# Eraring Battery Energy Storage System

## Traffic and Transport Assessment

IS365800_TIA | 03

13 October 2021

Origin Energy Eraring Pty Limited

SSD-15950052 EIS Appendix K

# Eraring Battery Energy Storage System

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## Document history and status

| Revision | Date | Description | Author | Reviewed | Approved |
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| 01 | 19/07/2021 | Draft Traffic and Transport Assessment | A Alcock | M Mansour | T Muddle |
| 02 | 30/07/2021 | Final Draft Traffic and Transport Assessment | A Alcock | M Mansour | T Muddle |
| 03 | 13/10/2021 | Final Traffic and Transport Assessment | A Alcock | M Mansour | T Muddle |

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# 1. Introduction

## 1.1 Project background

Origin Energy Eraring Pty Limited (Origin) owns and operates the Eraring Power Station (EPS) which is one of Australia's largest power stations, having a capacity of 2,880 megawatts (MW). EPS is scheduled to be among 14 gigawatts (GW) of coal-fired generation plants to be retired within the next few decades (AEMO, 2020). The retirement of the EPS will support Origin's carbon emission reduction goals. As such, Origin is now progressing an application to provide energy storage and key network services that would facilitate long term emissions reduction in the National Electricity Market (NEM) while supporting the delivery of secure and reliable electricity for consumers and businesses.

Origin is seeking regulatory and environmental planning approval for the construction and operation of a grid-scale Battery Energy Storage System (BESS) with a discharge capacity of 700 MW and storage capacity of 2,800 megawatt hours (MWh) on existing Origin landholding associated with the EPS (the Project).

The Project is a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) and subject to Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, the Project requires the preparation of an EIS in accordance with Secretary's Environmental Assessment Requirements (SEARs) and the approval of the Independent Planning Commission under circumstances described in SRD SEPP or the NSW Minister for Planning and Public Spaces.

## 1.2 Purpose of this report

This traffic and transport assessment has been prepared in accordance with the SEARs issued for the Project on 19 April 2021 by the Planning Secretary of the NSW Department of Planning, Industry and Environment (DPIE).

The SEARs relevant to this traffic and transport assessment are presented in Table 1-1.

Table 1-1: SEARs – Traffic and transport

| SEARs | Section addressed |
|---|---|
| An assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation. | Section 5.2<br>Section 5.3<br>Section 5.10 |
| An assessment of the likely transport impacts to the site access route (including, but not limited to the M1 Pacific Motorway, A43 New England Highway, Wangi Road and Rocky Point Road), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance. | Section 5 |
| A cumulative impact assessment of traffic from nearby developments. | Section 5.4 |
| Details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority. | Section 6 |

## 1.3 Project location

The Project will be situated on land zoned SP2 Infrastructure for electricity generating purposes and within an area previously disturbed by power station activities. No re-zonings or land acquisitions are required. The Project is located within, Lots 10 and 11 DP 1050120, Rocky Point Road Eraring, within the Lake Macquarie City Council (LMCC) LGA, as illustrated in Figure 1-1.

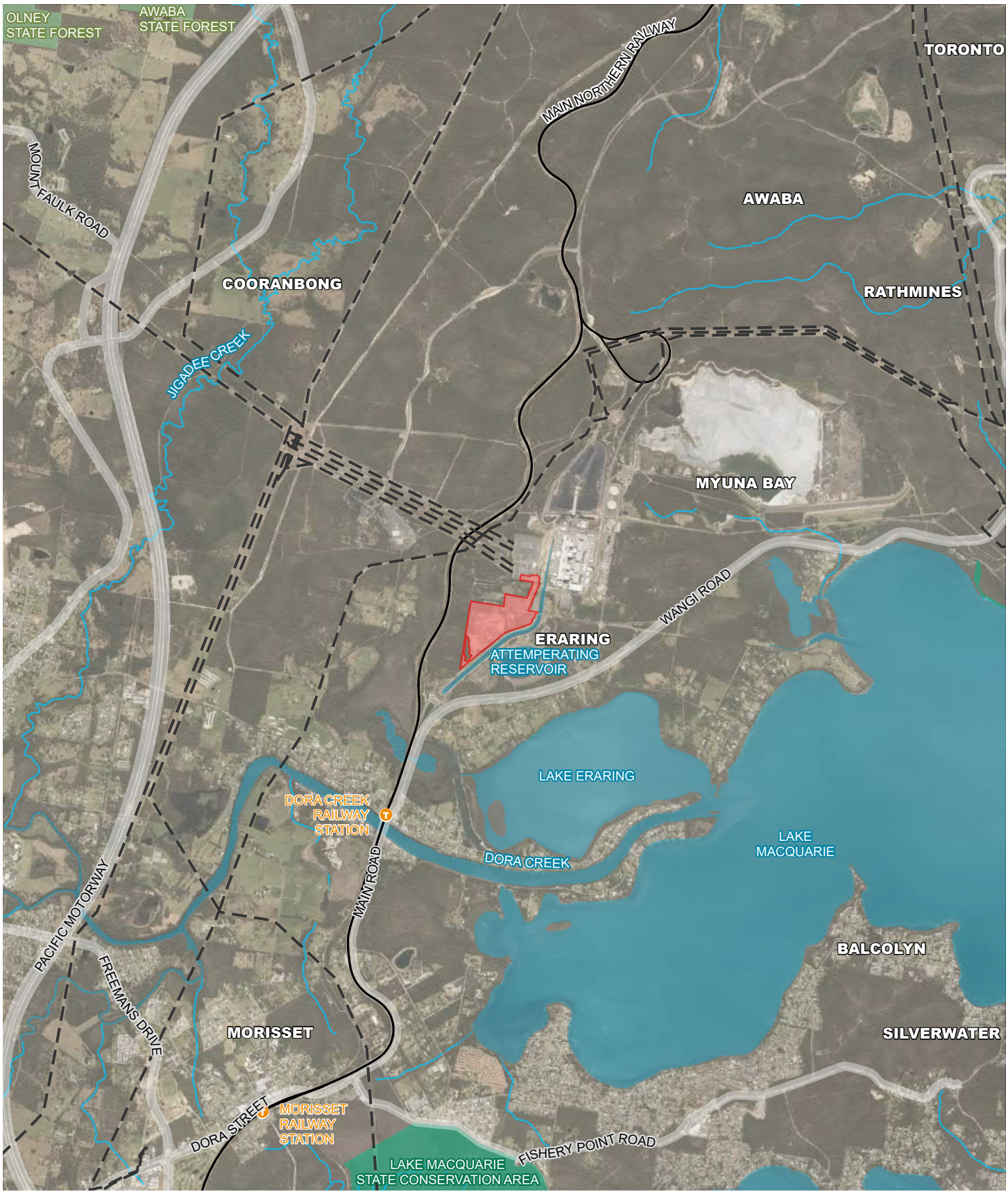



**Figure 1-1** Project location

Surrounding land external to the EPS consists of broadacre rural development and low-density residential properties. The largest commercial centre and population centre nearby is Charlestown (29.1 kilometres (km) north east), and the closest residential suburb is Dora Creek (1.2 km south). The Great Northern Railway alignment runs along the border of Dora Creek and Eraring suburbs, approximately 200 metres (m) west of the Project area.

The Project area is surrounded by the following features with the Origin landholding:

- EPS operations area, elevated TransGrid switchyard, coal yards and extensive EPS buffer lands to the north;
- Elevated attemperation reservoir to the east;
- Elevated EPS inlet canal to the south and east; and
- Mature vegetation within E2 environmental protection zoned land along a ridge line to the west.

The nearest private receptors to the Project area are located as follows:

- Rural residential dwellings approximately 600 m to the west on Gradwells Road beyond the Great Northern Railway;
- Dora creek township approximately 1.2 km to the south;
- Properties on Border Street approximately 600 m to the south which are screened by the EPS inlet canal and attemperation reservoir and beyond Wangi Road; and
- Dwellings to the north of Project area located over 4 km away beyond the EPS and mining operations.

Further detail on the Project location as relevant to traffic and transport are provided in Section 4.1.

## 1.4 Report structure

The report structure is as follows:

- Section 1 provides the Project background and purpose of the report
- Section 2 provides the Project description
- Section 3 provides a description of the assessment approach
- Section 4 describes the existing environment in relation to traffic and transport
- Section 5 describes expected traffic generation and provides an assessment of potential traffic impacts
- Section 6 outlines the proposed mitigation and management measures
- Section 7 provides a conclusion.

# 2. Project description

## 2.1 Overview

Origin is seeking regulatory and environmental planning approval for the construction and operation of a grid-scale BESS with a discharge capacity of 700 MW and storage capacity of 2,800 MWh at the Project area. The Eraring BESS would be among the largest battery projects in NSW and Australia in terms of peak power output and discharge duration. The Project would provide energy storage and key network services that would facilitate long term emissions reduction in the NEM while supporting the delivery of secure and reliable electricity for consumers and businesses.

The Project would be situated within the Origin landholding associated with the EPS located on the western shore of Lake Macquarie. The EPS is approximately 40 km south of Newcastle and approximately 120 km north of Sydney in NSW. The total area of the Origin's landholding is approximately 1,200 hectares (ha), including EPS operational areas, Eraring Ash Dam and surrounding buffer lands consisting of bushland and grassland interspersed with roads and water management and electricity transmission infrastructure.

The Project would include the construction and operation of:

- BESS compounds housing rows of enclosures housing lithium ion type batteries and associated power conversion systems with discharge capacity of up to 700 MW and storage capacity of 2800 MWh able to dispatch over variable durations from four hours to beyond eight hours;
- A BESS substation housing high voltage (HV) and medium voltage (MV) transformers and associated infrastructure;
- Approximately 400 m of overhead 330 kilovolt (kV) transmission line connecting the BESS substation to the existing 330 kV TransGrid switchyard; and
- Ancillary infrastructure and facilities including safety protection systems and site ancillary facilities such as laydown areas and site offices.

A full description of the Project is included in Section 3 of the EIS.

The BESS will be capable of providing energy Frequency Control Ancillary Services (FCAS), System Restart Ancillary Services (SRAS), as well as fast frequency response and synthetic inertia - security services currently under consideration in the NEM.

The Project maximum disturbance area is approximately 25 hectares (ha) in size with permeant infrastructure likely to cover half this area. Construction may require temporary compounds or laydown areas outside the permanent footprint but within the Project area and would be located in existing vacant areas of the Project area as illustrated in Figure 2-1.

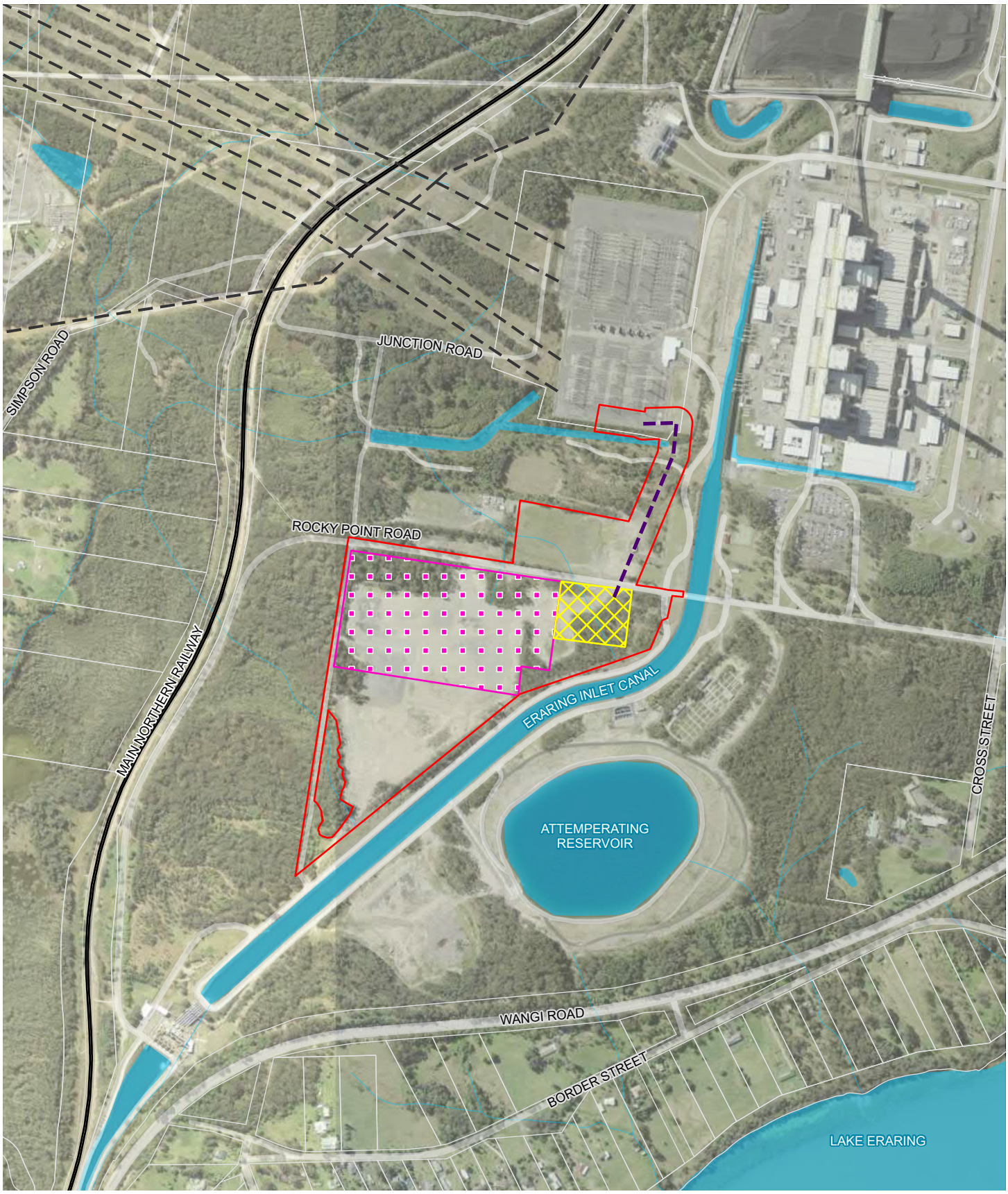



**Figure 2-1** Project overview

## 2.2 Battery system

The BESS technology provider is not yet confirmed; however, the batteries are likely to consist of modular lithium-ion type racks, housed within battery enclosures containing protection, control and heating, ventilation and air conditioning.

Other infrastructure within the BESS compound will include:

- PCS comprising of inverters and battery transformers;
- HV reticulation including ring main unit (RMU), cables and switchboards; and
- Switch rooms and control rooms.

The PCS will be four-quadrant bidirectional type, with capability for both charge/ discharge in leading and lagging reactive power scenarios. The PCS will also have grid forming capability to allow islanded operation and SRAS where required.

## 2.3 Network connection

The Project would take advantage of the close proximity to the existing TransGrid owned 330 kV switchyard which has sufficient spare capacity for the size of the proposed BESS. The Project's connection will be electrically separate to that of EPS, so it can be operated independently of the EPS.

The following components are required to connect the BESS to the NEM:

- 33/330 kV transformers in a bunded transformer area;
- Overhead steel structure lattice towers complete with insulators and conductor(s) spanning the distance between the Project area and the existing TransGrid 330 kV switchyard;
- Associated protection and control systems.

Connection works into the TransGrid switchyard is targeting existing vacant connection bays but allowance is made for bench extension and installation of additional infrastructure.

## 2.4 Construction works

The construction methodology for the Project will be developed in more detail during the preparation of the detailed design. However, it is expected to involve:

- Installation and maintenance of environmental controls including drainage and sediment controls;
- Upgraded construction access track from existing internal access road to battery location;
- Vegetation clearing;
- Cut and fill to level areas and establish a hardstand pad and construction laydown areas;
- Structural works – slabs to support battery modules, power conversion systems and transformer structures;
- Delivery, installation and electrical fit-out of battery modules, power conversion systems and transformers;
- Installation of 330 kV overhead cabling from the battery transformers to the TransGrid switchyard;
- Testing and commissioning activities; and
- Removal of construction equipment and rehabilitation of construction areas.

## 2.5 Construction workforce

The Project will involve the recruitment and training of a construction workforce and ongoing operations and maintenance roles. The Project will also provide localised upskilling and training in the region in relation to the deployment of batteries. Major contractors will be asked to demonstrate their commitment to using a regional workforce and creating Indigenous and equal opportunity employment.

## 2.6 Construction program

The Project's modular design provides significant deployment flexibility with the capacity to stage the 700 MW to meet market needs. The construction of the first stage of the BESS is expected to begin in 2022 (subject to approval) and have a duration of 18 months, with commercial operations possible by 2023. The indicative timeline for subsequent stages of the Project include:

- Stage 2 construction commencing 2023 and operations commencing 2025; and
- Stage 3 construction commencing 2026 and operations commencing 2027.

## 2.7 Operation

Operation will be 24 hours/365 days per week and will respond to market demand, fluctuating from discharge at full capacity for up to four hours or partial capacity for a longer duration. Maintenance activities will be ongoing (landscaping, asset protection zones, water management infrastructure, access tracks and inspection, testing and replacement of components). Operation life is expected to be between 20 to 30 years. Component replacements and/or upgraded may extend this timeframe.

## 2.8 Decommissioning

Following the end of economic life, above ground components would be removed and, where possible, re-purposed. Land rehabilitation will be undertaken where necessary to achieve acceptable conditions as far as reasonably practicable.

# 3. Assessment approach and methodology

## 3.1 Study area

The study area for this traffic and transport impact assessment consists of the transport network servicing the Project, including the roads which form part of the proposed access routes for construction and operational vehicles.

## 3.2 Methodology

To assess the impact of the Project on the transport and traffic network, the following methodology has been used to identify and, where possible, quantify the following:

- Impacts on road network performance – assessed using traffic modelling to determine the performance of the road network with and without vehicles associated with the construction of the Project;
- Impacts on public transport – assessed through an analysis of proposed changes to public transport operations including routes and stop infrastructure to determine impacts on public transport customers;
- Impacts on pedestrians and cyclists – assessed through an analysis of proposed changes to cycleways and footpaths to determine potential impacts on access as well as availability of pedestrian and cycling infrastructure during construction and operation phases of the Project;
- Impacts on road safety – assessed through an analysis of safety issues and trends associated with the roads forming part of the proposed access routes to the Project;
- Cumulative impacts – assessed through a qualitative analysis of the performance of the road network with vehicle movements generated by other major projects expected to be occurring concurrently with the Project using currently publicly available information; and
- Impacts of oversized overmass (OSOM) vehicles – assessed through an analysis of OSOM requirements and potential routes.

# 4. Existing environment

## 4.1 Road network and access

The Project is connected to the surrounding road network via Rocky Point Road and Wangi Road (B53) as shown in Figure 4-1.

Wangi Road is a 13 km road that extends between the township of Toronto to the northeast and the township of Dora Creek to the southwest. Wangi Road is classified as a State road and forms part of route B53, connecting settlements along the western shore of Lake Macquarie to the M1 Pacific Motorway and Newcastle's western suburbs. Wangi Road generally comprises a single carriageway with one lane in each direction, however overtaking lanes are provided at the following locations:

- A southbound overtaking lane between Nomad Road and Parkside Parade;
- A northbound and a southbound overtaking lane between Wangi Point Road and Dorrington Road; and
- A northbound and a southbound overtaking lane between Dora Creek and Horn Street.

Wangi Road generally has a posted speed limit of 90 km per hour, reducing to 60 km per hour near the townships of Toronto and Dora Creek.

Rocky Point Road is a local sealed road that connects to Wangi Road via a grade-separated interchange. The interchange consists of northbound entry and exit ramps and entry and exit ramps in southbound direction. The western end of Rocky Point Road provides access to the EPS and Project area whilst its eastern end provides access to residential areas near Rocky Point. The road comprises a single carriageway with one lane in each direction and a posted speed limit of 60 km per hour that reduces to 40 km per hour near the EPS. Beyond the EPS, Rocky Point Road transitions to become a private road.

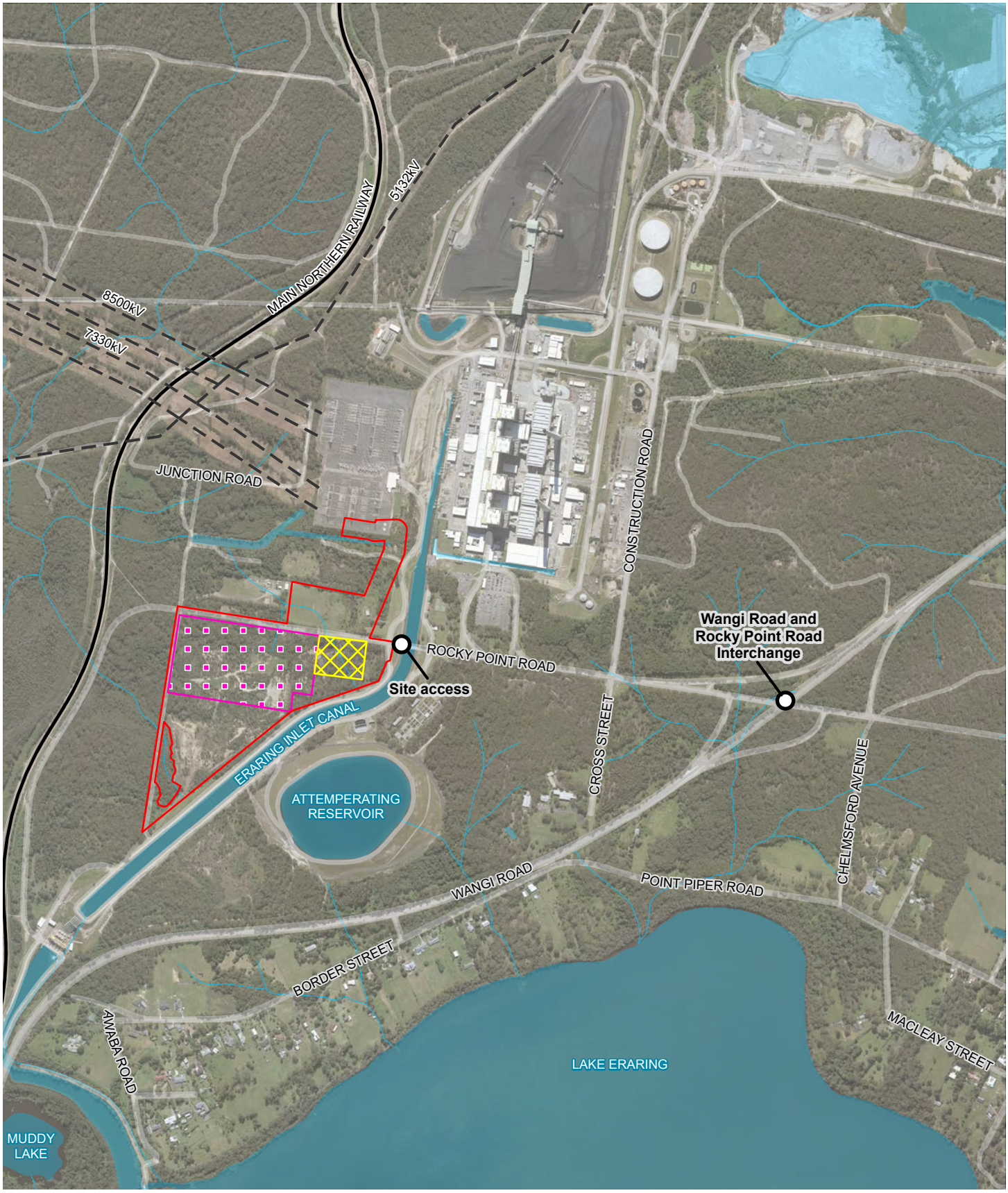
Principal materials and components required to construct the Project are expected to originate from Port Botany delivered in standard shipping containers. OSOM deliveries are expected to original from the Port of Newcastle. A number of major roads connect the Port of Newcastle and Port Botany to the Project area including the M1 Pacific Motorway and A43 New England Highway.

The M1 Pacific Motorway is the major high capacity road connection between Sydney, the Central Coast and Northern NSW. Near the Project area, the M1 Pacific Motorway is a dual carriageway road with two lanes in each direction and has a posted speed limit of 110 km per hour. The M1 Pacific Motorway is classified as a primary freight route.

The A43 New England Highway is an 878 km highway that links Newcastle to Brisbane. It connects to the M1 Pacific Motorway at Beresfield, facilitating access to Sydney. The A43 New England Highway is a dual carriageway road with two lanes in each direction and a central median. The posted speed limit is generally 100 km per hour. The A43 New England Highway is classified as a primary freight route.

## 4.2 Heavy vehicle access routes

The approved 25/26 m B-double routes in the vicinity of the Project area are shown in Figure 4-2. Heavy vehicle access to the Project from the south is expected to be via the M1 Pacific Motorway to Morisset, then through the Dora Creek via Mandalong Road and Main Road, and to the Project area via Wangi Road and Rocky Point Road. OSOM deliveries from the north would be determined in consultation with Transport for NSW and are described in Section 5.10.




Project area
Battery Energy Storage System
Substation
Electricity transmission line
Railway

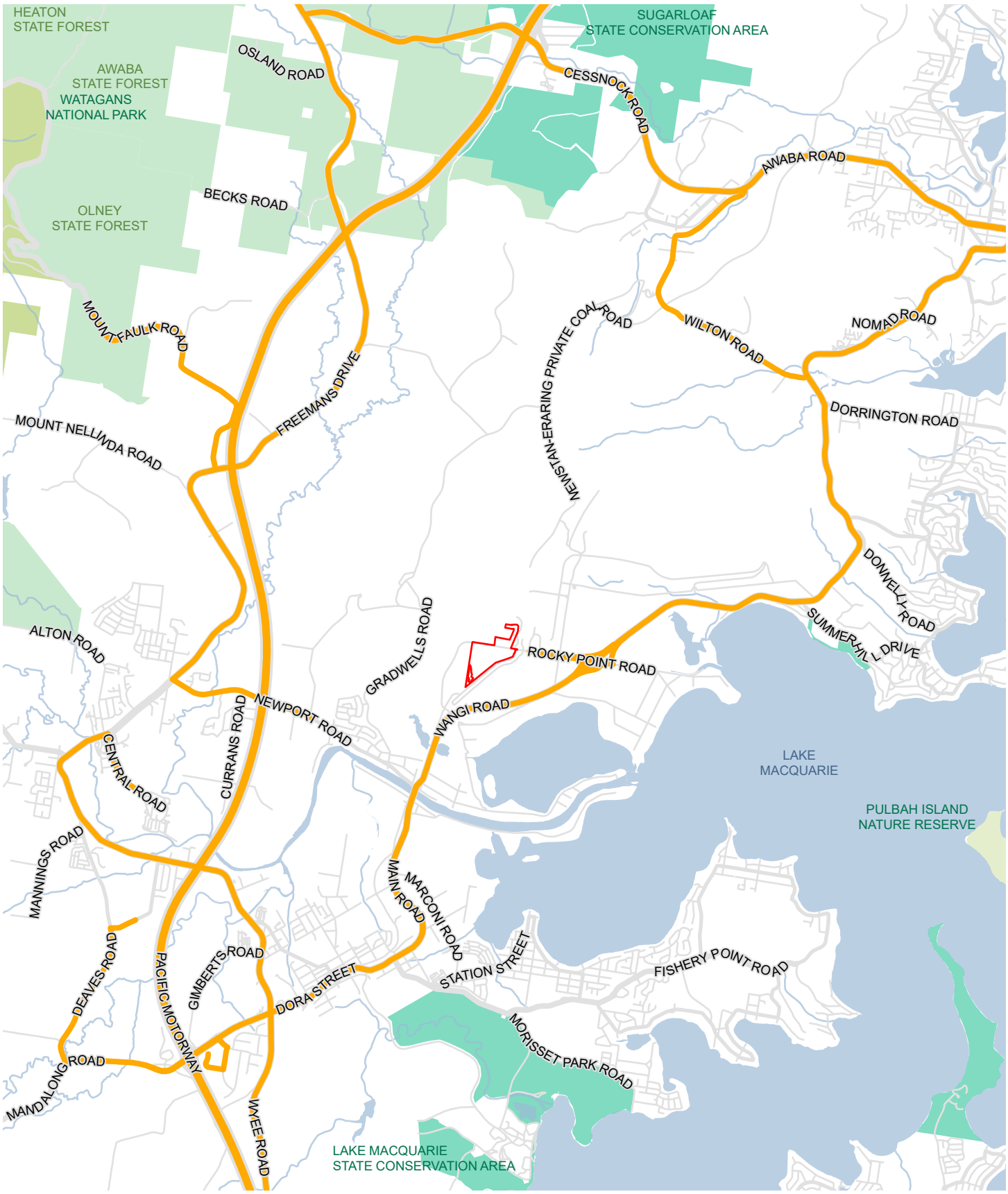
0 300 m

1:15,000 at A4
GDA94 MGA56


**Data sources**

Origin 2021
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020

**Figure 4-1** Road network surrounding the Project area




**Data sources**

Origin 2021
Aerometrex 2020,
© Department Finance, Services
and Innovation Dec 2020

**Figure 4-2** 25/26m B-double routes

## 4.3 Traffic volumes and patterns

### 4.3.1 Wangi Road

Tube counts were undertaken on Wangi Road approximately 250 m north of Wangi Point Road to determine the volume of traffic using the road. The counts spanned a one-week period between 18 November 2019 and 24 November 2019 (prior to COVID-19), inclusive.

To account for traffic growth from 2019 to the current year, traffic counts were scaled using a 1.5% annual growth rate. This growth rate has been assumed based on previous strategic traffic studies conducted in the Newcastle region[1] and is anticipated to provide a conservative assessment there have been no major roadworks, upgrades or developments within the vicinity of the Project area since November 2019.

Traffic volumes on Wangi Road indicate that the morning peak hour is from 7:00 am to 8:00 am and the evening peak hour is from 3:00 pm to 4:00 pm, as shown in Figure 4-3. Wangi Road exhibits a northbound peak direction of travel during the morning peak hour and a southbound peak direction of travel during the evening peak period. Near Wangi Point Road, peak hour volumes on Wangi Road typically range between 520 and 640 vehicles. Heavy vehicles comprise approximately 12% of the total traffic travelling on Wangi Road.

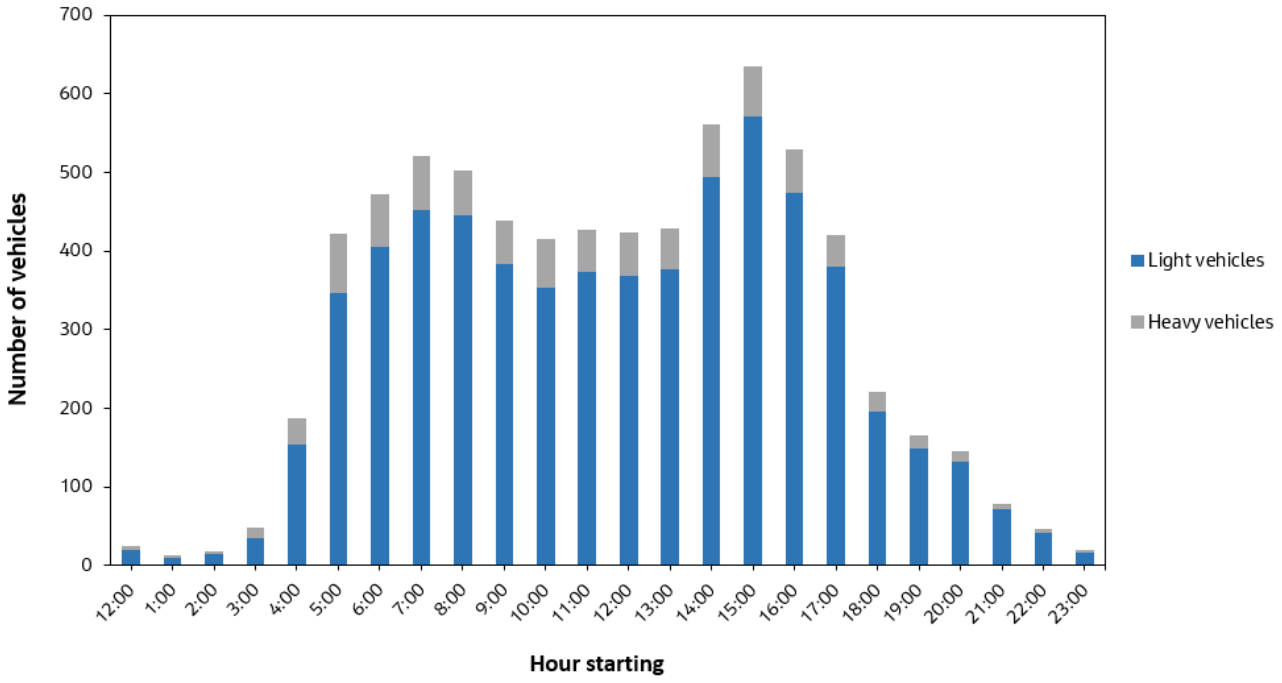



Figure 4-3: Existing traffic volumes on Wangi Road, 250 m north of Wangi Point Road

### 4.3.2 Wangi Road and Rocky Point Road Interchange

Classified vehicle counts were obtained from traffic surveys undertaken at the Wangi Road and Rocky Point Road grade-separated interchange on Thursday 5 April 2018 from 7:00 am to 10:00 am and 3:00 pm to 7:00 pm. Vehicle counts were obtained for the following intersections at the interchange:

- Rocky Point Road / Wangi Road northbound on-ramp;
- Rocky Point Road / Wangi Road northbound off-ramp;
- Rocky Point Road / Wangi Road Slip Road;

1 Aurecon 2015, *Traffic Modelling Report – Lower Hunter Traffic Model*

- Rocky Point Road / Wangi Road southbound on-ramp;
- Rocky Point Road / Wangi Road southbound off-ramp; and
- Rocky Point Road / Construction Road / Cross Street.

As with the tube counts obtained for Wangi Road, the classified vehicle counts were scaled up using a 1.5% annual growth rate to account for potential traffic growth since the completion of the traffic survey.

Traffic volumes at the Wangi Road and Rocky Point Road interchange indicate that the morning peak hour is 7:30 am to 8:30 am and the evening peak hour is 4:30 pm to 5:30 pm. The peak direction of travel on Rocky Point Road is westbound during the morning peak period and eastbound during the evening peak period. Peak hour volumes on Rocky Point Road typically range between 90 and 400 vehicles. The majority of vehicles access Rocky Point Road from Wangi Road, with a small proportion of traffic travelling to and from residential areas located near Rocky Point.

## 4.4 Road safety

A review of crash data was undertaken to provide an assessment of safety issues and trends associated with the roads forming part of the proposed access routes to the Project area. Crash data for was sourced from Transport for NSW's Centre for Road Safety database (Transport for NSW, 2020a). The crash data comprised self-reported crashes in the five-year period from January 2015 to December 2019.

### 4.4.1 Crash analysis

In the five-year period from 2015 to 2019, a total of 44 crashes were recorded on Wangi Road and Rocky Point Road. Crashes by reporting year are shown in Table 4-1. Key statistics include:

- The majority of crashes (43 crashes) occurred on Wangi Road
- A total of two crashes occurred at the Wangi Road and Rocky Point Road interchange. These crashes occurred in 2015 and 2019.

Table 4-1: Crashes by reporting year (2015-2019)

| Road | Number of crashes | | | | | |
|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | Total |
| Wangi Road | 10 | 8 | 7 | 7 | 11 | 43 |
| Rocky Point Road | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 11 | 8 | 7 | 7 | 11 | 44 |

*Source: TfNSW, Centre for Road Safety (2015-2019)*

Crashes by vehicle type are shown in Table 4-2. The majority of crashes (38 crashes) involved a light vehicle. Two crashed involved a heavy vehicle, two crashes involved a motorcycle and one crash involved a cyclist

Table 4-2: Crashes by vehicle classification

| Road | Light vehicle | Heavy vehicle | Motorcycle | Cyclist | Total |
|---|---|---|---|---|---|
| Wangi Road | 37 | 2 | 2 | 1 | 43 |
| Rocky Point Road | 1 | 0 | 0 | 0 | 1 |
| Total | 38 | 2 | 2 | 1 | 44 |

*Source: TfNSW, Centre for Road Safety (2015-2019)*

Crashes by injury severity are shown in Table 4-3.The majority of crashes resulted in an injury (73% of all crashes) with 17 resulting in a serious injury (39%). No crashes resulted in a fatality.

Table 4-3: Crashes by injury severity (2015-2019)

| Road | Number of crashes | | | | | |
|---|---|---|---|---|---|---|
| | Fatal | Serious injury | Moderate injury | Minor injury | Non-casualty | Total |
| Wangi Road | 0 | 17 | 11 | 4 | 11 | 43 |
| Rocky Point Road | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 0 | 17 | 11 | 4 | 12 | 44 |

*Source: TfNSW, Centre for Road Safety (2015-2019)*

Crashes by contributing factors and conditions are shown in Table 4-4. Key statistics include:

- 66% of crashes (29 crashes) occurred in daylight and 34% of crashes (15 crashes) occurred at dawn, dusk or in darkness
- 19% of crashes (eight crashes) involved speeding and 14% involved fatigue (six crashes) as contributing factors.

Table 4-4: Crashes by contributing factors and conditions (not mutually exclusive) (2015-2019)

| Road | Contributing factors | | Conditions | |
|---|---|---|---|---|
| | Speed | Fatigue | Day lighting conditions | Dark lighting conditions[2] |
| Wangi Road | 8 (19%) | 6 (14%) | 28 (65%) | 15 (34%) |
| Rocky Point Road | 0 (0%) | 0 (0%) | 1 (100%) | 0 (0%) |
| Total | 8 (19%) | 6 (14%) | 29 (66%) | 15 (34%) |

*Source: TfNSW, Centre for Road Safety (2015-2019)*

The number of crashes by road user movement (RUM) group are shown in Table 4-5. The most common crash type involved vehicles travelling off the road on a curve (23% of all crashes), followed by the collision of vehicles travelling in the same direction (23% of all crashes).

Table 4-5: Crashes by road user movement group and number

| Road | RUM group[3] | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pedestrians (00-09) | Adjacent direction (10-19) | Opposing direction (20-29) | Same direction (30-39) | Manoeuvring (40-49) | Overtaking (50-59) | On path (60-69) | Off path on straight (70-79) | Off path on curve (80-89) | Miscellaneous (90-99) | |
| Wangi Road | 0 | 6 | 4 | 8 | 5 | 0 | 3 | 7 | 10 | 0 | 43 |
| Rocky Point Road | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 6 | 4 | 9 | 5 | 0 | 3 | 7 | 10 | 0 | 44 |

*Source: TfNSW, Centre for Road Safety (2015-2019)*

[2] Includes crashes that occurred at dawn, dusk or in darkness.

[3] RUM group refers to road user movement group, which includes a group of movements or actions (classified by RUM number) undertaken by the vehicles involved directly before the crash.

## 4.5 Public transport network

### 4.5.1 Passenger rail network

The Great Northern Railway alignment lies approximately 200 m west of the Project area. Also known as the Main North Line, the Great Northern Railway is a major railway in New South Wales that runs through the Central Coast, Hunter and New England regions. The line comprises two tracks that serve both passenger and freight traffic. The nearest train station to the Project area is Dora Creek, approximately 1.6 km south.

### 4.5.2 Bus network

Two public bus services operate on Wangi Road including route 275 (Toronto to Wangi via Fishing Point & Rathmines) and route 281 (Lake Haven to Wangi Wangi). Route 275 and 281 are operated by Hunter Valley Buses. The nearest bus stop to the Project is an unmarked stop located on Wangi Road opposite Horn Street (Stop ID 2264163).

## 4.6 Pedestrian and cycling network

No formal off-road pedestrian or cycling facilities are provided on Wangi Road or Rocky Point Road.

# 5. Traffic impact assessment

## 5.1 Construction schedule and working hours

Construction of the first stage of the Project is anticipated to commence in 2021 and would be completed over a duration of 18 months. Stages 2 and 3 are currently anticipated to similarly occur over 18 months periods and would follow consecutively. The majority of works would be undertaken during the following standard construction hours:

- Monday to Friday 7:00 am – 6:00 pm;
- Saturday 8:00 am – 1:00 pm; and
- No Sunday or public holiday work.

Construction works outside of the standard construction hours may include:

- Work determined to comply with the relevant noise management level;
- The delivery of materials as required by the authorities for safety reasons;
- Emergency situations to prevent the loss of lives and properties and/or to prevent environmental harm; and
- Situations where agreement is reached with affected receivers.

For the purposes on traffic impact assessment, all standard deliveries are modelled as occurring within standard construction hours while OSOM deliveries are expected to occur outside standard hours and particularly peak hours so are not modelled.

## 5.2 Construction traffic generation and distribution

Traffic generated by the construction of the Project was confirmed in consultation with Origin in June 2021. It would include up to 128 additional workers travelling to the site, generating up to 128 additional inbound movements and 128 additional outbound movements per day. These light vehicle movements are expected to occur during the hours prior to shift commencement (6:00 am to 7:00 am) and after shift end (6:00 pm to 7:00 pm). In addition, the construction of the Project is expected to generate an additional 60 two-way heavy vehicle movements per day. The majority of heavy traffic movements are expected to occur between 6:00 am to 7:00 pm and would be distributed evenly within the time period.

During construction, all light vehicles would access the Project via Rocky Point Road and Wangi Road. It is anticipated that the distribution of this traffic would be similar to the existing traffic patterns in the area, with approximately 50% of these vehicles accessing the site from the north and 50% from the south. Principal materials and components required to construct the Project are expected to originate from Port Botany in Sydney. As such, heavy vehicles would access the Project area from the south.

Oversized components are expected to be transported to the Project area from the Port of Newcastle. Oversized vehicle movements would be conducted outside standard hours and are further discussed in Section 5.10.

## 5.3 Operation traffic generation and distribution

As discussed in Section 2.4, operation of the Project would occur 24 hours per day, 365 days per year. Traffic generation resulting from operation of the Project is expected to be minimal and would be limited to a small number of traffic movements associated with specialist maintenance staff, functional tests and facility upkeep activities.

## 5.4 Cumulative impacts

### 5.4.1 Eraring Power Station outages

During maintenance outages at EPS, an additional 280 personnel would travel to and from EPS using personal light vehicles, generating approximately 280 additional inbound and 280 outbound movements per day.

It is conservatively assumed that all light vehicle movements associated with power outages at EPS would occur concurrently to the peak periods of light vehicle generation of the Project (6:00 am to 7:00 am and 6:00 pm to 7:00 pm). The distribution of project traffic would be as per existing traffic distribution patterns, with 50% accessing the site from the north and 50% accessing the site from the south.

### 5.4.2 Nearby concurrent developments

There are several developments that are currently under construction or likely to commence operation during the construction of the Project. In order to capture potential cumulative impacts, traffic generation associated with these developments has been considered cumulatively alongside the Project in the traffic impact assessment.

The general activities, location, timing, duration and traffic generation of nearby developments are described below.

#### 5.4.2.1 Expansion of ash recycling operations

Origin is currently seeking approval to increase ash recycling capacities at the EPS. The proposed modification includes the reconfiguration of existing operations and the construction of up to four 600 tonnes (t) silos to provide additional on-site ash storage.

Construction

During peak construction, the expansion of ash recycling operations at EPS would result in an additional 20 workers travelling to EPS, generating an expected 20 two-way light vehicle movements per day (AECOM, 2021). Construction activities would be carried out during standard construction hours (from 7:00 am to 6:00 pm), up to seven days per week.

An additional 10 two-way heavy vehicle movements are expected to be generated per day to facilitate the delivery of construction materials. Deliveries to the construction site would occur within standard construction hours.

All construction traffic would enter the site from the existing access on Construction Road. Connection between Construction Road and the wider transport network is facilitated by Rocky Point Road and Wangi Road. The traffic distribution of light and heavy vehicles associated with the ash construction works is expected to be distributed evenly from the north and south.

Operation

Operation of the proposed modification is expected commence in 2022 and would provide direct employment for two additional operational staff, generating two additional two-way light vehicle movements per day.

The operation of the proposed modification would increase the number of heavy vehicles travelling to and from EPS to pick up fly ash for distribution to building and construction industries. 223 heavy vehicle movements per day are expected in addition to the 188 heavy vehicle movements per day associated with existing ash recycling operations (AECOM, 2021). It is anticipated that the distribution of heavy vehicle traffic would continue in accordance with existing traffic distribution patterns, where 50% of light vehicles would access the site from the north and 50% of light vehicles accessing the site from the south. For cumulative impact assessment purposes, it is assumed that the transportation of fly ash would be undertaken during daytime hours only from 8:00 am to 5:00 pm.

#### 5.4.2.2 Northern Coal Logistics Project

The Northern Coal Logistics Project comprises the ongoing use of the surface coal handling and processing facilities at Newstan Colliery surface site and Cooranbong Entry Site (CES), as well as the ongoing use of existing private haul roads between Newstan Colliery, Awaba Colliery, CES and the EPS.

In recent months, Centennial Myuna has been experiencing fluctuations in coal quality with some product coal not meeting EPS specifications. As a result, Centennial Myuna has proposed to blend coal from Myuna with coal from Mandalong Mine in order to continue to provide a secure supply of coal to EPS. Centennial NCS is therefore seeking approval to allow coal to be transferred between Myuna's pit top and CES, blending of this coal at CES, and associated activities.

Centennial has reported that the haulage of coal via road is nolonger proposed and the application is being withdrawn. At time of writing the application had not been updated on DPIE website and as such cumulative impact consideration is presented below.

##### Construction

No construction activities are required to facilitate the proposed modification to the Northern Coal Logistics Project.

##### Operation

Approval of the modification would result in the transportation of coal by truck between Myuna's pit top and CES. The proposed transportation route includes the section of Wangi Road between Wangi Point Road and Wilton Road, located approximately 4 km to the north of the Wangi Road and Rocky Point Road interchange. The remaining roads that form part of the proposed transportation route consist of private haul roads. As per the modification report for the Northern Coal Logistics Project (EMM, 2020), there would be a maximum of 10 loaded trucks (20 truck movements) per hour travelling between CES and Myuna via Wangi Road. Between 3:00 pm and 4:00 pm Monday to Friday, truck movements travelling back to Myuna will be restricted to five loaded trucks (10 truck movements) per hour to minimise impacts to the local road network during the afternoon peak hour.

### 5.4.3 Cumulative traffic generation

Cumulative midblock traffic volumes on Rocky Point Road between Construction Road and the northbound on-ramp to Wangi Road were assessed to determine the morning and evening peak hours of cumulative traffic generation resulting from the construction of the Project and nearby developments. As traffic count information pertaining to the Rocky Point Road and Wangi Road interchange is only available from 7:00 am to 10:00 am, the 6:00 am to 7:00 am volumes have been estimated by scaling the available 7:00 am to 8:00 am volumes in accordance with the average change observed between the two periods within the Wangi Road tube count dataset. The cumulative midblock traffic volumes in passenger car units (pcu) are shown in Table 5-1.

Analyses of cumulative midblock volumes on Rocky Point Road indicate that the morning and evening peak hours of cumulative traffic generation are 6:00 am to 7:00 am and 6:00 pm to 7:00 pm, respectively. The operational phase of the ash recycling expansion project at EPS is anticipated to generate the greatest cumulative impacts with the Project in comparison to the construction phase of the ash recycling expansion project.

Table 5-1: 2026 expected traffic generation and expected cumulative traffic generation

| Hour starting | Midblock volumes on Rocky Point Road (passenger car units) | | |
|---|---|---|---|
| | Without Project | With construction of Project, EPS outage and ash recycling expansion construction activities | With construction of Project, EPS outage and ash recycling expansion operation activities |
| Morning | | | |
| 6:00 am | 98 | 526 | 570 |
| 7:00 am | 109 | 139 | 171 |
| 8:00 am | 84 | 114 | 146 |
| 9:00 am | 76 | 106 | 138 |
| Evening | | | |
| 4:00 pm | 179 | 210 | 199 |
| 5:00 pm | 377 | 408 | 397 |
| 6:00 pm | 132 | 542 | 561 |

The cumulative morning and evening peak hour traffic volumes for key intersections near the Project area are shown below in

Figure 5-1 and Figure 5-2 respectively. It is noted that the cumulative peak hour traffic volumes are conservative as they assume that the Project and nearby developments would all occur concurrently.

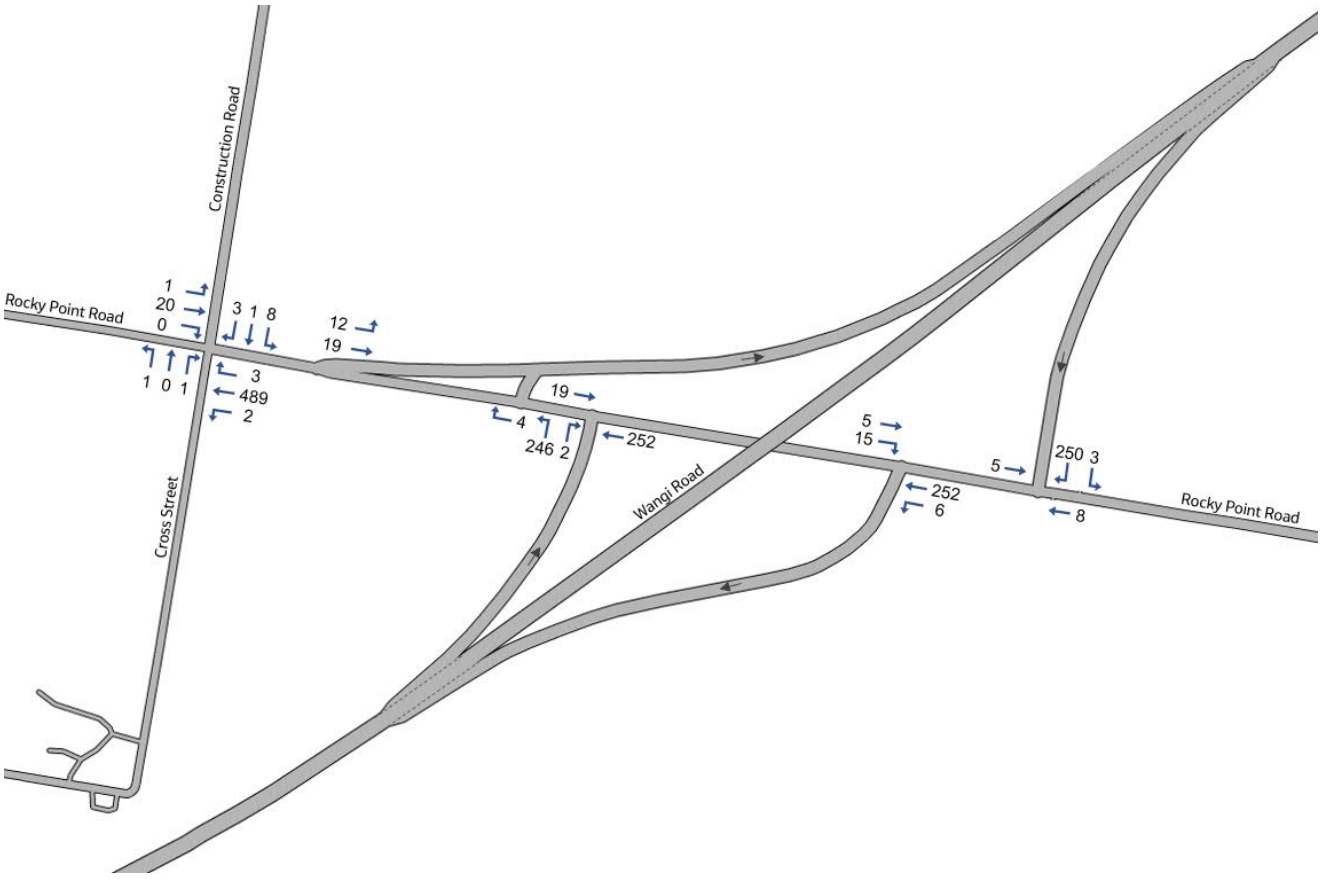



Figure 5-1: Cumulative morning peak hour traffic generation volumes (6:00 am – 7:00 am)

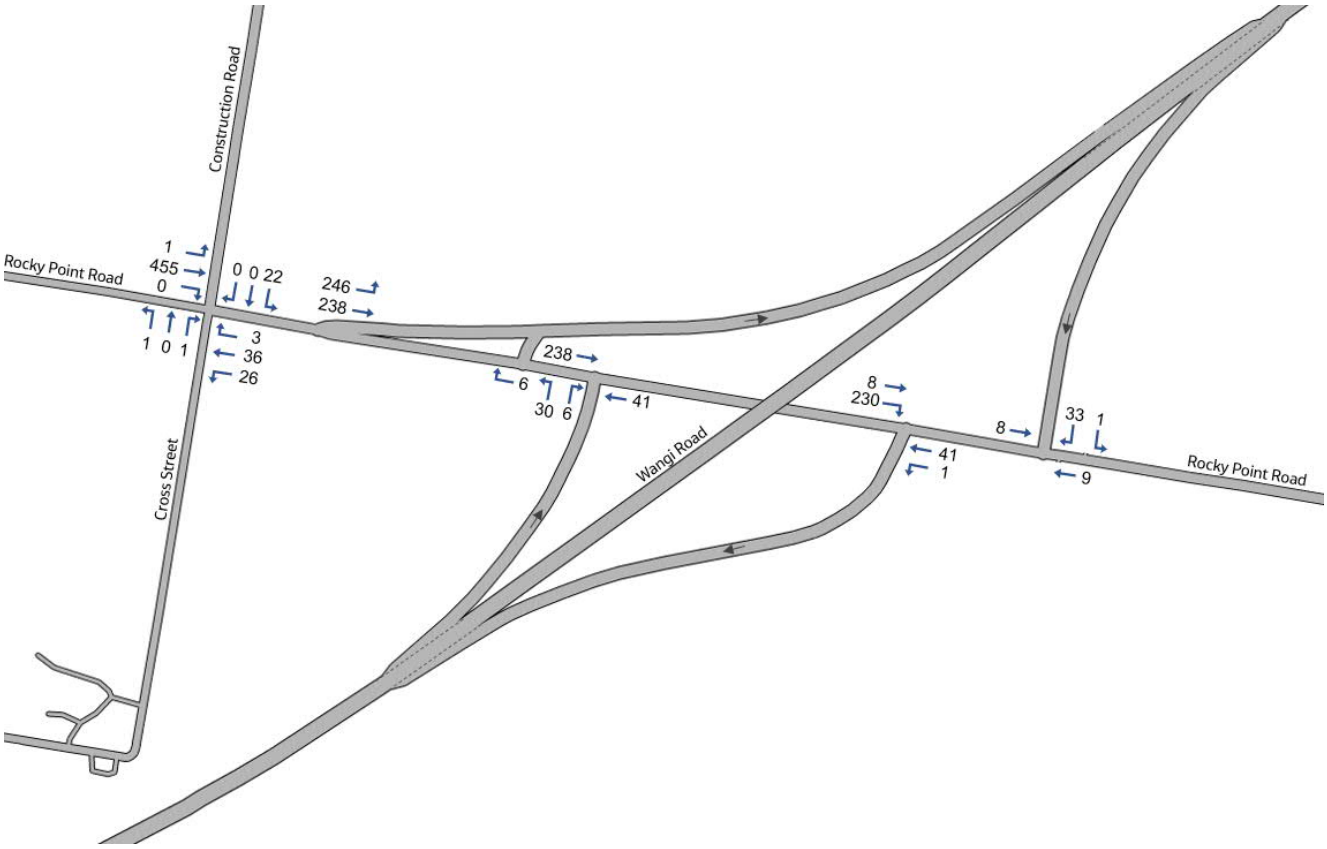



Figure 5-2: Cumulative evening peak hour traffic generation volumes (6:00 pm – 7:00 pm)

## 5.5 Impacts on intersection performance

Traffic modelling has been undertaken to assess the traffic impacts of the Project on the key intersections at the Wangi Road and Rocky Point Road interchange. The approach to traffic modelling undertaken for this assessment aligns with the *Traffic Modelling Guidelines* (Roads and Maritime, 2013) and includes the following broad steps:

- Development of calibrated and validated single intersection base models (validated against Google typical traffic data) to align with existing operational conditions along the proposed vehicle access routes; and
- Application of anticipated cumulative construction and operational traffic demands to the base models to enable the identification of potential impacts on road network performance. It is noted that peak construction activity associated with the Project may occur up until the year 2026. To account for background traffic growth, traffic volumes have been scaled using a 1.5% annual growth rate.

Models were developed using the SIDRA Intersection 9 traffic modelling software package. SIDRA Intersection 9 is a micro-analytical tool for evaluation of intersection performance mainly in terms of capacity, level of service and a wide range of other performance measures such as delay, queue length and stops for vehicles and pedestrians, as well as fuel consumption, pollutant emissions and operating cost.

The traffic modelling was undertaken from 6:00 am to 7:00 am and from 6:00 pm to 7:00 pm only as these hours present the highest cumulative traffic volumes and therefore represent a worst-case scenario as the available spare capacity of the road network is at its most limited during these periods.

It should be noted that this assessment is conservative as it assumes that:

- The construction of the Project and nearby developments in a given year would all occur concurrently;
- All light vehicle movements associated with the construction Project would occur within one hour before shift start (6:00 am to 7:00 am) and one hour after shift end (6:00 pm to 7:00 pm); and

- All light vehicle movements associated with power outages at EPS would occur concurrently to the peak periods of construction traffic movements associated with the Project (6:00 am to 7:00 am and 6:00 pm to 7:00 pm).

### 5.5.1 Intersection performance indicators

#### 5.5.1.1 Level of Service

The criteria for evaluating the operational performance of intersections is defined in Table 5-2 and is adopted from the *Guide to Traffic Generating Developments* (Roads and Maritime, 2002). For priority (sign-controlled) intersections, the criteria for evaluating the performance of intersections is based on the worst delay across all legs of the intersection during the peak hour. This average vehicle delay is equated to a corresponding Level of Service (LoS) from A (best) to F (worst). For rural roads, the desired LoS is C.

Table 5-2: Level of service definitions

| LoS | Average delay (seconds/vehicle) | Give way and stop signs |
|---|---|---|
| A | Less than 15 | Good operation |
| B | 15 to 28 | Acceptable delays and spare capacity |
| C | 29 to 42 | Satisfactory, but accident study required |
| D | 43 to 56 | Near capacity and accident study required |
| E | 57 to 70 | At capacity, requires other control mode |
| F | Over 70 | Extreme delay, traffic signal or other major treatment required |

*Source: Guide to Traffic Generating Developments (RMS, version 2.2, 2002)*

#### 5.5.1.2 95$^{th}$ percentile queue

95th percentile queue is the length (in metres) below which 95% of all observed cycle queues lengths fall. In other words, this queue length is expected to be exceeded only for 5% of observed queues. The 95th percentile queue is often interpreted as a design queue and is used to determine the desirable turn lane and storage lengths. Ideally, the 95th percentile queue should fit within the provided turning lane without spilling into the adjacent through lanes.

#### 5.5.1.3 Average delay

Average delay refers to the average additional amount of time it takes a vehicle to pass through the intersection than free flow conditions and takes into account congestion (i.e. queueing), signal delays, pedestrian crossing and the physical size of the intersection. This parameter is usually described in seconds and provides drivers with a tangible measurement.

### 5.5.2 Intersection performance results

SIDRA Intersection 9 was used to model the performance of key intersections at the Wangi Road and Rocky Point Road interchange. The modelled intersections are shown in Figure 5-3. Intersection performance results under the 'without Project' (without vehicles associated with construction of the Project) and the 'with Project' (with vehicles associated with construction of the Project and nearby concurrent projects) scenarios are presented in Table 5-3 and Table 5-4, respectively.


**Figure 5-3** Intersection model locations

Table 5-3: Modelled SIDRA intersection performance without the Project (2026)

| Intersection | Peak period | Degree of Saturation | Intersection Average delay/veh (seconds) | LoS | 95th percentile queue length (m) |
|---|---|---|---|---|---|
| Rocky Point Road / Construction Road / Cross Street | Morning peak | 0.03 | 6.1 | A | 0.6 |
| | Evening peak | 0.02 | 6.3 | A | 0.7 |
| Rocky Point Road / Wangi Road northbound on-ramp | Morning peak | 0.02 | 5.9 | A | 0.0 |
| | Evening peak | 0.04 | 5.7 | A | 0.0 |
| Rocky Point Road / Wangi Road Slip Lane | Morning peak | 0.02 | 4.7 | A | 0.2 |
| | Evening peak | 0.02 | 4.7 | A | 0.3 |
| Rocky Point Road / Wangi Road northbound off-ramp | Morning peak | 0.02 | 5.9 | A | 0.1 |
| | Evening peak | 0.02 | 5.9 | A | 0.3 |
| Rocky Point Road / Wangi Road southbound on-ramp | Morning peak | 0.03 | 6.9 | A | 0.5 |
| | Evening peak | 0.02 | 6.2 | A | 0.7 |
| Rocky Point Road / Wangi Road southbound off-ramp | Morning peak | 0.03 | 5.8 | A | 0.7 |
| | Evening peak | 0.02 | 5.8 | A | 0.5 |

Table 5-4: Modelled SIDRA intersection performance with the Project and nearby developments (2026)

| Intersection | Peak period | Degree of Saturation | Intersection delay (seconds) | LoS | 95th percentile queue length (m) |
|---|---|---|---|---|---|
| Rocky Point Road / Construction Road / Cross Street | Morning peak | 0.26 | 14.5 | A | 0.9 |
| | Evening peak | 0.25 | 11.9 | A | 1.2 |
| Rocky Point Road / Wangi Road northbound on-ramp | Morning peak | 0.13 | 6.0 | A | 0.0 |
| | Evening peak | 0.27 | 5.7 | A | 0.0 |
| Rocky Point Road / Wangi Road Slip Lane | Morning peak | 0.14 | 4.7 | A | 0.2 |
| | Evening peak | 0.13 | 5.4 | A | 0.3 |
| Rocky Point Road / Wangi Road northbound off-ramp | Morning peak | 0.15 | 5.7 | A | 0.1 |
| | Evening peak | 0.13 | 6.8 | A | 0.4 |
| Rocky Point Road / Wangi Road southbound on-ramp | Morning peak | 0.14 | 8.7 | A | 1.2 |
| | Evening peak | 0.15 | 5.9 | A | 5.3 |
| Rocky Point Road / Wangi Road southbound off-ramp | Morning peak | 0.21 | 5.8 | A | 5.7 |
| | Evening peak | 0.03 | 5.9 | A | 0.7 |

Modelled intersection performance indicates that all intersections in the study area would operate satisfactorily at a LoS A without the Project in 2026. Minimal queue lengths are observed for all intersections and the results show the maximum average delay any intersection would experience is seven seconds or less. These results indicate that all intersections within the study area would operate well within their capacity in 2026 without the Project, which is primarily due to the grade separation of the most conflicting movements at the interchange and the low volumes present.

Under the 'with Project' scenario (with vehicles associated with construction of the Project and nearby concurrent projects), all intersections in the study area are expected to continue to perform at a LoS A. The maximum increase in average delay as a result of the Project is anticipated to be approximately eight seconds and would occur at the Rocky Point Road / Construction Road / Cross Street intersection during the morning period of peak traffic generation. The results indicate that the 95th percentile queue is not expected to exceed 5.7 m in length at any intersection. As such, the Project and nearby developments are expected to have a minor impact on the performance of local intersections.

### 5.5.3 Wangi Road exit ramp queue length

The length of the exit ramps from Wangi Road to Rocky Point Road are shown in Table 5-5.

Table 5-5: Exit ramp lengths

| Exit ramp | Length (m) |
|---|---|
| Northbound exit ramp to Rocky Point Road | 320 |
| Southbound exit ramp to Rocky Point Road | 450 |

As shown in Table 5-5, the queue lengths under the 'with Project' scenario are expected to be very low and are not expected to extend into nor impact Wangi Road.

## 5.6 Impacts on road capacity

### 5.6.1 Wangi Road and Rocky Point Road

Section 4.2.4 in *Guide to Traffic Generating Developments* (Roads and Maritime, 2002) sets out the two-way hourly road capacities for two-lane roads with a design speed of 100 km per hour based on different terrain types. The two-way hourly road capacities quoted in Table 4.5 in *Guide to Traffic Generating Developments* are provided in Appendix A.

As Wangi Road generally has a posted speed limit of 90 km per hour, the appropriate capacities for the road are assumed to be 90% of the values quoted in Table 4.5 in the *Guide to Traffic Generating Developments*. Similarly, as Rocky Point Road has a posted speed limit of 60 km per hour, the appropriate capacities for the road are assumed to be 60% of the values quoted in Table 4.5 in the *Guide to Traffic Generating Developments*.

The adjusted two-way hourly road capacities for Wangi Road and Rocky Point Road are shown in Table 5-6 and Table 5-7, respectively. For a rural road, the desired LoS is C or above.

Table 5-6: Adjusted two-way hourly road capacities for Wangi Road

| Terrain | Level of Service | Percent of Heavy Vehicles | | | |
|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 15% |
| Level[4] | B | 567 | 531 | 504 | 477 |
| | C | 927 | 873 | 828 | 783 |
| | D | 1467 | 1395 | 1332 | 1269 |
| | E | 2367 | 2250 | 2151 | 2061 |

Table 5-7: Adjusted two-way hourly road capacities for Rocky Point Road

| Terrain | Level of Service | Percent of Heavy Vehicles | | | |
|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 15% |
| Level | B | 378 | 354 | 336 | 318 |
| | C | 618 | 582 | 552 | 522 |
| | D | 978 | 930 | 888 | 846 |
| | E | 1578 | 1500 | 1434 | 1374 |

The Level of Service associated with existing traffic volumes and the expected cumulative traffic volumes on Wangi Road and Rocky Point Road are shown in Table 5-8. The results indicate all roads would operate at or above a LoS B under the 'with Project' scenario. These results therefore suggest that there is spare capacity to accommodate the cumulative additional traffic generation on Wangi Road and Rocky Point Road without adversely impacting the operation of the roads.

[4] Level terrain - any combination of grades and horizontal and vertical alignment permitting heavy vehicles to maintain about the same speed as passenger cars.

Table 5-8: Comparison of mid-block peak hourly Level of Service (2026)

| Road | Terrain | Peak Period | Without Project | | | With Project and nearby developments | | |
|---|---|---|---|---|---|---|---|---|
| | | | Volume (veh/hr) | Heavy vehicles (%) | Level of Service | Volume (veh/hr) | Heavy vehicles (%) | Level of Service |
| Wangi Road | Level | Morning | 583 | 16% | B | 797 | 12% | B |
| | | Evening | 339 | 9% | A | 553 | 6% | B |
| Rocky Point Road | Level | Morning | 78 | 18% | A | 506 | 3% | B |
| | | Evening | 119 | 8% | A | 547 | 2% | B |

### 5.6.2 M1 Pacific Motorway

As discussed in Section 5.4, the construction of the Project is expected to generate an additional 128 two-way light vehicle movements per day. It is anticipated that a proportion of these light vehicles would commute to and from Project area via the M1 Pacific Motorway. In addition, the construction of the Project is expected to generate an additional 60 two-way heavy vehicle movements per day. These heavy vehicles would access the Project area to and from the south via the M1 Pacific Motorway.

Traffic volumes on the M1 Pacific Motorway were obtained from the nearest Transport for NSW permanent count station (ID 05098) located to the north of the Project, approximately 60 m to the west of Cessnock Road. In 2018, the average weekday traffic volume travelling on the M1 Pacific Motorway was approximately 38,400 vehicles.

The number of trips generated by the Project is considered to be relatively low compared to existing background traffic and within the range of daily variations in traffic volumes on the motorway. As a result, any impacts caused to the M1 Pacific Motorway by the addition of construction vehicles are likely to be minor.

### 5.6.3 A43 New England Highway

The construction of the Project is expected to generate a low number of additional traffic movements on the A43 New England Highway given its distance from the Project area. Additional traffic movements are expected to be limited to the transportation of oversized equipment from the Port of Newcastle to the Project area. Oversized vehicle movements would be conducted outside peak hours to minimise impacts to the A43 New England and are further detailed in Section 5.10.

## 5.7 Impacts on road safety

During the construction and operation of the Project, additional traffic has the potential to impact road safety on roads forming part of the proposed access route. This includes heavy vehicles transporting materials and equipment as well as personnel commuting to and from the Project area.

As outlined in Section 4.4, the Wangi Road and Rocky Point Road interchange has historically experienced a low rate of crashes, with two crashes reported during the five-year period between 2015 and 2019. Additional vehicle movements to and from the Project are unlikely to have an impact on the future crash frequency at the interchange as modelled performance suggests that all intersections at the interchange would continue to operate at a LoS A with additional cumulative traffic volumes. Moreover, as discussed in Section 5.5.3, queue lengths at the interchange with additional cumulative traffic volumes are not expected to exceed 5.3 m in length and therefore would not extend into nor cause safety issues on Wangi Road.

Beyond the Wangi Road and Rocky Point Road interchange, Wangi Road and Rocky Point Road are expected to have sufficient spare mid-block capacity to accommodate additional traffic volumes generated by the Project without adversely impacting the operation or safety of the roads.

As outlined in Section 4.4.1, 19% of crashes on Wangi Road and Rocky Point Road reported between 2015 and 2019 involved speeding and 14% involved fatigue as a contributing factor. To minimise the risks of speeding and fatigue, as well as other impacts associated with additional traffic movements on road safety, appropriate driver induction, training, safety measures and protocols would be detailed in a Construction Traffic Management Plan (CTMP) and Driver Code of Conduct. All construction and operational personnel would be required to adhere to the CTMP and Driver Code of Conduct.

## 5.8 Impacts on public transport

The Project would not result in any change or impact to public transport operations.

## 5.9 Impacts on pedestrians and cyclists

As discussed in Section 4.5, there are no formal pedestrian or cycling facilities near the Project. As such, the Project would have no impact on pedestrians or cyclists.

## 5.10 Impacts of oversized/overmass vehicles

OSOM vehicles would be required to transport certain oversized equipment to the Project area during the construction phase of the Project. Oversized equipment is expected to originate from the Port of Newcastle and would generate up to 20 one-way oversized vehicle movements including:

- Five one-way oversized vehicle movements during each construction stage to transport prefabricated switchrooms structures / control buildings and other battery components to the Project area; and
- Four one-way oversized vehicle movements to transport four 285 MVA transformers to the Project area.

The proposed OSOM vehicle routes from Port of Newcastle have been assessed against the *NSW OSOM load carrying vehicles network map* (TfNSW, 2020c). The *NSW OSOM load carrying vehicles network map* provides details on the approved routes and travel conditions for eligible vehicles operating under the following Heavy Vehicle National Law notices:

- Multi-State Class 1 Load Carrying Vehicles Mass Exemption Notice 2020, which authorises the use of class 1 load carrying vehicles that are up to 5.5 m wide, 35 m long and 5 m high; and
- Multi-State Class 1 Load Carrying Vehicles Dimension Exemption Notice 2020, which authorises the use of class 1 load carrying vehicles that are up to 115 t.

The proposed OSOM vehicle routes from Port of Newcastle and the relevant restrictions from the *NSW OSOM load carrying vehicles network map* are described in Table 5-9 and shown in Figure 5-4. It is noted that physical constraints may exist on each route and would be determined via a detailed route survey.


Project area
Proposed route 1
Proposed route 2
National Park
Nature Reserve
Regional Park
State Conservation Area
State Forest

0 5000 m

1:165,000 at A4
GDA94 MGA56

N


**Data sources**

Origin 2021
Jacobs 2021,
© Department Finance, Services and Innovation Dec 2020

**Figure 5-4** Proposed OSOM routes

Table 5-9: Proposed OSOM vehicle routes

| No. | Proposed routes | Distance (km) | Restrictions |
|---|---|---|---|
| 1 | From Port of Newcastle via Morisset:<br>▪ Selwyn Street<br>▪ A43 from Port of Newcastle to Sandgate<br>▪ A37 from Sandgate to Jesmond<br>▪ A15 from Jesmond to the M1<br>▪ M1 to Morisset<br>▪ B53 at Morisset to the Project area | 70 | ▪ Narrow bridge over Dora Creek and Muddy Lake |
| 2 | From Port of Newcastle via Toronto:<br>▪ Selwyn Street<br>▪ A43 from Port of Newcastle to Sandgate<br>▪ A37 from Sandgate to Jesmond<br>▪ A15 from Jesmond to the M1<br>▪ M1 to Ryhope<br>▪ Cessnock Road / Awaba Road from Ryhope to B53 at Toronto<br>▪ B53 at Toronto to the Project area | 60 | ▪ Nil |

To manage OSOM vehicles, an access permit will be sought from the National Heavy Vehicle Regulator (NHVR). This permit will undergo a separate approval process and a suitable contractor will be engaged for transportation. As part of the permit, the subcontractor would develop a traffic management plan and determine the suitable route based on the required OSOM vehicle dimensions and mass in consultation with Origin and the NHVR. These traffic movements would be undertaken at night under police escort and in accordance with any OSOM permit conditions.

The traffic management plan for the movement of these OSOM vehicles would be undertaken to identify risks and minimise impacts to the wider road network. The plan would cover:

- Identification of route;
- Measures to provide an escort for the loads;
- Times of transporting to minimise impacts on the road network;
- Communication strategy and liaising with emergency services and police; and
- Any minor temporary civil infrastructure works may be required to accommodate OSOM movements.

Due to the low number of OSOM vehicle movements and the occurrence of OSOM vehicle movements outside of peak periods, it is expected that the traffic impact of OSOM vehicles on the road network would be minimal.

# 6. Mitigation measures

Recommended safeguards and mitigation measures to manage traffic and transport impacts of the Project's construction and operation are summarised in Table 6-1.

Table 6-1: Summary of traffic and transport mitigation measures

| Ref | Impact | Mitigation measures |
|---|---|---|
| Detailed design and pre – construction | | |
| TT1 | Traffic, access and transport | A Construction Traffic Management Plan will be prepared and implemented by the construction contractor. The CTMP will include:<br>▪ Confirmation of haulage routes<br>▪ Access to construction site including entry and exit locations<br>▪ Times of transporting to minimise impacts on the road network<br>▪ Measures to minimise the number of workers using private vehicles<br>▪ Management of oversized vehicles<br>▪ Site specific traffic control measures (including signage) to manage and regulate traffic movement<br>▪ Relevant traffic safety measures including driver induction, training, safety measures and protocols<br>▪ Identify requirements for, and placement of, traffic barriers.<br>▪ Requirements and methods to consult and inform the local community of impacts on the local road network due to the development-related activities<br>▪ Consultation with Transport for NSW and Council<br>▪ Consultation with the emergency services to ensure that procedures are in place to maintain safe, priority access for emergency vehicles<br>▪ A response plan for any construction related traffic incident<br>▪ Monitoring, review and amendment mechanisms<br>▪ Individual traffic management requirements at each phase of construction |
| TT2 | OSOM vehicles | An oversized vehicle permit will be sought for all OSOM vehicle movements where required. The OSOM movements would be in accordance with the permit requirements and be outside of peak traffic periods where possible.<br>In addition, a separate OSOM Transport Management Plan will be prepared and will include:<br>▪ Identification of route<br>▪ Measures to provide an escort for the loads<br>▪ Times of transporting to minimise impacts on the road network<br>▪ Communication strategy and liaising with emergency services and police<br>▪ Any minor temporary civil infrastructure works may be required to accommodate OSOM movements. |
| Construction/operation | | |
| TT3 | Road safety | The Construction Environmental Management Plan (CEMP) and general site induction would inform construction and operational personnel of the risk of collisions, and the risks of speeding and fatigue on safety.<br>In addition, a Driver Code of Conduct will be prepared and used to outline the rules and behaviours which drivers associated with the Project would be required to adhere to. The Driver Code of Conduct will outline arrangements for light and heavy vehicle drivers including:<br>▪ General requirements including site induction requirements |

| Ref | Impact | Mitigation measures |
|---|---|---|
| | | ▪ Travelling speeds and safe driving practices, particularly through residential areas and school zones<br>▪ Fatigue management<br>▪ Adherence to designated transport routes and heavy vehicle noise<br>▪ Public complaint resolution and penalties and disciplinary action. |
| TT4 | Impact to the local road network | Road maintenance will be managed through the following measures:<br>▪ Routine defect identification and rectification of the access roads will be managed as part of the project maintenance procedure |
| TT5 | Access | Affected parties including emergency services will be notified in advance of any disruptions to traffic and restriction of access impacted by Project activities. |

# 7. Conclusion

This report details the traffic and transport impact assessment for the Eraring BESS and associated transmission connection infrastructure Project and addresses the relevant traffic and transport SEARs for the Project. This report provides an overview of the existing traffic and transport environment, an assessment of potential traffic and transport impacts of the Project and recommended mitigation measures.

The potential impacts on road network performance, parking, access, public transport, pedestrians and cyclists, safety and road condition during construction, cumulative construction and operation of the Project are expected to be minimal.

A CTMP implemented by the construction contractor would minimise potential impacts of the Project during construction. Relevant traffic safety measures included in the CTMP would be traffic control and signage, driver conduct, safety protocols and management of OSOM vehicles. Furthermore, a separate OSOM transport management plan would be prepared and would include a detailed overview of management measures for the OSOM movements, including identification of route, escort measures, time of transporting and a communications strategy.

# 8. References

AECOM 2021, *Modification Report: Ash Recycling Facilities, Eraring Power Station*

EMM (2020), viewed June 2021, https://www.planningportal.nsw.gov.au/major-projects/project/35031

RTA 2002, *Guide to Traffic Generating Developments*

TfNSW (Transport for NSW) (2020a), viewed June 2021, https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/nsw.html?tabnsw=3

TfNSW (Transport for NSW) (2020b), viewed June 2021, https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html

TfNSW (Transport for NSW) (2020c), viewed June 2021, https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/nsw-load-carrying-network/map/index.html

Transportation Research Board 2010, *Highway Capacity Manual*

# Appendix A. Two-way capacities for rural roads

Table A-1 sets out the two-way hourly road capacities for two-lane roads for different levels of service, with a design speed of 100 km/hr, based on different terrain types. The data presented in Table A-1 assumes the following criteria:

- terrain level with 20% no overtaking;
- rolling with 40% no overtaking;
- mountainous with 60% no overtaking;
- 3.7 m traffic lane width with side clearances of at least 2m; and
- 60/40 directional split of traffic.

Terrain definitions are provided in Table A-2.

Table A-1: Two-way hourly road capacities for two-lane rural roads with a design speed of 100 km/h (veh/hr)

| Terrain | Level of Service | Percent of Heavy Vehicles | | | |
|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 15% |
| Level | B | 630 | 590 | 560 | 530 |
| | C | 1030 | 970 | 920 | 870 |
| | D | 1630 | 1550 | 1480 | 1410 |
| | E | 2630 | 2500 | 2390 | 2290 |
| Rolling | B | 500 | 420 | 360 | 310 |
| | C | 920 | 760 | 650 | 570 |
| | D | 1370 | 1140 | 970 | 700 |
| | E | 2420 | 2000 | 1720 | 1510 |
| Mountainous | B | 340 | 230 | 180 | 150 |
| | C | 600 | 410 | 320 | 260 |
| | D | 1050 | 680 | 500 | 400 |
| | E | 2160 | 1400 | 1040 | 820 |

*Source: Guide to Traffic Generating Developments (RMS, version 2.2, 2002)*

Table A-2: Terrain definitions

| Terrain | Definition |
|---|---|
| Level | Any combination of grades and horizontal and vertical alignment permitting heavy vehicles to maintain about the same speed as passenger cars. |
| Rolling | Any combination of grades and horizontal and vertical alignment causing heavy vehicles to reduce their speeds substantially below those of passenger cars, but not causing them to operate at crawl speeds for any significant length of time. |
| Mountainous | Any combination of grades and horizontal and vertical alignment causing heavy vehicles to operate at crawl speeds for significant distances and/or at frequent intervals. |

*Source: Guide to Traffic Generating Developments (RMS, version 2.2, 2002)*