

# **EnergyConnect (NSW – Western Section)**

## **Technical paper 9**

### **Traffic and transport impact assessment**

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## EnergyConnect (NSW – Western Section) Technical paper 9 – Traffic and transport impact assessment

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# GLOSSARY

carriageway	A portion of the road assigned to the use of vehicles, inclusive of shoulder and auxiliary lanes.
construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or construction site offices and worker facilities.
driveway	That part of the vehicular access on a road lying between the edge of the carriageway and the abutting property boundary.
EnergyConnect	EnergyConnect is a proposed new electricity interconnector between Wagga Wagga in New South Wales and Robertstown in South Australia, with an added connection into north-west Victoria. EnergyConnect is a joint project between TransGrid and ElectraNet, who operate the transmission networks in New South Wales (NSW) and South Australia (SA), respectively.
Level of Service (LoS)	Defined by Austroads as a measure for ranking operating road and intersection conditions, based on factors such as speed, travel time, freedom to manoeuvre, interruptions, comfort and convenience.
main road	A main road within the meaning of the Roads Act 1993.
(the) proponent	The proposal is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd as a trustee for NSW Electricity Operations Trust (referred to as TransGrid). TransGrid is the operator and manager of the main high voltage (HV) transmission network in NSW and the Australian Capital Territory (ACT) and is the Authorised Network Operator (ANO) for the purpose of an electricity transmission or distribution network under the provisions of the <i>Electricity Network Assets (Authorised Transactions) Act 2015</i> .
(the) proposal	<p>The proposal is known as ‘<i>EnergyConnect (NSW – Western Section)</i>’</p> <p>The proposal would involve the following key features:</p> <ul style="list-style-type: none"> <li>— construction of new high voltage transmission lines and associated infrastructure between the SA/NSW border near Chowilla and the existing Buronga substation</li> <li>— an upgrade to the existing transmission line between the Buronga substation and the NSW/Victoria border at Monak, near Red Cliffs</li> <li>— an expansion and upgrade of the existing Buronga substation from an operating capacity of 220kV to 330kV</li> <li>— establishment and upgrade of access tracks and roads, as required</li> <li>— a minor realignment of the existing X2 220kV transmission line, in proximity to the Darling River</li> <li>— other ancillary works required to facilitate the construction of the proposal e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps.</li> </ul> <p>The description of the proposal as presented in the EIS is indicative and based on the current level of design. The proposal would continue to be refined during detailed design.</p>

proposal study area	<p>The study area for this EIS, which comprises a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga and a 200 m wide corridor between Buronga and the NSW/Victoria border at Monak, near Red Cliffs.</p> <p>The proposal would be located within the proposal study area, however the full area would not be subject to direct impacts.</p>
Road Occupancy Licence (ROL)	A permit which allows the applicant to use or occupy a specified road space at approved times, provided that certain conditions are met.
Schedule of Classified Roads and Unclassified Regional Roads	Classifies the road network based on the administrative function of the roads. Gazetted State Roads are managed and financed by Transport for NSW and Regional and Local roads are managed and financed by Council.
staging	Refers to the division of the project into multiple contract packages for construction purposes, and/or the construction or operation of the overall project in discrete phases.
Traffic Control Plan (TCP)	A diagram showing signs and devices arranged to warn traffic and guide it around, past or, if necessary through a work site or temporary hazard.
transmission line easement	<p>An area surrounding and including the transmission lines, which is a legal ‘right of way’ and allows for ongoing access and maintenance of the lines and will be acquired from landholders.</p> <p>The easement width would be up to 80 metres wide.</p>
trip	A one-way vehicular movement from one point to another excluding the return journey. Therefore, a vehicle entering and leaving a land use is counted as two trips.
Vehicle Movement Plan (VMP)	A diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing through the traffic stream.
work area	Individual areas within the proposal study area that are subject to construction at any one time.



# ABBREVIATIONS

DPIE	(NSW) Department of Planning Industry and Environment
EIS	environmental impact statement
EP&A Act	(NSW) <i>Environmental Planning and Assessment Act 1979</i>
FTE	Full Time Equivalents
HV	High voltage
LGA	Local Government Area
LOS	Level of Service
NSW	New South Wales
OSOM	Oversize Overmass vehicles
ROL	Road Occupancy Licence
SA	South Australia
SEARs	Secretary's Environmental Assessment Requirements
TCP	Traffic Control Plan
TfNSW	Transport for NSW
VMP	Vehicle Movement Plan

# EXECUTIVE SUMMARY

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## ENERGYCONNECT (NSW – WESTERN SECTION)

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

The proposal, focusing on the western section of EnergyConnect in NSW (and the subject of this technical paper), would involve the construction and operation of new 330kV transmission lines between the SA/NSW border and Buronga, an upgrade and expansion of the existing Buronga substation from an operating voltage of 220kV to 330kV and an upgrade of the existing 220kV transmission line between Buronga substation and the border of NSW and Victoria.

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## APPROACH TO THE TRAFFIC AND TRANSPORT ASSESSMENT

This Traffic and Transport Assessment has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the proposal, as issued on 31 July 2020. The assessment was taken using relevant governmental guidelines, policies and proposal construction and operation phase data.

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## OVERVIEW OF POTENTIAL IMPACTS

A summary of the potential impacts is as follows:

- the construction works are estimated to commence in mid-2021. Construction of the transmission lines is expected to take about 18 months to construct. Construction works at the Buronga substation is expected to continue to mid-2023. Site decommissioning and remediation could continue to mid-2024
- the construction workforce is expected to peak at around 400 full time equivalent workers at the peak construction phase of the proposal and a maximum workforce of 50 workers (not full time) operating concurrently during the operational phase
- the number of construction vehicles is expected to peak at 200 light vehicles and 15 to 80 heavy vehicles per 24-hour period with 10 per cent of heavy vehicles expected to be oversize and overmass vehicles. The number of vehicles generated by the operational phase is expected to peak at 50 light vehicles per month
- the proposal's construction phase would have a minor impact to general traffic on the road network, due to the low volumes of existing traffic and the rural nature of the proposal
- the public bus routes which operate in the proposal study area would potentially be subject to some minor delays and these would be consistent with delays potentially occurring for general traffic along the routes
- safety for users of the current pedestrian and cyclist network may be affected by the increase in heavy vehicle and construction vehicle traffic, particularly along George Chaffey Bridge (part of the Sturt Highway)
- during construction, temporary access tracks would need to be constructed to access the construction sites and the main compound and camp site facilities. Due to the location of proposed access points at the main compound and accommodation camp site facilities, some delays and disruptions may occur to existing traffic along Silver City Highway, Arumpo Road and Renmark Road
- access during maintenance periods for vehicles would be via land access protocols which would utilise access tracks as required. These accesses would be established in consultation with landowners
- impacts to property access for landowners are expected to be minimal during the construction phase and operation phase.

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## SUMMARY MITIGATION MEASURES

Mitigation measures for the construction and operational phases have been considered to minimise the potential impacts that arise from the development and maintenance of this proposal. Recommended mitigation measures have been provided so that the safety and efficiency of the transport network in the proposal area is maximised throughout all phases. The construction contractor of the proposal is responsible for following these measures and proactively communicating with the government road authorities, stakeholders and general public. These measures include:

- the preparation of a Construction Traffic Management Plan, which outlines the strategy and procedures to minimise, mitigate and communicate the impacts of the construction of the proposal. These impacts include changes to the road capacity, traffic performance and road safety of the local transport network and traffic systems
- undertaking community communication to ensure proper and adequate communication between the proposal and the community during construction. All affected communities and public bodies will be notified in advance of any disruptions to the transport network. This may be in the form of variable message signs, website notices, public notices in local publications and personal correspondence
- preparing and obtaining Road Occupancy Licence (ROL)
- the preparation of a Vehicle Movement Plan (VMP) to reduce the risk of accidents during the long distance travel required for transportation of materials and equipment
- road pre-condition surveys to assess the existing road surfaces that construction/maintenance vehicles would traverse. This report would describe mechanisms to repair any damage that may result
- determining alternate arrangements for public transport services in the event that construction activities disrupt bus movements.

# 1 INTRODUCTION

## 1.1 OVERVIEW OF ENERGYCONNECT

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

EnergyConnect aims to reduce the cost of providing secure and reliable electricity transmission between NSW and SA in TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

EnergyConnect comprises several components or 'sections' (shown on Figure 1.1). The Western Section (referred to as 'the proposal') is the subject of this technical paper.

EnergyConnect aims to secure increased electricity transmission between SA, NSW and Victoria, while facilitating the longer-term transition of the energy sector across the National Electricity Market (NEM) to low emission energy sources.

EnergyConnect has been identified as a priority transmission project in the NSW Transmission Infrastructure Strategy (Department of Planning and Environment, 2018), linking the SA and NSW energy markets and would assist in transporting energy from the South-West Renewable Energy Zone to major demand centres.

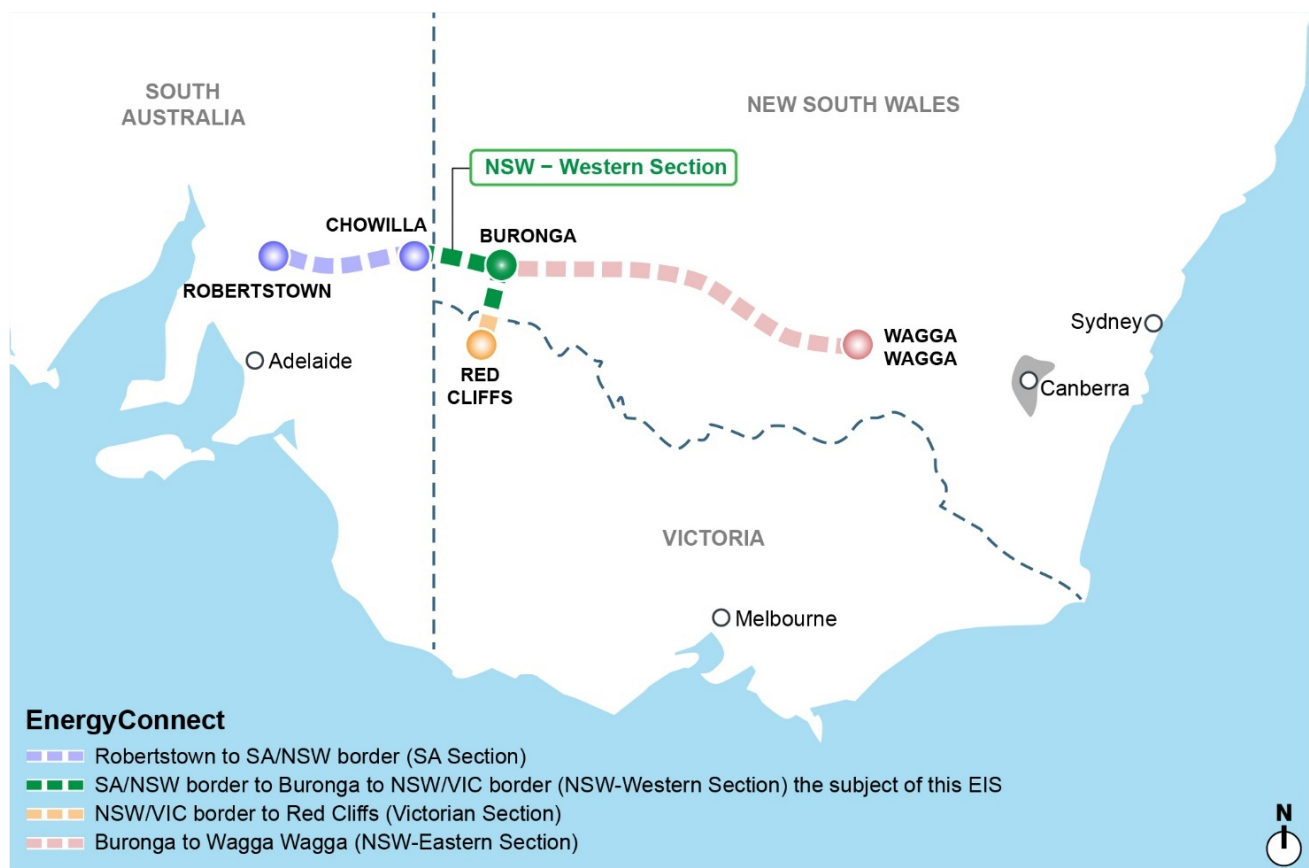


Figure 1.1 Overview of EnergyConnect



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## 1.2 THE PROPOSAL

TransGrid is seeking approval under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) to construct and operate the proposal. The proposal has been declared as Critical State significant infrastructure under Section 5.13 of the EP&A Act.

The proposal was also declared a controlled action on 26 June 2020 and requires a separate approval under the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*. The proposal is subject to the bilateral assessment process that has been established between the Australian and NSW governments.

The proposal is located in western NSW within the Wentworth Local Government Area (LGA), approximately 800 kilometres west of Sydney at its nearest extent. The proposal spans between the SA/NSW border near Chowilla and Buronga and the NSW/Victoria border at Monak, near Red Cliffs. It traverses around 160 kilometres in total.

### 1.2.1 KEY PROPOSAL FEATURES

The key components of the proposal include:

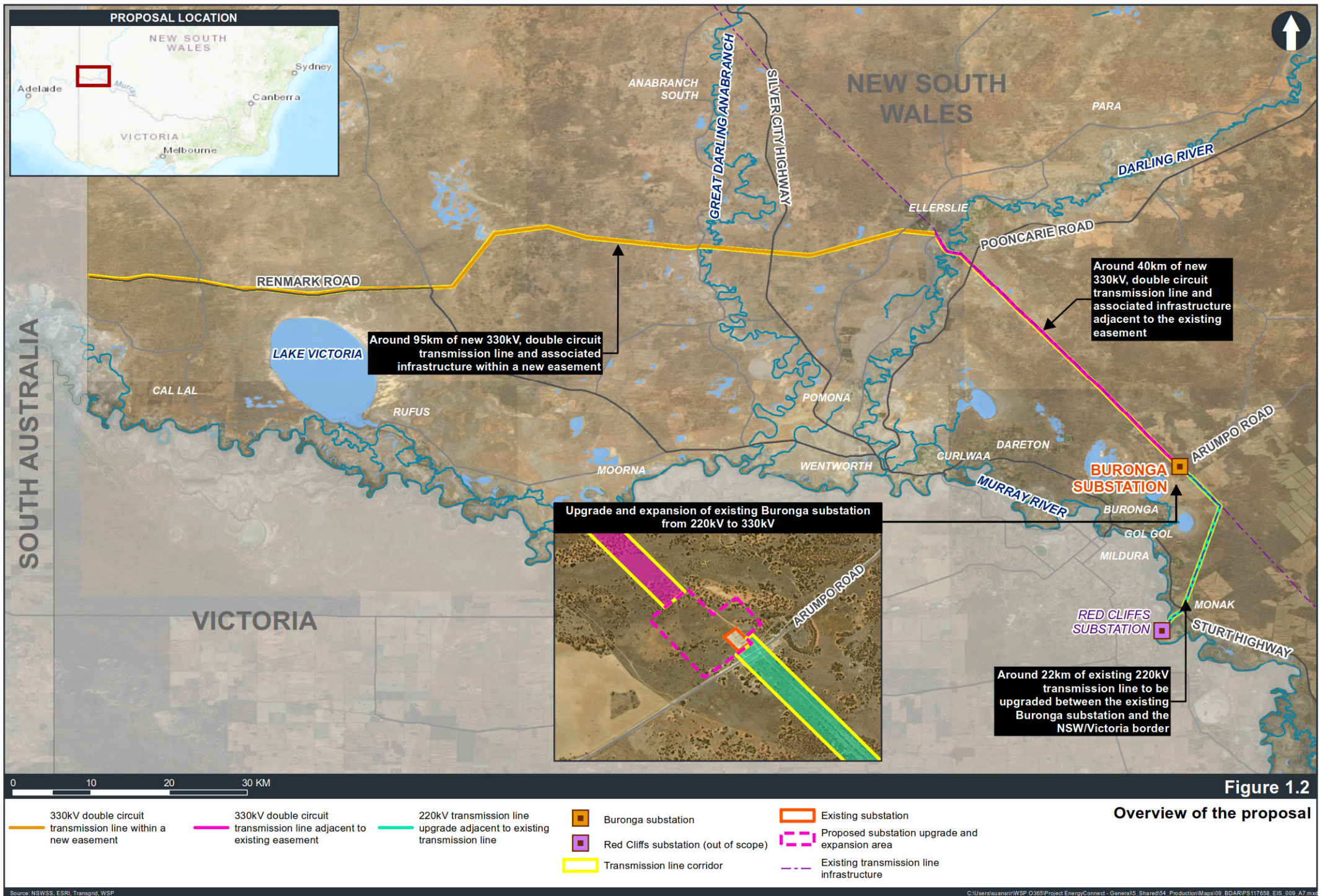
- a new 330 kilovolt (kV) double circuit transmission line and associated infrastructure, extending around 135 kilometres between the SA/NSW border near Chowilla and the existing Buronga substation
- an upgrade of the existing 24 kilometre long 220kV single circuit transmission line between the Buronga substation and the NSW/Victoria border at Monak (near Red Cliffs, Victoria) to a 220kV double circuit transmission line, , and the decommissioning of the 220kV single circuit transmission line (known as Line 0X1)
- a significant upgrade and expansion of the existing Buronga substation to a combined operating voltage 220kV/330kV
- new and/or upgrade of access tracks as required
- a minor realignment of the existing 0X2 220kV transmission line, in proximity to the Darling River
- ancillary works required to facilitate the construction of the proposal (e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps).

An overview of the proposal is provided in Figure 1.2. The final alignment and easement of the transmission line would be confirmed during detailed design and would be located within the transmission line corridor as shown in Figure 1.2.

Subject to approval, construction of the proposal would commence in mid-2021. The construction of the transmission lines would take approximately 18 months. The Buronga substation upgrade and expansion would be delivered in two components and would be initially operational by the end of 2022, with site decommissioning and rehabilitation to be completed by mid-2024. The final construction program would be confirmed during detailed design.

The proposal is further described in Chapter 5 and Chapter 6 of the Environmental Impact Statement (EIS).







### 1.2.2 PROPOSAL NEED

The proposal is required to complete the missing transmission link between the SA and NSW transmission networks. The upgrade to the existing transmission line between Buronga and Red Cliffs would also enhance the capacity of the network to provide electricity between NSW and Victoria.

This connection would relieve system constraints and allow for NSW, SA and Victorian consumers to benefit from significant amounts of low-cost, large-scale solar generation in south-west NSW. The proposal is an essential component of EnergyConnect.

## 1.3 PURPOSE OF THIS TECHNICAL REPORT

This technical paper is one of a number of technical papers that form part of the EIS for the proposal. The NSW Department of Planning, Industry and Environment (DPIE) has provided the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

The purpose of this technical paper is to identify and assess the potential impacts of the proposal in relation to traffic and transport impacts, responds directly to the Secretary's environmental assessment requirements (SEARs) (refer to Section 1.3.1) and has been prepared with consideration of Austroads Guide to Traffic Management.

This report has the following objectives:

- detail the methodology applied in this assessment
- describe the existing conditions for all modes of transport in the study area including general access vehicles, freight (including restricted access vehicles), public transport (bus services and point-to-point transport) and active transport (bicycles and pedestrians)
- describe the existing environment (road function, classification and operation) in the proposal study area that would be affected by the construction and operation of the proposal
- assess the impacts of constructing the project on the surrounding road network, including the potential impacts of construction activities and associated vehicle movements
- assess the operational impacts of the proposal to the surrounding road network
- assess the cumulative impacts of the planned infrastructure programs and significant developments programmed during both the construction and operational phases of the proposal
- recommend mitigation measures to manage identified traffic and transport impacts of the proposal.

### 1.3.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEARs specific to this assessment and where these aspects are addressed in this technical report are outlined in Table 1.1.

Table 1.1 Secretary's environmental assessment requirements – traffic and transport

REFERENCE	SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS	WHERE ADDRESSED
Key issues – Traffic and transport	An assessment of the transport impacts of the project on the capacity, condition, safety and efficiency of the local and State road network.	Chapter 5 – Assessment of construction impacts
	Details of the ongoing maintenance works required to service assets, outlining the measures to maintain the road network.	Chapter 6 – Assessment of operational impacts

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## 1.4 STRUCTURE OF THIS REPORT

The structure and content of this report is as follows:

- *Chapter 1 – Introduction:* Outlines the background and need for the proposal, and the purpose of this report.
- *Chapter 2 – Legislative and policy context:* Provides an outline of the key legislative requirements and policy guidelines relating to the proposal.
- *Chapter 3 – Methodology:* Provides an outline of the methodology used for the preparation of this TTIA.
- *Chapter 4 – Existing environment:* Describes the existing road environment and transport network.
- *Chapter 5 – Assessment of construction impacts:* Describes the potential construction impacts associated with the proposal.
- *Chapter 6 – Assessment of operational impacts:* Describes the potential operational impacts associated with the proposal.
- *Chapter 7 – Cumulative impacts:* Outlines the potential cumulative impacts with respect to other known developments within the vicinity of the proposal.
- *Chapter 8 – Mitigation measures:* Outlines the proposed mitigation measures for the proposal.
- *Chapter 9 – Conclusion:* Provides a conclusion of the potential impacts of the proposal on the road environment and transport network.
- *Chapter 10 – References:* Identifies the key reports and documents referenced to generate this report.

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## 1.5 REPORT TERMINOLOGY

The following terms are discussed throughout this report and are defined as:

- **Proposal study area** – the proposal, including transmission line corridor, Buronga substation upgrade and expansion, access tracks, and the main construction compounds and accommodation camps at Buronga and Anabran South would be contained within the proposal study area. The proposal study area comprises of a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga and a 200 metre wide corridor between Buronga and the NSW/Victoria border at Monak, near Red Cliffs, and is used in the environmental assessment to provide a broader understanding of the constraints and conditions of the locality.
- **Transmission line corridor** – the corridor in which the final easement and transmission line is expected to be contained within. It would consist of a 200 metre corridor along the transmission line component of the proposal. Transmission line construction activities would be contained within this area, but some access tracks may extend beyond this corridor.
- **Traffic and transport study area** – the study area for this assessment which focuses on Wentworth Shire Council LGA and the City of Mildura, and is defined by the indicative haulage route and roads affected by the proposal in the immediate locality. These indicative haulage routes are detailed in Section 4 of this report. The assessment does not extend beyond these LGAs.



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## 1.6 LIMITATIONS

- *Data collection:* for the most part, this report relies on traffic data sets collected by the relevant road authorities. The data have been reviewed and where possible, consider the historical growth of the region for relevance to the assessment.
- *Determination of haulage routes:* at the time of writing this report, details of full proposed haulage routes to shipping port locations were yet to be determined. Transporting of some of the construction materials would be required from a shipping port, which could include ports within Adelaide, Melbourne or Sydney/Wollongong. This study has limited assessment to roads intersecting with the transmission line corridor and major roads that are likely to be used as haulage route, within the Wentworth LGA. Use of the broader haulage roads to the port locations would be undertaken in accordance with the heavy vehicle haulage guidelines in each of the respective states.
- *Identifying specific access locations:* due to the geographic size of the work area involved, details of local access to the work sites are yet to be fully determined at the time of writing this report. Approval of specific access locations will be assessed and sought as part of the Construction Traffic Management Plan process before the construction phase. It is however intended that existing established roads, access tracks, and/or fire trails would be used to minimise impact to the surrounding environment where possible and new tracks would only be installed where this is not feasible.
- *Construction compound and camp site locations:* Three possible main construction compound and accommodation camp sites locations have been identified. The Buronga and Anabran South sites have locations identified however design of the entrances/access points to the facilities are not yet available. The Wentworth site is still to have its location and size determined. There is also no design of the entrance/access point to this facility as of October 2020.

## 2 LEGISLATIVE AND POLICY CONTEXT

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### 2.1 STATE LEGISLATION

#### 2.1.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is administered by the NSW Department of Planning, Industry and Environment and includes provisions for the assessment of environmental impact statements. As stated in Section 1.2, the proposal is Critical State significant infrastructure and requires approval from the NSW Minister for Planning and Public Spaces.

Under section 5.24 of the EP&A Act, consent under section 138 of the *Roads Act 1993* cannot be refused if it necessary for carrying out an approved State significant infrastructure project, and any consent is to be substantially consistent with the approval granted by the Minister for Planning and Public Spaces.

The EP&A Act requires that an environmental impact statement (EIS) be prepared according to the Secretary's Environmental Assessment Requirements (SEARs). This report has been prepared to address the traffic and transport SEARs for the proposal and to support the EIS.

#### 2.1.2 ROADS ACT 1993

The *Roads Act 1993* aims to establish the rights of members of the public to pass along public roads, rights of persons who own land adjoining a public road to have access to the public road, and to establish the procedures for the opening and closing of a public road. The Roads Act also aims to provide a structure for the classification of roads, empower the public agencies such as Transport for NSW as the road authorities and regulate the carrying out of various activities on public roads, including the transportation of construction materials with heavy vehicles.

This proposal is consistent with this legislation by ensuring that the appropriate processes and measures are in place to manage the impacts to users of the public roads, property owners and the opening/closing of public roads.

Consent from the appropriate roads authority is required under section 138 of the *Roads Act 1993* for certain activities, such as disturbing the surface of a public road, or carrying out work in, on or above a public road. For a network operator under the *Electricity Supply Act 1995*, section 138 of the *Roads Act 1993* does not apply for works that relate to the exercise of the operator's functions in, on or over an unclassified road (other than a Crown road) (Schedule 2 of the Roads Act 1993).

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### 2.2 POLICY AND STRATEGIC PLANS

#### 2.2.1 NSW ROAD RULES 2014

The *NSW Road Rules 2014* are a framework for safe and efficient movement of traffic on NSW roads. The NSW Road Rules is a legislation with key objectives as listed below:

- to consolidate in a single instrument the road rules that are applicable in New South Wales, and
- to provide for road rules that are based on the *Australian Road Rules* so as to ensure that the road rules applicable in this State are substantially uniform with road rules applicable elsewhere in Australia, and
- to provide for other road rules to be observed in this State in relation to matters that are not otherwise dealt with in the *Australian Road Rules*.

The proposal would support the objectives of the legislation by ensuring mitigation recommendations are aligned with the Road Rules.

## 2.2.2 TRAFFIC CONTROL AT WORK SITES – TECHNICAL MANUAL

The *Traffic Control at Work Sites – Technical Manual 2018* is a Transport for NSW document containing Traffic Control Plans that outline the minimum traffic controls to be applied in work site situations. The aim is to protect the safety for all transport mode users (vehicles, pedestrians, cyclists etc.) travelling around or passing through work sites. This manual applies to all persons, including construction site staff and members of public. It is intended to help personnel to comply with the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2017*.

It contains:

- examples of traffic control plans (TCPs) for a range of work activities
- information on how to develop a traffic management plan (TMP) and risk assessment prior to development of a TCP
- instructions on how to select an example TCP for a specific work activity
- instruction on how to design new TCPs; and
- guidance for traffic control in specific situations.

This guide refers to Australian Standards 1742 (*Manual of uniform traffic control devices*) and 1743 (*Road signs – specifications*) to have consistent application with the Australian Standards. Temporary works on public roads detailed in this report consider the practices detailed in this guideline.

## 2.2.3 NSW HEAVY VEHICLE ACCESS POLICY FRAMEWORK

The *NSW Heavy Vehicle Access Policy Framework 2018* aims to provide a framework for heavy vehicle access in NSW for both state and local council roads. As part of the proposal, heavy vehicles would be required to carry freight, including construction materials, to locations within the proposal study area. This Framework provides a platform to consider areas of priority such as safety and the capacity of road infrastructure (including roads and bridges), particularly for higher density loads such as construction material, is the limitation on the movement of vehicles operating at Higher Mass Limits (HML).

## 2.2.4 TOWARDS ZERO – A SAFE SYSTEM APPROACH

*Towards Zero – Safe System 2016* is a framework by the NSW Government that is central to moving towards zero fatalities and serious injuries on our roads.

The four elements of the Safe System approach, first used in Scandinavia, are safer people, safer roads, safer speeds and safer vehicles. This strategy highlights the need to improve the safety of all parts of the system, so that if one part fails, the other parts will protect people from being killed or seriously injured.

With all of these elements working together as a whole, the system is more forgiving of human or mechanical error and the impact of a mistake made on the road does not result in a fatality or serious injury.

The underlying principles of the Safe System approach are that:

- road safety is a shared responsibility
- the human body can only withstand limited forces in a crash before this results in a fatality or serious injury; and
- continuous improvements in vehicles, roads and behaviour will reduce fatalities and serious injuries.

The mitigation measures detailed in Section 8 of this report consider the principles of Safe System approach that would provide a safe temporary road environment.

# 3 METHODOLOGY

This section outlines the methodology followed to assess the traffic and transport related impacts of the proposal in support of the SEARs. The assessment considers both the operational and construction related impacts by examining the existing traffic and transport environment and the impact of the construction and operational phases of the proposal.

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## 3.1 METHODOLOGY OVERVIEW

Relevant information associated with construction methodology, workers requirement and logistics methodology has been provided by TransGrid. This traffic and transport impact assessment aims to assess the key issues raised in the SEARs as listed in Section 1.3.1. The methodology adopted in this report is as follows:

- undertake desktop and mapping analysis to identify, describe and qualitatively assess the existing conditions of the traffic and transport study area, including road regulations (speed zone, heavy vehicle restrictions, overmass and oversize (OSOM) vehicles access), crash history, traffic operating conditions (including the use of indicative Level of Service values) as indicated in 3.1.1 below, active transport provision, and public transport provisions
- review the proposed construction and operation vehicular access to the proposed construction areas. This has included an indicative haulage route to cater for a third main construction compound and accommodation camp in the Wentworth area
- complete a qualitative impact assessment of the construction activities and haulage activities with regards to traffic and transport conditions, with considerations of safety and operational impacts associated with these activities and determine the significance of the impact. This includes:
  - a capacity assessment to assess the impact of increasing traffic movements on the surrounding road network due to the construction activities
  - a review of haulage truck access requirements to transfer materials and plants required to conduct the proposal
  - assessing the impact to existing public and active transport provisions
- examine the operational traffic and transport impacts, such as impact on the road network due to maintenance vehicle movements, emergency vehicle access, and requirements of access by large vehicles
- develop mitigation measures to minimise as far as practicable the impacts of the proposal.

### 3.1.1 LEVEL OF SERVICE CRITERIA

The level of service (LoS) criteria adopted in this assessment focuses on the volume to capacity ratio of the roads likely to be affected by the proposal. This has been selected as the most appropriate assessment for this study with traffic volume metrics being the most accessible data consistently available throughout the study area.

The level of service is classified from LoS A representing a free flow condition to LoS F representing unstable flow. The description of the various level of services are listed below:

- LoS A describes free-flow operations. Vehicles are almost completely unimpeded in their ability to manoeuvre within the traffic stream
- LoS B represents reasonable free-flow operations. The ability to manoeuvre within the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to drivers is still high
- LoS C provides the flow conditions with speeds near the free-flow speed. Freedom to manoeuvre within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the drivers
- LoS D is the level at which speeds begin to decline slightly with increasing flows, with density increasing more quickly. Freedom to manoeuvre is seriously limited and the drivers experience reduced physical and psychological comfort levels



- LoS E describes operation at or near capacity. Operations at this level are highly volatile with virtually no usable gaps within the traffic stream, leaving little room to manoeuvre within the traffic stream. The physical and psychological comfort for drivers is poor
- LoS F describes unstable flow.

By categorising the changes in traffic volume during construction and at operation, the level of service aims to assess the proposal's impact to the road network's efficiency by referring to the existing condition. Table 3.1 provides a description for the level of service, based on Austroads' *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*.

Table 3.1 Level of Service description for road performance

LEVEL OF SERVICE	V/C RATIO BY AVERAGE SPEED			
	60 km/h	70 km/h	80 km/h	90 km/h
<b>A</b>	<0.24	<0.26	<0.28	<0.30
<b>B</b>	0.24–0.38	0.26–0.41	0.28–0.44	0.30–0.47
<b>C</b>	0.38–0.54	0.41–0.59	0.44–0.64	0.47–0.68
<b>D</b>	0.54–0.78	0.59–0.81	0.64–0.84	0.68–0.89
<b>E</b>	0.78–1.00	0.81–1.00	0.84–1.00	0.89–1.00
<b>F</b>	Demand exceeds capacity (>1.00)			

Source: *Guide to Traffic Management Part 3: Transport Study and Analysis Methods (Austroads, 2020)*

To understand the impact of additional traffic movements on the affected routes, the following assessment has been considered in Section 5.3.1 for assessment during construction and Section 6.3.1 for assessment during operational phase:

- low impact: no change in LoS
- medium impact: one level change in LoS
- high impact: two or more level change in LoS.

## 3.2 DATA SOURCES

The following data and corresponding sources have been used in this assessment:

- *Traffic Volume Viewer*, Transport for New South Wales – A publicly available website providing traffic volumes (including heavy vehicle percentages) at selected State Roads within New South Wales. The location of available data depends on the location of traffic count stations installed and operated by Transport for NSW (TfNSW)
- *Interactive Crash Statistics*, Transport for New South Wales – A publicly available website providing crash history data within New South Wales. The latest available crash data was recorded between 2014 to 2018
- *Crash Stats – Data Extract*, Data Vic by Vic Roads – A publicly available website providing crash history data within Victoria, using crash data was recorded between 2014 to 2018
- *heavy vehicle map networks in Victoria*, Vic Roads – A publicly available website providing interactive maps of roads that have been allowed for classifications of heavy vehicle permits in the state of Victoria
- *bus timetables*, Public Transport Victoria – A publicly available website that provides the bus service timetables and maps in the state of Victoria;
- *timetables & route maps*, Buslink Sunraysia – Bus service timetables and maps of bus services in Mildura and Buronga
- *construction methodology, plant and equipment and estimates of construction workers*, TransGrid: information relating to construction activities including methodology, plant and equipment and staff have been obtained from TransGrid
- *traffic counts and vehicle classifications*, Wentworth Shire Council – historical traffic counts at a number of local roads within the Wentworth LGA; and
- *population data of Wentworth Shire*, Remplan (based on the Australian Bureau of Statistics data).

## 4 EXISTING ENVIRONMENT

This section outlines the existing traffic and transport environment within the traffic and transport study area.

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### 4.1 ROAD NETWORK

#### 4.1.1 KEY ROADS

The existing conditions of a number of classified and unclassified roads that are key in providing haulage access for the proposal are described in this section. The classification described herewith are in accordance to the *Roads Act 1993* and can be found in the *Schedule of Classified Roads and Unclassified Regional Roads* (TfNSW, 2017). The classification of a road allows for Transport for NSW to exercise broad authority over some, or all, aspects of legally classified roads and to provide financial assistance to Councils for the management of the unclassified regional roads.

The location of the key roads listed in this section are depicted in Figure 4.1 along with the key proposed haulage route options associated with the proposal.

##### 4.1.1.1 NATIONAL ROAD AND STATE ROADS

###### *SILVER CITY HIGHWAY (B79):*

- This is a 683-kilometre-long state road with the Gazetted Road Number of 22 that connects Buronga to the Queensland Border, via Wentworth and Broken Hill. Silver City Highway is a sealed highway with two lanes (one lane in each direction).
- It runs in an east-west alignment between Wentworth and Buronga and in a north-south alignment between Wentworth and Broken Hill. Silver City Highway has a general speed limit of 100 kilometres per hour (110 kilometres per hour north of Wentworth) and 60 kilometres per hour in larger town centres such as Buronga and Dareton.
- Silver City Highway currently has no dedicated pedestrian and cycling facilities within the Wentworth LGA. There is no pedestrian footpath or shoulder on Silver City Highway, with any pedestrians traversing along the road verge and cyclists riding in the traffic lanes. The speed of traffic along Silver City Highway and the rural nature of the traffic and transport study area results in minimal pedestrian and cycle activity.
- Approved heavy vehicle types permitted to access the Silver City Highway are further discussed in Section 4.2.

###### *STURT HIGHWAY (A20):*

- This is a major east-west highway that connects Buronga to Wagga Wagga, catering for passenger vehicles and heavy vehicles. Sturt Highway is a sealed highway with one lane in each direction in a north-south alignment within the Wentworth LGA.
- Sturt Highway has a general speed limit of 100 kilometres per hour and 60 kilometres per hour in town centres such as Gol Gol (reduced in 2017 from 80 kilometres per hour to 60 kilometres per hour in 2017 as a result of road safety investigations).<sup>1</sup>

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<sup>1</sup> [rms.nsw.gov.au/about/news-events/news/roads-and-maritime/2017/171006-sturt-highway-speed-limit-change-on-way.html](https://rms.nsw.gov.au/about/news-events/news/roads-and-maritime/2017/171006-sturt-highway-speed-limit-change-on-way.html)

- It has a dedicated cycling facility (one lane in each direction) and a dedicated pedestrian footpath only on the west side on George Chaffey Bridge between Mildura and Buronga. A narrow road shoulder (approximately one metre wide) generally exists throughout Sturt Highway in both directions, which would allow some room for cyclists to travel on-road, however deficient of the minimum standard width. Outside of town centres, the speed of traffic along Sturt Highway and the rural nature of the traffic and transport study area results in minimal pedestrian and cycle activity.
- Approved heavy vehicle types permitted to access Sturt Highway are further discussed in Section 4.2.

#### 4.1.1.2 REGIONAL ROADS

##### *ARUMPO ROAD:*

- This is sealed regional road with unsealed road shoulders that connects traffic from Silver City Highway and Sturt Highway to Lake Mungo. There is a speed limit of 80 kilometres per hour and one lane in each direction.

##### *REMARK ROAD:*

- This is a partially sealed regional road that connects the South Australian border directly with Silver City Highway. This road is sealed from Silver City Highway for approximately 18 kilometres with unsealed road shoulders, where the rest of the road to the South Australian border is unsealed. There is a posted speed limit of 100 kilometres per hour with one lane in each direction.

##### *POONCARIE ROAD/WENTWORTH STREET:*

- This is a sealed regional road that connects the town of Wentworth to the village of Pooncarie. This road is sealed between Wentworth and Pooncarie, with a posted speed limit of 80 kilometres per hour and one lane in each direction.

In addition to the above, Arumpo Road, Renmark Road and Pooncarie Road/Wentworth Street currently have no dedicated pedestrian and cycling facilities within the Wentworth LGA. There are no pedestrian footpath or shoulder on these roads, with any pedestrians traversing along the road verge and cyclists riding in the traffic lanes. The speed of traffic along these roads and the rural nature of the traffic and transport study area results in minimal pedestrian and cycle activity.

Approved heavy vehicle types permitted to travel on Arumpo Road, Renmark Road and Pooncarie Road/Wentworth Street are further discussed in Section 4.2.

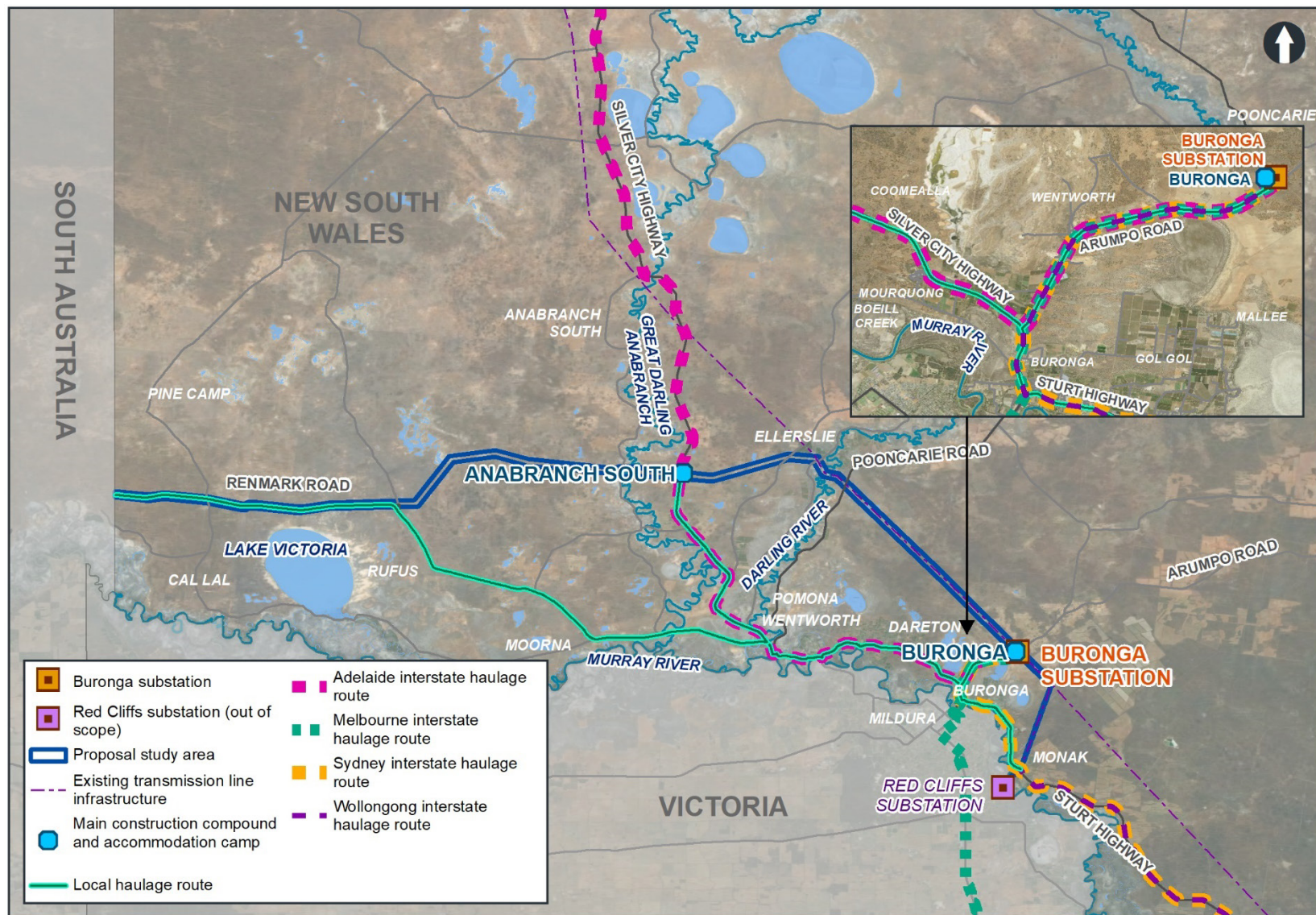


Figure 4.1 Prospective haulage routes within the traffic and transport study area



#### 4.1.2 TRAFFIC VOLUMES

This section summarises the traffic volume data of the key roads identified as part of the proposal, as publicly available (Transport for NSW Traffic Volume Viewer) and data sourced from Wentworth Shire Council from past projects. The traffic volumes provided in this section would provide a quantitative overview of the impact of the proposal to the surrounding road network.

In summary, the traffic volumes recorded outside of the major townships within the proposal study area are typically low. The two key highways along the prospective haulage routes (i.e. Sturt Highway and Silver City Highway (between Wentworth and Buronga)) have a bi-directional traffic volume of over 2,500 vehicles per day.

As expected, higher traffic volumes can be expected near major townships due to day-to-day activities. George Chaffey Bridge on the Sturt Highway, between Mildura and Buronga experiences significantly higher volumes of traffic, with over 10,500 vehicles per day. Similarly, Silver City Highway in Buronga Town Centre record over 5,000 vehicles per day.

Key regional roads to note include:

- Arumpo Road with just over 300 vehicles per day in either direction; and
- Renmark Road with the daily traffic volume recording no more than 50 vehicles per day.

The traffic volumes and their relationship with the proposal's haulage route are summarised in Table 4.1 and Figure 4.2. Traffic activities near the major townships of Buronga and Mildura are depicted in Figure 4.3. The available traffic volumes for this study was received from Wentworth Shire Council and Transport for NSW traffic volume viewer, which for most part covered the period circa 2010 to 2012.

Based on the census data available for Wentworth Shire Council, there has generally been low population growth in the past decade with 6,610 residents in 2011 and 7,053 residents recorded in 2019. This presents an increase of 6.7 per cent across the eight-year period, or approximately 0.8 per cent per annum. Consequently, low traffic growth is also expected in the road network.

Table 4.1 Summary of existing road information within the traffic and transport study area

ROAD NAME AND LOCATION	INTERSECTS WITH PROPOSAL STUDY AREA?	ON HAULAGE ROUTE?	POSTED SPEED	LANE DESCRIPTION	VOLUME (VEHICLES PER DAY)	ESTIMATED PEAK HOUR VOLUME <sup>2</sup>
<b>Silver City Highway (B79)</b>						
<i>Ellerslie – between Broken Hill and Wentworth (from Broken Hill to Perry Street in Wentworth)</i>	Yes	Yes	100 km/hr	2-lanes/2-way	358 (TfNSW, 2010)	35 vehicles per hour
<i>Within Wentworth Town Centre (from Perry Street in Wentworth to Delta Road in Wentworth)</i>	No	Yes	60 km/hr	4-lanes/2-way	2,559 (TfNSW, 2012)	255 vehicles per hour
<i>Between Wentworth and Dareton (from Delta Road in Wentworth to School Road in Dareton)</i>	No	Yes	100 km/hr	2-lanes/2-way	N/A	N/A
<i>Within Dareton Town Centre (from School Road to Fletchers Lake Road in Dareton)</i>	No	Yes	60 km/hr	4-lanes/2-way	N/A	N/A
<i>Mourquong – between Dareton and Buronga (from Fletchers Lake Road to Corbett Avenue)</i>	No	Yes	100 km/hr	2-lanes/2-way	2,228 (TfNSW, 2010)	222 vehicles per hour
<i>Within Buronga Town Centre (from Corbett Avenue to Sturt Highway)</i>	No	Yes	60 km/hr	4-lanes/2-way	5,478 (TfNSW, 2010)	547 vehicles per hour
<b>Sturt Highway (A20)</b>						
<i>George Chaffey Bridge – between Mildura and Silver City Highway, Buronga</i>	No	Yes	100 km/hr	2-lanes/2-way	10,593 (TfNSW, 2010)	1059 vehicles per hour
<i>Within Buronga (between Silver City Highway and Knights Road in Gol Gol)</i>	No	Yes	60 km/h	4-lanes/2-way	2,730 eastbound only (TfNSW, 2010)	273 vehicles per hour eastbound
<i>East of Buronga/Gol Gol (east of Knights Road in Gol Gol)</i>	Yes	Yes	100 km/h	2-lanes/2-way	N/A	N/A

<sup>2</sup> Estimated at 10 per cent of Annual Average Daily Traffic based on historical data

ROAD NAME AND LOCATION	INTERSECTS WITH PROPOSAL STUDY AREA?	ON HAULAGE ROUTE?	POSTED SPEED	LANE DESCRIPTION	VOLUME (VEHICLES PER DAY)	ESTIMATED PEAK HOUR VOLUME <sup>2</sup>
<b>Regional roads</b>						
<i>Arumpo Road (north of Mourquong Road, Mourquong)</i>	Yes	Yes	80 km/hr	2-lanes/2-way	327 (TfNSW, 2010)	32 vehicles per hour
<i>Renmark Road</i>	Yes	Yes	100 km/hr	Part unsealed, no line marking	<50 (Wentworth Shire Council, 2012)	<10 vehicles per hour
<i>Pooncarie Road/Wentworth Street</i>	Yes	No	50 km/hr	2-lanes/2-way	N/A	N/A
<b>Local roads</b>						
<i>Fletchers Lake Road</i>	No	No	80 km/hr	2-lanes/2-way	N/A	N/A
<i>Low Darling Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A
<i>Pomona Road</i>	Yes	No	<i>unknown</i>	Partially sealed, 2-lanes/2-way	N/A	N/A
<i>High Darling Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A
<i>Rufus River Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A
<i>Pine Camp Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A
<i>Nulla Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A
<i>Anabranche Mail Road</i>	Yes	No	<i>unknown</i>	Unsealed, no line marking	N/A	N/A



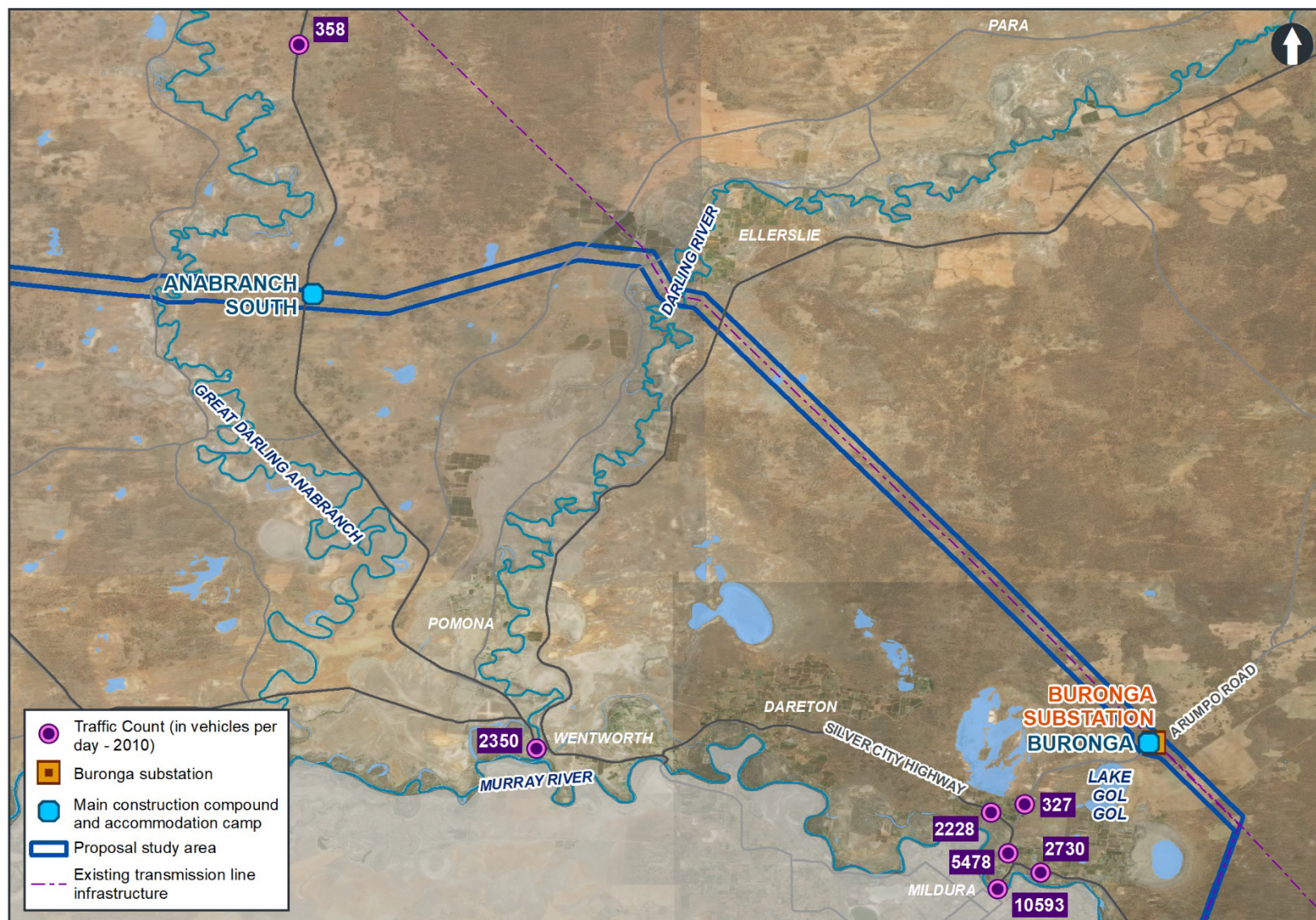


Figure 4.2 Traffic volumes (vehicles per day) within traffic and transport study area



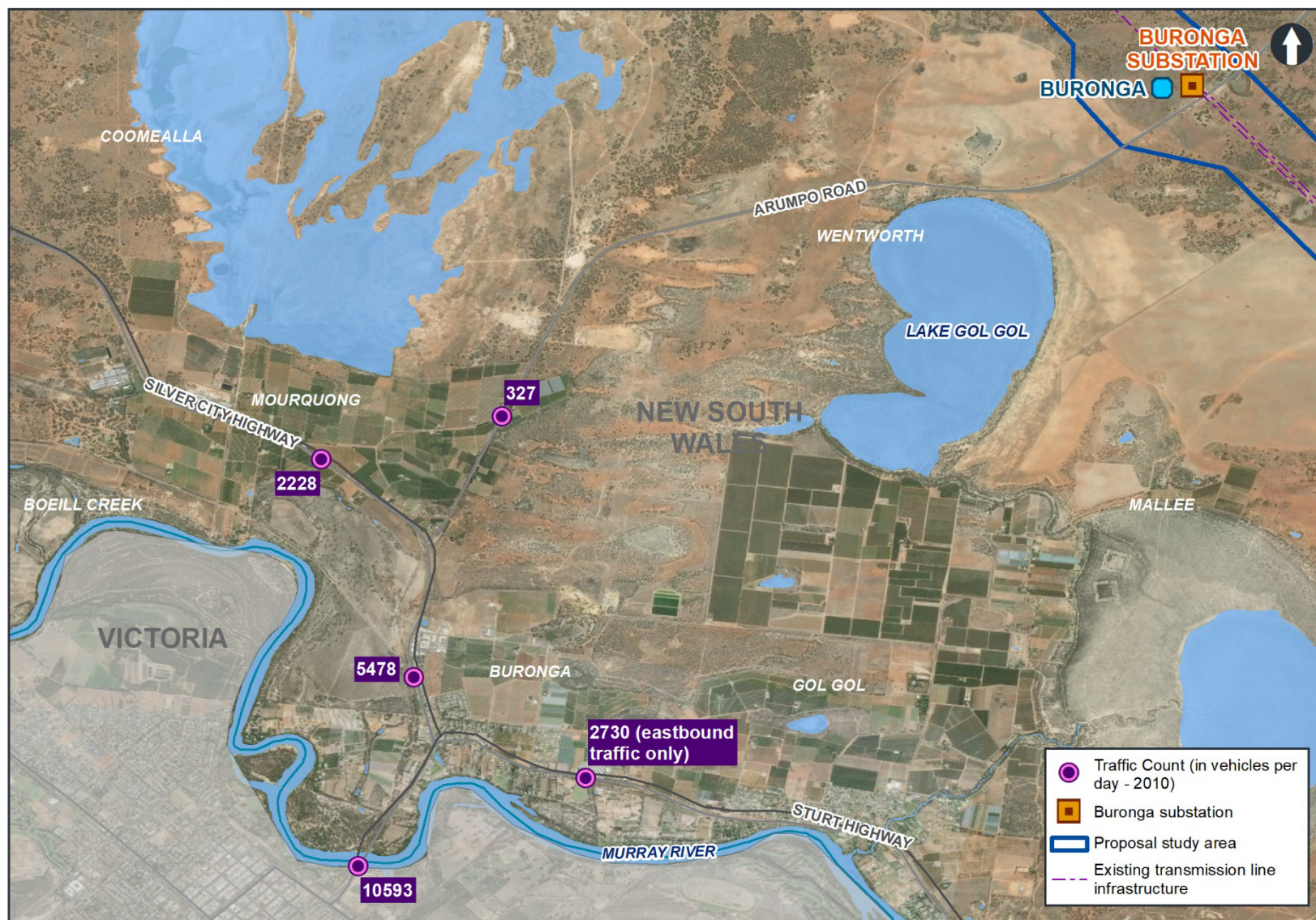


Figure 4.3 Available traffic volumes in Buronga and Wentworth (RMS Traffic Viewer)

### 4.1.3 ROAD NETWORK PERFORMANCE

According to the *Austrroads Guide to Traffic Management Part 3 – Transport Study and Analysis Methods*, Section 5.1.1, states that on single lane traffic lanes travelling at high speeds without overtaking, the operational capacity can be taken as 1,800 passenger cars per hour. According to the *Austrroads Guide to Traffic Management Part 3 – Transport Study and Analysis Methods*, Table 6.1 within the Austrroads document indicates the typical one-way mid-block capacities for urban roads with interrupted flow to be 1,000 passenger cars per hour.

The peak hourly volumes for roads were calculated conservatively at 10 per cent of the daily traffic (vehicles per day), which was used to derive the volume to capacity ratio, shown in Table 4.2. This is based upon the observation that the percentage value of the maximum peak hourly volume as a proportion of daily total volume was generally under 10 per cent. Using the hourly traffic volume from each month, the proportion was observed to be between seven per cent and nine per cent at Sturt Highway on George Chaffey bridge (2010), between eight per cent and 10 per cent on Silver City Highway within Buronga Town Centre (2010) and between nine per cent and 10 per cent on Silver City Highway within Wentworth Town Centre (2010).

Reference of Level of Service criteria as discussed in Section 3.1.1 have been included in the assessment below (Table 4.2), which indicates that all values of Level of Service vary between A and C depicting a satisfactory existing traffic conditions on Arumpo Road, Silver City Highway and Sturt Highway.

Table 4.2 Road network performance summary

ROAD NAME AND LOCATION	DAILY TRAFFIC VOLUME (VEHICLES PER DAY)	PEAK HOURLY TRAFFIC ESTIMATES	NUMBER OF LANES IN EACH DIRECTION	CAPACITY (VEHICLES PER HOUR)	VOLUME TO CAPACITY (%)	LEVEL OF SERVICE
<b>Arumpo Road</b>	327	32 in both directions (estimate)	1	3,600 (in both directions)	0.9%	A
<b>Silver City Highway (B79)</b>						
<i>Ellerslie – between Broken Hill and Wentworth (from Broken Hill to Perry Street in Wentworth)</i>	358	35 vehicles per hour	1	3,600 (in both directions)	1.0%	A
<i>Wentworth Town Centre (from Perry Street in Wentworth to Delta Road in Wentworth)</i>	2,559	255 vehicles per hour	1	2,000 (in both directions)	12.8%	A
<i>Mourquong – between Dareton and Buronga (from Fletchers Lake Road to Corbett Avenue)</i>	2,228	N/A	1	3,600 (in both directions)	6.2%	A
<i>within Buronga Town Centre (from Corbett Avenue to Sturt Highway)</i>	5,478	N/A	1	2,000 (in both directions)	27.4%	B

ROAD NAME AND LOCATION	DAILY TRAFFIC VOLUME (VEHICLES PER DAY)	PEAK HOURLY TRAFFIC ESTIMATES	NUMBER OF LANES IN EACH DIRECTION	CAPACITY (VEHICLES PER HOUR)	VOLUME TO CAPACITY (%)	LEVEL OF SERVICE
<b>Sturt Highway (A20)</b>						
<i>George Chaffey Bridge – between Mildura and Silver City Highway, Buronga</i>	10,593	1,059 vehicles per hour (estimate)	1	3,600 (in both directions)	29.4%	B
<i>within Buronga (between Silver City Highway and Knights Road in Gol Gol)</i>	2,730 eastbound only	273 vehicles per hour in eastbound direction (estimate)	1 (eastbound only)	500 (in eastbound direction)	54.6%	C

## 4.2 HEAVY VEHICLE ROUTE RESTRICTIONS

The heavy vehicle restrictions on the prospective haulage route from Melbourne, Sydney and Adelaide as enforced by Transport for NSW are illustrated in Figure 4.4 and summarised in Table 4.3, which show the roads where each classification of heavy vehicle are allowed to travel on.

Due to the magnitude of the works, a large range of vehicle types are proposed to be used in this proposal, including those restricted access and oversized and overmass (OSOM) vehicles to be used to transfer large plant and materials and mobile cranes proposed to be used to erect the towers.

This section has assessed the existing heavy vehicle network including those approved for restricted access vehicles (i.e. 19 metres, 23 metres and 25/26 metres B-doubles), road trains (Type 1 A-double, modular B-triple, B-triple, AB-triple, Type 2 A-triple and OSOM). OSOM are defined as Class 1 vehicles under the Heavy Vehicle National Law, which are vehicle (or vehicle combination) which exceeds any general access mass or dimension limits.

The classified roads within the traffic and transport study area (i.e. Silver City Highway and Sturt Highway) currently permit access by restricted access vehicles, road trains (except for Type 2 A-triple) and OSOM vehicles.

The unclassified regional roads currently permit access by restricted access vehicles, road trains (except for AB-triple and Type 2 A-triple). OSOM are not permitted without prior approval. This would be of particular relevance within the proposal study area for roads including Renmark Road, Arumpo Road and Pooncarie Road. Further details of the potential impacts and permit requirements are provided in Section 5.3.1.2.

The majority of local roads typically only allow access of up to the largest general vehicle type (i.e. a semi-trailer).



Table 4.3 Summary of heavy vehicle route restrictions by heavy vehicle type

	19M B-DOUBLE	23M B-DOUBLE	25/26M B-DOUBLE	TYPE 1 A-DOUBLE	MODULAR B-TRIPLE	AB-TRIPLE	TYPE 2 A-TRIPLE	OSOM (INCLUDING 4.6M VEHICLES)
<b>Silver City Highway (B79)</b>								
<i>Ellerslie – between Broken Hill and Wentworth (from Broken Hill to Perry Street in Wentworth)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<i>Wentworth Town Centre (from Perry Street in Wentworth to Delta Road in Wentworth)</i>	✓	✓	✓	✓	✓	✗	✗	✗
<i>between Wentworth and Dareton (from Delta Road in Wentworth to School Road in Dareton)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<i>within Dareton Town Centre (from School Road to Fletchers Lake Road in Dareton)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<i>Mourquong – between Dareton and Buronga (from Fletchers Lake Road to Corbett Avenue)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<i>within Buronga Town Centre (from Corbett Avenue to Sturt Highway)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<b>Sturt Highway (A20)</b>								
<i>George Chaffey Bridge – between Mildura and Silver City Highway, Buronga</i>	✓	✓	✓	✓	✓	✓	✗	✓
<i>east of Buronga/Gol Gol (east of Knights Road in Gol Gol)</i>	✓	✓	✓	✓	✓	✓	✗	✓
<b>Regional roads</b>								
Arumpo Road	✓	✓	✓	✓	✓	✗	✗	✗
Renmark Road	✓	✓	✓	✓	✓	✗	✗	✗
Pooncarie Road	✓	✓	✓	✓	✓	✗	✗	✗
<b>Local roads</b>								
Fletchers Lake Road	✓	✓	✓	✓	✓	✗	✗	✗
Low Darling Road	✗	✗	✗	✗	✗	✗	✗	✗
Pomona Road	✗	✗	✗	✗	✗	✗	✗	✗
High Darling Road	✗	✗	✗	✗	✗	✗	✗	✗
Rufus River Road	✗	✗	✗	✗	✗	✗	✗	✗
Pine Camp Road	✗	✗	✗	✗	✗	✗	✗	✗
Nulla Road	✗	✗	✗	✗	✗	✗	✗	✗
Anabranche Mail Road	✗	✗	✗	✗	✗	✗	✗	✗



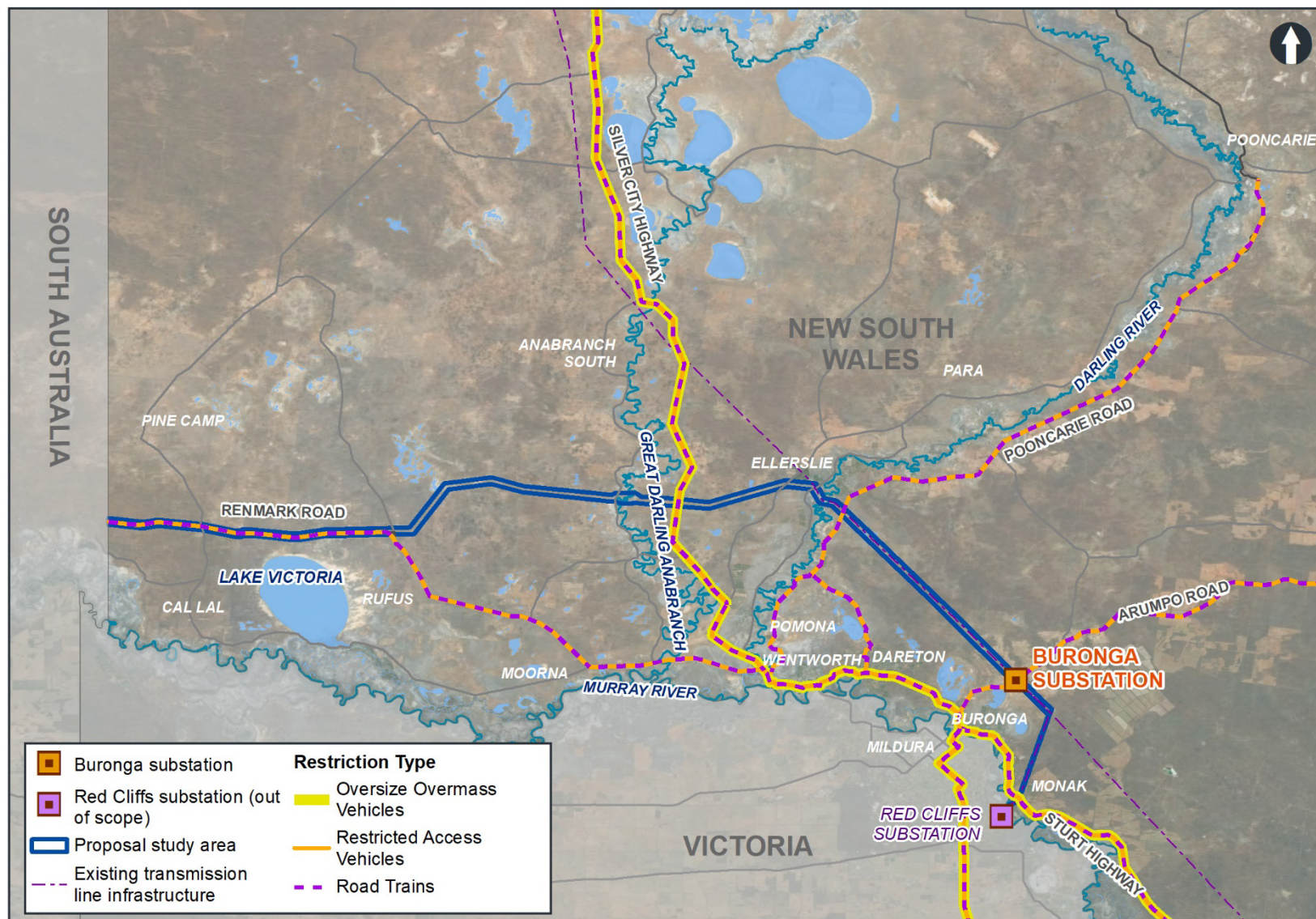


Figure 4.4 Location of heavy vehicle route restrictions

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## 4.3 ROAD SAFETY ON THE HAULAGE ROUTES

Crash and casualty data was extracted from the NSW Centre for Road Safety for the five year period between 2014 to 2018 for the region of Wentworth Shire Council. Figure 4.5 shows the identified crash locations and their relation to the proposal study area and indicative haulage routes within the Wentworth LGA and the City of Mildura region.

Section 4.3.1, Section 4.3.2 and Section 4.3.3 provide further detail of the road safety data for the potential Melbourne, Sydney and Adelaide regional haulage route options, respectively. Section 4.3.3 covers the haulage route to the Anabran South and Wentworth main construction compound and camp accommodation sites, since they are already part of the regional haulage route from Adelaide. Section 4.3.4 covers the haulage route option between the Buronga substation and the SA/NSW border worksite areas.



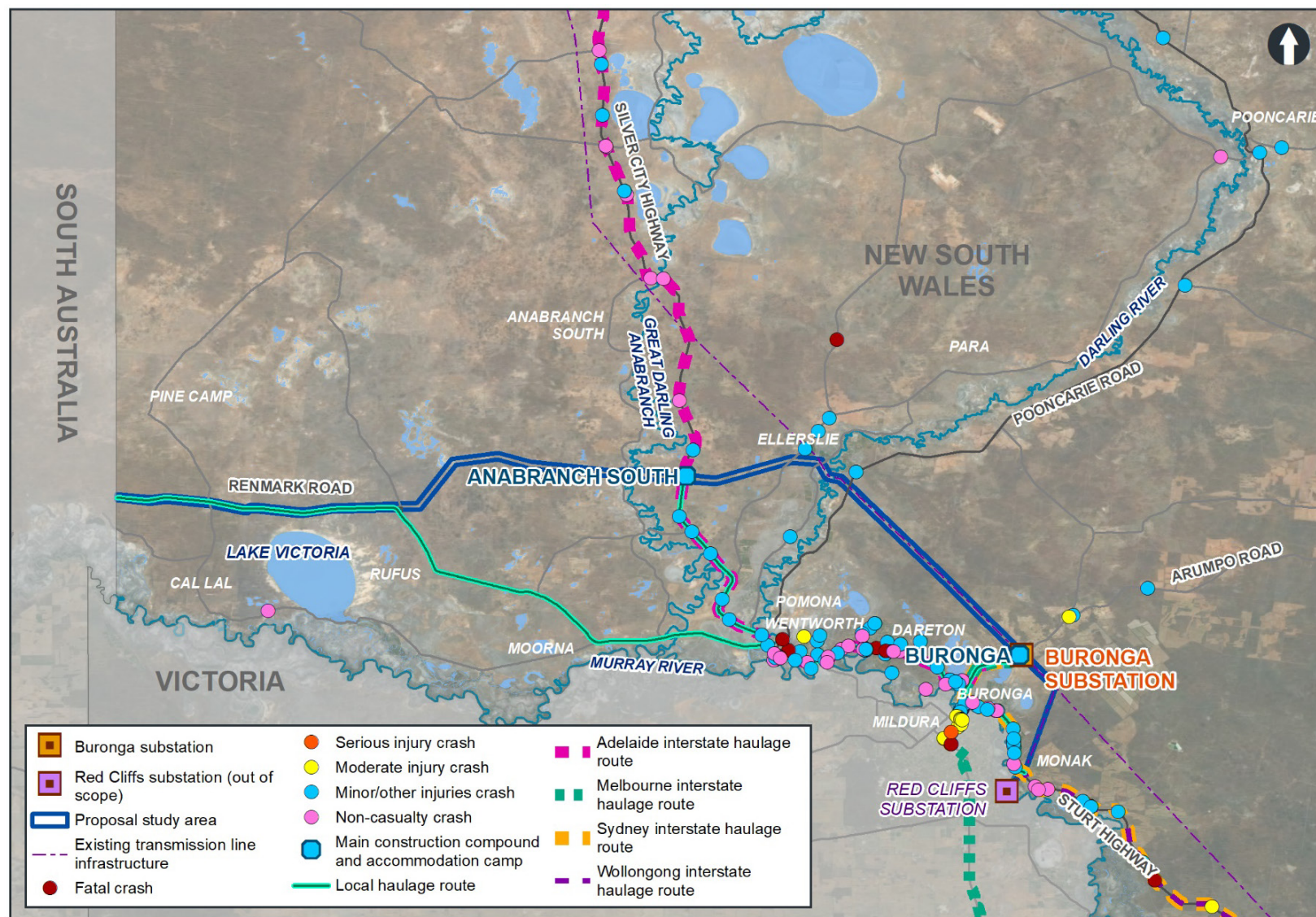


Figure 4.5 Crash locations along prospective haulage routes, main construction compound and accommodation camp sites

### 4.3.1 HAULAGE ROUTE FROM MELBOURNE DIRECTION

The haulage route option originating from Melbourne (Port of Melbourne) would be expected to traverse from the Calder Highway on the Victorian side, through Mildura along Benetook Avenue before crossing the Victorian border via the Sturt Highway (A20) south of Buronga. For deliveries to Buronga substation, vehicles would then travel along Arumpo Road.

A total of 31 crashes were identified along the haulage route between Mildura and the Buronga substation. The degree of crash classification for these instances is summarised in Table 4.4. Most of the crashes resulted in either no injury or minor injuries, with one fatal crash occurring on the Victorian side, at the intersection of Calder Highway and Sandilong Avenue when two vehicles turned into each other. Most of the crashes (48 per cent) were found to be rear-end crashes (refer to Table 4.5) and to have occurred in daylight. The majority of the crashes (52 per cent) were recorded to occur at an intersection and the remaining occurred at mid-block locations.

Table 4.4 Degree of crashes along the haulage route from Melbourne to Buronga substation

DEGREE OF CRASH	NUMBER OF CRASHES	PROPORTION
Fatal	1	3%
Serious injury	2	6%
Moderate injury	17	55%
Minor injury/other injury	8	26%
No casualty	3	10%

Table 4.5 Type of crash along the haulage route from Melbourne to Buronga substation

TYPE OF CRASH	NUMBER OF CRASHES	PROPORTION
Off-road crash	1	3%
Rear-end crash	15	48%
Animal crash	0	0%
Head on crash	2	6%
Miscellaneous	13	42%

Locations of crashes along this route are shown on Figure 4.6.



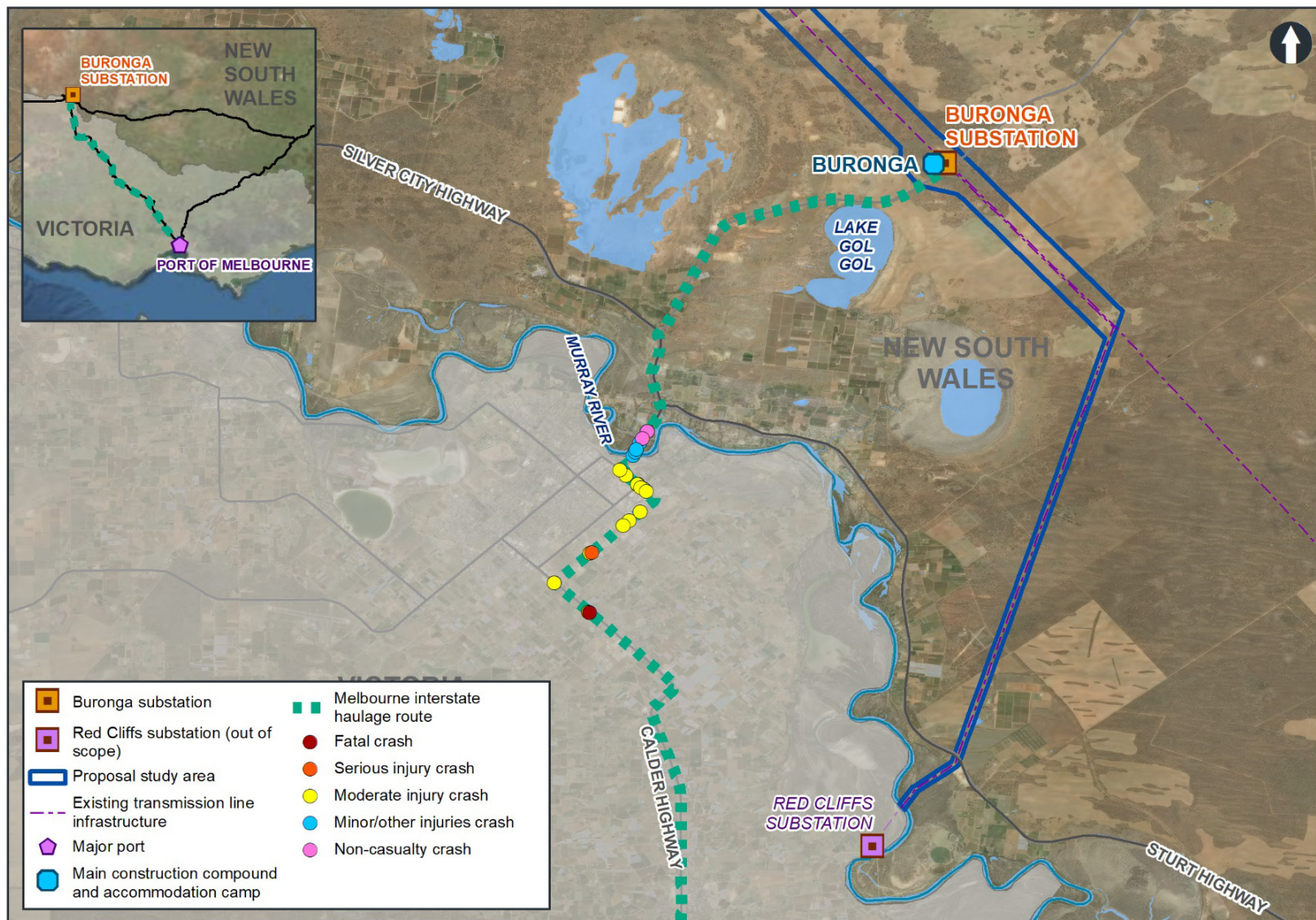


Figure 4.6 Crash locations in Melbourne to Buronga substation haulage route



### 4.3.2 HAULAGE ROUTE FROM SYDNEY AND WOLLONGONG (PORT KEMBLA)

The haulage route option originating from Sydney (Port Botany) or Wollongong (Port Kembla) direction would be expected to traverse from the eastern direction along the Sturt Highway (A20) south-east of Buronga. For deliveries to Buronga substation they would travel from the Sturt Highway along Arumpo Road.

A total of 29 crashes were identified along the haulage route on the Sturt Highway (within the Wentworth LGA). The degree of crash classification is summarised in Table 4.6. There was one fatal crash (a head on collision in 2017 on Sturt Highway approximately 40 kilometres south east of Buronga) and one crash which resulted in moderate injury. The type of crash varied between off-road, rear-end and head on collision (refer to Table 4.7) and were mostly found to have occurred in daylight. The majority of the crashes occurred in 2017 and occurred at an intersection (79 per cent), indicating that road safety is a concern closer to Buronga/Mildura as the land-uses become less rural.

Table 4.6 Degree of crashes along the haulage route from Sydney to Buronga substation

DEGREE OF CRASH	NUMBER OF CRASHES	PROPORTION
Fatal	1	3%
Serious injury	0	0%
Moderate injury	1	3%
Minor injury/other injury	16	55%
No casualty	11	38%

Table 4.7 Type of crash along the haulage route from Sydney to Buronga substation

TYPE OF CRASH	NUMBER OF CRASHES	PROPORTION
Off-road crash	7	24%
Rear-end crash	5	17%
Animal crash	2	7%
Head on crash	5	17%
Miscellaneous	10	34%

Locations of crashes along this route are shown on Figure 4.7.

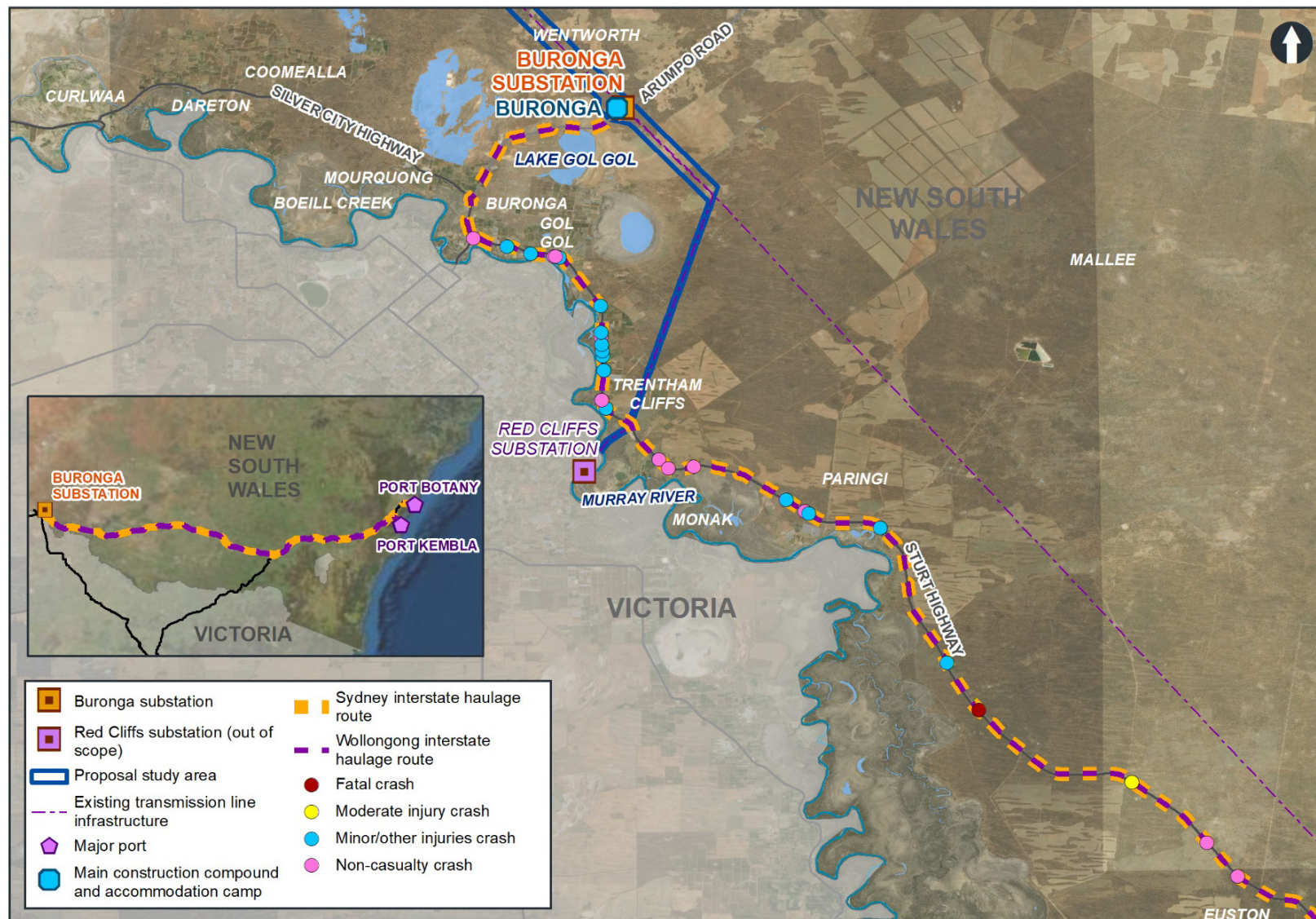


Figure 4.7 Crash locations in Sydney to Buronga substation haulage route

### 4.3.3 HAULAGE ROUTE FROM ADELAIDE

The haulage route option originating from Adelaide (Port of Adelaide) would be expected to traverse along Silver City Highway (B79) west and north of Buronga before connecting to Arumpo Road for deliveries to the Buronga substation site. From Arumpo Road, the Wentworth main construction compound and accommodation camp site (which is subject to further investigation (refer to Section 5.1.4)) is assumed, for the purposes of this assessment, to be reached by travelling west along Silver City Highway to the town of Wentworth. From the Town of Wentworth, the Anabran construction facilities can be reached by travelling north for about 30 kilometres along Silver City Highway.

A total of 45 crashes were identified along the haulage route on Silver City Highway (within the Wentworth LGA). The degree of crash classification is summarised in Table 4.8. There were two fatal crashes (a U-turn collision conducted in 2017 during darkness on Sturt Highway approximately 15 kilometres west of Buronga and an off carriage way collision where an oversteered right turn on a right bend fatality also occurred approximately 15 kilometres west of Buronga) and one crash which resulted in serious injury. The type of crash are mainly animal crashes (22 per cent) and off-road crashes (38 per cent) (refer to Table 4.9) and were mostly found to have occurred in daylight. The majority of the crashes occurred in 2018 and occurred at an intersection (67 per cent), indicating that road safety is a concern between Wentworth and Buronga as the land-uses become less rural.

Table 4.8 Degree of crashes along the haulage route from Adelaide to Buronga substation

DEGREE OF CRASH	NUMBER OF CRASHES	PROPORTION
Fatal	2	4%
Serious injury	1	2%
Moderate injury	0	0%
Minor injury/other injury	22	49%
No casualty	20	44%

Table 4.9 Type of crash along the haulage route from Adelaide to Buronga substation

TYPE OF CRASH	NUMBER OF CRASHES	PROPORTION
Off-road crash	17	38%
Rear-end crash	3	7%
Animal crash	10	22%
Head on crash	1	2%
Miscellaneous	14	31%

Locations of crashes along this route are shown on Figure 4.8.

### 4.3.4 LOCAL HAULAGE ROUTE FROM BURONGA SUBSTATION

The local haulage route option from the Buronga substation to the SA border work areas would be expected to traverse from Arumpo Road and Silver City Highway (B79) to Wentworth, before turning onto Renmark Road and travelling towards the SA border areas. There is one crash record on Renmark Road, located about 300 metres from Silver City Highway, which resulted in a minor injury from a vehicle veering to the left during dusk.



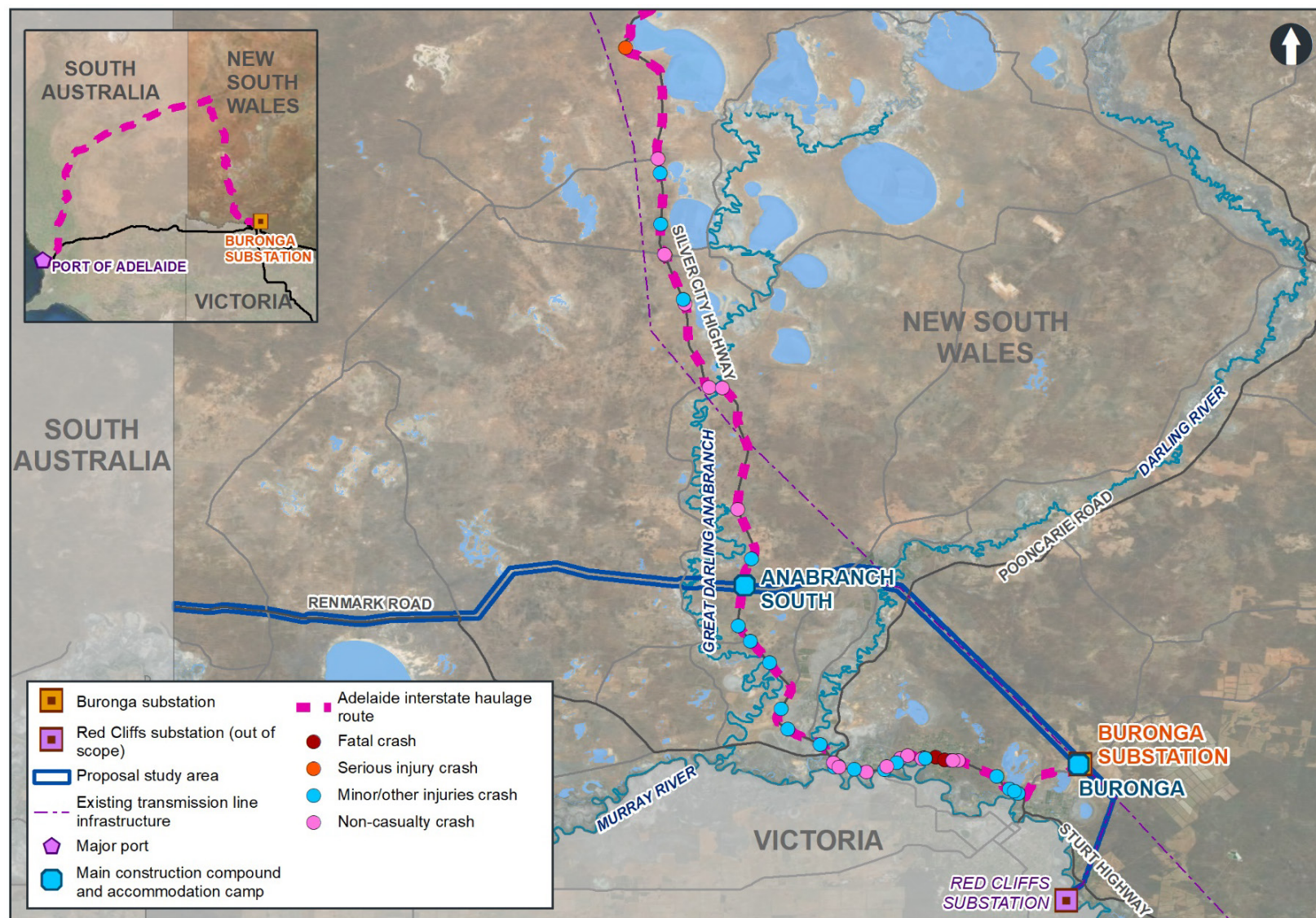


Figure 4.8 Crash locations in Adelaide to Buronga substation haulage route

## 4.4 PUBLIC TRANSPORT

### 4.4.1 BUS SERVICES

Buses provide the primary public transport service in the Wentworth LGA, which is shown in Figure 4.9 and Figure 4.10. The bus routes within the Wentworth LGA on the New South Wales side are operated by Buslink and the bus routes within the city of Mildura on the Victoria side are operated by Public Transport Victoria, where the key bus corridors and the bus routes are as follows:

- Buslink routes along Sturt Highway in New South Wales – 950, 951, 953, 954, 955, 956
- Buslink routes along Silver City Highway in New South Wales – 950, 951, 955, 956
- Public Transport Victoria routes along Calder Highway/Fifteenth Street (in Mildura) in Victoria – 100, 200
- Public Transport Victoria routes along Benetook Avenue (in Mildura) in Victoria – 400
- the section of Sturt Highway (including George Chaffey Bridge) between Mildura and Buronga serves all the Buslink services entering New South Wales, all of which originate from Mildura, with a peak of three buses per hour in each of the weekday AM and PM period direction. In terms of areas served, the primary destinations within the Wentworth LGA are the Buronga, Dareton, Wentworth and Gol Gol town centres
- Calder Highway/Fifteenth Street in the city of Mildura carries the 100 and 200 bus routes. It experiences a peak of 11 and nine buses per hour in the weekday AM and PM period directions respectively, connecting Red Cliffs to the city of Mildura; and
- Benetook Avenue in the city of Mildura carries the 400 bus route. It experiences two buses per hour in each of the weekday AM and PM period direction, providing a loop service for the south-eastern section of the city of Mildura.

Table 4.10 details the weekday AM and PM peak frequencies of bus routes in the area in the peak direction, where the AM Peak is defined as between 6:00 am and 10:00 am and the PM Peak is defined as between 4:00 pm and 8:00 pm.

Table 4.10 Bus service and frequency – weekdays

ROUTE	AM PEAK SERVICES	PM PEAK SERVICES
950	1	1
951	1	2 (arrives 90 minutes apart)
953	0	0
954	0	0
955	1	0
956	0	0
100	6 (arrives between 30 minutes and 60 minutes apart)	5 (arrives between 45 minutes and 60 minutes apart)
200	5 (arrives between 30 minutes and 50 minutes apart)	4 (arrives between 40 minutes and 50 minutes apart)
400	2 (arrives 90 minutes apart)	2 (arrives 60 minutes apart)



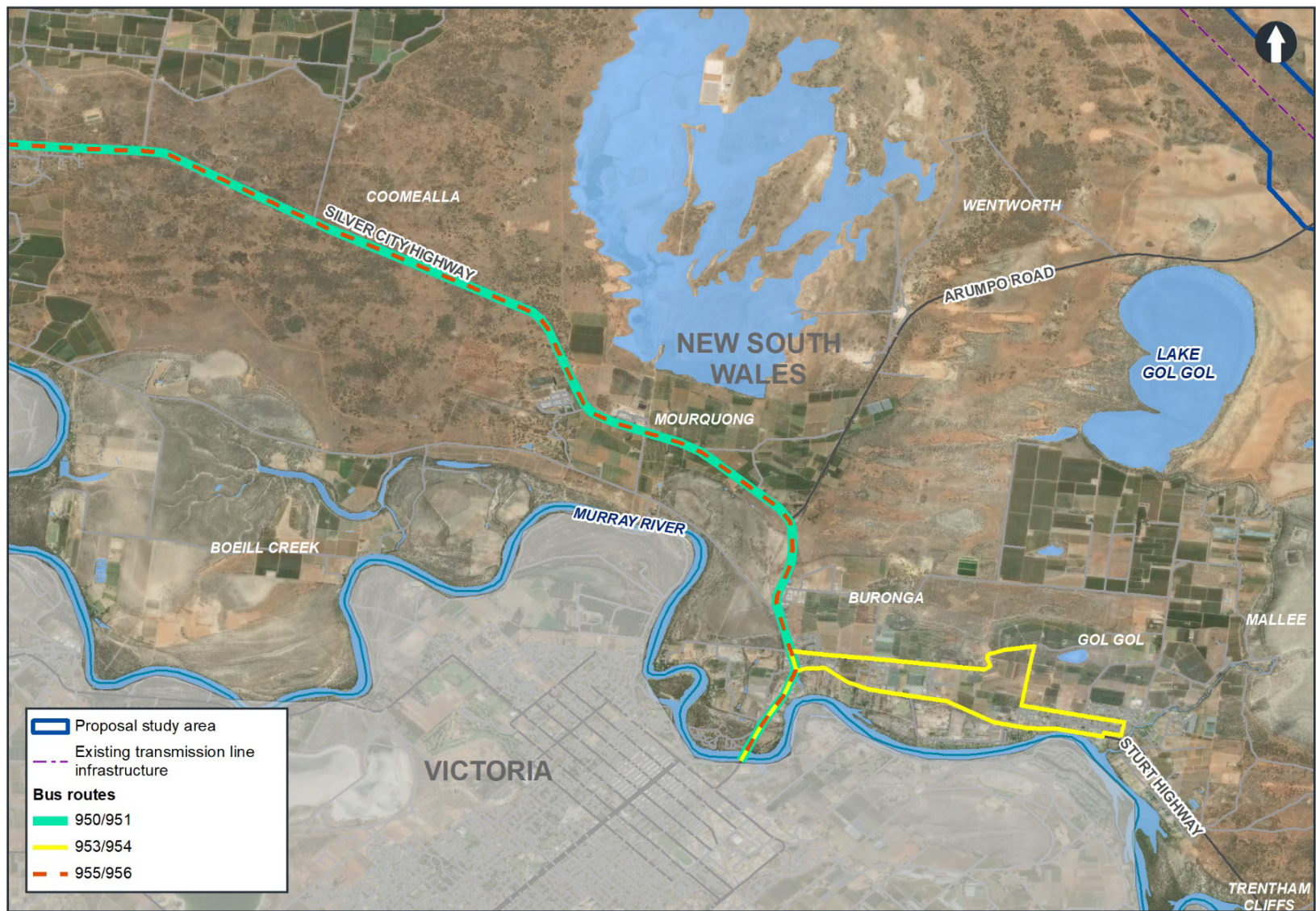


Figure 4.9 Existing bus routes relative to prospective haulage routes near Mildura





Figure 4.10 Existing bus routes relative to prospective haulage routes near Wentworth

# 5 ASSESSMENT OF CONSTRUCTION IMPACTS

This section of the report provides a summary of the indicative construction methodology and associated impacts, as required in the SEARs shown in Section 1.3.1.

## 5.1 CONSTRUCTION APPROACH

### 5.1.1 INDICATIVE CONSTRUCTION PROGRAM

The construction works are estimated to commence in mid-2021. Construction of the transmission lines is expected to take about 18 months to construct. Construction works at the Buronga substation is expected to continue to mid-2023. Site decommissioning and remediation could continue to mid-2024.

The indicative timing for the work phases for works is shown in Figure 5.1, with final completion (including the remediation of camps, laydowns, access tracks, site, documentation) to be finalised by mid 2024.

Detailed construction planning, including timing, staging, and work sequencing, would be confirmed once construction contractors have been engaged.

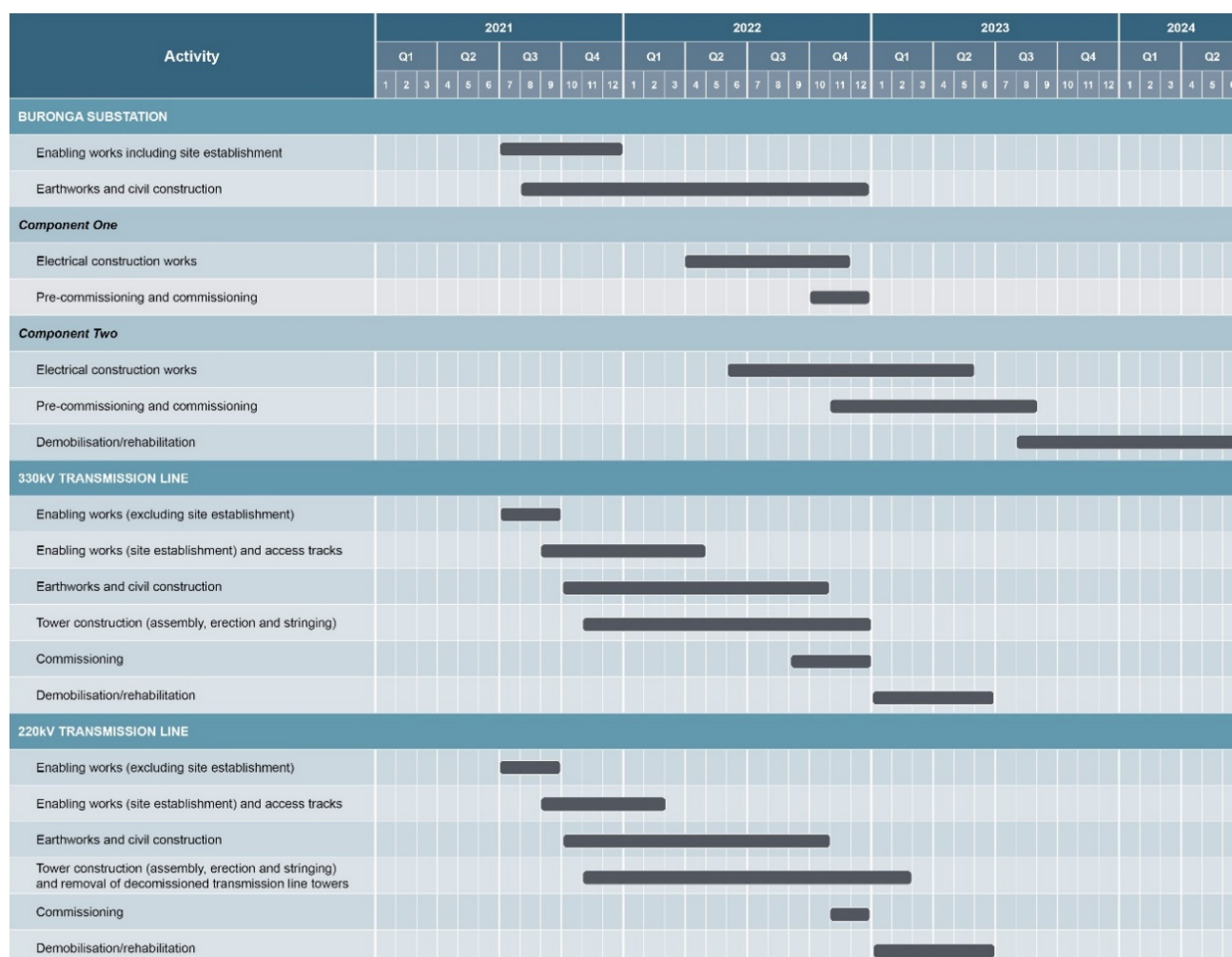


Figure 5.1 Indicative construction program

## 5.1.2 CONSTRUCTION ACTIVITIES AND WORKFORCE ESTIMATES

The general construction process covers two elements:

- upgrade and expansion of the existing Buronga substation capacity
- construction of transmission lines from the SA/NSW border to Buronga substation and from Buronga substation to Victorian border, near Monak.

### 5.1.2.1 BURONGA SUBSTATION EXPANSION

Table 5.1 below lists the proposed work phase, key activities and workforce estimates required to construct the proposed Buronga substation. These workforce numbers also translate into light vehicle movements and assessed as an impact from the construction stage in Section 5.2 and Section 5.3 respectively.

Table 5.1 Buronga substation work phase and workforce estimates

WORK PHASE	KEY CONSTRUCTION ACTIVITIES	WORKFORCE
Site establishment	<ul style="list-style-type: none"> <li>— Site Surveys (e.g. locating services/utilities)</li> <li>— Establishment of traffic management plans and site access</li> <li>— Install environmental controls</li> <li>— Vegetation clearing/tree trimming</li> <li>— Establishment of site compounds and erection of safety barriers around work site</li> <li>— Substation access road construction.</li> </ul>	10–20
Earthworks and civil construction works	<ul style="list-style-type: none"> <li>— Construction of substation bench</li> <li>— Construction of stormwater drainage system</li> <li>— Earth grid installation</li> <li>— Construction of footings including main transformer compound</li> <li>— Construction of spill oil drainage system including oil containment tank.</li> <li>— Construction of substation fencing</li> <li>— Construction of conduits and pits.</li> </ul>	80–100
Electrical construction works	<ul style="list-style-type: none"> <li>— Structure and High Voltage equipment erection</li> <li>— Transformer delivery and installation</li> <li>— Cabling and termination</li> <li>— High Voltage conductor installation.</li> </ul>	80–100
Switchyard surfacing	<ul style="list-style-type: none"> <li>— Installation of gravel around the substation.</li> </ul>	10
Pre-commissioning	<ul style="list-style-type: none"> <li>— Point to Point testing</li> <li>— High Voltage testing</li> <li>— High Voltage equipment operational check</li> <li>— Protection, control, and metering system testing.</li> </ul>	20–30
Commissioning/energisation	<ul style="list-style-type: none"> <li>— Transmission line cutover</li> <li>— Protection, control, and metering checks</li> <li>— High Voltage equipment operation.</li> </ul>	20–30
Demobilisation	<ul style="list-style-type: none"> <li>— Removal of temporary construction facilities</li> <li>— Rehabilitating and landscaping work sites and the affected area (as required/proposed)</li> <li>— Removing environmental controls once areas are established.</li> </ul>	10



### 5.1.2.2 TRANSMISSION LINE CONSTRUCTION WORKS

Table 5.2 below lists the proposed work phase, key activities and workforce estimates required to construct the proposed transmission line construction works.

Table 5.2 Work phase and workforce estimates for transmission line construction

WORK PHASE	KEY CONSTRUCTION ACTIVITIES	WORKFORCE
Enabling works (excluding site establishment)	<ul style="list-style-type: none"><li>— Site surveys (e.g. locating services/utilities)</li><li>— Establishment of traffic management plans and site access</li><li>— Install environmental controls</li><li>— Vegetation clearing/tree trimming along easements.</li></ul>	8–12
Site establishment and vegetation clearance	<ul style="list-style-type: none"><li>— Establishment of work sites and access tracks to structures for construction of towers.</li></ul>	8–12
Earthworks and civil construction works	<ul style="list-style-type: none"><li>— Excavation of pole and tower foundations at various sites along the easements</li><li>— Installation of pole butts &amp; tower foundations, including pole &amp; concrete deliveries.</li></ul>	40–50
Tower assembly, erection and stringing.	<ul style="list-style-type: none"><li>— Delivery of prefabricated steel work to each tower site, assembly of towers</li><li>— Erection of towers</li><li>— Stringing of conductors</li><li>— Removal of redundant 220kV transmission line structures.</li></ul>	40–50
Commissioning/energisation	<ul style="list-style-type: none"><li>— Testing and commissioning works.</li></ul>	20

### 5.1.3 CONSTRUCTION HOURS

The work hours for the construction phase is proposed to be between 7:00 am and 7:00 pm 7 days a week. Some works may need to be undertaken outside of these hours to minimise interruption to the road network and therefore direct impacts to the community.

### 5.1.4 CONSTRUCTION COMPOUNDS AND ACCESSES

Three main construction compound and camp sites are identified for the proposal. Large laydown areas for the transmission lines steel, conductors and hardware would be located at these facilities with some smaller laydown facilities at other worksites along the transmission line corridor.

The three main construction compound and camp sites:

- Anabranh South
- Buronga
- Wentworth.

At the time of writing of this report, two of the sites have been confirmed, being the sites located at Anabranh South on Silver City Highway, approximately 30 kilometres north of Wentworth, and adjacent to the existing Buronga substation. However, the exact location of the Wentworth site location is still to be confirmed. There is potential that it would be located fronting the Silver City Highway.

Suitably sized and located temporary access points off the adjacent roadways would be required for each of the three construction compound and camp sites. The Anabran South site would be within the proposal study area and directly adjacent to Silver City Highway. This would require the construction of temporary access point, directly from the unsealed highway road shoulder (which currently comprises of minor shrubbery vegetation) to the new construction compound site. Similarly, the site at Wentworth may need to undergo a similar temporary access point upgrade, depending on the selected location. For the site adjacent to Buronga substation, temporary access points from Arumpo Road would be required. Some vegetation clearing may be required alongside the unsealed road shoulders of Arumpo Road to facilitate this.

The accesses at each of the sites would require appropriate acceleration and deceleration lanes to allow heavy vehicles to safely enter and exit the road network, specifically Arumpo Road and Silver City Highway. The design of these would be confirmed during detailed design and approval obtained from the relevant roads authority prior to the commencement of works.

## 5.1.5 VEHICLES, PLANT AND EQUIPMENT

The proposed works would require an array of heavy rigid vehicles (i.e. concrete trucks, flatbed and tilt-tray), semi-trailers, varying types of mobile cranes (franna cranes, 50 to 300 tonne cranes) and earth moving vehicles (i.e. roller, backhoe, piling rig, dozer, grader and excavators).

The largest vehicle to access the site is likely to be an over-sized and over-mass 300 tonne crane and 150 tonne crane for the respective substation and transmission line construction. Large plant would need to be transported to the site via articulated vehicles (semi-trailers) which may qualify as an over-sized vehicle; however, the majority of bulk of material transfers would require the use of rigid trucks (general access vehicles). These movements would be classed as heavy vehicle movements and some as OSOM movements.

Further discussion on the heavy vehicle movement and impacts are provided in Section 5.2.2 and Section 5.3.

## 5.1.6 EARTHWORKS

Table 5.3 below details the earthworks required to construct the proposed Buronga substation expansion and transmission line construction works.

Table 5.3 Earthworks required for the construction phase

ITEM	APPROXIMATE EXCAVATED VOLUME (CUBIC METRES)	APPROXIMATE FILL VOLUME (CUBIC METRES)	EARTHWORK BALANCE (CUBIC METRES)	TYPICAL DEPTH (METRES)
<b>Substation – Buronga NSW</b>	Bulk earthworks to remove unsuitable for compaction sand/soil for the Substation pad construction 250,000 cubic metres to 350,000 cubic metres	Imported quarry products/fill suitable for compaction 250,000 to 350,000 cubic metres	Landscaping, drainage, crushed rock topping 25,000 cubic metres	Typical depth 2 (majority) to 6 (low spots in land parcel to be filled)
<b>330kV transmission line – SA Border to Buronga NSW</b>	Excavation for tower foundations, assuming self-supporting structure with four foundations per structure 270 structures x 200 cubic metres each = 54,000 cubic metres total	Reinforced concrete would be used to fill the excavations	Nil	Up to 5 metres, with piling depths up to 25 metres

ITEM	APPROXIMATE EXCAVATED VOLUME (CUBIC METRES)	APPROXIMATE FILL VOLUME (CUBIC METRES)	EARTHWORK BALANCE (CUBIC METRES)	TYPICAL DEPTH (METRES)
<b>220kV transmission line</b> – Buronga to Victorian Border	Excavation for tower foundations, assuming self-supporting structure with four foundations per structure 60 structures x 200 cubic metres each = 12,000 cubic metres total	Reinforced concrete would be used to fill the excavations	Nil	Up to 5 metres, with piling depths up to 25 metres

Assuming a 42.5 tonne (80 cubic metres) truck-and-dog is used to export unsuitable soil and import suitable fill aggregate for compaction, approximately 6,250 to 8,750 trucks would be required to import the materials to the site. However, this would be spread out across the construction program, with the aim to operate approximately 80 trucks per day.

In addition to the above earthworks, prefabricated steel would also be transported to construct the transmission line. This would be imported via the shipping ports requiring approximately 400, 20 tonne containers to transfer the materials and would require the use of articulated vehicles (B-doubles or similar). There is an estimated maximum daily peak of 80 heavy vehicles operating, which includes B-Doubles.

## 5.2 TRIP GENERATION AND DISTRIBUTION

### 5.2.1 WORKFORCE TRIP GENERATION AND DISTRIBUTION

For the construction of substation, it is envisaged that a full-time work force of 80-100 workers would be required during the undertaking of earthworks, civil construction works, and electrical construction works. For the construction of the transmission line, full-time work force of 40–50 workers would be required during the undertaking of earthworks, civil construction works, tower assembly and stringing.

It is estimated that 400 full-time equivalents (FTE) would be utilised at the peak construction time of the proposal. It is expected that these construction workers would be based at accommodation camps and be spread according to the approximate following breakdown:

- Anabran South (approximately 100 FTE)
- Wentworth (approximately 100 FTE)
- Buronga (approximately 200 FTE).

It is envisaged that 60 per cent of work force would be domestic fly-in-fly-out (FIFO) arrangements, with half to be expected from NSW and the other half from Victoria, and another 20 per cent would be sourced from overseas. They would be arriving via Mildura airport and transferred to the camp sites via arranged public transport (taxi or minibuses) or shuttle buses, subject to any health order restrictions. The remaining 20 per cent of the work force would be locally sourced. The use of arranged public transport or shuttle buses would greatly minimise the trips generated by construction workers. Additionally, separating the camp sites would minimise concentration of traffic issues and locate the workforce closer to the work sites.

During construction, a peak of approximately 250 light vehicle movements and approximately 80 heavy vehicle movements (including mini buses) per day would be generated. These are conservative estimates, assuming one-person car occupancy for light vehicle trips, with the camp sites at 100 per cent occupancy. The camp sites are not likely to operate at full capacity at all times due to various work demand as scheduled in different stages of the proposal.

The accommodation camp sites are estimated to consist of 60 per cent population at commencement of construction, 80 per cent population at three months after commencement of construction and 100 per cent population at the following three months. The traffic movement estimates for each accommodation camp site are further broken down in Table 5.4.

Table 5.4 Trips generated by workers

COMPOUND AND CAMP SITES	WORKERS (FTE)	FIFO WORKERS+ OVERSEAS WORKERS (80% FTE) [A]	LOCAL WORKERS (20% FTE) [B]	TRIPS WITHIN SITES [C]	LIGHT VEHICLE TRIPS [B*2 + C]	MINIBUS TRIPS [(A/20) *2]	COMBINED TOTAL TRIPS
Anabran South	100	80	20	30	70	8	78
Wentworth	100	80	20	30	70	8	78
Buronga	200	160	40	30	110	16	126
<b>TOTAL</b>	<b>400</b>	<b>320</b>	<b>80</b>	<b>90</b>	<b>250</b>	<b>32</b>	<b>282</b>

- (1) Inbound and outbound trips are calculated separately
- (2) Trips within sites include those generated by workers to coordinate works between various locations
- (3) Assume all local workers travel in single occupant vehicles
- (4) Assume 20-seater bus is used to transport FIFO workers

#### 5.2.1.1 PARKING REQUIREMENTS

To accommodate parking for the peak workforce, the following minimum supply of parking spaces would be provided:

- five minibus parking spaces
- 45 heavy goods vehicle (HGV)
- 30 car parking for supervisors and managers; and
- 190 car parking for light vehicles.

These would be provided off-street and distributed across the work sites and camps.

#### 5.2.2 HEAVY VEHICLE TRIP GENERATION

Heavy vehicle trips would be related to:

- the substation equipment – this would come from shipping port (Melbourne, Adelaide or Sydney based) to the Buronga substation. These deliveries would require OSOM vehicle movements to transport the large specialist equipment for Buronga substation
- transmission line structures – All steel work for the transmission line structures would be prefabricated at the factory and shipped from the factory in shipping containers via shipping ports. These would then travel on road via heavy vehicle transport to their location along the transmission line corridor
- quarry products such as rock, gravel, sand and soil – these would be sourced from suppliers in South West NSW and North East Victoria and generally within 250 kilometres of the worksites. Other raw materials such as cement would be sourced from Mildura (Victoria)
- spoil haulage routes for disposal, and haulage of steel and metals for recycling – these would be transported to either West Sydney (NSW) or Melbourne (Victoria).

Heavy vehicle trips generated from the construction activity would predominantly involve the delivery of construction plant, cranes, components, construction camps facilities and the movement of construction materials (steel structures for the transmission line towers, concrete, quarry products, cement, water supply and other materials). The delivery of plant and some construction materials will be required using articulated vehicles such as semi-trailers, truck and dog and low loaders. Rigid trucks, varying in size will be used throughout the project and include concrete trucks, water cartage, five tonne and 12 tonne vehicles.



The 300 tonne crane would remain the largest vehicle to be used during construction of the substation. A 150 tonne crane would be the largest vehicle required to erect the transmission line.

The following summarises the expected traffic and transport activities required for construction:

- 15 to 80 (peak) heavy vehicles a day including articulated vehicles and rigid vehicles which would include the transporting of earthworks from quarries and prefabricated materials from shipping ports
- 10 per cent of total heavy vehicle movement would be OSOM vehicles (this equates to 1 to 3 OSOM vehicles)
- 10 per cent of total heavy vehicle movement includes cranes/other large equipment requiring transportation (this equates to 1 to 3 cranes/other large equipment).

### 5.2.2.1 HAULAGE ROUTES

The shipping port locations which would receive each of the deliveries are not confirmed at this stage in the process. Three locations are being considered including Sydney (Port Botany), Adelaide (Port of Adelaide) and Melbourne (Port of Melbourne). The final haulage routes from each of these locations would be determined by the appointed contracted and they would need to accord with the heavy vehicle haulage guidelines in each of the respective states.

Haulage routes from port facilities would be expected to include:

- Port Botany or Wollongong (Port Kembla) – travel from Sydney or Wollongong (Port Kembla) to Buronga via Wagga Wagga along the Hume Highway (M31) and Sturt Highway (A20), before reaching Arumpo Road to access the Buronga substation site
- Port of Adelaide – travel from Adelaide to Buronga via Broken Hill along Silver City Highway (B79), before reaching Arumpo Road to access the Buronga substation site; and
- Port of Melbourne – travel from Melbourne to Buronga via Mildura along Calder Highway (A79) and Benetook Avenue (C255) on the Victorian side, before crossing the Murray River along George Chaffey Bridge on Sturt Highway (A20) and reaching Arumpo Road to access the Buronga substation site.

These routes are depicted in Figure 4.1.

The local haulage routes between the construction work areas would include:

- Buronga substation to the 330kV transmission line work site areas in the west via Wentworth – travel from Arumpo Road and Silver City Highway (B79) to Wentworth, before turning onto Renmark Road and travelling towards the western worksite areas; and
- Buronga substation to 220kV transmission line work sites (near Monak) – travel from Arumpo Road, onto Silver City Highway (B79) to the Sturt Highway (A20), exiting at the transmission line worksite areas.

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## 5.3 CONSTRUCTION IMPACT ASSESSMENT

### 5.3.1 IMPACT ON ROAD NETWORK

#### 5.3.1.1 CAPACITY

Most of the roads proposed to be used as haulage route currently have low traffic volumes and are well within the road capacity considering their respective configurations.

The increase of light vehicles movements by a peak of 250 light vehicle movements per day and heavy vehicle movements by a peak of 80 movements per day, which translates to a maximum 1.65 per cent increase from current traffic volumes in both directions, would not be expected to adversely impact the capacity and serviceability of the road network and at intersections. Heavy vehicle traffic movements would also be distributed throughout the day to minimise their impact on town centres' peak traffic activities.

Table 5.5 below depicts the impact on the capacity of the key haulage route on the road network with the additional traffic movements proposed as part of the proposal. Additionally, surrounding roads which do not form part of the haulage route may experience higher traffic movements due to the overall temporary increase in population of the town with additional 400 people workforce proposed. The traffic impacts are likely to be limited, given the workforce would travel on fixed routes to get to/from the sites, and during certain hours of the day, with the proposed work hours.

The increase in traffic volumes due to construction activities are not likely to significantly impact the efficiency of the road network. Sturt Highway in Buronga may experience a higher traffic volume which would marginally reduce its level of service.

Table 5.5 Impact of additional construction traffic on road network performance

ROAD NAME AND LOCATION	EXISTING DAILY TRAFFIC VOLUME (VEHICLES PER DAY)	INITIAL VOLUME/ CAPACITY AND LEVEL OF SERVICE	WITH ADDITIONAL CONSTRUCTION TRAFFIC VOLUMES (VEHICLES PER DAY)	RESULTING VOLUME/ CAPACITY AND LEVEL OF SERVICE
<b>Arumpo Road</b>	327	0.9% (LoS A)	657	1.83% (LoS A)
<b>Silver City Highway (B79)</b>				
<i>Ellerslie – between Broken Hill and Wentworth (from Broken Hill to Perry Street in Wentworth)</i>	358	1.0% (LoS A)	688	1.91% (LoS A)
<i>Wentworth Town Centre (from Perry Street in Wentworth to Delta Road in Wentworth)</i>	2,559	12.8% (LoS A)	2,889	14.45% (LoS A)
<i>Mourquong – between Dareton and Buronga (from Fletchers Lake Road to Corbett Avenue)</i>	2228	6.2% (LoS A)	2,558	7.11% (LoS A)
<i>within Buronga Town Centre (from Corbett Avenue to Sturt Highway)</i>	5,478	27.4% (LoS B)	5,808	29.04% (LoS B)
<b>Sturt Highway (A20)</b>				
<i>George Chaffey Bridge – between Mildura and Silver City Highway, Buronga</i>	10,593	29.4% (LoS B)	10,923	30.34% (LoS B)
<i>within Buronga (between Silver City Highway and Knights Road in Gol Gol)</i>	2,730 eastbound only	54.6% (LoS C)	3,060	61.20% (LoS D)

### 5.3.1.2 OVERSIZE AND OVERMASS VEHICLE ACCESS

The approach to OSOM deliveries for the proposal is on the basis that routes would be used which would not necessitate road or bridge widening or strengthening to provide access of the OSOM vehicles. Transporting an OSOM vehicle requires careful planning to minimise the impact to the surrounding road network and community. It may also require the application of a permit to the National Heavy Vehicle Regulator (NHVR) if the OSOM combination does not comply with a mass, dimension or operating requirements set out in a gazette notice. The permit application includes consideration of the vehicle characteristics, areas or routes, pilot and escort requirements and travel restrictions on the road network.

The use of pilots and escort vehicles would also be required. In NSW and SA, this would be carried out by the police, and in Victoria this service would be provided by NHVR's Safety Compliance Officer.

The proposed haulage routes considered from Sydney, Adelaide and Melbourne are discussed in Section 5.2.2.1. For most part, the haulage route would travel through the classified roads (Silver City Highway and Sturt Highway), which as detailed in Section 4.2, currently permit access by restricted access vehicles, road trains (except for Type 2 A-triple) and OSOM vehicles.

The unclassified regional roads currently permit access by restricted access vehicles, road trains (except for AB-triple and Type 2 A-triple). OSOM are not permitted without prior approval. This includes Renmark Road, Arumpo Road and Pooncarie Road which would be required to access the Buronga substation and other parts of the proposal study area.

The specific details of vehicle types, route options and time of deliveries would be made clearer closer to the date of construction, as such, the application to operate OSOM on the road network, particularly on the unclassified regional roads would be the responsibility of the construction contractor.

Submission of a Transport Management Plan (TMP) to comprehensively document the "High Risk" OSOM movements is required to Transport for NSW to obtain approval prior to undertaking the transporting activity. The "High Risk" criteria are detailed in Table 5.6 below.

Table 5.6 "High Risk" Criteria for OSOM Movements

CRITERIA	TMP REQUIRED IF VEHICLE IS:
Length	> 40 metres
Height	> 5.2 metres
Rear overhang	> 7.5 metres
Forward projection	> 5.5 metres
Width	> 6.0 metres
Total combination weight	> 150 tonnes
Route	Refer to NSW Oversize Overmass Load Carrying Vehicles Network Map (TfNSW, 2020)

Source: *Transport Management Plans for oversize and/or overmass movements in NSW (TfNSW, 2013)*

### 5.3.1.3 CONSTRUCTION SITE ACCESS POINTS

At all main construction compound and accommodation camp site locations, acceleration and deceleration lanes may be provided to allow heavy vehicles to safely enter and exit the road network. This would also minimise operational interruption to the road network, maintaining the desired operational speed.

The design of these access provisions would consider the speed limit, traffic volumes on the road network and intended use of the access point. Alterations and upgrades to the existing road networks, including these acceleration and deceleration lanes (if required), are temporary and would be removed after the construction phase.

The design and appropriate environmental assessment of these access provisions would be undertaken prior to construction commencing, where approval would be obtained prior to construction of the access points from the relevant roads authority. Any designs will be conducted in accordance with the Austroads Guide to Road Design and Austroads Guide to Traffic Management.

#### 5.3.1.4 ROAD CONDITION

The increased use of heavy vehicles and OSOM vehicle is likely to have a moderate impact to the condition of the road network. The construction contractor would be required to undertake road pre-condition survey to record the pavement condition along the haulage routes. This would be undertaken to understand the existing condition of the road pavement along the haulage routes. Following completion of construction works (and as needed through the construction period to maintain safe road conditions), the roads would be repaired to address pavement failures resulting from the increased construction and haulage activities from the proposal.

#### 5.3.2 IMPACTS FROM TEMPORARY ACCESS TRACKS

The construction of the transmission lines would require temporary access tracks to be created where existing tracks to reach a construction site do not currently exist. Any required temporary access tracks would be established by the construction contractor and removed after the construction phase is finished, unless these are required for permanent access. The establishment of access tracks would include construction of access tracks to accommodate safe access of construction machinery and materials to each transmission line structure site and the expanded substation site.

The use of temporary access tracks would provide a positive impact as it would provide direct access to proposed work areas. This is particularly beneficial to manage the traffic movements and would enable:

- appropriate wayfinding for haulage drivers and workers to the site
- appropriate temporary road and intersection design which is safe, appropriately delineated and suitable for all-weather conditions to accommodate the different types of construction vehicles; and
- a consolidation of accesses to different sites which would minimise disturbance to the surrounding environment, including the abutting roads.

TransGrid would consult with relevant landholders to determine the location of access tracks for the proposal. Any permanent access tracks would consider future access required for emergency vehicles and operational purposes. The design of permanent access tracks will substantially rely on use of existing property owner access gates, driveways, tracks or as otherwise agreed with each landholder.

#### 5.3.3 IMPACTS ON ACTIVE TRANSPORT

Active transport involves transport mode users who are either walking or cycling to reach their destinations. The bulk of the works would be undertaken without extensive interaction with the active transport facilities on the road network. Where interaction does occur, the construction contractor through the preparation of a Construction Traffic Management Plan (CTMP) would be required to maintain the existing active transport infrastructure including footpaths, bicycle paths, shared paths and on-road shoulders as appropriate. Where disruption to the facilities is required, a detour of the route would be planned accordingly.

A deficient bicycle lane currently exists on George Chaffey Bridge between Mildura and Buronga, which is part of the Sturt Highway (approved restricted access route) and would form part of the haulage route to the Port of Melbourne. The proposal however would only impact this part of the road network with the limited increase in truck movements likely to be experienced during construction.



#### 5.3.4 *IMPACTS ON PUBLIC TRANSPORT*

Buses form the main public transport service in the proposal study area. The main bus corridors are along Sturt Highway and Silver City Highway on the New South Wales side, while Benetook Avenue and Calder Highway/Fifteenth Avenue carry buses on the Victorian side in the city of Mildura. Buses are relatively infrequent, with a maximum of 11 bus services operating out of the weekday peak AM and PM periods of 6:00 am to 10:00 am and 4:00 pm to 8:00 pm respectively.

The construction of the proposal is not envisaged to require road closures that would affect the existing public transport routes. However, should a road closure be required, the construction contractors would liaise with the relevant public transport service providers, local council and TfNSW accordingly.

Some limited and occasional delays to some routes may be experienced if they coincide with peak heavy vehicle movement periods.

#### 5.3.5 *IMPACTS ON ROAD SAFETY*

Based on the crash pattern analysis of the latest available crash data, it is indicated that a large proportion of crashes were associated with off-road crashes, rear-end crashes and some head-on crashes.

Overall, a typical increase of one to two per cent and a maximum of seven per cent in daily traffic volumes (including heavy vehicles) from existing conditions, as calculated in Table 5.5. This can be readily accommodated on the road network (which have low traffic volumes and are found to operate efficiently with good level of service), and would not exacerbate safety issues on the road network.

However, the increase of heavy vehicle activities, including OSOM vehicles to transfer materials and construction plants may have some impact on the pavement condition along the haulage route. It is important to note however that the haulage route have been selected based on the road's suitability to carry heavy vehicles, cross checked against the current restrictions established by Transport for NSW. As such, it is considered that the safety impact due to increased heavy vehicle movements is minor. To further minimise the impact, a road precondition survey of the road pavement would be undertaken and the pavement condition would be monitored and repaired accordingly.

The haulage route to the proposal site from either Sydney, Port Kembla, Melbourne or Adelaide shipping ports would each require extensive travel time and the issue of travel fatigue may be present for drivers undertaking the haulage activities. As such, effective fatigue management must be implemented for drivers.

#### 5.3.6 *IMPACTS TO PROPERTY ACCESS*

Access to properties for residents (including for emergency vehicle access and egress) is expected to be maintained throughout the construction phase. In some limited circumstances, short-term restrictions for a particular property may need to be imposed with prior consultation with the affected party. There is expected to be minimal impacts to property access due to the rural nature of the proposal, however, some properties along the proposed 220kV transmission line near Monak may be affected for short periods as there are smaller land holdings in this area. This would be mitigated through establishing a communication process with landholders, keeping them informed of construction staging and work schedule.

# 6 ASSESSMENT OF OPERATIONAL IMPACTS

This section summarises the ongoing maintenance works required to service assets, outlining the measures to maintain the road network.

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## 6.1 MAINTENANCE ACTIVITIES

After the construction stages of the proposal has been finalised, the upgraded and expanded substation at Buronga would need to be inspected and maintained by field staff regularly in conjunction with having the capacity to respond in the event of an emergency. The newly constructed transmission lines are expected to require minimal regular maintenance. The likely maintenance activities at the substation have been identified as:

- regular inspections (ground and aerial), maintenance of electrical equipment and general maintenance of vegetation within easement. This would likely be conducted with light vehicles for transport and carrying handheld equipment on a maximum frequency of every month
- general building, asset protection zone and landscaping maintenance. This would likely be conducted with light vehicles for transport and carrying tools for landscaping and vegetation maintenance such as chainsaws on a maximum frequency of every six months
- fire detection system inspection and maintenance. This would likely be conducted with light vehicles for transport on a maximum frequency of every six months
- stormwater maintenance. This would likely be conducted with light vehicles for transport and carrying equipment for inspections on a maximum frequency of every six months.

The following maintenance activities are generally required for the transmission lines during ongoing operation:

- annual fly over by a light aircraft as part of seasonal bushfire prevention survey
- routine asset inspection on a six yearly cycle for self-supporting towers and three yearly cycle for guyed structures by a light vehicle (four wheel drive with a crew of up to three personnel), by driving from public roads to the easement by property owner access tracks, then generally from structure to structure along the easement. Structures would be inspected both from the ground and by personnel climbing the structure
- routine/planned line maintenance (three to six year cycle) by four-wheel drive light vehicles, elevated work platform and medium sized truck with five to 10 personnel to rectify any defects found from routine inspections
- ad hoc fault and emergency fly over by a light aircraft to assess asset condition during unplanned outage (e.g. due to weather, failure of assets). This is expected to be a rare (once per year) event. Subsequent to completion of damage assessment, a crew of up to 10 personnel would require access for repair of any damaged assets using light four-wheel drive vehicles, elevated work platforms and a medium sized truck
- fault and emergency crew, this is a rare (once per year) event, by light four-wheel drive, elevated work platform and medium sized truck with five to 10 personnel
- vegetation maintenance, which would occur every five years (excluding rectification works) with a crew of around six personnel.

As described above, any maintenance activities required for the transmission lines are expected to be infrequent (up to once yearly). If and when required, these activities are also expected to be either transient/ of short duration (e.g. flyover, drive-by) or local to a specific section/ transmission line structure.

## 6.2 MAINTENANCE WORKS VEHICLE VOLUMES, ACCESS, ROUTES AND SCHEDULING

### 6.2.1 MAINTENANCE WORKS WORKFORCE SIZE

Table 6.1 summarises the estimated maximum workforce size (based on the provided workforce estimates for the construction phase) for the ongoing operational activities required to maintain the upgraded and expanded Buronga substation expansion. The new transmission lines are expected to require minimal maintenance (ranging from three to 10 workers).

A conservative estimate of the maximum workforce required to conduct maintenance works is 50 workers, assuming that the key maintenance activities are undertaken concurrently. It is however expected that daily movements would be substantially lower on a typical day.

Table 6.1 Maintenance works and maximum workforce estimates

KEY MAINTENANCE ACTIVITIES	ESTIMATED MAXIMUM WORKFORCE
Regular inspections, maintenance of electrical equipment and general vegetation maintenance within easement	20
General building, asset protection zone and landscaping maintenance	10
Fire detection system inspection and maintenance	10
Stormwater maintenance	10

### 6.2.2 TRAFFIC GENERATION FROM MAINTENANCE WORKS

For the operation and maintenance of the Buronga substation and the transmission lines, it is conservatively estimated that there would be a monthly peak workforce of 50 workers operating concurrently. These workers are likely to travel with light vehicles as the main form of transport of personnel and tools. There is expected to be no regular heavy vehicle trips generated from the operational and maintenance activities.

It is assumed that there would be a daily peak of 100 light vehicles movements, resulting from a worst case peak workforce of 50 workers travelling to and from site within a day. This is based on the assumption that there would be an additional 100 vehicles per day travelling to the Buronga substation and other parts of the transmission line. These volumes are also a conservative peak and a normal day would have few vehicle movements. Depending on the origin, these vehicles will travel along Arumpo Road, Silver City Highway and Sturt Highway, adding a negligible impact to the road network performance, as shown in Table 6.2.

Similarly, the extra traffic from light vehicle movements from the operational and maintenance phase would have a negligible impact on the local roads that provide access to the transmission line, detailed in Table 4.1. The rural nature of these local roads indicates they likely have high road capacity, and include:

- Pooncarie Road
- Low Darling Road
- Pomona Road
- High Darling Road
- Renmark Road
- Rufus River Road
- Pine Camp Road
- Nulla Road
- Anabranche Mail Road.

### 6.2.3 SITE MAINTENANCE ACCESS AND ROAD ACCESS

Permanent access tracks may be constructed to support ongoing maintenance operations, however, impacts would be minimal due to the low volume of vehicles generated over this phase. In addition, access and egress for emergency vehicles would be maintained.

Access to the proposed easement for operational purposes would preferentially use existing public and private roads and tracks. Access easements may be required to provide TransGrid with access from the nearest public road to the easement. These access easements would be negotiated with landholders as necessary. TransGrid may install locked and signed access gates to enable access to the easement should a landholder not have a suitable existing gate nearby.

In the extreme case that there is a need for an OSOM vehicles carrying a load such as a crane that requires access to the site, there would need to be an application for an OSOM permit through the National Heavy Vehicle Regulator body to permit the delivery.

## 6.3 OPERATIONAL IMPACT ASSESSMENT

### 6.3.1 IMPACT ON THE ROAD NETWORK

Over the operational and maintenance phase, there is expected to be a maximum increase of 100 daily light vehicle movements, which is likely to have a negligible impact on the road network in the traffic and transport study area. These volumes are also a conservative peak and a normal day would have few vehicle movements.

Table 6.2 illustrates the impact on the capacity on the key roads on the road network resulting from the additional traffic generated.

Table 6.2 Impact of additional traffic from the operational/maintenance phase on road network performance

ROAD NAME	EXISTING TRAFFIC VOLUME (VEHICLES PER DAY)	INITIAL VOLUME/ CAPACITY AND LEVEL OF SERVICE	WITH ADDITIONAL OPERATIONAL TRAFFIC VOLUMES (VEHICLES PER DAY)	RESULTING VOLUME/ CAPACITY AND LEVEL OF SERVICE
Arumpo Road	327	0.9% (LoS A)	427	1.19% (LoS A)
<b>Silver City Highway (B79)</b>				
<i>Ellerslie – between Broken Hill and Wentworth (from Broken Hill to Perry Street in Wentworth)</i>	358	1.0% (LoS A)	458	1.27% (LoS A)
<i>Wentworth Town Centre (from Perry Street in Wentworth to Delta Road in Wentworth)</i>	2,559	12.8% (LoS A)	2,659	13.30% (LoS A)
<i>Mourquong – between Dareton and Buronga (from Fletchers Lake Road to Corbett Avenue)</i>	2228	6.2% (LoS A)	2,328	6.47% (LoS A)



ROAD NAME	EXISTING TRAFFIC VOLUME (VEHICLES PER DAY)	INITIAL VOLUME/ CAPACITY AND LEVEL OF SERVICE	WITH ADDITIONAL OPERATIONAL TRAFFIC VOLUMES (VEHICLES PER DAY)	RESULTING VOLUME/ CAPACITY AND LEVEL OF SERVICE
<i>within Buronga Town Centre (from Corbett Avenue to Sturt Highway)</i>	5,478	27.4% (LoS B)	5,578	27.89% (LoS B)
<b>Sturt Highway (A20)</b>				
<i>George Chaffey Bridge – between Mildura and Silver City Highway, Buronga</i>	10,593	29.4% (LoS B)	10,693	29.70% (LoS B)
<i>within Buronga (between Silver City Highway and Knights Road in Gol Gol)</i>	2,730 eastbound only	54.6% (LoS C)	2,830	56.60% (LoS D)

The increase in traffic volumes in the operational phase are not likely to significantly impact the efficiency of the road network. Sturt Highway in Buronga may experience a higher traffic volume which would reduce its level of service, however the increase from the background volume is considered minor.

### 6.3.2 IMPACTS ON ACTIVE TRANSPORT

George Chaffey Bridge between Mildura and Buronga, which is part of Sturt Highway, is the only section of road in the study area with dedicated cycling and pedestrian facilities. The rural nature of the traffic and transport study area results in minimal active transport activity as there are no road shoulders or line-markings on the roads in the rest of the traffic and transport study area to accommodate active transport except for the Sturt Highway which has lane shoulders that allow cyclists to traverse in.

The additional light vehicle traffic generated over the operational and maintenance phase of the proposal is expected to have a negligible impact on the active transport network in the traffic and transport study area.

### 6.3.3 IMPACTS ON PUBLIC TRANSPORT

As the main form of public transport in the traffic and transport study area, the main bus corridors are Sturt Highway and Silver City Highway on the New South Wales side, while Benetook Avenue and Calder Highway/Fifteenth Avenue carry buses on the Victorian side in the city of Mildura. Buses are relatively infrequent, with a maximum of 11 bus services operating out of the weekday peak AM and PM periods of 6:00 am to 10:00 am and 4:00 pm to 8:00 pm respectively.

The additional light vehicle traffic generated over the operational and maintenance phase of the project is expected to have a negligible impact on the public transport network in the traffic and transport study area.

### 6.3.4 IMPACTS ON ROAD SAFETY

Due to the low magnitude, the additional light vehicle traffic generated over the operational and maintenance phase of the proposal is expected to have a negligible impact on road safety in the traffic and transport study area.

### 6.3.5 IMPACTS TO PROPERTY ACCESS

Access to properties for residents (including for emergency vehicle access and egress) is expected to be maintained throughout the operational and maintenance phase. Should there be a requirement for a short-term restriction for a particular property, prior consultation with the affected party would be undertaken.

# 7 CUMULATIVE IMPACT

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## 7.1 OVERVIEW

Cumulative impact assessment means the consideration of other nearby development projects along with the proposal. Projects with the potential for cumulative impacts with the proposal were identified through a review of publicly available information and environmental impact assessments from the following databases:

- NSW Major Projects website (NSW Government, searched June 2020)
- Wentworth Shire Council website (Wentworth Shire Council, searched June 2020); and
- Australian Government – Department of Environment and Energy, EPBC Public notices list (Australian Government, searched June 2020).

This chapter aims to identify and discuss the cumulative impacts of proposed land development and transport projects.

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## 7.2 PROJECTS

Three proposed developments have been identified and these include:

- Copi Mineral Sands Mine
- Buronga Solar Farm
- Buronga – Gol Gol residential expansion.

### 7.2.1 *COPI MINERAL SANDS MINE*

The Copi Mineral Sands development, located around 25 kilometres north of the proposal, involves an open cut mineral sands mine and associated infrastructure to extract and process up to 1.5 million tonnes per annum (Mtpa) for up to six years, transporting the heavy mineral concentrate via road for off-site processing; and progressively rehabilitating the site.

This development is in the early stages of planning, but the impacts of the project will largely be isolated from the proposal. The proposal aims to transport heavy mineral concentrate via road to Broken Hill for further processing off-site. The traffic and transport impact during construction and operational phases are expected to be relatively localised to the proposal study area and low impact and therefore cumulative impacts are not expected.

### 7.2.2 *BURONGA SOLAR FARM*

The Buronga Solar Farm development included a 400 MW solar farm with energy storage and associated infrastructure located adjacent to the proposal Buronga substation. The proposal is in the early stages of planning.

At the peak of construction, there could be up to 400 construction workers travelling to and from the proposal site each day. During operation, there would be approximately five to ten operations staff travelling to and from the site each day.

The proposal site is accessed from Arumpo Road, which currently has a very low traffic volume of less than 350 vehicles per day. Lane capacity are typically conservatively estimated at 1,800 vehicles per hour.

At the time of writing this report, the estimated construction and operational date of the Buronga Solar Farm was not available. However, given the substantial residual capacity available on Arumpo Road, the impact between the two construction sites, should the peak construction works coincide, are considered manageable within the existing road network capacity.

To minimise localised impacts on Arumpo Road, the construction contractors of both sites are to coordinate any activities that would impact any access requirements for the sites. Subject to regular coordination between the two proposals, the cumulative impact during construction is considered minor.

Negligible operational cumulative impacts would be expected due to the low number of operational staffs required for either proposals.

### 7.2.3 *BURONGA – GOL GOL RESIDENTIAL EXPANSION*

Wentworth Shire Council are planning new subdivisions to provide approximately 500 new large residential housing allotments in the Buronga – Gol Gol growth area, approximately 10 kilometres to the west of the proposal study area.

During construction, the impact of proposed residential expansion would be localised to the intersections or road network accessing the proposed Buronga-Gol Gol growth area, which would include Silver City Highway and Sturt Highway. Given the well distributed and minor increase in traffic generated by the EnergyConnect proposal, the cumulative impact with the proposed residential expansion is considered negligible.

No operational cumulative impacts would be expected due to the low number of operational staffs required for the EnergyConnect proposal.

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## 7.3 ADDITIONAL TRANSPORT PROJECTS

### 7.3.1 *STATE-LEVEL TRANSPORT PROJECTS*

The NSW Government is currently upgrading and sealing 209 kilometres of sections of Cobb Highway and Silver City Highway, which is expected to be complete by 2022. This project is conducted north of the town of Broken Hill (outside of the traffic and transport study area for this proposal), which is on the prospective haulage route from the Port of Adelaide, travelling from Broken Hill to Buronga along Silver City Highway. The cumulative impacts from the construction traffic generated by this upgrade is expected to conflict with construction vehicles for the proposal that travel along Silver City Highway to reach the Anabran South compound facility or as part of the regional Adelaide haulage route. If the contractor chosen uses Adelaide as the origin for the haulage route, this highway upgrade project is likely to have some impact on the accessibility and timing of the construction phase of the project, which is expected to run from 2021 to mid-2022.

This highway upgrade project is expected to involve substantial amounts of construction materials and earthworks, as well as an estimated workforce of 150 workers per year, which will generate increased light vehicle and heavy vehicle movement along Silver City Highway, which is part of the haulage route during the construction phase.

### 7.3.2 *LOCAL ROAD UPGRADES*

In the event of flooding, accidents or roadworks, Wentworth Shire Council will conduct road closures on the local roads within the council area. These roads will be subject to road closures pending a road condition assessment conducted by Wentworth Shire Council, resulting in the diversion of traffic onto other local roads.

Arumpo Road is a local road within Wentworth Shire Council, and closures during wet periods may present a significant issue, as there are no other alternative routes to Buronga substation. Similarly, if the other local roads, such as Renmark Road, that provide access to the transmission line (detailed in Table 4.1) are subject to road closure, there may be a need to be investigate alternative routes for construction and maintenance traffic.

## 8 MITIGATION MEASURES

In all stages of construction, the appointed Construction Contractor is to actively liaise with and provide regular updates to the relevant road authority and stakeholders; and inform road users of the proposed works on the road network.

In addition, a traffic and transport management sub-plan will be prepared as part of the Construction Traffic Management Plan. The sub-plan will be prepared in consultation with Wentworth Shire Council to identify the key management and response strategies to potential transport-related delays and disruptions that may arise due to the proposal. It will include (as a minimum):

- measures to minimise disruption to pedestrians, cyclists and motorists
- management of safe vehicle access/egress from construction compounds and other construction work areas
- measures to manage oversize and overmass vehicle movements during construction, which will consider activities of adjoining land uses and safety of the public, such as entering urban areas from rural highways
- management of long-distance travel through driver fatigue management measures
- measures to ensure safe access to existing properties during construction, or provision of suitable alternatives.

The possible impact and proposed mitigation measures are discussed in more detail in Table 8.1.

Table 8.1 Mitigation measures – construction

REFERENCE	IDENTIFIED MITIGATION MEASURE	TIMING	LOCATIONS
TA1	Site access/egress points will be designed to minimise conflicts with vehicle movements on the road network and in accordance with relevant safety requirements. This may include the provision of acceleration and deceleration lanes at accommodation camp locations. Any designs will be in accordance with the Austroads Guide to Road Design and Austroads Guide to Traffic Management, Traffic Control at Worksites and approved by the relevant road authority.	Detailed design	All roads that intersect with the transmission line corridor or are on haulage routes.
TA2	Road pre-condition surveys on construction haulage routes will be carried out prior to the commencement of construction in consultation with relevant councils and road owners. This will include identification of existing conditions and mechanisms to repair damage to the road network caused by construction vehicles associated with the proposal.	Pre-construction	All roads that intersect with the transmission line corridor or are on haulage routes.
TA3	The community will be notified in advance of proposed road network changes through appropriate forms of communication.	Construction	All locations.
TA4	Road Occupancy Licence(s) will be sought (as required) for any road closures (full or partial) prior to any such closure. The timing of any closures will be carried out to minimise impacts to the road network.	Construction	All roads that intersect with the transmission line corridor or are on haulage routes.



REFERENCE	IDENTIFIED MITIGATION MEASURE	TIMING	LOCATIONS
TA5	<p>Permits from the National Heavy Vehicle Regulator (NHVR) will be obtained where required to provide oversized and overmass vehicles access during construction.</p> <p>Permit applications will be supported by a Vehicle Movement Plan (VMP), prepared to indicate the proposed heavy vehicle route(s). The Vehicle Movement Plan would consider activities of adjoining land uses and safety of the public, particularly when entering urban areas from rural highways.</p>	Construction	All roads that intersect with the transmission line corridor or are on haulage routes.
TA6	Construction access/egress, and construction movements, will be managed to ensure pedestrian and cyclist safety.	Construction	Sturt Highway (George Chaffey Bridge).
TA7	Adjustments to haulage routes in response to road closures by Wentworth Shire Council (e.g. during wet weather conditions or during other maintenance or other upgrade activities) will be identified in consultation with Wentworth Shire Council and affected residents, and suitable management measures identified and implemented.	Construction	Local roads within the study area.
TA8	Access to properties for emergency vehicles will be provided at all times.	Construction	All locations.
TA9	Access to properties will be maintained or alternative arrangements agreed in consultation with landholders.	Construction	All locations.
TA10	Following completion of construction, condition surveys of road pavements will be carried out. Any damage as a result of construction vehicles will be repaired following the completion of construction (and as needed through the construction period to maintain safe road conditions).	Construction	All roads that intersect with the transmission line corridor or are on haulage routes.
TA11	Co-ordination of traffic management arrangements between major construction projects will occur in consultation with the relevant road authorities (Transport for NSW and local councils) and/or other proponents as relevant. This will consider any potential conflicts in relation to deliveries and identified haulage routes during construction.	Construction	Silver City Highway, Arumpo Road.

## 9 CONCLUSION

This report has assessed the traffic and transport impacts of the proposed construction and operation of the proposal. The report addresses the Secretary Environment Assessment Requirements (SEARs), related to the traffic and transport associated impact on the capacity, condition, safety and efficiency of the local and State road network and to detail the ongoing maintenance works required to service assets, outlining the measures to maintain the road network.

**Construction** – The construction of the proposal is likely to extend up from 2021 to around mid-2023. The works would be typically divided into the upgrade of the Buronga substation and construction of transmission lines.

Three primary compound and camp sites would be used to house workers at the sites listed below. This would spread out the works, transport activities and thus impact to the road network and surrounding communities.

- Anabran South, NSW (approximately 100 FTE)
- Wentworth NSW (approximately 100 FTE)
- Buronga NSW (approximately 200 FTE).

In addition to the above, it is expected that a maximum of 80 heavy vehicles would be used on a daily basis to transport materials and plants to the construction sites. It is also expected for the accommodation camp sites to generate approximately 250 vehicles per day. Access to the sites above would include appropriately designed acceleration and deceleration bays to ensure safe access and egress to the road network. The design and appropriate environmental assessment of these access provisions would be undertaken prior to construction commencing. Any designs will be in accordance with the Austroads Guide to Road Design and Austroads Guide to Traffic Management.

The peak traffic movements resulting from the works have been assessed and would generally result in minor increase to the overall demand on the road network. The capacities of assessed road network are also assessed to be sufficient in accommodating the additional traffic movements due to construction works.

Haulage activities by heavy vehicles including OSOM vehicles would be required during construction. The haulage routes have been selected on roads that have current allowance to accommodate such vehicles. Appropriate Vehicle Movement Plans (VMP) and fatigue management plan will be developed to provide safety for drivers and public. Permit application for access by OSOM vehicles would also be processed upon determination of dates and fixed routes proposed to access the sites.

**Operational** – The operation of the substation and transmission lines would not require full-time workers on-site. The facilities are also considered to be low-maintenance infrastructure. It is envisaged that mitigation works would be undertaken on a regular, however infrequent basis (maximum monthly). The traffic generated by operational works is considered minor and the impact considered negligible.

Overall, it is considered that the traffic and transport impact associated with the construction and operation of the proposal would be generally low. Any moderate impacts are manageable through the upgrade of access points, consideration of permit application for OSOM, implementation of a fatigue management plan and vehicle movement plan for haulage routes, and a road pre-condition survey and pavement asset maintenance plan to manage the impacts associated with pavement quality along the haulage routes.

# 10 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (WSP) for TransGrid (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated September 2019 and agreement with the Client dated 31 October 2020 (Agreement).

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## 10.1 PERMITTED PURPOSE

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Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and/or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

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# 11 REFERENCES

Austroads, 2020. *Guide to Traffic Management Part 3 – Transport Study Analysis and Methods*.

Buslink. 2020. New Bus Route for New South Wales Communities - Buslink. [online] Available at: <[buslink.com.au/new-bus-route-for-new-south-wales-communities/](https://buslink.com.au/new-bus-route-for-new-south-wales-communities/)> [Accessed 16 June 2020].

NHVR. 2020. Oversize Overmass Permit. [online] Available at: <[nhvr.gov.au/road-access/access-management/applications/oversize-overmass-permit/](https://nhvr.gov.au/road-access/access-management/applications/oversize-overmass-permit/)> [Accessed 16 June 2020].

NSW Government, 1993, *Roads Act No.33*.

NSW Government, 2014, *NSW Road Rules*.

NSW Government, 2016, Towards Zero <<https://towardszero.nsw.gov.au/>> [Accessed 16 June 2020].

NSW Government, 2018, *Moving more with less – The NSW Heavy Vehicle Access Policy Framework*.

Roads and Maritime Services, 2020, Cobb Highway and Silver City Highway sealing and upgrade program <[rms.nsw.gov.au/projects/cobb-hwy-silver-city-hwy-upgrade/index.html](https://rms.nsw.gov.au/projects/cobb-hwy-silver-city-hwy-upgrade/index.html)> [Accessed 16 June 2020].

Roads and Maritime Services, 2020, <[rms.nsw.gov.au/about/news-events/news/roads-and-maritime/2017/171006-sturt-highway-speed-limit-change-on-way.html](https://rms.nsw.gov.au/about/news-events/news/roads-and-maritime/2017/171006-sturt-highway-speed-limit-change-on-way.html)> [Accessed 16 June 2020].

Transport for NSW, 2018, *Traffic Control At Work Sites – Technical Manual*.

Wentworth Shire Council, 2020. Available at: <<https://www.wentworth.nsw.gov.au/road-closures.aspx>> [Accessed 16 June 2020].

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