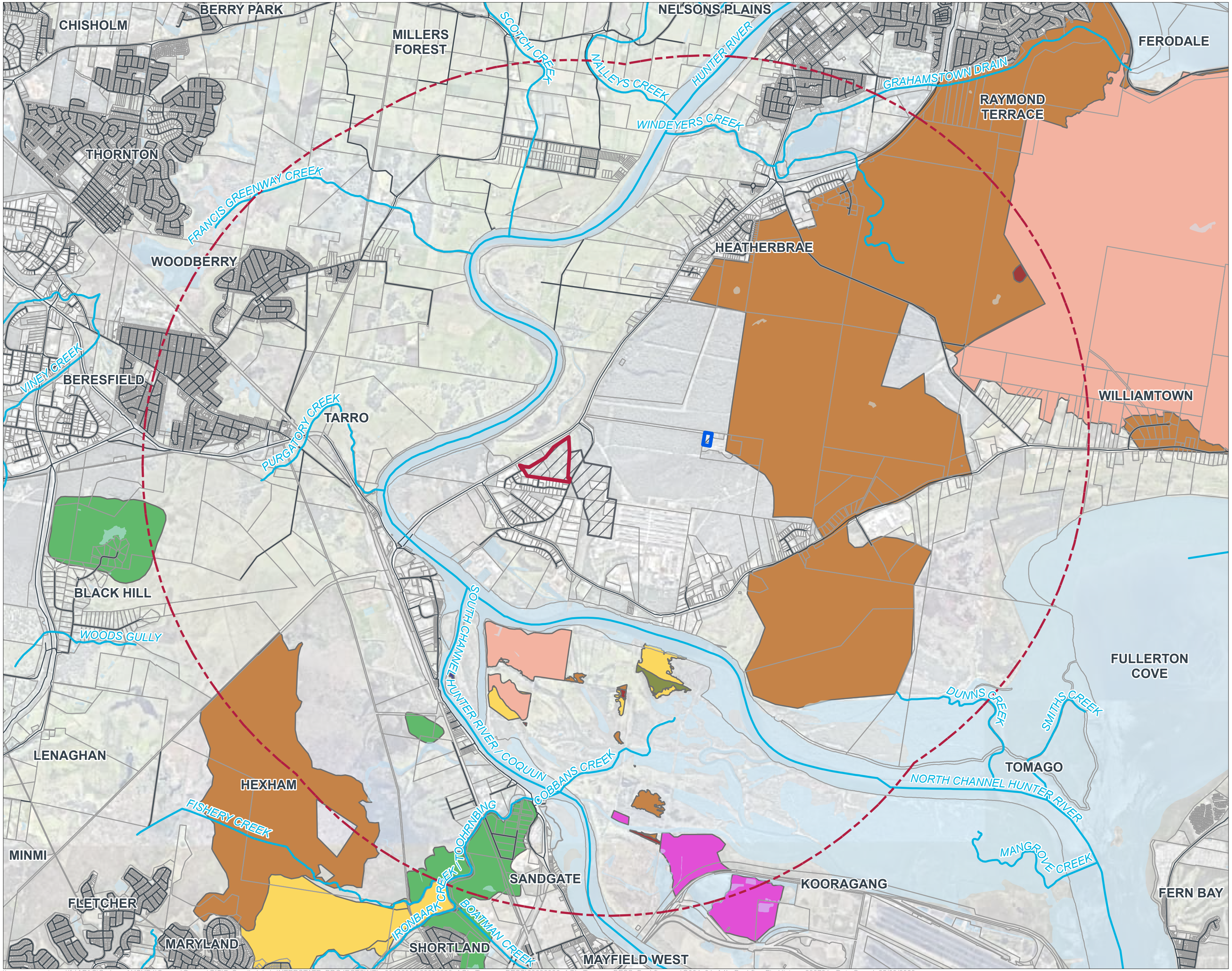
Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Proposed 132kV Line Easement
- 330kV Line Easement Yet to be Determined
- 330kV Line Easement Possible Underground Section
- Cadastral Boundary
- Water Body
- Watercourse
- Road

FIGURE 6.8-3: VEGETATION AND FUEL

Source: Nearmap, 2022.

\\na.aecomnet.com\lfs\APAC\Sydney-AUSYD1\Secure\Groups\GIS\7_Small_Jobs_INTERSTATE_PROJECTS\NTL_60696986\60696986_AGL_Tomago_BESS\60696986_AGL_Tomago_BESS_Bushfire.aprx\G003_01_A4L_Bushfire_VegetationandFuel_230731 Date Saved: 3/10/2023



AECOM

N

0 0.5 1 km

Legend

- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Water Body
- Watercourse
- Road

Fire History

- 1990-95 Wildfire
- 2001-2012 Wildfire
- 2013-14 Wildfire
- 2014-15 Wildfire
- 2016-17 Wildfire
- 2017-18 Wildfire
- 2018-19 Wildfire
- 2021-22 Wildfire
- 2022-23 Wildfire

FIGURE 6.8-4: FIRE HISTORY

Source: Nearmap, 2022.

6.8.4 Potential impacts

Construction

This section presents a summarised assessment of the potential impacts that could not be avoided or minimised and are expected to occur as part of Project construction.

The key potential impacts relating to bushfire during construction include:

- Onsite ignitions which may result in a fire escaping to the surrounding land and spreading in an uncontrolled manner causing damage to assets associated with the Project or external to the Site
- Occupational fire risk being the risk of workers being caught by out-of-control bushfire impacting the Site or while using the access and egress routes.

For construction, key management measures to reduce identified impacts include:

- Emergency management procedures during construction, including:
  - Provision of access for first responders
  - Water for firefighting - an adequate supply of water is essential for first response firefighting purposes.
- Formalising the Site as an APZ to be managed to IPA standards
- Postponing non-essential work on days with Fire Danger Rating (FDR) of Extreme and Catastrophic.

Details of management measures that would be undertaken to reduce impacts are further outlined in Section 31 of the BRA (**Appendix I (Bushfire Risk Assessment)**).

Operation

This section presents a summarised assessment of the potential impacts that could not be avoided or minimised and are expected to occur as part of Project operations.

The key potential impacts relating to bushfire during operation include:

- Onsite ignitions which may result in a fire escaping to the surrounding land and spreading in an uncontrolled manner causing damage to assets with and external to the site
- Occupational fire risk being the risk of workers being caught by out-of-control bushfire impacting the site or while using the access and egress routes
- Disruption to power supply if the site is impacted by fire
- Loss of critical infrastructure.

For operation, key management measures to reduce identified impacts include:

- Emergency management procedures during operation, including:
  - Provision of access for first responders
  - Water for firefighting - an adequate supply of water is essential for first response firefighting purposes.
- Suspension of certain activities on days of elevated fire danger
- Vegetation management as part of AGL’s inspection and management program.

6.8.5 Mitigation measures

Table 6.8-1 provides the measures to mitigate the impact of bushfire. Mitigation measures have been drawn from Section 31 of the BRA (**Appendix I (Bushfire Threat Assessment)**).

Table 6.8-1: Mitigation measures for design and pre-construction

ID	Environmental Safeguards	Timing
BF-1, BF-8	• At the commencement of construction works the entire Site would be managed as an APZ (IPA) as outlined within Appendix 4 of PBP 2019 and the NSW RFS's document 'Standards for asset protection zones' • The APZ would be managed in perpetuity • APZ requirements are: **Trees** • Tree canopy cover should be less than 15% at maturity • Trees at maturity should not touch or overhang the building • Lower limbs should be removed up to a height of 2 m above the ground • Tree canopies should be separated by 2-5 m • Preference should be given to smooth barked and evergreen trees. **Shrubs** • Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided • Shrubs should not be located under trees • Shrubs should not form more than 10% ground cover • Clumps of shrubs should be separated from exposed windows • Doors by a distance of at least twice the height of the vegetation. **Grass** • Grass should be kept low (as a guide grass should be kept to no more than 100 mm in height) • Leaves and vegetation debris should be removed. The location of maintenance works to be conducted for trees, shrubs, and grass are as shown in **Figure 6.8-3**.	Pre-construction, Operation
BF-2	• Vulnerable buildings and/or critical assets would be designed and constructed in accordance with Section 9.2 of the BRA. This would be refined during detailed design.	Design, Pre-construction
BF-3	The following mitigation measures regarding water are provided: • A minimum static water supply of 20,000 litres should be provided at the Site for firefighting • A 65-mm 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 mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is to be supplied within 4 m of the access hole • All associated above ground fittings to the tank shall be non-combustible • Firefighting equipment will be maintained at and/or accessible to all active construction site during the declared bushfire danger season, and site personnel trained in its use. Equipment should be appropriate to the activities being conducted and the fire danger at the time of works, but as a minimum must include: - 4WD Striker with slip-on water unit, equipped with diesel pump	Design, Pre-construction

ID	Environmental Safeguards	Timing
	and hoses - Extinguishers - Knap sacks - Hand tools (e.g., fire rakes).	
BF-4, BF-9	• A comprehensive Bushfire Emergency Management and Evacuation Plan would be completed for the construction and operational phase of the Project (see Section 24 of the BRA) • The bushfire evacuation procedures would be completed in accordance with NSW Rural Fire Service Guide to Developing a Bushfire Emergency Management Plan.	Pre-construction, Operation
BF-5	Provide and maintain access for Category 1 fire appliances: • The trafficable surface leading to the fence will have width of 4 m except for short constrictions to 3.5 m for no more than 30 m in length where an obstruction cannot be reasonably avoided or removed • Curves have a minimum inner radius of 6 m. The minimum distance between inner and outer curves is 6 m • Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes • The maximum grade of a trail is not more than 15 degrees • The crossfall of the trail surface is not more than 6 degrees • A minimum vertical clearance of 4 m is provided above the surface of the trafficable surface clear of obstructions • Capacity for passing is provided every 250 m comprising a widened trafficable surface of at least 6 m for a length of at least 20 m • A 6-m wide and 8-m-long area clear of the trafficable surface with a minimum inner curve radius of 6 m and minimum outer radius of 12 m. Applicable location for this environmental safeguard includes around the perimeter of the Site and to and from the Site.	Design, Pre-construction
BF-6	• 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) • Essential work during operations may be completed on a TOBAN providing it complies with the Hot Work and Fire Risk Work procedure exemption from the NSW RFS.	Construction
BF-7	• It is recommended that non-essential works be postponed on days with Fire Danger Rating (FDR) of Extreme and Catastrophic.	Construction

6.9 Aboriginal Heritage

6.9.1 Overview

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

The ACHAR is attached in **Aboriginal Cultural Heritage Assessment Report.** The relevant aspects are summarised in this chapter.

The ACHAR was conducted in line 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 (Consultation Requirements) (DECCW, 2010a)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010b).

This chapter assesses Aboriginal heritage impacts associated with the Project and recommends management and mitigation measures to address identified impacts, as described in the ACHAR.

6.9.2 Methodology

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

- **A desktop-based assessment of the Project Area** – A desktop assessment reviewed 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, and the preparation of a predictive model for the Aboriginal archaeological record of the Project Area. The results of previously completed archaeological test excavations were also used to define the archaeological values of the Project Area.
- **An archaeological survey of the Project Area -** The archaeological survey on 6 July 2023 was conducted on foot, with a total of nine transects completed during the survey (**Figure 6.9-1**). All landform elements within the Project Area were surveyed. All mature trees encountered during the survey were inspected for cultural scarring.

Consultation

Aboriginal community consultation was undertaken in accordance with Heritage NSW's Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a). The results of consultation 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
- Worimi Local Aboriginal Land Council (LALC)
- Office of the Registrar, Aboriginal Land Rights Act 1983 (NSW)
- The National Native Title Tribunal (NNTT)
- NTSCORP Limited
- Port Stephens Council.

Heritage NSW responded on 5 April 2023, providing a list of Aboriginal parties for the Port Stephens LGA. Refer **Appendix C (Aboriginal Cultural Heritage Assessment)** for details of the response. No other agencies responded during the notification period.

A public notice was placed in the Port Stephens Examiner on 27 April 2023. The closing date for registration via this notice was 12 May 2023. This provided the necessary minimum 14-day period for an expression of interest.

On 24 April 2023, a letter/email inviting an expression of interest and containing summary information on the Project was sent to all Aboriginal persons and organisations identified by the regulatory agencies. Thirty-three Aboriginal individuals and organisations were invited to register an interest in being consulted. The closing date for expressions of interest was 12 May 2023, which provided the minimum 14-day period for registering interest.

A total of 14 organisations (referred herein as ‘Registered Aboriginal Parties’ (RAPs)) registered an interest in being consulted for the current assessment. Two of these requested to have their details withheld:

- Didge Ngunawal Clan
- Murra Bidgee Mullangari Aboriginal Corporation
- Nur-Run-Gee Pty Ltd
- Gomery Cultural Consultants
- Woka Aboriginal Corporation
- Karuah Local Aboriginal Lands Council
- Worimi Local Aboriginal Land Council
- Karuah Indigenous Company Pty Ltd
- Worimi Traditional Owners Indigenous Corporation
- Mur-Roo-Ma Inc.
- Wingarra Wilay
- Girragirra Murun Aboriginal Corporation.

Stage 2 - Presentation of information about Project

The RAPs were provided with information about the proposed scope of the Project and cultural heritage assessment process as part of the registration of interest process described in Stage 1. A project summary and draft assessment methodology was sent to the RAPs on 23 May 2023 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 May 2023. The draft methodology provided a detailed outline of how the assessment would be completed. In particular, it noted that a targeted archaeological survey would be undertaken within the Project Area and that test excavations would not be completed as the Project Area has been subject to multiple programs of test excavation previously.

The RAPs were given a minimum of 28 days to review and provide feedback. Written responses to the draft methodology were provided by five RAPs. Four RAPs endorsed the methodology and recommendations, and one RAP requested additional test excavation in areas covered in blackberry bushes. AECOM provided a written response that adequate test excavation has been completed for the ACHAR. Furthermore, AECOM advised the RAP that a salvage program would be proposed as a mitigation measure. The RAP agreed with this approach and was satisfied that no further test excavations were required to support the ACHAR.

An archaeological survey on the Project Area was completed on 6 July 2023. Four RAPs provided site officers for the survey:

- Karuah Indigenous Company Pty Ltd
- Mur-Roo-Ma Inc.

- Worimi Local Aboriginal Land Council
- Nur-Run-Gee Pty Ltd.

No specific cultural values were communicated to AECOM as part of the archaeological survey.

Immediately after completing the archaeological survey, AECOM discussed potential management options for Aboriginal sites located in the Project Area with RAPs who were present. RAPs indicated they would like to see archaeological salvage excavation completed within the Project Area focussed on previous areas shown to contain high density archaeological deposits.

Stage 4 – Review of draft assessment report

The aim of Stage 4 of the Consultation Requirements is to prepare and finalise an ACHAR with input from RAPs.

In accordance with Section 4 of the Consultation Requirements, on 19 July 2023, a draft of this ACHAR was issued to all RAPs for their review. The closing date for comments was 17 August 2023 which provided the necessary minimum 28-day period for comment.

Responses to the draft ACHAR were provided by three RAPs. Responses are presented in **Table 6.9-1**.

Table 6.9-1: RAP responses to draft ACHAR

RAP Organisation	Representative/s	Date of response	Type	Response	AECOM Response
Murra Bidgee Mullangari Aboriginal Corporation	Darleen Johnson	20/07/2023	Email	"I have read the project information and draft ACHAR for the above project, I endorse the recommendations made"	None required
Woka Aboriginal Corporation	Steven Johnson	25/07/2023	Email	"We agree with review"	None required
Mur-Roo-Ma Inc.	Bec Young	10/08/2023	Email	"We agree with all aspects of this report and have viewed the draft management strategies/recommendations. Murrooma would like to comment on agreeing with the ground truth of the sites in this area and this was a true and accurate assessment of our field survey. We have read the salvage methodology within this report and believe this to be the best opportunity to protect our sites for this proposed project."	None required

6.9.3 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 C** (**Aboriginal Cultural Heritage Assessment Report**).

Landscape context

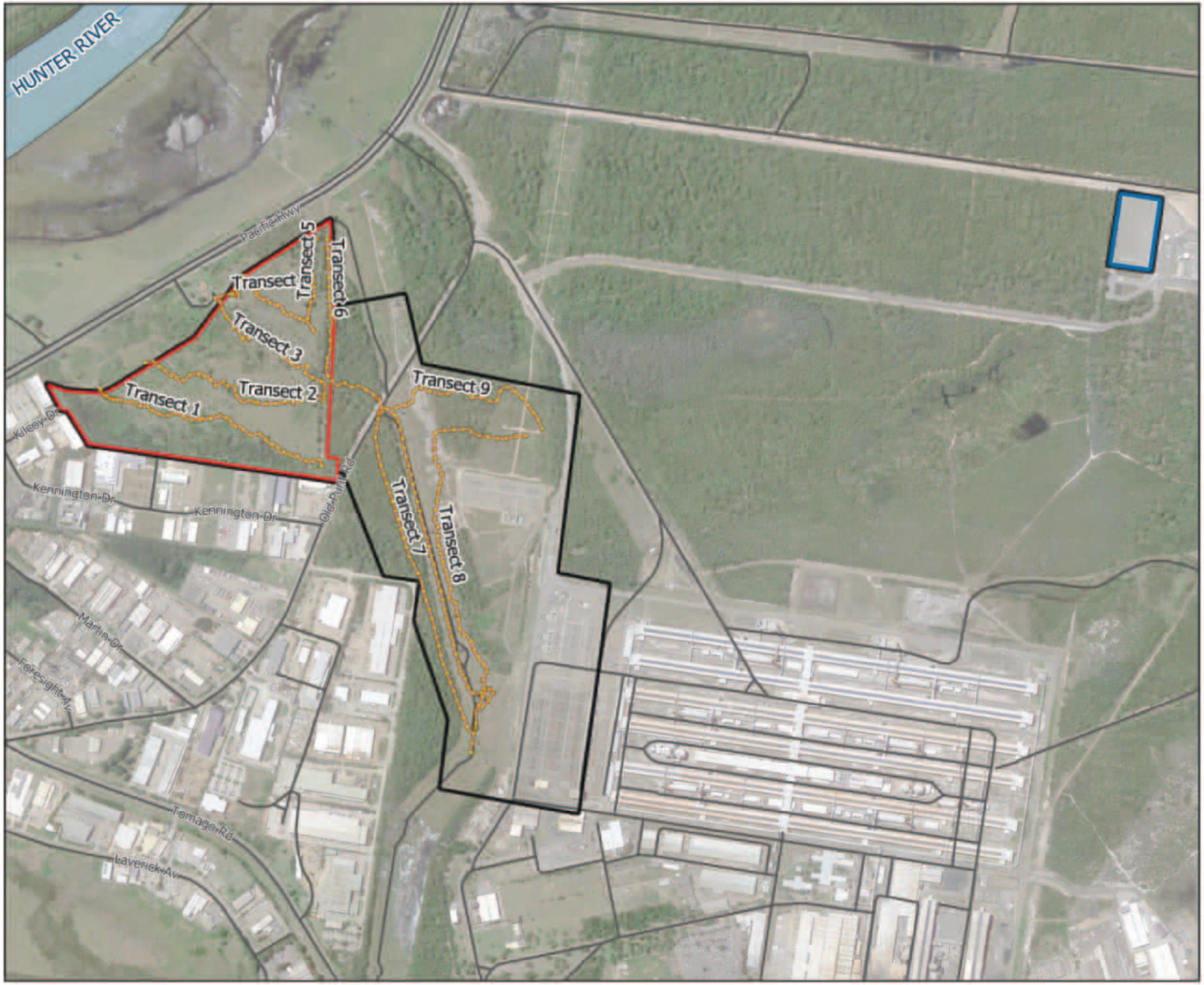
Consideration of the landscape context is based on the well-established proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local flora and fauna communities have played an important role in influencing how Aboriginal people moved within and used 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 to produce 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 **Section 6.3, Section 6.4,** and **Section 6.5,** respect-ively.Key observations about the landscape context of the Project Area, relevant to Aboriginal heritage include:

- Topographically, the Site and the transmission line corridor encompass part of low crests and flanks of a locally prominent ridgeline that forms the very western portion of the Newcastle Bight embayment. The construction laydown area is located on level, low-lying and heavily disturbed land occupied by the NGSF. Elevations within the Project Area range from 4 to 16 m AHD providing a total local relief of up to 12 m. Slope/gradient varies from level (0-1%) to very gently inclined (1-3%) on crests, flats and areas of high disturbance to gently/moderately inclined (3-10% and 10-32%) on slopes to some steep slopes (32-56%) associated with modified landforms.
- The Project Area does not directly contain any mapped watercourses. However, it falls wholly within the Hunter River Catchment, with the river's central channel located approximately 500 m to the northwest of the Site. Level to gently inclined land between the Site and the Hunter River comprises part of the river's extensive southern bank floodplain. Surface water from the Site drains from the crest of the ridgeline to drainage depressions found to the northeast and southwest. A number of important wetlands are present locally, including the Hunter Wetland National Park, which comprises the Kooragang Nature Reserve, Wetlands Centre Australia, and Coastal Protected Wetlands. A small area of wetland (mapped under the Port Stephens Local Environmental Plan 2013) is also present on the southern boundary of the Site as well as to the west, next to the Hunter River.
- Local flood mapping indicates that land within the Project Area comprises a variable flood hazard risk. The Site, for the most part, is not a flood risk due to its elevation, with the exception of land around the southern boundary which comprises part Low Hazard Flood Storage Area and Minimal Risk Flood Prone Land (discussed further in **Section 6.4**). Likewise, the majority of the transmission line corridor is not considered a flood risk. However, sections of it comprise high to minimal flood risk. Archaeologically, this is an important observation given that landscapes prone to flooding are liable to impart bias on the preservation of Aboriginal archaeological materials and features. The factors responsible for this bias include the erosion and destruction through movement of sites by channel activity, as well as sediment deposition which acts to bury/preserve sites but also renders them invisible. In this light, consideration of the flood risk mapping suggests that the Project Area's crests may be relatively undisturbed from flooding.
- The surface geology of the Project Area comprises a combination of Tomago Coal Measures, Pleistocene bedrock-mantling dune and Pleistocene dune (discussed further in **Section 6.5**). Soils within the Project Area have been mapped as belonging to the Beresford, Millers Forest, Tea Gardens and Shoal Bay soil landscapes.
- In terms of the geomorphic setting, the Project Area is in the very western part of the Newcastle Bight embayment, the largest sedimentary basin of Quaternary age in the greater Port Stephens-Myall Lakes area (Thom et al., 1992). Bordered to the south by the Hunter River and the north by an outcrop of Nerong Volcanics at Lemon Tree Passage, this broad south-southeast facing embayment is dominated by an extensive dual sand barrier system consisting of an inner Pleistocene barrier (the 'Inner Barrier'), an outer Holocene barrier (the 'Outer Barrier') and a broad interbarrier depression filled with Holocene estuarine swamp deposits.
- Native vegetation within and immediately surrounding the Project Area has been extensively modified by European land use activities, with the majority cleared historically for stock grazing and other activities (e.g., road and power generation). Currently, the Project Area consists of remnant and managed native vegetation.
- Although available historical records provide only limited insight into Aboriginal exploitation of plants within the Lower Hunter Valley, it can be confidently asserted that the original vegetation communities of the Project Area and its surroundings would have supplied Aboriginal people camping within or travelling through this area with an extensive array of edible and otherwise

useful plant species. Recorded native vegetation communities and locally occurring watercourses would also have supported a large and diverse array of economic terrestrial, aquatic and avian fauna.

- 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 high degree of integrity and the potential for intact archaeological deposits.
- Two basic levels of disturbance are recognised: ‘low’ and ‘high’ (refer to **Figure 6.9-2**). Any Aboriginal archaeological deposits located within areas of high disturbance are likely to have been either destroyed or severely disturbed. Areas of low disturbance, in contrast, retain the potential for the presence of intact archaeological deposits, albeit of variable character, depending on localised environmental conditions (e.g., slope, distance to water, stream order).



AECOM

Tomago BESS Project
Aboriginal Cultural Heritage
Assessment

N

0 100 200 300 m

Legend

- Project Area
- BESS Site (the Site)
- Proposed Construction Laydown Area
- Watercourses
- Roads
- Survey Transects

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FIGURE 6.9-1: SURVEY TRANSECTS

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Aboriginal Cultural Heritage Assessment

FIGURE 6.9-2: SOIL DISTURBANCE LANDSCAPE

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FIGURE 20: LAND DISTURBANCE

Archaeological context

Intensive development activities since this time have secured the Hunter Valley's place as one of the most intensively investigated archaeological regions in Australia, with thousands of Aboriginal archaeological investigations involving survey and/or excavation having now been carried out, the majority as part of environmental impact assessments for coal mining projects. Not surprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. They have generated a large and diverse body of evidence relating to past Aboriginal occupation.

Key observations to be drawn from a review of the local and regional archaeological context of the Project Area are as follows:

- Available radiometric dates indicate that Aboriginal people have occupied the Lower Hunter Valley since the late Pleistocene. However, 'early' (i.e., late Pleistocene/early Holocene) occupational evidence has proven elusive, with most sites identified to date likely of mid-to-late Holocene antiquity.
- Consistent with broader regional datasets, open artefact sites (i.e., artefact scatters and isolated artefacts) are the most common site type in the greater Maitland area. Other site types, such as scarred trees, PADs, grinding grooves and burials, have also been recorded but are comparatively rare.
- Flaked stone artefacts dominate archaeological finds assemblages from recorded open artefact sites across the central lowlands. Other stone artefacts, such as edge-ground hatchet heads, grindstones and hammerstones, have also been recorded, although comparatively infrequently, as have artefacts manufactured out of bottle glass.
- Unless severely disturbed, landform elements within the Project Area with the potential to retain Aboriginal archaeological materials include the ridgeline and crests.
- Regional and local datasets indicate that assemblage size and complexity tend to vary significantly in relation to stream order and landform, with larger, more complex assemblages concentrated on elevated, low gradient landform elements adjacent to higher order watercourses.
- Artefacts manufactured out of silicified tuff have tended to dominate locally recorded flaked stone artefact assemblages, with silcrete artefacts also well represented and frequently exhibiting evidence of deliberate thermal alteration.
- Consistent with regional datasets, locally recorded flaked stone artefact assemblages attest to an emphasis on the exploitation of alluvial gravels sourced from gravel banks and/or elevated 'palaeochannel remnants' (i.e., Tertiary terrace gravels).
- Locally recorded flaked stone assemblages tend to be dominated by flake debitage (*sensu* Andrefsky, 2005), with formed objects (i.e., cores and retouched implements) comparatively poorly represented.
- Backed artefacts (i.e., Bondi points, geometric microliths and elouera) dominate the retouched components of locally recorded surface and excavated assemblages.
- Knapping floors, where present, exhibit evidence indicative of systematic backed artefact manufacture.
- Quaternary alluvial deposits on the Hunter River's contemporary floodplain and its more recent terraces retain the greatest potential for the preservation of early (i.e., late Pleistocene/early Holocene) occupation evidence.

<u>AHIMS database review</u>

An Aboriginal Heritage Information Management System (AHIMS) database search was undertaken on 5 May 2023 for an approximate 10 x 10 km area centred on the Project Area. A total of 89 Aboriginal archaeological sites were identified within the search area comprising 63 open artefact sites (artefact scatters and isolated artefacts), nine with associated areas of Potential Archaeological Deposit (PAD), 10 shell middens, 10 areas of PAD, two art sites, two modified trees, one artefact reburial location and one resource and gathering site. Consideration of the location of previously recorded sites indicates that seven AHIMS sites are located within or directly adjacent to the Project Area. These include four open artefact sites, one open artefact with PAD site and one artefact reburial location (**Figure 6.9-3**).

6.9.4 Previous Archaeological Assessments

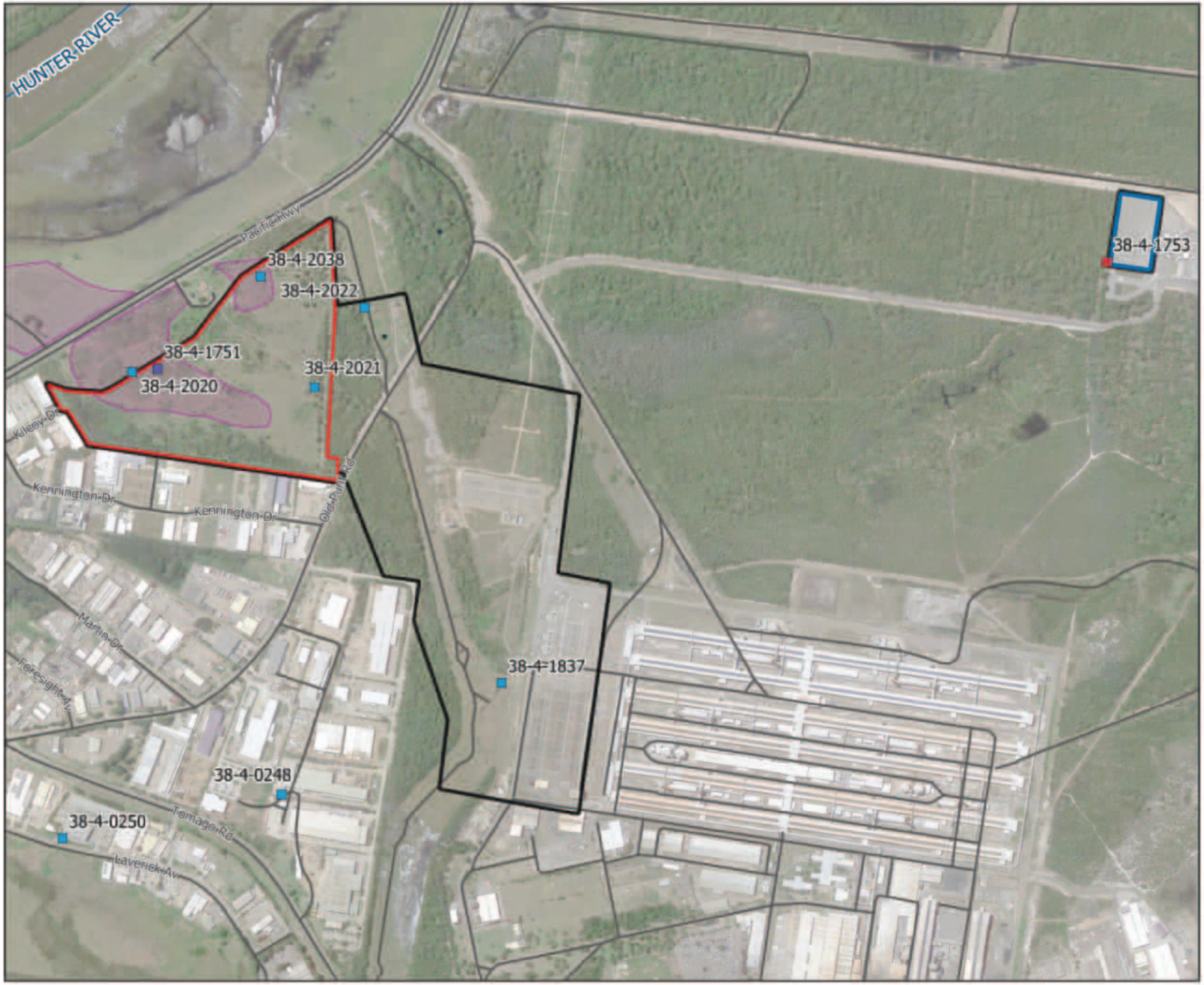
Previous archaeological field investigations within the Project Area where Aboriginal heritage values have been identified include three pedestrian surveys, two of which included test excavation (RPS, 2011; Transport for NSW, 2021). The results of these investigations are summarised in brief below.

In 2011, RPS completed an Aboriginal heritage assessment for the NGSF Project that included archaeological survey of part of the Project Area. During the survey, which incorporated the entire construction laydown area and small sections of the Site and transmission line corridor, one Aboriginal site was identified (RPS PHWY AS2) comprising an artefact scatter located to the west of the current Project Area.

In 2019, ERM completed an Aboriginal heritage assessment that encompassed the Site and part of the transmission line corridor for the Newcastle Power Station Project (NPS Project). The assessment incorporated an archaeological survey and test excavation with survey completed across the area over three days in May 2019. During the survey, 25 surface artefacts were identified which were subsequently assigned to four sites – NPS01 (38-4-2020), NPS02 (38-4-2021), NPS-03 (38-4-2022) and NPS-04 (38-4-2038). Recorded artefacts included flake and cores manufactured from silcrete, chert and mudstone. In addition, a large area of PAD was recorded across most of the Site. Accordingly, archaeological test excavation was completed within the PAD, comprising 28 test pits measuring 0.25 m². Three test pits contained artefacts – TP1, TP26, TP27 and TP28 all of which were located on the low ridgeline. The highest number of artefacts recovered was six from TP27. Soils encountered across the Site during the excavation were largely described as silty and clayey A horizons with gravel inclusions overlying heavy clays and, in some cases sandstone bedrock.

In 2021, TfNSW prepared an ACHAR for the M1 Extension Project that incorporated part of the Site. The ACHAR utilised the findings from the archaeological survey and test excavation completed by Jacobs in 2015/2016 for an earlier iteration of the M1 Extension Project. In 2015/2016, Jacobs completed archaeological survey across much of the BESS Site and part of the transmission line corridor. During the survey, two Aboriginal archaeological sites were identified – artefact scatter with PAD site “HEXHAM M1RT1” (38-4-1751) and “Tomago Power Artefact 1” (38-4-1837). The surface component of “HEXHAM M1RT1” (38-4-1751) included approximately 21 artefacts with 10 located within the Project Area BESS site. Archaeological test excavation across “HEXHAM M1RT1” (38-4-1751) incorporated approximately 131 test pits, with 105 test pits measuring 0.25 m² in size and 23 measuring 1 m². Of these, 49 were completed within the current Project Area BESS site with the highest density artefact bearing pit - STP 57 (0.25 m²) -located on the low ridgeline and containing 25 artefacts. More broadly, the highest density artefact bearing test pit recovered from test excavation within “HEXHAM M1RT1” (38-4-1751) was from TP 13 (1 m²) where 112 artefacts were recovered. This test pit was located outside the current Project Area in a low-lying area of floodplain approximately 145 m from the Hunter River’s active channel. RAPs participating in the project identified the site as highly culturally significant. In addition, to this site, an isolated artefact was identified within the transmission line corridor - “Tomago Power Artefact 1” (38-4-1837). Soils encountered across the Site during the excavation were described as shallow silty clay A horizons. TfNSW (2021) recommended that archaeological salvage incorporating surface collection and open area excavations occur within the impacted portion of “HEXHAM M1RT1” (38-4-1751)”.

A summary of the previous archaeological assessments is mapped in **Figure 6.9-4** and **Figure 6.9-5**.



AECOM

Tomago BESS Project
Aboriginal Cultural Heritage Assessment

N

0 100 200 300 m

Legend

- Project Area
- BESS Site (the Site)
- Proposed Construction Laydown Area
- Watercourses
- Roads

AHIMS Sites

- Artefact
- Artefact;PAD
- Reburial site
- Aboriginal Site Boundaries

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FIGURE 6.9-3: AHIMS SITES

AECOM

Tomago BESS Project
Aboriginal Cultural Heritage Assessment

N

0 100 200 300 m

Legend

- Project Area
- BESS Site (the Site)
- Proposed Construction Laydown Area
- Watercourses
- Roads
- RPS Survey 2011
- Jacobs M1 Survey 2015
- ERM Survey 2019
- Jacobs Surface Artefacts
- ERM Surface Artefacts

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FIGURE 6.9-4: PREVIOUS ARCHAEOLOGICAL SURVEYS

AECOM

Tomago BESS Project
Aboriginal Cultural Heritage Assessment

N

0 100 m

Legend

- Project Area
- BESS Site (the Site)
- Watercourses
- Roads

Jacobs 2016 Test Pits with artefact counts

- 0.25 m2
- 1 m2
- ERM 2019 Test Pits (0.25m2) with artefact counts

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FIGURE 6.9-5: PREVIOUS SUBSURFACE INVESTIGATIONS

Archaeological predictions

Considering 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:

1. Open artefact sites will be the dominant site type
2. Site types with *limited* potential to occur include scarred trees, stone quarries, grinding grooves, stone arrangements and burials
3. Subsurface artefact distribution within the Project Area will vary significantly in relation to landform
4. Subsurface artefact density within the Project Area will be highest in the crest landform unit followed by the floodplain unit
5. Most, if not all of the Aboriginal archaeological materials present within the Project Area will be of mid-to-late Holocene antiquity
6. Aboriginal burials, if present, will be located in sandy soil contexts
7. The dominant raw material for flaked stone artefact production within the Project Area will be silicified tuff with silcrete the second most common material
8. Flaked stone assemblages will be dominated by flake debitage items (*sensu* Andrefsky 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented
9. Knapping floors, if present, will exhibit evidence indicative of systematic backed artefact manufacture
10. Complete and/or fragmentary backed artefacts will dominate the retouched components of recorded flaked stone artefact assemblages
11. Tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts.

Ethnohistoric context

Information regarding the ways in which Aboriginal people likely used pre-contact landscapes is available to archaeologists through two primary sources: archaeological (i.e., survey and excavation) data and historical records. This section builds on this foundation by summarising relevant ethnohistoric information for the Project Area and environs.

As in other parts of New South Wales and Australia more broadly, non-Aboriginal people occupying the Upper Hunter Valley began to document Aboriginal culture from first contact with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

Key ethnographic characteristics of the area are discussed in discussed in detail in Section 7.0 of **Appendix E (Aboriginal Cultural Heritage Assessment Report)**, including relevant matters:

- Language Groups and Boundaries
- Social Organisation
- Settlement and Subsistence
- Material Culture
- Ceremony and Ritual
- Post-contact History.

Archaeological survey and test excavation results

Three Aboriginal objects, consisting of a small cluster of stone artefacts, were identified during the archaeological survey. All artefacts were recorded on an access track in the southern portion of the Site. The artefacts are considered to form part of previously recorded AHIMS site HEXHAM M1RT1 (38-4-1751). No new Aboriginal sites were recorded during the archaeological survey.

On the basis of the previous survey and test excavation works undertaken, a total of six Aboriginal sites are recognised as fully or partially within the Project Area. These include four open artefact sites (38-4-1837, 38-4-2020, 38-4-2021, 38-4-2022) and two open artefacts with deposit sites (38-4-1751 and 38-4-2038). **Figure 6.9-3** shows the mapped boundaries of all Aboriginal sites with site details provided in **Table 6.9-2**.

Table 6.9-2: Sites within the Project Area

AHIMS Site ID	Site name	AHIMS Centroid Coordinates		Site type	Location	AHIMS status	Reference
		MGAE	MGAN				
38-4-1751	HEXHAM M1RT 1	378722	6368559	Artefact; Deposit	Partially within the Site	Valid	Jacobs 2015 (Transport for New South Wales, 2021)
38-4-1753	Repatriated Aboriginal afts	380886	6368803	Reburial	Outside the construction laydown	Valid	ERM, 2019
38-4-1837	Tomago Power Artefact 1	379506	6367843	Artefact	Transmission line corridor	Valid	Jacobs 2015 (Transport for New South Wales, 2021)
38-4-2020	NPS01	378664	6368552	Artefact	Within the Site	Valid	ERM, 2019
38-4-2021	NPS02	379080	6368517	Artefact	Within the Site	Valid	ERM, 2019
38-4-2022	NPS03	379194	6368699	Artefact	Transmission line corridor	Valid	ERM, 2019
38-4-2038	NPS04	378957	6368770	Artefact; Deposit	Partially within the site	Valid	ERM, 2019

Scientific, cultural, historical, and aesthetic values

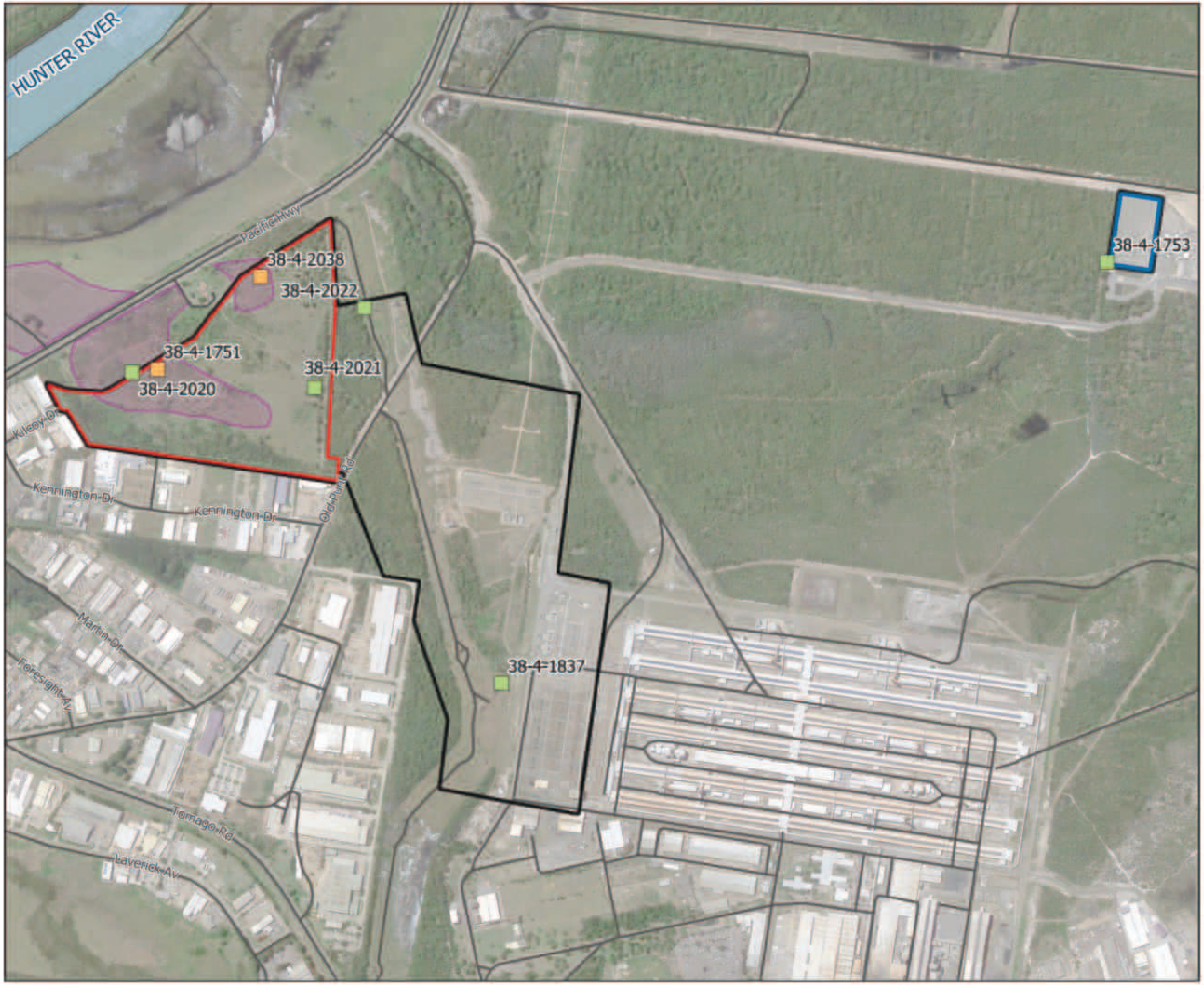
Information on the scientific, cultural, historical and aesthetic values of the Project Area with respect to Aboriginal cultural heritage has been obtained through a desktop review of existing environmental data, archaeological and ethnohistorical data for the Project Area and its environs, the archaeological survey completed as part of this assessment, as well as consultation with RAPs. A summary of this information is provided in **Table 6.9-3**. This information was used to underpin the assessment of potential impacts on Aboriginal cultural heritage.

Table 6.9-3: Scientific, cultural, historic, and aesthetic values relevant to the Project

Values	Assessment
Scientific	Scientific value or significance refers to the importance of a place in terms of its rarity, representativeness and the extent to which it may contribute further information (i.e., its research potential). An assessment of the scientific significance of all Aboriginal sites identified in the Project Area was undertaken. A scored ranking system was used for the current assessment, with overall significance ratings based on a cumulative 'score' derived from a ranked assessment of the research potential, rarity and representativeness of each site on a local and regional scale. Of the six Aboriginal sites recognised as fully or partially within the Project Area, four were ranked as '**Low significance**' and two were ranked as '**Moderate significance**'.
Cultural	Social or cultural value refers to the spiritual, traditional, historic and contemporary associations and attachments that a place or area has for Aboriginal people and can only be identified through consultation with Aboriginal people (OEH, 2011: 8). RAPs consulted for the current assessment have identified the following social or cultural values for the Project Area and its environs: • The Project Area forms part of a much larger cultural landscape for the Aboriginal community • The Hunter River and associated areas are high resource areas with Aboriginal people living close to the river and close by it • Campsites in the local area would have been sighted in areas of elevated, low gradient terrain overlooking, and providing ready access to, the floodplains of the Hunter River • Test and salvage excavations for the M1 project, which investigated part of the ridgeline that is occupied by the Site, yielded thousands of stone artefacts, indicative of a major camping area.
Historical	Historic value refers to the associations that a place has with a historically important person, event, phase or activity in an Aboriginal community. Historic values can but will not necessarily be represented by physical evidence. For the current assessment, an understanding of the historic values of the Project Area has been established through a combination of documentary research and consultation with RAPs. Together with verbal advice from RAPs, available historical reference materials indicate that no historic values have been identified for the Project Area. Accordingly, the Project Area is assessed as being of low historical significance.
Aesthetic	Aesthetic value refers to the sensory, scenic, architectural and creative aspects of a place and is manifested through a range of physical and non-physical attributes. Aesthetic values are not inherent in places but rather rest with peoples' sensory and emotional responses to them. Accordingly, radical variation in responses, both within and between social and cultural groups, is to be expected. While a significant proportion of the Project Area has been severely disturbed through historical land use activities, parts of both the Site and transmission line corridor remain undeveloped and are considered to retain moderate aesthetic significance based on their contemporary scenic qualities and/or the retention of a natural ambience.

Consolidated statement of significance

The Project Area forms part of a larger cultural landscape of high cultural significance to the Worimi people. It contains evidence of Aboriginal peoples' use of the area in the form of stone artefacts, with six Aboriginal archaeological sites recorded fully or partially within its bounds (**Figure 6.9-6**). Known Aboriginal sites within and immediately surrounding the Project Area hold cultural significance to contemporary Worimi people, attesting to traditional habitation, subsistence and land use patterns, including stone tool manufacturing within the area. The Hunter River and adjacent areas have been noted as high resource areas providing food, water and raw materials for stone tool manufacture with Aboriginal people known to have lived in these areas close to the river. Specifically, existing archaeological datasets for the Project Area and surrounds suggest an intensive Aboriginal occupation of the elevated ridgeline located above the Hunter River Floodplain that forms part of the Project Area.



AECOM

Tomago BESS Project
Aboriginal Cultural Heritage Assessment

N

0 100 200 300 m

Legend

- Project Area
- BESS Site (the Site)
- Proposed Construction Laydown Area
- Watercourses
- Roads

Significance Assessment

- Low
- Moderate
- Aboriginal Site Boundaries

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VERSION	1

FIGURE 6.9-6: SIGNIFICANCE ASSESSMENT

6.9.5 Potential impacts

Construction

Development activities within the Project Area are anticipated to directly impact the following Aboriginal sites, resulting in a partial or total loss of value:

- "HEXHAM M1RT1" (38-4-1751)
- "Tomago Power Artefact 1" (38-4-1837)
- "NPS01" (38-4-2020)
- "NPS02" (38-4-2021)
- "NPS03" (38-4-2022)
- "NPS04" (38-4-2038).

"HEXHAM M1RT1" (38-4-1751) and "NPS04" (38-4-2038) will be partially impacted with 28% of the former and 70% of the latter impacted. The remaining sites will be wholly impacted. **Table 6.9-4** provides a summary of impacted sites utilising the format provided in Heritage NSW's AHIP application and with their location's shown on **Figure 6.9-7.**

Table 6.9-4: Impact assessment for Aboriginal sites

AHIMS site information								Proposed harm		
Portion of site (whole or part – include map reference if part)	**AHIMS site ID**	**Site feature (there may be more than one site feature per site ID)**	**Site name**	**Easting**	**Northing**	**Datum (AGD or GDA)**	**Zone**	**Type of harm[8]**	**Degree of harm[9]**	**Consequence of harm[10]**
Part	38-4-1751	Artefact; Deposit	HEXHAM M1RT 1	378722	6368559	GDA	56	Directly harmed	Partial	Partial loss of value
None	38-4-1753	Reburial	Repatriated Aboriginal afts	380886	6368803	GDA	56	Will not be harmed	None	No loss of value
Whole	38-4-1837	Artefact	Tomago Power Artefact 1	379506	6367843	GDA	56	Directly harmed	Whole	Total loss of value
Whole	38-4-2020	Artefact	NPS01	378664	6368552	GDA	56	Directly harmed	Whole	Total loss of value
Whole	38-4-2021	Artefact	NPS02	379080	6368517	GDA	56	Directly harmed	Whole	Total loss of value
Whole	38-4-2022	Artefact	NPS03	379194	6368699	GDA	56	Directly harmed	Whole	Total loss of value
Part	38-4-2038	Artefact; Deposit	NPS04	378957	6368770	GDA	56	Directly harmed	Partial	Partial loss of value

[8] 'Will not be harmed' / 'Movement (collection) only' / 'Excavation' / 'Community collection' / 'Directly harmed'
[9] 'Whole' / 'Partial' / 'None'
[10] 'Total loss of value' / 'Partial loss of value' / 'No loss of value'

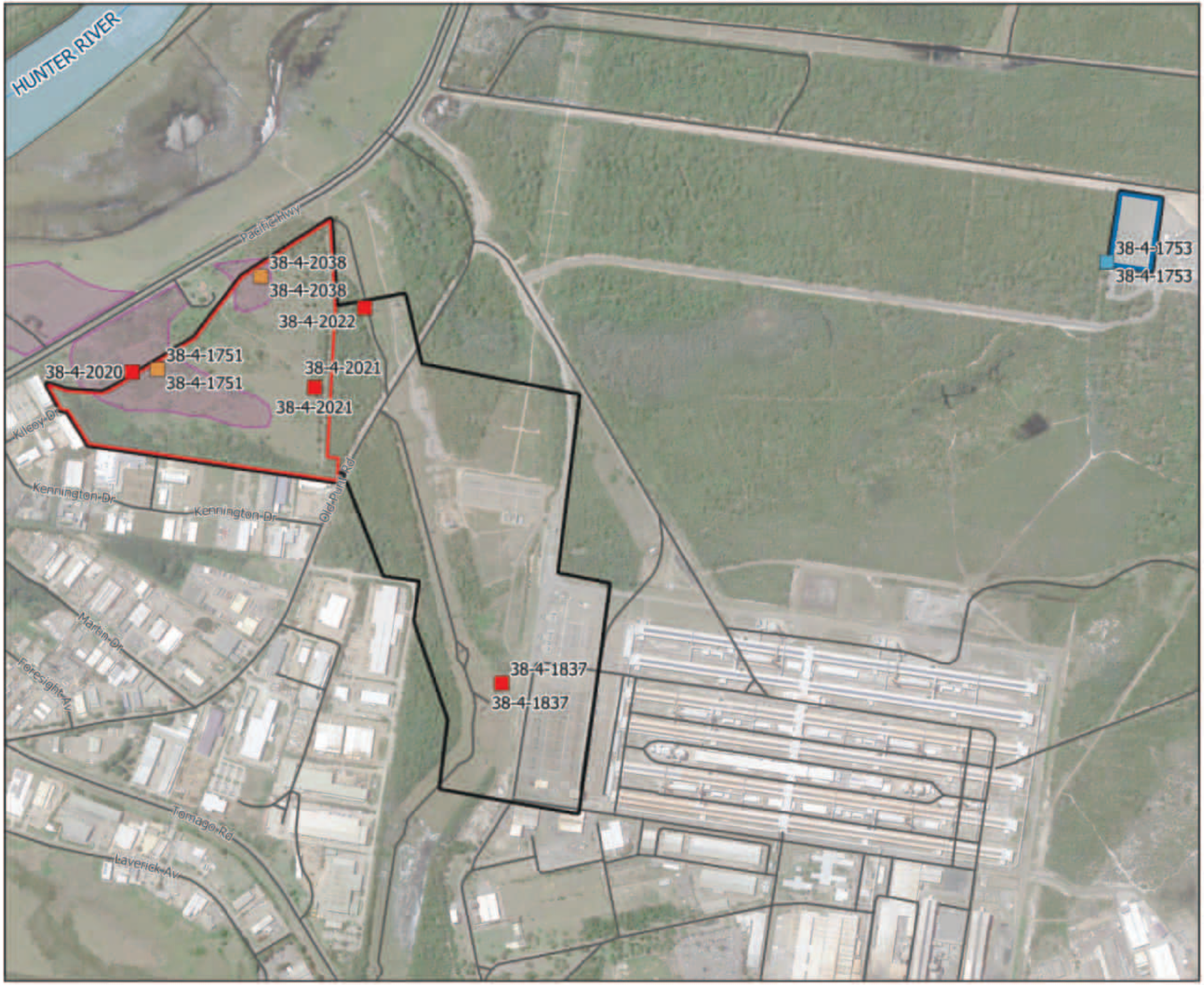


FIGURE 6.9-7: IMPACT ASSESSMENT

Operation

The construction of the BESS at the Site would result in whole loss of value for four Aboriginal sites, and the partial loss of two Aboriginal sites. No further loss would be expected during operation. The ACHAR determined that 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.

Cumulative impacts

An assessment of the cumulative Aboriginal Cultural Heritage impacts is provided in **Section 6.17**. This includes an assessment of ecologically sustainable development, intergeneration equity, and the known and potential resource with regards to Aboriginal heritage within the broader region.

6.9.6 Mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to Aboriginal heritage are listed in **Table 6.9-5**.

Table 6.9-5: Mitigation and management measures – Aboriginal heritage

ID	Mitigation measure	Timing
AH-1	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.	Design
AH-2	An archaeological salvage program incorporating surface collection of all Aboriginal objects/sites to be impacted by the Project, including Aboriginal objects associated with open artefact scatter sites 38-4-1837, 38-4-2020, 38-4-2021, 38-4-2022, 38-4-1751 and 38-4-2038. A program of open area salvage excavation, as detailed in Appendix G of the ACHAR, should be completed for sites 38-4-1751 and 38-4-2038.	Pre-construction
AH-3	All Aboriginal sites not impacted by the Project but close to the Project Area should be conserved *in-situ.* All relevant staff and contractors are to be made aware of the nature and locations of all sites as well as legal obligations with respect to them. Protected sites would need to be identified on all relevant site plans. Details for the care of protected sites should be outlined in the Project's ACHMP.	Pre-construction
AH-4	An Unexpected Aboriginal Heritage Finds Procedure (UAHFP) should be included in the ACHMP to cover the unanticipated discovery, at any point outside of the salvage program, of any actual or potential Aboriginal heritage item for which there is not an existing management process in place. The procedure should cover all Aboriginal objects (as defined by the NPW Act), including human skeletal remains. Management action/s for unexpected finds will vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts.	Construction
AH-5	Provisions for 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

ID	Mitigation measure	Timing
AH-6	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

6.10 Social and Economics

6.10.1 Overview

This section assesses the potential social and economic impacts associated with the construction, operation, and decommissioning and rehabilitation of the Project and provides mitigation measures to reduce potential social and economic impacts associated with the Tomago BESS. This section draws on a Social Impact Assessment (SIA), included as **Appendix G**.

6.10.2 Relevant guidelines

The Social Impact Assessment (SIA) Guidelines (DPIE 2021a) seeks to provide a consistent framework and approach to the assessment of social impacts associated with State Significant Development in NSW. This report has been prepared with reference to guiding principles detailed in the SIA Guideline (**Table 6.10-1**).

Table 6.10-1: SIA Guidelines – guiding principles categories

Categories	Description
Way of life	How people live, how they get around, how they work, how they play, and how they interact each day
Community	Community composition, cohesion, character, how the community functions, resilience, and people's sense of place
Accessibility	How people access and use infrastructure, services and facilities, whether provided by a public, private, or not-for-profit organisation
Culture	Both Aboriginal and non-Aboriginal, including shared beliefs, customs, practices, obligations, values and stories, and connections to Country, land, waterways, places and buildings
Health and wellbeing	Physical and mental health especially for people vulnerable to social exclusion or substantial change, psychological stress resulting from financial or other pressures, access to open space and effects on public health
Surroundings	Ecosystem services such as shade, pollution control, erosion control, public safety and security, access to and use of the natural and built environment, and aesthetic value and amenity
Livelihoods	People's capacity to sustain themselves through employment or business
Decision-making systems	The extent to which people can have a say in decisions that affect their lives, and have access to complaint, remedy and grievance mechanisms.

6.10.3 Methodology

This SIA involved:

- Defining the social locality of the Project and gaining an understanding of the characteristics of the communities within it
- Undertaking an initial scoping assessment to identify the key social impacts to be considered in the SIA, and the level to which these need to be assessed
- Completion of a social baseline study to understand the social context of the area without the Project, based on the ABS 2021 Census and other relevant data
- Use of consultation feedback to further understand the social context of the area, including community values
- Predicting and analysing potential social impacts and benefits of the Project within each relevant social impact category of the SIA Guidelines. This has been informed by other technical assessments including air quality, traffic and transport, noise and vibration, heritage, and visual amenity impacts
- Evaluating the potential significance of social impacts, through a risk-based assessment which involves defining the likelihood and magnitude of each impact
- Identification and assessment of potential cumulative social impacts
- Development of mitigation measures for identified negative social impacts, and opportunities to enhance social benefits
- Evaluation of the potential residual social impacts, following the application of proposed mitigation measures.

6.10.4 Existing environment

The social locality for the SIA has been defined using Australian Bureau of Statistics (ABS) state suburb (SSC) boundaries. The following nine ABS state suburbs were selected as they overlap with the Project and its surrounding area. These suburbs include Tomago, Fullerton Cove, Williamtown, Raymond Terrace, Heatherbrae, Woodberry, Tarro, Hexham and Kooragang (refer to **Figure 6.10-1**).

The social locality has been developed with a view to the likely direct and indirect areas of influence associated with the construction and operation of the Project. Within the social locality two sub-areas have been considered, being the primary impact area (the suburb of Tomago) and the secondary impact area (the rest of the social locality) (refer to **Figure 6.10-2**).

Data has been collated for the suburbs within the social locality to describe the social context prior to the commencement of construction or operation of the Project. Key demographic indicators of relevance to the Project derived from ABS 2021 Census data are provided in **Table 6.10-2**. Demographic data for all of NSW has also been provided to allow for comparison with the selected demographic indicators within the social locality.

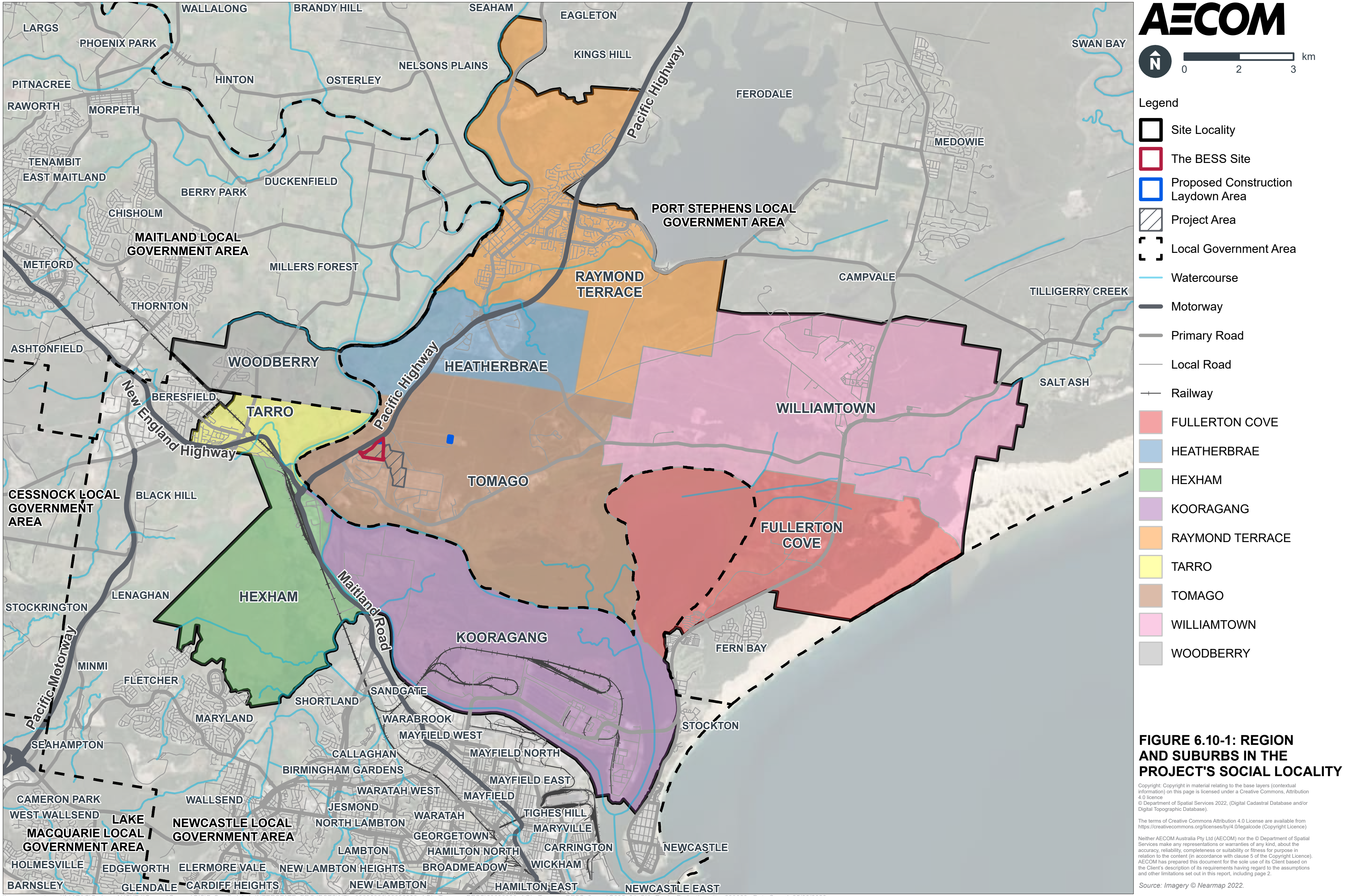
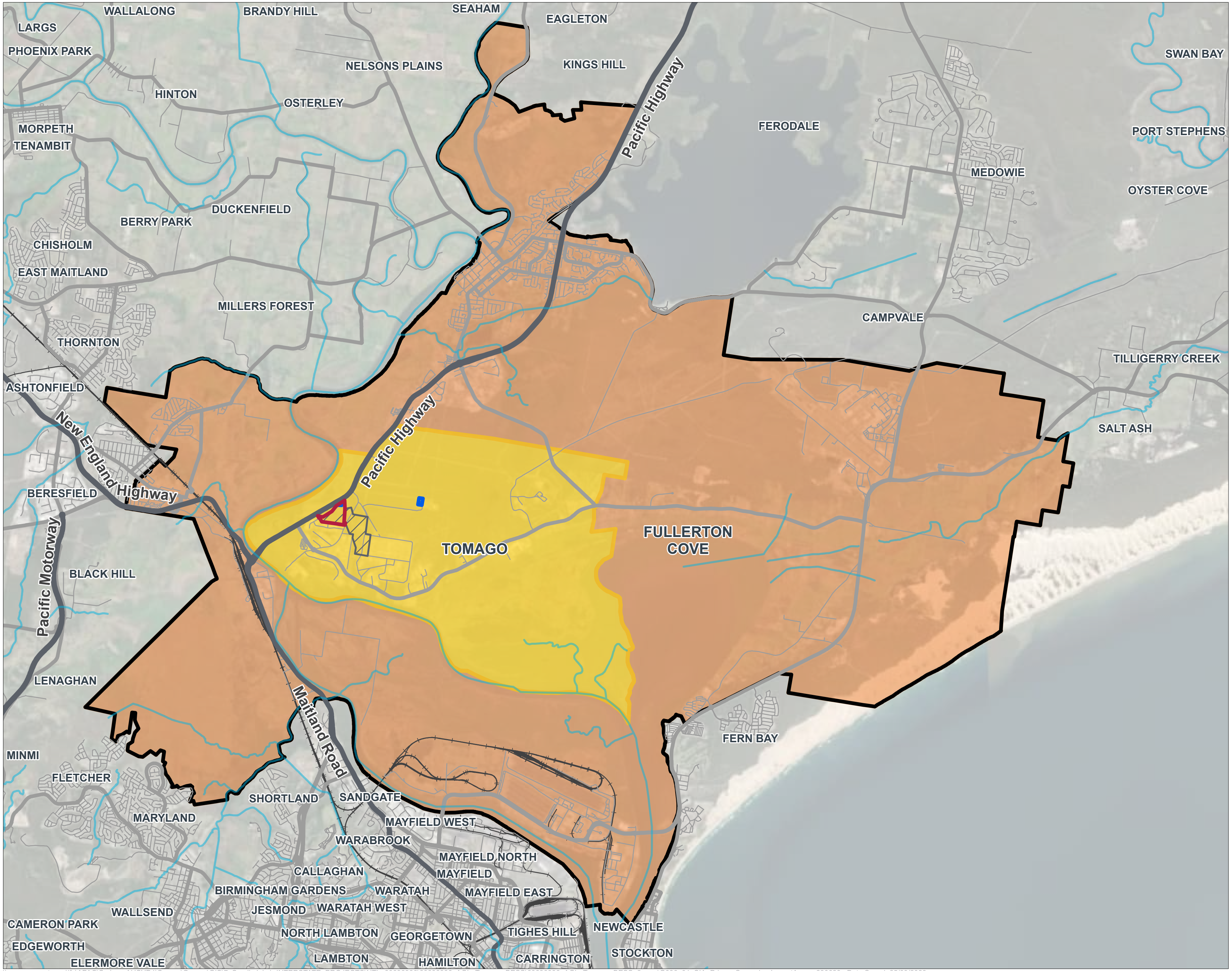


FIGURE 6.10-1: REGION AND SUBURBS IN THE PROJECT'S SOCIAL LOCALITY

Source: Imagery © Nearmap 2022.



AECOM

N

0 2 3 km

Legend

- Site Locality
- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Primary Impact Areas
- Secondary Impact Area
- Watercourse
- Motorway
- Primary Road
- Local Road
- Railway

FIGURE 6-10.2: PRIMARY AND SECONDARY IMPACT AREAS WITHIN THE PROJECTS SOCIAL LOCALITY

Source: Imagery © Nearmap 2022.

Table 6.10-2: Demographic information for social locality and NSW (ABS, 2021)

Demographic information	Tomago	Fullerton Cove	Williamtown	Raymond Terrace	Heatherbrae	Woodberry	Tarro	Hexham	NSW
Population									
Population	269	735	762	13,453	654	3,024	1,703	157	8,072,163
Median age	60	69	56	37	47	36	45	35	39
Aboriginal or Torres Strait Islander population	8.9%	2.3%	4.7%	11.8%	7.5%	15.3%	8.3%	12.1%	3.4%
Speaks only English at home	78.1%	86.1%	93.2%	90.7%	76.6%	91.0%	91.3%	85.4%	67.6%
Labour force and employment									
Employed full time	43.4%	51.4%	53.8%	53.3%	48.5%	51.1%	54.7%	47.4%	55.2%
Employed part time	32.5%	35.8%	34.7%	31.3%	33.6%	34.1%	30.9%	38.6%	29.7%
Unemployed	13.3%	1.7%	3.5%	7.2%	6.1%	9.5%	7.0%	5.3%	4.9%
Top three employment industries	• Manufacturing • Transport, Postal and Warehousing • Health Care and Social Assistance	• Construction • Health Care and Social Assistance • Education and Training	• Public Administration and Safety • Health Care and Social Assistance • Retail Trade	• Health Care and Social Assistance • Retail Trade • Construction	• Inadequately described/Not stated • Construction • Retail Trade	• Health Care and Social Assistance • Construction • Retail Trade	• Health Care and Social Assistance • Retail Trade • Manufacturing	• Inadequately described/Not stated • Education and Training • Manufacturing	• Health Care and Social Assistance • Retail Trade • Professional, Scientific and Technical Services
Dwellings									
Separate house	50.4%	76.8%	91.1%	78.6%	38.3%	91.9%	89.9%	97.6%	59.5%
Semi-detached, townhouse, terrace house, etc.	0%	21.0%	1.8%	14.8%	4.7%	3.5%	6.3%	0%	10.6%
Flat or apartment	0%	0%	0%	0.9%	0%	0%	0.4%	4.8%	19.7%
Other	48.9%	0.5%	7.6%	5.9%	55.6%	4.2%	3.5%	0%	10.2%

Demographic information	Tomago	Fullerton Cove	Williamtown	Raymond Terrace	Heatherbrae	Woodberry	Tarro	Hexham	NSW
Home ownership and household structure									
Owned outright	53.0%	76.8%	61.5%	26.1%	42.2%	26.9%	45.6%	31.6%	31.5%
Owned with a mortgage	16.7%	17.4%	17.8%	31.9%	12.8%	37.5%	30.7%	27.1%	32.5%
Rented	15.2%	1.3%	12.9%	39.5%	37.2%	33.7%	21.7%	35.6%	32.6%
Other tenure type	7.6%	0%	1.6%	0.9%	3.9%	0.8%	1.5%	0%	1.9%
Tenure type not stated	0%	1.3%	2.9%	1.6%	4.3%	1.1%	1.4%	6.8%	1.5%
Family household	39.4%	73.5%	55.0%	6.8%	53.9%	72.6%	61.9%	52.5%	71.2%
Single (or lone)	58.3%	24.2%	40.8%	28.3%	38.4%	23.7%	33.9%	45.8%	25.0%
Group household	2.4%	2.3%	1.3%	3.1%	5.0%	3.6%	3.5%	11.9%	3.8%
Journey to work and vehicle ownership									
Top transport method to work	Car (driver)	Car (driver)	Car (driver)	Car (driver)	Car (driver)	Car (driver)	Car (driver)	Car (driver)	Car (driver)
No motor vehicle	11.8%	2.3%	9.1%	6.6%	6.2%	5.3%	5.4%	5.1%	9.0%
One motor vehicle	55.1%	45.2%	44.0%	38.9%	48.1%	41.1%	43.4%	40.7%	37.8%
Two motor vehicles	23.6%	35.8%	18.8%	34.9%	21.7%	35.4%	30.9%	23.7%	24.1%
Three or more motor vehicles	5.5%	16.8%	24.0%	18.0%	21.7%	17.1%	18.6%	15.3%	17.6%

Notes:
Percentages may not add to 100 per cent due to rounding
Due to privacy, the Census data has been subject to perturbation to protect the confidentiality of individuals. Kooragang has a very limited population (four people) and therefore does not have any specific information about the individuals and has not been included in this table.

Vulnerable communities

Population groups within the social locality which are potentially vulnerable or marginalised have been identified and described in **Table 6.10-3**.

Table 6.10-3: Potentially vulnerable communities in the social locality

Group	Overview
Older and elderly people	Elderly people can represent potentially vulnerable groups within the community. As of 2021, 30.22% of the population within the social locality are aged 65 years and older, compared to 25.6% in NSW. Given the relatively large proportion of residents within this group, this group is considered to be one of the largest potentially vulnerable groups within the social locality. Of the suburbs within the social locality, in 2021 Fullerton Cove had the highest percentage of the population aged 65 years or older (62.9%), followed by Tomago (39.4%), then Williamtown (37.0%). 2.4% of people within the social locality are also aged 85 years and older, with the highest proportion of this group in Williamtown (3.9% of residents aged 85 years or older). Considerations for this group in preparing the SIA and proposed mitigation measures include a need for clear communication of proposed activities through diverse engagement materials (for example, less reliance on online materials); consideration of impacts across different times of the day and week (for example, members of this group, if retired, may be more likely to be at home daytime hours); maintaining easy and safe access to properties and local businesses. Impacts which involve changes to the local area may also be more relevant for members of this group where they have been long-term residents in the area.
Need for assistance	Core activity need for assistance data measures the number of people who need assistance in their day to day lives with any or all core activities, including self-care, mobility or communication because of a variety of reasons including disability, long-term health condition (lasting six months or more) or old age. In 2021, 9.0% of people within the social locality were identified as needing assistance with a core activity, which is slightly higher than the overall percentage of people in NSW needing assistance (5.8%). Of the suburbs within the social locality, Hexham had the highest percentage of the population needing help or assistance with a core activity (12.7%), followed by Williamtown (9.8%), then Woodberry (9.2%). Considerations for this group in preparing the SIA and proposed mitigation measures include a need for clear communication of proposed activities through diverse engagement materials and maintaining easy and safe access to properties and local businesses.
Socio-economic disadvantage	The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) has been used for this assessment, based on 2021 Census data. The IRSAD assesses the socio-economic conditions of people and households within an area, including both relative advantage and disadvantage measures. Overall, Tomago, Raymond Terrace, Heatherbrae, Woodberry and Tarro are reported to experience relatively higher levels of socio-economic advantage, compared to other suburbs within NSW, Australia, and the social locality. IRSAD scores for all suburbs in the social locality are of relatively higher advantage than other suburbs in NSW and Australia. Income levels can also provide an indicator of socio-economic advantage or disadvantage. Within the social locality, 2021 Census data indicates a range of median weekly household income from \$889 to \$2,250. The NSW median weekly household income is \$1,892. All suburbs in the social locality have a lower median weekly household income than NSW, with the exception of Kooragang which has a

Group	Overview
	median weekly household income of $2,250. Key considerations for groups that may experience socio-economic disadvantage in the social locality include the capability of this group to respond to potential business or amenity impacts.
Cultural and linguistic diversity	Culturally and linguistically diverse groups represent a small proportion of the social locality, particularly relative to NSW as a whole. Census results for 2021 indicate that 86.61% of residents within the social locality speak only English at home, compared to 67.6% of residents in NSW. Key considerations for culturally and linguistically diverse groups include the capability of this group to engage with communications and engagement activities undertaken for the Project. Translated communication materials about the Project during construction and operation would be made available if required.

Aboriginal culture and values

Aboriginal culture and values has been assessed as part of the Aboriginal Heritage Assessment described in **Section 6.9**.

Social infrastructure

Social infrastructure comprises social services or facilities that are used for the physical, social, cultural or intellectual development or welfare of the community. Social infrastructure includes educational facilities, childcare centres, hospital and medical facilities, aged care, sporting and recreational facilities, community halls, clubs, and libraries, and services, activities and programs that operate within these facilities. Open spaces, parks and sporting fields that support sport, recreational and leisure activities are also identified as social infrastructure.

Social infrastructure facilities generally operate at a local, district and/or regional level and are defined by the scale of the population catchment they serve. Social infrastructure can often be classified as a sensitive receiver and may be directly or indirectly affected by the Project.

There is limited social infrastructure in the area surrounding the Project due to the industrial setting the Project is in (see **Figure 6.10-3**). Social infrastructure within a 2 km radius of the Project Area includes:

- Sweetwater Grove, located at 819 Tomago Road, Tomago
- Tomago House, a museum and chapel located at 421 Tomago Road, Tomago
- Tomago Bowling & Sporting Club, a sporting club is located at 657 Tomago Road, Tomago.

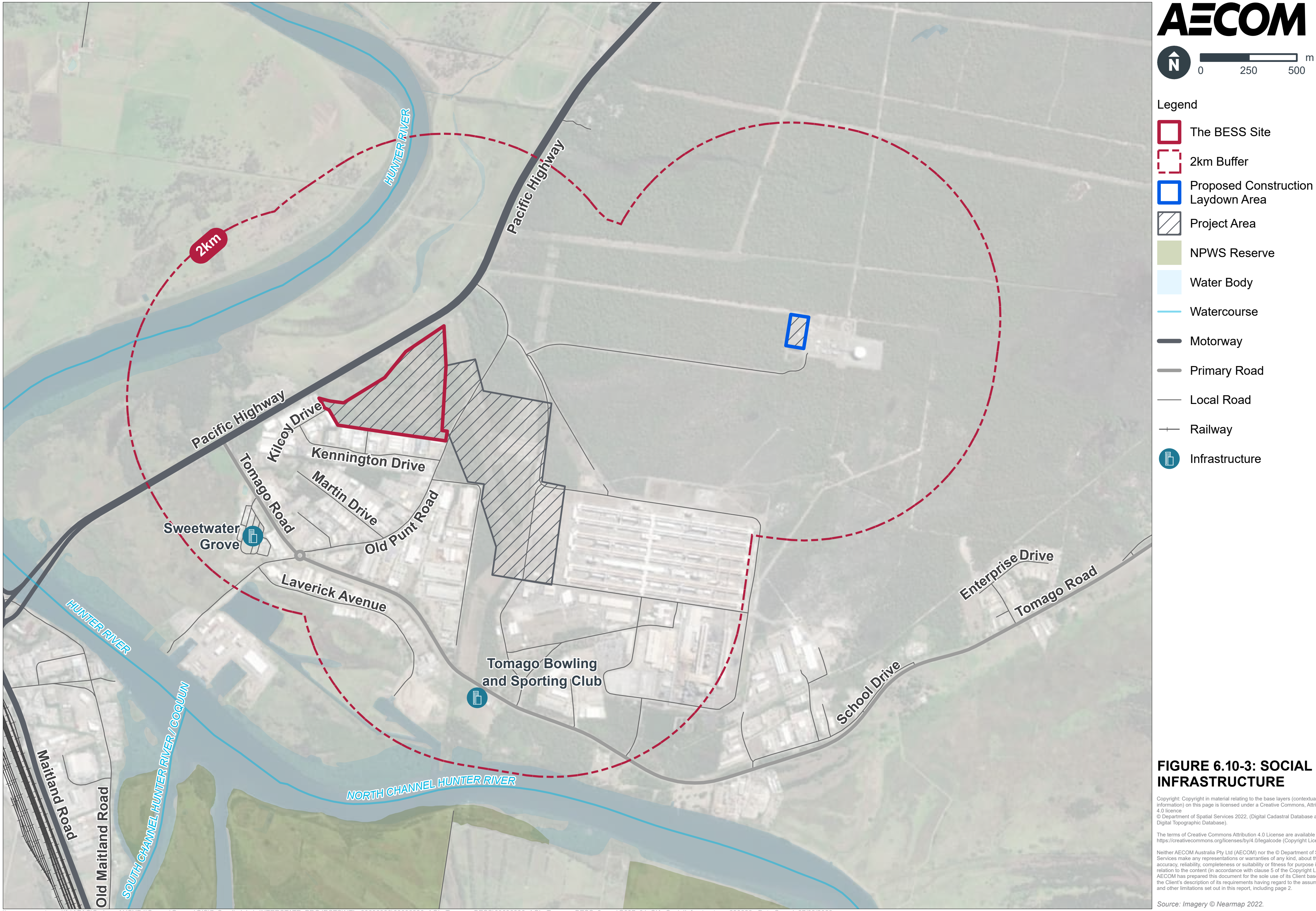


FIGURE 6.10-3: SOCIAL INFRASTRUCTURE

Source: Imagery © Nearmap 2022.

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Economic characteristics

Tarro, Hexham, Heatherbrae, Raymond Terrace all serve as local centres with the required services and facilities required to support surrounding residential areas. Tomago, Kooragang and Williamtown are considered to be more industrial areas.

Access and connectivity

A description of the existing conditions with regards to the road and freight network, public and active transport (walking and cycling) infrastructure within the vicinity of the project area is discussed in **Section 6.6**.

Construction workforce and industry

A substantial proportion of the existing workforce in each of the LGAs are employed in the construction industry, ranging from 5.8% to 9.0% (see **Table 6.10-4**). This represents a total of 54,805 persons This indicates there is a strong presence of existing skills and capabilities in the region that could be utilised on the Project.

Table 6.10-4: Existing construction workforce (2019) (ABS, 2022)

LGA	Number of persons employed in construction	Total workforce	Percentage of workforce employed in construction
Central Coast	19,837	225,802	8.8%
Cessnock	2,982	39,128	7.6%
Dungog	519	5,742	9.0%
Lake Macquarie	11,833	141,602	8.4%
Maitland	4,484	61,027	7.3%
Mid-Coast	3,243	47,032	6.9%
Newcastle	7,112	122,746	5.8%
Port Stephens	3,503	45,770	7.7%
Singleton	1,292	17,361	7.4%
Total	54,805	706,210	7.8%

6.10.5 Potential Impacts

Construction

An assessment of the potential social impacts associated with the construction of the project is provided in **Table 6.10-6**.

Table 6.10-5: Assessment of impacts associated with the construction of the Project

Impact	Impact summary
Way of life	
Changes to how people move around	Temporary disruptions in access to work, recreation, local shops, community facilities and essential services may occur due to temporary traffic disruptions during construction. Residential interview responses and ABS 2021 Census Data identified a high reliance on private vehicle transport. Measures to manage construction traffic and access impacts are an important consideration. The Project Area and proposed construction laydown area are located away from town centres and residential areas. This has largely avoided direct impacts to transport infrastructure (for example, the need for traffic detours), and in turn would minimise substantial disruption to the way in which people

<table>
<tr><th>Impact</th><th>Impact summary</th></tr>
<tr><td></td><td>move around their local area.

The key roads surrounding the Project include the Pacific Highway, Tomago Road, and Old Punt Road. The key roads would remain open to traffic, recreational cyclists, and pedestrians, with some traffic control measures in place near the Project Area access points to maintain safety.

Appendix F (Traffic and Transport Impact Assessment) of the EIS identified that the Project would increase the traffic generation on the surrounding key roads of the Project due to equipment and materials being brought to site. Further traffic generation would occur as a result of construction workers travelling to the Project Area and the proposed construction laydown area. The short-term increase in the traffic generation during construction would be acceptable and represent negligible impacts on the existing operation of the local road network, which carries high traffic volumes.

Given that potential impacts to movement would be generally limited to the key roads surrounding the Project, the magnitude of impact to different user groups (including pedestrians, cyclists and vehicle users across different age groups) would be minimal. These impacts would be unlikely to occur. As such, the overall significance of the impact would be low (negative).

These impacts would be managed through the development of a Construction Traffic Management Plan (CTMP) for the Project. The CTMP would seek to avoid and reduce transport and traffic impacts (and subsequently social impacts).</td></tr>
<tr><td>Property impacts</td><td>To facilitate the construction of the Project, the following landowners may be affected:
Port Stephens Council, as the transmission corridor is required to traverse Old Punt Road
TfNSW, where the Project may interface with the M1 Extension Project
Transgrid, as the BESS would connect to either the 132 kV or 330 kV substation both of which are on their land
Tomago Aluminium Company (TAC), for the construction of the electrical transmission corridor.
AGL would consult with the landowners listed above to ensure the construction of the Project would limit disruption to the existing operations and land uses.

The Project does not require the acquisition of land as the Site is owned by AGL. However, some easements are required to be entered into for connection to project elements. The impacts to way of life associated with easement negotiations is minimal, particularly since no property acquisition is necessary.

Overall, the magnitude of impact would be minimal. These social impacts would be unlikely to occur. The overall significance of the impact would be low (negative).</td></tr>
<tr><td>Utilities and digital access</td><td>Residents and businesses are dependent on public utilities, particularly the supply of electricity, telecommunications and water, and sewage infrastructure. Temporary disruptions to utilities, whether planned or unplanned, have the potential to adversely affect the ability of the community to access and use infrastructure.</td></tr>
</table>

Impact	Impact summary
	During construction, public utilities and services may be temporarily disrupted while they are relocated, or for safety reasons. Such disruptions would be planned and notified to affected users in advance, and their duration would be kept to a minimum. The extent of impact would generally be localised to the area where the disruption occurs. Impacts associated with utility disruptions could include impacts to businesses due to a temporary loss of operation of business-critical machinery or equipment or impacts upon resident's household routines. Utility disruptions, in particular to telecommunications infrastructure, could also affect a resident's digital access and ability to work or study from home. Overall, the magnitude of this impact for residents and businesses is considered to be **minor**. The likelihood of these impacts occurring would be **unlikely**. As such the overall social significance in relation to utilities and digital access would be **low** (negative).
Access to accommodation	The Project is expected to support an indicative peak construction workforce of up to 200 full time equivalent jobs over the duration of construction. The construction workforce would likely be sourced from across the local area and broader region, with a preference for local employees, where practicable. It has been assumed that 50% of the Project's construction workforce would comprise of local employees which currently live within commuting distance to the Project (totalling 100 workers during peak construction). These workers would not affect access to accommodation as they do not need to relocate to the social locality. For the remainder of the construction workforce, it is likely that some of these workers would relocate. For the purposes of the assessment, it is assumed that: • 40% of the peak workforce may require requiring longer-term relocation near the Project (80 workers in peak). These workers may enter the private rental market or other longer-term accommodation options in the commutable LGAs • 10% of the peak workforce may use FIFO/DIDO practices (20 workers in peak). These workers would use short-term accommodation options near the Project, that are typically also used by tourists and visitors to the area e.g. hotels, motels, bed and breakfast, Airbnb etc. The peak number of construction workers are not considered to be required throughout the entirety of the construction phase of the Project. It is assumed that the peak workforce would be required for approximately six months during the civil, structural, mechanical, and electrical works stage and transmission connection stage. The worst-case scenario of accommodation demand would be required for 100 workers for six months. Due to the large population of each of the LGAs, it is assumed that the combination of each LGA would have sufficient accommodation including hotels, motels, short-term rentals, Airbnb's and other options available for the peak construction timeframe to accommodate these workers. If the construction workforce is not dispersed throughout the commutable area, there could be a constraint on accommodation services in a particular area (likely within the secondary impact area). This could lead to a limited supply of short-term available accommodation, which may limit the ability of some tourists/visitors to access affordable accommodation in the area. While

Impact	Impact summary
	this may provide some benefits to local accommodation providers due to a potential upturn in trade, tourists or those wishing to visit the area may experience a negative impact due to lack of availability of accommodation. This may have a flow on effect to other businesses in the area that rely on tourism. This however is unlikely considering the large amount of available accommodation in the City of Newcastle alone, which is within commutable distance to the Project. The significance of impacts to businesses in relation to livelihoods of business owners and employees is discussed below under 'Livelihood'. Given that the potential increase in workers living in the area is likely to be dispersed across multiple urban and semi-urban LGAs, with several health services and social infrastructure, the increase in construction workers is not expected to have an appreciable impact on access to social services, especially given the proximity of the Project Area to the City of Newcastle. Due to the limited long-term operational employment opportunities on the Project, it is considered unlikely that workers would relocate their families to the region (if they are part of a family household). The potential magnitude of the impact of the Project on accommodation availability is considered to be **minor**. The likelihood would be **possible**, resulting in an overall **medium** (negative) significance.
Community	
Demographics and community composition	The Project is expected to support an indicative peak construction workforce of up to 200 full time equivalent jobs (direct employment) over the duration of construction. The construction workforce would comprise trades and construction personnel, and engineering, functional and administrative staff. The construction workforce would be sourced from across the local area and broader region, with a preference for local employees where practicable. Some workers may also choose to relocate to the social locality, contributing to an increase in the full time population. A large proportion of the construction workforce is likely to comprise young men, noting that 86.6% of employees in the Australian construction industry are male, and the median age for workers in the construction industry is 38 (Back to Basics, 2022). While limited change is anticipated to the overall population of LGAs, the presence of construction workers at the construction footprint would result in increases in the persons employed and the daytime population within Tomago and surroundings suburbs. Noticeable increases in population may result in temporary changes to the demographic profile and identity of the community as a whole. Introducing new groups of people to established areas can alter existing values and sense of community. An influx of construction workers, who are not familiar with the local area, it's community or the importance of place, may be a potential cause of conflict and dissatisfaction for some existing residents. While there is some potential for similar concerns to arise during construction of the Project, there is limited comparable research on this effect for energy projects, particularly in urban areas such as this. Relevant construction worker behaviour codes would be implemented to promote respectful and appropriate behaviours in the community, thereby limiting the potential for this impact to occur during construction. Overall, given the relative sizes of the local population and the likely

Impact	Impact summary
	construction workforce, the Project has the potential to result in minor temporary impacts to the local demographic profile including a small increase in daytime population, which may raise concerns among community members. The magnitude of this impact is considered to be **minimal**. The likelihood of the Project resulting in broader demographic changes during construction would be **possible**. As such the overall significance of the impact would be **low** (negative).
Social cohesion and sense of place	Social cohesion refers to the connections and relationships between individuals and their community. Activities that create a physical or psychological barrier between communities can affect social and/or economic interaction, potentially resulting in social isolation and an erosion of the sense of community. The presence of construction traffic on the key roads surrounding the Project may somewhat affect the ability of pedestrians and cyclists to cross roads, and/or it may increase travel times for vehicle users. This has the potential to limit people's opportunity to socialise within the community. For the Project, this effect is likely to be relatively small, taking into consideration the relatively small traffic volumes associated with the Project in comparison to the existing traffic volumes surrounding the Project Area. Construction of the Project would also result in minor changes to local amenity. This would be due to increases in noise levels, dust or reduced visual amenity as a result of construction hoarding (see amenity impacts described below). These changes would however generally result in limited changes to social cohesion and sense of place given the distance the Project is located from town centres or locations where people gather, thereby limiting direct amenity impacts. Vulnerable groups in the community may have an increased sensitivity to changes in access and amenity which may lead to a degree of self-exclusion from the community. The magnitude of this impact is considered to be **minor** for groups within the social locality (including vulnerable groups) given that changes to access are limited and the construction footprint is located a distance away from community centres. Overall, the likelihood of this impact occurring would be **unlikely**. As such the overall social significance in relation to community cohesion and sense of place would be a **low** (negative) impact.
Surroundings	
Local amenity	Amenity refers to the quality of a place, its appearance, feel and sound, and the way the community experiences the place. Amenity contributes to a community's identity and its sense of place. Aesthetic qualities are an important part of amenity, but the broader concept of amenity is also determined by the physical design of a place and the human activity that takes place within it. A place that has 'amenity' is regarded as pleasant and attractive, as well as convenient and comfortable. <u>Traffic and access</u> Transport and access has been considered in **Section 6.6 (Traffic and transport)**. The assessment outlines the nature of likely impacts, and the mitigation measures to be implemented to minimise impacts. This section considers the social implications of potential traffic and access impacts. Temporary increase in traffic on the roads surrounding the Project Area would occur during the construction of the Project. The presence of

Impact	Impact summary
	construction vehicles accessing the Project Area may adversely affect local amenity, however this is not expected to substantially differ from the existing environment, as the key roads surrounding the Project Area currently accommodates relatively high volumes of traffic, particularly heavy vehicles. Noise and vibration Noise and vibration impacts associated with the Project are described in **Section 6.7 (Noise and vibration)**. The assessment outlines the nature of likely impacts, and the mitigation measures to be implemented to minimise impacts. This section considers the social implications of potential noise and vibration impacts. Air quality Air quality impacts associated with the Project are described in **Section 6.12**. Construction activities such as demolition and earthworks have the capacity to increase airborne emissions such as dust and vehicle emissions. This has the potential to reduce the amenity of an area, and generate nuisance dust impacts (dust soiling) or odour related impacts. These impacts could also potentially deter people from using spaces, visiting businesses or enjoying residential amenity. Impacts associated with dust may particularly affect people who experience allergies, asthma or other respiratory issues. Potential dust, odour and exhaust impacts are likely to be short-term and localised to the Project Area. Considering the distance of construction works from social infrastructure and residents, it is considered appropriate that potential air quality impacts be addressed by the implementation of conventional management measures for construction and operations. Visual amenity Visual amenity impacts associated with the Project are described in **Section 6.14 (Visual amenity)** of the EIS. The assessment outlines the nature of likely impacts, and the mitigation measures to be implemented to minimise impacts. This section considers the social implications of potential visual amenity impacts. The nearby publicly-accessible visual environment is dominated by existing industrial businesses, transport corridors and urban development. Closer to the Project the surrounding area is dominated by native vegetation and electrical infrastructure such as transmission lines and substations. However, this area is not publicly accessible so these views are not typically experienced by most people. Visual impacts for nearby residents, workers and visitors would arise primarily from the presence of the construction laydown area, construction activity, equipment, workers and plant/machinery. Whilst this would not necessarily prevent people carrying on their day to day activity it may affect their enjoyment of their private spaces and potentially lead to a degree of stress or anxiety. The main receptors of the visual impacts would be passing traffic and those who work near the Project Area. Construction impacts would be distant from most receivers, temporary and limited to the length of the construction period. No residential receivers are likely to have views of construction from their homes. Boundary vegetation at the Site currently blocks most transient views, and, as such, no significant visual impacts are expected during construction.

Impact	Impact summary
Crime, safety and security	Security The presence of the construction sites may result in changes to perceptions of safety in an area. In general, the presence of a construction site may include changes to local sight lines, restrictions for pedestrian traffic reducing passive surveillance, the provision of new surfaces for graffiti, or perception that criminal activities may be attracted to construction facilities. The Project Area would be secured with fencing and located away from urban centres. Potential safety concerns would be manageable through the application of the principles of Crime Prevention Through Environmental Design (CPTED) at the construction site. Regular communication with the community and stakeholders throughout construction would also allow residents and business owners to understand construction plans and therefore be better prepared for the temporary changes to the area. Any community feedback on real or perceived crime or safety issues arising from the presence of the Project would be considered during construction with appropriate and practicable corrective actions taken at the time, depending on the issue. Based on the nature of the potential safety impacts, and location of the Project Area away from urban centres, the magnitude of impact is considered to be **minimal**. The likelihood of the Project Area substantially changing the security of the surrounding area is **unlikely**. As such the overall significance of impact would be a **low** (negative) impact. Safety The presence of a construction workforce may influence community perceptions of safety and security. While local workers would be employed wherever practicable, some workers would likely relocate to the area for the Project. The introduction of a non-resident workforce would introduce new people to the region. It is likely that a large proportion of these workers may be young men. Community members may experience heightened concerns about declining safety associated with worker behaviour, consumption of alcohol, and women's perception of safety in public areas. Relevant construction worker behaviour codes would be implemented to promote respectful and appropriate behaviours in the community, thereby limiting the potential for this effect to occur during construction of the Project. Furthermore, the accommodation of construction workers is likely to be distributed across suburbs within a commutable distance to the construction footprint, partly diluting potential impacts to perceptions of safety. Given the above and the likely broad geographic spread of those expected to be relocating to the region for this Project, the magnitude of real or perceived changes in safety would be **minor**. The likelihood of the local community holding real or perceived concerns in this regard is considered to be **unlikely**. The overall significance of the impact would be **low** (negative).
Culture	
Aboriginal culture and heritage	Potential impacts from the Project on Aboriginal culture and heritage are assessed in **Section 6.9 (Aboriginal Heritage).**
Non-Aboriginal heritage	The history and heritage (including non-Aboriginal heritage) of an area can influence the identity of the community who live amongst it. A search of the State Heritage Register and *Port Stephens Local Environment Plan 2013* was undertaken to determine the location of

Impact	Impact summary
	registered or known non-Aboriginal heritage items within or near the Project Area. There are no registered or known non-Aboriginal heritage sites within or adjacent to the Project Area. A non-Aboriginal Heritage Assessment (NAHA) was undertaken by ERM (2019), which included the Site. The NAHA determined there were no non-Aboriginal heritage features or items in located throughout the Site (and broader Project Area). It is considered unlikely that the Project Area or surrounds contain historic heritage values that reach the threshold for local or state historic significance. Ultimately, the historical archaeological potential of the Project Area is very low. On this basis, the magnitude of potential social impacts associated with impacts to non-Aboriginal heritage are considered **minimal**. The likelihood of these impacts occurring would be **very unlikely**. As such the overall significance of impact would be a **low** (negative) impact.
Livelihood	
Business impacts	<u>Business impacts</u> Businesses across the social locality may be affected during construction by temporary changes in passing trade, access and travel time (for employees, customers, and deliveries), changes to parking and impacts to local amenity. Potential impacts to the operation and viability of businesses can in turn affect people's livelihoods, including their ability to sustain themselves through employment or business opportunities. The Project is located within a well-established industrial area, where there is an existing concentration of businesses. Businesses may experience temporary amenity impacts associated with increases in noise and vibration levels, traffic and air quality, or be affected by potential utility disruptions (refer assessment of amenity above). Noise and vibration levels could disrupt focus and interfere with some business practices, depending on the business type. Utility disruptions could affect electrical or digital connections which would be essential to the running of some businesses and those who work remotely. Amenity impacts and changes to traffic conditions could also make some businesses, such as cafes, and recreational businesses, less attractive for people to visit and spend time in. Mitigation measures would be implemented to avoid or minimise these impacts. Based on the likely impacts outlined above, the overall magnitude of adverse amenity impacts to businesses would be **minor**. The likelihood of these impacts being experienced within the social locality would be **possible**, resulting in a **medium** (negative) social impact. <u>Impacts on revenue</u> Retail, food and beverage businesses would likely experience a temporary uplift in revenues of retail businesses in the social locality, due to an increase in passing trade associated with the presence of construction workers in the area. Local and regional construction contractors and businesses who service or supply goods to the construction industry would also be expected to experience an increase in trade. The construction of the Project may also require short and long-term occupancy of accommodation within the local area for employees sourced from outside the region. Accommodation providers within the social locality

Impact	Impact summary
	would likely experience an increase in trade. These changes would benefit livelihoods through generating revenue at existing businesses within the social locality, as well as potentially providing further employment opportunities within these businesses. The overall magnitude of benefits to businesses associated with increased expenditure in the social locality would be considered **minor**. The likelihood of these impacts being experienced within the social locality would be **possible**, resulting in a **medium** (positive) social impact.
Economic impacts	Construction activity can benefit the economy by injecting money into the local, regional and state economies. This can result in employment and business opportunities for people. The economic benefits of construction can include: • Increased expenditure at local and regional businesses through purchases by construction workers • Direct employment through onsite construction activities • Direct expenditure associated with onsite construction activities • Indirect employment and expenditure through the provision of goods and services required for construction. The capital expenditure required for the Project would create increased opportunities for both businesses and workers associated with construction, while also resulting in substantial flow-on impacts to other parts of the local economy, including for local businesses and the local workforce within the social locality. It is estimated that the Project could support up to 200 jobs over the construction period. Construction businesses, industries and skilled workers in the social locality would also experience these benefits. These may include local construction contractors, businesses who service or supply goods to the construction industry such as food and beverage retailers, accommodation providers, and other retail outlets that cater to the day-to-day needs of the construction workforce. This temporary increase in revenue may subsequently lead to increased employment opportunities locally, which would inject additional money back into the local economy. This has the potential to benefit people's livelihoods through supporting local business and employment in these businesses. The overall magnitude of economic benefits during construction in the social locality would be considered **minor**, given that the benefits would likely be dispersed across the broader region. The likelihood of these impacts being experienced within the social locality would be **possible**, resulting in a **medium** (positive) social impact.

Operation

An assessment of the potential social impacts associated with the operation of the Project is provided in **Table 6.10-6**.

Table 6.10-6: Assessment of impacts associated with the operation of the Project

Impact	Impact summary
Way of life	Amenity impacts arising from the operation of the Project would be minimal, given the low number of operational workers, vehicle movement, noise and visual impact. The Project would not implement any changes to the existing road network. The Project would also be located within an existing industrial area, where similar activities already take place. As such the Project would not be expected to change the way people move around their community or access social infrastructure. Based on the above, the likelihood of impacts to way of life is considered to a **minimal** magnitude and would be **very unlikely**. As such the overall significance of impact would be a **low** (negative) impact.
Community	The operation of the Project is not anticipated to result in a change to the demographic profile of the social locality, as much of the Project's operational infrastructure would be predominantly unmanned and would only require a small operational workforce. The Project is also unlikely to enable other changes that may induce any substantial demographic changes. The Project is in a location that is physically and visually separate from residents and community hubs within the social locality. The Project is not expected to affect social cohesion or the community's sense of place as it is located within an industrial area and would be consistent with the exiting environment of industrial businesses. The overall magnitude of this impact is considered to be **minimal**. The likelihood of the Project resulting in broader demographic changes or changes in social cohesion and sense of place during operation would be **very unlikely**. As such the overall significance of the impact would be **low** (negative).
Surroundings	<u>Traffic and access</u> Traffic impacts associated with the Project are expected to be negligible during the operational phase. The Site will be largely managed remotely, and on the infrequent occasion where maintenance work is required, a dedicated road and carpark within the Site would be available for workers. As such the Project would not result in any noticeable traffic generation or local parking impacts. <u>Noise and vibration</u> If maintenance activities are required during operation that would result in noise emissions, construction phase noise and vibration mitigation measures would be implemented. <u>Air quality</u> There would be no air quality impacts from the Project during the operational phase of the Project. The Project would not require any earthworks or activities that would lead to airborne dust or other emissions. If maintenance activities are required that may lead to airborne dust or other emissions, construction phase mitigation measures would be implemented. <u>Visual amenity</u> During operation, the Project would be an additional industrial facility on the

Impact	Impact summary
	edge of an existing industrial estate. The Site is not publicly accessible and is generally surrounded by mature vegetation, which would screen most views. The Project would suit the existing environment and would not create a loss of local amenity related to visual impacts. Crime, safety and security The Project would be located away from prominent public areas. The Site would be adequately secured, include security lighting and would be designed with consideration of CPTED principles. This would support safety and security in areas with a public interface. The magnitude of impact would be **minimal**. Given the nature of the Project, with limited security-related risks, adverse impacts to crime, or a deterioration in security in the community is considered **unlikely** to occur. The overall significance of the impact would be **low** (negative).
Culture	Aboriginal culture and heritage Potential impacts from the Project on Aboriginal culture and heritage are assessed in **Section 6.9.** Non-Aboriginal heritage There are no anticipated impacts to non-aboriginal heritage associated with the operation of the Project. Based on the above, the likelihood of negative impacts to non-Aboriginal heritage and values is considered to a **minimal** magnitude and would be **very unlikely**. As such the overall significance of impact would be a **low** (negative) impact.
Livelihood	Businesses and the local economy have been supported by the NSW Government to diversify from a focus on coal-fired generators as outlined in the Hunter Regional Plan 2041 (NSW Department of Planning and Environment, 2022). The Project would provide an opportunity to diversify local industry, and to support a more resilient local economy by supporting new renewable projects across the Hunter-Central Coast Renewable Energy Zone and the NEM more generally. The overall magnitude of economic benefits in the social locality would be considered **minor**, given that the benefits would likely be dispersed across the broader region. The likelihood of these impacts being experienced within the social locality would be **possible**, resulting in a **medium** (positive) social impact.
Economic	The Project is expected to indirectly support future capital investment in renewable energy projects in the region and across NSW, further stimulating regional and State economies. The Project is also expected to indirectly support the viability of cheaper electricity generation cost sources, such as wind and solar, by contributing to network firming with the potential to provide cheaper household electricity costs to households and businesses in the region, and to a less extent NSW. The operation of the Project would largely be undertaken remotely, however, up to six personnel are likely to be required, which may lead to minor increased employment opportunities for local and regional residents.

6.10.6 Management of impacts

Performance outcomes

The performance outcomes for the Project are summarised below in **Table 6.10-7** and identify measurable, performance-based standards for environmental management. Measures and strategies to address these performance outcomes are described in the following sections.

Table 6.10-7: Performance outcomes for the Project – social and economic impacts

SEARs desired performance outcome	Project performance outcome	Timing
An assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPIE, 2021a) and consideration of construction workforce accommodation An assessment of the economic impacts or benefits of the project for the region and the State as a whole	Design and implement the Project to provide net positive social and economic outcomes, including: • avoiding or minimising the environmental impacts of the Project during construction and operation • avoiding or minimising disruptions to local businesses during construction • maximising Project employment within the region during construction and operation • develop and implement clear, timely and inclusive stakeholder engagement and information measures.	Design, construction and operation

Mitigation measures

Construction and operational mitigation measures to manage potential social impacts of the Project are outlined in **Table 6.10-8**.

A construction environment management plan (CEMP) would be prepared for the Project. The CEMP would detail the proposed approach to environmental management, monitoring and reporting during construction. The management of other environmental matters considered in the EIS would contribute to the management of social impacts, due to their interrelated nature. Other mitigation measures identified in the EIS that are relevant to the management of potential social impacts include those specified in the Traffic and Transport, Noise and vibration, Visual amenity, and Air quality. Additionally, the mitigation measures in **Chapter 6.17 (Cumulative impacts)** would contribute to the management of cumulative social impacts.

Table 6.10-8: Mitigation measures – social impacts

ID	Mitigation measure	Timing
SI-1	Construction workers for the Project will be employed from the local area, where possible, to reduce the need for workers to relocate to the area for the duration of construction, and to contribute to local employment opportunities.	Construction
SI-2	Stakeholder engagement activities carried out during construction will be accessible to a range of groups in the community. This will include, at a minimum, a range of engagement methods (including options for physical copies of engagement materials) and opportunities for translated materials, upon request.	Construction

ID	Mitigation measure	Timing
SI-3	Coordination and engagement with other projects would occur before and throughout construction to manage consultation and construction fatigue where possible.	Pre-construction, Construction
SI-4	Application of the principles of Crime Prevention Through Environmental Design (CPTED) at the construction site.	Construction

6.12 Air Quality

6.12.1 Overview

This section assesses the potential air quality impacts associated with the construction and operation of the Project. Following this assessment, the section includes mitigation measures to reduce potential air quality impacts associated with the Project.

6.12.2 Methodology

A qualitative desktop assessment was undertaken to assess the air quality impacts. The assessment included:

- Reviewing the legislation for air pollution and air quality in NSW
- Reviewing data on baseline air quality for the region and existing nearby facilities that may contribute to air pollution
- Identifying potential air pollution generating activities that could occur during construction and operation
- Describing the proposed management techniques for key air pollutants during construction and operation.

No field surveys or monitoring was undertaken as part of the qualitative assessment for air quality.

6.12.3 Existing Environment

Air Quality Index

Information on the baseline air quality for the airshed around the Project Area was sourced from the DPE air quality monitoring data services (DPE, 2023). According to the DPE (2023) Air Quality Data Explorer, the nearest air quality monitoring site is in Beresfield, located approximately 4.5 km west of the Project Area. Given the proximity of the monitoring site, the data is considered adequate to represent the airshed around the Project Area, although it is noted that the Project Area is located in an industrial area proximate to Tomago Aluminium Smelter, other industrial facilities, and the M1 and as such these activities may cause some variance in air quality.

This monitoring site 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}).

The monitoring results of fine particles for the months of January and July between 2022-2023 from the monitoring site are presented in **Table 6.12-1**.

Table 6.12-1: Beresfield monitoring station air quality data

Pollutant	Averaging period	Concentration (µg/m3)			
		01/01/2022	01/07/2022	01/01/2023	01/07/2023
$PM_{2.5}$	1 hour average	10.32	15.40	2.74	8.17
PM_{10}	1 hour average	13.53	12.40	4.43	3.70

National Pollutant Inventory

Australian industrial facilities that meet the reporting criteria are required under legislation to report annually to the National Pollutant Inventory (NPI), kept and managed by the Department of Climate Change, Energy, the Environment, and Water (DCCEEW, 2023). A search of the NPI undertaken on 15 December 2022 using a 5 km radius from the Project Area, identified nine sources emitting 32 air pollutants within the 2020-2021 reporting period. A subsequent search of the NPI was conducted on the 03 July 2023, that revealed three industrial sources of pollution within a 2 km radius of the Site that are likely to impact air quality within the local area.

These were:

- Hunter Galvanizing Tomago, less than 1 km east
- Tomago Aluminium Smelter, approximately 1.5 km southeast
- NGSF, approximately 1.75 km east.

Other industrial facilities identified within a 5 km radius, but beyond a 2 km radius from the Site, that may also impact the local air quality include Omega Chemicals, Industrial Galvanizers Hexham, and Hexham Train Support Facility. For the purpose of this assessment, only the three industrial facilities within a 2 km radius of the Site have been further assessed to determine the existing local air quality.

For Hunter Galvanizing, the most recent Environmental Monitoring Data Report was published in 2012. The report states that beyond 2012, monitoring data was not required to be posted under the licence (Hunter Galvanizing, 2023). The site contains two discharge points described as biofilter stack exhausts. According to the NPI (2023), the biofilters were installed and have been operational since 2002. The 2012 monitoring data report primarily focuses on noise pollution and does not contain information on air quality or note any breaches, however a pollution incident response management plan (2023) is provided on their website.

The Tomago Aluminium Company Annual Environment Report (2022) found concentration and load based limits on fluoride, sulfur dioxide, particulates, and nitrogen oxides were met. There were no exceedances of the ANZECC air quality guidelines for fluoride outside the designated company buffer zone (Tomago Aluminium, 2023). The report highlighted several exceedances in the air quality guidelines for both fluoride and sulfur dioxide, however all exceedances were within the designated buffer zone for the smelter.

NGSF published an air monitoring report for 2022 in accordance with the Requirements for *Publishing Pollution Monitoring Data (EPA, October 2013)*. NGSF has four EPA monitoring points that are monitored twice per year. Of the various pollutants measured during air monitoring, only carbon monoxide, nitrogen oxides, solid particles, sulfuric acid mist and sulphur trioxide, and volatile organic compounds have set concentration limits. Of these pollutants, no exceedances were recorded in the data provided (NGSF, 2023).

Climate

The climate and meteorology of the Site has been assessed using the Bureau of Meteorology's (BOM) publicly available climate data.

The Site is located approximately 11.5 km inland of the east coast of Australia in the Hunter region of NSW. The nearest weather station is Williamtown Royal Australian Air Force (RAAF) base (weather station ID 061078), located approximately 14 km east of the Site (BOM, 2023). The area experiences the warmest temperatures between November to March, with a mean maximum temperature of 28.3°C in January for years recorded between 1942 - 2023. Cooler temperatures are experienced between May to September, with July being the coldest month on average, recording a mean minimum temperature of 6.5°C between 1942-2023.

On average, the area receives 1129.3 mm of rainfall annually, and the mean number of days receiving more than 1 mm of rain per year is 86.3. August tends to have the greatest wind speed in the morning, averaging 16.8 km/h at 9am, while afternoon wind speeds are greatest during November and December, both averaging 23.5 km/h at 3 pm. Mean annual wind speeds at 9 am and 3 pm are 13.7 km/h and 20.2 km/h respectively.

Sensitive Receivers

The sensitive receivers to air quality during construction and operation of the Project are:

- Workers at nearby industrial and commercial receivers
- Residential and temporary accommodation receivers within 1 km of the Site including Sweetwater Grove, and Old Punt Road Café.

Surrounding sensitive receivers and applied buffers ranging from 250 m to 1 km are shown in **Figure 2.6-4**.

6.12.4 Potential Impacts

Construction

Construction works are likely to generate dust emissions from the movement of vehicles, heavy machinery, and ground disturbance works, particularly during dry conditions. To mitigate dust impacts on sensitive receivers, dust suppression activities would include water spraying via water carts and the use of soil stabilisers. Ground disturbance works such as trenching for the transmission connection would be conducted in segments with soil backfilled and stabilised to reduce the amount of dust generated. Assigned access tracks would be provided to limit vehicles travelling on unsealed surfaces.

Other construction impacts include fuel emissions generated from site vehicles and vehicles transporting workers, trucks transporting materials and machinery, water carts, diesel generators, and certain machinery used onsite such as excavators and graders. Fuel emissions would be mitigated by conducting regular vehicle and machinery maintenance checks and having vehicles and machinery serviced regularly. Vehicles and machinery would be turned off while idle where safe to do so.

Operation

Dust generation during operation would primarily occur from both travelling to and from Site, and to carry out routine inspection works and maintenance activities. Given the minor nature of these potential impacts, the effect on local and regional air quality from dust emissions generated during operation 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.

Mitigation measures

Mitigation measures that would be implemented for the Project to minimise air quality impacts are provided in **Table 6.12-2**. The implementation of these management and mitigation measures would mean that potential air quality impacts would be negligible.

Table 6.12-2: Mitigation and management measures for air quality

ID	Mitigation and Management Measures	Timing
AQ-1	The CEMP would include measures to manage air quality including dust and fuel emissions. These would include: • Weather conditions being considered at the start of each day of work and strategies would be implemented to reduce dust generation • Designated access roads and main entry and exit points to the Site would be defined to minimise tracking of soil on surrounding roads • Heavy vehicles entering and leaving the Site would be covered to prevent material escaping during transport, where there is a risk of this occurring • A record of maintenance and service logs of machinery and vehicles used onsite to be kept, to help confirm vehicles and machinery are operating efficiently • Instructions to turn off vehicles while idled unless it is not safe to do so • Stop works procedure in the event dust levels impact public amenity or become hazardous.	Construction

ID	Mitigation and Management Measures	Timing
AQ-2	Opportunities to reduce impacts on air quality would be investigated and included in the Project Risk and Opportunity Register. Opportunities that may be investigated to reduce fuel emissions during construction include: • Use of hybrid vehicles • Use of green fleet vehicles or newer model vehicles with high fuel efficiency • Use of diesel particulate filters on vehicles and/or machinery.	Construction

6.13 Non-Aboriginal Heritage

6.13.1 Overview

This section assesses the potential impacts to non-Aboriginal heritage from the construction and operation of the Project. The section includes mitigation and management measures to reduce potential non-Aboriginal Heritage impacts.

6.13.2 Methodology

The desktop assessment for non-Aboriginal heritage involved undertaking searches of statutory and non-statutory historic registers to determine the location of registered or known non-Aboriginal heritage items. Registers searched included:

- State Heritage Register
- The Australian Heritage Database, which includes:
  - The Commonwealth Heritage List (CHL)
  - The Register of the National Estate (RNE)
  - The National Heritage List (NHL).
- The NSW State Heritage Register (SHR) and State Heritage Inventory (SHI)
- Port Stephens Local Environmental Plan (LEP) 2013
- Newcastle LEP 2012
- The National Trust of Australia (NSW)
- Section 170 Heritage and Conservation Register.

In addition to undertaking a desktop assessment, a non-Aboriginal Heritage Assessment (NAHA) was undertaken by Environmental Resources Management Australia Pty Ltd (ERM) 2019 for the NPS project. This NAHA captures the majority of the Project Area with the exception of a small portion of land close to the Transgrid 330 kV substation. The NAHA (ERM, 2019) comprised background research and desktop assessment, field survey and associated data analysis in accordance with the following guidelines:

- *The Australia International Council on Monuments and Sites, Charter for Places of Cultural Significance* (also known as the Burra Charter, Australia ICOMOC 2013)
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch, Department of Planning 2009)
- NSW Heritage Manual (Heritage Office 2006)
- *Assessing Heritage Significant* (NSW Heritage Office 2001).

The desktop assessment and NAHA (ERM 2019) has been used to inform the non-Aboriginal heritage assessment to:

- Identify non-Aboriginal heritage items with the potential to be impacted by the Project
- Assess the potential impacts of the Project on non-Aboriginal heritage values and any identified items during construction and operation
- Identify management measures to address potential impacts to non-Aboriginal heritage.

6.13.3 Existing Environment

Historical context

As stated within the NAHA (ERM 2019), early occupations for convicts in the Tomago area were oyster shell mining and lime burning, which was carried out along the Hunter River; coal mining, and subsistence farming also supported the penal settlement (Austral Archaeology 2011; Walsh 2010). Free settlement in the Tomago area began in the early 1820s and increased in the 1830s and 1840s and grazing and agricultural properties such as the well-known Tomago House were established at this time (Austral Archaeology 2011; National Trust n.d.; NSW Heritage Office 2008).

A number of mineral leases were taken out in the 1880s. These mineral leases relate to exploitation of coal reserves associated with the Tomago Coal Measures, which was one of the four coal measures that comprise the Newcastle/Hunter Valley coalfields. Although commercial mining of the Tomago Measures ceased in the mid-1860s, exploratory work to locate further seams continued. Mining continued to be a major local industry through the 19th and 20th centuries (ERM 2019).

From the 1940s, with the onset of World War II, Tomago developed as an industrial and manufacturing area (Austral Archaeology 2011). The Tomago Aluminium Smelter was established in the early 1980s at a site that had previously housed a coal mine from the early 19th century, and later the Courtaulds Textile Factory, which operated until 1976 (NSW Heritage Office 2008). The Tomago area is still primarily used for agricultural and industrial purposes today; however, it retains a small local population (Coffey 2011; ERM 2019).

The Project Area is located within Stockton Parish, and parish maps exist from 1915, 1923, 1933, and 1961 (refer to Appendix A of the NAHA, ERM 2019). The maps show the development of the Project Area through the first half of the 20th century, with the construction of the transmission line and corridor between 1923 and 1933, and the resumption of land to construct the Pacific Highway prior to 1961 (ERM 2019).

Historic aerial photographs of the Project Area show that an early version of the Pacific Highway had been constructed prior to 1954. The parish maps also show that the southwestern section of the Project Area is part of a flood plain for the Hunter River. Whether the entire Project Area was cleared or not during pastoral and agricultural activities in the mid-19th century is not shown in any available parish maps or other similar documentation and remains unclear; however, the earliest available aerial photographs show that by at least the 1950s, areas of bushland had been allowed to regrow throughout the Project Area. It is possible that these areas were left as remnant bush areas from before European settlement (ERM 2019).

Heritage items

Background research identified a number of listed heritage items proximate to the Project Area. These are shown in **Table 6.13-1**. Other items of historic heritage associated with early European settlement and industry were identified on the opposite side of the Hunter River to the west and south. None of the listed historical heritage items would be impacted by the Project.

Table 6.13-1: Listed heritage items proximate to Project Area

Site name	LEP	Item #/register	Location	Distance from Project Area (Approx.)
State listed heritage sites				
Tomago House and Tomago Chapel	Port Stephens	SHR #00207	421-423 Tomago Road	2 km to the southeast
Hexham Bridge over Hunter River	Newcastle	s.170 register	Pacific Highway, Hexham	2 km to the southwest
Tomago # 2 Spray Basin	Port Stephens	s.170 register	2034 Pacific Highway, Heatherbrae	1 km north

Site name	LEP	Item #/register	Location	Distance from Project Area (Approx.)
Tomago # 8 Vacuum Pumping Station	Port Stephens	s.170 register	2034 Pacific Highway, Heatherbrae	1 km north
Tomago Sands Scheme	Port Stephens	s.170 register	2034 Pacific Highway, Heatherbrae	1 km north
LEP listed heritage sites				
"Tomago House", including pinetum, pleasure garden and landscape setting	Port Stephens	I103	421 Tomago Road	2 km to the southeast
Tomago House Chapel	Port Stephens	I104	423 Tomago Road	2 km to the southeast
Hexham Bridge	Newcastle	I187	Pacific Highway, Hexham	2 km to the southwest

There are no places listed on the Commonwealth Heritage List, or National Heritage List, within or near the Project Area. Two items in the local area are listed on the Register of the National Estate (non-statutory archive); however both are located approximately 2 km southwest of the Project Area. These are:

- Tomago House Chapel, Tomago Road, Tomago (Place ID 1325)
- Tomago House, Grounds, Trees and Chapel, Tomago Road, Tomago (Place ID 1324).

A search of the State Heritage Inventory indicated that there are five places listed under the NSW Heritage Act (NSW State Heritage Register or section 170 NSW State Agency Heritage Register) near the Project Area (refer to **Table 6.13-1**).

Three items under Schedule 5: Part 1 Heritage Items lists of the Port Stephens LEP 2013 and Newcastle LEP 2012 are within 2 km of the Project Area (refer to **Table 6.13-1**). Additional local historic heritage items are located on the opposite side of the Hunter River (greater than 2 km from the Project Area boundary) to the west and south, including a railway station, hotel, factories and other industrial sites, a school, church, and other public buildings associated with early European settlement and industry. Given the distance to these items from the Project Area, none of these items are anticipated to be impacted as a result of the Project.

Based on the desktop assessment and the outcomes contained within the NAHA (ERM 2019), it is evident that there are no registered or known significant historic (non-Aboriginal) heritage sites in or near the Project Area. The historical background assessment contained within NAHA, suggests there may have been evidence of early agricultural activities, timber harvesting, fence lines, tracks and evidence of rudimentary outbuildings, such as sheds previously located within the Project Area. Given the long-term pastoral grazing and ongoing site disturbance associated with the installation of and maintenance of the transmission lines through sections of the Project Area, it is unlikely that there are substantial historical remains from the historical activities on the Site.

6.13.4 Potential Impacts

Construction

Considering that the primary historical land-use of the Project Area was likely grazing, that no previous historic heritage sites have been identified, and that no historic heritage items or sites were identified during the field survey in May 2019 (ERM 2019), it is very unlikely that the Project would have any impact on non-Aboriginal heritage. It is therefore, also very unlikely that the Project would have any serious and irreversible impacts on non-Aboriginal heritage.

Operation

There are not expected to be any non-Aboriginal heritage impacts from the operation of the Project.

6.13.5 Mitigation measures

While it has been determined that it is very unlikely that the Project would have an impact on non-Aboriginal heritage, an unexpected finds protocol would be implemented in the unlikely event unexpected finds are discovered (refer to **Table 6.13-2**).

Table 6.13-2: Unexpected finds protocol

ID	Environmental Safeguards	Timing
NAH-1	If any heritage objects and/or relics are uncovered during the construction of the Project, the following steps would be followed: • All activity in the immediate area would cease immediately. • The project manager would be notified. • Flagging or fencing would be erected to demarcate and protect the area. • Site personnel and visitors would be advised to avoid the area until further notice. • An appropriately qualified heritage professional would be consulted to confirm if the object/s is a heritage item or relic. Depending on the advice received from the appropriately qualified heritage profession, further consultation with RAPs may be required, where relevant. • NSW Environment and Heritage (OEH) would be contacted. • An appropriately qualified heritage professional would record the location and attributes of the site and determine the significance of the find.	Construction
NAH-2	In the event of the discovery of human skeletal material (or suspected human skeletal material) during project activities in the Project Area, the following steps would be followed: • All activities and/or works in the immediate area would cease as soon as practicable • The NSW Police would be immediately contacted along with the project manager and OEH • Flagging or fencing would be erected to demarcate and protect the area • Site personnel and visitors would be advised to avoid the area until further notice • Any sand or soils removed from the near vicinity of the find would be identified and set aside for assessment by the investigating authorities.	Construction

6.14 Visual Amenity

6.14.1 Overview

A qualitative Visual Impact Assessment (VIA) for the Project has been undertaken. This assessment has been informed by the technical assessment for the Newcastle Power Station (NPS) Project and visual and landscape information provided in the M1 Pacific Motorway extension to Raymond Terrace (SSI-7319) (M1 Extension Project).

This VIA considers the likely visual impacts of the Project on the amenity of the surrounding area and sensitive receivers near the Project Area. The evaluation of potential impacts on visual amenity is based on the visual effect (contrast and integration to the landscape) and the sensitivity of relevant viewpoints to change.

6.14.2 Methodology

The VIA for the Project involved:

- Identifying the existing landscape character and visual sensitivities of the Project Area and surrounds
- 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
- Identifying Photopoint locations to assess potential visual impacts
- Assessing potential visual impacts of identified receptor groups during the construction and operation of the Project in accordance with the rating matrix in **Table 6.14-1**
- Identifying management and mitigation measures to minimise the potential impacts to visual amenity.

Table 6.14-1: 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

6.14.3 Existing environment

Existing landscape context

The Site is located on Old Punt Road, Tomago. There is an existing general industrial precinct immediately to the south of the Site. Rural land borders the Site to the west and northeast. The Site has previously been used for rural activities, including grazing other agricultural purposes. Some isolated trees have been retained on the Site, while patches of native vegetation are generally confined to the boundaries. Several access paths have been cleared across the Site.

The Project Area is located close to the Hunter River on an area of land slightly elevated above the immediate flood plain. The land either side of the Hunter River is largely flat with some areas, including most of Tomago and the Site, slightly elevated. On the western bank of the river the land is flood plain and extends for some distance. It largely consists of agricultural land with some stands of trees and key infrastructure, including the New England Highway, Main Northern Railway and transmission infrastructure. The township of Tarro is located approximately 3.5 km due west of the Site.

On the eastern bank of the river around Tomago, the land is slightly elevated; however, at ground level the difference is not significant. The area is dominated by the township of Tomago itself, significant industrial land uses (e.g. Tomago Aluminium Smelter and NGSF), large areas of mature vegetation, and key infrastructure including the Pacific Highway, transmission infrastructure and substations. The Project Area also includes a potential construction laydown area proposed within AGL's NGSF. Human activity has heavily influenced the landscape in respect of those parts of Tomago where the land is not designated as part of the Tomago Sandbeds. The land designated as part of the Tomago Sandbeds largely consists of areas of mature vegetation.

Few features are prominent across what is largely a flat landscape. Existing transmission towers are visible where they cross open landscapes, agricultural areas and public transport infrastructure. Otherwise, industrial buildings and natural vegetation dominate most views, where these are visible from receivers or transport infrastructure.

Future landscape considerations

The land to the west of the Site has been compulsorily acquired by TfNSW after a Government Gazette notice for the M1 Pacific Motorway extension to Raymond Terrace (SSI-7319) (hereafter referred to as the M1 Extension Project). In the future, Lots 20 and 21 of DP1286735 are planned to be developed as part of the M1 Extension Project. Once this project is constructed, the northern boundary of the Site adjacent to the Pacific Highway will be significantly changed.

The M1 Extension Project will include development of the Tomago Interchange. This will be located immediately north of the existing Pacific Highway on the footprint of the existing highway and agricultural land between the Site and Hunter River. The Tomago Interchange will include significant works and alterations to the Pacific Highway directly adjacent to the Site. The configuration of the Tomago Interchange is shown in **Figure 6.14-1** and a visualisation is provided in **Figure 6.14-2** taken from the Environmental Impact Assessment (EIA) for the M1 Extension Project (Transport for NSW, 2021). The land which forms the Site can be clearly seen in the foreground of **Figure 6.14-2**.

The VIA undertaken for M1 Extension Project Environmental Impact Statement (EIS) (NSW Government, 2021) indicates that the project infrastructure would be consistent in character with existing industrial and road corridor uses in the area. The most notable changes would be associated with the new Tomago Interchange including the realignment of the Pacific Highway north of the Tomago Road intersection, with separation of the northbound and southbound travel lanes. This would increase the amount of the road-related infrastructure in the area.

Figure 6.14-3 shows how the M1 Extension Project is proposed to integrate with existing landscape features along the length of its project area. This work shows that the key views from the highway will be of the Hunter River and floodplain to the north and west (i.e., away from the Site).

The urban design strategy for the M1 Extension Project identified and incorporated strategies for enhancing the existing spatial character and views that contribute to the motorist's experience for this part of the Pacific Highway. These enhancements are shown in **Figure 6.14-4** (Transport for NSW, 2021). This figure shows that the M1 Extension Project will reinstate and extend native tree cover along its southern boundary between the new Tomago Road junction and the new Old Punt Road junction and provide for open views to the north towards the Hunter River and its floodplain. This means that the M1 Extension Project will provide a vegetated screen of trees between the Pacific Highway road infrastructure and the Site where the BESS facility is proposed to be located.

The Environmental Impact Statement for the M1 Extension Project indicates that mitigation measures for that project include cut batters and fill embankments for the Project which will be designed to allow revegetation to assist with the integration of the Project into the surrounding landscape where possible.

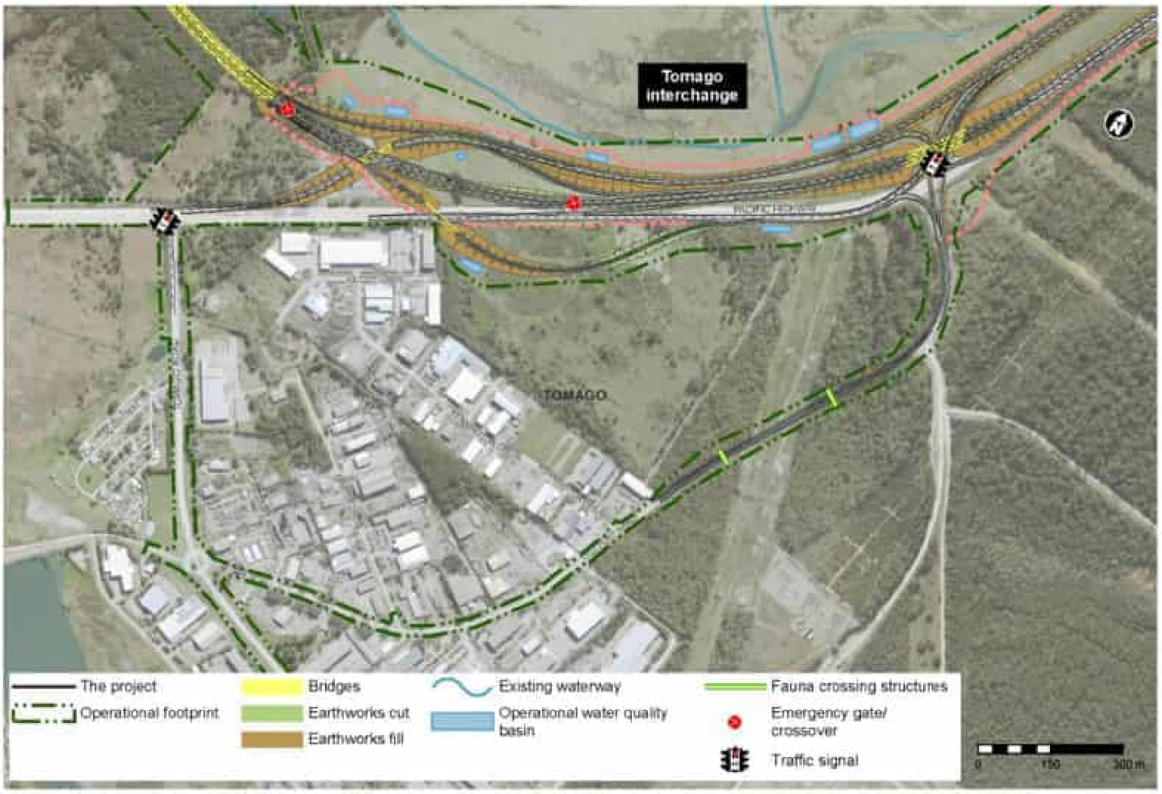


Figure 6.14-1: M1 Extension Project Tomago interchange configuration (NSW Government, 2021)

Figure 6.14-2: M1 Extension Project Tomago interchange visualisation (NSW Government, 2021)

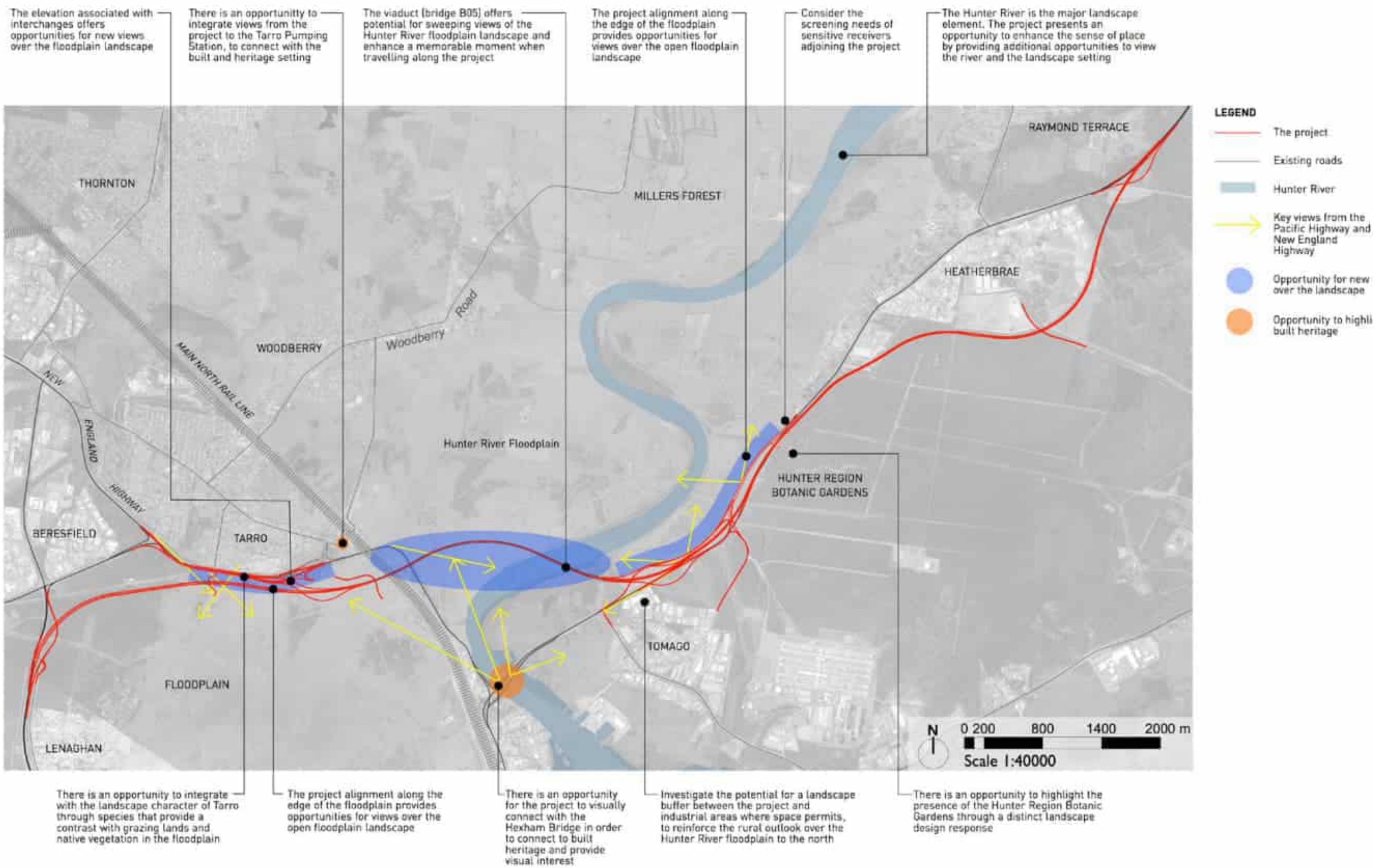


Figure 6.14-3: Integration of the M1 Extension Project with existing features (Figure 5-2 of the M1 Pacific Motorway extension to Raymond Terrace, Urban Design Report & Landscape Character and Visual Impact Assessment, Transport for NSW, 2021)

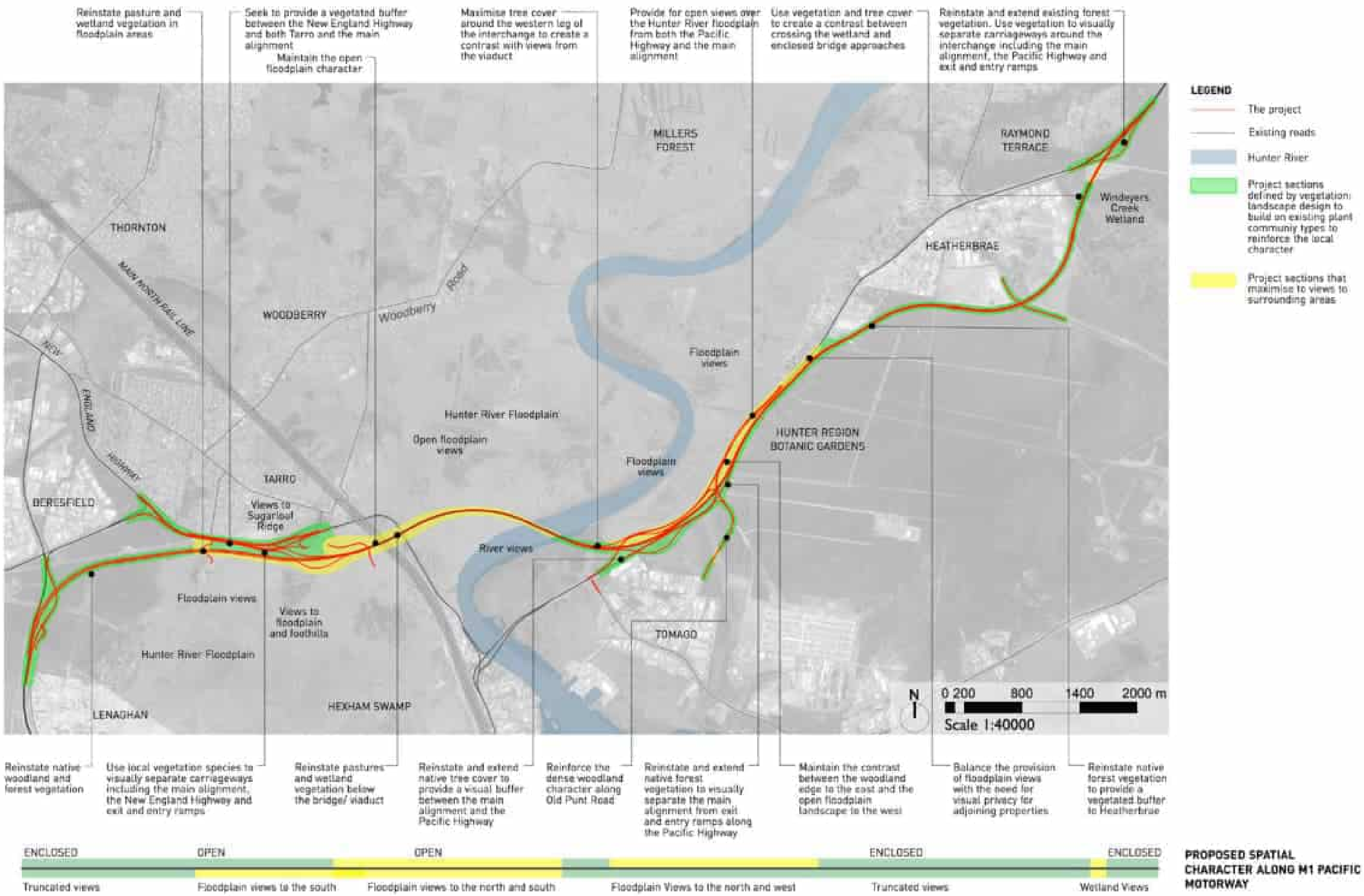


Figure 6.14-4: M1 Extension Project spatial character and views (Figure 5-3 of the M1 Pacific Motorway extension to Raymond Terrace, Urban Design Report & Landscape Character and Visual Impact Assessment, Transport for NSW, 2021)

Topography

The Site includes land between 4 – 16 m AHD. The topography of the Site is consistent with parts of Tomago but higher than land towards the Hunter River particularly to the north and northwest. The surrounding topography is relatively flat with gently rolling hills to Beresfield in the west, towards Fullerton Cove in the east, Raymond Terrace in the north and the suburbs of Newcastle (Sandgate) in the south. The topography of the land around the Project Area is shown on **Figure 6.14-5**.

Project visibility and visual receptors

The Site is not easily seen from any nearby sensitive receivers. An existing industrial estate consisting of large warehouses and distribution facilities separates the Site from the rest of Tomago to the south. This industrial estate itself is screened from the Site with large stands of mature vegetation. Large areas of mature vegetation area are present to the east, and there are no visually sensitive receivers in this direction. The closest sensitive receiver with a potential view of the Site is a residence located approximately 2.25 km to the northwest on Oakfield Road in Woodbury. This property is on the opposite bank of the Hunter River and there are stands of trees screening views between it and the Site.

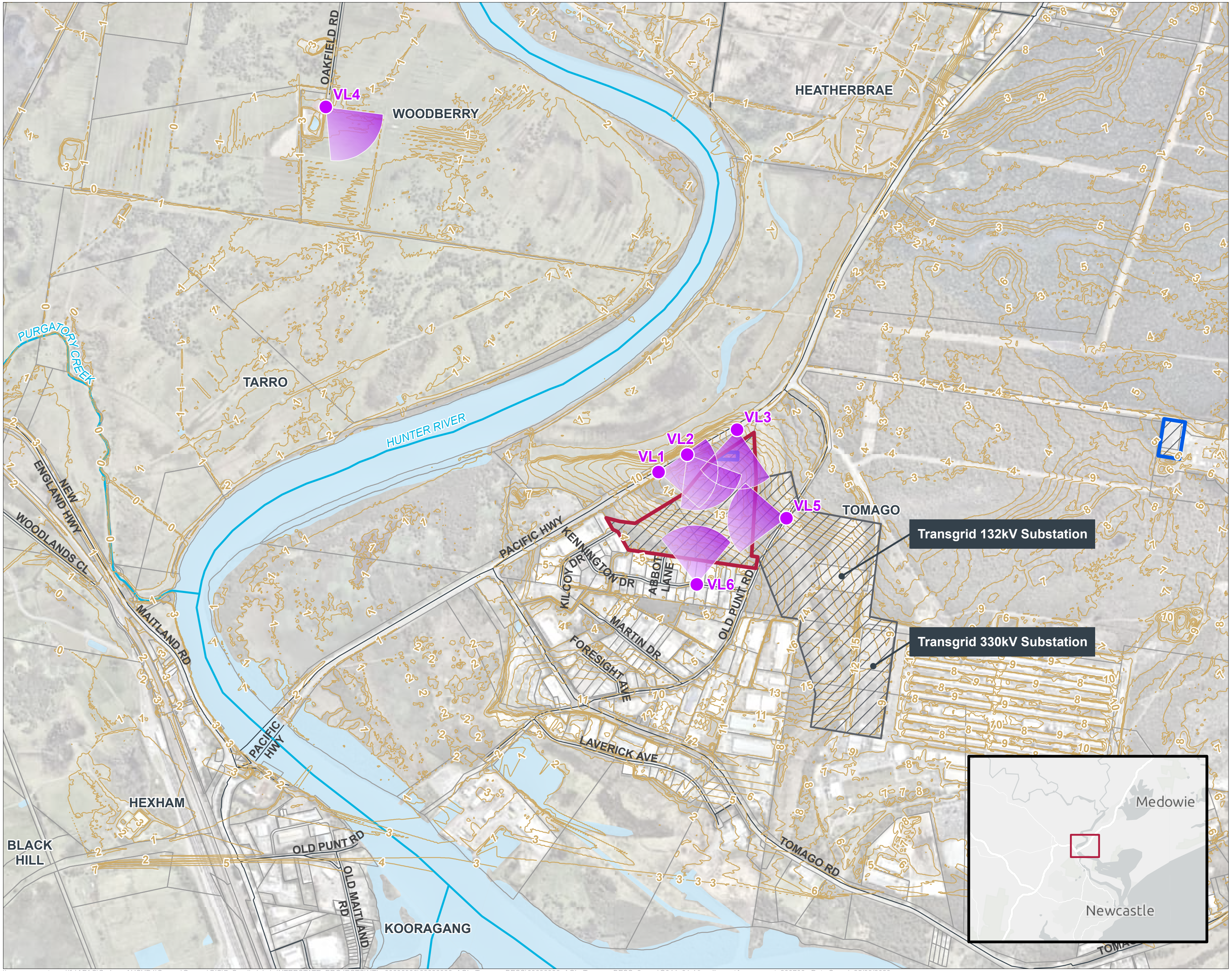
Views of the Site are expected to be possible from the Pacific Highway as motorists heading south would view the Site to their left as they approach. This view is currently defined by the highway cutting, electricity transmission towers and conductors, and vegetation consisting mainly of grasses and native eucalypt trees. For motorists heading north the current view is of transmission infrastructure, grasses, and native eucalypt trees.

The speed limit on the Pacific Highway is 80 kph in both directions and there are no posted pull outs or other safe stopping places. The speed limit and lack of stopping spaces limits the opportunity for views to the Site. In addition, the views from the north and south of the Site are either totally or partially obstructed by the vegetation that provides visual screening for motorists on the Pacific Highway. Views for motorists driving along the Pacific Highway are more likely to be impacted by the Project relative to other locations in the vicinity given the significant existing screening and distance between other receptors and the Site.

Old Punt Road is a local road that connects the Pacific Highway with Tomago Road via the Tomago industrial area. Motorists heading south would pass the Site to their right. The current view at this location for motorists in either direction is dominated by trees and the existing transmission infrastructure. Motorists heading north would first pass through and by industrial areas before encountering the trees and the existing transmission lines.

Given the visual receivers identified above, characteristics of the Project Area and the broader landscape surrounding it, six viewpoints have been identified to represent views to the Site. The first three viewpoints are representative of views to the Site from the adjacent sections of the Pacific Highway. The fourth viewpoint is considered representative of the residential property on Oakfield Road and the fifth viewpoint is from a location on the New England Highway on the opposite bank of the Hunter River close to Hexham. The sixth viewpoint location is located to the south of the Site, looking north from Kennington Drive. These viewpoints are mapped in **Figure 6.14-5** and listed below alongside the supporting photo locations:

- Viewpoint 1: Pacific Highway looking east (**Figure 6.14-6**)
- Viewpoint 2: Pacific Highway looking southeast (**Figure 6.14-7**)
- Viewpoint 3: Pacific Highway looking south (**Figure 6.14-8**)
- Viewpoint 4: Oakfield Road looking southeast (**Figure 6.14-9**)
- Viewpoint 5: Old Punt Road looking west (**Figure 6.14-10**)
- Viewpoint 6: Kennington Drive looking north (**Figure 6.14-11**).



AECOM

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Legend

- View Points
- The BESS Site
- Proposed Construction Laydown Area
- Project Area
- Cadastral Boundary
- Water Body
- Contours
- Watercourse
- Road

Location	Description
VL1	Pacific Highway Looking East
VL2	Pacific Highway Looking Southeast
VL3	Pacific Highway Looking South
VL4	Oakfield Road Looking Southeast
VL5	Old Punt Road Heading South
VL6	Kennington Drive Looking North

FIGURE 6.14-5: VIEWPOINT LOCATIONS

Source: Nearmap, 2022.

6.14.4 Potential impacts

Construction

The construction of the Project would be screened and not visible to most visually sensitive receptors. Motorists passing the Site on the Pacific Highway or Old Punt Road may briefly glimpse the construction activities and note the change in land use, however these views would be transient and in keeping with construction of other developments in the immediate area. The construction works for the BESS facility would be limited to the Site and would be relatively short in duration. Overall, whilst a change would occur for motorists passing the Site, the temporary nature of the construction works, the low sensitivity of receptors impacted, and the existing screening around the Site mean that a low level of visual impact is expected. Equally the distance between the Site, the existing screening present and the temporary nature of the works mean that visual impacts to residents at the property at Oakfield Road would also be negligible.

Construction of the transmission connection would use and be adjacent to existing transmission infrastructure. The transmission connection corridor does not pass by any sensitive receivers but may be visible where it crosses Old Punt Road, if it is installed above ground, however it would be visually consistent with the existing transmission infrastructure in the area. Given that construction would take place progressively and disturbed areas would be reinstated as soon as practicable, the magnitude of this change would be low. As the sensitivity of the views would be similarly low, visual impacts associated with the construction of the transmission line would be considered low.

Operation

Project context

Once constructed, the tallest piece of Project infrastructure would be the lightning rods above the high voltage transformers. These narrow rods would extend up to around 20 m above the ground. The high voltage transformers within the substation would have a height of approximately 10 m.

The battery units would be up to 4 m tall and have a footprint of approximately 2.6 m by 12 m each. Each battery unit is expected to be arranged in groups that consist of battery cells, inverters, medium voltage (MV) transformers, associated control systems, heating, air or liquid cooling, ventilation, and air conditioning (HVAC) units.

The office building would be designed to have a maximum height of 4.5 m, whereas the control room, switch rooms and warehouse would be constructed to a maximum height of 8 m. Up to a 3 m high security fence would be constructed around the perimeter of the Site.

The BESS facility would connect to the neighbouring Transgrid 132 kV or 330 kV substation via the installation of a transmission connection either above or below ground, or a combination of both. If the transmission connection is constructed above ground, the connection would require the construction of transmission structures and cables. The transmission structures would be up to approximately 50 m tall.

Landscape character assessment

The inclusion of the Project in the surrounding landscape would involve the construction of a new industrial element adjacent to an existing Tomago industrial estate and between two roads: the Pacific Highway and Old Punt Road. The Pacific Highway is classified as a National highway generally running in the northeast-southwest direction north of the Project. It intersects with Old Punt Road to the north of the Site and Tomago Road to the south of the Site.

The Project involves the development of electrical infrastructure. The landscape already includes two large substations and several high voltage transmission lines.

Whilst the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. The Project would be located on a long stretch of industrial type development stretching from Heatherbrae, Tomago through the Hexham. Given the context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings, such as Tomago Aluminium Smelter, NGSF, Transgrid substations, Pacific Highway, electrical transmission and distribution lines, Grahamstown Water Treatment Plant, the Kooragang Island Port, and the other industrial areas in and around Tomago. On this basis the sensitivity of the landscape to this change is considered low given the existing characteristics of the local area.

The development of the Project would not introduce built elements into the landscape that are of a significantly different scale or size to those already present at the substations or within the industrial estate to the south. The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of the change from developing the Project is likely to be low.

The low sensitivity of the landscape to the Project and the low magnitude of change expected from its development means that the overall significance of the Project on the existing landscape character of the Tomago area would be low.

Visual impact assessment

Factors that influence visibility of the Project from the identified viewpoints include topography, vegetation, buildings, distance, and viewing angle. A VIA has been provided for each viewpoint below.

Viewpoint location 1

The Pacific Highway runs adjacent to the Project Area along the northwest boundary of Lot 20 DP 1286735. Viewpoint location 1 (VL1) is approximately 100 m to the northwest of the Site. VL1 has the potential to be affected by the M1 Extension Project. **Figure 6.14-6** shows a picture of the view from the side of the Pacific Highway. **Table 6.14-2** below provides an impact assessment for this viewpoint.

Figure 6.14-6: Viewpoint 1 – view from the north bound side of the Pacific Highway looking east towards the Site

Table 6.14-2: Viewpoint location 1 (VL1) visual impact assessment

Criteria	Assessment
Anticipated change	<u>Change to current view from Project</u> There is minimal anticipated change to the view as the roadside trees, vegetation and derelict house in the foreground would not be impacted by the Project and would screen some of the Project components. Individual battery units (up to 4 m high) may be partially visible at the most elevated point of the Site, which occurs in the background of this viewpoint. Despite their height, the substation lightning rods (20 m) situated on the eastern side of the Site are likely to be completely obscured by existing vegetation and falling topography. Other associated infrastructure such as perimeter and internal fencing, lighting and surveillance, and a site gatehouse and gating at the site access road are unlikely to be visible during the day from VL1. 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 (i.e., road users). The Project would operate as a mostly unattended facility and as such no constant light outputs during the operation of the Project are expected during normal conditions. Additional lighting may be required during weather events such as storms, rain due to the lack of sunlight. Night lighting for the Project would be limited to security lighting. Sources of light during the operation of the Project are expected to be low**,** and thus impacts associated with the introduction of new light sources are expected to be **negligible**. <u>Anticipated cumulative changes to view</u> Changes to road infrastructure associated with the development of the M1 Extension Project is likely to significantly change the VIA of the Project from this viewpoint. The M1 Extension Project (and resultant change in road alignment) will result in south-bound road users being closer to the Project when using the highway; however, north-bound motorists would be further away. In addition, the derelict house would be removed and the area between the M1 Extension Project and the Site would be revegetated to reflect the plant community type of the area, obscuring views of the Project (refer to **Figure 6.14-2** and **Figure 6.14-4**).
Sensitivity to change	The landscape already includes two large substations and a number of high voltage transmission lines. Whilst the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River, stretching from Heatherbrae through to Hexham. Given the existing context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings. On this basis the sensitivity of the landscape to this change is considered **low** given the existing characteristics of the local area. Visual sensitivity of the motorists driving north on the Pacific Highway at this location is considered to be **low**. This is due to the likelihood that visible elements of the Project will partially be obscured by landscape elevation and vegetation. The speed limit on the Pacific Highway is 80 kph in both directions and there are no posted pull outs or other safe stopping places. The speed limit and lack of stopping spaces limits the opportunity for views to the Site.

Criteria	Assessment
Magnitude of change	<u>Size/scale</u> The scale of change in the landscape would be **low** given the size of the Site relative to the adjacent industrial area, the similar landscape nearby and across the region, the limited views to the Site and the presence of similar infrastructure across the local area. <u>Geographical extent</u> The geographic extent of the Project would align well with the available land to the north of the existing industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change by developing the Project is likely to be **low.** <u>Duration/reversibility</u> The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration and reversibility is likely to be **low**.
Significance visual impact	The significance of the potential visual impact for VL1 is predicted to be **low**, on the basis that the sensitivity of the receivers and magnitude of change are considered low. <u>Cumulative visual impact</u> The development of the M1 Extension Project would introduce significant additional road infrastructure at and between the Tomago Road and Old Punt Road intersections on Pacific Highway. In addition, the M1 Extension Project also includes additional native planting between the Site and the Pacific Highway , with the proposed urban design focusing motorists' views away from the Site and towards the Hunter River. In light of the treatments proposed as part of the M1 Extension Project, the cumulative effect of the Project would remain **Moderate** to **Low**.

<u>Viewpoint location 2</u>

Viewpoint location 2 (VL2) consists of views from the Pacific Highway heading southeast. VL2 is approximately 80 m to the northwest of the Project Area. The viewshed consists of highway cutting and elevated roadside vegetation consisting mainly of roadside grasses, shrubs, and scattered eucalypt trees. This viewpoint has the potential to be affected by the M1 Extension Project.

Figure 6.14-7: Viewpoint 2 – View from the Pacific Highway looking heading southeast

Table 6.14-3: Viewpoint location 2 (VL2) visual impact assessment

Criteria	Assessment
Anticipated change	Change to current view There is negligible anticipated change to the view due to elevated roadside verge, foreground roadside trees and vegetation completely obscuring view of the Project. The substation lightning rods on the eastern side of the Site are likely to be completely obscured by the roadside verge and falling topography. The introduction of a new light source has the potential to impact visual amenity at night time and could be a source of nuisance to road users. This is unlikely to have an effect at this viewpoint due to the elevated roadside banks which would obscure direct sources of light from passing motorists. Sources of light during the operation of the Project are expected to be **low**, and thus impacts associated with the introduction of new light sources are expected to be **negligible**. Anticipated cumulative changes to view Changes to road infrastructure associated with the development of the M1 Extension Project is likely to change the visual character of this viewpoint. The M1 Extension Project (and resultant change in road alignment) will result in visual receptors (i.e., road users) being closer to the Project when using the Pacific Highway. However, the area between the M1 Extension Project and the Site would be revegetated to reflect the plant community type of the area, obscuring any views of the Project infrastructure from view (see **Figure 6.14-2** and **Figure 6.14-4**).
Sensitivity to change	The landscape already includes two large substations and a number of high voltage transmission lines. Whilst the Project is on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. Given the existing context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings. On this basis the sensitivity of the landscape to this change is considered **low** given the existing

Criteria	Assessment
	characteristics of the local area. Visual sensitivity of the motorists driving southeast on the Pacific Highway at this location is considered to be **low**. This is due to the likelihood that visible elements of the Project will be totally obscured by landscape elevation and roadside vegetation. The speed limit on the Pacific Highway is 80 kph in both directions and there are no posted pull outs or other safe stopping places. The speed limit and lack of stopping spaces limits the opportunity for views to the Site.
Magnitude of change	<u>Size/scale</u> The scale of change in the landscape would be **low** given the size of the Site relative to the industrial area where it is located, the similar landscape nearby and across the region, the limited views to the Site and the presence of similar infrastructure across the local area. <u>Geographical extent</u> The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change from developing the Project is likely to be **low.** <u>Duration/reversibility</u> The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration an reversibility is likely to be **low**.
Significance of visual impact	The significance of the potential visual impact for VL2 is predicted to be **low**, on the basis that the sensitivity to change and magnitude of change are considered **low**. <u>Potential cumulative impacts</u> Similar to the cumulative impacts discussed for VL1, the development of the M1 Extension Project would introduce significant additional road infrastructure at and between the Tomago Road and Old Punt Road intersections on the Pacific Highway . This includes additional native planting between the Site and the Pacific Highway, which will soften the visual impact of the Project. In light of the treatments proposed as part of the M1 Extension Project, the cumulative effect of the Project would remain **Moderate** to **Low**.

<u>Viewpoint location 3</u>

Viewpoint location 3 (VL3) consists of views from the Pacific Highway from the north, heading south. VL3 is approximately 150 m to the northwest of the Project Area. The Project Area is predominately blocked by an existing stretch of vegetation. VL3 has the potential to be affected by the M1 Extension Project.

Figure 6.14-8: VL3 view from the Pacific Highway looking south

Table 6.14-4: Viewpoint location 3 (VL3) visual impact assessment

Criteria	Assessment
Anticipated change	<u>Change to current view</u> There is no anticipated change to the view due to dense stand of eucalypt trees obscuring views of the Project Area. 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 (i.e., road users). This is unlikely to have an effect on receivers at this location due to the dense stand of trees. Sources of light during the operation of the Project are expected to be low, and thus impacts associated with the introduction of new light sources are expected to be **negligible**. <u>Anticipated cumulative changes to view</u> Changes to road infrastructure associated with the development of the M1 Extension Project is likely to change the visual character of this viewpoint. The M1 Extension Project (and resultant change in road alignment) would result in visual receptors (i.e., road users) being closer to the Project when using the highway. However, the area between the M1 Extension Project and the Site would be revegetated to reflect the plant community type of the area, obscuring views of the Project (see **Figure 6.14-2** and **Figure 6.14-4**).
Sensitivity to change	<u>Sensitivity to change</u> The landscape already includes two large substations and a number of high voltage transmission lines. While the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. Given the existing context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings. On this basis the sensitivity of the landscape to this change is considered **low** given the existing characteristics of the local area.

Criteria	Assessment
	Visual sensitivity of the motorists driving southeast on the Pacific Highway at this location is considered to be **low**. This is due to the likelihood that visible elements of the Project will be totally obscured by landscape elevation and roadside vegetation. The speed limit on the Pacific Highway is 80 kph in both directions and there are no posted pull outs or other safe stopping places. The speed limit and lack of stopping spaces limits the opportunity for views to the Site.
Magnitude of change	Size/scale The scale of change in the landscape would be **low** given the size of the Site relative to the industrial area in which it is located in, the similar landscape nearby and across the region, the limited views to the Site and the presence of similar infrastructure across the local area. Geographical extent The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change from developing the Project is likely to be **negligible.** Duration/reversibility The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration an reversibility is likely to be **low**.
Significance of visual impact	The significance of the potential visual impact for VL3 is predicted to be **low** to **negligible**, on the basis that the sensitivity to change and magnitude of change are considered low. Potential cumulative impacts Similar to the cumulative impacts discussed for VL1 and VL2, the development of the M1 Extension Project would introduce significant additional road infrastructure at and between the Tomago Road and Old Punt Road intersections on the Pacific Highway. This includes additional native planting between the Site and the Pacific Highway. The introduction of additional infrastructure and planting between the Pacific Highway and the Site will soften the potential visual impact of the Project. In light of the treatments proposed as part of the M1 Extension Project, the cumulative effect of the Project would remain **Moderate** to **Low**.

Viewpoint location 4

Viewpoint location 4 (VL4) consists of a view from Oakfield Road to the West of the Site. Oakfield Road is located in the agricultural area within the Hunter River floodplain, and provides access to a single rural residential dwelling located at Lot 12 DP1189457.

VL4 is approximately 2.25 km to the west of the Project Area. The Project is predominately blocked by an existing stretch of vegetation. From this location the Project would be partially obstructed by proposed vegetation and diminished by distance.

Figure 6.14-9: Viewpoint 4 view from residential receptor at Oakfield Rd (West of the Site)

Table 6.14-5: Viewpoint location 4 (VL4) visual impact assessment

Criteria	Assessment
Anticipated change	There is negligible anticipated change to the view due to the distance to the Site and the Project infrastructure being predominately blocked by an existing stand of trees in the background. From this location the Project would be completely obstructed by vegetation. 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 such as residential receivers. Given the distance from this viewpoint location to the Project, light effects are predicted to be **negligible**.
Sensitivity to change	This viewpoint location consists of rural agricultural landholdings. The property at this location potentially provides a home for local residents. Views from a residential dwelling are typically considered sensitive given that people reside at these locations and will view new developments for a long period of time. However given the distance to the Site from this property, the resulting diminished views of the Site, and the existing vegetation between the property and the Site the sensitivity to the proposed change is considered **low**.
Magnitude of change	<u>Size/scale</u> The scale of change in the landscape would be **low** given the distance of the viewpoint to the Site and the negligible proportion of the viewpoint that the Project would occupy. <u>Geographical extent</u> The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change from developing the Project is likely to be **low.**

Criteria	Assessment
	Duration/reversibility The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration an reversibility is likely to be **low**.
Significance of visual impact	The significance of the landscape character effect is predicted to be low, on the basis that the sensitivity to change and magnitude of change are considered **low**. Potential cumulative impacts Similar to the cumulative impacts discussed for VL1, VL2 and VL3, the development of the M1 Extension Project would introduce significant additional road infrastructure at and between the Tomago Road and Old Punt Road intersections on Pacific Highway. This includes additional infrastructure and native planting between the Project and the VL4. The introduction of additional infrastructure and planting between the Pacific Highway and the Site as a result of the M1 Extension Project, will promote additional screening and reduce the potential visual impact of the Project. In light of the treatments proposed as part of the M1 Extension Project, the cumulative effect of the Project would remain **Low**.

Viewpoint location 5

Viewpoint location 5 (VL5) consists of a view from Old Punt Road which runs in an approximate northeast/southwest direction past the Site, providing access for the local workforce as well as access between the Pacific Highway and Tomago Road. The existing electrical transmission line crosses over Old Punt Road in the vicinity of the Project and the BESS will connect to the Tomago switchyard via a new transmission line that would also cross Old Punt Road.

Figure 6.14-10: Viewpoint 5 view from Old Punt Road looking west

Table 6.14-6: Viewpoint location 5 (VL5) visual impact assessment

Criteria	Assessment
Anticipated change	<u>Change to current view</u> VL5 is located within the existing electricity easement, looking south towards the Site. Mature and dense vegetation is present between VL5 and the Site, which would screen the visibility of the Site from this location. The Project includes the construction of a transmission connection which will be either above or below ground (or a combination of both). The transmission line would be located within the existing electricity easement (as pictured in Figure 6.14-10). As such, there is **negligible** anticipated change to the view due to dense stand of eucalypt trees obscuring views of the Site from VL5. 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 potentially affected receivers. This potential impact is unlikely to have an effect due to the lack of sensitive receivers at this location and the dense stand of trees likely obscuring any light sources. Sources of light during the operation of the Project are expected to be low, and thus impacts associated with the introduction of new light sources are expected to be **negligible**.
Sensitivity to change	The landscape already includes two large substations and a number of high voltage transmission lines. Whilst the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. Given the existing context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings. On this basis the sensitivity of the landscape to this change is considered **low** given the existing characteristics of the local area. Visual sensitivity of the motorists driving along Old Punt Road in this location is considered to be **low**. This is due to the transient nature of these receptors and the industrial nature of the surrounding landscape.
Magnitude of change	<u>Size/scale</u> The scale of change in the landscape would be **low** given the size of the Site relative to the industrial area in which it is located in, the similar landscape nearby and across the region, the limited views to the Site and the presence of similar infrastructure across the local area. <u>Geographical extent</u> The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change from developing the Project is likely to be **low.** <u>Duration/reversibility</u> The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration an reversibility is likely to be **low**.
Significance of visual impact	The significance of the potential visual impact is predicted to be **low**, on the basis that the sensitivity to change and magnitude of change are considered low.

Viewpoint location 6

Viewpoint location 6 (VL6) consists of a view from Kennington Drive which runs perpendicular to Old Punt Road in an approximate east/west direction south of the Site and is accessed via Old Punt Road. Kennington Drive is located within the Industrial area of Tomago and provides access to businesses. Existing vegetation is visible from the view towards the Site.

Figure 6.14-11: Viewpoint 6 view from Kennington Drive looking north

Table 6.14-7: Viewpoint location 6 (VL6) visual impact assessment

Criteria	Assessment
Anticipated change	Change to current view There is negligible anticipated change to the view due to dense stand of eucalypt trees obscuring views of the Project from Kennington Drive. 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 (i.e., road users). This is unlikely to have an effect due to the lack of sensitive receivers at this location and the dense stand of trees likely obscuring light sources. Sources of light during the operation of the Project are expected to be low, and thus impacts associated with the introduction of new light sources are expected to be **negligible**.
Sensitivity to change	The landscape already includes two large substations and a number of high voltage transmission lines. Whilst the Project is located on a greenfield site the development of this land would be in keeping with the existing industrialised nature of the Tomago area and this part of the lower Hunter River. Given the existing context of the Tomago area, the Project would be consistent and complimentary with the industrial nature of its surroundings. On this basis the sensitivity of the landscape to this change is considered **low** given the existing characteristics of the local area. Visual sensitivity of the motorists driving along Kennington Drive and the industrial workers at this location is considered to be **low**. Motorists would only have fleeting views of the Project and are typically concentrating on the road. Staff and visitors to the industrial estate are focused on their work and are less sensitive to a change in visual amenity, particular as they are already in an industrial setting.

Criteria	Assessment
Magnitude of change	Size/scale The scale of change in the landscape would be **low** given the size of the Site relative to the industrial area in which it is located in, the similar landscape nearby and across the region, the limited views to the Site and the presence of similar infrastructure across the local area. Geographical extent The geographic extent of the Project would align well with the available land to the north of the industrial estate and would not encroach on the areas of mature vegetation to the east. On this basis the magnitude of change from developing the Project is likely to be **low.** Duration/reversibility The BESS is intended to have an operational life of up to 50 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 recontoured, if and as required. Therefore the potential impact in relation to duration an reversibility is likely to be **low**.
Significance of visual impact	The significance of the potential visual impact for VL6 is predicted to be **low**, on the basis that the sensitivity to change and magnitude of change are considered low.

6.14.5 Mitigation measures

Visual impacts are predicted to be negligible during construction of the Project. Potential visual impacts at five of the six viewpoints assessed during operation are likely to be low. VL1 may experience a low to moderate impact due to the cumulative effect of the M1 Extension Project before its vegetation screening matures. Impacts on visual receivers have been considered in the design-development stage of the BESS facility, and potential visual impacts have been minimised where possible.

Post-construction and operation mitigation measures are unlikely to be required, but may include the following measures if visual impacts are perceived:

- Subject to further design iterations, the Project may introduce landscaped screening vegetation making the Site, even less visible to sensitive residential receptors
- Prior to operation, and if required, the disturbed areas onsite and within the transmission connection corridor may be recontoured and landscaped, if deemed necessary based on the visual impacts post-construction.

Development associated with the M1 Extension Project may also serve to further obscure visual impacts of the Project from the highway traffic.

Proposed mitigation and management measures are provided in **Table 6.14-8**.

Table 6.14-8: Mitigation and management measures

ID	Mitigation and Management Measures	Timing
V-1	During detailed design of the Project, a review of materials and colour finishes for visible built components of the Project would be completed to further reduce potential visual impacts, where practicable.	Design
V-2	Retention and enhancement of existing landscape features (areas of scrub, individual trees) would be considered where feasible.	Design
V-3	Lighting of the Site would be designed in accordance with AS 4282:2019 Control of the obtrusive effects of outdoor lighting.	Design
V-4	Where possible, the use of reflective surfaces will be minimised to avoid drawing attention to the Site within views due to reflective glare.	Design

6.15 Land use

6.15.1 Overview

A Land Use Conflict Risk Assessment (LUCRA) for the Project has been undertaken and is provided in **Appendix M** This chapter summarises the LUCRA and outlines relevant management and mitigation measures to avoid or minimise impacts.

6.15.2 Methodology

This LUCRA has been prepared in accordance with the Department of Primary Industries (DPIs) *Land Use Conflict Risk Assessment Guide* (NSW Department of Primary Industries, 2011) ('the Guide').

This land use assessment chapter has been prepared using the following methodology:

- Information gathering – information was gathered about the existing environment, including surrounding land uses and the environmental characteristics of the Project Area. Following this, proposed land use changes and activities associated with the Project were identified. Information used to inform this step included:
  - Review of available historic and present-day aerial photography
  - Publicly available spatial data including but not limited to; land use zone mapping, vegetation mapping, soil mapping, hydrology maps and topographic maps
  - Review of relevant publicly available reports.
- Screening of environmental matters – A screening of environmental matters was undertaken to identify those environmental considerations that, if affected by the Project, may lead to land use conflicts. This screening considered the results of the scoping assessment that has been carried out for the Project and is provided in **Chapter 6.0 (Assessment of Impacts)** of this EIS.
- Risk level evaluation - each proposed activity associated with the Project was reviewed and potential land use conflict level was assessed.
- Identification of risk mitigation strategies – mitigation strategies are identified which assist in lowering the risk of potential conflict.
- Record results – key issues, risk level and recommended management strategies were recorded and summarised.

6.15.3 Existing environment

Land use

The Project Area constitutes the Site (Part Lot 5 and Lot 6 DP1286735), transmission connection/s corridors, construction laydown areas within the Site, and a construction laydown area nearby, possibly at AGL's existing NGSF approximately 1.7 km northeast of the Site.

The proposed transmission connection/s would be located across Lots 7, 8, 24, 25 and 28 DP1286735, Lot 104 DP1125747 and Lot 3 DP808004. This land allows for the connection of the BESS to either the 132 kV substation (on Lot 101 DP1125747) or the 330 kV substation (on Lot 3 DP808004, and Lots 102 and 103 DP1125747). These substations are located to the southeast of the Site.

A potential construction laydown area has been considered nearby at AGL's existing NGSF, located at Lot 9 DP1286735 and Lot 1201 DP1229590 to the east of the Site. The area is paved (as part of the construction of the NGSF) and has been used as a contractor carpark from time to time. No clearing or earthworks are required to use the existing laydown area at the NGSF for the purposes of the Project.

Land use zoning

The Project is located within the Port Stephens LGA, which is subject to the application of the Port Stephens LEP. The Port Stephens LEP aims to make local environmental planning provisions for land in the region.

The Project Area is located on land that is zoned E4 General Industrial by the Port Stephens LEP. The surrounding land uses bordering the Project Area are zoned as SP1 Special Activities and SP2 Infrastructure to the north, E4 General Industrial to the east, E4 General Industrial and C2

Environmental Conservation to the south, and RU2 Rural Landscape and SP2 Infrastructure to the west. The nearest residential zoning is located approximately 3 km west of the Site, on the opposite side of the Hunter River in Beresfield. Land use zones on which the Project would be located are shown on **Figure 4.3-2**.

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 predominantly Class 4, with the southern end of the site being identified as Class 5, and the northern end of the Site Class 6, whereby:

- Class 4 denotes moderate to severe soil limitations
- Class 5 denotes severe limitations for high impact land management uses such as cropping
- Class 6 denotes very severe 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 low.

A review of the NSW DPE Soil and Land Information online mapping system (eSPADE) identified that the Project Area is predominately situated across Beresfield and Tea Gardens (Variant a) soils. The Beresfield soils occupy mostly the centre of the Project Area, while the Tea Gardens (Variant a) soils are present along the north and northeast boundary. A third soil landscape, Millers Forest, covers a small portion of the Project Area to the south and southwest. The Project infrastructure would be predominantly situated on Beresfield and Tea Gardens (Variant a) soils. Beresfield soils are an urban erosion hazard with moderate to high erodibility.

Flood prone land

The Site is not affected during the following modelled rain events: 10% annual exceedance probability (AEP), and 1% AEP, however the southern portion of the Site is impacted by flooding during the Probable Maximum Flood (PMF) event. Flooding of the southern portion of the Site can occur in three ways (refer to **Section 6.4.3**):

- mainstream flooding (refer to **Figure 6.4-4a**)
- local overland flooding (refer to **Figure 6.4-4b**)
- or a combination of both (refer to **Figure 6.4-4c**).

A combination of both mainstream flooding and local overland flooding is considered the worst-case scenario. These scenarios are summarised in Section 5.7 of **Appendix K (Surface Water and Flooding Assessment)**.

6.15.4 Potential impacts

Construction

The Project would result in varying levels of disturbance during the construction phase. Land use conflicts are discussed in detail in **Appendix M**.

Land uses and land use zones

The surrounding land use is mostly SP2 Infrastructure and E4 General Industrial. The development of the Project would maintain the existing industrial land use and would therefore be compatible with the SP2 Infrastructure and E4 General Industrial land uses.

The establishment of the Site would introduce new amenity impacts to the land immediately around the Site including increased noise levels and visual changes. While there is no residential zoning nearby, residential and temporary accommodation receivers have been identified within 1 km of the Site. Visual amenity, air quality, and noise impact assessments determined that potential impacts on these sensitive receivers was low-negligible. Low noise, visual, and air quality impacts from the Project suggests that the Project is compatible with surrounding land uses.

An assessment of soils and contamination for the area determined the risk of contamination of soil and water resources is low. As such, the nearest C2 Environmental Conservation zoning and W1 Natural Waterways zoning are unlikely to be affected by the Project.

The Project does not require the subdivision of any lots. Upon decommissioning, the BESS infrastructure would be removed and the Site would be returned to a pre-development condition as far as practicable, which would be suitable for future agricultural activities such as grazing.

Traffic disruptions

Primary access to the Site during construction and operation would be via a new access point off Old Punt Road. A secondary access point would be available in the northern corner of the Site to provide emergency access and egress to the Pacific Highway on ramp once the M1 Extension Project is constructed.

A peak of up to 200 construction staff would be required during construction of the Project. At times, this number could be significantly less depending on the works being undertaken. Up to 33 heavy vehicles a day may need to attend the Site during construction. These heavy vehicles could arrive and depart the Site at any point during the day, with the majority expected to arrive in the mornings. In addition to these heavy vehicles, OSOM vehicles are expected to be required to deliver large or prefabricated elements for the construction of the Project. However, it is expected that the usage of OSOM vehicles would be minimal, and the majority of deliveries would be limited to heavy vehicles up to 25 m/26 m B-Doubles.

Due to low traffic generation associated with the construction and the existing capacity in the surrounding road network, the Project is expected to have a minor impact on the operation of Old Punt Road. Therefore, no road upgrades are required to accommodate traffic generation associated with the Project.

Soils and contamination

Construction works for the Project would involve vegetation removal, ground disturbance, excavations, the transport, storage and reuse of soils, the use of heavy machinery, and other construction activities. These activities have the potential to destabilise the soils and cause erosion which may result in impacts to surrounding water and air quality if not managed. This impact may affect people and ecological receptors to varying degrees depending on the level of erosion and sensitivity of the receptors.

Landscape and visual amenity

The construction of the Project would be screened and not visible to most visually sensitive receptors. Motorists passing the Site on the Pacific Highway or Old Punt Road may briefly glimpse the construction activities and note the change in land use, however these views would be transient and in keeping with construction of other developments in the immediate area. The construction works for the BESS facility would be limited to the Site and would be relatively short in duration.

Land Use Conflict Risk Assessment

A LUCRA has been prepared for the Project and is provided in **Appendix M**. 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
- Exceedance of noise management levels during construction, affecting human amenity
- Spread of high priority weeds into neighbouring properties
- Soil erosion resulting in the sedimentation of watercourses
- Increased heavy vehicle movements resulting in road safety issues for people and other vehicles
- Degradation of local access roads through heavy vehicle movements, resulting in road conditions that may cause damage to other vehicles or compromise road safety.

Operation

Land uses and land use zoning

As discussed in **Chapter 2.0 (Strategic context)**, the construction and operation of a BESS for electricity generating works is permissible with consent in an area zoned E4 General Industrial. The impact on land use would be minor due to the relatively small footprint of the Site. The land use objectives of E4 General Industrial, as described in the Port Stephens LEP, are outlined below alongside a discussion as to whether the Project supports or conflicts with these objectives.

E4 zone objectives	Discussion
To provide a range of industrial, warehouse, logistics and related land uses	The Project would not conflict with this objective. The Project is located within a well-established industrial area. Construction and operation activities are consistent with industrial land use.
To ensure the efficient and viable use of land for industrial uses	The Project would not conflict with this objective. The Project is located within a well-established industrial area zoned E4 General Industrial.
To minimise any adverse effect of industry on other land uses	The Project would not conflict with this objective. Mitigation would be implemented to minimise any effects on other land uses.
To encourage employment opportunities	The Project would not conflict with this objective. The Project would employ up to approximately 200 workers during construction, and approximately six workers during operation.
To enable limited non-industrial land uses that provide facilities and services to meet the needs of businesses and workers	The Project would not conflict with this objective. The Project would benefit facilities and services within the area by providing sustainable, reliable and affordable electricity.

The BESS facility would be located at the Site and would be surrounded by various rural and industrial land 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 land uses would be able to continue to be used as expected once the Project is operational. On this basis, the operation of the Project is unlikely to impact the land uses surrounding the Site.

Traffic disruptions

During operation the Project would be a mostly unmanned facility with approximately 6 workers attending intermittently to conduct routine maintenance works. As such, traffic impacts during operation are not expected.

Soils and contamination

No erosion or sedimentation impacts are expected during operation of the Project. Typical operation of the BESS would not involve the regular handling of materials such as chemicals, fuels, or oils. As such, the risk of the operation of the Project contributing to the contamination of soil and water resources is considered low.

Upon decommissioning, the BESS infrastructure would be removed and the Site would be returned to a pre-development condition as far as practicable, which would be suitable for future agricultural activities such as grazing.

Land Use Conflict Risk Assessment

A LUCRA has been prepared for the Project and is provided in **Appendix M**. The LUCRA identified two potential land use risks associated with the operation of the Project. The key land use risk identified for the operation of the Project were:

- Minor to negligible adverse impacts upon the existing visual amenity of surrounding residents and road users

6.15.5 Mitigation measures

Mitigation measures have been identified for the impacts related to each of the construction and operations risks. These are described in **Appendix D (Compilation of mitigation measures),** as well as the following chapters of the EIS:

- **Section 6.3** Biodiversity
- **Section 6.4** Surface water, groundwater, and hydrology
- **Section 6.5** Soils and contamination
- **Section 6.6** Traffic and transport
- **Section 6.7** Noise and vibration
- **Section 6.11** Other matters **-** Air quality
- **Section 6.14** Other matters **-** Visual amenity.

6.16 Waste

6.16.1 Overview

An assessment of potential waste generated during construction and operation of the Project was undertaken. The assessment included identifying the types of waste likely to be generated by the Project and outlining measures to avoid, reduce, reuse, and recycle identified waste streams.

6.16.2 Methodology

In NSW, the Environment Protection Authority (EPA) are the primary regulator of waste management and recycling. Waste is managed by the NSW EPA using a collection of waste-related Acts and regulations. Acts and regulations used to govern waste management that are relevant to the Project include:

- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- *Protection of the Environment Operations (Waste) Regulation 2014* (POEO Waste Regulation)
- *Contaminated Land Management Act 1997* (NSW)
- *Waste Avoidance and Resource Recovery Act 2001* (NSW) (WARR Act)
- *National Environment Protection Council (New South Wales) Act 1995* (NSW)
- *Environmentally Hazardous Chemicals Act 1985* (NSW)
- *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW).

A qualitative desktop assessment was carried out to estimate waste types and approximate quantities, identify potential impacts, and identify appropriate management measures. The desktop assessment involved:

- Identifying potential waste generating activities during construction, operation, decommissioning and rehabilitation
- Estimating the likely waste streams/types and associated quantities
- Identifying the likely classification of waste streams in accordance with NSW EPA waste classification guidelines
- Describing proposed management and handling techniques for key waste streams, including waste storage and collection, minimisation, and reuse.

The waste types and quantities estimated in this chapter are indicative and have been identified for the purpose of determining potential waste management options. While quantities are likely to differ slightly from the estimates made, the identified waste management options would be appropriate for the final waste quantities.

6.16.3 Waste management framework

The 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, reused or recovered."*

The 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 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 WARR 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)
- Disposal.

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, ensure the environmental and human health risks associated with their waste is appropriately managed 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.

Definitions for waste classifications used during the desktop assessment have been provided within **Table 6.16-1**.

Table 6.16-1: NSW EPA waste classification guidelines

NSW EPA Waste Classification	Waste Description
Special waste	Waste that has unique regulatory requirements, including clinical and related waste, asbestos waste, tyres, and anything classified as special waste under an EPA gazettal notice.
Liquid waste	Liquid waste means any waste (other than special waste) that has an angle of repose of less than 5 degrees above horizontal, becomes free-flowing at or below 60 degrees Celsius or when it is transported, is generally not capable of being picked up by a spade or shovel, is classified as liquid waste under an EPA gazettal notice.
Hazardous	Hazardous waste (other than special waste or liquid waste) includes waste that is a dangerous good that is classified under the Transport of Dangerous Goods Code as a 'Class 1' to 'Class 8' type of waste. It can also include coal tar or coal tar pitch waste, lead, acid or nickel-cadmium batteries, lead paint waste, or any mixture containing one of these types of wastes.

NSW EPA Waste Classification	Waste Description
Restricted Solid Waste	No wastes have been pre-classified by the EPA as ‘restricted solid waste’. Restricted solid waste, therefore, currently only includes wastes assessed and classified as restricted solid waste in accordance with the procedures in Step 5 of the waste classification guidelines. Restricted solid waste is generally determined based on the exceedance of a given mg/kg limit for each type of contaminant. See Table 1 and Table 2 of the waste classification guidelines (NSW EPA, 2014).
General solid waste – putrescible (GSWp)	GSWp waste (other than special waste, liquid waste, hazardous waste, or restricted solid waste) includes standard household and litter bins waste that is collected by, or on behalf of, local councils, food waste, animal waste, manure and night soil and any grit of screening from sewage treatment systems.
General solid waste – non-putrescible (GSWnp)	GSWnp waste (other than special waste, liquid waste, hazardous waste, restricted solid waste or GSWp) includes glass, plastic, rubber, ceramics, bricks, concrete or metal, paper or cardboard, household recyclable waste (excluding food waste), garden waste, wood waste, waste that was previously in dangerous containers that have been thoroughly cleaned out, virgin excavated material and building and demolition waste.

6.16.4 Existing environment

A site history assessment was completed as part of a Waste Management Strategy (WMS) that accompanied the NPS project (Aurecon, 2019). This WMS identified that the eastern portion of the Site was used for heavy mineral sand mining between the 1970s and 1990s and has since primarily been used as an industrial buffer zone for the Tomago Aluminium Smelter since 1981. Furthermore, a Detailed Site Investigation (DSI) was undertaken by Aurecon in 2019 to support the NPS project, which includes the Site. The DSI identified areas of environmental concern (AEC) within the Site boundary. One AEC is classified as ‘dumped waste’, which may contain polycyclic aromatic hydrocarbons (PAHs).

A site walkover was undertaken by Aurecon on 25 March 2019 as part of the DSI. During this site walkover, illegal dumping locations were found, which identified items such as fill containing shale, brick and asphalt, cement sheeting, tyres, paint cans and car parts (i.e., contaminated fill). In addition to the DSI (Aurecon 2019), an intrusive environmental assessment was undertaken by Environmental Strategies in 2018 that found the following:

“AEC 5 (Dumped Waste) - Based on the existing dataset, elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil may pose a potential risk to ecological and human health. Environmental Strategies (2018) provided an indicative/conservatively high estimate of 2,100 m^3 potentially PAH impacted soil in this area. Concentrations of heavy metals/PAHs in groundwater may not be reflective of background conditions and may impact upon human health (e.g., drinking water) or ecological receptors (e.g., aquatic ecosystems within a nearby creek).”

At the time of the preparation of the WMS (Aurecon 2019), an estimate in the quantity of existing waste at the Site was approximately less than 100 kg of paint waste and 10 tonnes (t) of demolition waste. Further details related to the existing conditions of the Site is discussed in **Section 6.5**.

6.16.5 Potential Impacts

Construction

The key waste streams expected to be generated during construction include:

- Vegetation through the clearing of weeds, trees and shrubs within the Project Area
- Wastewater (sewage and grey water) generated from the use of workers’ facilities, such as toilets
- Construction waste, including any excess materials (e.g., steel offcuts) and packaging materials such as pallets, crates and plastic wrapping
- Demolition materials generated from the removal of existing infrastructure (e.g. fencing)
- Illegal waste historically dumped on the Site to be removed through site clearance

- Construction and office personnel waste, including paper, coffee cups, and food scraps
- Excess spoil through site clearance activities and earthworks
- Contaminated fill from historic oil spills, potential spills during construction and other existing onsite contaminants (low risk).

A summary of key waste streams, waste classifications, estimated waste volumes, and a description of the methodology likely to be adopted for the management of each waste type is provided in **Table 6.16-2**.

Table 6.16-2 Waste likely to be generated from construction of the Project

Waste type/stream	Waste Classification	Proposed handling, treatment, and/or disposal method	Estimated volume
Green waste (vegetation)	GSWnp	Separated from other excavation waste and chipped, to be stored and used later for landscaping where possible. Excess woodchips would be sent to landscape suppliers or offsite recycling.	Moderate – limited clearing required onsite, clearing will be minimised where possible in the transmission corridor.
Wastewater	Liquid waste	Collection, transport and pump-out for offsite disposal into existing sewer system.	Up to 20,000 litres per week at peak construction (100 litres per person per day)
Construction waste	GSWnp	Reuse of materials would be prioritised where possible. Otherwise, waste will be transported to an offsite recycling or disposal facility.	Minimal
Demolition waste	GSWnp	Reuse of materials would be prioritised where possible. Otherwise, waste would be transported to an offsite recycling or disposal facility.	Minimal
Construction and office personnel waste	GSWnp	Waste would be recycled or separated where possible. Other general waste would be distributed to landfill.	Minimal
Excess spoil	GSWp	Onsite reuse for fill or use in landscaping (e.g., as topsoil) would be prioritised, where possible. Otherwise, spoil would be distributed to another project as fill or sent to a repurposing facility or a landfill. Confirmation of excess spoil will be determined following the preparation of a bulk earthworks plan as part of the detailed design.	Moderate
Contaminated fill or soils	To be classified subject to results of testing	Procedure for handling and disposal of contaminated fill or soils would be in line with the management measures presented in **Section 6.5**. An unexpected finds protocol would be implemented.	Negligible/Minimal – low risk from limited nearby contaminated sites

As shown in **Table 6.16-2** waste generated during construction would be removed or reused as required. In order to avoid potential waste impacts 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 6.16.6** it is anticipated that construction waste management activities for the Project would not pose a significant risk to the environment or human health.

Operation

During operation, the Project is likely to generate the following waste streams:

- BESS facility operational equipment waste (e.g., replaced battery modules, used transformer oil)
- Onsite office waste
- Waste generated by workers.

Onsite office waste and waste generated by workers is likely to include general waste and recycling generated from everyday operations of the BESS facility. It is estimated the BESS would require up to six staff during operation on an intermittent basis. The BESS would typically be managed remotely and staffed as required during both planned and unplanned maintenance periods. As such, waste generated from everyday operation of the BESS facility is anticipated to be minimal.

Operational equipment waste such as the end of life and replaced battery modules 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 management measures stated in **Section 6.16.6**, it is anticipated there will be no significant waste generated during operations that would pose an environmental or human health risk.

Decommissioning and rehabilitation

Prior to the decommissioning of the BESS, all wastes and operating chemicals would be disposed of at a licenced facility in accordance with the POEO Regulation and the NSW EPA Waste Classification Guidelines (NSW EPA, 2014).

Where possible, the reuse or re-purposing of existing materials and infrastructure would be prioritised to encourage sustainable material use via a circular economy approach.

Prior to demolition, existing infrastructure, plant and equipment would be assessed and categorised based on whether the materials can be reused, repurposed, or recycled. Materials able to be reused, repurposed, or recycled will be distributed offsite to other projects, suppliers, or recycling facilities willing to accept the materials. Batteries within the BESS would be recycled at an approved battery recycling facility or returned to the battery manufacturer for refurbishment, where possible. Other materials that cannot be recycled would be disposed of at an appropriately licenced waste facility.

Depending on the planned future land-use of the area post-decommissioning, rehabilitation and recontouring of the area may be undertaken. Under circumstances where land rehabilitation is undertaken, waste is anticipated to be minimal and mostly generated by workers and plant and equipment (e.g. oil and grease). All waste from rehabilitation efforts would be disposed of at appropriately licenced waste facilities.

6.16.6 Mitigation measures

Mitigation and management measures to avoid or minimise potential waste-related impacts during construction, operations, and decommissioning and rehabilitation of the Project have been provided in **Table 6.16-3**.

Table 6.16-3 Mitigation and Management Measures

ID	Mitigation and Management Measures	Timing
W-1	A Waste Management Sub-Plan would be prepared as part of the Construction Environmental Management Plan and would: • Identify requirements consistent with the waste hierarchy and circular economy initiatives • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Provide a framework to target resource efficiency through the design and construction phases • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Set out processes for disposal, including onsite transfer, management, and the necessary associated approvals/permits • Describe the process for regularly removing waste from the Project Area to avoid issues associated with odour, visual amenity, and the attraction of animal/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
W-2	All waste would be assessed, classified, managed, and disposed of in accordance with the Waste Classification Guidelines and other relevant legislation (NSW EPA, 2014).	Construction, Operation, Decommissioning and Rehabilitation

6.17 Cumulative Impacts

"*Cumulative impacts are a result of incremental, sustained and combined effects of human action and natural variations over time and can be both positive and negative. They can be caused by the compounding effects of a single project or multiple projects in an area, and by the accumulation of effects from past, current and future activities as they arise*" (DPE, 2022).

Cumulative impacts may arise from the combined impact of the construction or operational activities of the Project and other proposed projects on shared sensitive receptors.

6.17.1 Methodology

Cumulative impacts can occur when the residual impacts from a project, interact or combine with impacts from other projects or actions potentially resulting in a larger overall effect on environmental or community receptors. In order to identify and assess potential project level cumulative impacts, the following four step process has been employed:

- identifying the residual impacts of the Project (identified through the previous sections of **Chapter 6.0** of this EIS)
- identifying potentially cumulative projects or actions within the vicinity of the Project Area (i.e. the immediate geographic area of influence) that could affect shared receptors
- applying a screening process to assess whether the identified potential cumulative projects are likely to impact the same receptors impacted by the residual impacts of the Project
- assess potential cumulative impacts (if any) of the Project and nearby cumulative projects.

This process has been developed to provide a Cumulative Impact Assessment (CIA) proportionate to the likely level of impact for the Project in broad accordance with the *Cumulative Impact Assessment Guidelines for State Significant Projects* (CIA Guideline) (DPE, 2022).

The key residual impacts of the Project include:

- Minor impacts on traffic generation on Old Punt Road during construction of the Project
- Minor noise impacts on a single residential receiver (Sweetwater Grove) during construction of the Project
- Minor visual amenity impacts during the construction and operation of the Project.

No other notable residual impacts for the other environmental and social matters assessed are expected.

6.17.2 Identification of potentially cumulative projects

In accordance with CIA Guideline, the following databases were reviewed on 11 September 2023 to identify other State Significant Development (SSD) and State Significant Infrastructure (SSI) projects, Designated Developments, Major Review of Environmental Factors (REFs), EPBC Controlled Actions and major greenfield and urban development proposals within the vicinity of the Project that may be relevant to the cumulative impact assessment:

- DPE Major Projects website
- EPBC Referral Database
- Port Stephens DA tracker (accessed via NSW Planning Portal)
- Newcastle Council DA tracker (accessed via NSW Planning Portal).

To be considered relevant, nearby projects needed to be of similar size, within reasonable proximity and have a timeframe that may overlap with the project. The identified projects are outlined in **Table 6.17-1**.

6.17.3 Cumulative impact screening

Potential cumulative projects in the immediate area of the Site that may adversely affect the same receptors as the residual impacts of the Project have been considered as part of the screening process.

The screening process involved reviewing each of the potential cumulative projects against the three criteria listed below:

- **Scale** – Larger scale projects identified on the DPE’s Major Projects website, Port Stephens and Newcastle City Council’s development application register have been included in line with the CIA Guideline. Projects or actions that are small scale are likely to result in neutral or very low magnitude temporary adverse impacts that would be unlikely to influence the CIA.
- **Location** – Projects in proximity to the Project Area where there is potential for residual impacts to spatially overlap and adversely impact the same environmental or social receptor (e.g. shared use of roads for construction access, or noise impacts from two projects affecting the same receptor)
- **Timeframe** – Only projects likely to be built concurrently with the Project have been included for further assessment. This includes:
  - projects that are under construction but not yet operational
  - projects that have been approved but where construction has not yet started
  - projects where a development application and/or environmental impact assessment has been publicly exhibited.

  This includes both new projects and where a significant change or modification is proposed to an existing operation. Projects at a conceptual stage where a referral or scoping report is available have been considered but to a lesser degree due to an absence of accurate and detailed project and/or environmental impact information or development timeframes. Any other projects at a conceptual stage have not been considered due to an absence of accurate and detailed information. 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.

The list of potential cumulative projects subject to the screening process is provided in **Table 6.17-1**.

Table 6.17-1: Potential cumulative projects and actions

Project	Relative location	Proposed construction timeline	Project details	Initial screening
Newcastle Power Station (NPS) (SSI-9837)	The NPS would occupy the Site	Not confirmed	AGLM received approval (SSI-9837) to construct and operate the Newcastle Power Station on the Site in March 2021. The relationship between the Project and the NPS has been discussed in **Chapter 1.0 (Introduction)**.	The NPS would only be constructed in lieu of the Project, as the proposed projects occupy the same site. On this basis, the cumulative impacts from the projects have not been considered further as only one of these two projects would be developed and so cumulative impacts would not be possible.
M1 Pacific Motorway Extension project (SSI-7319)	<100 m east of the Site	Proposed to commence in the third quarter of 2023 and completed by the second quarter of 2026.	A portion of land owned by AGL has been compulsorily acquired by TfNSW (refer to **Section 2.3.3**). This acquisition will not impact the Project Area but it is directly adjacent to it. The M1 extension to Raymond Terrace (M1 Extension Project) (SSI-7319), and associated interchange with Old Punt Road and Tomago Road, will result in significant changes to local traffic flows and conditions. The project would see traffic volumes along the Pacific Highway decrease significantly, with an improvement in the operational efficiency of the existing Pacific Highway intersections with Tomago Road and Old Punt Road.	The M1 Extension Project has the potential to result in adverse cumulative impacts with the Project due to the size and magnitude of the development and its location directly adjacent the Project Area. The Project may generate cumulative noise and traffic impacts with the M1 Extension Project, especially during construction of both projects. The project would also result in potential cumulative impacts to visual receivers. This cumulative impact would arise out of the construction of grade separated intersections, as well as additional lanes being proposed as part of the project.

Project	Relative location	Proposed construction timeline	Project details	Initial screening
Tomago Resource Recovery Facility (SSD-55177233)	Approximately 2.6 km southeast of the Site	Not confirmed	Recycled Concrete Products Pty Ltd (RCP) submitted a Scoping Report to DPE to request SEARs for a resource recovery facility at 509 Tomago Road, Tomago. The resource facility would be capable of receiving and processing up to 250,000 tonnes of general solid waste (non-putrescible) per year consisting of construction waste such as soils, concrete, bricks and tiles.	Heavy vehicle transport routes for the RCP project are likely to occupy Tomago Road, which could result in a cumulative impact on traffic on this road if the construction programs for the Project and Tomago Resource Recovery Facility (TRRF) project overlap. The potential for a cumulative traffic impact will be confirmed following a review of the traffic impact assessment for the TRRF project, which is not yet available.
Tomago Industrial Estate (MP_06_0050)	Approximately 2.8 km east of the Site	Not confirmed	Redlake Enterprises Pty Ltd proposes to establish an industrial park on approximately 116 ha of vacant agricultural land located on Tomago Road, Tomago in the Port Stephens local government area. Redlake Enterprises is seeking approval for the subdivision of the site to create approximately 130 lots in three stages, bulk earthworks across the site, as well as the construction and operation of an integrated WesTrac facility on 23 ha of the site. The WesTrac facility would include: • a warehouse and distribution centre • training facility for WesTrac employees • staff amenities building • utility building including wash bays, a diagnostic centre, sandblasting facilities	Access to the site will be via Tomago Road. Therefore, there could be potential traffic and transport cumulative impacts if there is overlap in construction activities. An increase in workers accessing the site would also increase traffic on the local road network.

Project	Relative location	Proposed construction timeline	Project details	Initial screening
			• spray booth, machine shop • utility building including wash bays, a diagnostic centre, sandblasting facilities • spray booth, machine shop • administration/office • fuel storage and oil waste depot • solid waste depot • carparking for 391 passenger vehicles and 22 motor bikes • landscaping.	

6.17.4 Cumulative impact assessment

Based on the initial screening, the following projects were considered to have the potential to result in cumulative impacts with the Project:

- M1 Extension project
- Tomago Resource Recovery Facility
- Tomago Industrial Estate.

Following a review, it has been determined that the potential residual impacts associated with these projects that have a potential to cause a cumulative impact with the Project relate to noise and vibration, traffic and transport, visual impacts, and social impacts. This conclusion was based on their location and the nature of the developments, i.e. their similarities (or lack of) with the Project. Impacts related to other matters have not been assessed further, given the limited residual impacts of the BESS, distance of potential cumulative projects and lack of detailed information publicly available in relation to the potential cumulative projects.

Construction

An assessment of the potential cumulative impacts associated with the construction of the Project and the existing/future projects identified in **Table 6.17-1** is provided below.

Traffic and transport

The predicted residual impacts of the Project associated with traffic and transport are predicted to be low in comparison to those generated from the M1 Extension Project. Whilst a detailed timeline and program for the M1 Extension Project construction is yet been confirmed, it is expected that some temporary short-term diversions, temporary road closures and temporary traffic intersections may be required to support construction of the M1 Extension Project. These changes alongside construction traffic for the Project could result in temporary cumulative traffic impacts on the local road network.

Potential receptors of cumulative impacts would include motorists commuting along the M1, local residential traffic, and commercial and industrial motorists using Tomago Road and Old Punt Road.

During construction of the M1 Extension Project, where construction traffic movements are unable to be confined to the construction footprint, the existing road network would be used. Where possible, heavy vehicle movements would primarily use state roads including the Pacific Highway (M1) and New England Highway; however, there may be other roads that could be used by the project, including Old Punt Road.

During construction of the M1 Extension Project, the most substantial contribution to additional vehicle movements on the existing road network would occur at access points to ancillary facilities and at roads being used for haulage (such as those mentioned above). Approximately 2,800 daily vehicle movements are anticipated to support construction of the M1 Extension Project, comprising approximately 1,300 daily heavy vehicle movements and approximately 1,500 light vehicle movements.

To accommodate construction activities and delivery of materials to various sites across the M1 Extension Project, temporary traffic intersections are proposed at the Tomago Road intersection with the Pacific Highway, and Old Punt Road intersection with the Pacific Highway. The temporary intersections, proposed as part of the M1 Extension Project, would improve direct access and connectivity for construction activities while reducing delays to general traffic by removing unnecessary heavy vehicle movements.

Based on the existing traffic volumes on roads within the study area, the low number of peak hour construction traffic movements, and that the majority of the ancillary facilities are accessed via dedicated left in/left out arrangements, minimal delays and queuing to the surrounding network are anticipated as a result of construction traffic accessing ancillary facilities for the M1 Extension Project.

The estimated traffic generation during construction and operation of the Project would result in negligible impacts on the existing operations of the local road network. The key intersection of Tomago Road and Old Punt Road would continue operating at good Level of Service (LoS) with sufficient spare capacity to support the Project, both in the short-term, accommodating the higher traffic generation during construction, and long-term, during operation.

LoS modelling undertaken for the M1 Extension Project indicates that the intersections at Pacific Highway and Tomago Road, Pacific Highway and Old Punt Road, Old Punt Road and Tomago Road would operate at a good Level of Service during both AM and PM peak periods, with spare capacity to accommodate potential traffic volume increase during construction. These results indicate that there is enough capacity to accommodate cumulative impacts on traffic and transport on the road network around the Site.

Heavy vehicle transport routes for the Tomago Resource Recovery Facility (TRRF) and the Tomago Industrial Estate (TIE) are likely to use the Pacific Highway and Tomago Road, which could result in a cumulative impact on traffic on this road if the construction programs for these projects and the Project overlap. No information on the traffic impacts from the TRRF or TIE project are currently available, as such no assessment of cumulative impacts with these projects is possible. However, given that the LoS modelling undertaken for both the Project and the M1 Extension Project indicates that Tomago Road and Pacific Highway intersection could accommodate increased capacity, the cumulative impacts associated with the TRRF on traffic and transport is expected to be negligible.

The Traffic and Transport assessment undertaken for the M1 Extension Project indicates that with the implementation of recommended environmental management measures, such as a Traffic Management Plan, no adverse residual impacts are anticipated during construction.

In order to mitigate the potential cumulative transport and traffic impact, consultation with TfNSW, RCP and Redlake would continue with regards to the interaction of the Project with the projects identified in **Table 6.17-1,** and where works affect Old Punt Road and relevant intersections.

Noise and vibration

While most construction activities for the Project and the M1 Extension Project are expected to occur at separate times and/or locations, it is possible that construction activities may occur at the same time in close proximity to each other.

Noise modelling undertaken for the Project indicate that no residential receivers for any construction scenario are expected to experience noise levels above the noise management level and, thus, no receivers are expected to be highly noise affected. Noise modelling undertaken for the M1 Extension Project indicates that there will likely be some noticeable impacts on residential receivers near the Tomago BESS Site; however, there would be no exceedances. Therefore, it is likely that cumulative impacts from the two projects are expected to be negligible.

The activities associated with the construction components for the Project are expected to exceed the noise management levels at one industrial premises directly adjoining the Site (9 Old Punt Road, Tomago) during the daytime. For the M1 Extension Project, commercial and industrial receivers in the industrialised noise catchment area directly south of the Tomago BESS Project Area (designated NCA10 in the M1 Extension Project Noise and Vibration Impact Assessment) are predicted to be ‘Clearly audible’ and ‘Moderately intrusive’ (11 dB to 20 dB exceedance of NML) during different construction scenarios and activities.

An initial noise assessment undertaken for the Tomago Industrial Estate indicates that the noise levels associated with the construction of Stage 1 would be 43 dB(A) at the closest residence at Tomago Road and hence would not result in significant noise impacts. If construction of the projects overlaps, it is unlikely to result in significant cumulative noise impacts.

Increased traffic noise on Tomago Road associated with the Project is likely to be less than 2 dB(A) during the peak construction period for a worst-case scenario which is negligible. For the M1 Extension Project, construction traffic associated with the project is also not expected to increase traffic noise levels by more than 2 dB(A) on most of the roads along the proposed construction traffic routes. The cumulative impacts of the construction of both projects (where activities overlap in time) is expected to be negligible.

In terms of impacts associated with vibration, the closest residential receiver is more than 600 m from the Tomago BESS Site and, therefore, the Project can comply with minimum working distances at this location and, thus, no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic damage. For the M1 Extension Project, there is a low to medium risk of human disturbance in the industrial noise catchment area adjacent the Tomago BESS site. Cumulative impacts associated with vibration are expected to be negligible.

Visual amenity

Changes to road infrastructure associated with the development of the M1 Extension Project is likely to result in impacts on visual amenity. The VIA undertaken for the M1 Extension Project Environmental Impact Statement (NSW, 2021) indicates that the project infrastructure would be consistent in character with existing industrial and road corridor uses in the area. The most notable changes would be associated with the new Tomago interchange including the realignment of the Pacific Highway north of the Tomago Road intersection, with separation of the northbound and southbound travel lanes. This would affect the spatial qualities and increase the amount of the road-related infrastructure in the general area.

The VIA undertaken for M1 Extension Project EIA (NSW, 2021) indicates that the overall Sensitivity, Magnitude, and Impact to landscape character of the Tomago area associated with the M1 Extension Project are considered to be Low. Further analysis related to the potential cumulative impacts at identified viewpoint locations between the Project and the M1 Extension Project is provided in **Section 6.14**.

Given the existing industrial setting, cumulative impacts in relation to visual amenity are expected to be negligible.

Social

The main cumulative social impacts arising from the Project and other proposed or concurrent projects include impacts related to Traffic and Transport, Noise and Vibration, and Visual Amenity (discussed above).

The M1 Extension Project may be constructed at the same time as the Project. This could result in construction fatigue in people living and working in areas affected by both projects due to the combined impacts (e.g. traffic impacts from one project and noise impacts from another), or simply from the concurrent or consecutive nature of disruptions in the area. Noting the proposed construction start and duration for each, as well as their proximity, this impact is likely to be most felt by residents and businesses in Tomago. Construction management would be addressed through coordinating and engaging with other projects before and throughout construction to manage consultation and construction fatigue where possible.

Operation

An assessment of the potential cumulative impacts associated with the operation of the Project and the existing/future projects identified in **Table 6.17-1** is provided below.

Traffic and Transport

The Project would require up to six operational staff on an intermittent basis. On this basis, no notable traffic related residual impacts from the Project are expected. As such, no cumulative traffic impacts with the identified cumulative projects are likely.

Noise and vibration

During operation, the predicted operational noise emissions from the Project generally comply with the most stringent (night-time) operational noise criteria at all locations. The one exception is at Sweetwater Grove (located approximately 600 m away from the Project Area) where noise predicted operational noise levels are 2 dB above the project noise trigger level. The Noise Policy for Industry (*NPfI*) considers an exceedance of up to and including 2 dB negligible as it would not be discernible to the average listener.

On this basis no notable traffic related residual impacts from the Project are expected. As such, no cumulative noise impacts with the identified cumulative projects are likely.

Visual amenity

During operation, adverse cumulative impacts would be limited to visual impact, due to the interface the project would have at the northern border of the Site with the M1 Extension Project. The design of the Project has considered this road upgrade and would site prominent visual infrastructure (such as workshops, substations and transmission connections) in a manner that reduces the potential for visual impacts to stationary receivers in the area (noting that passing receivers would mostly be located on the motorway itself and hence are not considered to be affected by the visual impact of that project). Further analysis related to the potential cumulative impacts at identified viewpoint locations between the Project and the M1 Extension Project is provided in **Section 6.14**. The operation of both projects would result in a visual change to the local area, with a hardening of the primary impact area.

The magnitude of operational cumulative impacts is considered to be moderate, with a likelihood of the impacts being possible, resulting in a low (negative) social impact.

6.17.5 Conclusion

Cumulative impacts associated with the Project are expected to be negligible. Whilst there is expected to be some temporary cumulative impacts associated with the M1 Extension Project in relation to noise and vibration, traffic and transport, visual impacts and the associated social impacts, these will be mitigated through management measures described herein and those developed for the M1 Extension Project.

Ongoing cumulative impacts associated with the operation of the Project are expected to be negligible.

7.0 Justification of the Project

7.1 Justification

The Tomago BESS is supported by Commonwealth, State, regional and local plans and policies (as described in **Chapter 2.0 (Strategic context)**) and will support the Commonwealth and State government's aspirations to achieve their respective renewable energy and greenhouse gas (GHG) emission reduction targets. The Project will also contribute to the continued growth of renewable energy generation and storage capacity in the Hunter and Central Coast REZ.

7.1.1 Recognised need

The electricity market is transitioning from fossil fuel generators to a system of widely dispersed, relatively small-scale renewable generators. Challenges facing this transition include an ageing coal-fired generation fleet that is being decommissioned over the coming years and a projected short-fall of generation capacity in the next two to three years. As a result, there is a need to transition the electricity network to reliable, low-carbon and low-cost forms of energy generation supported by electricity storage technologies to maintain a power supply system that is reliable, secure, and affordable.

Therefore, the factors that have determined the need for the Project (as described further in **Chapter 2.0 (Strategic context)**) include:

1. Transition to renewable energy
2. Closure of existing coal-fired generators
3. Projected shortfall of generation capacity.

The development and operation of the Project, in conjunction with other large-scale renewable energy storage projects in NSW, has potential to fill the need for replacement power as ageing coal-fired generators face closure.

If the Project was not developed, its benefits, which include supporting grid reliability, the storage of electricity during periods of high generation, release of electricity during period of high demand, and job creation in the region, would not be realised.

The Project would result in negligible environmental impacts and social impacts. Impacts have been comprehensively assessed, are not predicted to be significant and can be adequately managed through appropriate design, mitigation and management during construction and operation (refer to **Chapter 6.0 (Assessment of impacts)**). It is therefore considered that the Project is in the public interest.

7.1.2 Suitability of the Project site

As discussed in **Section 1.2.1**, the Site was granted approval (SSI-9837) for the NPS). The attributes of the Site that make the location optimal for development of "*electricity generating works*" (including storage) remain relevant to this Project.

A range of potential sites for the Project were investigated. The review of sites considered key selection parameters including, siting of the BESS near a point of energy generation, as well as the option to construct the BESS close to a point of energy distribution. Constructing the Project in proximity to the existing Transgrid substation (either the 132 kV or 330 kV) would likely reduce disruptions to energy supply, thus aiming to achieve the Project objectives of enhancing the use, reliability, and efficiency of renewable energy within the newly established Hunter and Central Coast REZ.

In addition to the above, the Site also exhibits key location requirements necessary for battery energy storage, including availability of suitably zoned land, access for the delivery of heavy construction loads and the availability of a skilled construction and operational workforce.

In summary, the Site is considered highly suitable for the Project due to:

- The location of the Project being within the Hunter and Central Coast REZ
- Proximity to the high voltage electricity transmission network and high electricity demand centres
- Capacity of the transmission network to deliver electricity stored without constraint

- Availability of suitably zoned land with compatible existing land uses surrounding the Site
- The absence of highly sensitive or important natural or built features within or proximate to the Site
- Access for the delivery of heavy construction loads (including OSOM vehicles)
- Availability of a skilled construction and operational workforce.

7.1.3 Consideration of community views

Consultation conducted for the Project is described in **Chapter 5.0 (Engagement)**. The Project is not expected to generate significant stakeholder interest due to the anticipated low level of impact. However, community and stakeholder engagement activities will continue to occur during public exhibition of the EIS. Where stakeholders have raised concerns with specific aspects, such as impacts to biodiversity, water, heritage, and visual, these are addressed through the mitigation measures as recommended in appended technical reports and summarised in this EIS.

Positive impacts identified include increased employment opportunities and improved network resilience, which are consistent with the Project objectives.

7.1.4 Consistency of the Project with relevant statutory requirements and government policies

The Project is consistent with the relevant local, state and Commonwealth environmental planning instruments. **Chapter 4 (Statutory context)** describes the relevant statutory requirements. The Project also supports state and Commonwealth governments to achieve their respective renewable energy and GHG emission reduction targets.

7.1.5 Future monitoring and communication during operation

Throughout construction, management measures would be implemented through the adoption of a construction environmental management plan, supported by the following sub-plans:

- Construction Traffic Management Plan (CTMP)
- Bushfire Emergency Management and Evacuation Plan (BEMEP)
- Construction Noise and Vibration Management Plan (CNVMP)
- Water and Soil Management Plan (WSMP)
- Surface Water Management Plan (SWMP)
- Aboriginal Cultural Heritage Management Plan (ACHMP)
- Emergency Response Plan (ERP)
- Construction Waste Management Plan (CWMP)
- Site-specific Remedial Action Plan. (RAP).

Operation and monitoring of the facility would be governed by an operational environmental management plan that would provide an approach to managing environmental compliance during operation, with particular emphasis on bushfire management, risk management, landscape management and noise monitoring.

The BESS is intended to have an operational life of up to 50 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 (including poles and wires) would be removed and re-purposed where possible and land rehabilitated and recontoured, if and as required.

7.1.6 Key uncertainties

Due to the extent of technical studies undertaken to inform the Project and the mitigation measures proposed to address impacts of the development, there are no notable uncertainties with the Project. Identified impacts can be mitigated through the location and design of the BESS and the implementation of management measures and monitoring.

7.2 Consistency with the objectives of the EP&A Act

Object	Response
(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 provides for grid firming and will also support the penetration of renewable energy sources in the NEM. During construction, economic benefits are anticipated for local businesses due to increased demand for goods and services. Benefits would also be associated with direct and indirect employment opportunities. During operation, the Project would benefit communities, businesses, and industry by increasing the reliability in the NEM. The Project may provide an overall downward pressure on energy prices by shifting use of lower cost renewable generation from times of peak generation to times of peak demand. This in turn may support reduced electricity costs for households, businesses and industry over the medium to long term while supporting the transition to a low carbon energy future. Technical specialists have been engaged to assess and report on the potential for the Project to impact upon the natural and other resources of the State and local areas. Impacts have been assessed and discussed in **Chapter 6.0 (Assessment of impacts)**.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	This EIS describes the economic, environmental, and societal context of the Project and the potential impacts of it to allow informed consideration of these aspects in determining the development application. The Project would contribute to the continued growth of renewable energy generation and storage capacity, as well as assisting to provide future energy security and generation reliability. The Project's consistency with the principles of Ecologically Sustainable Development (ESD) is further outlined in **Section 7.4**.
(c) to promote the orderly and economic use and development of land,	The orderly and economic use of land is best served by development that is permissible under the relevant planning regime and predominately in accordance with the prevailing planning controls. The Project comprises a permissible development, which is consistent with the statutory and strategic planning controls and is in proximity to similar land uses including the Transgrid substation. As detailed in this EIS, the Project would result in positive economic impacts, with appropriate mitigation measures and management strategies being proposed to reduce adverse environmental and social impacts.
(d) to promote the delivery and maintenance of affordable housing,	This object is not applicable to the Project.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	A comprehensive BDAR has been undertaken to identify potential adverse impacts on biodiversity. Most impacts on biodiversity would occur during construction from the limited clearing of native vegetation and removal of habitat for a limited range of flora and fauna. Identified direct and indirect impacts, and relevant management and mitigation measures are described in **Section 6.3**

Object	Response
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	The construction of the BESS at the Site would result in whole loss of value for four Aboriginal sites, and the partial loss of two sites. There is no further loss expected during operation. The ACHAR determined the Project would result in a 0.02% decline in the region's potential Aboriginal resource. On this basis, it is concluded that the impact of the Project on this resource would be negligible. Management and mitigation measures would be implemented for the Project to address potential impacts to Aboriginal heritage (described in **Section 6.9**).
(g) to promote good design and amenity of the built environment,	Potential noise, air quality, and visual impacts on sensitive receivers and the broader community have been assessed and described in **Sections 6.7, 6.12**, and **6.14**, respectively. Amenity impacts would be negligible.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	Over the life of the Project, infrastructure would be maintained, or upgraded, to ensure safe and efficient operations. All construction associated with the Project would be compliant with the Building Code of Australia and other relevant statutory requirements.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	AGL is seeking approval for the Project under Part 4, Division 4.7, of the EP&A Act. As summarised in **Chapter 5.0 (Engagement)**, a wide range of government agencies have been consulted regarding the Project, including relevant State government departments and local councils.
(j) to provide increased opportunity for community participation in environmental planning and assessment.	As described in **Chapter 5.0 (Engagement)**, there have been a range of engagement activities to inform the community about the Project and to seek community (and other stakeholder) feedback. This EIS provides further detailed information regarding the Project and its potential impacts. It will be placed on public exhibition by DPE, and the community will be able to make formal submissions.

7.3 Summary of project impacts

This EIS has considered the potential impacts associated with the Project, as well as the need for the Project and alternative development options. This section summarises the potential impacts and provides a justification for the Project on environmental, economic, and social grounds.

7.3.1 Environmental impacts

This EIS has assessed potential impacts to the biophysical environment which are summarised in **Table 7.3-1**.

Table 7.3-1: Summary of environmental impacts

Matter	Summary
Hazards and risk	The PHA (**Appendix I**) concluded that the Project is not considered potentially hazardous, in accordance with the DPE's definition based on the intended storage and transport of hazardous material. The potential hazards from the Project are predominantly associated with the 'other types of hazards' such as risk associated with the lithium-ion batteries, of environmental pollution from a spill or other pollutant, among other worst-case consequence scenarios limited within the Project.

Matter	Summary
Biodiversity	The Project would result in the removal of 14.1 ha of native vegetation, 11.3 ha of which represents the BC Act listed TEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions. The Project would require the removal of: • 14.1 ha of Common Planigale habitat (assumed present) • 1.7 ha of Netted Bottlebrush habitat only, no individuals removed • 10.7 ha of Southern Myotis habitat • 0.2 ha of *Pterostylis chaetophora* habitat. The Project would also result in the loss of 12 hollow-bearing trees. Mitigation measures would help to minimise the potential impacts to biodiversity values that remain present within the Project Area.
Water	Associated infrastructure, including transmission lines, would not be impacted by flooding in all events up to and including the PMF event, as the associated infrastructure is positioned along the natural ridgeline, which is set above peak flood levels. The operation of the Project is not anticipated to impact on groundwater except for an increase of 9.7 ha of impermeable surfaces on the Site. This may result in localised decreases in groundwater levels due to a reduction in recharge to groundwater aquifers. During operation, potable water would be supplied directly to the Site from a new connection to Council's municipal supply system on Old Punt Road. This would service the Site office building and other amenities. It would also supply water to the fire services system. The expected water supply demand for the Site would likely be minimal as it would be operated remotely, with staff only required onsite periodically.
Soils and contamination	The land capability within the Project Area is identified as moderate to low. No significant geotechnical constraints have been noted. Construction activities have the potential to destabilise soils and cause erosion which may result in impacts to surrounding water and air quality. These would be mitigated in line with the WSMP within the CEMP. No earthworks or materials handling is proposed as part of the typical operation of the Project. The Project would consist of a hardstand area for the BESS and a transmission line that may be either above ground, partially or fully underground between the BESS and Transgrid 132 kV and 330 kV Tomago Substations. It is unlikely the Site or transmission line would result in erosion related impact. Land that is not required for the operation of the Project would be rehabilitated/recontoured and returned to its pre-development condition or would be landscaped, as needed. No erosion or sedimentation impacts are expected during operation of the Project.

Matter	Summary
Traffic and transport	During the construction and operation phases, the Pacific Highway would be the main transport route to the Site. A peak of up to 200 construction staff would be required during construction of the Project. At times, this number could be significantly less depending on the works being undertaken. Up to 33 heavy vehicles a day may need to attend the Site during construction. A CTMP would be prepared in consultation with Port Stephens Council and TfNSW to mitigate potential traffic impacts. During operation, the Project is anticipated to require up to six staff members on an intermittent basis. As a result, the traffic generation during operation would be very low, and as such is not expected to impact the road network surrounding the Site.
Noise and vibration	No residential receivers during construction are expected to experience noise levels above the construction noise management level. As such, no residential receivers are expected to be affected. The activities associated with the construction components for the Project are expected to exceed the noise management levels at one industrial premises directly adjoining the Site during the daytime while work is active in that area. Operational noise impacts for receivers are considered negligible with only a 2dB(A) exceedance at a residential receiver located over 600 m away from the Project Area. The NPfI denotes that an exceedance of 2dB(A) is undiscernible from the existing background environment.
Bushfire	Potential impacts relating to bushfire during construction include onsite ignitions, which may result in a fire escaping to the surrounding land, and occupational fire risk, being the risk of workers being caught by out-of-control bushfire impacting the Site. Potential impacts relating to bushfire during operation include onsite ignitions, occupational fire risk, disruption to power supply if the Site is impacted by fire, and loss of critical infrastructure. A Bushfire Emergency Management and Evacuation Plan would be prepared to manage the potential impacts during construction and operation of the Project (further discussion is provided in **Section 6.8.5**).
Aboriginal heritage	Six Aboriginal archaeological sites have been recorded fully or partially within the Site. Two sites will be partially impacted, and four sites will be wholly impacted. **Section 6.9** further describes these impacts and identifies relevant management and mitigation measures.

Matter	Summary
Air quality	Construction works are likely to generate dust emissions from the movement of vehicles, heavy machinery, and ground disturbance works, particularly during dry conditions. Other impacts include emissions generated from site vehicles, trucks, water carts, diesel generators, and certain machinery used onsite such as excavators and graders. Dust generation during operation would primarily occur from both travelling to and from Site, and to carry out routine inspection works and maintenance activities. Given the minor nature of these potential impacts, the effect on local and regional air quality from dust emissions generated during operation is expected to be negligible.
Non-Aboriginal heritage	It is expected that the Project would not impact non-Aboriginal heritage sites during construction, given that the primary historical land-use of the Project Area was likely grazing. It is also expected that the operation stage of the Project would not impact non-Aboriginal heritage sites.
Visual amenity	The construction of the Project would be screened and not visible to most visually sensitive receptors. Motorists passing the Site on the Pacific Highway or Old Punt Road may briefly glimpse the construction activities; however, these views would be transient and in keeping with construction of other developments in the immediate area. During the operation stage of the Project, impacts to receivers are considered to be negligible to low, on the basis that the sensitivity of the receivers and magnitude of change are considered low.
Waste management	Waste expected to be generated during construction includes vegetation (from clearing of weeds, trees, and shrubs), wastewater, construction waste, and demolition materials generated from the removal of existing infrastructure (e.g., fencing). During operation, the Project is likely to generate operational equipment waste (e.g., replaced battery modules, used transformer oil), onsite office waste, and waste generated by workers.

7.3.2 Economic impacts

The Project would provide long-term livelihood benefits during operation. It would help smooth out energy spot prices and provide greater energy security.

Economic benefits would also be generated during construction, which may include:

- Increased expenditure at local and regional businesses through purchases by construction workers
- Direct employment through onsite construction activities (estimated that the Project could support up to 200 jobs over the construction period)
- Direct expenditure associated with onsite construction activities
- Indirect employment and expenditure through the provision of goods and services required for construction.

7.3.3 Social impacts

The social impacts of the Project have been comprehensively assessed in **Section 6.10** and **Appendix G (Social Impact Assessment).** The Project would provide direct benefits to NSW overall, through providing firming capacity to the NEM. The Project would also directly benefit the surrounding local areas, as outlined in the SIA (and summarised in **Section 6.10** of this EIS). While the Project has potential negative impacts, it is considered that these can be managed to acceptably low levels.

Mitigation and management strategies have been proposed for each of the identified potential social impacts to minimise negative consequences and to maximise social benefits for the local community (refer to **Section 6.10.6**).

7.3.4 Cumulative impacts

Cumulative impacts associated with the Project are expected to be low. While there is the potential for some temporary cumulative impacts associated with construction of the M1 Extension Project in relation to noise and vibration, traffic and transport, visual impacts and the associated social impacts, these will be mitigated through management measures described within this EIS, and those developed for the M1 Extension Project.

Ongoing cumulative impacts associated with the operation of the Project are expected to be negligible. Cumulative impacts are discussed further in **Section 6.17**.

7.4 Ecologically sustainable development

7.4.1 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 EP&A Regulation and the *Protection of the Environmental Administration Act 1991* (NSW). The principles, as listed in clause 193 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.

7.4.2 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 has been 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 because of the Project.

7.4.3 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.

7.4.4 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 requires that conservation of biological diversity and ecological integrity should be a fundamental consideration for a project.

The conservation of biological diversity and ecological integrity was a fundamental consideration in the development of the Project. The BDAR was prepared to assess potential impacts of the Project (**Section 6.3**). There are direct impacts to 14.1 ha of native vegetation or habitat for threatened species would occur because of the Project. These impacts will be compensated through the implementation of biodiversity offsets.

Management and mitigation measures have been prescribed to minimise, manage and offset residual biodiversity impacts (**Appendix D (Biodiversity Development Assessment Report))**.

7.4.5 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.

Project benefits are considered to outweigh the costs. The Project would generate up to 200 jobs during construction and would continue to provide economic benefits to the local community through potentially assisting in smoothing in energy spot prices.

The Project would also improve the penetration of renewable energy in the grid, supporting transition away from fossil fuel (coal and gas) generation, thereby contributing to a net reduction in GHG emissions.

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.

7.5 Conclusion

The Project involves the development and operation of a large-scale BESS with a capacity of up to 500 MW and up to 2,000 MWh. The Project would be within the NSW Government declared Hunter and Central Coast REZ and would function to help smooth out fluctuations in electricity supply from intermittent power sources (for example, solar and wind energy), providing system security and other network services.

The Project would provide environmental, social, and economic sustainability benefits to NSW as the Project would facilitate a deeper penetration of intermittent renewable energy within the NEM. At a regional level, the Project would contribute to the regional economy through increases in direct and indirect business turnover, value add, household income and job creation.

The Project would result in environmental and social impacts as identified throughout the EIS, which would be managed through the mitigation and management measures described throughout, such that the Project would not result in significant or social impacts.

The Project would achieve the following overall benefits:

- Alignment with Commonwealth and NSW electricity policies, strategies, and regional plans
- Contribution to the overall storage capacity of the NEM and provide GHG benefits by increasing the supply of electricity generated from renewable sources that are intermittent (such as solar and wind)
- Improvements to network reliability by providing back-up power during network disruptions.

It is considered that the environmental, social, and economic benefits for the local, regional and NSW communities far outweigh the temporary impacts that would result from the development and operation of the Project and that the Project should be approved.

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Appendix A

Secretary's Environmental Assessment Requirements Table

Appendix A Secretary's Environmental Assessment Requirements Table

Secretary's Environmental Assessment Requirements	Location addressed in EIS
General requirements	
The environmental impact statement (EIS) for the development must comply with the requirements in Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) and must have regard to the *State Significant Development Guidelines*.	The EIS is compliant with the EP&A Regulation, with regard to the *State Significant Development Guidelines*. The responses below provide justification of this.
In particular, the EIS must include:	
A stand-alone executive summary	A stand-alone executive summary is provided at the start of the EIS.
A full description of the development, including:	
Details of construction, operation, and decommissioning, including any staging of the development	**Chapter 3.0 (Project description)** provides a detailed description of the Project, including details of construction, operation, and decommissioning.
A high-quality site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development but the subject of a separate approvals process)	**Chapter 3.0 (Project description)** includes four figures illustrating the infrastructure and facilities: • **Figure 3.1-1** depicts the Project Area • **Figure 3.6-1** illustrates the site layout. • **Figure 3.6-2** illustrates services and utilities. • **Figure 3.6-3** depicts construction laydown areas.
A high-quality, detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development	**Chapter 2.0 (Strategic context), Figure 2.6-1** provides a map of environmental constraints for the Project.
A strategic justification of the development focusing onsite selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land use, rural/residential development, Crown lands adjacent to the site, and neighbouring industrial and infrastructure developments)	**Chapter 2.0 (Strategic context)** provides a strategic justification of the Project in **Section 2.1** and discusses surrounding land uses in **Section 2.4.2**. The Land Use Conflict Risk Assessment (LUCRA) (**Appendix M**) further details the suitability of the proposed site with respect to potential land use conflicts.
An assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:	
A description of the existing environment likely to be affected by the development using sufficient baseline data	**Chapter 6.0 (Assessment of impacts)** includes an existing environment section for each issue described in **Section 6.2-6.15**.
An assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region in accordance with the *Cumulative Impact Assessment Guideline* (DPIE, Nov 2021)	**Chapter 6.0 (Assessment of impacts)** includes an assessment of potential impacts for each issue described in Section **6.2-6.15**.

Secretary's Environmental Assessment Requirements	Location addressed in EIS
A description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below)	**Chapter 6.0 (Assessment of impacts)** includes measures to mitigate potential impacts for each issue described in **Section 6.2-6.15**.
A description of the measures that would be implemented to monitor and report on the environmental performance of the development	**Chapter 6.0 (Assessment of impacts), Section 6.2-6.15** includes monitoring actions within the associated mitigation measures tables.
A consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS	A consolidated summary of all mitigation and monitoring measures is provided in **Appendix D (Mitigation measures).**
A detailed evaluation of the merits of the project as a whole having regard to:	
The requirements in Section 4.15 of the *Environmental Planning and Assessment Act 1979,* including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction, and ongoing operations of the development	**Chapter 7.0 (Justification of the Project), Section 7.4** describes how the principles of ecologically sustainable development have been incorporated into the Project.
The suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses	**Appendix M (Land Use Conflict Risk Assessment),** details the suitability of the Site with respect to potential land use conflicts.
Feasible alternatives to the development (and its key components), including consequences of not carrying out the development	**Chapter 2.0 (Strategic context)**, **Section 2.2** provides a description of the feasible alternatives considered.
A detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter	**Chapter 2.0 (Strategic context), Section 2.1** adequately details the capability of the Project to contribute to the security and reliability of the electricity market.
Provide a detailed calculation of the capital investment value (CIV) of the development, prepared by an AIQS Certified Quantity Surveyor or RICS Chartered Quantity Surveyor in accordance with *Planning Circular PS 21-020: Calculation of Capital Investment Value*. The calculation of the estimated CIV is to be accurate at the date of application and includes details of all components and assumptions from which it is derived	A Capital Investment Value (CIV) report has been prepared by a suitably qualified Quantity Survey in accordance with the SEARs. The CIV report would be provided to DPE as part of the State significant development application submission requirements. The CIV report has confirmed that the CIV for the project exceeds $30 million. On this basis, the Project is considered SSD, which is explained further in **Section 4.2.2**.
Provide an estimate of the retained and new jobs that would be created during the construction and operational phases of the development, including details of the methodology to determine the figures provided	**Chapter 3.0 (Project description)** provides an estimate of jobs retained and created. This is specified in **Section 3.3.6** and **Section 3.4.3.**
The development must be accompanied by:	
The consent of the owner/s of the land (as required in Section 23(1) of the EP&A Regulation)	Consent of the landowner of the Site has been provided to the Department of Planning and Environment separately by AGL.

Secretary's Environmental Assessment Requirements	Location addressed in EIS
A declaration from a Registered Environmental Assessment Practitioner that the EIS includes the information specified in the Department's *Registered Environmental Assessment Practitioner Guidelines*.	Provided in this EIS.
Biodiversity – including:	
An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW) (BC Act), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the BC Act, unless BCS and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values	**Chapter 6.0 (Assessment of impacts), Section 6.3** outlines and discusses biodiversity values. **Appendix H (BiodiversityDevelop-ment Assessment Report)** provides detailed informationon biod-iversity in the form of a specialist report.
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	**Section 6.4** includes an assessment of likely impacts to aquaticspecies and habitat.
If an offset is required, details of the measures proposed to address the offset obligation	**Section 6.3.4** details measures proposed to address the offset obligation.
Heritage – including:	
An assessment of the impact of Aboriginal cultural heritage items (cultural and archaeological) in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of archaeological test excavations (if required)	**Section 6.9** includes an Aboriginal cultural heritage impact assessment.
Evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)	**Section 6.9.2** includes a description of consultation with Aboriginal communities. **Appendix E (Aboriginal cultural heritage assessment report)** provides further details in the specialist report.
Assess the impact to historic heritage having regard to the NSW Heritage Manual	**Section 6.13** assesses the potential impacts to Non-Aboriginal Heritage.
Land – including:	
A detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, land contamination, permissibility, strategic context and existing site constraints	**Chapter 2.0 (Strategic context**) provides the strategic context, justification for the suitability of the Project (**Section 2.1**), and describes existing site constraints (**Figure 2.6-1)**, while **Chapter 6.0**

Secretary’s Environmental Assessment Requirements	Location addressed in EIS
	(Assessment of impacts) describes the potential environmental impacts, land contamination, and permissibility.
An assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:	
Flood-prone land, Crown lands, mining, quarries, mineral or petroleum rights; and	Potential impacts on existing land uses is captured in **Section 6.15** and **Section 6.5**. Potential conflicts to existing land uses are further outlined in **Appendix M (Land Use Conflict Risk Assessment)**.
A soil survey to determine the soil characteristics and consider the potential for salinity, acid sulfate soils and erosion to occur	**Section 6.5** describes soils and contamination for the Site.
A cumulative impact assessment of nearby developments	Cumulative impacts are described in **Section 6.17**.
An assessment of the compatibility of the development with existing land uses during construction, operation and after decommissioning, including:	
Consideration of the zoning provisions applying to the land, including subdivision (if required)	**Chapter 1.0 (Introduction)** provides a brief description of zoning provisions within the area. **Appendix M (Land Use Conflict Risk Assessment)** further considers and addresses zoning provisions.
Completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry’s Land Use Conflict Risk Assessment Guide.	A LUCRA has been provided in **Appendix M (Land Use Conflict Risk Assessment)**.
Visual - including	
A detailed assessment of the likely visual impacts of all components of the project (including transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas, road corridors in the public domain, and provide details of measures to mitigate and/or manage potential impacts	**Section 6.14** provides a visual impact assessment.
Noise – including:	
An assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria	**Section 6.7** provides an assessment of noise and vibration impacts.
Transport – including:	
An assessment of the peak and average traffic generation (including light, heavy and over-mass and over-dimensional vehicles/heavy vehicles requiring escort) and construction worker transportation	**Section 6.6** includes an assessment of traffic impacts, including trafficgeneration.

Secretary's Environmental Assessment Requirements	Location addressed in EIS
An assessment of the likely transport impacts to the site access route/s, including for over-dimensional vehicles/heavy vehicles requiring escort, site access point/s, any Crown land, and the M1 Motorway Extension to Raymond Terrace project, particularly in relation to the capacity and condition of the roads, road safety and intersection performance	**Section 6.6.4** describes the potential traffic impacts to the Site access routes.
A cumulative impact assessment of traffic from nearby developments	**Section 6.6.4** describes the potential traffic impacts. Cumulative impacts are further discussed in **Section 6.17**.
Provide details of measures to mitigate and/or manage potential impacts, including a schedule of all required road upgrades (including resulting from a 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	**Section 6.6.5** provides the mitigation measures for traffic impacts.
Water – including:	
A detailed and consolidated site water balance and an assessment of the likely impacts of the development (including flooding) on surrounding watercourses (including their Strahler Stream Order) and groundwater resources and measures proposed to monitor, reduce, and mitigate these impacts, including water management issues	**Section 6.4** provides an assessment of Surface Water, Groundwater &Hydrology. Measures to mitigate and monitor potential impacts are described in **Section 6.4.5**
Details of water requirements and supply arrangements for construction and operation	**Section 6.4.4** covers water requirements for construction and operation under potential impacts.
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 6.4.5** includes erosion and sediment controls. Erosion and sediment controls are also discussed in relation to soils and contamination in **Section 6.5**.
Assessing the impacts of the development, including any changes to flood risk and overland flows onsite or offsite, and detail design solutions and operational procedures to mitigate flood risk where required	Potential impacts are discussed in **Section 6.4.4.**
Where the project involves works within 40 m of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land (2018) and (if necessary) Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI 2003), and Policy & Guidelines for Fish Habitat Conservation & Management (DPE, 2013).	N/A
Hazards – including:	
A preliminary risk screening completed in accordance with the State Environmental Planning Policy (Resilience and Hazards) and Applying SEPP 33 (DoP, 2011)	**Section 6.2.1** includes a preliminary risk screening.
A Preliminary Hazard Analysis (PHA) prepared in accordance with Hazardous Industry	**Section 6.2.1** includes a preliminary hazard analysis.

Secretary's Environmental Assessment Requirements	Location addressed in EIS
Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to onsite and offsite receptors to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011);	
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.	**Section 6.2.3** assesses the potential hazards and risks. A detailed Preliminary Hazard Assessment is provided in **Appendix I (Bushfire risk assessment)**.
Social impact – including:	
An assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPIE, 2021) and consideration of construction workforce accommodation.	**Section 6.10** provides an assessment of the social impacts.
Economic – including:	
An assessment of the economic impacts or benefits of the project for the region and the State as a whole	**Section 6.10** provides an assessment of the economic impacts.
Waste – including:	
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 6.15** includes an assessment of the likely waste stream to be generated and their management.
Plans and documents	
The EIS must include all relevant plans, diagrams and relevant documentation required under Part 3 of the EP&A Regulation. Provide these as part of the EIS rather than as separate documents. In addition, the EIS must include high-quality files of maps and figures of the subject site and proposal.	All relevant plans, diagrams and relevant documentation are provided in **Appendix M (Land Use Conflict Risk Assessment).**

Secretary's Environmental Assessment Requirements	Location addressed in EIS
Legislation, policies and guidelines	
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.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines ; and http://www.environment.gov.au/epbc/publications#assessments	**Chapter 4.0 (Statutory context)** describes all relevant guidelines, policies, plans, and legislation.
Consultation	
During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development, relevant government agencies and Port Stephens Council.	**Chapter 5.0 (Engagement)** details engagement and consultation undertaken for the Project.
The EIS must:	
Detail how engagement undertaken was consistent with the Undertaking Engagement Guidelines for State Significant Projects (DPIE, 2021)	**Chapter 5.0 (Engagement)** provides information on how engagement undertaken was consistent with the Undertaking Engagement Guidelines for State Significant Projects
Describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided.	**Chapter 5.0 (Engagement)** describes the consultation process.
Expiry date	
If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.	N/A

Appendix B

Statutory Compliance Table

Appendix B Statutory Compliance Table

Table 7.5-1: Statutory compliance table

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
State legislation					
Environmental Planning and Assessment Act 1979 (EP&A Act) (NSW)	The EP&A Act is the principal legislation regulating development in NSW. It establishes a regime for the making of development applications, assessment of their environmental impacts, and the determination of those applications. It also allows for the making of environmental planning instruments (EPI) such as State Environmental Planning Policies (SEPP)and Local Environmental Planning Policies (LEP). Part 4, Division 4.7 of the EP&A Act provides for declaration, assessment, and approval of State Significant Development (SSD). The Project has been declared SSD in accordance with Section 4.36 of the EP&A Act and Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). The Minister for Planning or the Independent Planning Commission is the consent authority, and the Project is to be assessed in accordance with the provisions of Division 4.2 of the EP&A Act.	Required	Approval - development consent	This EIS	This EIS
Mine Subsidence Compensation Act 1961 (repealed by the *Coal Mine Subsidence Compensation Act 2017*) (CMSC Act)	The object of the CMSC Act is to provide for a fair, efficient, and sustainable compensation framework for dealing with the impacts of coal mine subsidence. It provides for the provision of compensation for damage caused by subsidence resulting from coal mine operations, and assessment and management of risks	Not required	-	**Section 6.2**	-

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
	associated with subsidence resulting from coal mine operations. Certain development within mine subsidence districts require approval. The Project is not located within a mine subsidence district. An approval under section 15 of the CMSC Act would not be required.				
Biodiversity Conservation Act 2016 (BC Act) (NSW)	The BC Act aims to maintain a healthy, productive, and resilient environment consistent with the principles of ecologically sustainable development. Importantly, it aims to conserve biodiversity in NSW. Part 4 of the BC Act provides for the listing of threatened species and threatened ecological communities. Part 6 of the BC Act provides for a biodiversity offsets scheme for biodiversity values. Part 7 of the BC Act provides for biodiversity assessment and approvals under the EP&A Act and includes a test to determine whether a proposed development will significantly affect threatened species or ecological communities. Section 7.9 of the BC Act states an application for SSD, under the EP&A Act is to be accompanied by a Biodiversity Development Assessment report (BDAR). Section 7.14 of the BC Act states the Minister, in making a determination in relation to a development application, must take into account the likely impact of the development on biodiversity values assessed in the BDAR, and may require biodiversity offsets through the Biodiversity Offsets Scheme.	Required	Approval – development consent	**Section 6.3**	**Appendix H**

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
Biosecurity Act 2015 (NSW)	The *Biosecurity Act 2015* provides the statutory framework to protect the NSW economy, environment, and community from the negative impact of pests, diseases, and weeds. The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter. In NSW, all plants are regulated through a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable. Any biosecurity matters encountered during the carrying out of the Project would need to be managed in accordance with this duty.	-	-	**Section 6.3**	**Appendix H**
Contaminated Land Management Act 1997 (CLM Act) (NSW)	The CLM Act establishes a process for investigating and (where appropriate) remediating land that the NSW EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3 of the Act. A search of the NSW EPA contaminated land database (undertaken on 21 August 2023) confirmed that the Project Area is not listed as a notified contaminated site under the CLM Act.	-	-	**Section 6.5**	-
Water Management Act 2000 (WM Act) (NSW)	The WM Act provides for the sustainable and integrated use and management of water resources in NSW. The WM Act controls the extraction of water, its use, and the carrying out of activities on or near water sources.	Not required for SSD	-	**Section 6.4**	**Appendix L**

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
	Part 3 of the WM Act outlines the approval requirements for water use (Section 89), management works approvals (Section 90), and activity approvals other than aquifer interference (Section 91). These approvals include two activity types, controlled activity approvals and aquifer interference approvals. A controlled activity approval allows the holder to carry out a specific controlled activity on waterfront land, defined as land within 40 m of a river, lake, estuary, or shoreline. The Project would not involve a water use or any water management works under the WM Act. No works are being carried out on waterfront land and, as such, a controlled activity approval is not required.				
National Parks and Wildlife Act 1974 (NPW Act) (NSW)	The NPW Act provides for the protection of Aboriginal objects and places in NSW. Section 86 of the Act states it is an offence to harm an Aboriginal object, defined as destroying, defacing, damaging or moving an object from the land. Section 87 states a defence to the harm or destruction of an Aboriginal object is the authorisation of an Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of NPW Act.	Not required for SSD	-	**Section 6.9**	**Appendix E**
Heritage Act 1977 (Heritage Act) (NSW)	The Heritage Act is concerned with all aspects of the conservation of heritage places and items, with items of state significance listed on the State Heritage Register. Part 4 of the Heritage Act states that approval must be obtained for works that have the potential to interfere with an item on the State Heritage Register or that is subject to an Interim Heritage Order.	Not required for SSD	-	**Section 6.13**	-
Fisheries Management Act 1994 (FM Act) (NSW)	The objectives of the FM Act are to conserve, develop and share the fisheries resources of NSW for the benefit of present and future generations. Part 7 of the FM Act outlines a number of permits required for works within	Not required for SSD	-	**Section 6.4**	**Appendix L**

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
	fisheries areas, including dredging or reclamation works (Section 201), marine vegetation in protected areas (Section 205) and fish passages (Section 219). No predicted habitat for threatened aquatic species is mapped on the DPI spatial data portal within 5 km of the subject land, nor considered to contain habitat that could support entities listed under the FM Act. However, the Hunter River is mapped as Key Fish Habitat (KFH). The Project has the potential to indirectly impact this KFH through adverse changes in water quality and quantity; however, management measures developed to mitigate the identified risks, as would be specified in the Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) mean the potential for the Project to impact upon KFH protected under the FM Act is considered low and not assessed further in this EIS or supporting BDAR.				
Rural Fires Act 1997 (RF Act) (NSW)	The objectives of the RF Act are to provide for the prevention, mitigation, and suppression of bush and other fires; for the co-ordination of bush firefighting and bush fire prevention; for the protection of persons from injury or death, and property from damage, arising from fires; and for the protection of infrastructure and environmental, economic, cultural, agricultural, and community assets from damage arising from fires. A bush fire safety authority must be obtained before developing in bush fire prone land under Section 100B of the RF Act.	Not required for SSD	-	**Section 6.8**	**Appendix I**

Legislation	Purpose/description	Approval required/not required	Requirement (approval/ licence/consent)	Where addressed/ considered in EIS	
				Section	Appendix
Commonwealth legislation					
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cth)	The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora and fauna, ecological communities, and heritage places defined as MNES. Approval from the Australian Government Minister for the Environment is required for: • An action which has, would have, or is likely to have a significant impact on MNES. • An action likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).	Not required – no significant impact on MNES (i.e., not a controlled action)	-	**Section 6.3**	**Appendix H**
Native Title Act 1993 (Native Title Act) (Cth)	The Native Title Act provides for the recognition and protection of native title across Australia.	Not required – no future act associated with the Project	-	**Section 6.9**	**Appendix E**

Appendix C

Engagement Table

Appendix C Engagement Table

Stakeholder	Method	Date	Feedback	Comments
NSW Department of Planning and Environment (DPE)	Phone meeting	9 December 2022	Positive	AGL provided DPE with an initial update on the Project and requested the opportunity for continued engagement throughout the preparation of the State significant development application. DPE welcomed the update and requested AGL engage regularly to keep them updated with submission timings.
	Online meeting	24 May 2023	Positive	AGL facilitated a discussion with DPE related to the SEARs and how to each matter was going to be addressed in EIS. DPE noted the approach regarding the specific SEAR requirements and advised that matters that required further exploration related to visual impacts, water balance and cumulative impacts with the M1 Extension Project.
	Email	14 July 2023	Neutral	AGL issued DPE an email seeking a meeting to discuss DPE's input into the preparation of the SEARs. A meeting was agreed for 24 July 2023.
	Phone message	17 July 2023	Neutral	AGL issued DPE a phone message responding to an email received from DPE to seek more detail regarding the meeting for 24 July.
	Online meeting	24 July 2023	Positive	AGL briefed the new DPE planning officer on the Project. AGL provided a description of the Project and environmental assessments completed to date. No issues were raised by the assessing officer, who was open to be consulted further during the final preparations of the EIS. It was agreed that a site visit would be arranged with the DPE team following EIS lodgement.
	Phone call	25 July 2023	Neutral	AGL supplied DPE with information related to the proposed water usage of the Project during construction and operation. DPE advised that no further meetings related to

Stakeholder	Method	Date	Feedback	Comments
				water usage was required at this stage of the Project.
	Email	25 July 2023	Neutral	AGL confirmed, via email, that the Project is unlikely to intercept aquifers during construction of the Project, is not located on the waterfront and would use reticulated water. No further issues were raised from DPE in response to this email.
	Online meeting	9 August 2023	Neutral	A discussion with DPE was conducted related on model proponent process and CIV reporting requirements. AGL would provide a preliminary CIV report to facilitate the Project Delivery Unit (PDU) process. No other matters were discussed or raised by DPE during this meeting.
Federal Department of Climate Change; Environment, Energy and Water (DCCEEW)	Emails	November 2022 to December 2022	Neutral	AGL issued DCCEEW correspondence via email to request whether the relevant assessing officer would like the opportunity to attend a site visit. DCCEEW confirmed they would appreciate a briefing and advised they had availability 25 January 2023. The details related to the site visit is discussed further below.
	Phone meeting	25 January 2023 6 April 2023	Neutral	AGL hosted a telephone discussion with to discuss the pending EPBC referral that was being prepared. DCCEEW welcomed the update and requested AGL continue to keep DCCEEW updated as the EPBC referral is finalised.
	Email	6 April 2023	-	AGL lodged the EPBC referral via the company portal and advised DCCEEW of the recent submission. No response was received from DCCEEW.
	Site visit	15 June 2023	Neutral	AGL hosted a project briefing and onsite. DCCEEW requested: A design guaranteeing there will be no adverse stormwater or surface water impact Confirmation from AGL on how many hollow baring trees are located within Project Area Confirmation of the

Stakeholder	Method	Date	Feedback	Comments
				transmission connection 'impact' footprint A check of current MNES as more species have been listed.
	Email	25 June 2023	Neutral	DCCEEW issued AGL an email, requesting additional information related to the EPBC referral.
	Email	29 June 2023	Neutral	DCCEEW issued a follow up notice to AGL related to the previous correspondence issued on 25 June 2023 – noting that an out of office was received from the AGL representative was on leave.
	Email	30 June 2023	Neutral	Further correspondence issued by DCCEEW to AGL to follow up on the RFI material issued on 25 June 2023 and ensure that the relevant matters were being addressed.
	Email	30 June 2023	Neutral	AGL provided DCCEEW a response to the RFI notice and follow up correspondence confirming that a response will be provided by the 14 July 2023
	Email	3 August 2023	Neutral	AGL provided DCCEEW with a response to the RFI that was issued on the 25 June 2023.
	Phone call	14 August 2023	Neutral	AGL called DCCEEW to request the preferred approach to seek confirmation of the referral and whether it was acceptable to be submitted through to gateway. DCCEEW advised the best approach was to issue a request to the validation team.
	Email	14 August 2023	Neutral	Following the advice provided by DCCEEW via phone (on the same day, detailed above), AGL emailed the validation team to confirm the referral application now meets the minimum requirement of the regulations and will be published as soon as practicable.
	Email	17 August 2023	Neutral	DCCEEW's validation team advised AGL that the referral application has been published.
NSW Rural Fire Service	Email	14 July 2023	Neutral	AGL issued NSW RFS an email seeking a meeting to discuss their input submission to the

Stakeholder	Method	Date	Feedback	Comments
				SEARs. This meeting was established for 1 August 2023.
	Email	20 July 2023	Positive	Email correspondence between AGL and RFS confirmed a meeting was to be held online to discuss the following matters: access, water, hazard separation and management as standard tools for risk mitigation.
	Phone call	25 July 2023	Positive	AGL contacted RFS, via phone, to schedule a meeting to discuss the progression of the Project and how the relevant SEARs requirements are being addressed. NSW RFS agreed to a meeting for 1 August 2023.
	Online presentation	1 August 2023	Positive	AGL hosted an online presentation to discuss the Project, its location and recommendations of draft Bushfire Risk Assessment. RFS will wait for the EIS to assess bushfire plans.
Fire & Rescue NSW (FRNSW)	Email	14 July 2023	Neutral	AGL emailed FRNSW to seek a meeting to discuss DPE's agency input submission related to the SEARs. A meeting date of 27 July was agreed.
	Email	14 July 2023	Neutral	AGL emailed FRNSW to confirm that the meeting application form was received to facilitate further engagement.
	Email	20 July 2023	Positive	AGL confirmed that the meeting application form was completed and submitted and requested a meeting to discuss the Project.
	Email	25 July 2023	Positive	AGL and FRNSW agreed to meet on 27 July 2023 to discuss the Project, specifically how the environmental assessment has been addressed and the relevant SEAR requirements.
	Online presentation	27 July 2023	Positive	AGL hosted a meeting and provided a presentation on the Project, its location and recommendations for assessing Bushfire Risk. FRNSW confirmed they will review the EIS to assess fire plans.

Stakeholder	Method	Date	Feedback	Comments
Transgrid	Formal connection enquiry, phone meetings and email	October 2022 and ongoing	Neutral	AGL made a formal Connection Enquiry with Transgrid. This is an ongoing matter.
Tomago Aluminium Company (TAC)	Phone meeting	25 January 2023	Neutral	AGL provided TAC with a project briefing. The TAC representative confirmed they would work with AGL regarding future transmission connection easements. AGL further emailed project briefing notes to TAC on 25 January 2023.
	Phone meeting	25 January 2023	Neutral	TAC responded to AGLs correspondence on the same day following receipt of the meeting minutes. Project briefing notes emailed 25 January 2023.
	Email	4 April 2023	Neutral	AGL issued a copy of the Scoping Report that formed part of the SEARs request to TAC for their records.
	In person	4 May 2023	Neutral	TAC agreed that AGL will prepare list of easement requirements. Following receipt of the easement requirements TAC would arrange a meeting for AGL to brief TAC CEO which was set for 15 June.
	In person	15 June 2023	Neutral	AGL attended TACs office on 15 June 2023 to discuss noise and air quality assessments that were being completed as part of the EIS. TAC agreed to review prior to EIS lodgement.
Biodiversity Conservation Division	Online presentation	26 July 2023	Neutral	AGL consulted with the Biodiversity Conservation Division (BCD) on 26 July 2023. This meeting was attended with support from AECOM and Biosis who are the specialist ecologists engaged to support the production of the Biodiversity Development Assessment Report (BDAR) for the project. The main matter raised by BCD during this meeting was the reliance on historical survey data, noting a few species were approaching the five-year currency period. In response to this matter, AGL

Stakeholder	Method	Date	Feedback	Comments
				further engaged Biosis to undertake additional field surveys, in accordance with the Biodiversity Assessment Method (BAM). BCD was supportive of this approach and the updated survey efforts were captured within the BDAR.
Transport for NSW	Email	31 January 2023	Neutral	AGL emailed TfNSW to request a date for briefing meeting. The purpose of this briefing was to update TfNSW on the Project and identify any potential cumulative impacts. A follow up meeting was set for 1 Feb 2023.
	Phone meeting	1 February 2023	Neutral	AGL organised a briefing meeting with TfNSW. TfNSW agreed to meet in future and for AGL to send slide deck and fact sheet. Furthermore, TfNSW advised they will send map showing secondary emergency access location.
	Email	4 April 2023	Neutral	AGL provided TfNSW with a copy of the Scoping Report that formed part of the request for SEARs for the Project. No response was required .
	Phone meeting	26 April 2023	Neutral	AGL provided TfNSW with a project update. During this discussion on AGL and TfNSW discussed working together during construction.
	Phone meeting	20 June 2023	Neutral	AGL provided TfNSW with a general project update and discussed how the project could, beneficially interact with the M1 extension project.
	Virtual meeting	21 July 2023	Neutral	A meeting was held between AGL and TfNSW to provide a project update and discuss the approach to TfNSW's approach to review the TIA. It was agreed that AGL would email the TIA to TfNSW for review.
	Email	10 August 2023	Neutral	Following on from the meeting held on 21 July 2023. AGL emailed TfNSW a copy of the TIA for their preliminary review
	Virtual meeting	17 August	Neutral	A meeting was held between

Stakeholder	Method	Date	Feedback	Comments
		2023		TfNSW and AGL to provide initial comments on the TIA. It was agreed that TfNSW would issue formal correspondence so that AGL could address the matters raised.
	Virtual meeting	14 September 2023	Neutral	A further meeting was held between TfNSW and AGL to provide additional project briefings and updated timing for submission of the SSDA.
	Virtual meeting	19 October 2023	Neutral	A meeting was held between TfNSW and AGL to discuss an the need of further intersection performance assessment for the Project. It was agreed that intersection analysis would be completed during the response to submissions phase of the SSD application assessment to accommodate the updated intersection design which is currently being finalised by TfNSW. TfNSW issued a confirmation of this approach on 27 October 2023.
Federal Member for Paterson, Meryl Swanson MP	Direct Message	7 February 2023	Nil	AGL contacted Ms Swanson regarding the intent to build a new battery in Tomago near AGL's existing NGSF.
NSW State Member for Port Stephens, Kate Washington MP	Direct Message	7 February 2023	Nil	AGL contacted Ms Washington regarding the intent to build a new battery in Tomago near AGL's existing NGSF. No further action required.
Port Stephens Council – Mayor and General Manager	Phone meeting	31 January 2023	Positive	AGL provided PSC a general update on the Project and the progression of the Scoping Report activities. PSC welcomed the update and requested AGL brief Koala Steering Committee (SteerCo) at May meeting and Councillors during EIS exhibition.
	Community Dialogue Group (CDG)	23 February 2023	Positive	CDG Meeting briefing on the project design, plans and timeline was well received and the response was positive.
Port Stephens	Phone	31 January	Neutral	Phone briefing and follow up

Stakeholder	Method	Date	Feedback	Comments
Council (PSC) - Commercial Investment Manager		2023		email sent. Confirmed PSC will reopen AGL easement requirements for the transmission line to determine if the matter needs to go to a Council meeting to be agreed.
	In Person	15 June 2023	Neutral	AGL attended a meeting with PSC to discuss the proposed easement across Old Punt Road. It was agreed the matter would be addressed.
	In person	15 June 2023	Neutral	AGL attending a meeting with PSC to discuss how the SEARs would be addressed in the EIS: Visual Impact Assessment approach was agreed. It was agreed to reference M1 Extension Project) landscaping plan in the EIS and that the proposed slip lane would act as a buffer between motorists and the Project infrastructure. Flooding - PSC requested AGL reference Council's DCP as a guidance document
Port Stephens Councillors	Phone	March 2023	Neutral	AGL with the assistance from PSC, requested that a briefing session be arranged as part of a general meeting following the lodgement of the EIS. A Project briefing will be arranged following EIS lodgement.
Worimi Local Aboriginal Land Council chair & CEO	Phone /email	3 February 2023	Neutral	AGL provided the LALC with a project briefing. It was agreed AGL will continue engagement regarding the project .
Hunter Water Corporation (HWC)	Phone call	20 December 2022	Neutral	HWC are happy for AGL to brief them at the CDG meeting in February 2023. HWC requested a copy of the Scoping Report when lodged. They Suggested that a firefighting tank of 45 kL would be required.
	Phone call	23 February 2023	Positive	CDG Meeting briefing – response was positive. It was agreed AGL will keep CDG up to date regarding the project
	Phone call	4 April 2023	Neutral	AGL provided HWC with a copy of the Scoping Report,

Stakeholder	Method	Date	Feedback	Comments
				which was requested during the phone call held on 20 December 2022. No response was required.
Newcastle Airport	Emails	27 January 2023	Positive	AGL spoke to Newcastle Airport staff who advised they received the briefing note, which was previously provided.
	CDG briefing	23 February 2023	Positive	CDG Meeting briefing on the project design, plans and timeline was well received and the response was positive.
Hunter Botanic Gardens	CDG briefing	23 February 2023	Positive	CDG Meeting briefing on the project design, plans and timeline was well received and the response was positive. They want to grow a stock of grevillea.
Department of Defence	Emails	27 January 2023	Neutral	AGL provided the Department of Defence a Project briefing update covering the design, plans and timeline. Defence was satisfied there is little effect on DoD operations.
CASA	Phone call	25 January 2023	Positive	CASA raised no concerns regarding the Project, particularly since plume rise would not be an issue for this Project. CASA suggested that AGL call CASA to discuss crane – only an issue if it is 150m high. AGL provided a response on 25 January 2023. Three days' notice will be given before erecting the crane.
Wahroonga Aboriginal Group (WAG)	CDG Meeting	23 February 2023	Nil	WAG did not attend the CDG. Minutes issued.
NSW Indigenous Chamber of Commerce (Maitland)	Phone/email	3 February 2023	Neutral	AGL provided the NSW Indigenous Chamber of Commerce a brief on the Project, designs, plans and timeline. Following this meeting AGL issued a summary email. Chamber is interested in business opportunities
Newcastle Wildlife Corporation	CDG Meeting	23 February 2023	Nil	NWC did not attend the CDG. Minutes were issued. There was no response.

Stakeholder	Method	Date	Feedback	Comments
Port Stephens Koalas	CDG Meeting	23 February 2023	Nil	PSK did not attend the CDG. Minutes were issued. There was no response.
Port Stephens Council – (Koala Steering committee)	Phone call	December 2022	Neutral	AGL contacted PSC Koala SteerCo to organise a meeting, which was to be held on 10 May 2023.
	In person	10 May 2023	Neutral	AGL provided a project briefing to the PSC Koala SteerCo. During this presentation the assessment approach was discussed is in line with guidelines. Council advised there were open to further consultation once EIS is lodged.
Hunter Business Chamber	In person	9 February 2023	Positive	AGL provided a project briefing to the Hunter Business Chamber covering designs, plans and timeline. Chamber is interested in the business opportunities.
Newcastle City Council - Mayor	Phone call and email requesting meeting	27 January 2023	Neutral	AGL introduced the Project to the office of Newcastle Council Mayor and offered a briefing session. Council responded on 30 January 2023.
	Email	30 January 2023	Neutral	Mayor's office responded requesting further detail on the Project before a meeting was arranged.
	Email	30 January 2023	Neutral	AGL supplied more detail including key features, benefits and indicative timeline. Council responded on 7 February 2023.
	Email	7 February 2023	Neutral	Council responded, offering options for a meeting time.
	Email	24 February 2023	Neutral	AGL determined a meeting time on 24 February at Council Chambers with Mayor and GM. AGL staff met with Mayor and GM and briefed them on the Project design, plans and timeline. Response was positive. Council was interested in local business opportunities. A follow up meeting was planned for August 2023.

Stakeholder	Method	Date	Feedback	Comments
	Email	21 August 2023	Neutral	AGL emailed a copy of the presentation to NCC. No response was received. Council cancelled meeting on August 28 due to Mayor's unavailability Briefing will follow EIS lodgement.
Maitland City Council - Mayor	Phone call	25 January 2023	Neutral	AGL introduced the Project to the Maitland Council Mayor and offered a briefing session. Briefing will follow EIS lodgement.
2HD (radio)	On air bulletin	5 April 2023	Positive	News stories communicating details of the Project, its location in Tomago estate and the timeline for consultation. No response was received.
	Online article	5 April 2023	Positive	2HD printed the project briefing material on 5 April 2023. It included the provision of the SEARs and further consultation in future.
Newcastle Herald	Phone call/media release	4 April 2023	Positive	AGL drafted a press release communicating details of Project to reporter. This information was subsequently received and formed the basis of a story that was published in the Newcastle Herald on 5 April 2023 (discussed below).
	Article	5 April 2023	Positive	Newcastle Herald printed the project briefing material on 5 April 2023, which included the provision of the SEARs.
AGLM Community Dialogue Group[11]:	Meeting	8 March 2023	Positive	AGL staff presented the proposed Project design, plans and timeline. Feedback was positive and appreciated at this early stage. CDG meets quarterly.
	Meeting	4 April 2023	Positive	AGL provided AGLM Community with a copy of the Scoping Report that formed part of the request for SEARs for the Project. CDG was grateful, no specific questions

[11] AGLM Community Dialogue Group: General Manager, Muswellbrook Shire Council Executive Manager Planning, Environment and Regulatory Services, Mayor, Singleton Council, Manager Strategy and Engagement, Singleton Council, Director Organisation and Community Capacity, Singleton Council, Mayor, Upper Hunter Shire Council, Director Environmental and Community Services, Upper Hunter Shire Council President, Muswellbrook Chamber of Commerce and Industry President, Singleton Business Chamber CEO, Wonnarua Nation Aboriginal Corporation CEO, Wanaruah Local Aboriginal Land Council Chair, Lake Liddell Recreation Area Trust Manager, Lake Liddell Recreation Area, Three individual Community Representatives

Stakeholder	Method	Date	Feedback	Comments
				arose from it.
	Meeting	1 June 2023	Positive	Project update provided giving more guidance on the timeline for further consultation and lodgement. Response was positive.
Neighbouring property owner: Oakfield Road Woodberry	In person	1 February 2023	Nil	Fact sheets delivered by hand. No response was received by the community member following receipt of the fact sheet.
Neighbouring property owner: Tomago Road Tomago	In person	1 February 2023	Nil	Fact sheets delivered by hand. No response was received by the community member following receipt of the fact sheet.
Neighbouring property owner: Tomago Rd, Tomago - Sweetwater Grove	In person	1 February 2023	Neutral	Fact sheets delivered by hand and project briefing to manager who did not see any issues given the distance of their property from the Project.
	Phone call	25 October 2023	Nil	AGL attempted to contact the manager of Sweetwater Grove by phone on Tuesday, 25 October 2023. The purpose of this call was to provide an update relating to the outcomes of the noise and vibration assessment, which identified a 2dB(A) exceedance.
	Phone call	26 October 2023	Positive	The manager at Sweetwater Grove responded to AGL on Thursday, 26 October 2023 stating that they acknowledged the potential noise exceedance of 2dB(A) and did not have any concerns. They advised AGL, that due to potential impacts of the M1 Extension Project, John Holland will instal double glazed doors and windows into many of the residences, which would reduce the possible noise impacts (including the contribution from the Tomago BESS project).

Stakeholder	Method	Date	Feedback	Comments
Neighbours: Kennington Road Industrial Estate – Numbers 1, 4, 3, 6, 8, 11, 12, 13, 15, 19, 21, 28, 30.	In person	1 February 2023	Nil	Fact sheets delivered by hand. No response was received by following delivery of the fact sheet.
Neighbour – Old Punt Road, Tomago	In person	1 February 2023	Nil	Fact sheets delivered by hand. No response was received by the community member following receipt of the fact sheet.
Local Business – OPR - Old Punt Road, Tomago	In person	1 February 2023	Positive	Fact sheets delivered by hand and project briefing to manager who was excited at potential future customers.
SGM Fabrication Drainage easement over Lot 54 DP 270494	Email post	1 February 2023	Nil	Project Briefing note emailed. Fact sheets delivered by hand. No response was received by the community member following receipt of the briefing note.

Appendix D

Compilation of Mitigation Measures

Appendix D Compilation of Mitigation Measures

ID	Mitigation and Management Measures	Timing
General		
G-1	AGL would prepare and implement a CEMP and subplans for the Project, which include the measures outlined in this table, relevant conditions of consent and the relevant requirements of other approvals.	Construction
G-2	AGL 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
G-3	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
Hazards and Risks		
HR-1	Relevant requirements in the Australian Standards will be applied for the Project, and requirements in relevant International Standards such as the US National Fire Protection Association Code NFPA855 (2023) will also be applied.	Pre-construction, Construction, Operation
HR-2	The BESS technology installed as part of the Project will be certified under an internationally recognised test method such as the Underwriters Limited UL 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems. Other means of demonstrating that a credible fire within a HR-3 battery enclosure will not propagate to other enclosures will also be considered when procuring the BESS technology. The BESS will be equipped with an internal alarm system to notify operators of equipment and technology faults. Operators will also be responsible for maintenance and regular monitoring of the BESS infrastructure and equipment.	Pre-construction, Construction, Operation
HR-3	An Emergency Response Plan will be developed for the construction and operational phases of the Project. Evacuation protocols for personal not involved in an emergency response and not wearing appropriate Personal Protective Equipment (PPE) will be provided in this plan. The plan will also include details regarding the possible release of gas and a pressure release from a battery enclosure during a fire and will include details on how to communicate these hazards to first responders.	Pre-construction, Construction, Operation
HR-4	A Fire Safety Study for the Project will be prepared in consultation with NSW RFS and DPE during detailed design. The measures, controls, and recommendations within the Fire Safety Study will be implemented prior to commissioning of the BESS.	Detailed design, construction, and operation

ID	Mitigation and Management Measures	Timing
HR-5	The detailed design of the BESS facility will consider the hazards associated with deflagration and will minimise this risk associated with this hazard to ALARP.	Pre-construction, Construction, Operation
HR-6	Measures to prevent leaks from the BESS and transformers, and for containing spills if they occur, will be identified in the detailed design phase and implemented during construction and operation of the Project as relevant.	Pre-construction, Construction, Operation
HR-7	The person-in-charge of the AGL gas pipeline will be consulted on the design of the transmission connection and will be provided relevant studies (including the alternating current (AC) induction study) relating to works in proximity to or crossing the pipeline in order to provide comment and safeguard the integrity of the pipeline.	Pre-construction, Construction, Operation
HR-8	Materials or substances that could potentially pollute the Tomago Sandbeds aquifer or impact on the NGSF will not be stored at the temporary construction laydown area at the NGSF. Fuels, lubricants, oils, corrosive liquids, battery enclosures or lithium-ion battery modules will not be stored at the NGSF construction laydown area.	Pre-construction, Construction
HR-9	The person-in-charge of the AGL gas pipeline will be consulted to confirm weight restrictions for vehicles and plant crossing the buried pipeline. Vehicles or plant that exceed the weight limit would only be able to cross the pipeline if appropriate controls to protect the pipeline have been agreed person-in-charge of the AGL gas pipeline.	Pre-construction, Construction, Operation
HR-10	Security, access and egress to/from the temporary construction laydown area at the NGSF will be determined during detailed design once the need for the location and the types of materials to be stored there has been confirmed.	Pre-construction, Construction
HR-11	The asset protection zone (APZ) established at the NGSF will be reviewed once the need for the temporary construction laydown area and the types of materials to be stored there has been confirmed.	Pre-construction, Construction
Biodiversity		
BD-1	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,	Pre-construction and construction.

ID	Mitigation and Management Measures	Timing
	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.	
BD-2	• A Biosecurity Management Plan prepared as part of the Project's CEMP/OEMP is recommended and will prevent the spread of weeds and pathogens, and other biosecurity items into or out of the impact area upon implementation.	Pre-construction and construction.
BD-3	• All material stockpiles, vehicle parking and machinery storage, and other ancillary works are to be located within areas considered impacted within the current assessment and not be located within retained vegetation outside the impact area unless an updated impact assessment is undertaken.	Construction
BD-4	Establishment of construction fencing to minimise the risk of fauna entering the construction zones • Restriction of all construction traffic and machinery to 30 km/h and erection of signage informing personnel of this restriction.	Pre-construction, construction and post-construction.
Surface Water and Groundwater		
W-1	A SWMP would be prepared as part of the Construction Environmental Management Plan (CEMP). It would include a framework for the management of soils and water during construction of the Project. The construction phase SWMP would include: • Surface water management strategy for containing and safely conveying surface water runoff around construction works • Erosion and Sediment Control Plan/s • Dewatering Procedure (detailed below) • Spill Response Procedure (detailed below) • Surface water discharge monitoring requirements • Surface water control monitoring requirements	Pre-construction, Construction
W-2	Construction phase monitoring would occur at stormwater control measures to help satisfy regulatory requirements and identify if water quality issues are occurring as the result of construction works. Monitoring would occur upstream and downstream of the construction works. Monitoring would occur monthly and as soon as practical following rainfall events. As a minimum the following locations would be monitored during construction: • Northern ephemeral drainage line and southern industrial precinct channel, as designated 'background areas' • Sediment basins • Discharge points from the Site.	Pre-construction, Construction

ID	Mitigation and Management Measures	Timing
	The following parameters would be monitored: • pH • Total suspended solids (TSS) • Turbidity (NTU) • Electrical conductivity (EC) • Dissolved oxygen (DO) • Oils and grease (visual assessment).	
W-3	The SWMP and ESCP will be developed in accordance with the Blue Book (Landcom, 2004). Measures to be included in these plans will include: • Designated vehicle access tracks to reduce the risk of soil disturbance onsite and vibration grids to prevent the transportation of sediments offsite • Minimising the area of exposed and unstable ground surfaces by resealing or revegetating surfaces as soon as practicable • Clean water diversion drains to direct external, ‘clean’ surface water around the Site and prevent it from mixing with ‘dirty’ surface water runoff generated by the construction site • Early installation of necessary permanent drainage culverts, under access roads or wherever drainage paths are obstructed to prevent localised ponding/flooding across the site • Locating stockpiles and other loose materials at localised high points, away from drainage paths, and protecting these stockpiles from rainfall with geofabric or other equivalent measures • Installation of sediment fences, sediment traps, and contour berms to slow down flow rates and capture and contain mobilised sediments and gross pollutants carried by Site runoff • Scour protection and energy dissipaters along steep channels and at discharge points • Sediment basins near both northern and southern discharge points to store, test and manage surface water from disturbed areas onsite • Reuse of water stored within sedimentation basins for dust suppression and irrigation purposes.	Pre-construction, Construction
W-4	A Dewatering Procedure would be developed to control the process for removing water from excavations, storing this water, testing water (where applicable) and either releasing water into the environment or removing it from Site. The procedure will outline the testing methods, treatment options and water quality requirements to discharge the water into the receiving environment.	Construction
W-5	An Emergency Response Plan (ERP) would be prepared for the Project. The ERP would include procedures for the protection of personnel and infrastructure during extreme flood events, up to the PMF event. This plan will include: • Roles, responsibilities and communication procedures including emergency contacts, monitoring procedures for predicted rainfall and flood warnings	Construction, Operation

<table>
<tr><th>ID</th><th>Mitigation and Management Measures</th><th>Timing</th></tr>
<tr><td></td><td>Requirements to monitor weather forecasts and flood warnings to enable flood preparedness procedures to be implemented ahead of potential flooding events
Site shutdown and flood preparedness procedures, to minimise harm to persons, plant and the environment. This would include:
Actions in the lead up to a potential flood
Actions at the time of a flood
Actions post-flood
Safe evacuation routes and procedures
Rescue procedures
Procedure for resuming operations
Reporting requirements and corrective actions.</td><td></td></tr>
<tr><td>W-6</td><td>The SWMPs for construction and operations will include a Spill Response Procedure to help avoid and manage spills of potentially hazardous substances during construction and operation. Separate procedures would be prepared for both construction and operational phases. Both procedures will include:
Training and required personal protective equipment (PPE) requirements
Measures for handling and storing chemicals and fuels
Details of a program of regular inspections for spills, leaks or damages to bunds/sumps
Spill response protocols
Reporting procedures
Spill kits will be kept at the Site during construction and operation and close to worksites during the transmission connection installation.</td><td>Construction, Operation</td></tr>
<tr><td>W-7</td><td>The Site would include dedicated re-fuelling areas with bunded fuel and liquid storage areas to minimise the risk of potential losses of containment.</td><td>Construction</td></tr>
<tr><td>W-8</td><td>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).

If the storage of liquids requires bunding, these bunded areas would have sufficient capacity, to be able to contain 110% of the volume of the liquid stored within the bund.

Inspection and if required maintenance would be undertaken after significant rainfall events.

Licenced contractors would be engaged to collect, transport and dispose of liquid hazardous materials, waste solvents, paints and hydrocarbon products to an appropriate offsite facility in accordance with relevant EPA guidelines.</td><td>Construction</td></tr>
</table>

ID	Mitigation and Management Measures	Timing
W-9	Lined concrete washout areas would be established away from drainage paths and waterbodies. The washout capacity would be regularly checked before being used. The wash water would be left to evaporate, with dried concrete removed for recycling as required. Inspection of the capacity of the washout area and integrity of the liner would be undertaken prior to each use, and prior to rainfall events or site shut down. Wash water will be pumped out as required to maintain capacity or prior to rain events and disposed offsite as contaminated water.	Construction
W-10	If encountered, groundwater would be managed in accordance with groundwater provisions in the SWMP. These provisions would align with the Dewatering Procedure. Information and measures relating to groundwater within the SWMP will include: • Background groundwater quality and levels • Management of groundwater interference and dewatering • Groundwater discharge or reinjection criteria • Groundwater monitoring program during construction • Reporting requirements • Protocol for the investigation, notification and mitigation of identified exceedances of the groundwater quality criteria.	Construction, Operation
W-11	Any water encountered and abstracted from the Tomago Sandbeds aquifer during the transmission connection construction works would be managed in line with statutory and environmental requirements.	Construction
W-12	Sealed pavement areas should be used for refuelling and chemical storage areas to minimise the risk of spills infiltrating to groundwater.	Construction
W-13	If under-boring or Horizontal Directional Drilling (HDD) is required for the transmission connections, a Drilling Fluid Management Plan would be produced as part of the SWMP, to guide the environmental management of the HDD work. The drilling would be undertaken by an appropriately trained and experienced person. Should 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 minimise 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.	Construction
W-14	The transformers at the Site would be designed in line with the appropriate Australian Standards for power transformers and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Operation
W-15	A Surface Water Management Plan would be prepared as part of the Operational Environmental Management Plan	Operation

ID	Mitigation and Management Measures	Timing
	(OEMP). It will include details on the required surface water management measures and monitoring requirements needed to manage surface water runoff within the Site and control the quality and quantity of surface water discharge into receiving environments. The plan would detail the final stormwater management approach and treatment train for the Project including the internal drainage system, bioretention system, interceptors, gross pollutant traps, scour protection and outlet control measures. The plan would include the water quality monitoring procedures to ensure the above measures can achieve the required level of treatment. The operational SWMP would also include appropriate methods for the disposal of contaminated waters at a licensed facility. Runoff generated during maintenance/cleaning activities, along with any oily or contaminated water, would be trucked offsite and disposed of at an appropriate liquid waste facility.	
Soils and Contamination		
SC-1	Either one or more Erosion and Sediment Control Plans (ESCP) will be prepared as part of the WSMP developed in accordance with the 'Blue Book' Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). ESCPs will detail specific controls that will be employed to help ensure that erosion is minimised. This includes, but is not limited to: 1. Exposed soils and stockpile management measures 2. 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 (if required)	Pre-construction, Construction
SC-2	Further ground investigations will be undertaken to determine the presence and, if present, depth of ASS at the Site. These investigation would be used to inform the detailed design.	Pre-construction
SC-3	Where soil or ground is to be left exposed for more than three 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
SC-4	Bare ground and exposed soils across the Site would be rehabilitated and returned to its pre-development condition as far as practicable and/or would be landscaped.	Pre-construction, Construction
SC-5	The following measures would be included as part of the WSMP to mitigate potential impacts to soil and surface water: 1. Impermeable barriers would be placed between the source/s of contamination (e.g. contaminated soil stockpiles or certain construction materials) and the natural ground 2. 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).	Pre-construction, Construction, Operation
SC-6	Heavy machinery and site vehicles will be assigned allocated tracks and temporary roads for access around the Site and construction areas to minimise ground disturbance and soil erosion.	Construction

ID	Mitigation and Management Measures	Timing
SC-7	An Acid Sulfate Soil Management Plan (ASSMP) will be a subplan to the CEMP and implemented for the construction of the Project. The ASSMP will include an evaluation of the ASS risk, clearly defined and site-specific management actions including the handling of PASS, and monitoring and reporting procedures (e.g., recording pH levels).	Construction
SC-8	An unexpected finds protocol for contaminated material will be established as part of the WSMP and include: 1. Delegation of responsibilities 2. Identification and handling procedures – General procedures for recognising and handling unexpected contaminated soils or materials 3. Reporting and notification – internal and external reporting and regulatory obligations 4. Mitigation measures – stop work procedure, containment and isolation, and consultation 5. Remediation and disposal – procedures for containing, disposing, and documenting the disposal of the contaminated material.	Construction , Operation
SC-9	Diesel 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
SC-10	Transformers would be designed in line with the relevant Australian Standards for power transformers and located within impermeable bunds which are designed to contain 110% of the volume of the oil in the transformer.	Pre-construction, Construction, Operation
Traffic and Transport		
T-1	Consultation would be carried out between Port Stephens Council, TfNSW, emergency services and other relevant authorities to minimise transport impacts during construction and secure additional approvals (e.g. for OSOM movements or as required under the Roads Act 1993 (NSW)).	Construction
T-2	Community consultation would be carried out and notifications would be issued in advance for proposed road, bus or pedestrian network changes through appropriate channels and forms of communication.	Construction, Operation
T-3	A Construction Traffic Management Plan (CTMP) would be prepared and include the following measures: • Vehicle access to and from the Project Area would be managed to minimise safety risk to pedestrians, cyclists and motorists. To minimise traffic impacts on the surrounding network, heavy vehicles would enter and exit the Project Area in a forward direction and outside of peak periods, where this is feasible. • Near the proposed site access, appropriate signage, line marking and/or traffic control measures would be used to direct and guide pedestrians, cyclists and motorists past the Project Area during oversized delivery and high usage times. • Workers would be encouraged to utilise the shuttle buses if deemed to be required as part of the Project or carpool • The proposed Site access would be designed to ensure construction vehicles (including, OSOM, heavy and light	Construction

ID	Mitigation and Management Measures	Timing
	vehicles) can safely enter the Site. • Heavy vehicle drivers associated with the construction work would be directed to access the site via the signal-controlled intersection of Old Punt Road and the Pacific Highway. Potential provision of a channelised right turn treatment at the intersection of Old Punt Road with the site access, subject to further evaluation in later design stage.	
Noise and Vibration		
NV-1	A Construction Noise and Vibration Management Plan would be prepared as part of the Construction Environmental Management Plan. The CNVMP would identify: • 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, Construction
NV-2	All sensitive receivers likely to be affected by noise during construction would be notified at least five days prior to commencement of works associated with the scenario that may have an adverse noise or vibration impact. The notification would include details of: • The Project • Construction period and construction hours • Contact information for proposal management staff • Complaint and incident reporting and how to obtain further information.	Construction

ID	Mitigation and Management Measures	Timing
NV-3	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant proposal specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.	Construction
NV-4	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Works generating high noise and/or vibration levels where feasible would be scheduled during less sensitive time periods.	Construction
N-1	The following would be implemented for deliveries to and from the Site: • Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers • Dedicated loading/unloading areas are to be shielded if close to sensitive receivers • Delivery vehicles are to be fitted with straps rather than chains for unloading, wherever possible • Construction site would be arranged to minimise the need for reversing associated with regular/repeatable movements.	Construction
N-2	Non-tonal reversing beepers (or an equivalent mechanism), where feasible and reasonable, must be fitted and used on all construction vehicles and mobile plant regularly used onsite and for any out of hours work.	Construction
N-3	In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures may be required. These measures include the following: • Monitoring • Notification (letterbox drop or equivalent) • Specific notifications • Phone calls • Individual briefings • Respite offers • Respite periods • Duration respite • Alternative temporary accommodation.	Construction

<table>
<tr><th>ID</th><th>Mitigation and Management Measures</th><th>Timing</th></tr>
<tr><td colspan="3">Bushfire</td></tr>
<tr><td>BF-1, BF-8</td><td>At the commencement of construction works the entire Site would be managed as an APZ (IPA) as outlined within Appendix 4 of PBP 2019 and the NSW RFS's document 'Standards for asset protection zones'.
The APZ would be managed in perpetuity.
APZ requirements are:

Trees
Tree canopy cover should be less than 15% at maturity
Trees at maturity should not touch or overhang the building
Lower limbs should be removed up to a height of 2 m above the ground
Tree canopies should be separated by 2-5 m
Preference should be given to smooth barked and evergreen trees
Shrubs
Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided
Shrubs should not be located under trees
Shrubs should not form more than 10% ground cover
Clumps of shrubs should be separated from exposed windows
Doors by a distance of at least twice the height of the vegetation
Grass
Grass should be kept low (as a guide grass should be kept to no more than 100 mm in height)
Leaves and vegetation debris should be removed
The location of maintenance works to be conducted for trees, shrubs, and grass are as shown in Figure 6.8-3</td><td>Design, Pre-construction, Operation</td></tr>
<tr><td>BF-2</td><td>Vulnerable buildings and/or critical assets would be designed and constructed in accordance with Section 9.2 of the BTA report. This would be refined during detailed design.</td><td>Design, Pre-construction</td></tr>
<tr><td>BF-3</td><td>The following mitigation measures regarding water are provided:
A minimum static water supply of 20,000 litres should be provided at the Site for firefighting
A 65-mm 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 mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is to be supplied within 4 m of the access hole
All associated above ground fittings to the tank shall be non-combustible</td><td>Design, Pre-construction</td></tr>
</table>

ID	Mitigation and Management Measures	Timing
	• Firefighting equipment will be maintained at and/or accessible to all active construction site during the declared bushfire danger season, and site personnel trained in its use. Equipment should be appropriate to the activities being conducted and the fire danger at the time of works, but as a minimum must include: - 4WD Striker with slip-on water unit, equipped with diesel pump and hoses - Extinguishers - Knap sacks Hand tools (e.g., fire rakes).	
BF-4, BF-9	• A comprehensive Bushfire Emergency Management and Evacuation Plan would be completed for the construction and operational phase of the Project (see Section 24 of the BRA). The bushfire evacuation procedures would be completed in accordance with NSW Rural Fire Service Guide to Developing a Bushfire Emergency Management Plan.	Design, Pre-construction, Operations
BF-5	Provide and maintain access for Category 1 fire appliances: • The trafficable surface leading to the fence will have width of 4 m except for short constrictions to 3.5 m for no more than 30 m in length where an obstruction cannot be reasonably avoided or removed • Curves have a minimum inner radius of 6 m. The minimum distance between inner and outer curves is 6 m. • Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes • The maximum grade of a trail is not more than 15 degrees • The crossfall of the trail surface is not more than 6 degrees • A minimum vertical clearance of 4 m is provided above the surface of the trafficable surface clear of obstructions • Capacity for passing is provided every 250 m comprising a widened trafficable surface of at least 6 m for a length of at least 20 m • A 6-m wide and 8-m-long area clear of the trafficable surface with a minimum inner curve radius of 6 m and minimum outer radius of 12 m Applicable location for this environmental safeguard includes around the perimeter of the Site and to and from the Site.	Design, Pre-construction
BF-6	• 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) • Essential work during operations may be completed on a TOBAN providing it complies with the Hot Work and Fire Risk Work procedure exemption from the NSW RFS	Construction

ID	Mitigation and Management Measures	Timing
BF-7	It is recommended that non-essential works be postponed on days with Fire Danger Rating (FDR) of Extreme and Catastrophic.	Construction
Aboriginal Heritage		
AH-1	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.	Design
AH-2	An archaeological salvage program incorporating surface collection of all Aboriginal objects/sites to be impacted by the Project, including Aboriginal objects associated with open artefact scatter sites 38-4-1837, 38-4-2020, 38-4-2021, 38-4-2022, 38-4-1751 and 38-4-2038. A program of open area salvage excavation, as detailed in Appendix G of the ACHAR, should be completed for sites 38-4-1751 and 38-4-2038.	Pre-construction
AH-3	All Aboriginal sites not impacted by the Project but close to the Project Area should be conserved *in-situ.* All relevant staff and contractors are to be made aware of the nature and locations of all sites as well as legal obligations with respect to them. Protected sites would need to be identified on all relevant site plans. Details for the care of protected sites should be outlined in the Project's ACHMP.	Pre-construction
AH-4	An Unexpected Aboriginal Heritage Finds Procedure (UAHFP) should be included in the ACHMP to cover the unanticipated discovery, at any point outside of the salvage program, of any actual or potential Aboriginal heritage item for which there is not an existing management process in place. The procedure should cover all Aboriginal objects (as defined by the NPW Act), including human skeletal remains. Management action/s for unexpected finds will vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts.	Construction
AH-5	Provisions for 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
AH-6	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
Socio-economic		
SI-1	Construction workers for the Project will be employed from the local area, where possible, to reduce the need for workers to relocate to the area for the duration of construction, and to contribute to local employment opportunities.	Construction

ID	Mitigation and Management Measures	Timing
SI-2	Stakeholder engagement activities carried out during construction will be accessible to a range of groups in the community. This will include, at a minimum, a range of engagement methods (including options for physical copies of engagement materials) and opportunities for translated materials, upon request.	Construction
SI-3	Coordination and engagement with other projects would occur before and throughout construction to manage consultation and construction fatigue where possible.	Pre-construction, Construction
SI-4	Application of the principles of Crime Prevention Through Environmental Design (CPTED) at the construction site.	Construction
Air Quality		
AQ-1	The CEMP would include measures to manage air quality, including dust and fuel emissions. These would include: • Weather conditions being considered at the start of each day of work and strategies would be implemented to reduce dust generation • Designated access roads and main entry and exit points to the Site would be defined to minimise tracking of soil on surrounding roads • Heavy vehicles entering and leaving the Site would be covered to prevent material from escaping during transport, where there is a risk of this occurring • A record of maintenance and service logs of machinery and vehicles (excluding workforce vehicles) used onsite to be kept, to help confirm vehicles and machinery are operating efficiently • Instructions to turn off vehicles while idled, when practicable and safe to do so • Stop works procedure in the event dust levels impact public amenity or become hazardous	Construction
AQ-2	Opportunities to reduce impacts on air quality would be investigated and included in the Project Risk and Opportunity Register. Opportunities that may be investigated to reduce fuel emissions during construction include: • Use of hybrid vehicles • Use of green fleet vehicles or newer model vehicles with high fuel efficiency • Use of diesel particulate filters on vehicles and/or machinery	Construction
Non-Aboriginal Heritage		
NAH-1	If any heritage objects and/or relics are uncovered during the construction of the Project, the following steps would be followed: • All activity in the immediate area would cease immediately • The project manager would be notified • Flagging or fencing would be erected to demarcate and protect the area • Site personnel and visitors would be advised to avoid the area until further notice • An appropriately qualified heritage professional would be consulted to confirm if the object/s is a heritage item or relic. Depending on the advice received from the appropriately qualified heritage profession, further consultation with RAPs	Construction

ID	Mitigation and Management Measures	Timing
	may be required, where relevant. • NSW Environment and Heritage (OEH) would be contacted An appropriately qualified heritage professional would record the location and attributes of the site and determine the significance of the find.	
NAH-2	In the event of the discovery of human skeletal material (or suspected human skeletal material) during project activities in the Project Area, the following steps would be followed: • All activities and/or works in the immediate area would cease as soon as practicable • The NSW Police would be immediately contacted along with the project manager and OEH • Flagging or fencing would be erected to demarcate and protect the area • Site personnel and visitors would be advised to avoid the area until further notice • Any sand or soils removed from the near vicinity of the find would be identified and set aside for assessment by the investigating authorities.	Construction
Visual Amenity		
V-1	During detailed design of the Project, a review of materials and colour finishes for visible built components of the Project would be completed to further reduce potential visual impacts, where practicable.	Detailed design
V-2	Retention and enhancement of existing landscape features (areas of scrub, individual trees) would be considered where feasible.	Detailed design
V-3	Lighting of the Site would be designed in accordance with AS 4282:2019 Control of the obtrusive effects of outdoor lighting.	Detailed design
V-4	Where possible, the use of reflective surfaces will be minimised to avoid drawing attention to the Site within views due to reflective glare.	Detailed design
Waste Management		
W-1	A Waste Management Sub-Plan would be prepared as part of the Construction Environmental Management Plan and would: • Identify requirements consistent with the waste hierarchy and circular economy initiatives • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Provide a framework to target resource efficiency through the design and construction phases • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Set out processes for disposal, including onsite transfer, management, and the necessary associated approvals/permits • Describe the process for regularly removing waste from the Project Area to avoid issues associated with odour, visual amenity, and the attraction of animal/pest species	Construction

ID	Mitigation and Management Measures	Timing
	• 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.	
W-2	All waste would be assessed, classified, managed, and disposed of in accordance with the Waste Classification Guidelines and other relevant legislation (NSW EPA, 2014).	Construction, Operation, Decommissioning and Rehabilitation

Appendix E

Aboriginal Cultural Heritage Assessment Report

Appendix E Aboriginal Cultural Heritage Assessment Report

Appendix F

Traffic Impact Assessment

Appendix F Traffic Impact Assessment

Appendix G

Social Impact Assessment

Appendix G Social Impact Assessment

Appendix H

Biodiversity Development Assessment Report

Appendix H Biodiversity Development Assessment Report

Appendix I

Bushfire Threat Assessment

Appendix I Bushfire Threat Assessment

Appendix J

Preliminary Hazard Analysis

Appendix J Preliminary Hazard Analysis

Appendix K

Noise Assessment

Appendix K Noise Assessment

Appendix L

Hydrology Assessment

Appendix L Hydrology Assessment

Appendix M

Land Use Conflict Risk Assessment

Appendix M Land Use Conflict Risk Assessment