APPENDIX R
Transport impact assessment

Evolution MINING

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Transport Impact Assessment

Cowal Gold Operations - Open Pit Continuation Project

Prepared for Evolution Mining

April 2023

Transport Impact Assessment

Cowal Gold Operations - Open Pit Continuation Project

Evolution Mining

J190417 RP34

April 2023

Version	Date	Prepared by	Approved by	Comments
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1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of Cowal Gold Operations (CGO), an existing open pit and underground gold mine approximately 38 kilometres (km) north-east of West Wyalong, in the central west region of New South Wales (NSW).

CGO is located on the traditional lands of the Wiradjuri People and is immediately adjacent to the western foreshore of Lake Cowal, which is an ephemeral waterbody. The existing CGO mine is shown at a regional scale in Figure 1.1 and a local setting in Figure 1.2.

CGO was first approved in 1999, and open pit mining operations commenced in 2005. Underground mining operations were approved in 2021 and development works to enable underground mining are underway.

Evolution is seeking approval for further open pit mining operations at CGO through the Open Pit Continuation Project (the Project). The Project primarily seeks to continue the open pit operations by approximately 10 years to 2036 and extend the total mine life by approximately two years to 2042.

This Transport Impact Assessment (TIA) report forms part of the Open Pit Continuation Project Environmental Impact Statement (EIS). It documents the assessment methods, results and the initiatives built into the project design to avoid and minimise traffic impacts, and the additional mitigation and management measures proposed to address residual impacts which cannot be avoided.

1.2 Project overview

This will involve further development of the existing E42 Pit and the development of open pit mining of three adjacent orebodies, known as the 'E46', 'GR' and 'E41'. It is noted that the three new open pits will be within the existing mining lease (ML 1535). No change to the approved ore processing rate of 9.8 Mt per annum is proposed.

A detailed description of the Project is contained in Chapter 4 of the EIS and a conceptual Project layout is shown in Figure 1.3. The Project comprises the following key components:

- the continued operation of activities as approved under DA14/98 and SSD 10367
- development of three new open pits (the 'E46', 'GR' and 'E41' pits) to the north and south of the existing open pit, within the current approved mining lease
- extending the existing open pit to the east and south via a 'cutback' within the current approved mine lease
- extending open pit mining operations by approximately 10 years to 2036 and total mine life by approximately 2 years to 2042
- expansion of the IWL to accommodate life of mine tailings
- extension of the lake protection bund (LPB) system to provide continued separation and mutual protection between Lake Cowal and the mine
- backfilling of one of the new open pits (E46) with waste rock and establishment of a new waste rock emplacement on the backfilled pit to minimise the additional area required for waste rock disposal
- expansion of the footprint of the existing WRE areas to accommodate additional waste rock

- development of additional topsoil and subsoil stockpiles to accommodate materials from pre-stripping, with materials to be reused during progressive mine rehabilitation
- upgrades to existing surface water drainage system, to assist with on-site water management and maximise on-site water conservation
- modification of internal site access and haul roads
- development of new water storages and relocation of some components of the surface water drainage system
- construction and operation of a secondary site access off Lake Cowal Road to the north of the existing ML
- modification and relocation of some existing auxiliary mining infrastructure.

Other than the changes to existing approved activities as set out above, all activities that are currently approved under the existing Ministerial development consents are intended to continue.

The Project will not change existing ore processing rates or methods, tailings disposal methods, main site access, water supply sources or hours of operation. The Project will also retain the existing open pit mining workforce.

1.3 Purpose of this report

This TIA has been prepared by EMM Consulting Pty Limited (EMM) in accordance with the relevant Council and NSW government assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

The assessment is based on the following general scope for matters to consider in a TIA, which is defined by the Transport for NSW (TfNSW) Guide to Traffic Generating Developments (RTA, 2002):

- review of background traffic data and previous assessments carried out for CGO
- the existing traffic flows on major roads and at intersections in the locality
- the proposed construction and operational traffic circulation and car parking
- impacts assessment of the construction traffic on the external road network and intersections
- consideration of public transport and pedestrian and cycling infrastructure
- future road works and mitigation measures.

1.4 Assessment requirements

1.4.1 Secretary's Environmental Assessment Requirements

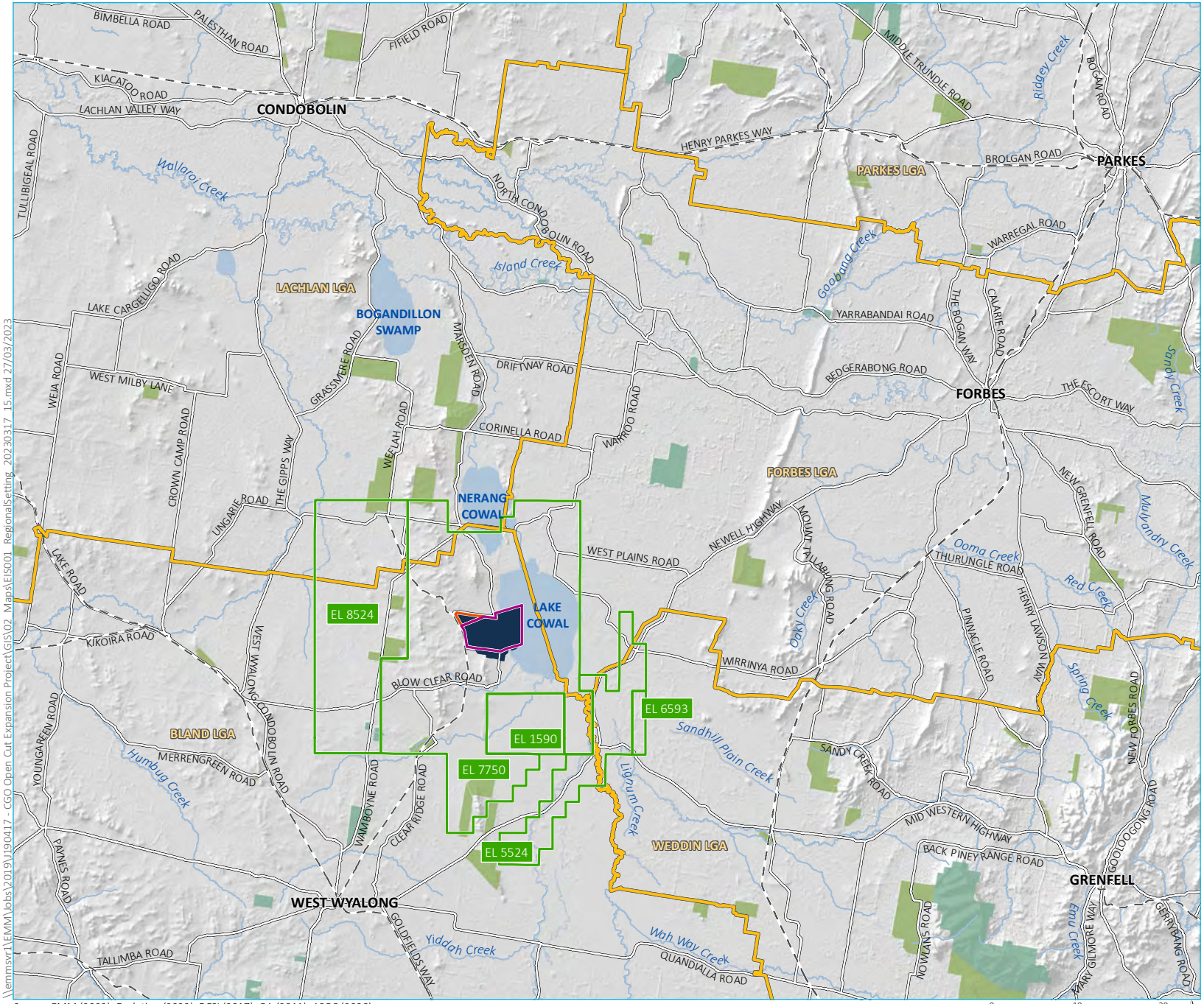
This assessment has been prepared in accordance with requirements set out in the Secretary's Environmental Assessment Requirements (SEARs) for the Project. The SEARs identify matters which must be addressed in the EIS. Table 1.1 lists individual requirements relevant to this TIA and the section in this report where the requirements are addressed.

Table 1.1 Transport related SEARs and where addressed

Item no.	SEARs	Where addressed
1	an assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the road and rail networks and any cumulative impacts of other developments in the locality, including:	Sections 4.1 and 4.2 discuss the Project traffic impacts on road network capacity. Section 4.1 and 4.2 discusses the Project traffic impacts on road network condition. Section 3.3 discusses the potential for cumulative traffic impacts.
2	• the site access routes, site access point and road closures in accordance with the *Roads Act 1993*	Section 2.2 and Figure 2.1 to Figure 2.3 detail site access routes and site access points for this Project.
3	• a description of the measures that would be implemented to mitigate and / or manage potential traffic impacts including a schedule of all required road upgrades, road maintenance contributions, management of oversized and over mass traffic and other traffic control measures, road closures developed in consultation with the relevant road authority.	Chapter 5 discusses the mitigation measures for this Project. Section 4.3 and 4.4 includes results of assessment of road upgrades which do not identify any road upgrades required for this Project. Section 4.9 considers Over Size Over Mass (OSOM) vehicle movements for the Project. The Project applicant (CGO) is already responsible for much of the road maintenance for local roads in the surrounding area and this arrangement will continue with the proposed Project.

1.4.2 Agency comments

In addition to the above SEARs, Transport for New South Wales (TfNSW) in its letter dated 3 June 2022 and Bland Shire Council (BSC) in its email dated 1 June 2022 have provided additional traffic and transport assessment requirements and comments. These traffic and transport requirements and comments and where they are addressed have been presented in Attachment A.



KEY

- Project area
- Mining lease (ML1535)
- Mining lease (ML1791)
- Exploration licence (EL)
- Rail line
- Main road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve
- State forest

Source: EMM (2023); Evolution (2023); DFSI (2017); GA (2011); ASGC (2006)

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Regional setting

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Figure 1.1

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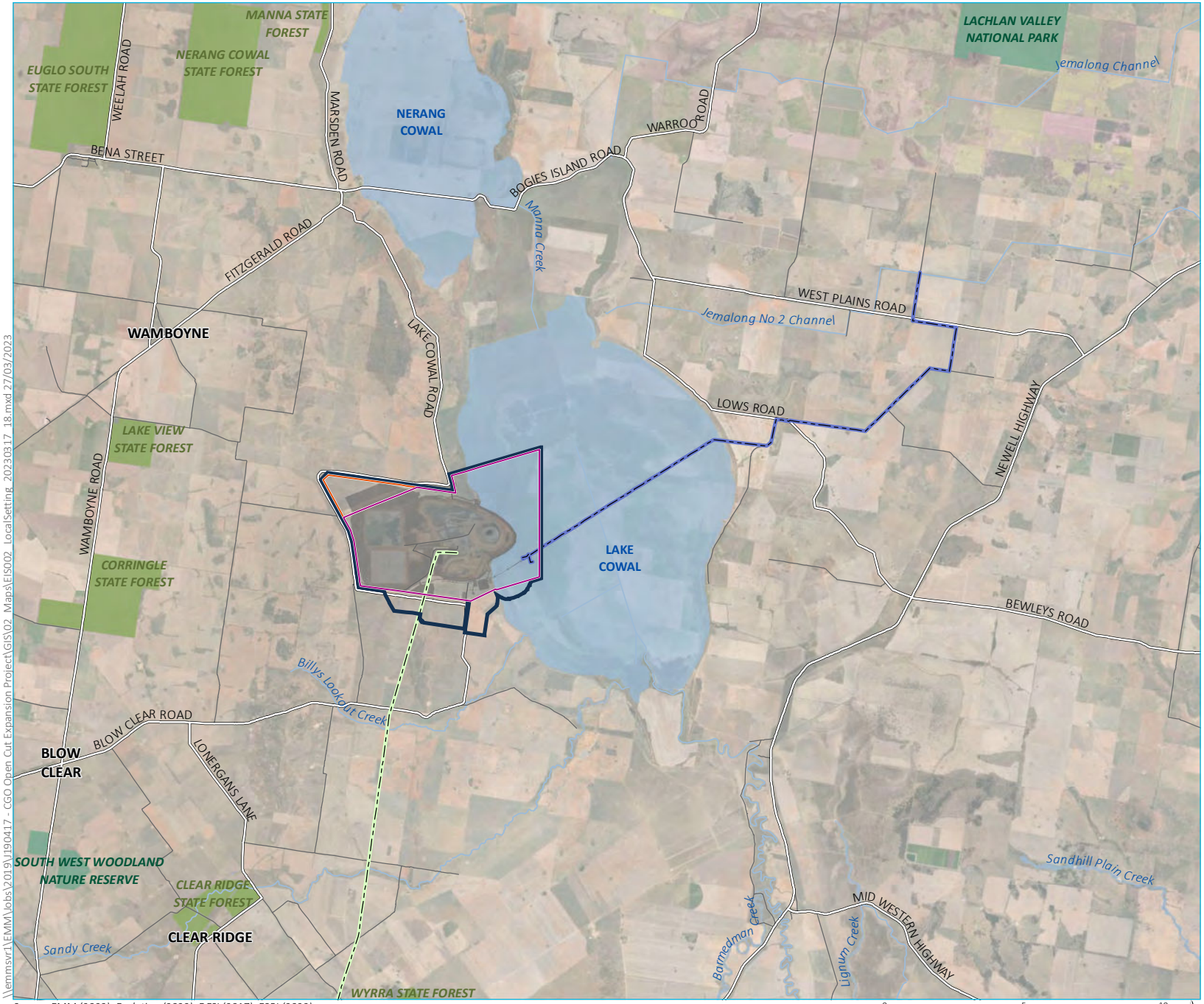

KEY

- Project area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Water supply pipeline
- Electricity transmission line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

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Source: EMM (2023); Evolution (2023); DFSI (2017); ESRI (2023)

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Local setting

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Figure 1.2

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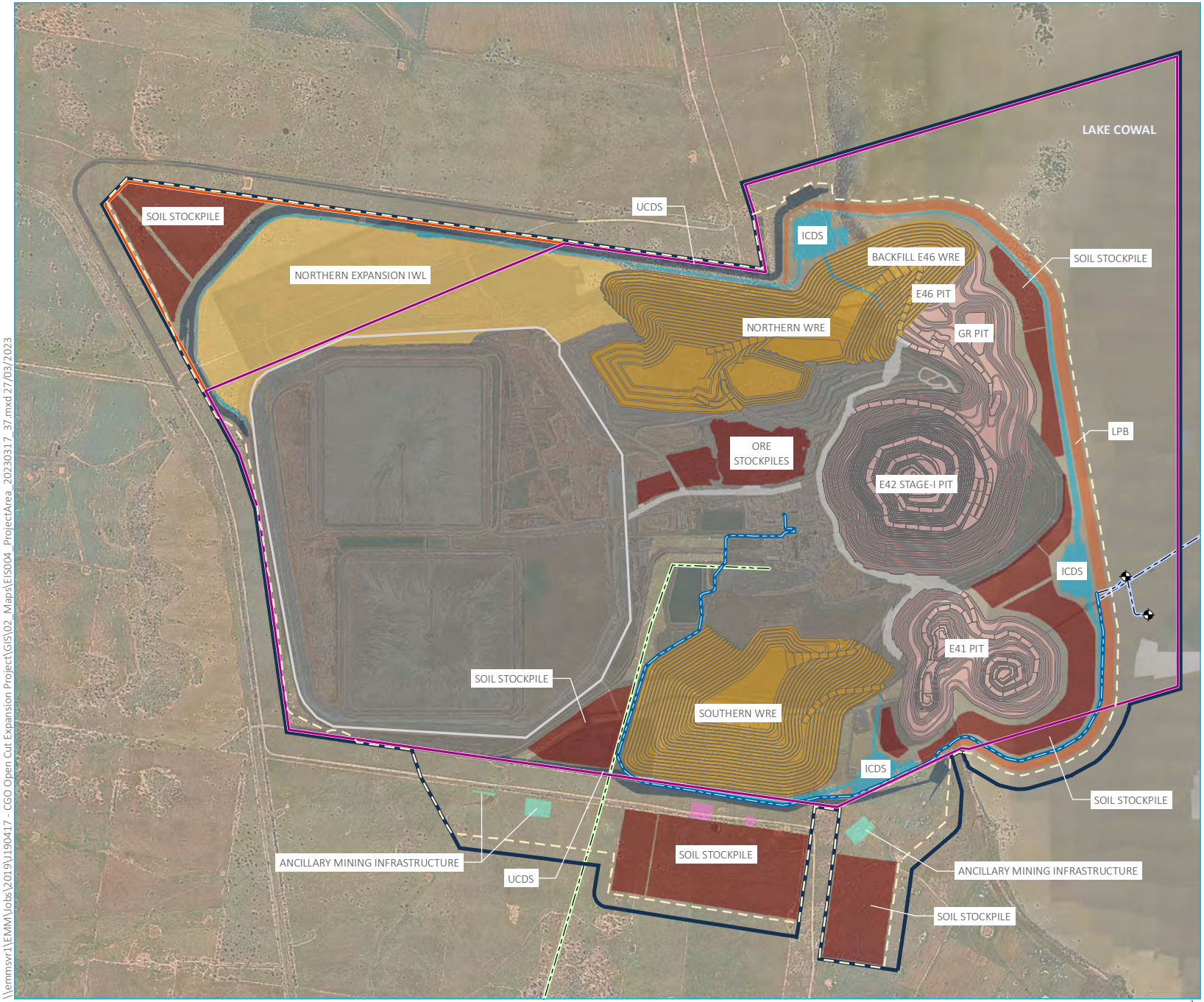

KEY

- Project area
- Proposed disturbance footprint
- DA14/98 approved surface disturbance
- Approved IWL footprint
- Mining lease (ML1535) (offset for clarity)
- Mining lease (ML1791) (offset for clarity)
- Saline groundwater supply bore
- Water supply pipeline
- Electricity transmission line

Conceptual project infrastructure

- Open cut pit footprint
- Northern expansion IWL
- Waste rock emplacement (WRE)
- Lake protection bund (LPB)
- Stockpile
- Up catchment diversion system (UCDS)
- Internal Catchment Drainage System (ICDS)
- Ancillary mining infrastructure
- Magazine
- Road
- Water supply pipeline realignment

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Source: EMM (2023); Evolution (2023); DFSI (2017); Nearmap (2021)

0 1 2 km

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Project area

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Figure 1.3

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1.5 Terminology

A summary of the key terminology used throughout this assessment is provided in below. A full glossary and list of abbreviated terms are provided in the Glossary of this report.

- **Cowal Gold Operations (CGO)** – comprises the existing open pit mine, underground mine, processing facility, IWL, waste rock emplacement areas, ore stockpiles and ancillary infrastructure.
- **The Project area** – outlines the area at the CGO mine site which is subject to the development application as shown on Figure 1.3.
- **Existing and approved disturbance area** – areas that are disturbed and/or approved to be disturbed under the current development consents that apply to CGO (DA 14/98, DA 2011/64 and SSD 10367).
- **Additional disturbance area** – the areas that will be disturbed by the Project that are outside of the existing and approved disturbance area.

2 Existing traffic conditions

2.1 Overview

This Chapter has been informed through a review of the following documentation:

- *Cowal Gold Operations Underground Development Project Traffic Impact Assessment* (EMM 2020) (herein referred to as the Underground TIA)
- *Cowal Gold Operations Transport Management Plan* (Evolution 2022).

Information regarding the existing condition of the road network and background traffic data has been retrieved from the Underground TIA. This approach is considered appropriate as the Project will not change approved primary and alternative access routes, primary site access or operational traffic movements (refer Section 3.2), combined with the relatively short duration of Project construction activities and low construction traffic volumes (refer Section 3.1).

It is noted that since approval of the Underground Development and Modification 16, Evolution has entered into a lease in perpetuity with Council over the portion of Lake Cowal Road south of the Lake Cowal Road/Bonehams Lane intersection which runs east west through Lot 100 DP 1059150 (i.e. along the southern boundary of ML1535). As such this portion of Lake Cowal Road (i.e. from the Lake Cowal Road/Bonehams Lane/internal mine access road intersection) is now closed to the public and is effectively a private road.

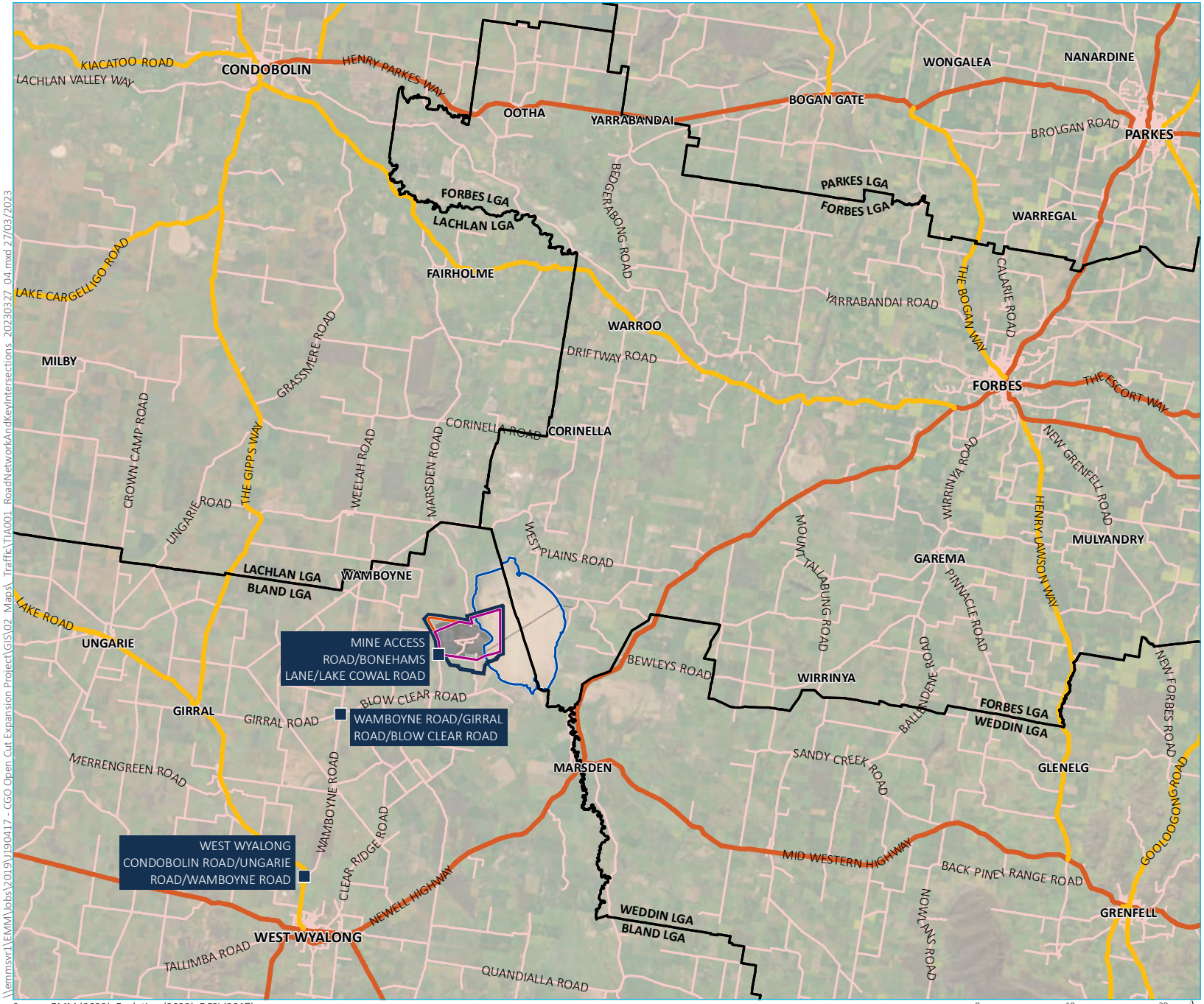
2.2 Road network

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- state roads – freeways and primary arterials (TfNSW managed)
- regional roads – secondary or sub arterials (council managed and part funded by the State)
- local roads – collector and local access roads (council managed).

The existing road network and key intersections are shown in Figure 2.1. The approved existing transport routes are shown in Figure 2.2. Their corresponding road conditions and speed limits, based on an EMM site inspection in 2019 (as detailed in EMM 2020) are summarised in Table 2.1.

All the identified roads were considered to have adequate design standards for the traffic carried in 2019 (EMM 2020). Since the preparation of the Underground TIA, TfNSW has carried out upgrade works on the Newell Highway as part of the Newell Highway Program Alliance including northbound and southbound overtaking lanes at Back Creek (approximately 19 km north of West Wyalong) and Bundaburrah (approximately 26 km south of Forbes).



Source: EMM (2023); Evolution (2023); DFSI (2017)

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Existing road network and key intersections

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Figure 2.1

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Table 2.1 Description of geometry and conditions of roads along transport routes

Roads	Road length	Road surface	Road width	Speed limit	Observations as per 2019 site inspection
Preferred transport route from West Wyalong					
Newell Highway	13 km	Fully sealed	9 m–22 m	50 km/h in West Wyalong township	• Street parking generally permitted on both sides of the road. • Edge line and centre line generally marked.
Bypass Road MR 639	4.9 km	Fully sealed	10 m–11 m	80 km/h	• *Edge line and centre line generally marked.
Ungarie Road	6 km	Fully sealed	9 m	50 km/h approaching township 100 km/h outside township	• Edge line and centre line generally marked.
Wamboyne Road	18.5 km	Fully sealed	9 m	100 km/h	• Edge line and centre line generally marked. • 80 km/h speed limit is applicable for all restricted access vehicle classes.
Blow Clear Road	11 km	Fully sealed	8 m–10 m	100 km/h	• Edge line and centre line generally marked. • Safety sign along the side of the road (e.g. reduce speed sign).
Bonehams Lane	4.4 km	Fully sealed	9 m	100 km/h	• Edge line and centre line generally not marked.
Mine access road	4.6 km	Fully sealed	9 m	N/A	• Edge line and centre line are marked. • Safety signs along the side of the road.
Preferred transport route from Condobolin					
The Gipps Way	49 km	Fully sealed	6 m–7 m	N/A	• Centre line is generally marked. • Edge line is generally not marked.
Burcher Road	10 km	Fully sealed	6 m	N/A	• Centre line and edge line generally not marked.
Bena Street	3.3 km	Fully sealed	3 m	50 km/h	• Bena Street run through the rural township of Burcher.
Lake Cowal Road (east-west)	6.4 km	Fully sealed	7 m	80 km/h	• Centre line and edge line generally not marked.
Fitzgerald Road	550 m	Unsealed	8 m–10 m	N/A	• Gravel surface
Lake Cowal Road (north-south)	18.4 km	Generally unsealed	9 m–11 m	N/A	• The road is generally unsealed with some sections sealed approaching the mine site.
Mine access road	4.6 km	Fully sealed	9 m	N/A	• Edge line and centre line are marked. • Safety signs along the side of the road.

Table 2.1 Description of geometry and conditions of roads along transport routes

Roads	Road length	Road surface	Road width	Speed limit	Observations as per 2019 site inspection
Preferred transport route from Forbes					
Newell Highway	41.5 km	Fully sealed	11 m–12 m	90 km/h – 110 km/h outside townships 50 km/h approaching township	• Edge line and centre line generally marked.
West Plains Road	20.7 km	Mostly sealed	4 m–5 m	N/A	• Road section near Newell Highway sealed. • Remainder road section is gravel surface.
Bogies Island Road	6.2 km	Unsealed	6 m	N/A	• Gravel surface.
Lake Cowal Road (east-west)	5.0 km	Unsealed	9 m–10 m	N/A	• Gravel surface.
Fitzgerald Road	550 m	Unsealed	8 m–10 m	N/A	• Gravel surface.
Lake Cowal Road (north-south)	18.4 km	Generally unsealed	9 m–11 m	N/A	• The road is generally unsealed with some sections sealed approaching the mine site.
Mine access road	4.6 km	Fully sealed	9 m	N/A	• Edge line and centre line are marked. • Safety signs along the side of the road.

Note: *Observations for this road have been made via satellite imagery

During severe wet weather conditions, unsealed roads in the region are closed, which makes parts of the preferred transport routes to or from Condobolin and Forbes unavailable for access.

Under these circumstances, the alternate transport route from Condobolin comprises the following sealed roads:

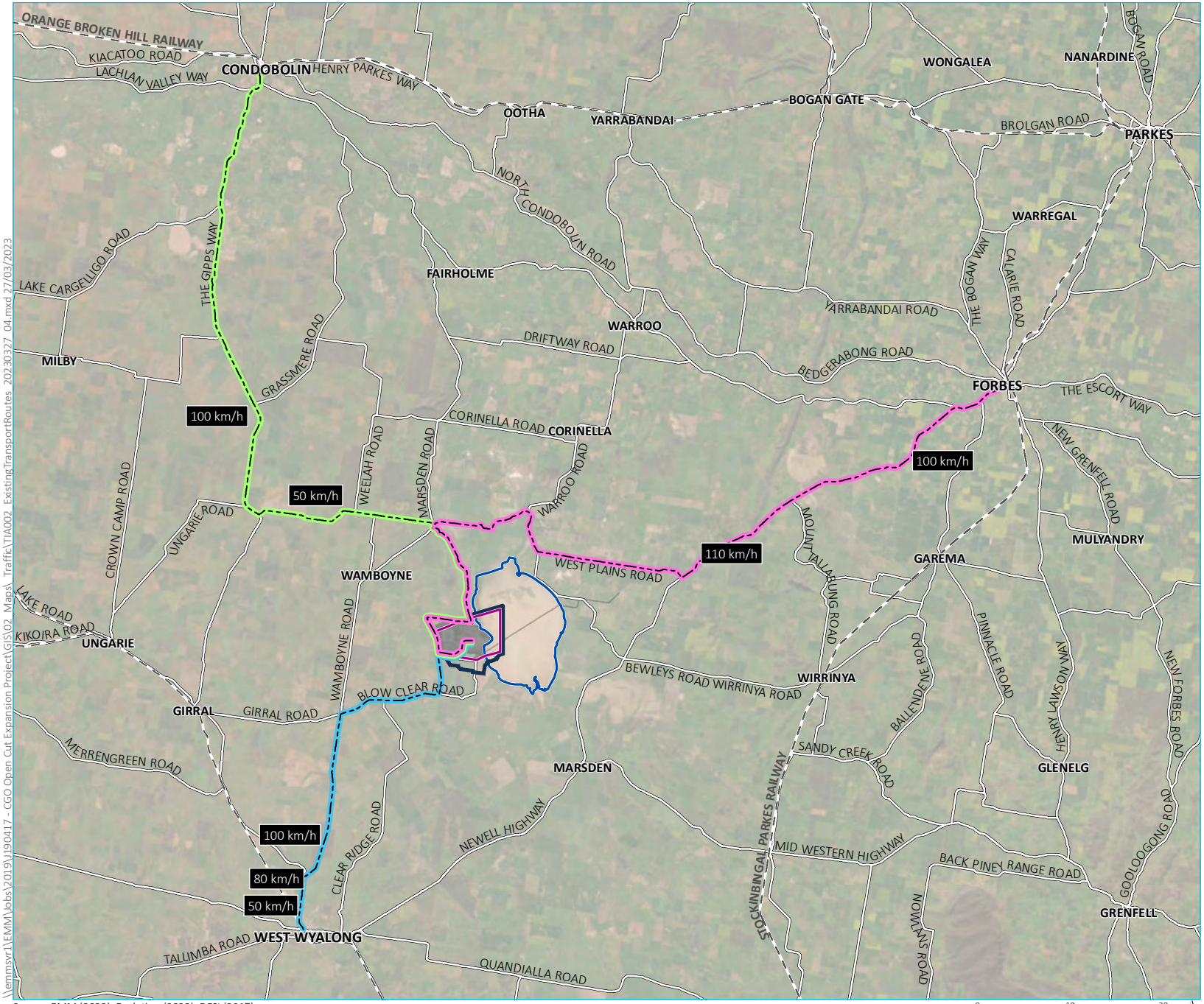
- The Gipps Way -> Burcher Road -> Bena Street -> Wamboyne Road -> Blow Clear Road -> Bonehams Lane -> Mine access road.

Likewise, under severe wet weather conditions, the alternate transport route to or from Forbes is via the Newell Highway using the West Wyalong Bypass MR 639 to West Wyalong, then following the preferred transport route from West Wyalong to the site.

When the water level is high at Lake Cowal/Nerang Cowal, the preferred transport route to or from Forbes via Lake Cowal Road and Bogies Island Road become inaccessible to traffic for lengthy periods. Under these circumstances, the alternate transport route will use the following roads:

- Newell Highway -> Lachlan Valley Way-> Driftway Road -> Warroo Road -> Corinella Road -> Marsden Road -> Lake Cowal Road (east-west) -> Fitzgerald Road -> Lake Cowal Road (north-south) -> Mine access road.

The alternate transport routes are shown in Figure 2.3.



KEY

- Project area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Rail line
- Main road
- Extent of Lake Cowal

Preferred transport routes

- Condoblin route
- Forbes route
- West Wyalong route

Source: EMM (2023); Evolution (2023); DFSI (2017)

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Existing transport routes

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Figure 2.2

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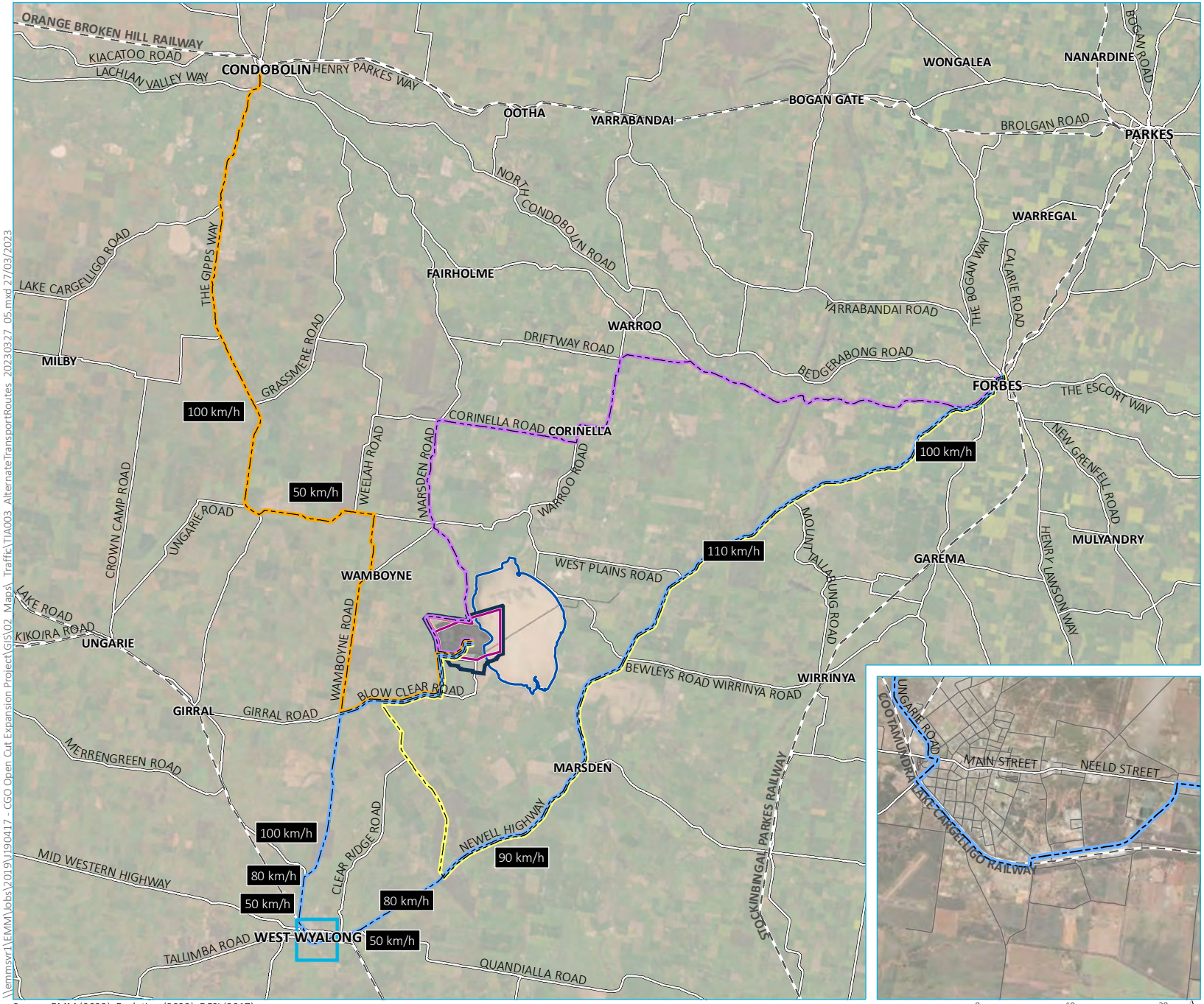

KEY

- Project area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Rail line
- Main road
- Extent of Lake Cowal

Alternate transport routes

- Condoblin alternate route due to weather condition
- Forbes alternate route due to weather condition
- Forbes alternate route due to high water level 1
- Forbes alternate route due to high water level 2

Source: EMM (2023); Evolution (2023); DFSI (2017)

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Alternative transport routes

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Figure 2.3

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2.3 Road design standards

Road width design standards for low volume (generally rural) roads are defined by the *Austroads Guide to Road Design Part 3: Geometric Design* (Austroads, 2016) and are based on daily traffic volumes as shown in Table 2.2.

Table 2.2 Austroads road design for rural road

Threshold band (daily traffic volumes)	Design standard
1–150	8.7 m wide total carriage (if unsealed); or minimum 3.7 m wide seal
150–500	Minimum 7.2 m wide seal
500–1,000	Minimum 7.2 m – 8 m wide seal
1,000–3,000	Minimum 9 m wide seal
> 3,000	Minimum 10 m wide seal

The existing road width measurements and conditions for each road in the network considered as part of this TIA are summarised in Table 2.3.

A linear growth factor of 1% per annum has been applied to the 2019 daily traffic volumes presented in the Underground TIA to determine the current year (2022) daily traffic volumes.

The results show that the design standards for the road network fully comply with the Austroads design standard requirements, with many routes exceeding the current design standard requirements.

Table 2.3 Daily traffic volumes and corresponding Austroads designs standards

Road	2019 daily traffic volumes	2022 daily traffic volumes	Relevant Austroads design standard	Current road width	Compliance
Newell Highway	2,588	2,666	Minimum 9 m wide	9 m to 22 m wide sealed	Yes
Ungarie Road	1,221	1,258	Minimum 9 m wide	9 m wide sealed	Yes
Wamboyne Road	303	312	Minimum 7.2 m wide seal	9 m wide sealed	Yes
Blow Clear Road	254	262	Minimum 7.2 m wide seal	8 m – 10 m wide sealed	Yes
Bonehams Lane	254	262	Minimum 7.2 m wide seal	9 m wide sealed	Yes
The Gipps Way	478	492	Minimum 7.2 m wide seal	6 m – 7 m wide sealed	Yes
Burcher Road	43	44	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	6 m wide sealed	Yes
West Plains Road	42	43	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	4 m – 5 m wide (mostly sealed)	Yes

Table 2.3 Daily traffic volumes and corresponding Austroads designs standards

Road	2019 daily traffic volumes	2022 daily traffic volumes	Relevant Austroads design standard	Current road width	Compliance
Lake Cowal Road	55	57	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	7 m wide for sealed section; 10 m wide for unsealed section	Yes

2.4 Key intersections

The key intersections which have been assessed for their Project related traffic impacts are described in this section as follows:

- West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road
- Wamboyne Road/Girral Road/Blow Clear Road
- Mine Access Road/Bonehams Lane/Lake Cowal Road.

2.4.1 West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road intersection

The West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road is a T-junction. There is a rural auxiliary lane turning treatment for right turn traffic (AUR) from the major road to the minor road. An aerial layout of the intersection and the relevant rural auxiliary lane turn treatment for AUR type intersection design is shown in Figure 2.4 and Figure 2.5 respectively.

Source: Six Maps 2015

Figure 2.4 Aerial layout of Ungarie Road/Wamboyne Road intersection

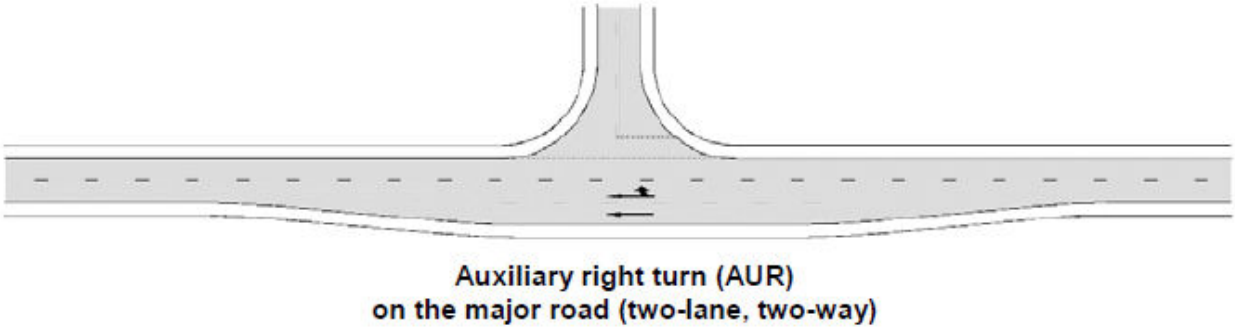


Figure 2.5 Auxiliary right turn lane design (AUR) for a major road (Source: Austroads Guide to Road Design Part 4: 2017)

2.4.2 Wamboyne Road/Girral Road/Blow Clear Road intersection

The Wamboyne Road/Girral Road/Blow Clear Road intersection is an unsignalized four-way intersection. An aerial layout of this intersection is shown in Figure 2.6.

Source: MetroMap 2020

Figure 2.6 Aerial layout of Wamboyne Road/Girral Road/Blow Clear Road intersection

2.4.3 Mine Access Road/Bonehams Lane/Lake Cowal Road intersection

The Mine Access Road/Bonehams Lane/Lake Cowal Road intersection is an unsignalized four-way intersection. An aerial layout of this intersection is shown in Figure 2.7.

It is noted that since the finalisation of the Underground TIA, Evolution has entered into a lease in perpetuity with Council over the portion of Lake Cowal Road south of the Lake Cowal Road/Bonehams Lane intersection which runs east west through Lot 100 DP 1059150. This portion of Lake Cowal Road is now closed to the public.

Source: MetroMap 2020

Figure 2.7 Mine access road intersection at Bonehams Lane/Lake Cowal Road

2.5 Baseline traffic volumes

Baseline traffic volumes have been determined through the methodology outlined in the following sections. In summary baseline traffic have been determined by adding a linear growth rate of 1% per annum to the surveyed traffic volumes from the Underground TIA to obtain future base case year (2025 i.e. the year construction activities for the Project are expected to peak). These volumes contain existing approved traffic volumes for CGO open pit operations. The approved operational traffic volumes of the Underground Development (SSD-10367) have been added to these baseline volumes (operation of the Underground Development will commence in 2023) to determine Project baseline traffic volumes.

2.5.1 Surveyed traffic volumes

The intersection peak hourly surveyed traffic volumes were retrieved from the Underground TIA. The AM peak is from 5:00 am – 6:00 am and PM peak is from 6:00 pm – 7:00 pm. The peak hour traffic volumes surveyed in 2019 are presented in Figure 2.8.

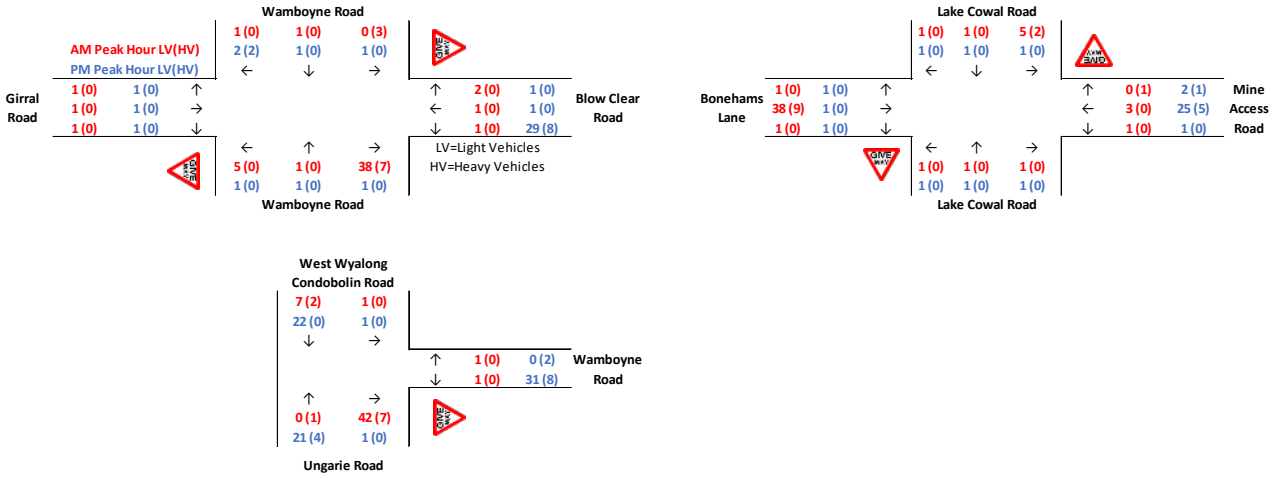


Figure 2.8 AM and PM peak hour 2019 surveyed traffic volumes

2.5.2 Future base year traffic volumes

A linear growth rate of 1% per annum has been applied to the 2019 surveyed volumes to obtain future base year (2025) traffic volumes. The future base year (2025) traffic volumes are presented in Figure 2.9.

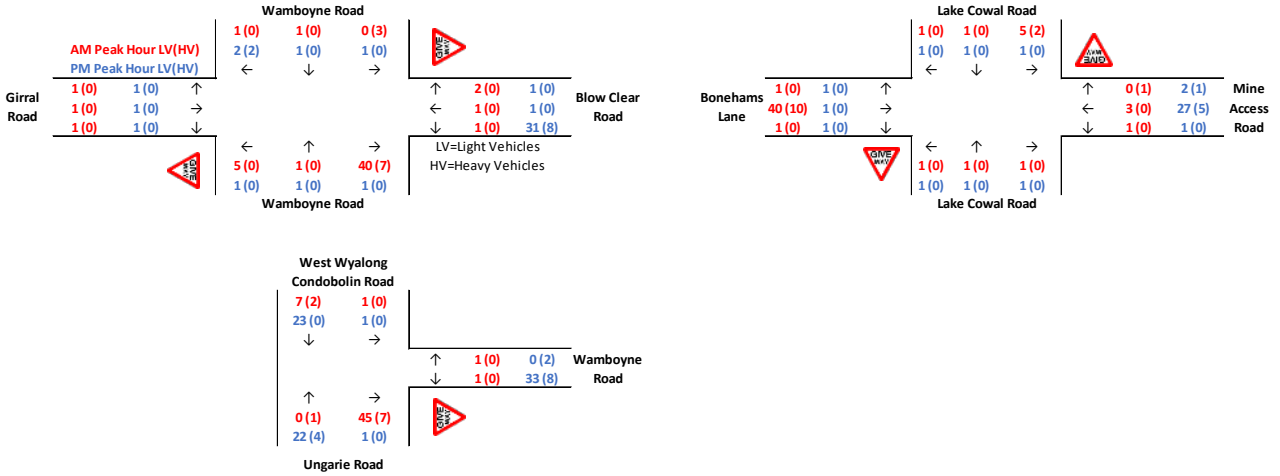


Figure 2.9 AM and PM peak hour 2025 traffic growth volumes

2.5.3 Underground development project traffic volumes

The approved peak hour operations traffic volumes associated with the operation traffic of approved Underground Development as assessed in the Underground TIA are presented in Figure 2.10.

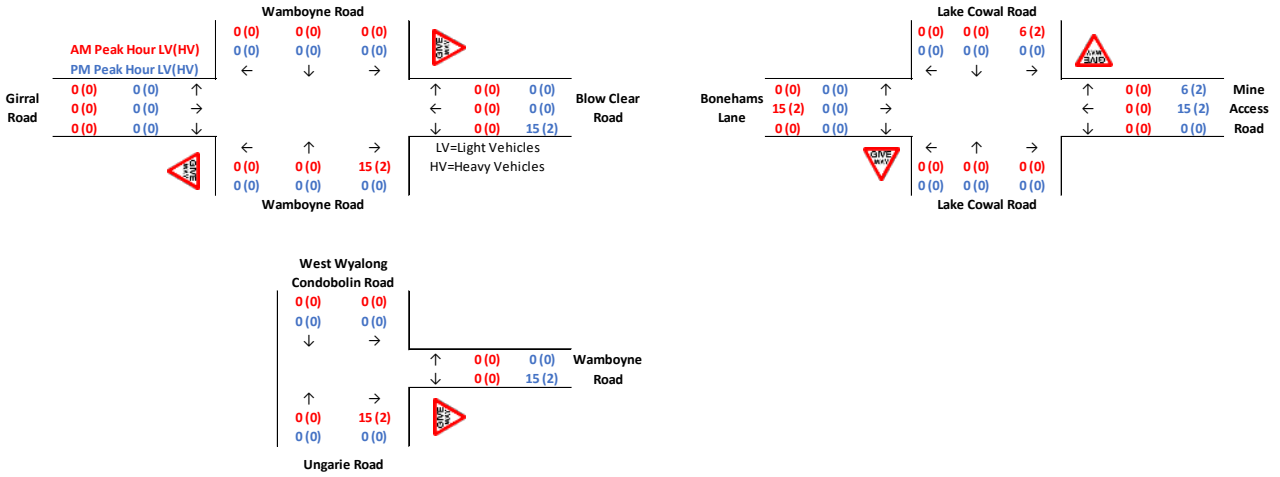


Figure 2.10 AM and PM peak hour CGO Underground Development Project traffic volumes

2.5.4 Project baseline traffic volumes

Project baseline traffic volumes are future base year (2025) traffic volumes (Section 2.5.2) combined with approved Underground Development operational traffic volumes (Section 2.5.3). Peak hour baseline traffic volumes are presented in Figure 2.11.

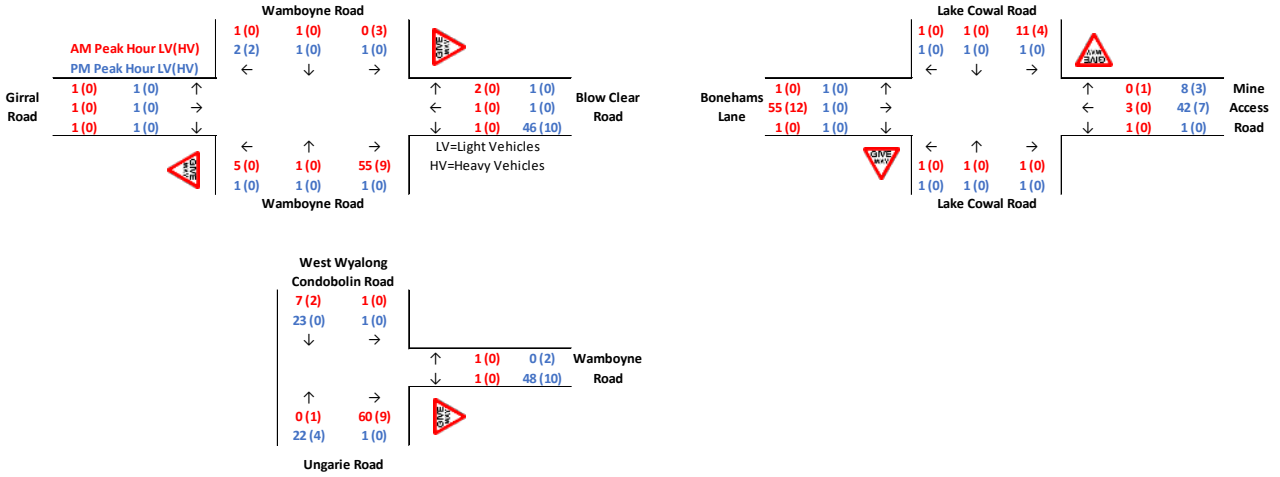


Figure 2.11 AM & PM peak hour baseline traffic volumes

2.6 Crash analysis

Crash data from TfNSW Centre for Road Safety interactive history database for the five available years between 2017 and 2021 along the transport routes has been studied in the vicinity of the site and is presented in Figure 2.12.

The crashes are categorised based on the severity of the crashes as follows:

- fatal
- serious injury
- moderate injury
- minor/other injury, or

- non-casualty (e.g. towaway).

Overall, there were 52 crashes along the existing and alternative transport routes within the three local government areas. These crashes along with their crash categories are presented in Table 2.4.

Table 2.4 Crash data between 2017 to 2021

LGA and roads	Total crashes	Crash categories
Bland Shire Council	23	1 – fatal
Newell Highway	20	4 – serious injury
Ungarie Road	2	8 – moderate injury
Wamboyne Road	1	1 – minor/other injury
		9 – non-casualty (e.g. towaway)
Forbes Shire Council	22	1 – fatal
Newell Highway	15	3 – serious injury
Lachlan Valley Way	7	13 – moderate injury
		2 – minor/other injury
		3 – non-casualty (e.g. towaway)
Lachlan Shire Council	7	2 – fatal
The Gipps Way	7	0 – serious injury
		2 – moderate injury
		2 – minor/other injury
		1 – non-casualty (e.g. towaway)

There were four fatal crashes, two along The Gipps Way and two on Newell Highway. The fatal crashes were caused by head on collisions and loss of control on a bend during the night. Speeding and fatigue may have been factors contributing to the crash caused by the loss of control on a bend. On the local roads, which are expected to attract 80% of Project traffic, there were two serious crashes – one each on Ungarie Road and Wamboyne Road. There were no reported crashes on Blow Clear Road, Bonehams Lane and Lake Cowal Road.

The two crashes on Ungarie Road and Wamboyne Road were 'vehicle running off the road' crashes involving injuries and driver fatigue was a contributing factor to both crashes. Overall, these crashes do not indicate any significant road safety deficiencies along the transport routes within the locality.

2.7 Public transport

2.7.1 Train services

There is a non-operational railway line between West Wyalong and Burcher, which is directly adjacent to the Project area on the western side. It is understood this railway line discontinued operations in the early 1990s.

West Wyalong is located along the Temora to Lake Cargelligo freight railway line which passes to the south of the town in a south-east to north-west direction. The railway line does not intersect with the defined CGO transport routes to/from West Wyalong, Forbes and Condobolin. The rail line manager is John Holland Rail.

Several other existing level crossings are also present on various major roads in the wider regional area (e.g. along the Newell Highway, Mid-Western Highway and the West Wyalong-Newell Highway bypass). However, these roads carry significant daily traffic volumes currently, including many heavy vehicles, and their traffic does not represent a major safety risk to the level crossing operations currently.

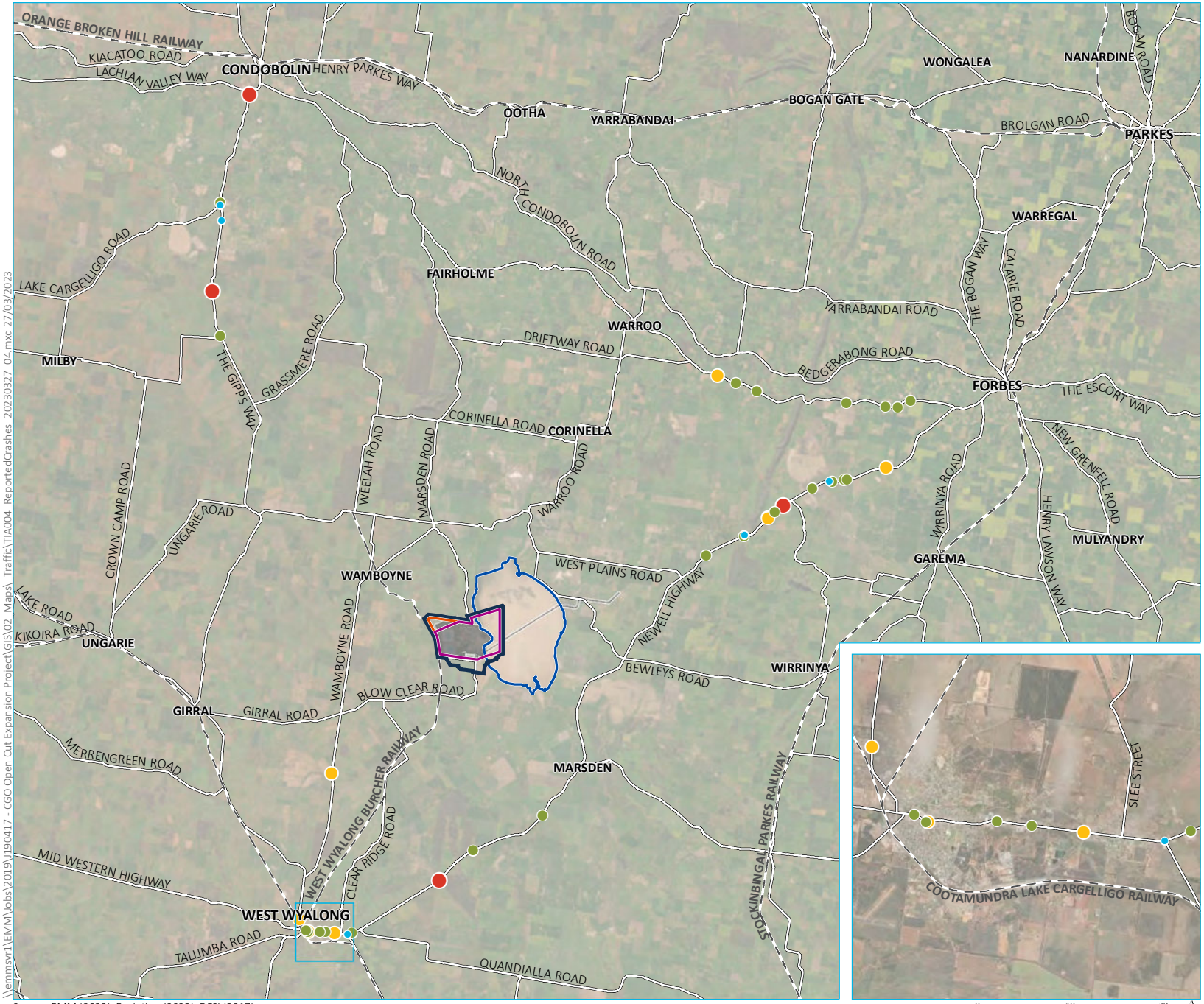
2.7.2 Bus and coach services

The nearest coach stops to CGO are located in West Wyalong and Wyalong townships. There are two bus services, namely Coach 717 and Coach 718. Coach 717 connects Cootamundra to Condobolin town and Coach 718 runs the opposite direction. Bookings are required to use these bus services.

There are school bus services operating via some of the roads in the locality of the mine, primarily Wamboyne Road, during the periods 7:30 am to 8:30 am and 3:30 pm to 4:30 pm primarily. In general, the majority of the mine workforce shift changeover light vehicle and heavy vehicle traffic does not travel during these times, and therefore any potential traffic safety conflicts with school bus traffic are avoided.

2.8 Pedestrian and cycling infrastructure

There are no pedestrian or cycling infrastructure in the rural localities outside of the West Wyalong township. Consultation with Evolution staff indicate that the approved transport routes are seldom utilised by cyclists.



KEY

- Project area
- DA14/98 approved surface disturbance
- Mining lease (ML1535)
- Mining lease (ML1791)
- Rail line
- Main road
- Extent of Lake Cowal

Reported crashes along transport routes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury

\\emmsvr1\EMM\Jobs\2019\J190417 - CGO Open Cut Expansion Project\GIS\02_Maps_Traffic\TIA004_ReportedCrashes_20230327_04.mxd 27/03/2023

Source: EMM (2023); Evolution (2023); DFSI (2017)

0 10 20 km

GDA 1994 MGA Zone 55

N

Overview of reported crashes along transport routes

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Transport Impact Assessment
Figure 2.12

EMM
creating opportunities

2.9 Existing car and bus parking

Existing car park capacity at CGO is approximately 64 parking spaces in the main sealed car park area, with three additional disabled car parking spaces. A bus shelter is present immediately north of the sealed car parking area.

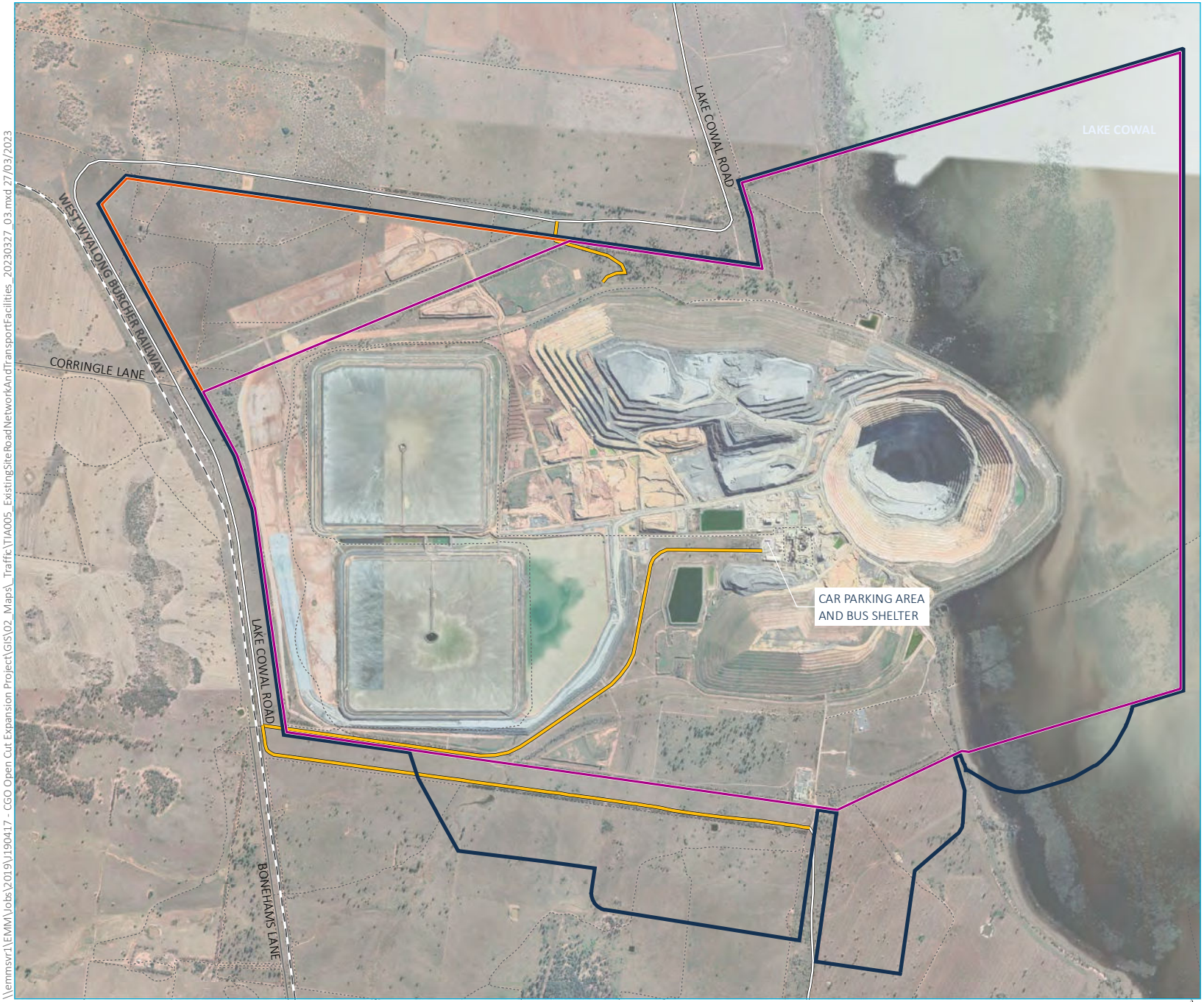
An additional unsealed gravel car parking area is present to the left of the sealed car park area. Minor upgrades are underway at this area as part of the CGO Underground Project to accommodate additional car parking. This area can accommodate approximately 28 mine related utility type vehicles.

Car parking and bus shelter area locations are shown in Figure 2.13.

2.10 Over size over mass (OSOM) vehicles

A number of OSOM vehicle movements are required on an occasional basis during approved operations predominantly to deliver mining equipment to the site. Traffic management for OSOM vehicles is outlined in Section 7.9 of CGO's approved Transport Management Plan (Evolution Mining 2022).

All OSOM vehicles operate with the relevant permits and load declarations obtained in accordance with Additional Access Conditions for OSOM heavy vehicles and loads (RMS, 2017) and any other licences and escorts as required by regulatory authorities. The relevant permits and travel conditions will be negotiated with TfNSW and relevant local councils on a case-by-case basis.



KEY

- Project area
- Mining lease (ML1535)
- Mining lease (ML1791)
- Main site access
- Disused rail line
- Major road
- Minor road
- Vehicular track

\\emmsvr1\EMM\Jobs\2019\I190417 - CGO Open Cut Expansion Project\GIS\02_Maps_Traffic\TIA005_ExistingSiteRoadNetworkAndTransportFacilities_20230327_03.mxd 27/03/2023

Source: EMM (2023); Evolution (2023); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Existing site road network and transport facilities

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Transport Impact Assessment
Figure 2.13

EMM
creating opportunities

3 The Project

3.1 Construction

3.1.1 Overview

The Project will involve the following construction activities:

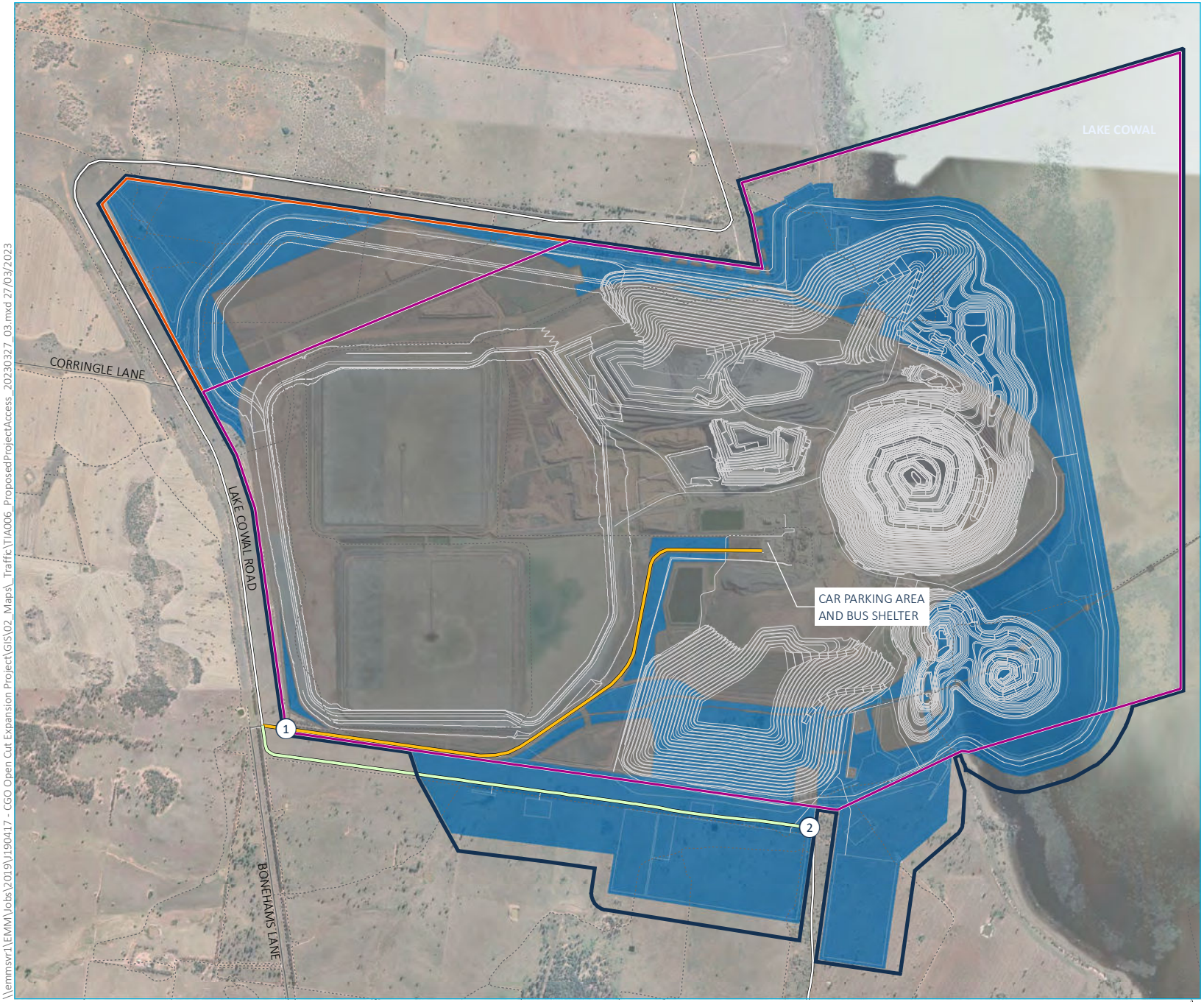
- construction of the expanded lake protection bund
- realignment of sections of the existing upstream catchment diversion system (UCDS)
- modification and relocation of some existing auxiliary mining infrastructure.

The construction phase is expected to be approximately 2 years and will occur in parallel with existing open pit and underground mining operations.

3.1.2 Construction access

Construction related deliveries and construction workforce related heavy vehicle and light vehicle traffic will travel along the approved access routes and predominately access the site via the existing secondary access off Lake Cowal Road to the south of the existing ML. This will minimise interactions between operational and construction traffic movements. As noted in Section 2.1 and Section 2.4.3, Evolution has entered into a lease in perpetuity agreement with Council over this portion of Lake Cowal Road (i.e. south of the Lake Cowal Road/Bonehams Lane intersection). As such this portion of Lake Cowal Road is now closed to the public and therefore the construction access from the Lake Cowal Road/Bonehams Lane intersection is effectively a private access road.

Construction access for the Project is detailed in Figure 3.1.



KEY

- Project area
- Mining lease (ML1535)
- Mining lease (ML1791)
- DA14/98 approved surface disturbance
- Additional disturbance footprint
- Proposed project layout
- Main site access
- Construction access
- Major road
- Minor road
- Vehicular track

Site access locations

1. Main access point for all employees
2. Construction access

0 1 2 km

GDA 1994 MGA Zone 55

N

Source: EMM (2023); Evolution (2023); DFSI (2017)

\\emmsvr1\EMM\Jobs\2019\I190417 - CGO Open Cut Expansion Project\GIS\02_Maps_Traffic\TIA006_ProposedProjectAccess_20230327_03.mxd 27/03/2023

Project access

Evolution Mining
Cowal Gold Operations
Open Pit Continuation Project
Transport Impact Assessment
Figure 3.1

EMM
creating opportunities

3.1.3 Workforce and traffic

The additional daily and peak hourly mine traffic movements that will occur during the construction phase will primarily be related to the construction workforce travel, material deliveries and construction fleet for construction activities for the Project.

The Project will generate light vehicle traffic movements from individual employee cars and utes, as well as heavy vehicle traffic from coach/minivans and delivery trucks.

The peak construction workforce for the Project will be a total of approximately 114 persons on-site. This workforce will predominately travel to the site using mini vans.

The proposed construction work hours for the project will generally be from 6:00 am to 6:00 pm seven days per week, resulting in two significant hourly peaks of construction related traffic movements, travelling inbound to the mine site between 5:00 am – 6:00 am and travelling outbound from the mine site between 6:00 pm – 7:00 pm. From time to time construction hours may extend into the evening period (i.e. to 10:00 pm) to address potential schedule delays (i.e. due to wet weather).

It is assumed that there would be up to 20 workers travelling per coach/minivan and up to 2 workers per car/ute. It is further assumed that all peak daily construction traffic would travel within the AM and PM peak hours. Based on these assumptions there would be up to 15 light vehicle trips and 5 coach/minivan trips per day during peak construction months. Additionally, there would be up to 12 heavy vehicle trips per day consisting of material and building deliveries and earthmoving fleet. In total, there would be 15 light vehicle and 17 heavy vehicle trips for a combined 32 vehicle trips per day during peak construction months.

3.1.4 Traffic distribution

Construction traffic will travel along existing and alternative approved transport routes as presented in Figure 2.2 and Figure 2.3. Construction traffic distribution assumptions are as follows:

- approximately 80% of the construction related traffic will originate from the Wyalong/West Wyalong area
- approximately 10% of the construction related traffic will originate from the Forbes Shire urban or rural areas
- approximately 10% of the construction related traffic will originate from the Lachlan Shire urban or rural areas.

Peak hour traffic volumes at key intersections are presented in Figure 3.2. Combined peak hour baseline and Project traffic is presented in Figure 3.3.

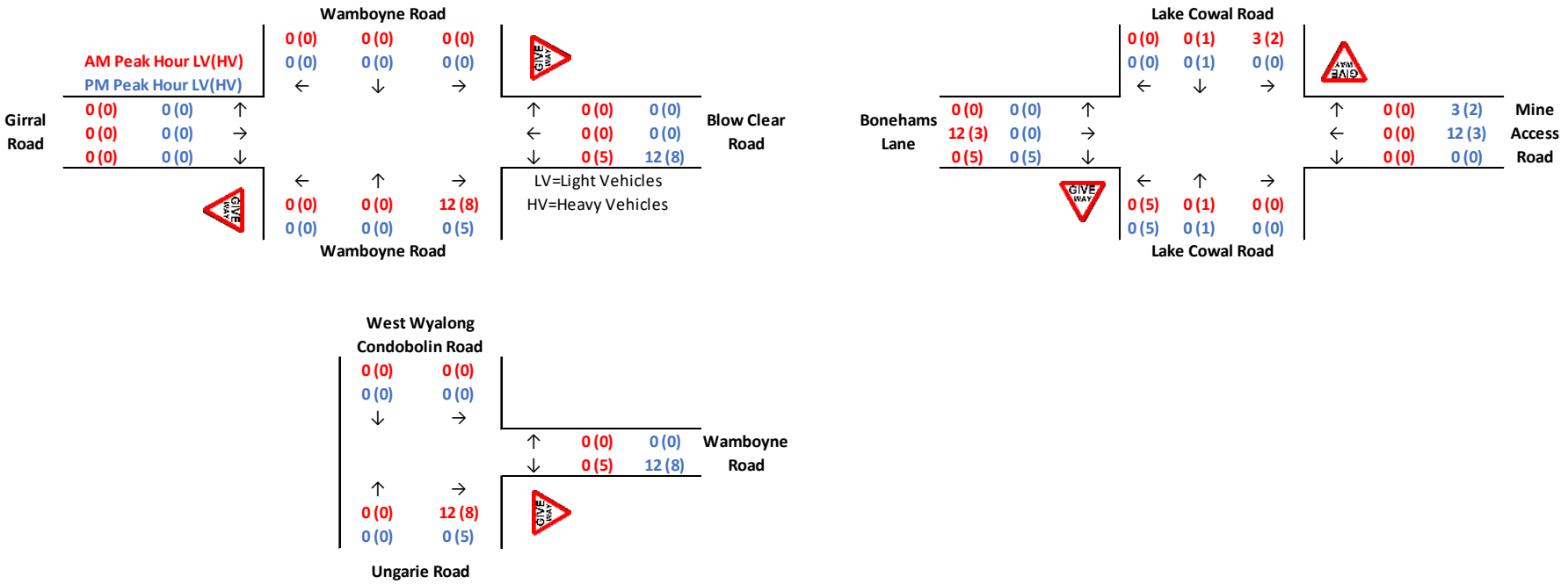


Figure 3.2 **AM and PM peak hour Project construction traffic**

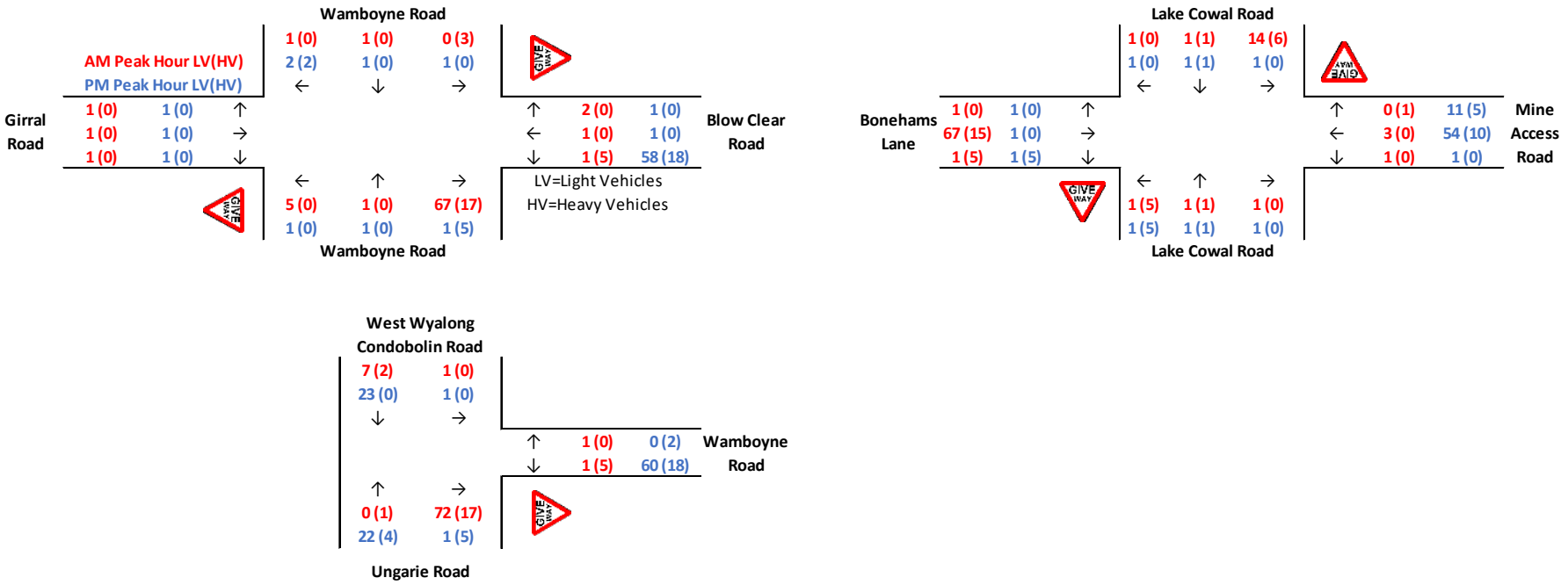


Figure 3.3 AM and PM peak hour combined Baseline & Project construction traffic

3.2 Operations

The Project will involve the continuation of existing approved open pit operations and underground operations. There will be no changes to workforce numbers, shift times and extraction or processing rates. Project operations will follow the same transport routes as presented in Figure 2.2 and Figure 2.3 and access the site predominately via the approved primary site access.

Traffic matters relevant to ongoing open pit and underground operations as part of the Project have been previously assessed and approved under the existing open pit and underground development consents and therefore are not assessed in this TIA.

3.3 Car and bus parking provision

3.3.1 Construction

Project construction staff and contractors car parking and bus parking will be accommodated predominately in the vicinity of the southern secondary site access (i.e. the primary construction access) as shown in Figure 3.1.

3.3.2 Operation

Operational parking arrangements for staff and contractor will not change from what is currently approved under the open pit and underground approvals (Figure 3.1).

4 Impact assessment

4.1 Intersection performance

Baseline traffic volumes as outlined in Section 2.5 have been combined with the Project's peak construction traffic volumes to assess the Project's potential to impact the road network during the construction phase.

The key intersections have been modelled with the SIDRA Intersection 9.0 software; a micro-analytical tool for individual intersections and linked intersection-network modelling. The modelling is based on the traffic survey data detailed in Section 2.5.4 (baseline traffic volumes) and Section 3.1.4 (baseline + Project construction traffic volumes). SIDRA provides the following performance indicators:

- Degree of saturation (DOS) – the total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation (e.g. 0.8 = 80% saturation). In practice the target degrees of saturation of 0.90 for signals, 0.85 for roundabouts and 0.80 for unsignalised intersections are generally agreed to. These are usually called 'practical degrees of saturation'.
- Average delay (DEL) – the average delay in seconds encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- Level of service (LOS) – this is a categorisation of average delay, intended for simple reference.
- 95% queue lengths (Q95) – is defined to be the queue length in metres that has only a 5% probability of being exceeded during the analysed time period. It transforms the average delay into measurable distance units.

The LOS is a good indicator of overall performance for individual intersections, with each level summarised in Table 4.1.

Table 4.1 Intersection LOS standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
A	<14	Good operation.	Good operations.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity. At traffic signals, incidents will cause extensive delays. Roundabouts require other control mode.	At capacity; required other control mode.
F	>71	Unsatisfactory with excessive queuing.	Unsatisfactory with excessive queuing; required other control mode.

Source: *RTA Guide to Traffic Generating Development* (RTA 2002)

SIDRA modelling for the key intersection has been conducted for the following scenarios:

- Baseline scenario – This scenario models baseline traffic volumes only.
- Baseline + Project construction scenario – This scenario includes combined baseline and Project construction traffic volumes.
- SIDRA modelling results for the key intersections are provided in Table 4.2 to Table 4.4.

Table 4.2 SIDRA modelling result for West Wyalong Condobolin Road/Ungarie Road intersection

Control/ scenarios	AM peak					PM Peak				
Priority controlled	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**
Baseline scenario	82	7.9	A	0.043	1.6 (south)	111	10.8	A	0.044	1.5 (east)
Baseline + construction scenario	107	10.1	A	0.058	2.2 (south)	136	10.9	A	0.060	2.1 (east)

Key findings:

- The intersection performs satisfactorily within capacity during AM and PM peak in all scenarios with LOS A and DoS <0.1.
- The intersection will still have over 90% additional capacity after accommodating the additional construction traffic generated by the Project.

Table 4.3 SIDRA modelling result for Wamboyne Road/Girral Road/Blow Clear Road intersection

Control/ scenarios	AM peak					PM Peak				
Priority controlled	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**
Baseline scenario	82	10.4	A	0.044	1.6 (south)	70	8.8	A	0.041	1.3 (east)
Baseline + construction scenario	107	10.4	A	0.058	2.2 (south)	95	9.7	A	0.056	2.0 (east)

Key findings:

- The intersection performs satisfactorily within capacity during AM and PM peak in all scenarios with LOS A and DoS <0.1.
- The intersection still has over 90% additional capacity after accommodating the additional traffic generated by the Project.

Table 4.4 SIDRA modelling result for Mine Access Road/Bonehams Lane/Lake Cowal Road intersection

Control/ scenarios	AM peak					PM Peak				
Priority controlled	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**	**Intersection volume**	**DEL(s)**	**LOS**	**DOS**	**Q95 in m (approach)**
Baseline scenario	94	10.6	A	0.041	0.4 (north)	70	8.0	A	0.038	0.6 (east)
Baseline + construction scenario	126	10.7	A	0.057	0.7 (north)	102	10.4	A	0.051	0.9 (east)

Key findings:

- The intersection performs satisfactorily within capacity during AM and PM peak in all scenarios with LOS A and DoS <0.1.
- The intersection will still have over 90% additional capacity after accommodating the additional construction traffic generated by the Project.

The details of the intersection results are attached in Attachment B.

4.2 Impact on road network capacity

Based on the Project daily traffic volume increases during the construction phase which are identified in Section 3.1.2 for the peak mine construction periods, the effect of these additional daily traffic movements is assessed in terms of the percentage daily traffic volume increases as summarised in Table 4.5.

The forecast daily traffic increases over the road network during the Project construction stages will be maximum of 15%. These daily traffic increases will not generally be noticeable and should have minimal impact to the prevailing traffic operating conditions (e.g. levels of service) for the existing traffic using these routes.

Table 4.5 Daily traffic volume increases during Project construction

Road	Baseline total daily traffic	Baseline HV daily traffic	Project construction stage total daily traffic	Project construction stage daily HV traffic	Future total daily traffic	Percentage increase
Ungarie Road	1,370	179	52	20	1,422	4%
Wamboyne Road	397	97	52	20	449	13%
Blow Clear Road	345	86	52	20	397	15%
Bonehams Lane	345	71	52	20	397	15%
Mine Access Road*	407	94	40	10	447	10%
Lake Cowal Road	92	28	12	4	104	13%

Table 4.5 Daily traffic volume increases during Project construction

Road	Baseline total daily traffic	Baseline HV daily traffic	Project construction stage total daily traffic	Project construction stage daily HV traffic	Future total daily traffic	Percentage increase
West Plains Road	62	16	6	2	68	10%
Burcher Road	63	16	6	2	69	10%
The Gipps Way	516	180	6	2	522	1%

1. Note: The Mine Access Road existing daily traffic volume was estimated as 90% of the combined daily traffic volume using both Bonehams Lane and Lake Cowal Road

4.3 Warrants for rural road upgrades

Austroads Guide to Road Design Part 3: Geometric Design (Austroads, 2016), refers to a range of daily traffic volume thresholds for the design of rural roads, which are shown in Table 2.2 of this report.

The existing road width measurements and condition with respect to existing daily traffic volumes for each road section were considered as part of this TIA are shown in Table 2.3.

A further assessment of the Austroads road width capacity standards including the future proposed Project construction traffic is provided in Table 4.6. Gipps Way (along the preferred access route from Condobolin) is the only road to exceed the future road design threshold in the future construction traffic scenario. This is due to its limited current width and existing high daily traffic volumes. However, the existing width and condition of Gipps Way will still be generally compliant and acceptable as CGO OC construction traffic only adds 6 daily vehicles to this road and the future daily traffic volume will be at the lower range of the revised threshold band (between 500 and 1,000 daily vehicle movements).

Overall, the road network assessed will be adequate for the future compliance of the assessed daily traffic volume increases during the Peak project construction, in relation to the Austroads road width capacity standards for rural roads.

Table 4.6 Daily traffic volumes and corresponding Austroads designs standards

Road	Assessed future daily traffic volume during construction	Relevant Austroads design standard	Current road width	Future road width compliance?
Ungarie Road	1,422	Minimum 9 m wide	9 m wide sealed	Yes
Wamboyne Road	449	Minimum 7.2 m wide seal	9 m wide sealed	Yes
Blow Clear Road	397	Minimum 7.2 m wide seal	8 m – 10 m wide sealed	Yes
Bonehams Lane	377	Minimum 7.2 m wide seal	9 m wide sealed	Yes
The Gipps Way	522	Minimum 7.2 m – 8 m wide seal	6 m – 7 m wide sealed	Yes*
Burcher Road	69	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	6 m wide sealed	Yes
West Plains Road	68	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	4 m – 5 m wide (mostly sealed)	Yes
Lake Cowal Road	104	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	7 m wide for sealed section; 10 m wide for unsealed section	Yes

Note*: the existing width and condition of The Gipps Way is still considered to be generally compliant and acceptable as the future daily traffic volume will be at the lower range of the revised threshold band (between 500 and 1,000 daily vehicle movements).

4.4 Warrants for basic, auxiliary lane and channelised turn movements

Intersection operations are assessed from a combination of the peak hourly through and turning traffic movements that occur at each intersection. There are several types of turning lanes/turn treatments at an intersection such as basic, auxiliary lane and channelised which are described as follows:

- a basic turn treatment (BAL/BAR) where turning vehicles may share the lane with through traffic movements
- an auxiliary lane turn treatment (AUL/AUR(S)) where a separate lane is provided to enable the turn to be performed in an additional lane
- a channelised turn treatment (CHL/CHR) which provides a traffic island to enhance the safety of right-turning or left-turning vehicles.

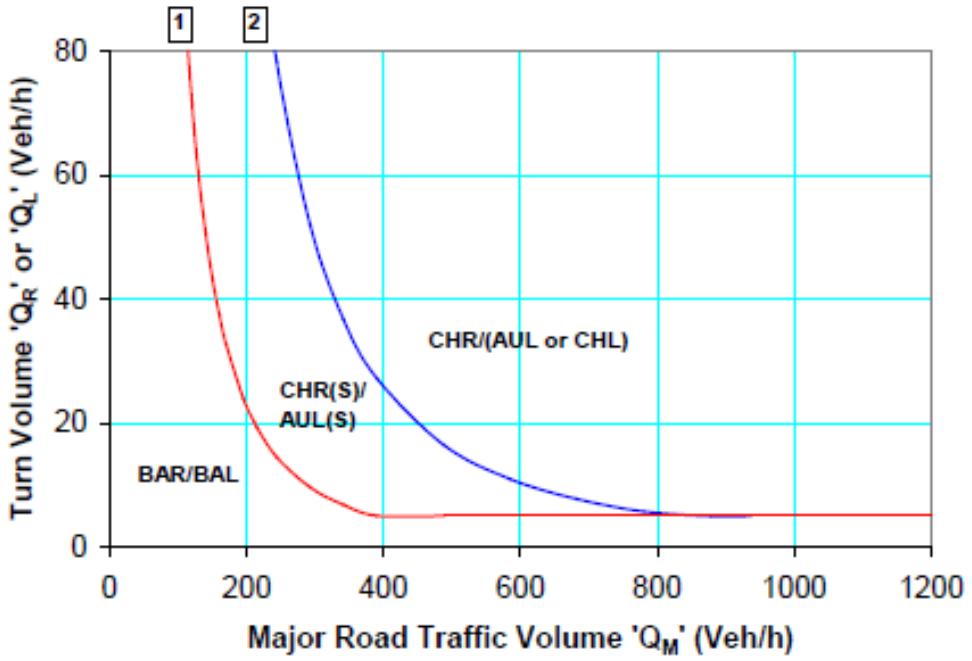
The need for additional intersection turning lanes is determined in accordance with the current intersection design standards (Austroads 2017b) *Guide to Road Design Part 4, Intersections and Crossings General* (Figure A 10, Figure 4.1), where:

- Curve 1 (red line) represents the boundary between a basic right turn (BAR) and a channelised short right turn (CHR(S)) turn treatment and between a basic left turn (BAL) and an auxiliary short left turn (AUL(S)) turn treatment.
- Curve 2 (blue line) represents the boundary between a CHR(S) and a full length CHR treatment and between an AUL(S) and a full length AUL or CHL treatment. The choice of CHL over an AUL will depend on factors such as the need to change the give way rule in favour of other manoeuvres at the intersection and the need to define more appropriately the driving path by reducing the area of bitumen surfacing.

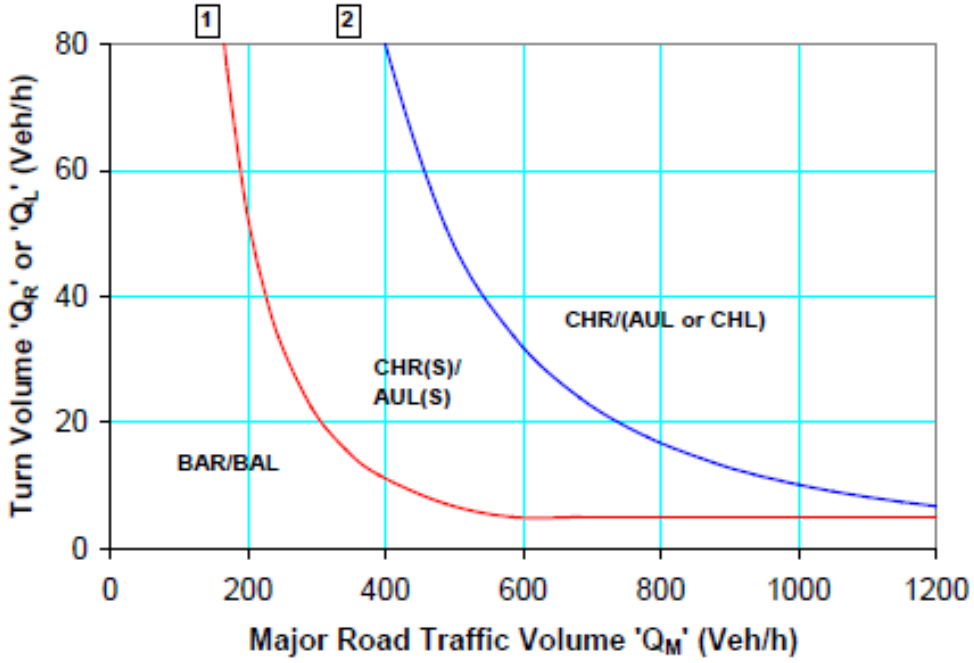
Figure 4.1 below contains graphs for the selection of turn treatments on roads with a design speed lesser than 100 km/h or greater than and equal to 100 km/h, whichever is appropriate for the road in consideration. TfNSW recommends that intersections should be designed for a travel speed 10 km/h greater than the posted speed limit.

The upper warrant chart is used to assess the adequacy of intersection design at West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road and Wamboyne Road/Girral Road/Blow Clear Road as the road speed on the major road at both intersections is 100 km/h. The lower warrant chart is used to assess the adequacy of intersection design at Mine Access Road/Bonehams Lane/Lake Cowal Road as the road speed on the major road at this intersection is lower than 100 km/h.

Figure A 10: Warrants for turn treatments on the major road at unsignalised intersections



(a) Design speed ≥ 100 km/h



(b) Design speed < 100 km/h

Source: Arndt and Troutbeck (2006).

Figure 4.1 Austroads warrant design charts for rural intersection turning lanes

The combination of the peak hourly major road through traffic movements and the right or left turning traffic movement for each intersection during the AM and PM peak hour traffic periods for baseline + construction scenario, is summarised in Table 4.7, with the corresponding intersection turning warrant requirement for the right and left turn lane on the major road shown in the right-hand column.

Table 4.7 Intersection turns treatment warrant for key intersections for baseline + construction scenario

Intersection	Peak hour	Major Road through traffic volume	Major Road right/left turn traffic volume	Turn treatment required
West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road	AM	11	89	BAR
	PM	50	6	BAR
Wamboyne Road/Girral Road/Blow Clear Road	AM	10	84	BAR
	PM	4	6	BAR
Mine Access Road/Bonehams Lane/Lake Cowal Road	AM	2	20	BAL
	PM	2	1	BAL

As per Table 4.7, future intersection right and left turning lane warrant requirement for the intersections are Type BAR and Type BAL warrant. The current design of the intersections complies with this design requirement and does not require any future improvements.

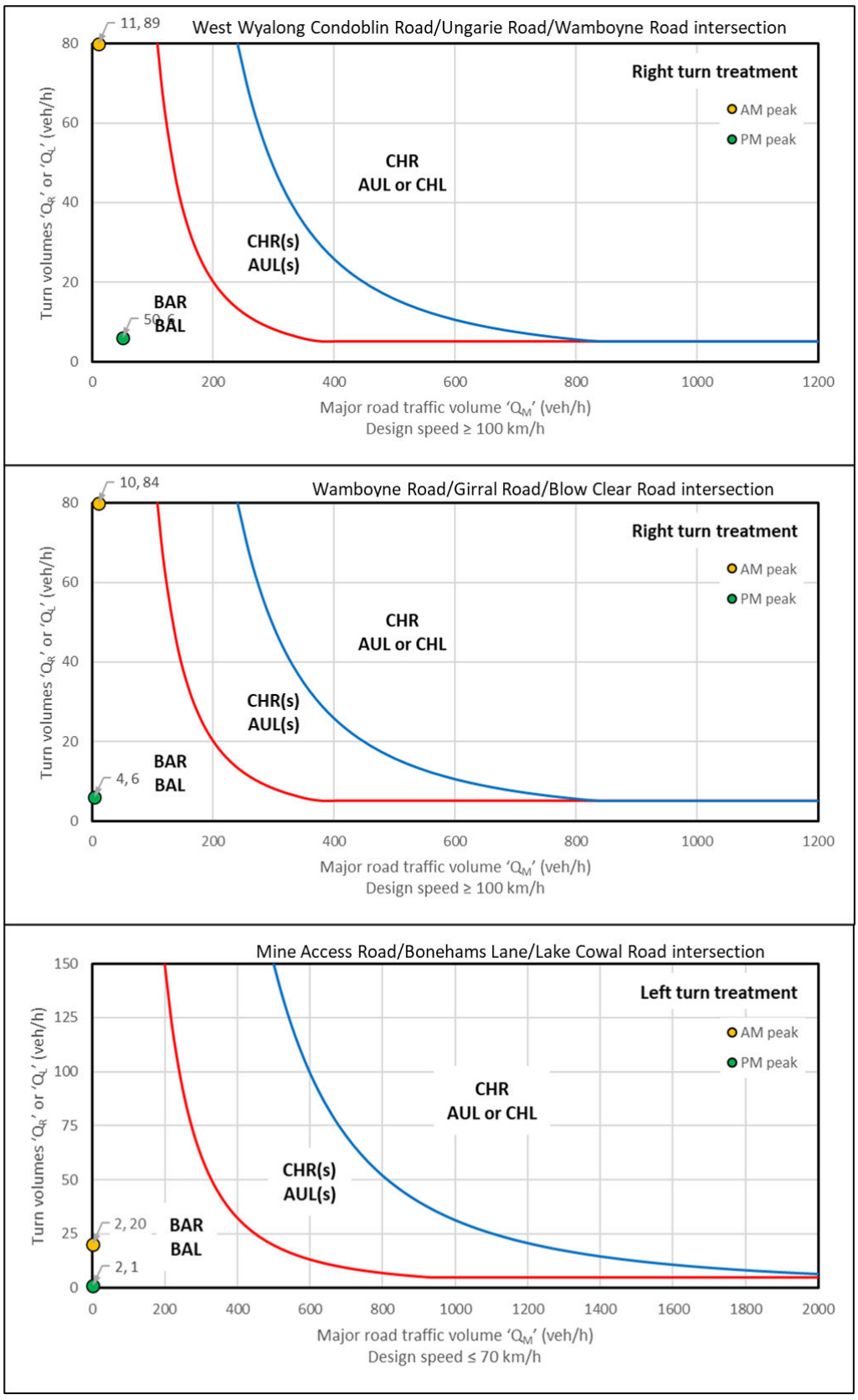


Figure 4.2 Austroads turn treatment warrant assessment for key intersections

4.5 Car and bus parking provision

The existing 64 car parking spaces in the sealed car parking area, 28 mine related utility type vehicles parking spaces in the unsealed parking area and bus shelter are considered to be adequate to accommodate ongoing operations. There is adequate provision for construction vehicle parking in the vicinity of the construction access (refer Figure 3.1).

4.6 Impact on road safety

The review of historic crashes in the region detailed in Section 2.6 showed no significant crash history on any of the existing or proposed mine access routes. On the local roads, which are expected to attract 80% of Project traffic, there were only two serious crashes – one each on Ungarie Road and Wamboyne Road.

The existing rural road network in the localities where the existing and proposed CGO daily and peak hourly traffic movements will occur, is considered to be safe and adequately designed and there would not typically be any increased road safety risk from the comparatively small additional Project construction traffic using these roads at the relevant times of the day on normal weekdays and weekends.

The majority of the existing and future construction and operational workforce traffic movements will continue to occur at times of the day which do not conflict with school bus traffic on routes such as Wamboyne Road, Blow Clear Road, Burcher Road and Bena Street, where school buses operate between the periods 7:30 am to 8:30 am and 3:30 pm to 4:30 pm on school weekdays.

4.7 Impact on rail network and level crossings

The potential impacts of the project to the non-operational rail corridor from West Wyalong to Burcher has been reviewed by AECOM. AECOM considered the Project to have no material effect on the geotechnical and structural performance of the rail corridor. The letter from AECOM is presented in Attachment C.

Numerous level crossings are also present on various major roads in the wider regional project area (e.g. along Newell Highway, Mid-Western Highway and West Wyalong bypass). There will be minimal additional impact on these level crossings' operations from the construction traffic in comparison to the significant volumes of existing traffic (including heavy truck traffic) which is using these routes.

4.8 Impact on public transport, pedestrians and cyclists

As noted in Section 4.6 above, the majority of future construction and operational workforce traffic movements will continue to occur at times of the day which do not conflict with school bus traffic on routes such as Wamboyne Road, Blow Clear Road, Burcher Road and Bena Street, where school buses operate between the periods 7:30 am to 8:30 am and 3:30 pm to 4:30 pm on school weekdays.

The Project will not result in impacts or demands on public transport services.

As noted in Section 2.1, there are no pedestrian or cycling infrastructure in the rural localities outside of the West Wyalong township. Consultation with Evolution staff indicate that the approved transport routes are seldom utilised by cyclists and accordingly the Project is not expected to impact on pedestrians and cyclists.

4.9 Over-size over-mass vehicles

The Project will not increase the frequency of OSOM movements which as outlined in Section 2.10 currently occur from time to time predominantly to deliver mining equipment to the site. OSOM vehicles may also be required from time to time during the Project's construction phase.

OSOM movements will continue to be managed under the approved TMP and relevant licenses and permits. The relevant permits and travel conditions including OSOM routes will be negotiated with TfNSW and relevant local councils on a case-by-case basis.

4.10 Cumulative assessment

A review of the Major Projects website and TfNSW Projects website identified the following projects as occurring in the vicinity of CGO or approved access routes:

- West Wyalong Solar Farm
- Wyalong Solar Farm
- Newell Highway Upgrades – projects between CGO, West Wyalong, Forbes and Condobolin:
  - Newell Highway Program Alliance – Gullifers Road
  - Moomba to Wilton Pipeline Accommodation Camp 6.

Each of the above projects was reviewed to determine project timeframes and traffic routes. The review concluded that a cumulative traffic impact assessment is not required as the construction of the Project will not coincide with any of the identified projects with the potential exception of the Moomba to Wilton Pipeline Accommodation Camp 6. While the construction of this camp is expected to be completed by the time the Project commences, there is the potential that the occupancy of this camp overlaps with Project construction during maintenance work required on the Moomba to Wilton Pipeline (GHD, 2022). The accommodation camp will be accessed off the Newell Highway however the Wilton Pipeline worksite, which the accommodation camp will service is located approximately 1.2 km from the camp (via local roads and private property) and is unlikely to require use of the Newell Highway (GHD, 2022) and therefore there is unlikely to be cumulative traffic impacts from the interactions of the Project with the temporary operation of the accommodation camp. Hence cumulative traffic impacts due to nearby development projects have not been considered as part of this TIA report.

4.11 Road maintenance contributions

The Project applicant is already responsible for much of the road maintenance for the local roads in the immediate area surrounding CGO and between the mine and West Wyalong. These arrangements will continue with the proposed Project. Further details of the existing and proposed maintenance requirements for individual roads are provided in Chapter 5, Mitigation Measures.

5 Mitigation measures

There are no specific transport network improvements or other traffic related road transport mitigation measures identified by this TIA as necessary to address the assessed locality road network and intersection traffic impacts due to the Project construction traffic.

In determining future road maintenance requirements, roads such as Wamboyne Road and Blow Clear Road are the key access routes to CGO from West Wyalong but are currently also used by significant amounts of other public traffic. Therefore, the future upkeep of these roads should generally be a shared responsibility with contributions being made by both Evolution and the Bland Shire Council.

The Bonehams Lane and Lake Cowal Road routes (directly south and north of the mine) will continue to be used primarily by mine related traffic, with minimal use by other public traffic. Evolution should therefore monitor the future road surface conditions for both these roads and where necessary undertake appropriate maintenance and/or road reconstruction repair work to ensure the road surface is generally maintained to safe trafficable standards, in accordance with the existing dilapidation/road maintenance protocol mechanism in the existing Transport Management Plan (TMP) for CGO.

The existing TMP for the CGO will be revised as necessary to address construction and ongoing operations related impacts of the Project and implemented for the life of the Project.

6 Summary and conclusion

This report has been prepared to identify and assess the potential road network construction stage traffic impacts for the Project.

All the affected roads generally have low daily traffic usage currently such that their existing daily traffic usage (including both CGO related and other rural locality traffic) is well within the existing Austroads recommended road design 'daily traffic capacity' rural road design standards for each route. These routes therefore all have significant spare traffic capacity currently and can accommodate the Project's forecast construction phase daily and peak hourly traffic movements without any need for further road widening or other capacity/safety improvements. There will be no changes to operational traffic compared to that currently approved.

The locality road network has a range of approved normal weather and wet weather traffic routes for vehicle access to CGO, which is on the western side of Lake Cowal, from population centres in the three adjoining local government areas of the Bland, Forbes and Lachlan Shire Councils.

Peak daily and hourly Project baseline traffic volumes have been determined by adding a linear growth rate of 1% per annum to the surveyed traffic volumes from the Underground TIA to obtain future base case year volumes. These volumes contain existing approved traffic volumes for CGO open pit operations. The approved operational traffic volumes of the Underground Development (SSD-10367) have been added to these baseline volumes (operation of the Underground Development will commence in around 2023) to determine Project baseline traffic volumes.

Construction traffic volumes for the Project include light vehicle traffic movements from individual employee cars and utes and heavy vehicle traffic from coach/minivans and delivery trucks. There would be 15 light vehicle and 17 heavy vehicle trips for a combined 32 vehicle trips per day during peak construction months.

Construction traffic distribution assumptions adopted are as follows:

- approximately 80% of the construction traffic will originate from the Wyalong/West Wyalong area
- approximately 10% of construction traffic will originate from the Forbes Shire urban or rural areas
- approximately 10% of the construction traffic will originate from the Lachlan Shire urban or rural areas.

The three primary access route intersections, along the main traffic route, which is between West Wyalong and the mine are at:

- West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road
- Wamboyne Road/Girral Road/Blow Clear Road
- Mine Access Road/Bonehams Lane/Lake Cowal Road.

These three intersections have been assessed for their current traffic safety and detailed analysis undertaken for the existing and proposed (construction stage) peak hourly traffic volumes for both the Austroads turning lane warrant assessment and the SIDRA intersection capacity analysis and in all cases, the existing intersection design and capacity has been found to be adequate with no need for intersection improvements.

Along the assessed access routes on the local road network, the proposed additional construction stage traffic movements will not result in any significantly increased road safety risk or exposure to crashes for the other traffic which is using these roads currently. Construction traffic will travel at times which do not conflict with school bus traffic which generally occurs on routes such as Wamboyne Road, Blow Clear Road, Burcher Road and Bena Street between the periods 7:30 am to 8:30 am and 3:30 pm to 4:30 pm on weekdays.

Parking areas for light vehicles and existing bus shelters are considered to be adequate for future construction traffic.

Assuming the mitigations outlined in Chapter 5 are implemented, the construction traffic of the Project is not expected to have adverse impacts to the regional or local traffic or road networks.

References

Austroads. (2016). *Guide to Road Design Part 3: Geometric Design.*

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GHD. (2022). *Moomba to Wilton Pipeline Temporary Camps Modification Report APA Group September*. Retrieved from https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=PMA-46935210%2120220930T070229.065%20GMT

RTA. (2002). *Guide to Traffic Generating Developments.*

Transport for NSW. (2022). *Traffic control at work sites .*

Glossary

Term	Description
AUR/AUL	Auxiliary right turn/Auxiliary left turn where a separate lane is provided to enable the turn to be performed in an additional lane
Additional disturbance area	The areas that will be disturbed by the Project that are outside of the existing and approved disturbance area.
BAL/BAR	basic turn treatment where turning vehicles may share the lane with through traffic movements
BSC	Bland Shire Council
CHL/CHR	a channelised turn treatment which provides a traffic island to enhance the safety of right-turning or left-turning vehicles
CGO	Cowal Gold Operations
DEL	Average delay
DOS	Degree of saturation
DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Limited
EPA	NSW Environment Protection Authority
EP&A Act	Environmental and Planning Assessment Act 1979 (NSW)
Evolution	Evolution Mining (Cowal) Pty Limited
Existing and approved disturbance area	Areas that are disturbed and/or approved to be disturbed under the current development consents that apply to CGO.
IWL	Integrated waste landform
LOS	Level of Service
LPB	Lake Protection Bund
Project area	The area at the CGO mine site which is subject to the development application as shown on Figure 1.3
OSOM	Over Size Over Mass
SEARs	Secretary's environmental assessment requirements
TIA	Transport Impact Assessment
TMP	Transport management plan
TfNSW	Transport for NSW
Underground TIA	*Cowal Gold Operations Underground Development Project Traffic Impact Assessment* (EMM 2020)
WRE	Waste rock emplacement
Q95	95% queue lengths

Attachment A

TfNSW and BSC assessment requirements and comments

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A.1 Agency requirements

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
1	The Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network, particularly intersections. Further to the above the TIA shall outline measures to address and manage traffic related issues generated by the development. The documentation submitted should address, but not be limited to:	This TIA.
2	• The potential impacts on the road network associated with the development during the lifetime of the project.	Sections 4.1 and 4.2 detail an assessment of the Project's impact on the road network over the lifetime of the Project.
3	• An assessment of the existing and anticipated additional traffic generation on the surrounding road network, including vehicle types and average and peak traffic volumes.	Section 2.3 and 2.5 present the existing traffic on surrounding road network and key intersections. Section 3.1 and 3.2 present the anticipated additional traffic on key intersections.
4	• Travel and haulage routes along the road network for vehicles to and from the development site including appropriate swept paths for large heavy vehicles.	Section 2.1 includes figures outlining the existing primary and alternative transport routes.
5	• The potential for oversize and over-mass vehicle movements.	Section 2.10 and Section 4.9.
6	• Consideration of the cumulative impacts of the potential traffic generation when added to existing traffic volumes upon the surrounding road network shall be undertaken.	Section 2.5.4 baseline traffic volumes consider CGO Underground Development Project operational traffic volumes. Baseline traffic volumes have been used for all assessments in Chapter 4.
7	• An assessment of the likely transport impacts to the site access route and site access point, particularly in relation to the capacity and condition of the roads.	Section 4.2 and 4.3 include assessments for likely transport impacts along site access route and at site access point, in relation to the capacity and condition of the roads.
8	• Any works/upgrades required within the road network to accommodate the development including concept plans for these works.	N/A
9	• The measures to be implemented to maintain the standard and safety of the road network, and the procedures to monitor and ensure compliance.	Chapter 5 outlines mitigation and management measures.
10	• A description of the measures that would be implemented to mitigate any transport impacts during construction.	Chapter 5 identifies and discusses the transport related mitigation measures for the Project.
11	A Construction Transport Management Plan and Driver Code of Conduct may be appropriate to outline measures to manage traffic related issues generated by the development.	Evolution has an existing approved Transport Management Plan (TMP) which includes a Drivers Code of Conduct. The TMP will be updated, should the Project be approved, to address construction and ongoing operations under the Project. A separate Construction Transport Management Plan will be prepared for construction of the northern access (refer Chapter 5).

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
12	In additional to that above, the following may aid in the consideration of the logistics associated with the transportation of materials for the development.	
13	Route assessment guidelines for the transport of materials and specialised construction equipment having consideration for the loads, weights and lengths of haulage vehicles.	All large vehicles including semi-trailers would be directed to use the heavy vehicle bypass route around West Wyalong.
14	The requirements outlined in the "Operators Guide to Oversize & Over Mass Vehicle Movements" need to be followed. Special Permits will need to be obtained for all over mass and over dimension loads.	Refer Section 4.9.
15	A full and independent risk analysis and inspection of the route may be required to be prepared and supplied for comment. Further analysis and reporting to assess possible damage to, and repair of the route will be required on a regular basis.	Refer to Section 4.6 for public traffic safety. Also, the EIS should refer to the independent and separate risk analysis report for all transport operations for all mine construction and operations activities (i.e. the previous PHA risk assessment undertaken by Pinnacle risk management as referenced in previous EIS and related applications including the MOD 16 application report dated October 2020).
Attachment A: Traffic Impact Assessment (TIA)		
16	The requested TIA should be tailored to the scope of the proposed development and include, but not be limited to, the following: • Detailed plans identifying the proposed location of any:	
	– Project-related infrastructure within and outside of the project boundary including transmission lines, water supply etc or any other project-related structures, within a road reserve. Include demarcation of local and classified road reserves.	Figure 1.3 shows the project related infrastructure
	– Permanent or temporary connection/access to classified roads.	The approved site access is shown on Figure 1.2 and described in Section 2.4.3.
	– The TIA should identify the source for input materials and quantify the traffic generation associated with the haulage of the source materials for construction and operation of the development.	Section 3.1.
	• Cumulative impacts: – Identify and assess the implications of any road and rail projects that will potentially be occurring simultaneously with the scheduling of the OSOM movements along the proposed OSOM routes.	Section 4.10.
	– An assessment should be undertaken as a part of the EIS and TIA to identify the projects that will have overlapping construction periods and assess the cumulative traffic impacts with emphasis on the following:	Section 4.10.

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
	▪ The cumulative impacts from traffic generated from the construction workforces in terms of the origin-destination routes, access, AM/PM peaks where there is overlap with other projects.	
	▪ The cumulative impacts of heavy vehicle movements in terms of AM/PM peaks and routes where there is an overlap with other projects.	
	▪ Cumulative impacts and consideration in relation to the timing of movements of OSOMs where other projects will be utilising the same routes as proposed for this development.	Section 4.10.
	• Heavy vehicle and OSOM routes: – Identify the return routes for OSOMs. – National Heavy Vehicle Regulator (NHVR) approved routes identified on the Restricted Access Maps (RAV MAP) are to be utilised for the heavy vehicle routes for the proposed development. – The TIA is required to include details on the number of OSOM movements, the intended time for OSOM movements to occur and identify the location of rest areas required along the OSOM routes.	Section 4.9.
	• Project schedule: – Hours and days of work, number of shifts and start and end times.	Section 3.1.2 presents project schedule details.
	– Phases and stages of the project, including construction, operation and decommissioning.	Sections 3.1 and 3.2.
	Traffic volumes including: – Existing background traffic,	Section 2.3 presents existing daily traffic and Section 2.5 presents existing peak hour traffic.
	– Project-related traffic for each phase or stage of the project.	Section 3.1 presents Project related traffic for construction stage and Section 3.2 presents Project related traffic for operations stage.
	– Projected cumulative traffic at commencement of operation, and a 10-year horizon post-commencement.	Section 2.5.4 presents baseline traffic volumes which include background traffic + construction traffic. Cumulative traffic for a 10-year horizon post- commencement is not needed as the project operations traffic will be a continuation of the CGO Underground Development Project.
	• Traffic characteristics including: – Number and ratio of heavy vehicles to light vehicles.	Section 3.1.2 includes details of Project light and heavy vehicle traffic.
	– Peak times for existing traffic.	Section 2.5 includes peak times for existing traffic.
	– Peak times for project-related traffic including commuter periods.	Section 3.1.2 includes details of peak times for Project-related traffic including commuter periods
	– Proposed hours for transportation and haulage.	Section 3.1 and 3.2.

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
	– Interactions between existing and project-related traffic.	Section 3.1 and 3.2 consider interactions between existing CGO traffic and future Project-related construction traffic.
	• The origins, destinations and routes for: – Commuter (employee and contractor) light vehicles and pool vehicles.	Section 2.1 includes maps for approved transport routes for traffic.
	– Heavy (haulage) vehicles.	
	– OSOM vehicles.	Section 2.10 and Section 4.9.
	• Road safety assessment of key haulage route/s.	There will be no haulage as part of the Project. Construction deliveries for the Project will use the approved transport routes (refer Section 2.1).
	• Identify the necessary road network infrastructure upgrades that are required to cater for and mitigate the impact of project related traffic on both the local and classified road network for the development (for instance, road widening and/or intersection treatments). In this regard, preliminary concept drawings should be submitted with the SSD application for any identified road infrastructure upgrades. It should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of TfNSW and Council.	No road widening or intersection treatments are proposed are part of this Project.
	• Proposed road facilities, access and intersection treatments are to be identified and be in accordance with Austroads Guide to Road Design including provision of Safe Intersection Sight Distance (SISD).	
	• Consideration of the local climate conditions that may affect road safety during the life of the project (e.g. fog, wet and dry weather, icy road conditions).	Chapter 6
	• The layout of the internal road network, parking facilities and infrastructure.	Figure 2.4
	• Impact on rail corridors and level crossings detailing any proposed interface treatments.	The existing rail corridor between West Wyalong to Burcher is non-operational. Refer to AECOM letter in Attachment C for impacts on rail corridor. Section 4.7 discusses impacts on level crossings. Level crossings are present on various major roads outside the immediate project area (e.g. Newell Highway, Mid-Western Highway and West Wyalong bypass). There will be minimal additional impact from the project traffic in comparison to the existing truck traffic using these routes.
	• Impact on public transport (public and school bus routes) and consideration for alternative transport modes such as carpooling and shuttle buses during construction.	Section 4.8 discusses the impacts on public transport. Section 3.1.2 describes the use of shuttle buses during construction.

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
	• The proposed development will draw workers from surrounding rural townships and nearby regional centres. This may require travel over large distance after work long shifts. The TIA should include measures to address high traffic volumes generated by workers attending the project site, particularly single vehicle use, and the potential fatigue related issues due to long distance travel and work shifts.	Section 3.1.2 describes the use of shuttle buses during construction.
	• Identification and assessment of potential environmental impacts of the project, such as blasting, lighting, visual, noise, dust and drainage on the function and integrity of all affected public roads.	Refer to EIS and relevant technical assessments
	• Controls for transport and use of any dangerous goods in accordance with State Environmental Planning Policy No. 33 – *Hazardous and Offensive Development*, the Australian Dangerous Goods Code and Australian Standard 4452 *Storage and Handling of Toxic Substances*.	The transportation of hazardous materials for CGO is managed under the approved Hazardous Materials Management Plan. The Project will not change the transport or use of any dangerous goods compared to what are currently approved.
	• A draft Traffic Management Plan (TMP) that could be implemented following approval of the EIS, in consultation with relevant Councils and TfNSW. The TMP would need to identify strategies to manage the impacts of project related traffic, including any community consultation measures for peak haulage periods.	The existing Cowal Gold Operations Transport Management Plan will be revised following approval of the EIS to account for the Project.
	• Propose a Driver Code of Conduct for haulage operations which could include, but not be limited to: – Safety initiatives for haulage through residential areas and/or school zones. – An induction process for vehicle operators and regular toolbox meetings. – A public complaint resolution and disciplinary procedure.	The existing Driver Code of Conduct within the approved Transport Management Plan will be revised as required for the Project.

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
Attachment 2: Rail Corridor Considerations		
	The development should undertake an assessment of impacts (both operation and construction) to the immediately adjacent non-operational rail corridor from West Wyalong to Burcher The Environmental Impact Statement shall address the relevant heads of consideration under Section 2.96, 2.97 and 2.98 of the State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021 and Development near Rail Corridors and Busy Roads – Interim Guideline 2008), including the following but not limited to the following documents: • A Geotechnical Investigation Report that based on actual boreholes and includes: – Analysis of the potential impact of demolition, excavation and operation of the development on the rail corridor and rail infrastructure. – Demolition and excavation induced vibration impacts on the rail corridor and rail infrastructure. – Potential loadings of the development on the rail corridor and rail infrastructure.	The potential for impacts from the Project to the non-operational rail corridor from West Wyalong to Burcher were reviewed by AECOM. AECOM considered the Project to have no material effect on the geotechnical and structural performance of the rail corridor. The letter from AECOM is presented in Attachment C.
	• Structural drawings and Report which demonstrates: – The foundation design and associated works has taken into appropriate consideration of the rail infrastructure and assets to enable verification of compliance to TfNSW requirements. – Any deformation induced by bulk excavation will not have adverse impacts on the rail corridor, rail infrastructure or rail easements. – Plan and Cross-sectional drawings showing the rail corridor, sub soil profile and/or foundation excavation and structure design of the development's sub-ground support adjacent to the rail corridor. All measurements contained within the cross-sectional drawings must be verified by a registered surveyor.	

Table A.1 TfNSW requirements

No.	TfNSW comments	Where addressed
	• Preliminary Contamination Assessment. TfNSW is currently conducting an environmental assessment to identify contamination on the CRN. All railway corridors are generally deemed to be contaminated unless proven otherwise by sample testing. Contamination risk arises from both the construction (e.g. unknown fill used in rail construction) and operations (e.g. transportation of contaminated material, spills) of the railway. Potential contaminants could include, but are not limited to, heavy metals, PAHs, phenolics (boiler ash), Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs). Although TfNSW is committed to ensuring the health and wellbeing of the community, TfNSW is not aware whether there are contaminants found in the rail corridor or on the common boundaries with the development site.	
	• Details of stormwater management plan and drainage details which may have impacts on the rail corridor land and rail infrastructure including culverts.	
	• A suite of survey plans that shows rail corridor, fencing and rail infrastructure (including easements).	
	• Details of traffic routes for operation and construction on nearby level crossings managed by UGLRL.	
	• If required, an ALCAM assessment on level crossings which are proposed to be included in traffic routes for construction and operation.	

Table 6.1 Bland Shire Council comments

No.	Bland Shire Council comments	Where addressed
1	The “bypass” MR 639 is also a TfNSW route. It should be acknowledged that all heavy vehicles use this route instead on the Newell Highway through West Wyalong’s Main Street.	Section 2.1 acknowledges Project heavy vehicles will be using the bypass route, when travelling through West Wyalong to or from other regional destinations.

Attachment B
SIDRA results

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MOVEMENT SUMMARY

Site: 101 [W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd AM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ungarie Road														
2	T1	1	1	1	100.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
3	R2	69	9	73	13.0	0.043	7.8	LOS A	0.2	1.6	0.06	0.65	0.06	69.5
Approach		70	10	74	14.3	0.043	7.7	NA	0.2	1.6	0.06	0.64	0.06	69.8
East: Wamboyne Road														
4	L2	1	0	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.05	0.64	0.05	75.3
6	R2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.05	0.64	0.05	74.8
Approach		2	0	2	0.0	0.002	7.8	LOS A	0.0	0.0	0.05	0.64	0.05	75.0
North: West Wyalong Condoblin Road														
7	L2	1	0	1	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.07	0.00	86.6
8	T1	9	2	9	22.2	0.006	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	97.4
Approach		10	2	11	20.0	0.006	0.8	NA	0.0	0.0	0.00	0.07	0.00	96.2
All Vehicles		82	12	86	14.6	0.043	6.8	NA	0.2	1.6	0.05	0.57	0.05	72.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd PM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ungarie Road														
2	T1	26	4	27	15.4	0.012	0.0	LOS A	0.0	0.0	0.01	0.02	0.01	99.0
3	R2	1	0	1	0.0	0.012	7.5	LOS A	0.0	0.0	0.01	0.03	0.01	87.1
Approach		27	4	28	14.8	0.012	0.3	NA	0.0	0.0	0.01	0.03	0.01	98.5
East: Wamboyne Road														
4	L2	58	10	61	17.2	0.044	8.4	LOS A	0.2	1.5	0.09	0.62	0.09	67.9
6	R2	2	2	2	100.0	0.044	10.8	LOS A	0.2	1.5	0.09	0.62	0.09	48.0
Approach		60	12	63	20.0	0.044	8.4	LOS A	0.2	1.5	0.09	0.62	0.09	67.0
North: West Wyalong Condoblin Road														
7	L2	1	0	1	0.0	0.013	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.0
8	T1	23	0	24	0.0	0.013	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		24	0	25	0.0	0.013	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.6
All Vehicles		111	16	117	14.4	0.044	4.7	NA	0.2	1.5	0.05	0.35	0.05	78.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wamboyne Rd/Girral Rd/Blow Clear Rd AM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wamboyne Road														
1	L2	5	0	5	0.0	0.044	7.9	LOS A	0.2	1.6	0.04	0.65	0.04	75.0
2	T1	1	0	1	0.0	0.044	0.0	LOS A	0.2	1.6	0.04	0.65	0.04	83.0
3	R2	64	9	67	14.1	0.044	7.8	LOS A	0.2	1.6	0.04	0.65	0.04	69.3
Approach		70	9	74	12.9	0.044	7.7	NA	0.2	1.6	0.04	0.65	0.04	69.9
East: Blow Clear Road														
4	L2	1	0	1	0.0	0.004	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
5	T1	1	0	1	0.0	0.004	6.9	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
6	R2	2	0	2	0.0	0.004	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.2
Approach		4	0	4	0.0	0.004	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
North: Wamboyne Road														
7	L2	3	3	3	100.0	0.004	10.4	LOS A	0.0	0.1	0.02	0.53	0.02	42.8
8	T1	1	0	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.02	0.53	0.02	82.3
9	R2	1	0	1	0.0	0.004	7.4	LOS A	0.0	0.1	0.02	0.53	0.02	74.2
Approach		5	3	5	60.0	0.004	7.7	NA	0.0	0.1	0.02	0.53	0.02	52.3
West: Girral Road														
10	L2	1	0	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
11	T1	1	0	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
12	R2	1	0	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		3	0	3	0.0	0.003	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.6
All Vehicles		82	12	86	14.6	0.044	7.7	NA	0.2	1.6	0.03	0.64	0.03	68.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wamboyne Rd/Girral Rd/Blow Clear Rd PM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wamboyne Road														
1	L2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.01	0.45	0.01	79.7
2	T1	1	0	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.01	0.45	0.01	87.6
3	R2	1	0	1	0.0	0.002	7.4	LOS A	0.0	0.0	0.01	0.45	0.01	79.1
Approach		3	0	3	0.0	0.002	5.1	NA	0.0	0.0	0.01	0.45	0.01	82.0
East: Blow Clear Road														
4	L2	56	10	59	17.9	0.041	8.3	LOS A	0.2	1.3	0.01	0.65	0.01	68.3
5	T1	1	0	1	0.0	0.041	6.7	LOS A	0.2	1.3	0.01	0.65	0.01	74.2
6	R2	1	0	1	0.0	0.041	7.4	LOS A	0.2	1.3	0.01	0.65	0.01	74.2
Approach		58	10	61	17.2	0.041	8.3	LOS A	0.2	1.3	0.01	0.65	0.01	68.5
North: Wamboyne Road														
7	L2	1	0	1	0.0	0.004	7.8	LOS A	0.0	0.2	0.02	0.56	0.02	77.8
8	T1	1	0	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.02	0.56	0.02	86.4
9	R2	4	2	4	50.0	0.004	8.8	LOS A	0.0	0.2	0.02	0.56	0.02	60.3
Approach		6	2	6	33.3	0.004	7.2	NA	0.0	0.2	0.02	0.56	0.02	66.1
West: Girral Road														
10	L2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0	1	0.0	0.002	6.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0	1	0.0	0.002	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
Approach		3	0	3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
All Vehicles		70	12	74	17.1	0.041	8.0	NA	0.2	1.3	0.01	0.64	0.01	69.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Mine Access Rd/Bonehams Ln/Lake Cowal Rd AM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lake Cowal Road														
1	L2	1	0	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.7
2	T1	1	0	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.02	0.65	0.02	70.6
3	R2	1	0	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.2
Approach		3	0	3	0.0	0.003	7.5	LOS A	0.0	0.1	0.02	0.65	0.02	73.8
East: Mine Access Road														
4	L2	1	0	1	0.0	0.003	8.2	LOS A	0.0	0.1	0.13	0.25	0.13	80.4
5	T1	3	0	3	0.0	0.003	0.2	LOS A	0.0	0.1	0.13	0.25	0.13	89.6
6	R2	1	1	1	100.0	0.003	10.6	LOS A	0.0	0.1	0.13	0.25	0.13	50.7
Approach		5	1	5	20.0	0.003	3.9	NA	0.0	0.1	0.13	0.25	0.13	76.2
North: Lake Cowal Road														
7	L2	15	4	16	26.7	0.014	7.7	LOS A	0.1	0.4	0.17	0.58	0.17	60.9
8	T1	1	0	1	0.0	0.014	6.0	LOS A	0.1	0.4	0.17	0.58	0.17	68.3
9	R2	1	0	1	0.0	0.014	7.0	LOS A	0.1	0.4	0.17	0.58	0.17	68.2
Approach		17	4	18	23.5	0.014	7.6	LOS A	0.1	0.4	0.17	0.58	0.17	61.6
West: Bonehams Lane														
10	L2	1	0	1	0.0	0.041	7.8	LOS A	0.0	0.1	0.00	0.02	0.00	72.2
11	T1	67	12	71	17.9	0.041	0.0	LOS A	0.0	0.1	0.00	0.02	0.00	99.3
12	R2	1	0	1	0.0	0.041	7.4	LOS A	0.0	0.1	0.00	0.02	0.00	87.6
Approach		69	12	73	17.4	0.041	0.2	NA	0.0	0.1	0.00	0.02	0.00	98.5
All Vehicles		94	17	99	18.1	0.041	2.0	NA	0.1	0.4	0.04	0.15	0.04	86.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Mine Access Rd/Bonehams Ln/Lake Cowal Rd PM peak (Site Folder: Baseline scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lake Cowal Road														
1	L2	1	0	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.14	0.60	0.14	75.3
2	T1	1	0	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.14	0.60	0.14	70.2
3	R2	1	0	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.14	0.60	0.14	74.8
Approach		3	0	3	0.0	0.003	7.5	LOS A	0.0	0.1	0.14	0.60	0.14	73.3
East: Mine Access Road														
4	L2	1	0	1	0.0	0.038	7.8	LOS A	0.1	0.6	0.01	0.14	0.01	85.8
5	T1	49	7	52	14.3	0.038	0.0	LOS A	0.1	0.6	0.01	0.14	0.01	96.4
6	R2	11	3	12	27.3	0.038	8.2	LOS A	0.1	0.6	0.01	0.14	0.01	67.0
Approach		61	10	64	16.4	0.038	1.6	NA	0.1	0.6	0.01	0.14	0.01	89.2
North: Lake Cowal Road														
7	L2	1	0	1	0.0	0.002	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.3
8	T1	1	0	1	0.0	0.002	5.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.4
9	R2	1	0	1	0.0	0.002	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	69.9
Approach		3	0	3	0.0	0.002	6.6	LOS A	0.0	0.1	0.01	0.63	0.01	70.2
West: Bonehams Lane														
10	L2	1	0	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.11	0.41	0.11	65.5
11	T1	1	0	1	0.0	0.002	0.1	LOS A	0.0	0.0	0.11	0.41	0.11	86.8
12	R2	1	0	1	0.0	0.002	7.5	LOS A	0.0	0.0	0.11	0.41	0.11	78.4
Approach		3	0	3	0.0	0.002	5.2	NA	0.0	0.0	0.11	0.41	0.11	75.9
All Vehicles		70	10	74	14.3	0.038	2.2	NA	0.1	0.6	0.02	0.19	0.02	86.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd AM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ungarie Road														
2	T1	1	1	1	100.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
3	R2	89	17	94	19.1	0.058	8.0	LOS A	0.3	2.2	0.06	0.65	0.06	67.4
Approach		90	18	95	20.0	0.058	7.9	NA	0.3	2.2	0.06	0.64	0.06	67.6
East: Wamboyne Road														
4	L2	6	5	6	83.3	0.007	10.1	LOS A	0.0	0.3	0.05	0.65	0.05	52.2
6	R2	1	0	1	0.0	0.007	7.9	LOS A	0.0	0.3	0.05	0.65	0.05	74.2
Approach		7	5	7	71.4	0.007	9.8	LOS A	0.0	0.3	0.05	0.65	0.05	54.5
North: West Wyalong Condoblin Road														
7	L2	1	0	1	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.07	0.00	86.6
8	T1	9	2	9	22.2	0.006	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	97.4
Approach		10	2	11	20.0	0.006	0.8	NA	0.0	0.0	0.00	0.07	0.00	96.2
All Vehicles		107	25	113	23.4	0.058	7.3	NA	0.3	2.2	0.05	0.59	0.05	68.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd PM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ungarie Road														
2	T1	26	4	27	15.4	0.016	0.0	LOS A	0.1	0.5	0.04	0.11	0.04	98.6
3	R2	6	5	6	83.3	0.016	9.8	LOS A	0.1	0.5	0.06	0.18	0.06	56.5
Approach		32	9	34	28.1	0.016	1.9	NA	0.1	0.5	0.04	0.12	0.04	86.5
East: Wamboyne Road														
4	L2	78	18	82	23.1	0.060	8.5	LOS A	0.2	2.1	0.09	0.62	0.09	66.1
6	R2	2	2	2	100.0	0.060	10.9	LOS A	0.2	2.1	0.09	0.62	0.09	48.0
Approach		80	20	84	25.0	0.060	8.6	LOS A	0.2	2.1	0.09	0.62	0.09	65.5
North: West Wyalong Condoblin Road														
7	L2	1	0	1	0.0	0.013	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.0
8	T1	23	0	24	0.0	0.013	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		24	0	25	0.0	0.013	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.6
All Vehicles		136	29	143	21.3	0.060	5.5	NA	0.2	2.1	0.06	0.40	0.06	74.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wamboyne Rd/Girral Rd/Blow Clear Rd AM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wamboyne Road														
1	L2	5	0	5	0.0	0.058	7.9	LOS A	0.3	2.2	0.04	0.65	0.04	75.0
2	T1	1	0	1	0.0	0.058	0.0	LOS A	0.3	2.2	0.04	0.65	0.04	83.0
3	R2	84	17	88	20.2	0.058	8.0	LOS A	0.3	2.2	0.04	0.65	0.04	67.2
Approach		90	17	95	18.9	0.058	7.9	NA	0.3	2.2	0.04	0.65	0.04	67.7
East: Blow Clear Road														
4	L2	6	5	6	83.3	0.008	10.0	LOS A	0.0	0.3	0.01	0.66	0.01	52.5
5	T1	1	0	1	0.0	0.008	7.0	LOS A	0.0	0.3	0.01	0.66	0.01	74.7
6	R2	2	0	2	0.0	0.008	7.8	LOS A	0.0	0.3	0.01	0.66	0.01	74.7
Approach		9	5	9	55.6	0.008	9.2	LOS A	0.0	0.3	0.01	0.66	0.01	58.2
North: Wamboyne Road														
7	L2	3	3	3	100.0	0.004	10.4	LOS A	0.0	0.1	0.02	0.53	0.02	42.8
8	T1	1	0	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.02	0.53	0.02	82.3
9	R2	1	0	1	0.0	0.004	7.4	LOS A	0.0	0.1	0.02	0.53	0.02	74.2
Approach		5	3	5	60.0	0.004	7.7	NA	0.0	0.1	0.02	0.53	0.02	52.3
West: Girral Road														
10	L2	1	0	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
11	T1	1	0	1	0.0	0.003	7.0	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
12	R2	1	0	1	0.0	0.003	7.9	LOS A	0.0	0.1	0.01	0.66	0.01	75.2
Approach		3	0	3	0.0	0.003	7.6	LOS A	0.0	0.1	0.01	0.66	0.01	75.5
All Vehicles		107	25	113	23.4	0.058	8.0	NA	0.3	2.2	0.04	0.65	0.04	66.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wamboyne Rd/Girral Rd/Blow Clear Rd PM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Wamboyne Road														
1	L2	1	0	1	0.0	0.007	7.8	LOS A	0.0	0.3	0.02	0.59	0.02	78.7
2	T1	1	0	1	0.0	0.007	0.0	LOS A	0.0	0.3	0.02	0.59	0.02	87.5
3	R2	6	5	6	83.3	0.007	9.7	LOS A	0.0	0.3	0.02	0.59	0.02	53.0
Approach		8	5	8	62.5	0.007	8.3	NA	0.0	0.3	0.02	0.59	0.02	58.3
East: Blow Clear Road														
4	L2	76	18	80	23.7	0.056	8.5	LOS A	0.2	2.0	0.01	0.65	0.01	66.4
5	T1	1	0	1	0.0	0.056	6.7	LOS A	0.2	2.0	0.01	0.65	0.01	74.2
6	R2	1	0	1	0.0	0.056	7.5	LOS A	0.2	2.0	0.01	0.65	0.01	74.2
Approach		78	18	82	23.1	0.056	8.4	LOS A	0.2	2.0	0.01	0.65	0.01	66.6
North: Wamboyne Road														
7	L2	1	0	1	0.0	0.004	7.8	LOS A	0.0	0.2	0.02	0.56	0.02	77.8
8	T1	1	0	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.02	0.56	0.02	86.4
9	R2	4	2	4	50.0	0.004	8.8	LOS A	0.0	0.2	0.02	0.56	0.02	60.3
Approach		6	2	6	33.3	0.004	7.2	NA	0.0	0.2	0.02	0.56	0.02	66.1
West: Girral Road														
10	L2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
11	T1	1	0	1	0.0	0.002	6.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
12	R2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		3	0	3	0.0	0.002	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		95	25	100	26.3	0.056	8.3	NA	0.2	2.0	0.01	0.64	0.01	66.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Mine Access Rd/Bonehams Ln/Lake Cowal Rd AM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lake Cowal Road														
1	L2	6	5	6	83.3	0.009	10.0	LOS A	0.0	0.4	0.02	0.66	0.02	52.4
2	T1	2	1	2	50.0	0.009	8.4	LOS A	0.0	0.4	0.02	0.66	0.02	55.7
3	R2	1	0	1	0.0	0.009	8.0	LOS A	0.0	0.4	0.02	0.66	0.02	74.6
Approach		9	6	9	66.7	0.009	9.4	LOS A	0.0	0.4	0.02	0.66	0.02	55.0
East: Mine Access Road														
4	L2	1	0	1	0.0	0.004	8.2	LOS A	0.0	0.1	0.15	0.25	0.15	80.2
5	T1	3	0	3	0.0	0.004	0.2	LOS A	0.0	0.1	0.15	0.25	0.15	89.4
6	R2	1	1	1	100.0	0.004	10.7	LOS A	0.0	0.1	0.15	0.25	0.15	50.6
Approach		5	1	5	20.0	0.004	3.9	NA	0.0	0.1	0.15	0.25	0.15	76.0
North: Lake Cowal Road														
7	L2	20	6	21	30.0	0.019	7.8	LOS A	0.1	0.7	0.20	0.58	0.20	59.9
8	T1	2	1	2	50.0	0.019	7.1	LOS A	0.1	0.7	0.20	0.58	0.20	56.3
9	R2	1	0	1	0.0	0.019	7.1	LOS A	0.1	0.7	0.20	0.58	0.20	68.0
Approach		23	7	24	30.4	0.019	7.7	LOS A	0.1	0.7	0.20	0.58	0.20	59.9
West: Bonehams Lane														
10	L2	1	0	1	0.0	0.057	7.9	LOS A	0.1	0.5	0.01	0.05	0.01	72.3
11	T1	82	15	86	18.3	0.057	0.0	LOS A	0.1	0.5	0.01	0.05	0.01	99.3
12	R2	6	5	6	83.3	0.057	9.7	LOS A	0.1	0.5	0.01	0.05	0.01	57.0
Approach		89	20	94	22.5	0.057	0.7	NA	0.1	0.5	0.01	0.05	0.01	94.2
All Vehicles		126	34	133	27.0	0.057	2.8	NA	0.1	0.7	0.05	0.20	0.05	80.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Mine Access Rd/Bonehams Ln/Lake Cowal Rd PM peak (Site Folder: Baseline scenario + construction scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Lake Cowal Road														
1	L2	6	5	6	83.3	0.009	10.4	LOS A	0.0	0.4	0.19	0.61	0.19	52.1
2	T1	2	1	2	50.0	0.009	8.4	LOS A	0.0	0.4	0.19	0.61	0.19	55.2
3	R2	1	0	1	0.0	0.009	7.8	LOS A	0.0	0.4	0.19	0.61	0.19	73.9
Approach		9	6	9	66.7	0.009	9.7	LOS A	0.0	0.4	0.19	0.61	0.19	54.5
East: Mine Access Road														
4	L2	1	0	1	0.0	0.051	7.8	LOS A	0.1	0.9	0.01	0.14	0.01	85.7
5	T1	64	10	67	15.6	0.051	0.0	LOS A	0.1	0.9	0.01	0.14	0.01	96.3
6	R2	16	5	17	31.3	0.051	8.3	LOS A	0.1	0.9	0.01	0.14	0.01	65.5
Approach		81	15	85	18.5	0.051	1.7	NA	0.1	0.9	0.01	0.14	0.01	88.0
North: Lake Cowal Road														
7	L2	1	0	1	0.0	0.004	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	69.4
8	T1	2	1	2	50.0	0.004	7.0	LOS A	0.0	0.1	0.01	0.63	0.01	56.9
9	R2	1	0	1	0.0	0.004	7.1	LOS A	0.0	0.1	0.01	0.63	0.01	69.1
Approach		4	1	4	25.0	0.004	7.0	LOS A	0.0	0.1	0.01	0.63	0.01	62.5
West: Bonehams Lane														
10	L2	1	0	1	0.0	0.007	8.2	LOS A	0.0	0.3	0.20	0.51	0.20	65.0
11	T1	1	0	1	0.0	0.007	0.4	LOS A	0.0	0.3	0.20	0.51	0.20	86.0
12	R2	6	5	6	83.3	0.007	10.1	LOS A	0.0	0.3	0.20	0.51	0.20	52.4
Approach		8	5	8	62.5	0.007	8.6	NA	0.0	0.3	0.20	0.51	0.20	56.6
All Vehicles		102	27	107	26.5	0.051	3.2	NA	0.1	0.9	0.04	0.23	0.04	79.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Attachment C

AECOM railway corridor letter

EMM
creating opportunities

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05 August 2022

Locked Bag 210
West Wyalong, NSW 2671

Dear Pierre Miguel

TfNSW Ref. SWT22/0151, Attachment 2

AECOM Australia Pty Ltd (AECOM) is pleased to provide our opinion regarding potential impacts to the non-operational rail corridor from West Wyalong to Burcher. The matter was presented to us in the above-referenced TfNSW letter dated 03 June 2022.

Background

The undersigned, as the appointed Engineer of Record of the tailings storage facilities at Evolution Cowal Mine (a.k.a Cowal Gold Operations), is the person responsible for dam safety and the principal point of contact regarding matters of design, surveillance and construction of the Integrated Waste Landform (IWL) facility.

The IWL is situated to the east of the subject rail corridor and the closest proximity is approximately 295 m between the toe of the IWL west embankment and the rail corridor. Plans to expand the IWL to the north, as part of the OPC Project, will see the embankment toe more than 300 m from the rail corridor. Figure 1 illustrates the proximity of the IWL and IWL North Expansion projects to the rail corridor.

The western cell of IWL (i.e. IWL Stage 2) was completed in September 2021 to a crest elevation of 231 mAHD and the cell reached interim capacity in June 2022. Construction and operation of IWL is expected to continue through 2031 reaching the ultimate crest elevation of 245 mAHD. The west embankment of IWL has reached the ultimate footprint per the design and therefore will not encroach further upon the rail corridor.

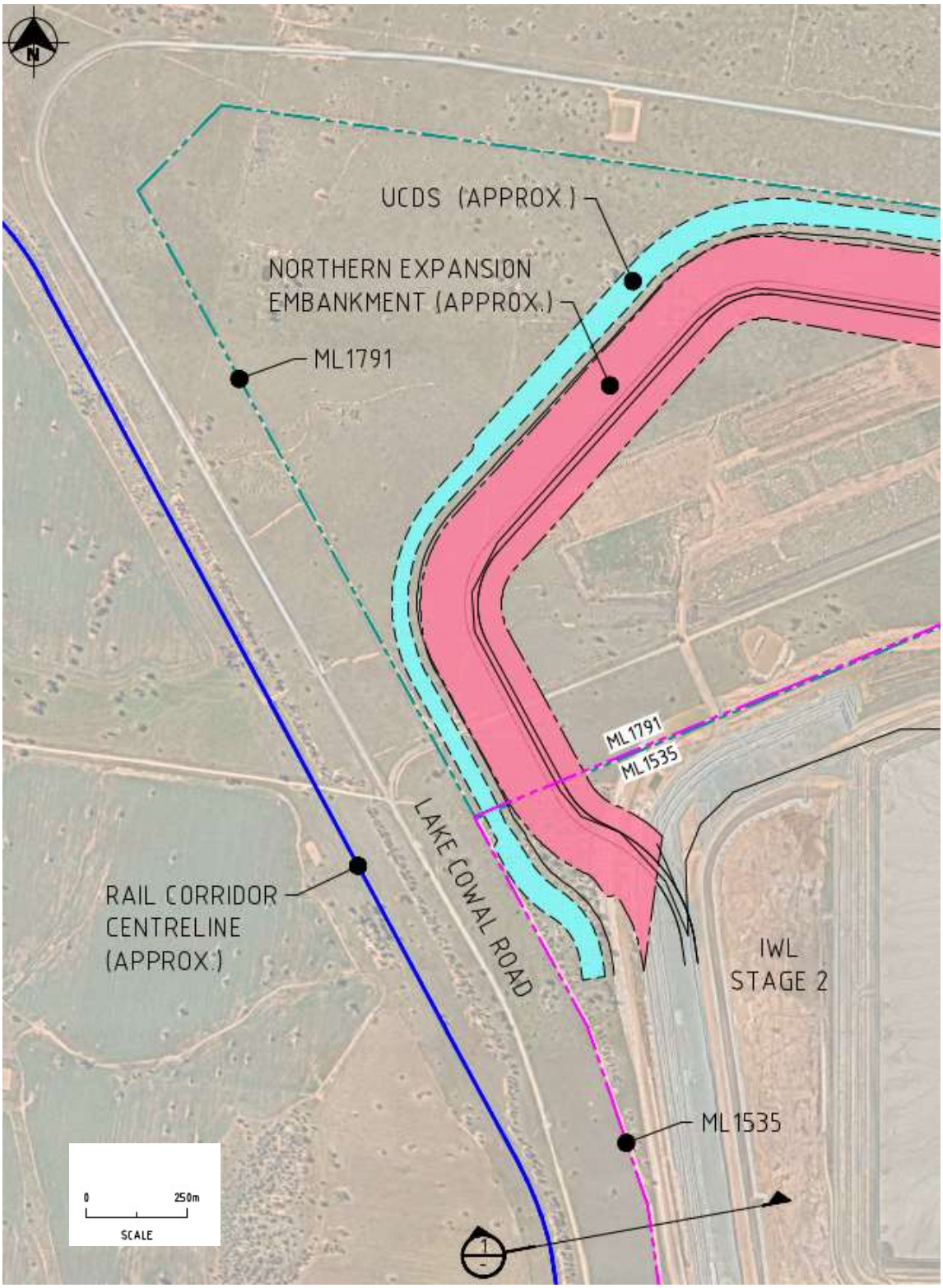


Figure 1 Plan view showing proximity of IWL and IWL North Expansion to the rail corridor.

Site Ground Conditions

The topography of the IWL area is characterised by relatively flat ground sloping at about 0.4% to Lake Cowal in the east.

During the design of the original tailings storage facilities in 2004, SNC Lavalin reported on the surficial geology at the Cowal site as consisting of a sequence of transported soils (alluvium, colluvium), residual soils (saprolite, SOX) and transitional soft rock (saprock, HOX). The combined thickness of these units varies from 50 m to 100 m in the mine area. The transported soils are found in the upper 30 m.

Hundreds of geotechnical test pits and boreholes have been carried out in the vicinity of IWL since 1995. The materials encountered in the upper 10 m (below ground level) generally comprise stiff to very stiff overconsolidated clayey soils with few lenses and paleochannels of clayey sands and clayey gravels.

There are no geotechnical investigation sites within approximately 200 m of the rail corridor.

Geotechnical Stability of IWL

The IWL embankments are robustly designed with 28 m crest width and compacted rock fill shoulders constructed on stripped and proof-rolled clayey foundation. Foundation stripping consists of uniformly removing the upper 0.8 m of topsoil and subsoil to expose natural clayey soils.

Engineered clays are limited to the upstream embankment facing to prevent seepage from the tailings stored within.

Geotechnical stability assessments carried out during design indicate global and local factor of safety (FoS) exceeding 2.0 against instability.

IWL and Ground Deformation

Elastic settlement of the IWL foundations due to embankment loading is expected to be confined to the immediate facility footprint. Settlement of the IWL tailings facility is monitored using InSAR satellite technology, which has indicated no significant settlement outside of IWL footprint over the past 18 months despite the construction and tailings deposition filling the IWL west cell. Figure 2 shows the distribution of InSAR satellite data points available near the rail corridor and monitoring section A corresponds to the position of Section 1 shown in Figure 1. Figure 2 shows InSAR satellite monitoring data collected along Section A between January 2021 and June 2022, indicating no significant ground deformation between the rail corridor and the IWL embankment. Deformation measured (+/- 5 mm to 10 mm) over this period is considered background level and within the degree of error of the technology over an 18-month period.

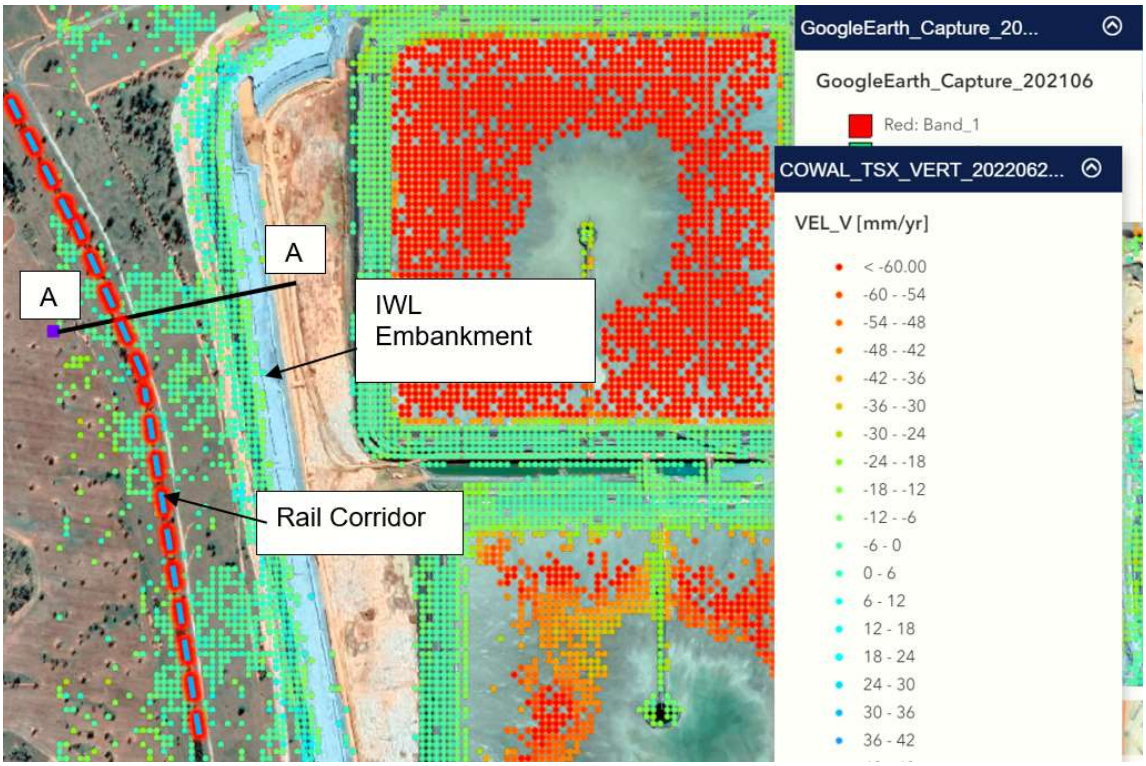


Figure 2 InSAR satellite monitoring imagery, June 2022 (image courtesy of TreAltamira)

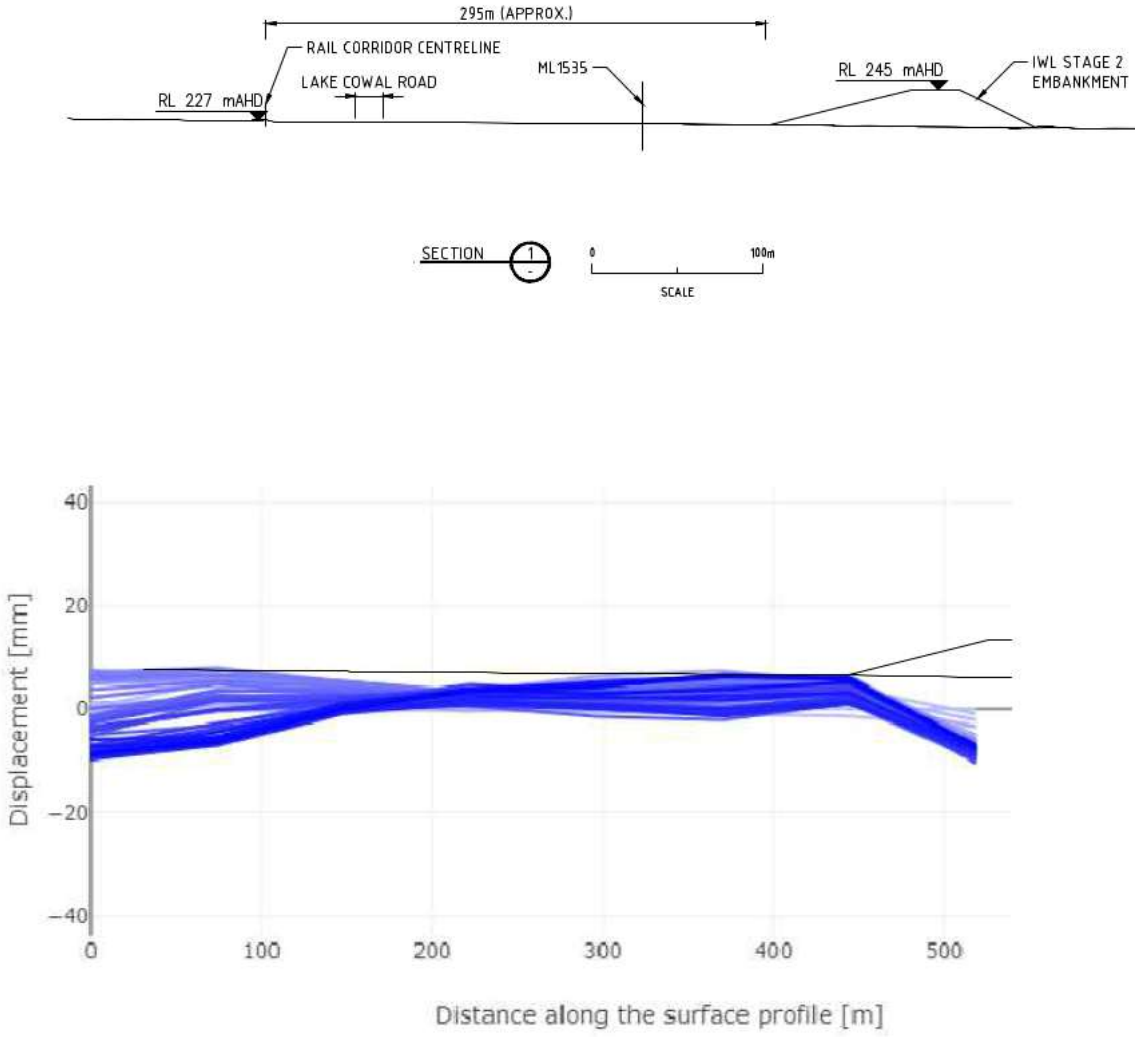


Figure 3 InSAR vertical displacement data along Section A shown in Figure 2 superimposed on ground profile taken from Figure 1. Data collected between Jan 2021 through Jun 2022 (image courtesy of TreAltamira).

IWL Construction Works

The IWL construction works generally involve stripping of topsoil/subsoil by 70 tonne excavators and loaders and haulage by mine trucks (up to Cat789 size) to distant stockpiles located elsewhere on the Mine Leases (ML1535 and ML1791).

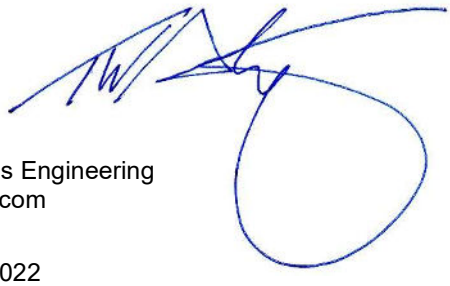
The IWL construction works are confined to the boundaries of the Mine Leases and the heavy vehicle construction traffic is confined to the embankment footprint. No significant activities come within about 295 m of the rail corridor. Therefore, no negative impacts (e.g. vibration, deformation) to the rail corridor are expected due to the IWL construction works.

Assessment

Based on the robust nature of the IWL structure, the significant distance (>295 m) from the rail corridor and the InSAR satellite monitoring evidence, AECOM considers the IWL and IWL North expansion projects to have no material effect on the geotechnical and structural performance of the rail corridor.

If you have any questions or concerns regarding the above, please contact me at the details provided below.

Kind regards



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