



Appendix K

Traffic impact assessment





Cowal Gold Operations Underground Development Project

Traffic Impact Assessment

Prepared for Evolution Mining (Cowal) Pty Limited
September 2020





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Cowal Gold Operations Underground Development Project

Traffic Impact Assessment

Report Number

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Client

Evolution Mining (Cowal) Pty Limited

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1 Introduction

1.1 Overview

EMM Consulting Pty Limited (EMM) has been engaged by Evolution Mining (Cowal) Pty Limited (Evolution) to prepare a traffic impact assessment (TIA) guided by the NSW Roads and Traffic Authority (RTA) (now Transport for NSW) (2002) Guide to Traffic Generating Developments for the Cowal Gold Operations (CGO) Underground Development Project (the Project).

Evolution is the owner and operator of CGO, which is located approximately 38 km north-east of West Wyalong in the central west region of NSW.

CGO is an existing open cut gold mining operation, which has been operational since 2005. It operates under a Ministerial development consent (DA 14/98) which allows Evolution to:

- extract 167 million tonnes (Mt) of ore by open-cut methods until 2032;
- process this ore at an on-site processing facility at a rate of 9.8 Mtpa;
- produce up to 6.1 million ounces of gold;
- emplace tailings and waste rock on site at an Integrated Waste Landform (IWL) and waste rock emplacement areas; and
- progressively rehabilitate the site.

The mine operates under two mining leases (mining lease (ML) 1535 and ML 1791). The current open-cut mine and surface infrastructure is wholly contained within ML 1535.

Evolution operates CGO under DA 14/98 and within ML 1535 and ML 1791. Evolution also operates a water supply pipeline to the Bland Creek Palaeochannel Borefield, which is approved under DA 14/98.

The CGO site also includes a range of surface infrastructure, which generally includes an ore processing plant, the IWL (which includes tailings storage facilities (TSFs)), waste rock emplacement areas, ore stockpiles and other ancillary facilities.

Evolution additionally holds a development consent (DA 2011/64) from Bland Shire Council which allows it to operate the Eastern Saline Borefield.

The site is adjacent to Lake Cowal in the Lachlan Catchment, which is an ephemeral inland wetland system. Lake Cowal is the largest natural inland lake in NSW, and when full is approximately 21 km long (north to south) and 9.5 km wide (east to west) covering an area of over 13,000 ha.

The Project application area is illustrated at a regional scale in Figure 1.1 and at a local scale in Figure 1.2. The Project area is shown in Figure 1.3.

Evolution is now seeking to introduce an underground mine at CGO. To enable this to be developed and operated, it is seeking development consent for the construction of the Project.

The Project comprises four key components (refer Figure 1.3):

- underground mine development – utilising stope mining practices to a final depth of -850 m Australian Height Datum (AHD), which will extend northwards via a portal located adjacent to the existing open cut pit;
- the production of up to 1.8 Mtpa of ore for until mid-2039;
- backfilling extracted stopes with cemented pastefill made from cement and tailings; and
- transporting ore to the surface via a conveyor system and by truck.

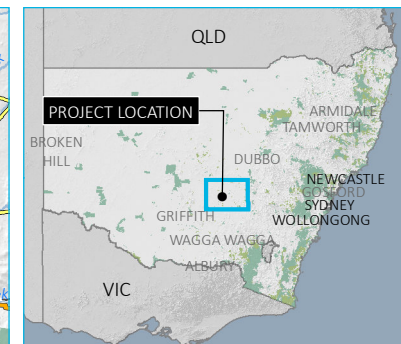
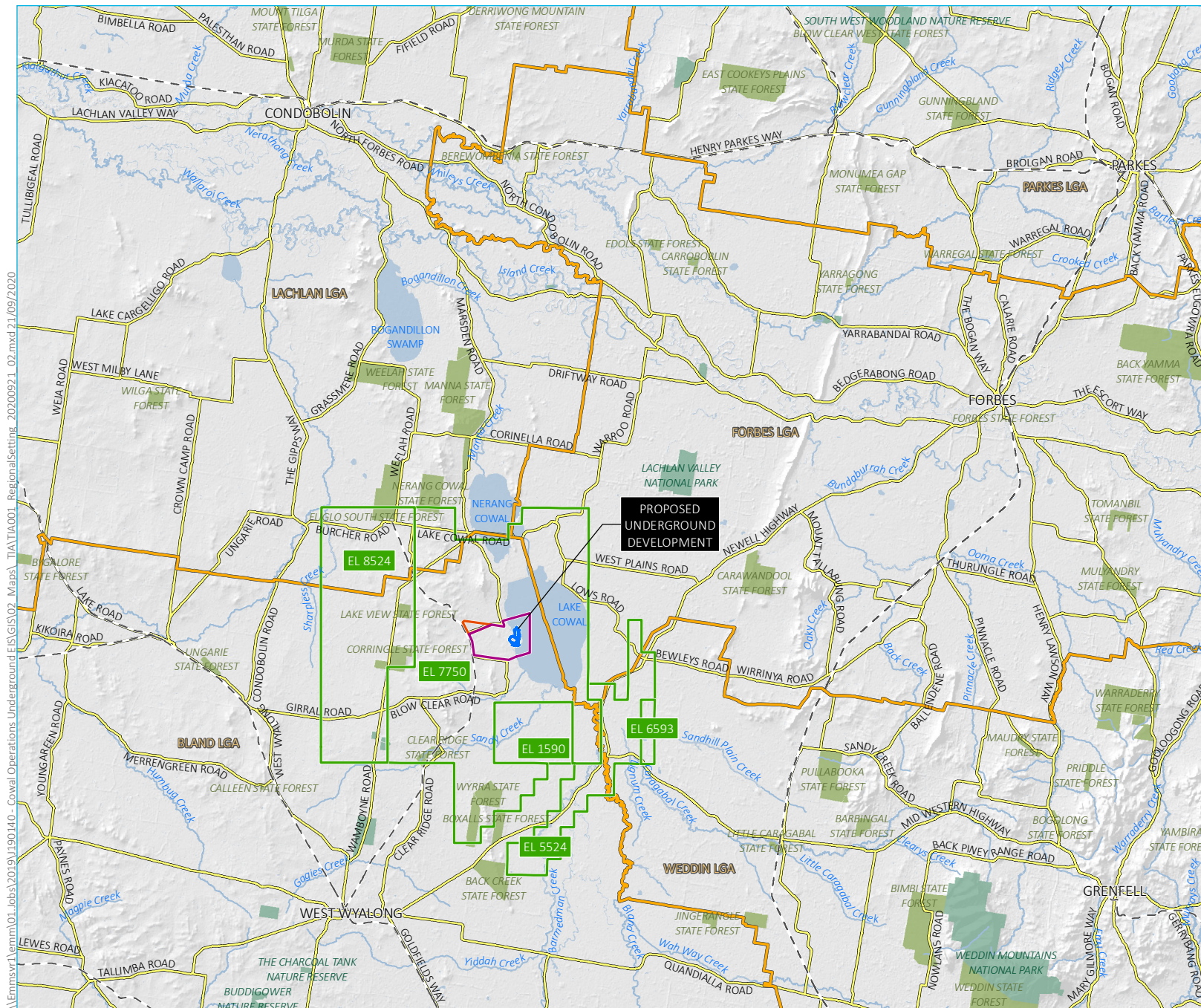
The construction and operation of the underground mine is the subject of a State Significant Development (SSD) application (SSD 10367) under Part4, Division 4.7, section 4.38 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The development of the underground mine will require a number of changes to approved surface infrastructure, including (refer Figure 1.3):

- extending the life of the surface operations in line with the life of proposed underground mining;
- providing access to the underground mine via a box-cut;
- transporting the additional 27 Mt of ore from the underground mine to the processing facility;
- processing the additional ore;
- moving around 3.9 Mt of waste rock to existing waste rock emplacement areas;
- producing an additional 1.8 million ounces of gold (Moz); and
- developing a paste fill plant to produce paste fill to backfill underground stopes.

The surface changes are the subject of a separate application, in the form of a request for modification (Modification 16 or 'Mod 16') to the existing development consent (DA 14/98) under Section 4.55(2) of the EP&A Act.

The additional underground development workforce travel movements will primarily use travel via an extension of the existing shuttle bus system which currently serves the existing CGO workfroce. This will minimise the potential for any additional locality daily and peak hourly traffic movements generated by the additional mine activity.



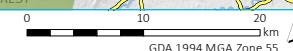
- KEY**
- Proposed underground development
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - Exploration licence (EL)
 - Rail line
 - Main road
 - Named watercourse
 - Waterbody
 - Local government area
 - NPWS reserve
 - State forest

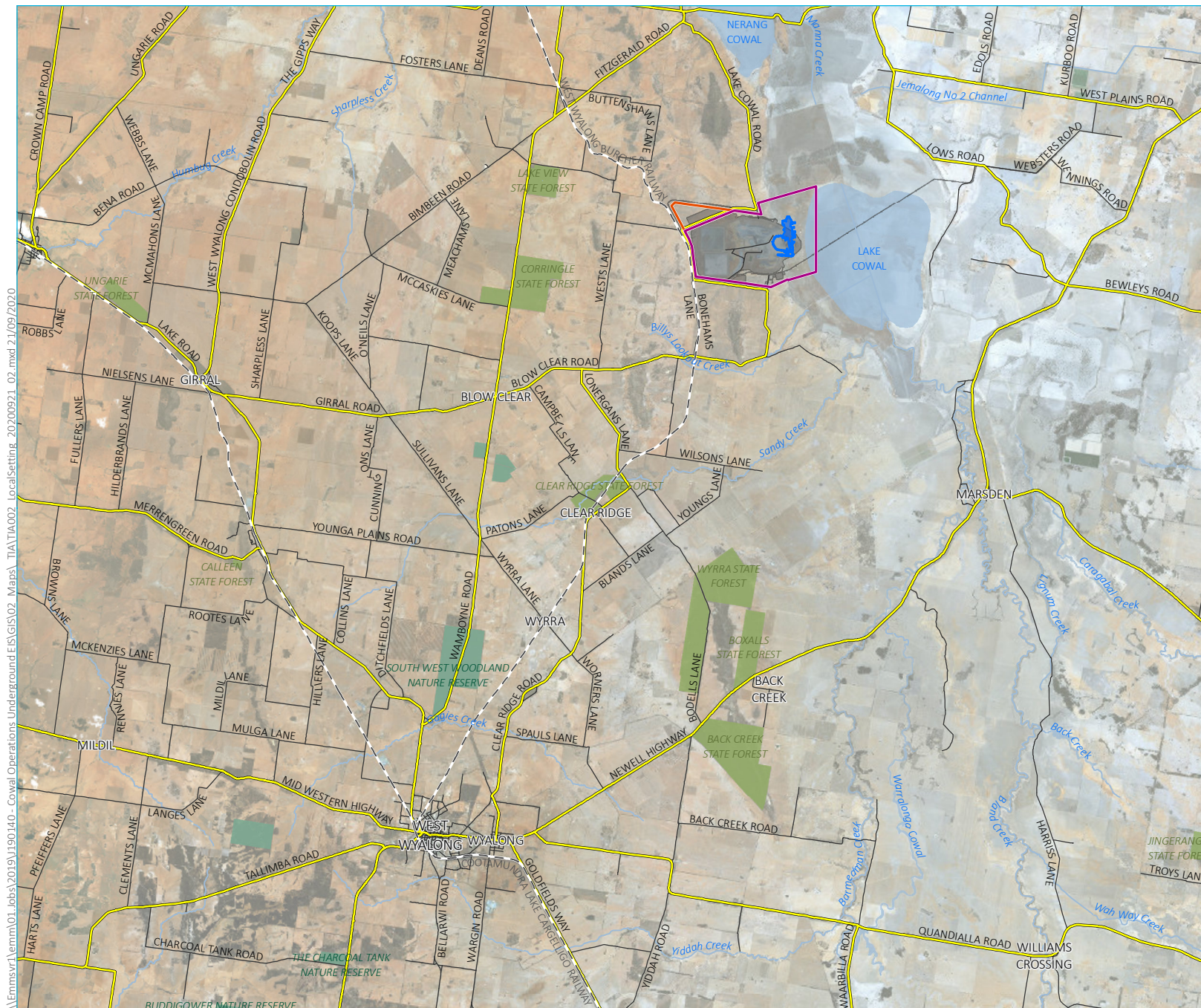
Regional setting

Evolution Mining
Cowl Gold Operations
Traffic impact assessment
Figure 1.1



Source: EMM (2020); Evolution (2020); DFSI (2017); GA (2011); ASGC (2006)





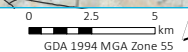
- KEY
- Proposed underground development
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - Approved surface disturbance
 - Rail line
 - Main road
 - Minor road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
 - State forest

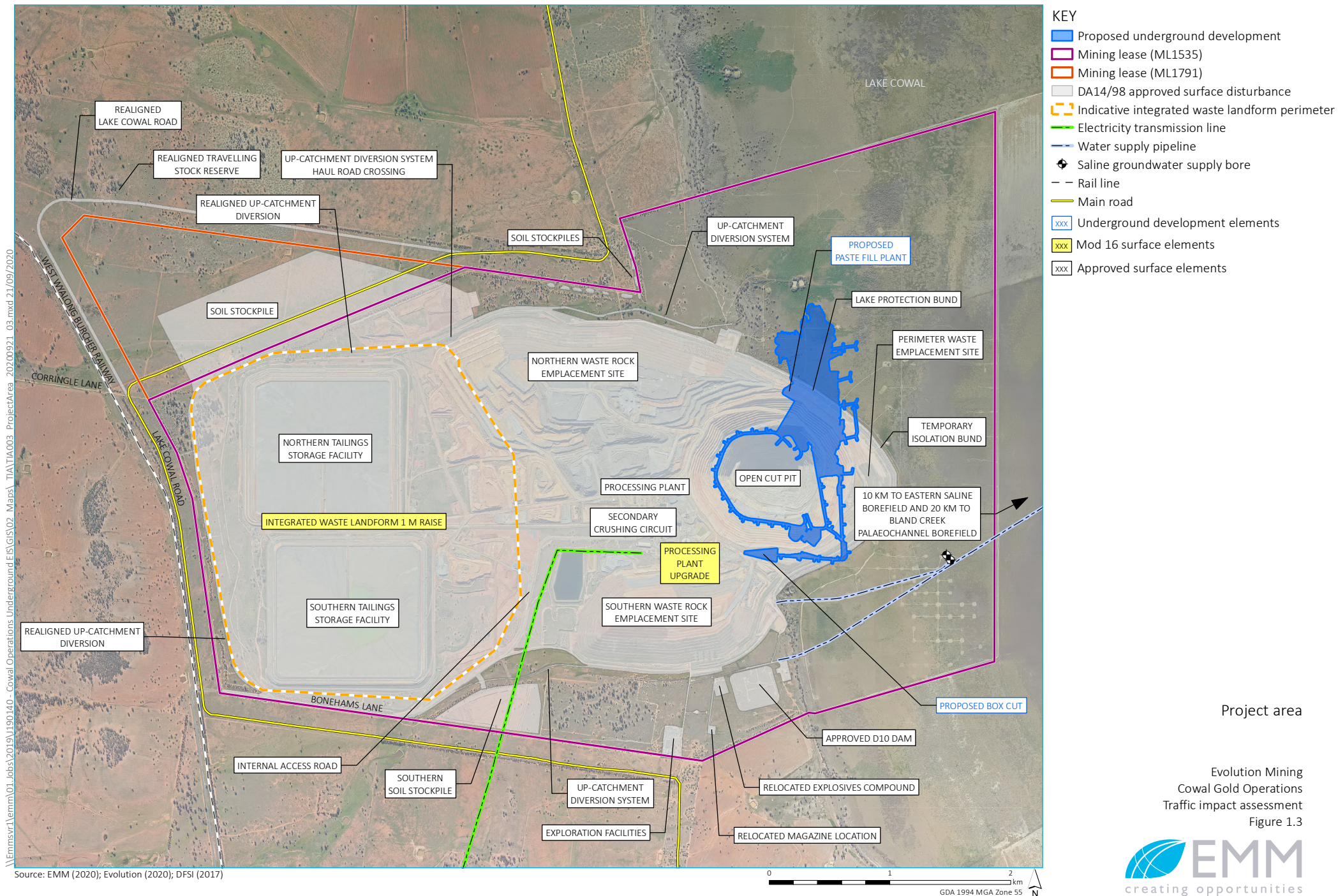
Local setting

Evolution Mining
Cowl Gold Operations
Traffic impact assessment
Figure 1.2



Source: EMM (2020); Evolution (2020); DFSI (2017)





1.2 The Project

1.2.1 Approvals pathway

To facilitate the Project, Evolution proposes to seek approval under the EP&A Act for two separate but inter-related applications:

- **Underground development EIS** – a SSD application under section 4.38 of the EP&A Act for the new underground component of the Underground Development.
- **Surface changes modification** – a request for modification (Mod 16) to the existing CGO development consent (DA 14/98) under section 4.55(2) of the EP&A Act for the ancillary surface changes associated with the Underground Development.

This assessment addresses traffic matters for both development applications.

1.2.2 Terminology

A brief description of Project and assessment definitions is outlined below in Table 1.1.

Table 1.1 Project assessment definitions

Full component name	Abbreviated name(s)	Description
Cowal Gold Operations	CGO or 'the site'	Existing open-cut mine and associated processing plant, IWL, TSFs, waste rock emplacement areas, ore stockpiles and ancillary facilities (refer Figure 1.3).
Underground Development Project	The Project	The proposed underground development at CGO to which this EIS applies, as shown in Figure 1.3.
Mod 16 to DA 14/98	Mod 16	The proposed surface changes to the existing CGO development consent (DA14/98) supporting the Project, as described in the modification Report for Mod 16
The combined Cowal Gold Operations Underground Workings and Mod 16	The Project	An abbreviated term to address the overall proposed underground development Project, including both the underground mine and the surface changes modification.
The study area	Study area	The study area relevant to this TIA includes the local road network to CGO, including the preferred transport routes from West Wyalong, Condoblin and Forbes and the key intersections of West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road, Wamboyne Road/Girral Road/Blow Clear Road and Mine Access Road/Bonehams Lane/Lake Cowal Road.
The combined Cowal Gold Operations Underground Workings and Mod 16 impact footprint	Surface disturbance footprint	The disturbance footprint referenced in this report refers to where surface ground disturbance is proposed. Currently this only applies to activities related to Mod 16 within the existing approved CGO surface disturbance footprint.

1.2.3 Project description

i Underground development

The underground development is further described in Table 1.2.

Table 1.2 SSD CGO Underground Development Project overview

Aspect	Description
General description	Construction and operation of an underground mine at the Cowal Gold Mine to extract the GRE46 mineralisation, which includes: • a box-cut entry to the underground workings; • a decline from the box-cut to provide access for personnel and maintenance; • six access points to the decline for access, ore haulage, ventilation circuit, underground services and emergency egress; • a network of underground tunnels to provide access to the ore, transportation to the surface and ventilation; • use of sub-level open stoping (SLOS) to extract the ore; • production of up to 27 Mt of ore at a rate of 1.8 Mtpa; • production of approximately 5.74 Mt of waste rock; • delivery of extracted ore and waste rock to the surface by truck; • development of a paste fill plant, and the delivery of paste fill via a borehole and the backfilling underground stopes with the paste; and • development of ancillary underground infrastructure to support the underground operation, including dewatering infrastructure, ventilation system, electrical reticulation.
Project duration	• construction of the decline and development drives over a period of up to two years; and • ore production of the currently known economic resource until the end of the 2038.
Mining method	• Top down SLOS to a depth of -850 m AHD with approximately 1106 stopes developed over the life of the mine.
Stope backfill	• Stopes to be fully backfilled with paste material made from dewatered tailings and cement. • Paste material to be produced in a purpose-built paste plant on the surface. • Paste material will be delivered to the underground workings via a borehole near the paste fill plant.
Ore transport	• Ore will be transported to the surface by truck.

ii Modification 16

Mod 16 is further described in Table 1.3.

Table 1.3 Proposed modification components

Development Component	Approved CGO	Proposed Modification
Life of Mine	CGO is approved to operate to the end of 2032.	Extension to the end of 2040.
Gold Production	Production of approximately 6.1 million ounces (Moz) of gold over the life of the CGO.	Production of 1.8 Moz of gold (approximate).
On-site ore Transportation	Ore is transported from the open-cut by truck to a temporary stockpile prior to rehandling to the primary crusher.	No change. Underground ore trucked from the underground run-of-mine stockpile to the temporary ore stockpile.
Ore processing Facility	Ore processing is undertaken at the ore processing facility at a rate up to 9.8 Mtpa. A secondary ore crushing circuit within existing process plant is approved to be constructed.	No change to processing rate. The existing processing facility would be modified to include: • a tailings desliming and tailings thickener circuit; • an ore receival bin and mill feed conveyor; and • an upgraded elution circuit.
Cyanide Consumption	Use of a primary ore conventional carbon-in-leach circuit, which includes recovery of gold from flotation tailings.	No change. Increase in annual cyanide consumption associated with the higher grade ore.
Site Water Management Infrastructure	The existing CGO water management infrastructure is comprised of the following key components: • Up-catchment Diversion System (UCDS) and • the ICDS (including the contained water storages); • lake isolation system (comprising the temporary isolation bund, lake protection bund and perimeter waste rock emplacement); • integrated erosion, sediment and salinity control system; and • open pit sump and dewatering borefield.	No change to UCDS and ICDS. Pipeline from the tailings deslimer to the paste fill plant and a return water pipeline from the paste fill plant to the processing facility. Augmentation of dam D5A. This augmentation would not change the overall catchment area of the dam. Augmentation of other on-site water storages from time to time depending on water supply and on-site requirements.
Tailings storage	Tailings are deposited in two (Northern and Southern) tailings storage facilities (TSFs). NTSF and STSF are allowed to be constructed to approximately 240 mAHD and 248 mAHD, respectively. These TSFs are also approved to be combined with the northern waste rock emplacement to form the integrated waste landform (IWL), which would provide a life of mine tailings strategy. The IWL is approved to be developed to a final rehabilitated height of 245 mAHD.	A height increase from 245 mAHD to 246 mAHD to the final rehabilitated height of the IWL.
Waste rock	Approximately 299 Mt of waste rock would be produced over the life of the approved CGO and emplaced in the Northern, Southern and Perimeter waste rock emplacements.	Approximately 5.74 Mt of additional underground mine waste rock would be managed.
Ancillary surface infrastructure	A range of ancillary surface infrastructure is operated to support open-cut mining operations, including that related to administration, water management, maintenance, pipelines, magazines and other functions.	Development of additional surface infrastructure and augmentation of existing infrastructure, all within the existing approved disturbance areas, including (but not limited to): administration facilities, offices and car parking, warehouses and stores, vehicle washdown facilities, heavy vehicle and light vehicle maintenance

Table 1.3 **Proposed modification components**

Development Component	Approved CGO	Proposed Modification
		workshop and maintenance bays, control room, fuel farm, core yards and drill sheds, hard stands and go lines, ablutions, bathhouse and changerooms, communications infrastructure, access tracks, water storages and other minor ancillary infrastructure.

1.3 Research method

The research method completed to inform this TIA has been outlined below. This included a site inspection, desktop research focused on the surrounding road network, data collection and review of current and previously completed tube traffic count data and intersection surveys and modelling of key peak hour traffic periods utilising the SIDRA-8 model.

1.3.1 Site inspection

An inspection of the site, the site access intersections and the approved transport routes was carried out on 5 and 6 June 2019 by EMM Associate Transport Planner Tim Brooker and Planner Alice Meng. This included photographing the site, the site access intersections and the transport routes. A selection of these photographs is provided in Appendix A.

1.3.2 Desktop research

Desktop research was also conducted to inform the baseline road network conditions in the surrounding area. This included identifying the lengths of the road network affected; historic road crash records; public transport services and known future road network improvement Projects in the relevant study area.

1.3.3 Data collection

Tube traffic count data for all the nearby relevant roads was provided by the three Councils, where the Project transport routes extend to, these are:

- Bland Shire Council;
- Forbes Shire Council; and
- Lachlan Shire Council.

All three Councils provided year 2019 or earlier tube count traffic data for the requested roads.

1.3.4 Intersection traffic surveys

Project related intersection traffic surveys were compiled from the Bland Shire Council tube traffic count data (supported by additional intersection turning traffic observations recorded during the site inspection). The intersection survey movements were compiled for the three key mine access route intersections, as follows:

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

1.3.5 Peak hour traffic periods for SIDRA modelling

For the relevant Project peak morning and afternoon peak hour traffic periods The hourly intersection traffic performance was determined for each intersection by using the SIDRA-8 model, for the following traffic periods:

- the 5-6 am and 6-7 pm traffic peak hours for the underground mine construction; and
- the 5-6 am, 6-7 am, 5-6 pm and 6-7 pm traffic peak hours for the future underground mine operations.

1.4 Assessment guidelines

This TIA has been prepared in accordance with the relevant governmental assessment requirements, guidelines and policies. The assessment is based on the RTA (now Transport for NSW) (2002) *Guide to Traffic Generating Developments*.

The TIA has also considered the following Austroads Guides:

- *Austroads Guide to Road Design Part 3: Geometric Design (Austroads 2016)*;
- *Austroads Guide to Road Design Part 4: Intersections and Crossings: General (Austroads 2017)*; and
- *Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development (Austroads 2016)*.

1.5 Assessment requirements

The TIA addresses the requirements set out in the Secretary's Environmental Assessment Requirements (SEARs) for the underground development issued by the NSW Department of Planning, Industry and Environment (DPIE) on 26 August 2020 (refer Table 1.4).

Table 1.4 Underground development: Traffic – relevant SEARs issued by DPIE

Requirement	Section addressed
Transport – including an assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the local and State road network.	This TIA report.

To inform preparation of the SEARs, DPIE invited other government agencies to recommend matters to be addressed in the EIS. These matters were taken into account by the Secretary for DPIE when preparing the SEARs. Table 1.5 summarises the recommended requirements provided by the Bland Shire Council for the underground.

Table 1.5 Underground development: traffic – relevant SEARs issued by DPIE and recommended Bland Shire Council requirements

Comments	Section addressed
Impacts on local roads – Council requests the SEARs require robust, comprehensive and transparent examination of the following:	Chapter 4
Increased traffic on local roads during both construction and operations phases – including light vehicles, commuter buses and heavy vehicles (including axle numbers and loadings).	Chapter 3
Proposed travel routes.	Chapter 3
A financial contribution towards the upkeep of the main access roads to the mine.	The main access route to the mine is via the township of West Wyalong, where 80% of the current and future workforce will travel from. The access roads include: - Newell Highway (short section within the main strip of the township); - Ungarie Road; - Wamboyne Road; - Blow Clear Road; - Bonehams Lane, and - Lake Cowal Road. Newell Highway and Ungarie Road are substantially used by other public traffic, being the key routes to and from Condoblin and Lake Cargeligo from West Wyalong. Therefore, the upkeep of these roads should not generally be liable to the Proponent. Wamboyne Road and Blow Clear Road are currently used by other public traffic, but are the key access routes to the mine from West Wyalong. Therefore, the upkeep of these roads should generally be a shared responsibility with contributions being made by both the Proponent and the Council. The Bonehams Lane and Lake Cowal Road routes (directly south and north of the mine) are currently and will continue to be used primarily by mine related traffic including a wide range of employee and contractor light and heavy vehicles. The Proponent will actively monitor the future condition of the road surface on both these roads and where necessary undertake appropriate maintenance and/or other repair work to ensure the road surface does not deteriorates to an unsafe standard. Either by financial contributions or works in kind, the Proponent will generally maintain the upkeep of these roads.

There were no traffic related agency comments received for Mod 16. However, the same requirements applicable to the underground development will be adopted for the additional traffic movements as a result of Mod 16.

2 Existing traffic conditions

The purpose of this report is to:

- provide a description of the current design and condition of the local road network uses to access the current CGO;
- provide a summary of the baseline traffic volumes and relevant capacity standards using Austroads design standards;
- summarise the layout of the key intersections; and
- provide the results of the baseline intersection traffic surveys and intersection performance.

2.1 Study area

The study area referenced in this TIA includes the local road network as described in Section 2.1.1. There are three key intersections in proximity to the CGO. These key intersections are:

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

Photographs showing the condition of the study area road network and the traffic control signage at these intersections are provided in Appendix A.

2.1.1 Road network

The approved transport routes and their key intersections are shown in Figure 2.1. Their corresponding road conditions and speed limits are summarised in Table 2.1.

Table 2.1 Conditions of preferred transport routes

Roads	Road length	Road surface	Road width	Speed limit	Visual observations during 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.
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.

Table 2.1 **Conditions of preferred transport routes**

Roads	Road length	Road surface	Road width	Speed limit	Visual observations during site inspection
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 (eg: 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 Condoblin					
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.
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

Table 2.1 **Conditions of preferred transport routes**

Roads	Road length	Road surface	Road width	Speed limit	Visual observations during site inspection
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.

Occasionally, due to severe wet weather conditions, unsealed roads in the region are closed, which makes part of the preferred transport routes to Condoblin and Forbes unavailable for access. Under these circumstances, the alternate transport route from Condoblin is made up of the following sealed roads:

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

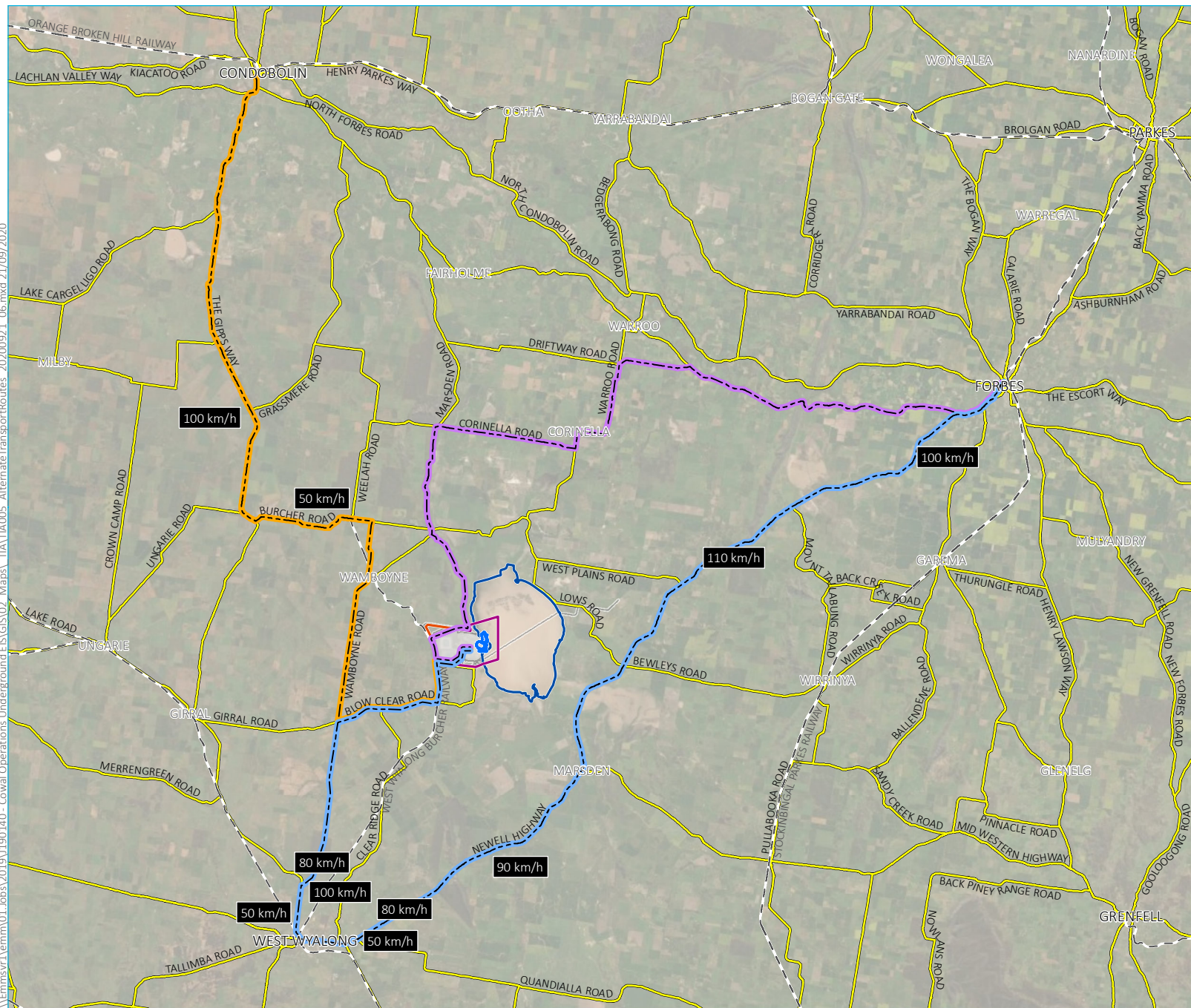
Likewise, under severe weather conditions, the alternate transport route from Forbes is via the Newell Highway to West Wyalong, then following the preferred transport route from West Wyalong to the site.

Also, when the water level is high at Lake Cowal/Nerang Cowal, the preferred transport route via Lake Cowal Road and Bogies Island Road become inaccessible for cars and trucks. Under these circumstances, the alternate transport route from Forbes 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 2.2.

\\Emmsvr1\emmm\01_Jobs\2019\190140 - Cowl Operations Underground EIS\GIS\02_Maps\TIA\TIA005_AltimateTransportRoutes_20200921_06.mxd 21/09/2020



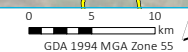
- KEY**
- ▭ Proposed underground development
 - ▭ Mining lease (ML1535)
 - ▭ Mining lease (ML1791)
 - ▭ DA14/98 approved surface disturbance
 - Rail line
 - ▭ Main road
 - ▭ Extent of Lake Cowal
 - Alternate transport routes
 - Condoblin alternate route due to weather condition
 - Forbess alternate route due to weather condition
 - Forbess alternate route due to high water level

Alternative transport routes

Evolution Mining
Cowal Gold Operations
Traffic impact assessment
Figure 2.2



Source: EMM (2020); Evolution (2020); DFIG (2017)



2.1.2 Baseline daily traffic volume

Baseline daily traffic volumes for the road network have been determined from published Transport for NSW (TfNSW) daily traffic surveys for the years where the data is available and are summarised in Table 2.2.

Table 2.2 RMS baseline daily traffic volumes

Station ID	Road	Location	2017	2018	2019	Approximate peak hourly volume	Average proportion of heavy vehicle
6144	Newell Highway	150 m west of Greens Road, Forbes	2,607	2,681	2,588	260	37%
MRDSTC	Newell Highway	160 m south of Mid Western Highway, Caragabal	1,958	1,990	1,975	200	44%
6142	Newell Highway	460 m east of Nicholson Lane, Wyalong	2,243	-	2,254	230	38%

Source: Traffic Volume Viewer (Transport for NSW, 2020)

The TfNSW traffic data is very limited for minor rural roads. Given the number of roads involved, EMM requested baseline daily traffic volumes from Bland Shire Council, Forbes Shire Council and Lachlan Shire Council. As baseline daily traffic volume is not available for year 2020, it is standard practice in most rural areas of NSW to add +1% annual (linear) traffic growth to the most recent annual survey. The baseline daily traffic volumes for the transport route in each local government area (LGA) are summarised in the following subsections. A map showing the locations of traffic survey data used in this TIA is shown in Figure 2.3.

i Bland Shire Council

Bland Shire Council conducted seven-day tube traffic count surveys at the following locations from 29 June 2019 to 6 July 2019:

- Blow Clear Road (Wamboyne Road end);
- Bonehams Lane (Blow Clear Road end);
- Lake Cowal Road (north of the mine entrance);
- Ungarie Road (south of Hateleys Lane); and
- Wamboyne Road (near Hiawatha Forest).

The average daily traffic volumes and proportions of heavy vehicle for each road are summarised in Table 2.3.

Table 2.3 Daily traffic volumes – transport route in Bland Shire Council area

Roads	Average daily traffic volume for 2019	Daily heavy vehicle traffic	Daily heavy vehicle percentage
Blow Clear Road (south of Bonehams Lane)	254	66	26%
Bonehams Lane (north of Blow Clear Road)	254	52	20%
Lake Cowal Road (north of mine entrance)	55	17	31%
Ungarie Road (south of Hateleys Lane)	1,221	154	21%
Wamboyne Road (near Hiawatha Forest)	303	76	25%

ii Lachlan Shire Council

Lachlan Shire Council also provided tube traffic count survey results for the following roads from various years:

- The Gipps Way (south of Wallaroi Creek Bridge) in 2018; and
- Burcher Road (3 km west of Burcher) in 2014.

As mentioned above, a linear growth rate of 1% is adopted to predict average daily traffic volume for 2019 from the earlier years' data as a standard practice.

The average daily traffic volume for each route on the road network is summarised in Table 2.4.

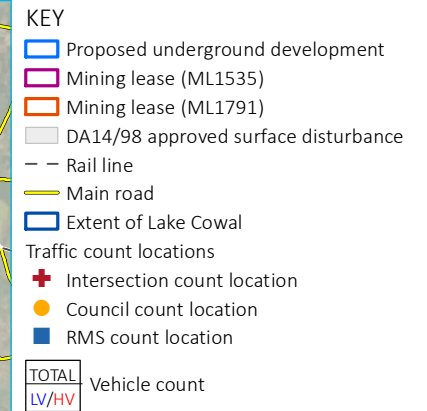
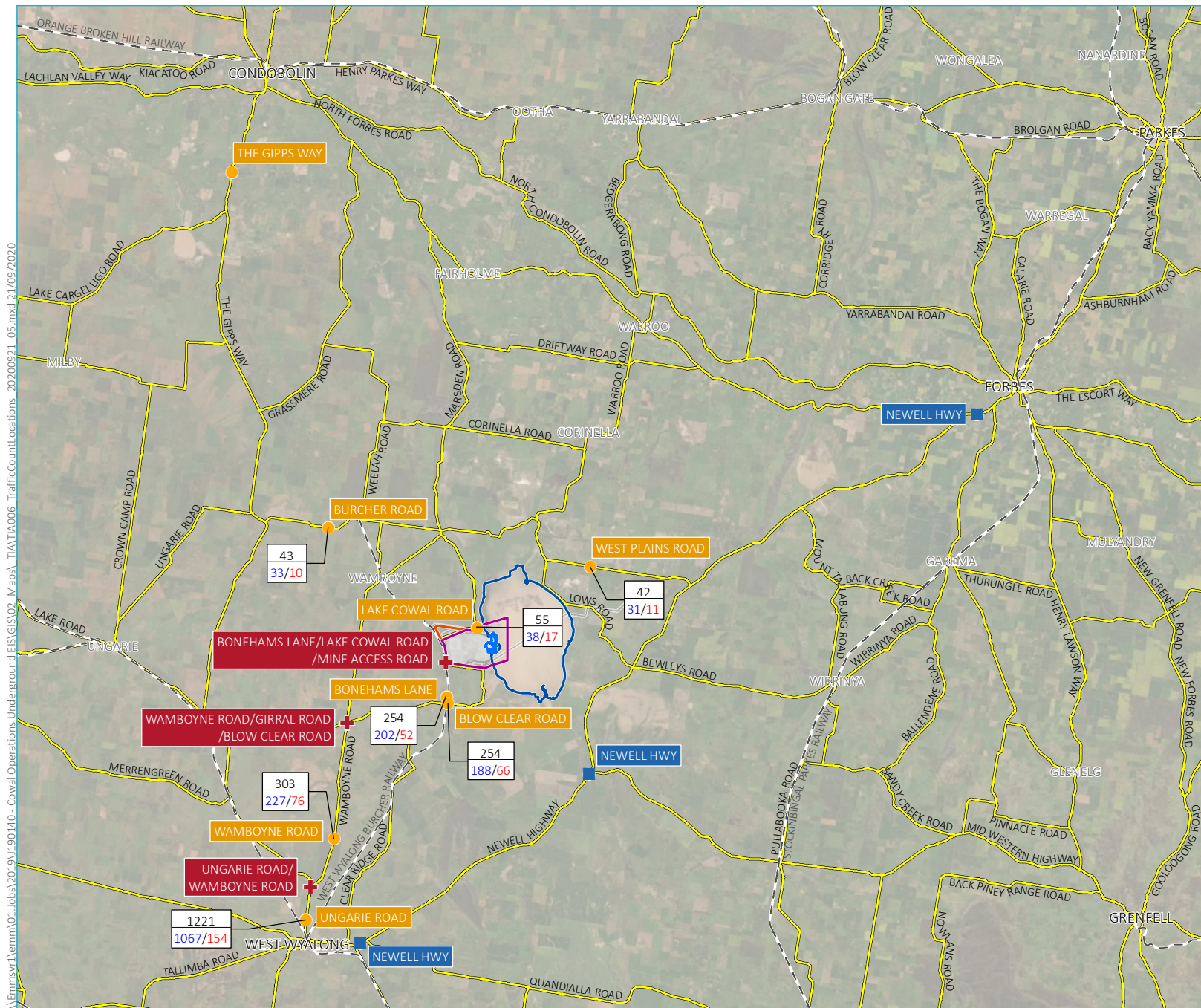
Table 2.4 Daily traffic volumes – transport route in Lachlan Shire Council area

Roads	2014	2018	Estimated average daily traffic volume for 2019	Percentage of heavy vehicle
The Gipps Way (south of Wallaroi Creek Bridge)	-	473	478	35%
Burcher Road (3 km west of Burcher)	41	-	43	24%

iii Forbes Shire Council

Forbes Shire Council provided traffic count data for West Plains Road for year 2011 and 2015. The average traffic growth from 2011 to 2015 was at a negative growth of -0.3% per year, from 41 vehicles to 40 vehicles. However, for assessing a worst-case scenario, it is assumed that traffic has increased at a percentage of 1% per year from 2015 to 2019. By adopting this growth rate, the estimated average daily traffic volume for 2019 is 42 vehicles a day.

The heavy vehicle percentage provided by Council shows that in 2011, the percentage of heavy vehicles using West Plains Road was at 14%. This percentage increased to 31% in 2015. For the estimated year 2019 daily traffic volume of 42 vehicles, 25% heavy vehicle traffic has been assumed, which is a similar proportion to many of the other roads in the study area.



Traffic count locations

Evolution Mining
Cowal Gold Operations
Traffic impact assessment
Figure 2.3



2.1.3 Design standards

Road width design standards for low volume (generally rural) roads are defined by the Austroads *Guide to Road Design* (Austroads 2016a) and are based on daily traffic volumes. The existing road width measurements and conditions for each road network considered as part of this TIA are summarised in Table 2.5. 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 2.5 Daily traffic volumes and corresponding Austroads designs standards

Road	Daily traffic volume	Relevant Austroads threshold band	Relevant Austroads design standard	Current road width	Compliance?
Newell Highway	2,588 ¹	1,000 – 3,000	Minimum 9 m wide	9 m to 22 m wide sealed	Yes
Ungarie Road	1,221	1,000 – 3,000	Minimum 9 m wide	9 m wide sealed	Yes
Wamboyne Road	303	150 – 500	Minimum 7.2 m wide seal	9 m wide sealed	Yes
Blow Clear Road	254	150 – 500	Minimum 7.2 m wide seal	8 m – 10 m wide sealed	Yes
Bonehams Lane	254	150 – 500	Minimum 7.2 m wide seal	9 m wide sealed	Yes
The Gipps Way	478	150 – 500	Minimum 7.2 m wide seal	6 m – 7 m wide sealed	Yes
Burcher Road	43	1 – 150	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	6 m wide sealed	Yes
West Plains Road	42	1 – 150	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	55	1 – 150	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: 1. Three RMS count locations data were available for Newell Highway. In order to assess a worst-case scenario, the highest traffic volume data is used.

2.2 Key intersections

2.2.1 West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road

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.



Figure 2.4 Aerial layout of Ungarie Road/Wamboyne Road intersection (Source: Six Maps 2020)

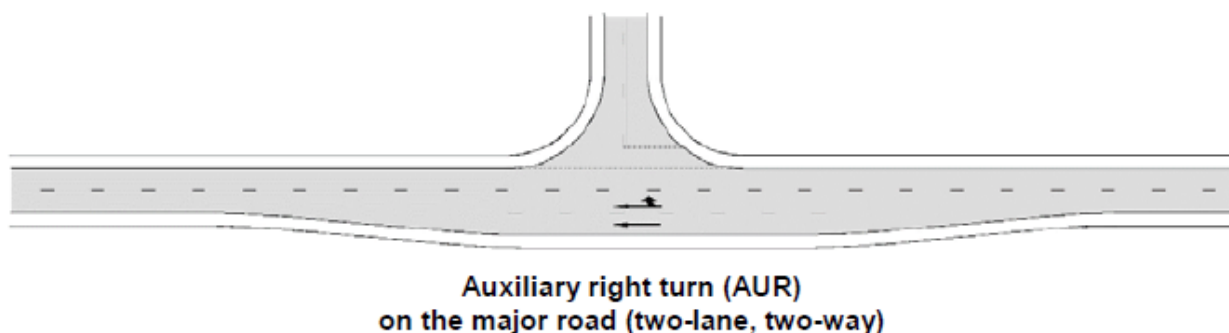


Figure 2.5 Auxiliary right turn lane design (AUR) for a major road (Source: Austroads Guide to Road Design Part 4 2017)

The intersection peak hourly traffic volumes were determined for the main mine shift changeover traffic periods from the peak weekday (Wednesday) peak hourly traffic volumes surveyed by the Bland Shire Council tube traffic surveys during June – July 2019. The current peak hourly traffic volumes for each approach to the intersection and the numbers of heavy vehicles using each approach are summarised in Table 2.6. The heavy vehicles recorded on the approved route travelling to and from the mine from West Wyalong via Wamboyne Road are primarily buses during these peak hours, which operate at the main mine shift changeover times.

Table 2.6 Summary of surveyed peak hour light and heavy vehicle traffic volumes – West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road intersection

Road	Direction	AM peak hour inbound 5-6 am		AM peak hour outbound 6-7 am		PM peak hour inbound 5-6 pm		PM peak hour outbound 6-7 pm	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
West Wyalong Condobolin Road (north of Wamboyne Road)	Northbound	0	1	30	6	35	1	21	6
	Southbound	8	2	15	2	24	0	22	0
MR 57 Ungarie Road (south of Wamboyne Road)	Northbound	42	8	61	9	46	5	22	4
	Southbound	8	2	20	6	64	7	53	8
Wamboyne Road (east of West Wyalong Condobolin Road and Ungarie Road)	Eastbound	43	7	31	3	11	4	1	0
	Westbound	1	0	5	4	40	7	31	10

2.2.2 Wamboyne Road/Girral Road/Blow Clear Road

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



Figure 2.6 Aerial layout of Wamboyne Road/Girral Road/Blow Clear Road intersection (Source: Six Maps 2020)

The intersection peak hourly traffic volumes were determined for the main mine shift changeover traffic periods from the peak weekday (Wednesday) peak hourly traffic volumes surveyed by the Bland Shire Council tube traffic surveys during June – July 2019, as summarised in Table 2.7. The section of Girral Road, west of Wamboyne Road and Blow Clear Road had no peak hourly turning traffic movements and minimal daily traffic usage and is not included in the traffic survey results in Table 2.7.

Table 2.7 Summary of surveyed peak hour light and heavy vehicle traffic volumes – Wamboyne Road/Girral Road/Blow Clear Road intersection

Road	Direction	AM peak hour inbound 5-6 am		AM peak hour outbound 6-7 am		PM peak hour inbound 5-6 pm		PM peak hour outbound 6-7 pm	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Wamboyne Road (north of Girral Road and Blow Clear Road)	Northbound	7	0	3	0	4	1	0	0
	Southbound	0	3	6	1	1	2	2	2
Wamboyne Road (south of Girral Road and Blow Clear Road)	Northbound	43	7	31	3	11	4	1	0
	Southbound	1	0	5	4	40	7	31	10
Blow Clear Road (east of Wamboyne Road)	Eastbound	38	10	37	4	12	6	1	0
	Westbound	3	0	8	4	44	8	29	8

2.2.3 Mine Access Road/Bonehams Lane/Lake Cowal Road

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



Figure 2.7 Mine access road intersection at Bonehams Lane/Lake Cowal Road (Source: Six Maps 2020)

The current peak hourly traffic volumes for each approach to the intersection and the numbers of heavy vehicles at the intersection, from the Bland Shire Council tube traffic surveys during June – July 2019, are summarised in Table 2.6. The section of Lake Cowal Road, south of Bonehams Lane and the Mine Access Road, was observed to have no peak hourly turning traffic movements (and minimal daily traffic usage) and is not included in the traffic survey results in Table 2.8.

Table 2.8 Summary of surveyed peak hour light and heavy vehicle traffic volumes – Mine Access Road/Bonehams Lane/Lake Cowal Road intersection

Road	Direction	AM peak hour inbound 5-6 am		AM peak hour outbound 6-7 am		PM peak hour inbound 5-6 pm		PM peak hour outbound 6-7 pm	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Bonehams Lane (west of Lake Cowal Road)	Eastbound	38	9	41	3	15	4	1	0
	Westbound	3	0	11	3	49	6	25	5
Lake Cowal Road (north of Bonehams Lane and Mine Access Road)	Northbound	0	1	0	0	5	4	2	1
	Southbound	5	2	8	2	1	1	0	0
Mine Access Road (east of Bonehams Lane and Lake Cowal Road)	Eastbound	43	11	49	5	16	5	1	0
	Westbound	3	1	11	3	54	10	27	6

2.2.4 Warrants for intersection improvements

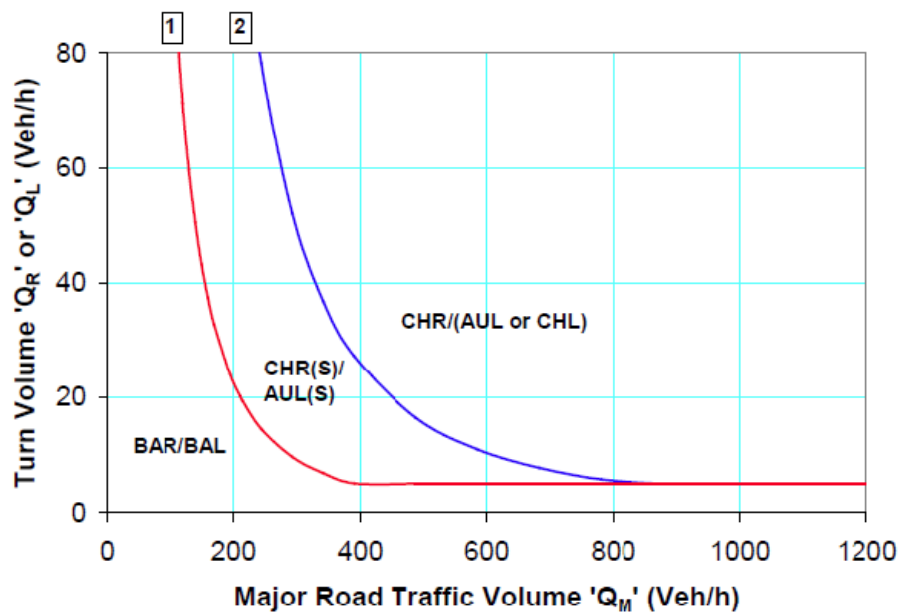
The three key intersections, as previously identified in Section 2.1, are:

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

While there are other major road intersections to the north of the mine site (e.g. Newell Highway/West Plains Road and Burcher Road/The Gipps Way), the additional peak hourly traffic movements as a result of both the underground development and Mod 16 are predicted to be significantly lower travelling via these routes than for the additional traffic movements coming to and from West Wyalong. Therefore, only the three key intersections for traffic movements travelling to and from West Wyalong, and traffic movements to and from Lake Cowal Road immediately north of the mine site are considered in this TIA.

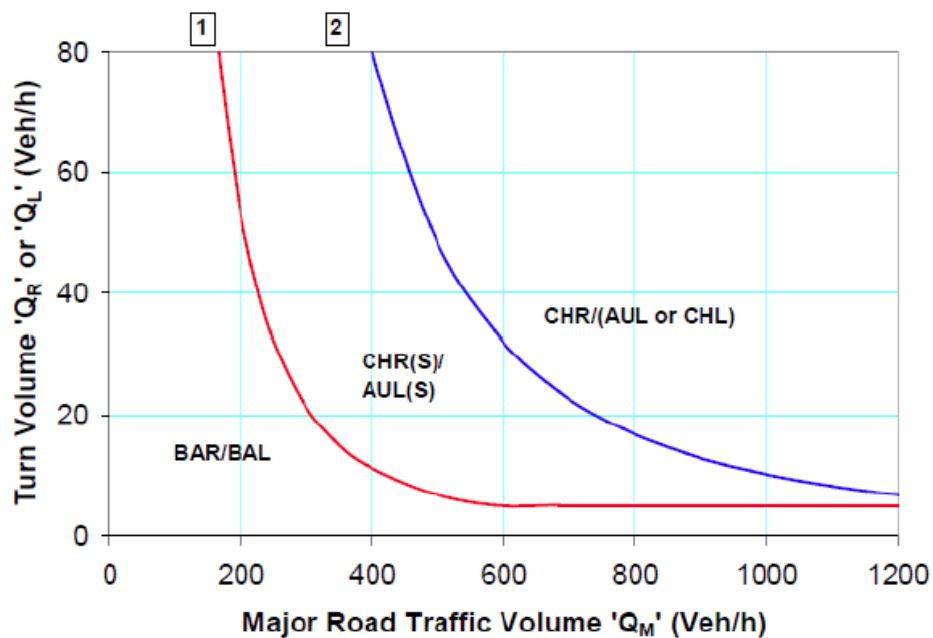
Rural intersection operations are assessed from a combination of the peak hourly through and turning traffic movements that are occurring at each intersection. This determines the need for additional intersection turning lanes in accordance with *Part 4 Intersection Design Standards* (Austroads 2017), which are shown in Figure 2.8 and Figure 2.9.

There are separate design charts for roads with a design speed either 100 km/h and greater, or lower than 100 km/h. The upper warrant chart is used to assess the adequacy of intersection design at West Wyalong Condobolin Road/Ungarie Road/Wamboyno Road and Wamboyno 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 intersections is lower than 100 km/h.



(a) Design speed ≥ 100 km/h

Figure 2.8 Warrant Chart for additional turning lanes for traffic volumes for design speeds 100 km/h or greater.



(b) Design speed < 100 km/h

Figure 2.9 Warrant Chart for additional turning lanes for traffic volumes for design speeds lower than 100 km/h.

The combination of the peak hourly major road through traffic movements (Qm) and the right turning traffic movement (Qr) for each intersection during the four existing peak hour traffic periods considered, is summarised in Table 2.9, with the corresponding intersection turning warrant requirement for the right turn lane on the major road shown in the right hand column.

Table 2.9 Existing intersection peak hourly traffic movements for Austroads Warrant Assessment

Intersection major road	Intersection minor road	Peak hourly traffic period	(Qm) Major Road through traffic volume	(Qr) Major Road right turn traffic volume	Turning Lane warrant requirement
West Wyalong Condoblin Road/Ungarie Road	Wamboyne Road	5-6 am inbound	11	49	BAR
		6-7 am outbound	53	34	BAR
		5-6 pm inbound	60	15	BAR
		6-7 pm outbound	47	1	BAR
Wamboyne Road/Girral Road/Blow Clear Road	Girral Road/Blow Clear Road	5-6 am inbound	8	45	BAR
		6-7 am outbound	7	34	BAR
		5-6 pm inbound	3	15	BAR
		6-7 pm outbound	4	1	BAR
Mine Access Road/Bonehams Lane	Lake Cowal Road	5-6 am inbound	50	1	BAR
		6-7 am outbound	58	0	BAR
		5-6 pm inbound	74	9	BAR
		6-7 pm outbound	31	3	BAR

i West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road

The existing major road peak hourly traffic movements are a maximum of 60 vehicles for the through movement (two way) and 49 vehicles for the right turn movement northbound. These levels of intersection traffic movements warrant the intersection to have only the minimum BAR right turn treatment. The current design of the intersection is an AUR type right turn intersection, which exceeds the requirement. Therefore, the current intersection design does not require any improvements.

ii Wamboyne Road/Girral Road/Blow Clear Road

As Girral Road will carry minimal existing or future Project traffic, the intersection has been considered as a normal T-junction where Wamboyne Road is the major road and Blow Clear Road is the minor road.

The major road peak hourly traffic movements are a maximum of 8 vehicles for the through movement (two way) and 45 vehicles for the right turn movement northbound. These levels of intersection traffic movements warrant the intersection to have a BAR right turn treatment. The current design of the intersection complies with this design and does not require any improvements.

iii Mine Access Road/Bonehams Lane/Lake Cowal Road

As Lake Cowal Road south of the intersection has minimal daily or peak hourly traffic usage and will not be used for future Project traffic, the intersection has been considered as a normal T-junction where the Mine Access Road – Bonehams Lane route (east-west) is the major road and Lake Cowal Road (north) is the minor road.

The major road peak hourly traffic movements are a maximum of 74 vehicles for the through movement (two way) and 9 vehicles for the right turn movement west bound. These levels of intersection traffic movements warrant the intersection to have a BAR right turn treatment. The current design of the intersection complies with this design and does not require any improvements.

2.3 Existing mine daily traffic using Bonehams Lane and Lake Cowal Road

The existing mine operations traffic currently constitutes the major proportion (at least 90% probably) of the existing daily traffic movements using both Bonehams Lane and Lake Cowal Road in the vicinity of the mine. The existing daily traffic on these roads was surveyed by Bland Shire Council over a one week period during June-July 2019.

The following daily traffic volumes were recorded as summarised in Tables 2.12, 2.13 and 2.14. There is only a very small proportion of non-mine related traffic using these roads. During the morning and evening mine shift changeover peak hourly traffic periods which are 5-6 am inbound, 6-7 am outbound, 5-6 pm inbound and 6-7 pm outbound, the existing surveyed peak hourly traffic volumes are virtually all existing mine related traffic movements using these roads.

Table 2.10 Existing daily traffic movements surveyed using Bonehams Lane

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	62	35	138	154	191	150	143	155	125
Southbound	64	75	137	153	182	149	143	153	129
Combined	126	110	275	307	373	299	286	308	254

Source: Bland Shire Council Traffic Survey

Table 2.11 Existing daily traffic movements surveyed using Lake Cowal Road

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	15	12	22	31	48	32	32	33	27
Southbound	15	14	27	27	45	39	26	33	28
Combined	30	26	49	48	93	71	58	66	55

Source: Bland Shire Council Traffic Survey

From the total daily traffic movements using both roads, which is summarised in Table 2.14, assuming 90% of the traffic activity is mine related, around 280 vehicle movements (140 actual vehicles) travel to and from the mine each day on an average day (including both weekdays and weekends). Of this traffic approximately 115 actual vehicles travel to and from the mine each day via the Bonehams Lane route (south of the Mine Access Road) and 25 actual vehicles travel to and from the mine each day via Lake Cowal Road (north of the Mine Access Road).

Table 2.12 Total daily traffic movements using both routes

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	77	47	160	185	239	182	175	188	152
Southbound	79	75	164	180	227	188	169	186	157
Combined	156	122	324	365	466	370	344	374	309

Source: Bland Shire Council Traffic Survey

2.3.1 Heavy vehicle movements

The traffic surveys in June-July 2019 also recorded the vehicle classification and the number of daily heavy vehicle movements (either trucks or buses) using each road. The survey recorded the following mine related daily heavy vehicle traffic movements as summarised in Table 2.15, Table 2.16 and Table 2.17.

In addition to the buses and coaches which currently transport the majority of the mine workforce to and from work each day, a range of rigid trucks and semi-trailers also transport a wide range of mining equipment and consumables to and from the mine site each days.

Table 2.13 Existing daily heavy vehicle traffic surveyed using Bonehams Lane

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	13	7	30	35	35	35	40	35	28
Southbound	12	12	26	29	26	28	35	29	24
Combined	25	19	56	64	61	63	75	64	52

Source: Bland Shire Council Traffic Survey

Table 2.14 Existing daily heavy vehicle traffic surveyed using Lake Cowal Road

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	6	6	9	9	13	8	9	10	9
Southbound	4	5	9	10	8	8	9	9	8
Combined	10	11	18	19	21	16	18	19	17

Source: Bland Shire Council Traffic Survey

From the total daily heavy vehicle traffic movements summarised in Table 2.17, assuming 90% of traffic activity is mine related traffic, 64 heavy vehicle movements (32 actual heavy vehicles-either trucks or buses) visit the mine site each day on an average day (measured over both weekdays and weekends). Of this traffic approximately 24 heavy vehicles(either trucks or buses) travel to and from the mine via Bonehams Lane each day and 8 heavy vehicles (either trucks or buses) travel to and from the mine each day via Lake Cowal Road.

There are significantly fewer daily heavy vehicle movements accessing the mine on weekends (approximately 15 trucks or buses) compared to weekdays (approximately 36 trucks or buses).

Table 2.15 Total daily heavy vehicle traffic using both routes

Direction	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Weekday Average	Seven Day Average
Northbound	19	13	39	44	48	43	49	45	37
Southbound	16	17	35	39	34	36	44	38	32
Combined	35	30	74	83	82	79	93	83	69

Source: Bland Shire Council Traffic Survey

2.3.2 Baseline intersection performance

The current RMS intersection level of service (LOS) standards for traffic analysis, which are undertaken using SIDRA or similar traffic analysis programs for intersections, are summarised in Table 2.16.

Table 2.16 Intersection level of service (LOS) standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
A	<14	Good operation	Good operation
B	15-28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29-42	Satisfactory	Satisfactory, but accident study required
D	43-56	Operating near capacity	Near capacity and accident study required
E	57-70	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: Guide to Traffic Generating Developments (RTA 2002)

The SIDRA analysis results for the baseline performance for all three key intersections are summarised in Table 2.11. Currently, all three intersections are operating at LOS A with low average traffic delays and low degree of saturation (typically 0.02 to 0.04) giving plenty of capacity for future traffic growth. The detailed SIDRA intersection performance results and the assessed intersection layout diagrams are included in Appendix B.

Table 2.17 Intersection peak hourly SIDRA intersection performance

Intersection	Peak hourly period	LOS	DOS	DEL (secs)	95% BQL (m)
West Wyalong	5-6 am inbound	A	0.031	7.9	1.1
Condoblin Road/Ungarie Road/Wambo	6-7 am outbound	A	0.032	9.1	1.1
yne Road	5-6 pm inbound	A	0.034	8.3	1.1
	6-7 pm outbound	A	0.031	9.4	1.1

Table 2.17 **Intersection peak hourly SIDRA intersection performance**

Intersection	Peak hourly period	LOS	DOS	DEL (secs)	95% BQL (m)
Wamboyne Road/Girral Road/Blow Clear Road	5-6 am inbound	A	0.032	9.1	1.2
	6-7 am outbound	A	0.022	9.0	0.8
	5-6 pm inbound	A	0.039	9.6	1.2
	6-7 pm outbound	A	0.028	8.8	0.9
Mine Access Road/Bonehams Lane/Lake Cowal Road	5-6 am inbound	A	0.030	9.1	0.2
	6-7 am outbound	A	0.026	7.9	0.3
	5-6 pm inbound	A	0.040	8.7	0.6
	6-7 pm outbound	A	0.021	8.3	0.2

Note: LOS = level of service, DOS = degree of saturation, DEL = average delay by second, 95th percentile BQL = 95th percentile back of queue length

2.4 Road safety

Only personal injury or fatal crashes are recorded within the TfNSW interactive accident history database. A summary of the most recent 5 year crash history along the Project transport routes is shown in Figure 2.10.

There were no recorded personal injury crashes on either Ungarie Road, Blow Clear Road, Bonehams Lane, West Plains Road, Bogies Island Road, Bena Street and Burcher Road.

In the locality of the mine area and approved transport routes, one recorded personal injury crash occurred at the intersection of Wamboyne Road with Blow Clear Road and Girral Road and one recorded personal injury crash occurred at the intersection of the Mine Access Road with Bonehams Lane and Lake Cowal Road. At both these intersections, the visibility (sight distance) for the minor road traffic which is turning either left or right at the major road, is considered to be relatively good in relation to the current traffic speed limits, with no inherent traffic safety deficiencies present at either intersection.

Elsewhere, the crashes occurring on rural roads including the Newell Highway are related to speeding and/or driver fatigue which are considered inappropriate driver behaviours.

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- KEY**
- Proposed underground development
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - DA14/98 approved surface disturbance
 - Rail line
 - Main road
 - Extent of Lake Cowal
 - Reported crashes along transport routes**
 - Fatal
 - Serious injury
 - Moderate injury
 - Minor/other injury

Overview of reported crashes
along transport routes

Evolution Mining
Cowl Gold Operations
Traffic impact assessment
Figure 2.10

2.5 Current car parking

Existing car park capacity at CGO is approximately 64 vehicles in the main sealed car park area, with three additional disabled car parking spaces. An additional unsealed gravel car parking area is also available for approximately 28 mine related utility type vehicles, immediately inside the main gate adjacent to the main office area.

At the time of the site inspection during the mid morning on 5 and 6 June 2019, the main external car park area was observed to be approximately 85% occupied with 55 car parking spaces occupied and 9 vacant car parking spaces. This car park area can be extended if necessary to incorporate other nearby areas which are currently unsealed.

The utilisation of the unsealed mine (utility vehicle) car parking area located inside the main gate, adjacent to the main office area, was not recorded.

2.6 Public transport

2.6.1 Airport

The nearest operating airport to CGO is Parkes Airport. Parkes Airport is approximately 145 km from CGO via the Forbes transport route.

Parkes is approximately one-hour flight time from Sydney and is serviced by 18 Regional Express flights per week. The airport terminal is open weekdays from 5:30 am until 8:30 pm, Saturday 5:30 am until 11:30 am and Sundays 4:00 pm until 8:00 pm.

West Wyalong Airport is located just south-west of the town of West Wyalong and is made up of one runway. It is approximately 35 km south-west of CGO and currently non-operational.

2.6.2 Train services

West Wyalong is located along Temora to Lake Cargelligo railway line in a north-south direction. The railway line does not intersect with CGO transport routes. The rail line manager is John Holland Rail.

2.6.3 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 Condoblin town and Coach 718 runs the opposite direction. Bookings are required to use these bus services.

During the site inspection, school bus services were observed to operate via some of the roads in the locality of the mine, primarily Wamboyne Road, during the periods 7.30 to 8.30 am and 3.30 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.

2.7 Pedestrian and cycling activities

No pedestrian or cycling activities were observed during the site inspection in the rural localities outside of the West Wyalong township.

2.8 Road improvement Projects

There are no TfNSW or Council proposed road improvement Projects along the preferred mine transport routes at the time of this report being prepared.

Bland Shire Council is continuing to undertake road maintenance and road sealing operations on a numbers of the roads in its area surrounding the mine, to the extent that the general design standard and condition of the rural roads in the area is continually being improved.

3 Project-related traffic

3.1 Underground development

The additional daily and peak hourly mine traffic movements will primarily be related to the additional workforce travel. The underground development will generate light vehicle traffic movements from individual employee cars and utes, as well as heavy vehicle traffic from the buses and coaches which will be transporting the major proportion of the additional Project workforce (75%) to and from work each day.

The peak construction workforce for the underground development will occur during month 9 of construction, with a total of 335 persons on-site, representing 84 CGO employees and 251 persons employed by contractors. The proposed construction work hours for the Project will be from 6 am to 6 pm seven days per week, resulting in two significant hourly peaks of construction related traffic movements, travelling inbound to the mine site between 5-6 am and travelling outbound from the mine site between 6-7 pm.

The future underground development workforce for the Project will be a total of 83 persons for each shift, representing 21 CGO operations employees and 62 persons employed by contractors. The underground development shift work hours for the Project will be from 6 am to 6 pm and from 6 pm to 6 am, seven days per week, resulting in four significant hourly peaks of underground development workforce traffic movements, travelling inbound to the mine site between 5-6 am and 5-6 pm seven days per week and travelling outbound from the mine site between 6-7 am and 6-7 pm seven days per week.

3.1.1 Heavy vehicle (truck) movements

During both the future underground development construction and operations periods, there will be some additional daily heavy vehicle truck traffic travelling to and from the mine area.

During construction, there will be approximately 316 deliveries of identified construction equipment and future mechanical equipment required for underground development operations, plus an unspecified number of general construction materials deliveries over an 18 month period. Construction stage truck deliveries for the Project are estimated as being on average, five deliveries per day, with corresponding empty return truck movements over the full 18 month construction period.

During future operations, there will be additional weekly or more frequent deliveries for the following deliveries:

- ground support consumables;
- ventilation consumables;
- maintenance parts (regular);
- maintenance parts (emergency);
- general stores;
- fuel;
- explosives; and
- cement, aggregate and sand.

Generally the above identified additional mine truck traffic deliveries will not occur during the peak mine workforce shift changeover traffic periods.

During both the future construction and operations periods there could potentially be up to 10 additional truck deliveries per day which would correspond to approximately 5 additional truck deliveries per day on average during both the mine construction and operations periods.

3.1.2 Daily traffic movements and distribution

The additional daily and peak hourly traffic generation movements for the underground development have been calculated for both the peak construction phase (month 9) and future underground development operations (which will be uniform over each year of the Project).

The additional underground development workforce travel movements will primarily use travel via an extension of the existing shuttle bus system which currently serves the existing CGO workforce. This will minimise the potential for any additional locality daily and peak hourly traffic movements generated by the additional mine activity.

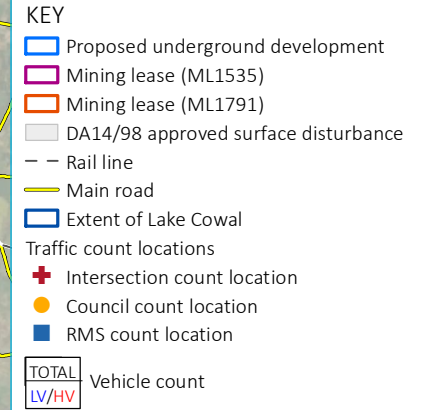
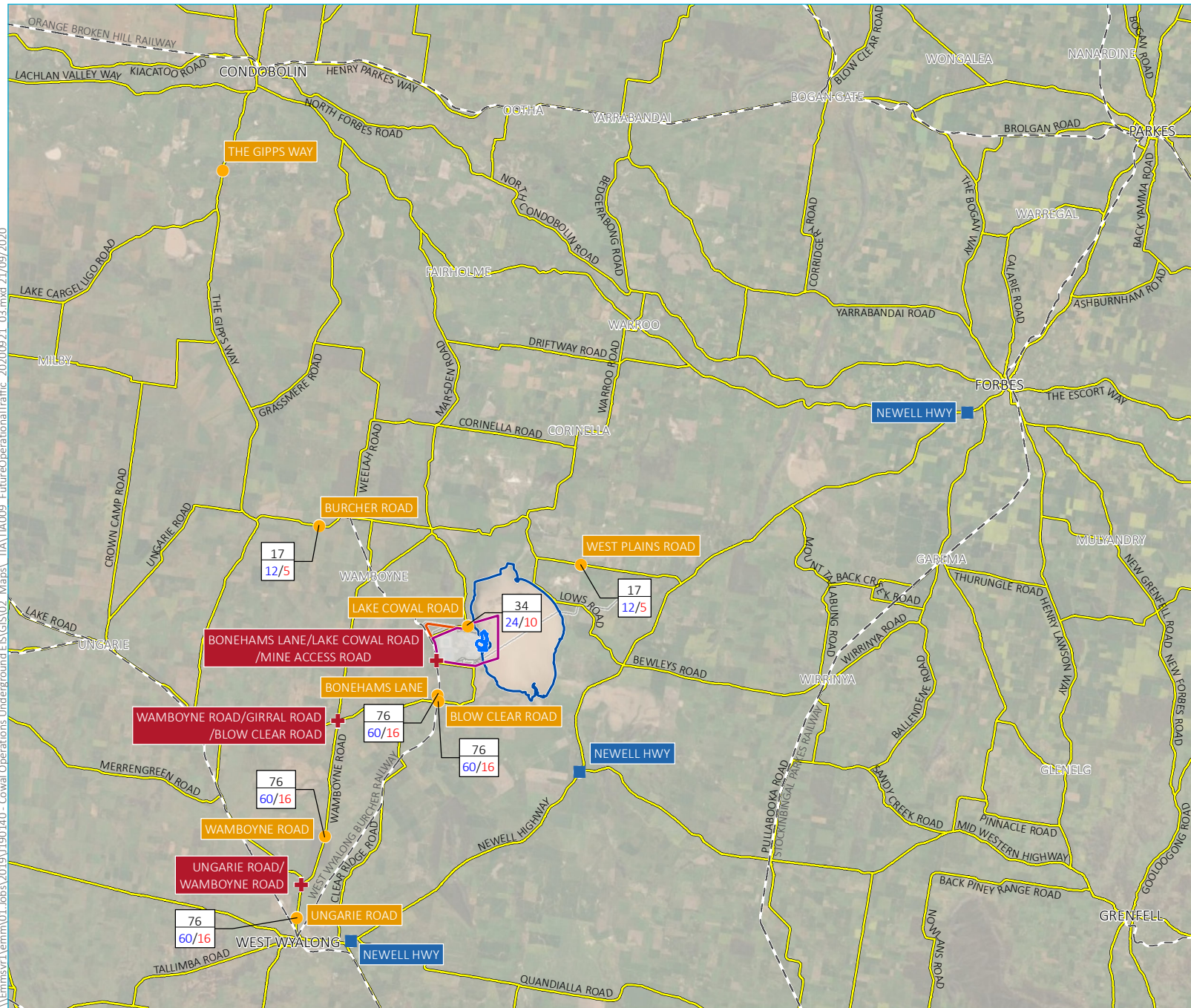
The future distributions of the additional daily traffic movements using the approved access routes to the mine are shown in Figures Figure 3.1 and Figure 3.2. The key assumptions in the traffic calculations for each stage are as follows:

- 75% of the additional workforce will travel to and from work by bus/coach and 25% will travel by light vehicle (car/utility);
- the average occupancy for bus/coach travel will be 30 persons per bus;
- approximately 80% of the future additional workforce will be based in the Wyalong/West Wyalong area;
- approximately 10% of the future additional workforce will be based in Forbes Shire urban or rural areas; and
- approximately 10% of the future additional workforce will be based in Lachlan Shire urban or rural areas.

During peak construction (month 9) on a typical day, the total daily number of additional vehicles generated will be 105 (5 trucks, 16 buses and 84 light vehicles) all travelling both to and from the site (total 210 daily vehicle movements). These additional daily vehicle movements will be distributed approximately as follows:

- 168 daily vehicle movements (68 daily light vehicles, 12 daily buses and 4 daily trucks) travelling to and from the Wyalong/West Wyalong area;
- 21 daily vehicle movements (8 daily light vehicles, 2 daily buses and up to 1 truck) travelling to and from the Forbes Shire urban or rural areas; and
- 21 daily vehicle movements (8 daily light vehicles, 2 daily buses and up to 1 truck) travelling to and from the Lachlan Shire urban or rural areas.

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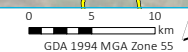


Future operational traffic - daily volumes

Evolution Mining
Cowl Gold Operations
Traffic impact assessment
Figure 3.2



Source: EMM (2020); Evolution (2020); DFSI (2017)



During future mine underground operations, the total number of additional vehicles generated for 83 persons each shift will be 25 vehicles (4 buses and 21 light vehicles) travelling both to and from the site. This represents a total 100 additional daily vehicle movements for the two 12 hour work shifts. There will also be approximately five additional daily truck deliveries. These additional daily vehicle movements will be distributed approximately as follows:

- 76 daily vehicle movements (30 daily light vehicles, 4 daily buses and 4 daily trucks) travelling to and from the Wyalong/West Wyalong area;
- 17 daily vehicle movements (6 daily light vehicles, 2 daily buses and up to 1 truck) travelling to and from the Forbes Shire urban or rural areas; and
- 17 daily vehicle movements (6 daily light vehicles, 2 daily buses and up to 1 truck) travelling to and from the Lachlan Shire urban or rural areas.

3.1.3 Peak hourly traffic movements

The corresponding additional peak hourly traffic movements for this traffic, travelling to or from CGO during each identified shift changeover period, are summarised for each of the three preferred transport routes in Table 3.1, for the additional peak Project construction traffic and in Table 3.2 for the additional Project underground development operations traffic.

Table 3.1 Additional peak hourly traffic movements during peak construction

Approved Travel Route Direction	Peak hour	Inbound Light Vehicles	Inbound Heavy Vehicles	Inbound All Traffic	Outbound Light Vehicles	Outbound Heavy Vehicles	Outbound All Traffic
Wyalong and West Wyalong	5-6 am	68	12	80			
	6-7 pm				68	12	80
Forbes Shire urban or rural areas	5-6 am	8	2	10			
	6-7 pm				8	2	10
Lachlan Shire urban or rural areas	5-6 am	8	2	10			
	6-7 pm				8	2	10
Total all routes	5-6 am	84	16	100			
	6-7 pm				84	16	100

Table 3.2 Additional peak hourly traffic movements during future underground mine operations

Approved Travel Route Direction	Peak hour	Inbound Light Vehicles	Inbound Heavy Vehicles	Inbound All Traffic	Outbound Light Vehicles	Outbound Heavy Vehicles	Outbound All Traffic
Wyalong and West Wyalong	5-6 am	15	2	17			
	6-7 am				15	2	17
	5-6 pm	15	2	17			
	6-7 pm				15	2	17
Forbes Shire urban or rural areas	5-6 am	3	1	4			
	6-7 am				3	1	4
	5-6 pm	3	1	4			
	6-7 pm				3	1	4
Lachlan Shire urban or rural areas	5-6 am	3	1	4			
	6-7 am				3	1	4
	5-6 pm	3	1	4			
	6-7 pm				3	1	4
Total all routes	5-6 am	21	4	25			
	6-7 am				21	4	25
	5-6 pm	21	4	25			
	6-7 pm				21	4	25

3.2 Dangerous good transportation route

This primarily relates to additional transport of chemicals (cyanide) to and from the mine which is being assessed separately to this TIA report.

3.3 Alternative access routes

In this assessment, the potential traffic impacts of the mine generated daily and peak hourly traffic movements, as identified in section 3.1.2 and summarised in Table 3.1 and Table 3.2, have been assessed for this traffic travelling via the three preferred mine transport routes, as this will be the normal mine traffic situation. The potential use of the identified alternative mine transport routes (e.g. during wet weather conditions) is noted only in an advisory context in this traffic impact assessment, as the potential use of these roads will occur infrequently and is not considered to be a 'normal' mine traffic situation.

3.4 Additional workforce and parking demand

The potential numbers of additional daily light vehicles which will be travelling to and from CGO each day, as noted in Section 3.1.2 are likely to require some improvement to/and or expansion of the existing workforce car parking areas, this requirement is discussed in further detail in Section 4.4.

4 Impact assessment

4.1 Impact on road network capacity

Based on the mine daily traffic volume increases which are identified in section 3.1.2 for the peak mine construction and operations periods, the effect of these additional daily traffic movements is assessed in terms of the percentage daily traffic volume increases as summarised in Table 4.1 below.

The additional mine underground development workforce travel movements will primarily travel via an extension of the existing shuttle bus system which currently serves the existing CGO workfroce. This will minimise the potential for any additional locality daily and peak hourly traffic movements generated by the additional mine activity.

A further assessment of the Austroads road width capacity standards is provided in Table 4.2, which confirms the future compliance of the assessed daily traffic volume increases during the peak underground development construction and operations periods, in relation to the Austroads road width capacity standards for rural roads.

Table 4.1 Daily traffic volume increases during future mine construction and operations

Road	Existing daily traffic (daily heavy vehicle trips)	Additional construction stage daily traffic (heavy vehicles)	Future total construction stage daily traffic (percentage increase)	Additional operation stage daily traffic (heavy vehicles)	Future total operation stage daily traffic (percentage increase)
Ungarie Road	1,221 (154)	168 (32)	1,389 (14%)	76 (16)	1,297 (6%)
Wamboyne Road	303 (76)	168 (32)	471 (55%)	76 (16)	379 (25%)
Blow Clear Road	254 (66)	168 (32)	422 (66%)	76 (16)	330 (30%)
Bonehams Lane	254 (52)	168 (32)	422 (66%)	76 (16)	330 (30%)
Mine Access Road*	280 (64)	210 (42)	490 (75%)	110 (26)	390 (39%)
Lake Cowal Road	55 (17)	42 (10)	97 (76%)	34 (10)	89 (62%)
West Plains Road	42 (10)	21 (5)	63 (50%)	17 (5)	59 (40%)
Burcher Road	43 (10)	21 (5)	64 (49%)	17 (5)	60 (40%)
The Gipps Way	478 (167)	11 (3)	489 (2%)	9 (3)	487 (2%)

Note; * The Mine Access Road existing daily traffic volume is estimated as 90% of the combined daily traffic volume using both Bonehams Lane and Lake Cowal Road

On the two main road access routes, which are Ungarie Road and The Gipps Way, the forecast daily traffic increases during the Project construction and operations stages will be between 6-14% for Ungarie Road and 2% for The Gipps Way. These daily traffic increases will not generally be noticeable and should have minimal impact to the prevailing traffic operating conditions (eg levels of service) for the existing traffic using these routes.

On the other assessed local road access routes to the mine from the south, within the Bland Shire Council area, which are Wamboyne Road, Blow Clear Road, Bonehams Lane and the Mine Access Road, the forecast daily traffic increases during the Project construction and operations stages are 25-55% at Wamboyne Road, 30-66% at Blow Clear Road and Bonehams Lane and 39-75% at the Mine Access Road. These daily traffic increases will probably be noticeable for the other traffic using these routes, but should not generally affect the existing traffic operations (levels of service) or road width design requirements for these, due to the low existing daily traffic volumes which all currently comply with the Austroads rural roads design width requirements. This is described in further detail in Table 4.2.

On the other assessed local road access routes to the north of CGO, which also extend into the Forbes and Lachlan Shire Council areas, which are Lake Cowal Road, West Plains Road and Burcher Road, the assessed daily traffic increases during the Project construction and operations stages are 62-76% at Lake Cowal Road, 40-50% at West Plains Road and 40-49% at Burcher Road. These daily traffic increases will probably not be noticeable for the other traffic using these routes, as these roads are very lightly trafficked currently, and the increases will not generally affect the Austroads road width design requirements for each route. This is summarised further in Table 4.2.

Table 4.2 Daily traffic volume increases during future underground development construction and operations

Road	Assessed future daily traffic volume during construction and (operations)	Relevant Austroads threshold band	Relevant Austroads design standard	Current sealed road width	Sealed road width compliance during construction and (operations)
Ungarie Road	1,389 (1,297)	1,000 – 3,000	Minimum 9 m wide	9 m wide sealed	Yes (Yes)
Wamboyne Road	471 (379)	150 – 500	Minimum 7.2 m wide seal	9 m wide sealed	Yes (Yes)
Blow Clear Road	422 (330)	150 – 500	Minimum 7.2 m wide seal	8 m – 10 m wide sealed	Yes (Yes)
Bonehams Lane	422 (330)	150 – 500	Minimum 7.2 m wide seal	9 m wide sealed	Yes (Yes)
Mine Access Road	490 (390)	150 – 500	Minimum 7.2 m wide seal	9 m wide sealed	Yes (Yes)
Lake Cowal Road	97 (89)	1 – 150	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	7 m wide for sealed sections; 10 m wide for unsealed section	Yes (Yes)
West Plains Road	63 (59)	1 – 150	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	4 m – 5 m wide (mostly sealed)	Yes (Yes)

Table 4.2 Daily traffic volume increases during future underground development construction and operations

Road	Assessed future daily traffic volume during construction and (operations)	Relevant Austroads threshold band	Relevant Austroads design standard	Current sealed road width	Sealed road width compliance during construction and (operations)
Burcher Road	64 (60)	1 – 150	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal	6 m wide sealed	Yes (Yes)
The Gipps Way	489 (487)	150 – 500	Minimum 7.2 m wide seal	6 m – 7 m wide sealed	Yes (Yes)

4.2 Impact on key intersection performance

4.2.1 SIDRA intersection capacity analysis

Based on the forecast mine peak hourly traffic volume increases identified in Table 3.1 and Table 3.2 for the peak mine construction and operations traffic periods, the effects of the additional peak hourly intersection traffic movements are summarised in terms of the SIDRA intersection capacity results in Table 4.3 (for construction traffic) and Table 4.4 (for operations traffic). The detailed SIDRA intersection analysis results are listed in detail for each peak hour period in Appendix C and Appendix D.

The effects of the additional peak hourly intersection traffic movements in terms of the Austroads turning lane warrant analysis for the future right turning traffic is summarised in Table 4.5 (for construction traffic) and Table 4.6 (for operations traffic).

Table 4.3 Peak hourly SIDRA intersection performance including construction traffic

Intersection	Peak hourly period	LOS	DOS	DEL (secs)	95% BQL (m)
West Wyalong Condoblin Road/Ungarie Road/Wamboyn Road	5-6 am inbound	A	0.082	8.2	3.1
	6-7 pm outbound	A	0.088	9.4	3.0
Wamboyn Road/Girral Road/Blow Clear Road	5-6 am inbound	A	0.083	9.1	3.1
	6-7 pm outbound	A	0.084	8.8	2.8
Mine Access Road/Bonehams Lane/Lake Cowal Road	5-6 am inbound	A	0.077	9.7	0.8
	6-7 pm outbound	A	0.077	8.2	1.3

Note: LOS = level of service, DOS = degree of saturation, DEL = average delay by second, 95th percentile BQL = 95th percentile back of queue length

Table 4.4 Peak hourly SIDRA intersection performance including future mine operations traffic

Intersection	Peak hourly period	LOS	DOS	DEL (secs)	95% BQL (m)
West Wyalong Condoblin Road/Ungarie Road/Wamboyn Road	5-6 am inbound	A	0.042	7.9	1.5
	6-7 am outbound	A	0.032	7.9	1.1
	5-6 pm inbound	A	0.034	8.3	1.1
	6-7 pm outbound	A	0.043	9.4	1.4
Wamboyn Road/Girral Road/Blow Clear Road	5-6 am inbound	A	0.043	9.1	1.6
	6-7 am outbound	A	0.022	8.2	0.8
	5-6 pm inbound	A	0.039	9.6	1.2
	6-7 pm outbound	A	0.040	8.8	1.3
Mine Access Road/Bonehams Lane/Lake Cowal Road	5-6 am inbound	A	0.040	9.2	0.4
	6-7 am outbound	A	0.026	8.0	0.5
	5-6 pm inbound	A	0.040	8.8	0.6
	6-7 pm outbound	A	0.036	8.0	0.6

Note: LOS = level of service, DOS = degree of saturation, DEL = average delay by second, 95th percentile BQL = 95th percentile back of queue length

In comparison to the existing surveyed traffic SIDRA intersection results, which are summarised in Table 2.11, where all three intersections are operating at level of service A, and the highest degree of saturation and intersection right turn traffic delay at any intersection are 0.040 and 9.6 seconds respectively, all three intersections will remain operating at level of service A, but there will be an increase in the highest intersection degree of saturation to 0.088 and the highest intersection right turn traffic delay to 9.7 seconds respectively with the assessed construction traffic movements as summarised in Table 4.3.

With the assessed future mine operations traffic movements as summarised in Table 4.4, all three intersections will remain operating at level of service A. There will be much lower increases in the highest intersection degree of saturation to 0.043 and the highest intersection right turn traffic delay will remain at 9.6 seconds respectively.

In neither of these assessed traffic scenarios will the future intersection traffic delays, level of service or other assessed intersection performance measures change significantly with either the additional Project construction or operations stage traffic movements.

4.2.2 Austroads turning lane warrant assessment

Based on the forecast mine peak hourly traffic volume increases which are summarised in Table 3.1 and Table 3.2 for the peak mine construction and operations traffic periods, the effects of the additional peak hourly intersection traffic movements are summarised in terms of the Austroads intersection warrant assessment for right turning traffic in Table 4.5 (for construction traffic and Table 4.6 for operations traffic).

Table 4.5 Future construction stage peak hourly traffic assessment for Austroads Warrant

Intersection	Peak hourly traffic period	(Qm) Major Road through traffic volume	(Qr) Major Road right turn traffic volume	Turning Lane warrant requirement
West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road	5-6 am inbound	11	129	BAR
	6-7 pm outbound	47	1	BAR
Wamboyne Road/Girral Road/Blow Clear Road	5-6 am inbound	8	125	BAR
	6-7 pm outbound	4	1	BAR
Mine Access Road/Bonehams Lane/Lake Cowal Road	5-6 am inbound	130	1	BAR
	6-7 pm outbound	111	23	BAR

Table 4.6 Future operations stage peak hourly traffic assessment for Austroads Warrant

Intersection	Peak hourly traffic period	(Qm) Major Road through traffic volume	(Qr) Major Road right turn traffic volume	Turning Lane warrant requirement
West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road	5-6 am inbound	11	66	BAR
	6-7 am outbound	53	34	BAR
	5-6 pm inbound	60	32	BAR
	6-7 pm outbound	47	1	BAR
Wamboyne Road/Girral Road/Blow Clear Road	5-6 am inbound	8	62	BAR
	6-7 am outbound	7	34	BAR
	5-6 pm inbound	3	32	BAR
	6-7 pm outbound	4	1	BAR
Mine Access Road/Bonehams Lane/Lake Cowal Road	5-6 am inbound	67	1	BAR
	6-7 am outbound	75	8	BAR
	5-6 pm inbound	91	9	BAR
	6-7 pm outbound	48	11	BAR

In none of the assessed traffic scenarios in Table 4.5 and Table 4.6 will the future intersection right turning lane warrant requirement change from the minimum Type BAR warrant which was determined for the existing intersection performance at all three intersections (summarised in Table 2.9). Therefore neither the additional Project construction or additional Project operations traffic movements will generate any requirement to construct an additional right turning lane at any of the assessed intersections.

4.3 Impact on road safety

The review of historic crashes in the region detailed in Section 2.5 showed no significant accident history on any of the existing or proposed mine access routes, with no accidents reported at all on most roads, including Ungarie Road, Blow Clear Road, Bonehams Lane, West Plains Road, Bogies Island Road, Bena Street and Burcher 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 additional CGO traffic using these roads at the relevant times of the day on normal weekdays and weekends.

As the majority of the existing and future mine 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 to 8.30 am and 3.30 to 4.30 pm on school weekdays.

4.4 Impact on public transport, pedestrian and cycling activities

Currently, a shuttle bus run between CGO and the town centres of West Wyalong, Forbes and Condoblin to transport the existing workforce. This will be extended on a proportional basis to accommodate the increases in workforce associated with construction and operational phases of the Project. Apart from this, there will be no additional impact or demand for this type of public transport service.

4.5 Mitigation measures

There are no specific transport network improvements or other traffic related road transport mitigation measures that have been identified by this TIA in order to address the assessed locality road network and intersection traffic impacts for the Project and for Mod 16.

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 additional underground development workforce travel movements will primarily use the existing shuttle bus system which currently serves the existing CGO workforce. This will minimise the potential for any additional locality daily and peak hourly traffic movements generated by the additional activity.

For certain roads in the locality between CGO and the townships of Wyalong and West Wyalong, such as Lonergans Lane, Clear Ridge Road and Bonehams Lane, which do not form part of the approved transport routes for CGO during normal weather conditions, the existing monitoring and enforcement measures which are used by Evolution to limit traffic using these routes will need to be reviewed. The effectiveness of these measures should continue to be monitored and reviewed on an ongoing basis, to ensure their continuing effectiveness for the anticipated additional daily and peak hourly traffic movements which are expected to be travelling to and from CGO in future years from the Wyalong and West Wyalong directions.

5 Conclusion

This report has been prepared to identify and assess the potential road network construction and operations stage traffic impacts for the proposed underground development and Mod 16 at CGO.

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 and operations stage daily and peak hourly traffic movements without any need for further road widening or other capacity/safety improvements.

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.

The existing daily and peak hourly traffic volumes from CGO have been identified for typical weekday and weekend operations. The future additional generated daily and peak hourly traffic volumes have also been calculated for the Project's construction and operation stages, for workforce and heavy vehicle traffic for the three main access routes which the additional traffic will be using, which shows:

- approximately 80% of the future additional workforce will be based in the Wyalong/West Wyalong area;
- approximately 10% of the future additional workforce will be based in Forbes Shire urban or rural areas; and
- approximately 10% of the future additional workforce will be based in Lachlan Shire urban or rural areas.

The additional workforce travel movements will primarily operate via an extension of the shuttle bus system which currently serves the existing workforce, which will minimise the potential additional daily and peak hourly traffic movements generated by this activity.

The existing road width and condition of all the identified access routes have been inspected for this report and existing traffic volumes documented, for both light and heavy vehicle traffic from Council and other traffic data sources.

Evolution will continue to monitor the future road surface conditions for all the affected roads and where necessary assist each Council in providing appropriate maintenance and/or road reconstruction repair work to ensure that all road surfaces are generally maintained to safe trafficable standards, in accordance with the existing dilapidation/road maintenance protocol mechanism in the existing TMP for CGO.

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/Wamboyn Road;
- Wamboyn Road/Girral Road/Blow Clear Road; and
- Mine Access Road/Bonehams Lane/Lake Cowal Road.

These three intersections have been inspected to confirm their current traffic safety and detailed analysis undertaken for the existing and proposed (construction and operations 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 locality road network, the proposed additional construction stage and operations 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. Also, the majority of the existing and future workforce changeover light and heavy vehicle traffic will continue to 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 to 8.30 am and 3.30 to 4.30 pm on weekdays.

The required additional expansion of the mine car parking areas could be provided either as sealed or unsealed car parking areas (sealing would be preferable).

Abbreviations

AUR	Right turn traffic
CGO	Cowal Gold Operations
CMP	Cyanide Management Plan
DPIE	NSW Department of Planning, Industry and Environment
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
ESCMP	Erosion and Sediment Control Management Plan
Evolution	Evolution Mining (Cowal) Pty Limited
IDCS	Internal Catchment Drainage System
IWL	Integrated waste landform
LGA	Local government area
LOS	Level of service
Mg/L	Miligrams per litre
ML	Mining lease
Moz	Million ounces
Mt	Million tonnes
RTA	NSW Roads and Traffic Authority
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TfNSW	Transport for NSW
The Project	Cowal Gold Operations Underground Development Project
TIA	Traffic impact assessment
TSF	Tailings storage facility
UCDS	Up-catchment Diversion System
Qr	Right turning traffic movement
Qm	Through traffic movements

References

TfNSW 2019a, Traffic Volume Viewer, Transport for NSW, viewed on 3 January 2020, <https://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=10&lat=-33.90543404904591&lon=147.3335268398438&id=6142&tb=1&to=0>

TfNSW 2019b, Centre for Road Safety, viewed on 6 January 2020, <https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/>

BSC 2019, Traffic counts, received from Bland Shire Council on 10 July 2019, unpublished data.

LSC 2019, Traffic data, received from Lachlan Shire Council on 9 July 2019, unpublished data.

FSC 2019, Traffic data, received from Forbes Shire Council on 12 July 2019, unpublished data.



Appendix A

Site inspection photographs



A.1 Preferred transport route from West Wyalong

Newell Highway (between West Wyalong and Ungarie Road)



Photograph A.1 Newell Highway westbound through West Wyalong township, parking permitted on both sides of the road



Photograph A.2 Newell Highway westbound, approaching Ungarie Road and Mid Western Highway intersection

Ungarie Road



Photograph A.3 Ungarie Road northbound, approaching 100 km/h speed zone



Photograph A.4 Ungarie Road northbound, excellent road condition and sight distance



Photograph A.5 **Ungarie Road northbound, approximately 150 m south of West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road intersection**



Photograph A.6 **Ungarie Road northbound, approaching West Wyalong Condobolin Road/Ungarie Road/Wamboyne Road intersection**

Wamboyne Road



Photograph A.7 Wamboyne Road northbound, excellent road condition and sight distance in bushland



Photograph A.8 Wamboyne Road northbound, excellent road condition and sight distance in a relative open area



Photograph A.9 **Wamboyne Road northbound, approaching Wamboyne Road/Girral Road/Blow Clear Road intersection**

Blow Clear Road



Photograph A.10 **Blow Clear Road westbound, at Blow Clear Road/Bonehams Lane intersection**



Photograph A.11 **Blow Clear Road westbound, long straight road and excellent sight distance**



Photograph A.12 **Blow Clear Road westbound, long straight road condition in a relative open area**



Photograph A.13 **Blow Clear Road eastbound, looking from Wamboyne Road/Girral Road/Blow Clear Road intersection**

Bonehams Lane



Photograph A.14 Bonehams Lane southbound, long straight road with excellent sight distance



Photograph A.15 Bonehams Lane southbound, long straight road with excellent sight distance, big shed on the side of the road



Photograph A.16 Bonehams Lane southbound, approaching Blow Clear Road/Bonehams Lane intersection

A.2 Preferred transport route from Condoblin

The Gipps Way



Photograph A.17 The Gipps Way, looking north from the The Gipps Way/Burcher Road intersection



Photograph A.18 The Gipps Way, looking south from the The Gipps Way/Burcher Road intersection

Burcher Road



Photograph A.19 Burcher Road westbound, approaching the Burcher township



Photograph A.20 Burcher Road westbound, approaching the 100 km/h speed zone (leaving Burcher township)

Bena Street



Photograph A.21 Bena Street westbound, long straight road with excellent sight distance



Photograph A.22 Bena Street eastbound, road condition change from sealed to unsealed surface

Lake Cowal Road (east-west)



Photograph A.23 Lake Cowal Road eastbound, gravel road surface with good sight distance



Photograph A.24 Lake Cowal Road eastbound, gravel road surface with excellent sight distance

Lake Cowal Road (north-south)



Photograph A.25 Lake Cowal Road southbound, generally gravel surface



Photograph A.26 Lake Cowal Road southbound, approaching the section of sealed road surface



Photograph A.27 Lake Cowal Road southbound, gravel surface and excellent sight distance



Photograph A.28 Lake Cowal Road southbound, road condition change from sealed to unsealed

A.3 Preferred transport route from Forbes

Newell Highway (between Forbes and West Wyalong)



Photograph A.29 Newell Highway southbound, approaching 100 km/h speed zone



Photograph A.30 Newell Highway southbound, long straight sealed road



Photograph A.31 Newell Highway southbound, watch out and reduce speed for cattle along road side and crossing the road



Photograph A.32 Newell Highway southbound, approaching 110 km/h speed zone near junction with the Mid Western Highway



Photograph A.33 **Newell Highway southbound, approaching 90 km/h speed zone**



Photograph A.34 **Newell Highway southbound, approaching 80 km/h speed zone**

West Plains Road



Photograph A.35 West Plains Road eastbound, unsealed section, long and straight



Photograph A.36 West Plains Road eastbound, unsealed section continues



Photograph A.37 **West Plains Road eastbound, sealed section in a relative open area**



Photograph A.38 **West Plains Road eastbound, sealed section with excellent sight distance**

Bogies Island Road



Photograph A.39 Bogies Island Road westbound, gravel surface



Photograph A.40 Bogies Island Road westbound, gravel surface with excellent sight distance



Photograph A.41 Bogies Island Road westbound, gravel surface in a relative open area

Lake Cowal Road (east-west)



Photograph A.42 Lake Cowal Road westbound, gravel surface



Photograph A.43 Lake Cowal Road westbound, gravel surface in a relative open area



Photograph A.44 Lake Cowal Road westbound, gravel surface with excellent sight distance



Photograph A.45 Lake Cowal Road westbound, gravel surface continued

A.4 Mine access road and car park



Photograph A.46 Mine access road, sealed surface with excellent sight distance



Photograph A.47 Mine access road, approaching a road curve



Photograph A.48 Mine car park, leaving the mine site



Photograph A.49 Mine car park, outside the mine entrance



Photograph A.50 Bus access directly adjacent to the car park area



Photograph A.51 Truck access to the main gate, bypasses the car park area

A.5 Alternate routes

Lachlan Valley Way



Photograph A.52 Lachlan Valley Way, sealed road with centre and edge line marked



Photograph A.53 Lachlan Valley Way, sealed road with only centre line marked



Photograph A.54 Lachlan Valley Way, approaching a road curve



Photograph A.55 Lachlan Valley Way, long and straight road with excellent sight distance

A.6 Key intersections

West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road intersection



Photograph A.56 West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road intersection – looking east towards Wamboyne Road



Photograph A.57 West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road intersection – looking south towards Ungarie Road



Photograph A.58 **West Wyalong Condoblin Road/Ungarie Road/Wamboyne Road intersection – looking north towards West Wyalong Condoblin Road**

Wamboyne Road/Girral Road/Blow Clear Road intersection



Photograph A.59 Wamboyne Road/Girral Road/Blow Clear Road intersection – looking east towards Blow Clear Road



Photograph A.60 Wamboyne Road/Girral Road/Blow Clear Road intersection – looking south towards Wamboyne Road



Photograph A.61 Wamboyne Road/Girral Road/Blow Clear Road intersection – looking west towards Girral Road



Photograph A.62 Wamboyne Road/Girral Road/Blow Clear Road intersection – looking north towards Wamboyne Road

Mine access road intersection (Bonehams Lane/Lake Cowal Road)



Photograph A.63 Looking west from mine access road, heading to Bonehams Lane



Photograph A.64 Looking south on Lake Cowal Road, approaching Bonehams Lane



Appendix B

Existing Baseline - intersection performance



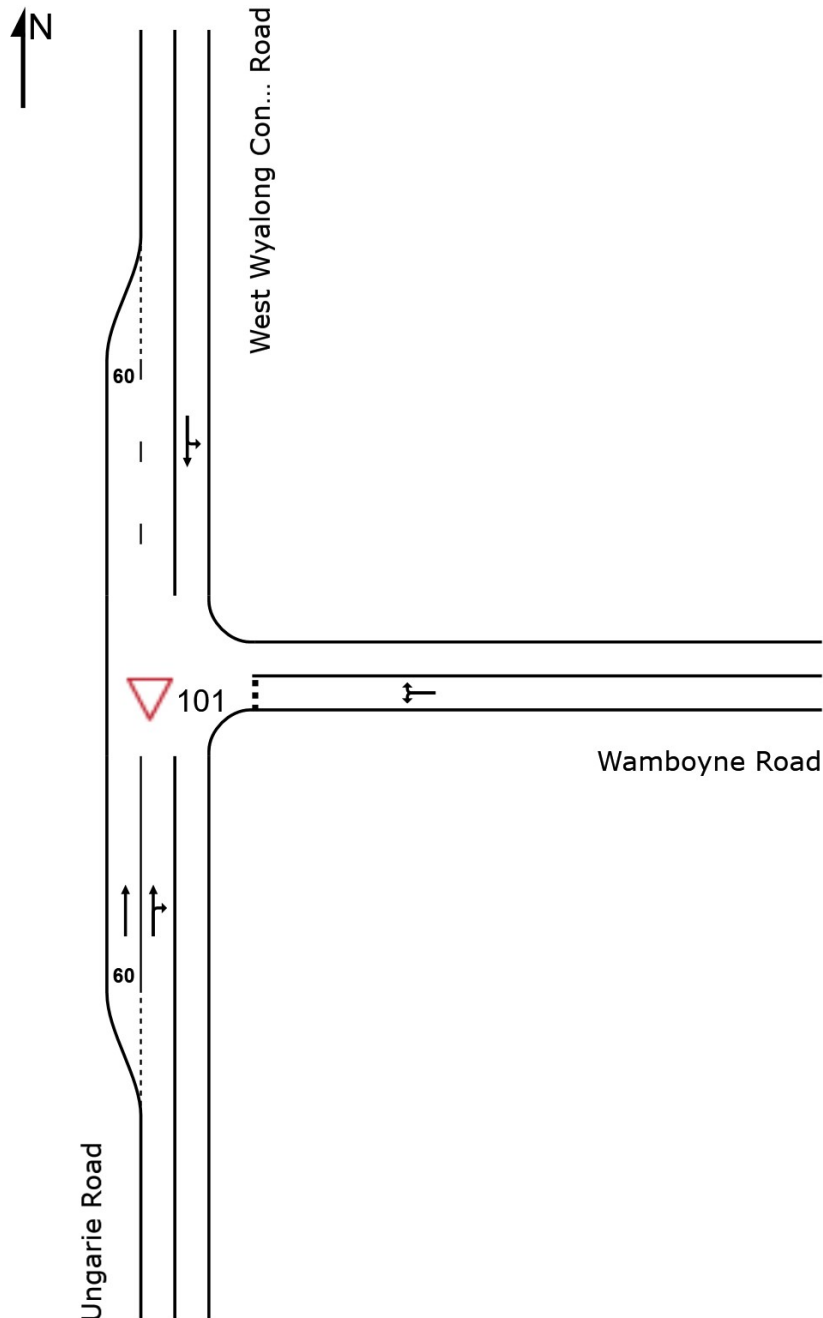
SITE LAYOUT

▽ Site: 101 [Ex W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)



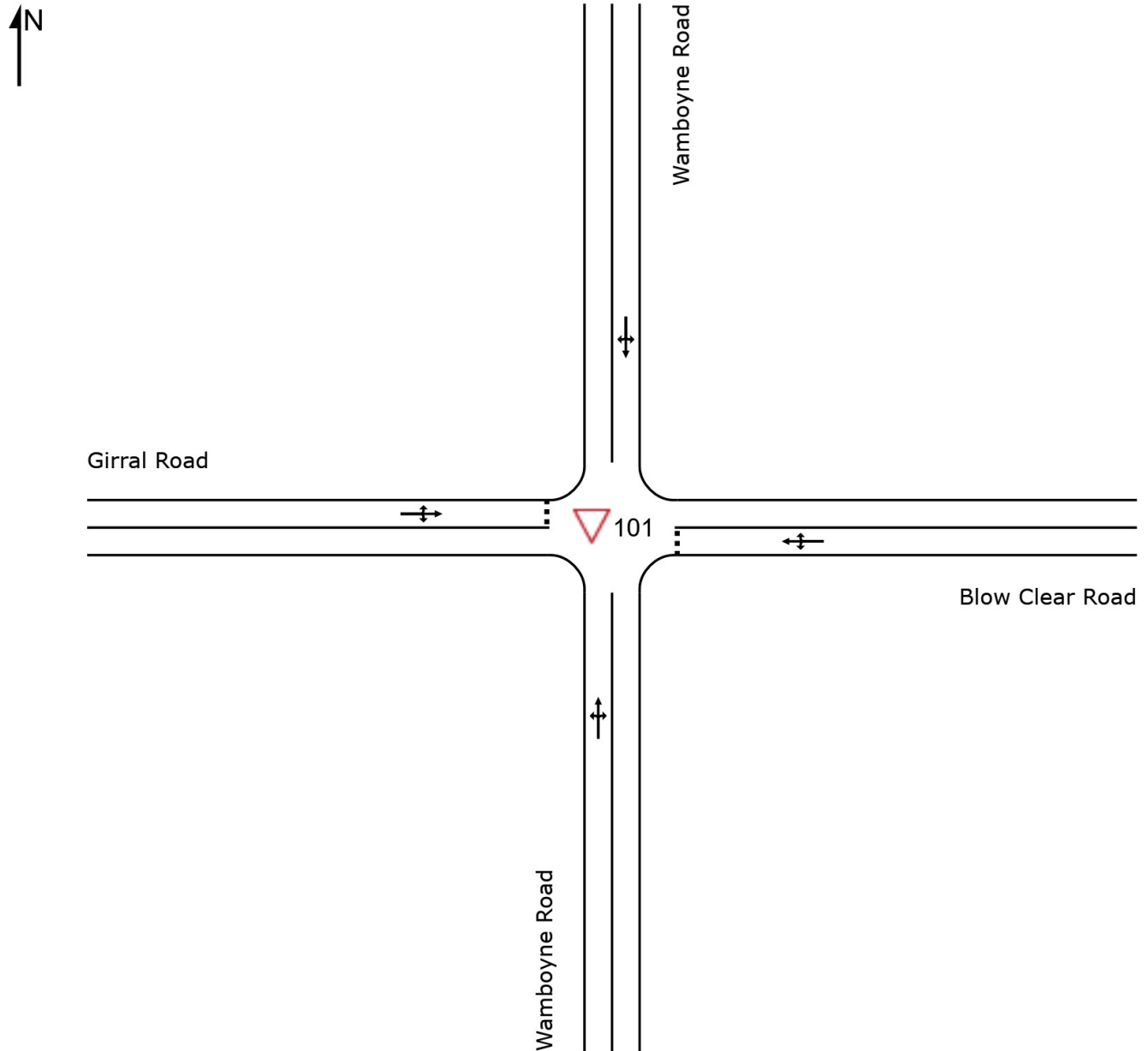
SITE LAYOUT

▽ Site: 101 [Ex Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)



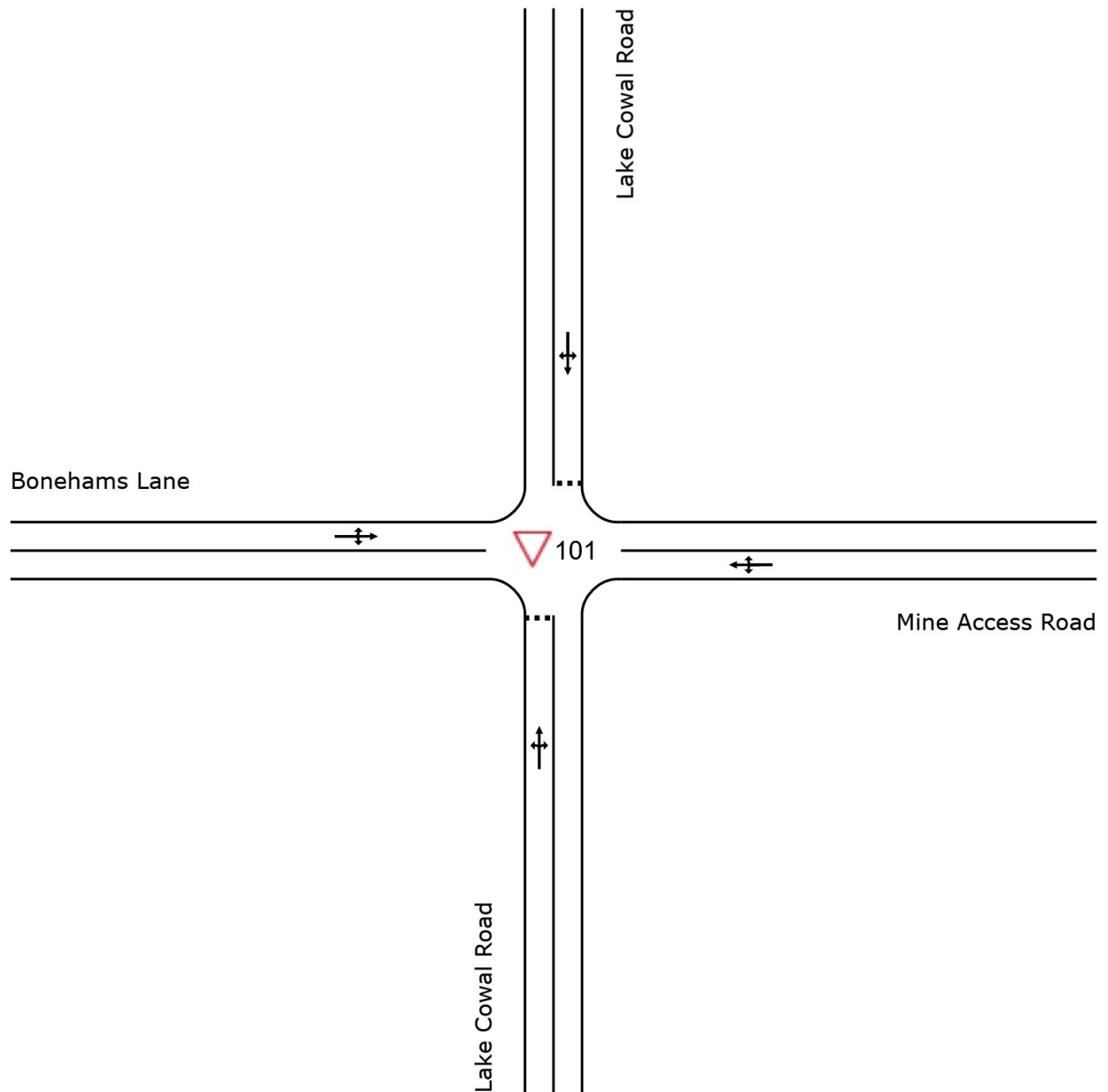
SITE LAYOUT

▽ Site: 101 [Ex Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 101 [Ex W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Ungarie Road												
2	T1	1	100.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
3	R2	52	14.3	0.031	7.8	LOS A	0.1	1.1	0.06	0.65	0.06	69.0
Approach		53	16.0	0.031	7.7	NA	0.1	1.1	0.06	0.63	0.06	69.5
East: Wamboyne Road												
4	L2	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.05	0.64	0.05	75.3
6	R2	1	0.0	0.002	7.7	LOS A	0.0	0.0	0.05	0.64	0.05	74.8
Approach		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	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.07	0.00	86.6
8	T1	9	22.2	0.006	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	97.4
Approach		11	20.0	0.006	0.8	NA	0.0	0.0	0.00	0.07	0.00	96.2
All Vehicles		65	16.1	0.031	6.6	NA	0.1	1.1	0.05	0.54	0.05	72.9

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Ex Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	5	0.0	0.032	7.9	LOS A	0.1	1.2	0.04	0.64	0.04	75.1
2	T1	1	0.0	0.032	0.0	LOS A	0.1	1.2	0.04	0.64	0.04	83.1
3	R2	47	15.6	0.032	7.8	LOS A	0.1	1.2	0.04	0.64	0.04	68.9
Approach		54	13.7	0.032	7.7	NA	0.1	1.2	0.04	0.64	0.04	69.7
East: Blow Clear Road												
4	L2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
5	T1	1	0.0	0.003	6.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
6	R2	2	0.0	0.003	7.6	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		4	0.0	0.003	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.5
North: Wamboyne Road												
7	L2	3	100.0	0.004	9.1	LOS A	0.0	0.1	0.02	0.58	0.02	60.9
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.02	0.58	0.02	85.4
9	R2	1	0.0	0.004	7.4	LOS A	0.0	0.1	0.02	0.58	0.02	76.6
Approach		5	60.0	0.004	7.8	NA	0.0	0.1	0.02	0.58	0.02	67.5
West: Girral Road												
10	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		66	15.9	0.032	7.6	NA	0.1	1.2	0.03	0.64	0.03	70.1

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.8
2	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.02	0.65	0.02	70.7
3	R2	1	0.0	0.002	7.7	LOS A	0.0	0.1	0.02	0.65	0.02	75.3
Approach		3	0.0	0.002	7.5	LOS A	0.0	0.1	0.02	0.65	0.02	73.9
East: Mine Access Road												
4	L2	1	0.0	0.003	8.1	LOS A	0.0	0.1	0.10	0.32	0.10	81.6
5	T1	3	0.0	0.003	0.1	LOS A	0.0	0.1	0.10	0.32	0.10	91.2
6	R2	1	100.0	0.003	9.1	LOS A	0.0	0.1	0.10	0.32	0.10	57.4
Approach		5	20.0	0.003	4.4	NA	0.0	0.1	0.10	0.32	0.10	79.9
North: Lake Cowal Road												
7	L2	7	28.6	0.007	7.6	LOS A	0.0	0.2	0.14	0.58	0.14	60.6
8	T1	1	0.0	0.007	5.9	LOS A	0.0	0.2	0.14	0.58	0.14	68.6
9	R2	1	0.0	0.007	6.9	LOS A	0.0	0.2	0.14	0.58	0.14	68.5
Approach		9	22.2	0.007	7.4	LOS A	0.0	0.2	0.14	0.58	0.14	62.2
West: Bonehams Lane												
10	L2	1	0.0	0.030	7.8	LOS A	0.0	0.1	0.00	0.03	0.00	72.1
11	T1	49	19.1	0.030	0.0	LOS A	0.0	0.1	0.00	0.03	0.00	98.9
12	R2	1	0.0	0.030	7.4	LOS A	0.0	0.1	0.00	0.03	0.00	87.3
Approach		52	18.4	0.030	0.3	NA	0.0	0.1	0.00	0.03	0.00	97.9
All Vehicles		69	18.2	0.030	1.8	NA	0.0	0.2	0.03	0.15	0.03	88.2

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex Mine Access Rd/Bonehams Ln/Lake Cowal Rd 6-7am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	7.9	LOS A	0.0	0.1	0.08	0.63	0.08	75.6
2	T1	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.08	0.63	0.08	70.5
3	R2	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.08	0.63	0.08	75.1
Approach		3	0.0	0.003	7.5	LOS A	0.0	0.1	0.08	0.63	0.08	73.7
East: Mine Access Road												
4	L2	1	0.0	0.010	7.9	LOS A	0.0	0.1	0.02	0.08	0.02	85.9
5	T1	15	21.4	0.010	0.0	LOS A	0.0	0.1	0.02	0.08	0.02	96.6
6	R2	1	0.0	0.010	7.5	LOS A	0.0	0.1	0.02	0.08	0.02	79.4
Approach		17	18.8	0.010	1.0	NA	0.0	0.1	0.02	0.08	0.02	94.6
North: Lake Cowal Road												
7	L2	11	20.0	0.009	7.5	LOS A	0.0	0.3	0.13	0.58	0.13	62.8
8	T1	1	0.0	0.009	5.9	LOS A	0.0	0.3	0.13	0.58	0.13	68.5
9	R2	1	0.0	0.009	6.9	LOS A	0.0	0.3	0.13	0.58	0.13	68.5
Approach		13	16.7	0.009	7.3	LOS A	0.0	0.3	0.13	0.58	0.13	63.7
West: Bonehams Lane												
10	L2	1	0.0	0.026	7.9	LOS A	0.0	0.1	0.00	0.03	0.00	72.1
11	T1	46	6.8	0.026	0.0	LOS A	0.0	0.1	0.00	0.03	0.00	99.0
12	R2	1	0.0	0.026	7.4	LOS A	0.0	0.1	0.00	0.03	0.00	87.4
Approach		48	6.5	0.026	0.3	NA	0.0	0.1	0.00	0.03	0.00	97.9
All Vehicles		81	10.4	0.026	1.8	NA	0.0	0.3	0.03	0.15	0.03	88.7

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd 6-7am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	38	16.7	0.032	0.0	LOS A	0.1	1.1	0.04	0.21	0.04	93.2
3	R2	36	8.8	0.032	7.7	LOS A	0.1	1.1	0.08	0.43	0.08	74.3
Approach		74	12.9	0.032	3.8	NA	0.1	1.1	0.06	0.32	0.06	83.0
East: Wamboyne Road												
4	L2	9	44.4	0.008	9.1	LOS A	0.0	0.3	0.07	0.63	0.07	60.5
6	R2	1	0.0	0.008	7.9	LOS A	0.0	0.3	0.07	0.63	0.07	73.8
Approach		11	40.0	0.008	8.9	LOS A	0.0	0.3	0.07	0.63	0.07	61.6
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.010	7.8	LOS A	0.0	0.0	0.00	0.04	0.00	87.6
8	T1	18	11.8	0.010	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	98.7
Approach		19	11.1	0.010	0.4	NA	0.0	0.0	0.00	0.04	0.00	98.0
All Vehicles		103	15.3	0.032	3.7	NA	0.1	1.1	0.05	0.30	0.05	82.4

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Ex Wamboyne Rd/Girral Rd/Blow Clear Rd 6-7am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.022	7.9	LOS A	0.1	0.8	0.05	0.63	0.05	75.1
2	T1	1	0.0	0.022	0.0	LOS A	0.1	0.8	0.05	0.63	0.05	83.2
3	R2	36	8.8	0.022	7.7	LOS A	0.1	0.8	0.05	0.63	0.05	71.4
Approach		38	8.3	0.022	7.5	NA	0.1	0.8	0.05	0.63	0.05	71.7
East: Blow Clear Road												
4	L2	9	44.4	0.011	9.0	LOS A	0.0	0.4	0.01	0.66	0.01	60.9
5	T1	1	0.0	0.011	6.8	LOS A	0.0	0.4	0.01	0.66	0.01	74.5
6	R2	3	0.0	0.011	7.6	LOS A	0.0	0.4	0.01	0.66	0.01	74.5
Approach		14	30.8	0.011	8.5	LOS A	0.0	0.4	0.01	0.66	0.01	64.5
North: Wamboyne Road												
7	L2	7	14.3	0.005	8.2	LOS A	0.0	0.1	0.01	0.59	0.01	70.8
8	T1	1	0.0	0.005	0.0	LOS A	0.0	0.1	0.01	0.59	0.01	84.3
9	R2	1	0.0	0.005	7.4	LOS A	0.0	0.1	0.01	0.59	0.01	75.7
Approach		9	11.1	0.005	7.2	NA	0.0	0.1	0.01	0.59	0.01	72.6
West: Girral Road												
10	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		64	13.1	0.022	7.6	NA	0.1	0.8	0.03	0.63	0.03	70.4

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.16	0.60	0.16	75.2
2	T1	1	0.0	0.003	7.0	LOS A	0.0	0.1	0.16	0.60	0.16	70.1
3	R2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.16	0.60	0.16	74.6
Approach		3	0.0	0.003	7.6	LOS A	0.0	0.1	0.16	0.60	0.16	73.2
East: Mine Access Road												
4	L2	1	0.0	0.040	7.9	LOS A	0.1	0.6	0.03	0.10	0.03	86.5
5	T1	58	10.9	0.040	0.0	LOS A	0.1	0.6	0.03	0.10	0.03	97.4
6	R2	9	44.4	0.040	8.7	LOS A	0.1	0.6	0.03	0.10	0.03	61.5
Approach		68	15.4	0.040	1.3	NA	0.1	0.6	0.03	0.10	0.03	89.9
North: Lake Cowal Road												
7	L2	2	50.0	0.004	7.9	LOS A	0.0	0.1	0.09	0.60	0.09	56.1
8	T1	1	0.0	0.004	6.0	LOS A	0.0	0.1	0.09	0.60	0.09	69.2
9	R2	1	0.0	0.004	7.0	LOS A	0.0	0.1	0.09	0.60	0.09	69.2
Approach		4	25.0	0.004	7.2	LOS A	0.0	0.1	0.09	0.60	0.09	61.9
West: Bonehams Lane												
10	L2	1	0.0	0.013	7.9	LOS A	0.0	0.1	0.02	0.06	0.02	71.2
11	T1	20	21.1	0.013	0.0	LOS A	0.0	0.1	0.02	0.06	0.02	97.3
12	R2	1	0.0	0.013	7.6	LOS A	0.0	0.1	0.02	0.06	0.02	86.1
Approach		22	19.0	0.013	0.7	NA	0.0	0.1	0.02	0.06	0.02	95.1
All Vehicles		98	16.1	0.040	1.7	NA	0.1	0.6	0.04	0.13	0.04	88.6

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	38	2.8	0.023	0.0	LOS A	0.1	0.7	0.05	0.16	0.05	95.4
3	R2	16	26.7	0.023	8.2	LOS A	0.1	0.7	0.08	0.27	0.08	70.9
Approach		54	9.8	0.023	2.4	NA	0.1	0.7	0.05	0.19	0.05	86.6
East: Wamboyne Road												
4	L2	49	14.9	0.034	8.3	LOS A	0.1	1.1	0.09	0.62	0.09	68.8
6	R2	1	0.0	0.034	7.8	LOS A	0.1	1.1	0.09	0.62	0.09	73.7
Approach		51	14.6	0.034	8.3	LOS A	0.1	1.1	0.09	0.62	0.09	68.9
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.014	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.1
8	T1	25	0.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		26	0.0	0.014	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.7
All Vehicles		131	9.7	0.034	4.3	NA	0.1	1.1	0.06	0.33	0.06	80.6

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Ex Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.011	7.9	LOS A	0.1	0.4	0.04	0.62	0.04	75.7
2	T1	1	0.0	0.011	0.0	LOS A	0.1	0.4	0.04	0.62	0.04	83.9
3	R2	16	26.7	0.011	8.2	LOS A	0.1	0.4	0.04	0.62	0.04	65.7
Approach		18	23.5	0.011	7.7	NA	0.1	0.4	0.04	0.62	0.04	67.1
East: Blow Clear Road												
4	L2	49	14.9	0.039	8.2	LOS A	0.2	1.2	0.01	0.66	0.01	69.3
5	T1	1	0.0	0.039	6.7	LOS A	0.2	1.2	0.01	0.66	0.01	74.3
6	R2	5	20.0	0.039	8.1	LOS A	0.2	1.2	0.01	0.66	0.01	67.0
Approach		56	15.1	0.039	8.2	LOS A	0.2	1.2	0.01	0.66	0.01	69.1
North: Wamboyne Road												
7	L2	3	66.7	0.003	9.6	LOS A	0.0	0.1	0.01	0.53	0.01	57.9
8	T1	1	0.0	0.003	0.0	LOS A	0.0	0.1	0.01	0.53	0.01	87.7
9	R2	1	0.0	0.003	7.4	LOS A	0.0	0.1	0.01	0.53	0.01	78.5
Approach		5	40.0	0.003	7.2	NA	0.0	0.1	0.01	0.53	0.01	65.8
West: Girral Road												
10	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0.0	0.002	6.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0.0	0.002	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		82	17.9	0.039	8.0	NA	0.2	1.2	0.01	0.64	0.01	68.7

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex Wamboyne Rd/Girral Rd/Blow Clear Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.01	0.45	0.01	79.7
2	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.01	0.45	0.01	87.6
3	R2	1	0.0	0.002	7.4	LOS A	0.0	0.0	0.01	0.45	0.01	79.1
Approach		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	39	21.6	0.028	8.4	LOS A	0.1	0.9	0.01	0.65	0.01	67.1
5	T1	1	0.0	0.028	6.7	LOS A	0.1	0.9	0.01	0.65	0.01	74.2
6	R2	1	0.0	0.028	7.4	LOS A	0.1	0.9	0.01	0.65	0.01	74.2
Approach		41	20.5	0.028	8.3	LOS A	0.1	0.9	0.01	0.65	0.01	67.4
North: Wamboyne Road												
7	L2	1	0.0	0.004	7.8	LOS A	0.0	0.2	0.02	0.56	0.02	77.8
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.02	0.56	0.02	86.4
9	R2	4	50.0	0.004	8.8	LOS A	0.0	0.2	0.02	0.56	0.02	60.3
Approach		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	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.65	0.01	76.0
11	T1	1	0.0	0.002	6.7	LOS A	0.0	0.1	0.01	0.65	0.01	76.0
12	R2	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.01	0.65	0.01	75.5
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.65	0.01	75.8
All Vehicles		54	19.6	0.028	7.9	NA	0.1	0.9	0.01	0.63	0.01	68.4

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex Mine Access Rd/Bonehams Ln/Lake Cowal Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.002	7.9	LOS A	0.0	0.1	0.10	0.61	0.10	75.5
2	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.10	0.61	0.10	70.3
3	R2	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.10	0.61	0.10	75.0
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.10	0.61	0.10	73.5
East: Mine Access Road												
4	L2	1	0.0	0.021	7.8	LOS A	0.0	0.2	0.00	0.08	0.00	86.9
5	T1	32	16.7	0.021	0.0	LOS A	0.0	0.2	0.00	0.08	0.00	97.8
6	R2	3	33.3	0.021	8.3	LOS A	0.0	0.2	0.00	0.08	0.00	65.4
Approach		36	17.6	0.021	1.0	NA	0.0	0.2	0.00	0.08	0.00	93.3
North: Lake Cowal Road												
7	L2	1	0.0	0.002	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.4
8	T1	1	0.0	0.002	5.8	LOS A	0.0	0.1	0.01	0.63	0.01	70.5
9	R2	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.01	0.63	0.01	70.0
Approach		3	0.0	0.002	6.5	LOS A	0.0	0.1	0.01	0.63	0.01	70.3
West: Bonehams Lane												
10	L2	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.08	0.42	0.08	65.6
11	T1	1	0.0	0.002	0.1	LOS A	0.0	0.0	0.08	0.42	0.08	87.1
12	R2	1	0.0	0.002	7.5	LOS A	0.0	0.0	0.08	0.42	0.08	78.6
Approach		3	0.0	0.002	5.1	NA	0.0	0.0	0.08	0.42	0.08	76.0
All Vehicles		45	14.0	0.021	2.1	NA	0.0	0.2	0.02	0.18	0.02	88.3

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Ex W Wyalong Condoblin Rd/Ungarie Rd/Wamboyne Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	26	16.0	0.012	0.0	LOS A	0.0	0.0	0.01	0.03	0.01	99.0
3	R2	1	0.0	0.012	7.5	LOS A	0.0	0.0	0.01	0.04	0.01	87.1
Approach		27	15.4	0.012	0.3	NA	0.0	0.0	0.01	0.03	0.01	98.5
East: Wamboyne Road												
4	L2	41	20.5	0.031	8.4	LOS A	0.1	1.1	0.08	0.63	0.08	67.0
6	R2	2	100.0	0.031	9.4	LOS A	0.1	1.1	0.08	0.63	0.08	58.1
Approach		43	24.4	0.031	8.5	LOS A	0.1	1.1	0.08	0.63	0.08	66.5
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.012	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.0
8	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		24	0.0	0.012	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.6
All Vehicles		95	15.6	0.031	4.0	NA	0.1	1.1	0.04	0.30	0.04	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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Baseline.sip8



Appendix C

Forecast Construction - intersection performance



MOVEMENT SUMMARY

▽ Site: 101 [Construction W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	v/c	sec		veh				km/h	
South: Ungarie Road												
2	T1	1	100.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
3	R2	136	14.7	0.082	6.7	LOS A	0.4	3.1	0.06	0.61	0.06	57.7
Approach		137	15.4	0.082	6.6	NA	0.4	3.1	0.06	0.61	0.06	57.9
East: Wamboyno Road												
4	L2	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.04	0.65	0.04	75.0
6	R2	1	0.0	0.002	8.2	LOS A	0.0	0.0	0.04	0.65	0.04	74.5
Approach		2	0.0	0.002	8.0	LOS A	0.0	0.0	0.04	0.65	0.04	74.7
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.07	0.00	86.6
8	T1	9	22.2	0.006	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	97.4
Approach		11	20.0	0.006	0.8	NA	0.0	0.0	0.00	0.07	0.00	96.2
All Vehicles		149	15.5	0.082	6.2	NA	0.4	3.1	0.06	0.57	0.06	59.8

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Construction.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Construction Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	5	0.0	0.083	7.9	LOS A	0.4	3.1	0.04	0.62	0.04	68.0
2	T1	1	0.0	0.083	0.0	LOS A	0.4	3.1	0.04	0.62	0.04	74.5
3	R2	132	15.2	0.083	6.6	LOS A	0.4	3.1	0.04	0.62	0.04	57.5
Approach		138	14.5	0.083	6.6	NA	0.4	3.1	0.04	0.62	0.04	58.0
East: Blow Clear Road												
4	L2	1	0.0	0.004	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
5	T1	1	0.0	0.004	7.2	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
6	R2	2	0.0	0.004	8.0	LOS A	0.0	0.1	0.01	0.66	0.01	74.8
Approach		4	0.0	0.004	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.1
North: Wamboyne Road												
7	L2	3	100.0	0.004	9.1	LOS A	0.0	0.1	0.02	0.58	0.02	60.9
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.02	0.58	0.02	85.4
9	R2	1	0.0	0.004	7.4	LOS A	0.0	0.1	0.02	0.58	0.02	76.6
Approach		5	60.0	0.004	7.8	NA	0.0	0.1	0.02	0.58	0.02	67.5
West: Girral Road												
10	L2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.5
11	T1	1	0.0	0.003	7.2	LOS A	0.0	0.1	0.01	0.66	0.01	75.5
12	R2	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.01	0.66	0.01	75.0
Approach		3	0.0	0.003	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
All Vehicles		151	15.4	0.083	6.7	NA	0.4	3.1	0.04	0.62	0.04	58.9

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Construction Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.4
2	T1	1	0.0	0.003	7.2	LOS A	0.0	0.1	0.02	0.65	0.02	70.3
3	R2	1	0.0	0.003	8.2	LOS A	0.0	0.1	0.02	0.65	0.02	74.9
Approach		3	0.0	0.003	7.7	LOS A	0.0	0.1	0.02	0.65	0.02	73.5
East: Mine Access Road												
4	L2	1	0.0	0.004	8.5	LOS A	0.0	0.1	0.19	0.30	0.19	80.9
5	T1	3	0.0	0.004	0.4	LOS A	0.0	0.1	0.19	0.30	0.19	90.3
6	R2	1	100.0	0.004	9.7	LOS A	0.0	0.1	0.19	0.30	0.19	57.0
Approach		5	20.0	0.004	4.8	NA	0.0	0.1	0.19	0.30	0.19	79.2
North: Lake Cowal Road												
7	L2	28	22.2	0.024	6.8	LOS A	0.1	0.8	0.25	0.56	0.25	51.9
8	T1	1	0.0	0.024	6.3	LOS A	0.1	0.8	0.25	0.56	0.25	63.2
9	R2	1	0.0	0.024	7.3	LOS A	0.1	0.8	0.25	0.56	0.25	63.1
Approach		31	20.7	0.024	6.8	LOS A	0.1	0.8	0.25	0.56	0.25	52.6
West: Bonehams Lane												
10	L2	1	0.0	0.077	7.8	LOS A	0.0	0.1	0.00	0.09	0.00	64.6
11	T1	134	16.5	0.077	0.4	LOS A	0.0	0.1	0.00	0.09	0.00	74.7
12	R2	1	0.0	0.077	7.4	LOS A	0.0	0.1	0.00	0.09	0.00	76.5
Approach		136	16.3	0.077	0.5	NA	0.0	0.1	0.00	0.09	0.00	74.6
All Vehicles		175	16.9	0.077	1.8	NA	0.1	0.8	0.05	0.18	0.05	69.6

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Construction W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	26	16.0	0.012	0.0	LOS A	0.0	0.0	0.01	0.03	0.01	99.0
3	R2	1	0.0	0.012	7.5	LOS A	0.0	0.0	0.01	0.04	0.01	87.1
Approach		27	15.4	0.012	0.3	NA	0.0	0.0	0.01	0.03	0.01	98.5
East: Wamboyno Road												
4	L2	125	16.8	0.088	6.9	LOS A	0.4	3.0	0.09	0.58	0.09	56.3
6	R2	2	100.0	0.088	9.4	LOS A	0.4	3.0	0.09	0.58	0.09	53.4
Approach		127	18.2	0.088	7.0	LOS A	0.4	3.0	0.09	0.58	0.09	56.2
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.012	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.0
8	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		24	0.0	0.012	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.6
All Vehicles		179	15.3	0.088	5.0	NA	0.4	3.0	0.06	0.42	0.06	64.1

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Construction.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Construction Wamboyne Rd/Girral Rd/Blow Clear Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.01	0.45	0.01	79.7
2	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.01	0.45	0.01	87.6
3	R2	1	0.0	0.002	7.4	LOS A	0.0	0.0	0.01	0.45	0.01	79.1
Approach		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	123	17.1	0.084	6.8	LOS A	0.4	2.8	0.01	0.61	0.01	56.2
5	T1	1	0.0	0.084	6.7	LOS A	0.4	2.8	0.01	0.61	0.01	66.7
6	R2	1	0.0	0.084	7.4	LOS A	0.4	2.8	0.01	0.61	0.01	66.6
Approach		125	16.8	0.084	6.8	LOS A	0.4	2.8	0.01	0.61	0.01	56.3
North: Wamboyne Road												
7	L2	1	0.0	0.004	7.8	LOS A	0.0	0.2	0.02	0.56	0.02	77.8
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.02	0.56	0.02	86.4
9	R2	4	50.0	0.004	8.8	LOS A	0.0	0.2	0.02	0.56	0.02	60.3
Approach		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	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
11	T1	1	0.0	0.003	6.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
12	R2	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.01	0.66	0.01	75.2
Approach		3	0.0	0.003	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.6
All Vehicles		138	16.8	0.084	6.8	NA	0.4	2.8	0.01	0.60	0.01	57.5

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Construction Mine Access Rd/Bonehams Ln/Lake Cowal Rd 6-7pm]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	8.2	LOS A	0.0	0.1	0.23	0.59	0.23	74.8
2	T1	1	0.0	0.003	7.2	LOS A	0.0	0.1	0.23	0.59	0.23	69.7
3	R2	1	0.0	0.003	8.1	LOS A	0.0	0.1	0.23	0.59	0.23	74.3
Approach		3	0.0	0.003	7.8	LOS A	0.0	0.1	0.23	0.59	0.23	72.8
East: Mine Access Road												
4	L2	1	0.0	0.082	7.8	LOS A	0.2	1.3	0.01	0.13	0.01	72.8
5	T1	116	15.5	0.082	0.1	LOS A	0.2	1.3	0.01	0.13	0.01	69.1
6	R2	24	21.7	0.082	6.1	LOS A	0.2	1.3	0.01	0.13	0.01	60.3
Approach		141	16.4	0.082	1.2	NA	0.2	1.3	0.01	0.13	0.01	67.4
North: Lake Cowal Road												
7	L2	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.0
8	T1	1	0.0	0.003	6.2	LOS A	0.0	0.1	0.01	0.63	0.01	70.1
9	R2	1	0.0	0.003	7.3	LOS A	0.0	0.1	0.01	0.63	0.01	69.6
Approach		3	0.0	0.003	6.8	LOS A	0.0	0.1	0.01	0.63	0.01	69.9
West: Bonehams Lane												
10	L2	1	0.0	0.002	8.1	LOS A	0.0	0.0	0.17	0.39	0.17	65.1
11	T1	1	0.0	0.002	0.2	LOS A	0.0	0.0	0.17	0.39	0.17	86.2
12	R2	1	0.0	0.002	7.7	LOS A	0.0	0.0	0.17	0.39	0.17	78.0
Approach		3	0.0	0.002	5.3	NA	0.0	0.0	0.17	0.39	0.17	75.4
All Vehicles		151	15.4	0.082	1.5	NA	0.2	1.3	0.02	0.15	0.02	67.7

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Appendix D

Title for appendix goes here



MOVEMENT SUMMARY

▽ Site: 101 [Operations W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	1	100.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
3	R2	69	13.6	0.042	7.4	LOS A	0.2	1.5	0.06	0.64	0.06	65.0
Approach		71	14.9	0.042	7.3	NA	0.2	1.5	0.06	0.63	0.06	65.4
East: Wamboyne Road												
4	L2	1	0.0	0.002	7.9	LOS A	0.0	0.0	0.05	0.64	0.05	75.3
6	R2	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.05	0.64	0.05	74.8
Approach		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	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.07	0.00	86.6
8	T1	9	22.2	0.006	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	97.4
Approach		11	20.0	0.006	0.8	NA	0.0	0.0	0.00	0.07	0.00	96.2
All Vehicles		83	15.2	0.042	6.5	NA	0.2	1.5	0.05	0.56	0.05	68.4

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Operation.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Operations Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	5	0.0	0.043	7.9	LOS A	0.2	1.6	0.04	0.63	0.04	72.5
2	T1	1	0.0	0.043	0.0	LOS A	0.2	1.6	0.04	0.63	0.04	79.9
3	R2	65	14.5	0.043	7.4	LOS A	0.2	1.6	0.04	0.63	0.04	64.8
Approach		72	13.2	0.043	7.3	NA	0.2	1.6	0.04	0.63	0.04	65.5
East: Blow Clear Road												
4	L2	1	0.0	0.004	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
5	T1	1	0.0	0.004	6.9	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
6	R2	2	0.0	0.004	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.2
Approach		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	100.0	0.004	9.1	LOS A	0.0	0.1	0.02	0.58	0.02	60.9
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.1	0.02	0.58	0.02	85.4
9	R2	1	0.0	0.004	7.4	LOS A	0.0	0.1	0.02	0.58	0.02	76.6
Approach		5	60.0	0.004	7.8	NA	0.0	0.1	0.02	0.58	0.02	67.5
West: Girral Road												
10	L2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
11	T1	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
12	R2	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		3	0.0	0.003	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.6
All Vehicles		84	15.0	0.043	7.3	NA	0.2	1.6	0.03	0.63	0.03	66.4

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.7
2	T1	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.02	0.65	0.02	70.6
3	R2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.02	0.65	0.02	75.2
Approach		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	0.0	0.003	8.1	LOS A	0.0	0.1	0.13	0.31	0.13	81.4
5	T1	3	0.0	0.003	0.2	LOS A	0.0	0.1	0.13	0.31	0.13	90.9
6	R2	1	100.0	0.003	9.2	LOS A	0.0	0.1	0.13	0.31	0.13	57.3
Approach		5	20.0	0.003	4.5	NA	0.0	0.1	0.13	0.31	0.13	79.7
North: Lake Cowal Road												
7	L2	16	26.7	0.014	6.9	LOS A	0.1	0.4	0.17	0.56	0.17	54.3
8	T1	1	0.0	0.014	6.0	LOS A	0.1	0.4	0.17	0.56	0.17	65.2
9	R2	1	0.0	0.014	7.0	LOS A	0.1	0.4	0.17	0.56	0.17	65.2
Approach		18	23.5	0.014	6.9	LOS A	0.1	0.4	0.17	0.56	0.17	55.4
West: Bonehams Lane												
10	L2	1	0.0	0.040	7.8	LOS A	0.0	0.1	0.00	0.14	0.00	69.3
11	T1	67	17.2	0.040	0.7	LOS A	0.0	0.1	0.00	0.14	0.00	88.8
12	R2	1	0.0	0.040	7.4	LOS A	0.0	0.1	0.00	0.14	0.00	83.2
Approach		69	16.7	0.040	0.9	NA	0.0	0.1	0.00	0.14	0.00	88.3
All Vehicles		96	17.6	0.040	2.4	NA	0.1	0.4	0.04	0.25	0.04	78.6

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 6-7am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	38	16.7	0.032	0.0	LOS A	0.1	1.1	0.04	0.21	0.04	93.2
3	R2	36	8.8	0.032	7.7	LOS A	0.1	1.1	0.08	0.43	0.08	74.3
Approach		74	12.9	0.032	3.8	NA	0.1	1.1	0.06	0.32	0.06	83.0
East: Wamboyno Road												
4	L2	27	23.1	0.020	7.0	LOS A	0.1	0.7	0.07	0.59	0.07	54.3
6	R2	1	0.0	0.020	7.9	LOS A	0.1	0.7	0.07	0.59	0.07	66.9
Approach		28	22.2	0.020	7.1	LOS A	0.1	0.7	0.07	0.59	0.07	54.7
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.010	7.8	LOS A	0.0	0.0	0.00	0.04	0.00	87.6
8	T1	18	11.8	0.010	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	98.7
Approach		19	11.1	0.010	0.4	NA	0.0	0.0	0.00	0.04	0.00	98.0
All Vehicles		121	14.8	0.032	4.0	NA	0.1	1.1	0.05	0.34	0.05	75.6

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Operation.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Operations Wamboyne Rd/Girral Rd/Blow Clear Rd 6-7am]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.022	7.9	LOS A	0.1	0.8	0.05	0.63	0.05	75.1
2	T1	1	0.0	0.022	0.0	LOS A	0.1	0.8	0.05	0.63	0.05	83.2
3	R2	36	8.8	0.022	7.7	LOS A	0.1	0.8	0.05	0.63	0.05	71.4
Approach		38	8.3	0.022	7.5	NA	0.1	0.8	0.05	0.63	0.05	71.7
East: Blow Clear Road												
4	L2	27	23.1	0.022	7.0	LOS A	0.1	0.7	0.01	0.62	0.01	55.1
5	T1	1	0.0	0.022	6.8	LOS A	0.1	0.7	0.01	0.62	0.01	68.2
6	R2	3	0.0	0.022	7.6	LOS A	0.1	0.7	0.01	0.62	0.01	68.1
Approach		32	20.0	0.022	7.0	LOS A	0.1	0.7	0.01	0.62	0.01	56.6
North: Wamboyne Road												
7	L2	7	14.3	0.005	8.2	LOS A	0.0	0.1	0.01	0.59	0.01	70.8
8	T1	1	0.0	0.005	0.0	LOS A	0.0	0.1	0.01	0.59	0.01	84.3
9	R2	1	0.0	0.005	7.4	LOS A	0.0	0.1	0.01	0.59	0.01	75.7
Approach		9	11.1	0.005	7.2	NA	0.0	0.1	0.01	0.59	0.01	72.6
West: Girral Road												
10	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0.0	0.002	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		82	12.8	0.022	7.3	NA	0.1	0.8	0.03	0.62	0.03	65.2

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Operations Mine Access Rd/Bonehams Ln/Lake Cowal Rd 6-7am]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	7.9	LOS A	0.0	0.1	0.13	0.61	0.13	75.3
2	T1	1	0.0	0.003	7.0	LOS A	0.0	0.1	0.13	0.61	0.13	70.2
3	R2	1	0.0	0.003	7.8	LOS A	0.0	0.1	0.13	0.61	0.13	74.8
Approach		3	0.0	0.003	7.6	LOS A	0.0	0.1	0.13	0.61	0.13	73.4
East: Mine Access Road												
4	L2	1	0.0	0.026	8.0	LOS A	0.1	0.5	0.07	0.29	0.07	74.4
5	T1	33	16.1	0.026	1.2	LOS A	0.1	0.5	0.07	0.29	0.07	73.8
6	R2	9	22.2	0.026	6.2	LOS A	0.1	0.5	0.07	0.29	0.07	61.6
Approach		43	17.1	0.026	2.5	NA	0.1	0.5	0.07	0.29	0.07	70.7
North: Lake Cowal Road												
7	L2	11	20.0	0.009	7.5	LOS A	0.0	0.3	0.13	0.59	0.13	62.8
8	T1	1	0.0	0.009	6.0	LOS A	0.0	0.3	0.13	0.59	0.13	68.5
9	R2	1	0.0	0.009	7.0	LOS A	0.0	0.3	0.13	0.59	0.13	68.5
Approach		13	16.7	0.009	7.3	LOS A	0.0	0.3	0.13	0.59	0.13	63.7
West: Bonehams Lane												
10	L2	1	0.0	0.026	7.9	LOS A	0.0	0.1	0.01	0.03	0.01	72.1
11	T1	46	6.8	0.026	0.0	LOS A	0.0	0.1	0.01	0.03	0.01	98.9
12	R2	1	0.0	0.026	7.5	LOS A	0.0	0.1	0.01	0.03	0.01	87.3
Approach		48	6.5	0.026	0.3	NA	0.0	0.1	0.01	0.03	0.01	97.9
All Vehicles		107	11.8	0.026	2.2	NA	0.1	0.5	0.05	0.22	0.05	79.7

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	38	2.8	0.031	0.0	LOS A	0.1	1.1	0.04	0.19	0.04	91.3
3	R2	34	18.8	0.031	7.0	LOS A	0.1	1.1	0.09	0.41	0.09	62.0
Approach		72	10.3	0.031	3.3	NA	0.1	1.1	0.07	0.29	0.07	74.7
East: Wamboyno Road												
4	L2	49	14.9	0.034	8.3	LOS A	0.1	1.1	0.09	0.62	0.09	68.8
6	R2	1	0.0	0.034	7.9	LOS A	0.1	1.1	0.09	0.62	0.09	73.7
Approach		51	14.6	0.034	8.3	LOS A	0.1	1.1	0.09	0.62	0.09	68.9
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.014	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.1
8	T1	25	0.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		26	0.0	0.014	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.7
All Vehicles		148	9.9	0.034	4.5	NA	0.1	1.1	0.06	0.36	0.06	75.8

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Operation.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Operations Wamboyne Rd/Girral Rd/Blow Clear Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.022	7.9	LOS A	0.1	0.8	0.04	0.61	0.04	69.8
2	T1	1	0.0	0.022	0.0	LOS A	0.1	0.8	0.04	0.61	0.04	76.6
3	R2	34	18.8	0.022	6.9	LOS A	0.1	0.8	0.04	0.61	0.04	58.4
Approach		36	17.6	0.022	6.8	NA	0.1	0.8	0.04	0.61	0.04	59.1
East: Blow Clear Road												
4	L2	49	14.9	0.039	8.2	LOS A	0.2	1.2	0.01	0.66	0.01	69.3
5	T1	1	0.0	0.039	6.8	LOS A	0.2	1.2	0.01	0.66	0.01	74.3
6	R2	5	20.0	0.039	8.2	LOS A	0.2	1.2	0.01	0.66	0.01	67.0
Approach		56	15.1	0.039	8.2	LOS A	0.2	1.2	0.01	0.66	0.01	69.1
North: Wamboyne Road												
7	L2	3	66.7	0.003	9.6	LOS A	0.0	0.1	0.01	0.53	0.01	57.9
8	T1	1	0.0	0.003	0.0	LOS A	0.0	0.1	0.01	0.53	0.01	87.7
9	R2	1	0.0	0.003	7.4	LOS A	0.0	0.1	0.01	0.53	0.01	78.5
Approach		5	40.0	0.003	7.2	NA	0.0	0.1	0.01	0.53	0.01	65.8
West: Girral Road												
10	L2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
11	T1	1	0.0	0.002	6.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
12	R2	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.3
Approach		3	0.0	0.002	7.5	LOS A	0.0	0.1	0.01	0.66	0.01	75.7
All Vehicles		100	16.8	0.039	7.6	NA	0.2	1.2	0.02	0.63	0.02	65.2

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations Mine Access Rd/Bonehams Ln/Lake Cowal Rd 5-6pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.17	0.60	0.17	75.1
2	T1	1	0.0	0.003	7.0	LOS A	0.0	0.1	0.17	0.60	0.17	70.0
3	R2	1	0.0	0.003	7.9	LOS A	0.0	0.1	0.17	0.60	0.17	74.6
Approach		3	0.0	0.003	7.6	LOS A	0.0	0.1	0.17	0.60	0.17	73.2
East: Mine Access Road												
4	L2	1	0.0	0.040	8.0	LOS A	0.1	0.6	0.05	0.10	0.05	86.4
5	T1	58	10.9	0.040	0.0	LOS A	0.1	0.6	0.05	0.10	0.05	97.2
6	R2	9	44.4	0.040	8.8	LOS A	0.1	0.6	0.05	0.10	0.05	61.4
Approach		68	15.4	0.040	1.4	NA	0.1	0.6	0.05	0.10	0.05	89.8
North: Lake Cowal Road												
7	L2	11	30.0	0.010	6.4	LOS A	0.0	0.3	0.12	0.56	0.12	49.9
8	T1	1	0.0	0.010	6.1	LOS A	0.0	0.3	0.12	0.56	0.12	64.1
9	R2	1	0.0	0.010	7.1	LOS A	0.0	0.3	0.12	0.56	0.12	64.1
Approach		13	25.0	0.010	6.4	LOS A	0.0	0.3	0.12	0.56	0.12	51.8
West: Bonehams Lane												
10	L2	1	0.0	0.023	7.9	LOS A	0.0	0.1	0.01	0.22	0.01	66.5
11	T1	38	16.7	0.023	1.1	LOS A	0.0	0.1	0.01	0.22	0.01	80.4
12	R2	1	0.0	0.023	7.6	LOS A	0.0	0.1	0.01	0.22	0.01	79.3
Approach		40	15.8	0.023	1.5	NA	0.0	0.1	0.01	0.22	0.01	80.0
All Vehicles		124	16.1	0.040	2.1	NA	0.1	0.6	0.04	0.20	0.04	80.1

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations W Wyalong Condoblin Rd/Ungarie Rd/Wamboyno Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ungarie Road												
2	T1	26	16.0	0.012	0.0	LOS A	0.0	0.0	0.01	0.03	0.01	99.0
3	R2	1	0.0	0.012	7.5	LOS A	0.0	0.0	0.01	0.04	0.01	87.1
Approach		27	15.4	0.012	0.3	NA	0.0	0.0	0.01	0.03	0.01	98.5
East: Wamboyno Road												
4	L2	59	17.9	0.043	7.8	LOS A	0.2	1.4	0.08	0.61	0.08	62.9
6	R2	2	100.0	0.043	9.4	LOS A	0.2	1.4	0.08	0.61	0.08	56.3
Approach		61	20.7	0.043	7.9	LOS A	0.2	1.4	0.08	0.61	0.08	62.7
North: West Wyalong Condoblin Road												
7	L2	1	0.0	0.012	7.8	LOS A	0.0	0.0	0.00	0.03	0.00	89.0
8	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	99.1
Approach		24	0.0	0.012	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.6
All Vehicles		113	15.0	0.043	4.4	NA	0.2	1.4	0.05	0.34	0.05	75.2

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: T:\Jobs\2019\J190140 - Cowal Operations Underground EIS\Technical studies\Transport\SIDRA Results\Operation.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Operations Wamboyne Rd/Girral Rd/Blow Clear Rd 6-7pm]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wamboyne Road												
1	L2	1	0.0	0.002	7.8	LOS A	0.0	0.0	0.01	0.45	0.01	79.7
2	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.01	0.45	0.01	87.6
3	R2	1	0.0	0.002	7.4	LOS A	0.0	0.0	0.01	0.45	0.01	79.1
Approach		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	57	18.5	0.040	7.7	LOS A	0.2	1.3	0.01	0.64	0.01	62.8
5	T1	1	0.0	0.040	6.7	LOS A	0.2	1.3	0.01	0.64	0.01	71.2
6	R2	1	0.0	0.040	7.4	LOS A	0.2	1.3	0.01	0.64	0.01	71.2
Approach		59	17.9	0.040	7.7	LOS A	0.2	1.3	0.01	0.64	0.01	63.1
North: Wamboyne Road												
7	L2	1	0.0	0.004	7.8	LOS A	0.0	0.2	0.02	0.56	0.02	77.8
8	T1	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.02	0.56	0.02	86.4
9	R2	4	50.0	0.004	8.8	LOS A	0.0	0.2	0.02	0.56	0.02	60.3
Approach		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	0.0	0.002	7.8	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
11	T1	1	0.0	0.002	6.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.9
12	R2	1	0.0	0.002	7.7	LOS A	0.0	0.1	0.01	0.66	0.01	75.4
Approach		3	0.0	0.002	7.4	LOS A	0.0	0.1	0.01	0.66	0.01	75.8
All Vehicles		72	17.6	0.040	7.5	NA	0.2	1.3	0.01	0.62	0.01	64.5

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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 [Operations Mine Access Rd/Bonehams Ln/Lake Cowal Rd 6-7pm]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lake Cowal Road												
1	L2	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.14	0.60	0.14	75.3
2	T1	1	0.0	0.003	6.9	LOS A	0.0	0.1	0.14	0.60	0.14	70.2
3	R2	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.14	0.60	0.14	74.8
Approach		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	0.0	0.036	7.8	LOS A	0.1	0.6	0.01	0.21	0.01	79.0
5	T1	49	14.9	0.036	0.5	LOS A	0.1	0.6	0.01	0.21	0.01	81.9
6	R2	12	27.3	0.036	6.6	LOS A	0.1	0.6	0.01	0.21	0.01	64.7
Approach		62	16.9	0.036	1.8	NA	0.1	0.6	0.01	0.21	0.01	77.9
North: Lake Cowal Road												
7	L2	1	0.0	0.002	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.4
8	T1	1	0.0	0.002	5.9	LOS A	0.0	0.1	0.01	0.63	0.01	70.4
9	R2	1	0.0	0.002	6.9	LOS A	0.0	0.1	0.01	0.63	0.01	69.9
Approach		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	0.0	0.002	7.9	LOS A	0.0	0.0	0.10	0.41	0.10	65.5
11	T1	1	0.0	0.002	0.1	LOS A	0.0	0.0	0.10	0.41	0.10	86.8
12	R2	1	0.0	0.002	7.5	LOS A	0.0	0.0	0.10	0.41	0.10	78.5
Approach		3	0.0	0.002	5.2	NA	0.0	0.0	0.10	0.41	0.10	75.9
All Vehicles		72	14.7	0.036	2.4	NA	0.1	0.6	0.02	0.25	0.02	77.3

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



