APPENDIX 17 Traffic and Transport Report







Mangoola Coal Continued Operations Project Traffic and Transport Report

April 2019

Executive summary

GHD has been engaged by Umwelt Environmental and Social Consultants (Umwelt) on behalf of Mangoola Coal Operations Pty Limited (Mangoola) to complete a Traffic and Transport Impact Assessment (TTIA) for the Mangoola Coal Continued Operations Project (MCCO Project). The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared for the MCCO Project by Umwelt to support an application for development consent under Division 4.1 and 4.7 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The MCCO Project will allow for the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operations. The MCCO Project will extend the life of the existing operation providing for ongoing employment opportunities for the Mangoola workforce.

The intersections of interest for the MCCO Project are:

- Golden Highway / Wybong Road.
- Wybong Road / the Mangoola Coal Mine Access Road.
- Denman Road / Bengalla Road.
- Denman Road / Thomas Mitchell Drive.

The operation of the intersections of interest has been assessed using SIDRA 7.0.

As there is no change proposed to the currently approved maximum rate of production (13.5 Mtpa) or the existing approved operational workforce numbers. The operational traffic volumes are not expected to increase as a result of the MCCO Project. Accordingly, this TTIA has assessed the construction phase of the MCCO Project, as discussed and agreed with Roads and Maritime (see Appendix E).

The MCCO Project construction workforce will peak at approximately 145 workers.

The MCCO Project will result in the impact to a portion of the existing Wybong Post Office Road. Subject to development consent approval timing construction activities, including the realignment portion of Wybong Post Office Road proposed to be realigned, are expected to be finalised by quarter 2, 2022. Wybong Post Office Road currently has a poor quality road surface condition. Further, Wybong Post Office Road intersects Wybong Road at an angle less than 70 degrees, which does not comply with Austroads Design Guidelines.

The realigned section of the road will be constructed in accordance with Austroads Design Guidelines, including two line marked travel lanes and sealed shoulders. Further it will intersect Wybong Road at approximately ninety degrees which will comply with Austroads Design Guidelines.

Analysis indicates that the realignment of Wybong Post Office Road will have a minor impact on travel times and improve the road condition and safety for road users (see Section 4.2).

An assessment of the heavy vehicle activity associated with the MCCO Project indicates the project is expected to generate:

- An average of approximately 31 heavy vehicle movements (inbound and outbound) per day.
- A peak of approximately 70 heavy vehicle movements (inbound and outbound) per day.

This includes heavy vehicle activity associated with 28 tonne gravel trucks, primarily related to internal and external road construction. The majority of gravel is planned to be sourced "internally" from within the Mangoola Coal Mine and prior to the completion of the haul road overpass over Wybong Road and Big Flat Creek gravel required for construction in the MCCO Additional Project Area will be transported via road truck along the existing Mangoola site access road and a section of Wybong Road.

The MCCO Project is expected to generate up to 31 "internal" gravel truck movements per day over the course of the construction period.

The analysis undertaken in this TTIA indicates that the intersection of interest are expected to operate with a good level of service through to the 2022 horizon year accounting for the vehicle activity associated with the construction of the MCCO Project.

This TTIA has found that no road upgrades or changes are required to the regional road network as a result of the MCCO Project. In order to guide traffic management during the construction phase a Construction Traffic Management Plan is recommended to be prepared and implemented.

With regard to transporting product coal from the site the MCCO Project will not result in any changes to the existing approved capacity of up to ten trains per day, however, the MCCO Project will extend the life of the Mangoola Coal Mine by approximately one year beyond that currently approved. The MCCO Project will not result in any additional trains on the Hunter Valley rail network and will continue to operate within the approved capacity.

The productive life of the mine will continue for approximately one further year than is currently approved. This small life extension is not considered likely to result in any significant impact on rail transport capacity as the existing network has adequate capacity for existing mine production and no increases in annual train movements are proposed.

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1. Introduction

GHD has been engaged by Umwelt Environmental and Social Consultants (Umwelt) on behalf of Mangoola Coal Operations Pty Limited (Mangoola) to complete a Traffic and Transport Impact Assessment (TTIA) report for the Mangoola Coal Continued Operations Project (MCCO Project). The purpose of the assessment is to form part of an Environmental Impact Statement (EIS), which is being prepared by Umwelt for the MCCO Project to support an application for development consent under Division 4.1 and 4.7 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

1.1 Project Overview

Mangoola Coal Mine is an open cut coal mine, located approximately 20 kilometres (km) to the west of Muswellbrook and 10 km to the north of Denman in the Upper Hunter Valley of NSW. Mangoola has operated the Mangoola Coal Mine in accordance with Project Approval (PA) 06_0014 since mining commenced at the site in September 2010. The locations of the Mangoola Coal Mine and the adjoining MCCO Project Area is shown in Figure 1-1.

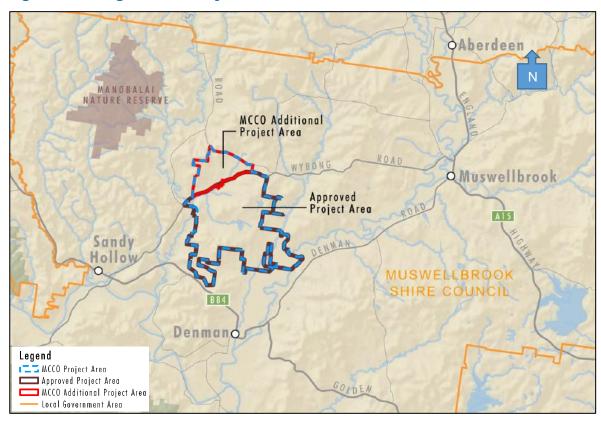


Figure 1-1 - Regional Locality Plan

Source: Umwelt

The MCCO Project will allow for the continuation of mining at Mangoola Coal Mine into a new mining area located immediately to the north of the existing mining operations area. The MCCO Project will extend the life of the existing operation, providing for ongoing employment opportunities for the Mangoola workforce.

The MCCO Project Area includes the existing approved Project Area for Mangoola Coal Mine and the MCCO Additional Project Area as shown on Figure 1.1.

The MCCO Project comprises the following:

- Open cut mining peaking at up to the same rate as that currently approved (13.5 Million tonnes per annum (Mtpa) of run of mine (ROM) coal) using truck and excavator mining methods.
- Continued operations within the existing Mangoola Coal Mine (see Section 4.2).
- Mining operations in a new mining area located north of the existing Mangoola Coal Mine, Wybong Road, south of Ridgelands Road and east of the 500 kV Electricity Transmission Line (ETL).
- Construction of a haul road overpass over Big Flat Creek and Wybong Road to provide access from the existing mine to the proposed additional mining area.
- Establishment of an out-of-pit overburden emplacement area.
- Distribution of overburden between the proposed additional mining area and the existing mine in order to optimise the final landform design of the integrated operation.
- Realignment of a portion of Wybong Post Office Road.
- The use of all existing or approved infrastructure and equipment for the Mangoola Coal Mine with some minor additions to the existing mobile equipment fleet.
- Construction of a water management system to manage sediment laden water runoff, divert clean water catchment, provide flood protection from Big Flat Creek and provide for reticulation of mine water. The water management system will be connected to that of the existing mine.
- Continued ability to discharge excess water in accordance with the Hunter River Salinity Trading Scheme (HRSTS).
- Establishment of a final landform in line with current design standards at Mangoola Coal Mine including use of natural landform design principles consistent with the existing site.
- Rehabilitation of the proposed additional mining area using the same revegetation techniques as at the existing mine.
- A likely (maximum) construction workforce of approximately 145 persons. No change to the existing approved operational workforce is proposed.
- The continued use of the mine access for the existing operational mine and access to/from Wybong Road, Wybong Post Office Road and Ridgelands Road to the MCCO Project Area for construction, emergency services, ongoing operational environmental monitoring and property maintenance.

The key features of the MCCO Project, including the realignment of Wybong Post Office Road are displayed in Figure 1-2.

Proposed New T-Junction of Wybong Post Office Road with Wybong Road /
Big Flat Creek Overpass

Proposed New T-Junction of Wybong Post Office Road with Wybong Road

Approved Mangaala Caal Mine

Approved Mangaala Caal Mine

Approved Mangaala Caal Mine Disturbance Area

MCCO Proposed Topsoil Stockpile Area

Indicative Wybong Post Office Road Realignment

Approved Mangaala Crown Land (ISR) Excluded from MCCO Project Area

MCCO Proposed Topsoil Stockpile Area

MCCO Proposed Mangaala Crown Land (ISR) Excluded from MCCO Project Area

Figure 1-2 – MCCO Key Features

Source: Umwelt

As there is no change proposed to the currently approved maximum rate of production (13.5 Mtpa) or the existing approved operational workforce the operational traffic volumes are not expected to change as a result of the MCCO Project. Accordingly, this TTIA has assessed the construction phase of the MCCO Project.

1.2 Purpose of this Report

The purpose of this report is to quantify the traffic and transport related impacts of the proposed MCCO Project on the adjoining road network. This report will form part of the EIS prepared by Umwelt to support an application for development consent under Division 4.1 and 4.7 of Part 4 of the EP&A Act for the MCCO Project.

1.3 Secretary's Environmental Assessment Requirements

The MCCO Project is declared a State Significant Development as defined under the provisions of the NSW State Environmental Planning Policy (State and Regional Development) 2011.

The Department of Planning and Environment (DPE) has issued the Secretary's Environmental Assessment Requirements (SEARs) for the MCCO Project on 15 February 2019 (replacing a previous version of the SEARs issued on 22 August 2017) which, with regard to traffic and transport require that the EIS must address the following:

- An assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the road and rail networks; and
- A description of the measures that would be implemented to mitigate any impacts, including concept plans of the proposed overpasses and road realignment, developed in consultation with the relevant road authorities.

Also contained within the SEARs are comments received from relevant government agencies. With regard to traffic and transport comments were provided by Roads and Maritime Services (Roads and Maritime) and Muswellbrook Shire Council (MSC). These comments were included as Attachment 2 to the SEARs and have been summarised in Table 1-1 (Roads and Maritime) and Table 1-2 (MSC) along with a reference to where they have been considered and addressed in this report.

Table 1-1 – SEARs Transport and Accessibility (Roads and Maritime)

Comment	Response and where addressed in the report
Assessment of all relevant vehicular traffic routed and intersection for access to / from the subject properties.	The traffic assessment has included SIDRA intersection traffic modelling of the following intersections: Refer to: - Section 4 - Impact Assessment - Section 3.2.3 - Construction Traffic Distribution
Current traffic counts for all traffic routes and intersections	Traffic counts were completed for the intersections of interest and are provided in Section 2.5 - Traffic Surveys The intersection survey outputs are included in Appendix A.
Identification of the anticipated additional vehicular traffic generated from both the construction and operational stages of the project.	An assessment of anticipated additional construction ¹ vehicular traffic has been assessed. Refer to Section 3.2.2 - Construction Traffic.
The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.	Refer to Section 3.2.3 - Construction Traffic Distribution. The expected construction trip distribution for the MCCO Project in diagrammatic form for easy interpretation is included in Appendix B.
Consideration of the traffic impacts on existing and proposed intersections, in	The intersections of Bengalla Road / Denman Road and Wybong Road / Golden Highway have been

¹ The operational traffic volumes are not expected to change as a result of the MCCO Project

Comment Response and where addressed in the report particular, the intersections of the Wybong included in the analysis (refer to Section 4 - Impact Road / Denman Road and Wybong Road / Assessment, SIDRA outputs are included in Appendix Golden Highway, and the capacity of the D). local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area. Identification of the necessary road network Consideration of potential impacts and any required infrastructure upgrades that are required to upgrades or mitigation are included in Section 4 maintain existing levels of service on both Impact Assessment, SIDRA outputs are included in the local and classified road network for the Appendix D). Proposed management measures are development. In this regard, preliminary included in Section 5. concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Roads and Maritime and Council. Traffic analysis of any major / relevant As there will be no change to the operational traffic at intersections impacted, using SIDRA or the Mangoola Coal Mine, a ten year traffic growth similar traffic model, including: projection has been excluded from the scope of works. This approach has been discussed and Current traffic counts and ten year agreed between GHD and Roads and Maritime in traffic growth projections preparing this assessment (refer to correspondence With and without development in Appendix E). scenarios Analysis has been undertaken for the 2022 horizon 95th percentile back of queue length year (when the construction of the MCCO Project is expected to be completed) for the following scenarios: Delays and level of service on all legs of the relevant intersections A "no-build" scenario, accounting for the background traffic growth. Electronic data for Roads and Maritime Review. A "build" scenario accounting for the background traffic volumes and the construction trips associated with the MCCO Project. Refer to Section 4 - Impact Assessment, SIDRA outputs are included in Appendix D. All SIDRA files can be provided to Roads and

Any other impacts on the regional and state road network including consideration of pedestrian, cyclist and public transport facilities and provision for service vehicles.

Refer to Section 4 - Impact Assessment, SIDRA outputs are included in Appendix D.

Maritime and MSC for review.

Table 1-2 – SEARs Comments Provided by MSC

Comme	nt	Response			
	assessment should be undertaken ssesses any changes compared to: The impact of the Construction Project on roads and intersection in Muswellbrook Shire including: - Wybong Road - Bengalla Link Road - Thomas Mitchell Drive - State road network	SIDRA interaction analysis has been undertaken for the following intersections to assess the expected traffic impacts of the construction traffic for the proposal: - Golden Highway / Wybong Road - Wybong Road / the mine access road - Denman Road / Bengalla Road - Denman Road / Thomas Mitchell Drive. Refer to Section 4 - Impact Assessment, SIDRA outputs are included in Appendix D.			
b)	Any impact on emergency access and the use of road in emergency situations	Refer to Section 2.4 - Emergency Vehicle Access.			
c)	Contemplates the management of oversize vehicles.	Refer to Section 4.4 - Oversize Vehicles.			
The traf	fic assessment should:				
a)	Consider the impact on Council's road network with reference to the principles set out in Roads and Maritime's Network Planning Notes	The Traffic and Transport Assessment has been undertaken in accordance with Roads and Maritime Guide to Traffic Generating Developments. Refer to Section 4 - Impact Assessment, SIDRA outputs are included in Appendix D.			
b)	Assess travel distances and times for all major users and routes, including changes resulting from the realignment of Post Office Road	Refer to Section 4.2 - Wybong Post Office Road.			
c)	Include estimates of vehicle mass and equivalent standard axles as well as volume for all road traffic assessment so that pavement life and maintenance impacts can be determined for any additional traffic predicted to result from either the construction or operation of the Continuation Project.	This information is not currently available, but can be provided to Muswellbrook Council and Roads and Maritime at a later time, if required. It is noted that the Project will not result in any increases in operational traffic volumes and will not cause additional pavement impacts beyond the construction of the Project.			
Where any Council local road (Post Office Road) is sought to be closed (including any realignment of a road outside of its reserve), the assessment should include an alternative mine plan and final landform plan in the event that Council does not resolve to		An alternative mine plan has been considered as necessary within the main volume of the MCCO Project EIS. It is not part of this traffic and transport report.			

Comment	Response
close that road in accordance with the Roads Act 1993.	

1.4 Study Limitations and Assumptions

The study limitations and key assumptions applicable to the TTIA include:

- A site inspection was undertaken of the road network in proximity to the MCCO Project (November 2017).
- Intersection modelling using SIDRA 7.0 was completed for the following intersections:
 - Wybong Road / mine access road
 - Golden Highway / Wybong Road
 - Denman Road / Bengalla Road
 - Denman Road / Thomas Mitchell Drive.
- As the operational traffic volumes are not expected to increase following construction of the Project, the TTIA has only been undertaken for the construction phases of the MCCO Project.
- An annual growth rate of 1.5 percent has been applied to the observed 2017 traffic volumes
 to determine the horizon year traffic volumes. This traffic growth rate is considered to be a
 conservative assumption and is consistent with information included in the Muswellbrook
 Mine Affected Roads Stage 1 Road Network Plan.
- In accordance with current conditions of PA 06 0014 for Mangoola Coal Mine, for trip distribution purposes it was assumed that no construction vehicles accessed the Project site via Reedy Creek Road, Mangoola Road, Roxburgh Road or Castlerock Road.
- The construction vehicle traffic estimated to be generated by the MCCO Project has been
 determined based on information provided by the Client in relation to the Project. The data
 indicates that during construction the Project will generate up to 169 trips per hour (see
 Section 3.2).
- The construction phase of the MCCO Project is expected to be completed in a 16 month period prior to the anticipated commencement of mining operations in 2022.
- Intersection analysis was undertaken for the current situation (based on surveys completed in November 2017) and the expected year of completion of the construction of the MCCO Project (2022), using the peak construction vehicle activity.

1.5 Report Structure

The remainder of this report is structured as follows:

- Section 2, Existing Conditions: provides a review of the traffic and transport facilities in proximity to Mangoola Coal Mine and their current operation.
- Section 3, Proposed Development: provides a summary of the operational and construction activity associated with the MCCO Project.
- Section 4, Impact Assessment: quantifies the traffic impacts of the MCCO Project.
- Section 5 Management and Mitigation.

2. Existing Conditions

2.1 Existing Road Network Characteristics

2.1.1 Road Hierarchy

Roads within NSW are categorised in the following two ways:

- By Road Classification.
- By the function that they perform.

Road Classification

Roads are classified (as defined by the *Roads Act 1993*) based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Roads and Maritime to exercise authority of all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways and Transitways.

For management purposes, Roads and Maritime has three administrative classes of roads. These are:

- State Roads Major arterial links through NSW and within major urban areas. They are
 the principle traffic carrying roads and fully controlled by Roads and Maritime with
 maintenance fully funded by Roads and Maritime. State Roads include all Tollways,
 Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- Regional Roads Roads of secondary importance between State Roads and Local Roads which, with State Roads provide the main connections to and between smaller towns and perform a sub-arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though Roads and Maritime funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from Roads and Maritime. Regional Roads may include all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by Roads and Maritime.
- Local Roads The remainder of the council controlled roads. Local Roads are the
 responsibility of councils for maintenance funding. Roads and Maritime may fund some
 maintenance and improvements based on specific programs (e.g. urban bus routes, road
 safety programs). Traffic management on Local Roads is controlled under the delegations
 to local government from Roads and Maritime.

Functional Hierarchy

Functional road hierarchy involves the relative balance of the mobility and access functions of a road. Roads and Maritime define four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

- Arterial Roads generally controlled by Roads and Maritime, typically no limit in flow and designed to carry vehicles long distance between regional centres.
- Sub-Arterial Roads can be managed by either Roads and Maritime or local council.
 Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region, or provide connectivity from arterial road routes (regional links).

- Collector Roads provide connectivity between local roads and the arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- Local Roads provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

A summary of the key roads in proximity to the subject site is provided below.

2.1.2 Wybong Road

Wybong Road functions as a local road connecting Kayuga Road, at Muswellbrook, and Golden Highway at Sandy Hollow. Wybong Road connects to Bengalla Road at a give-way controlled junction with an altered alignment where Bengalla Road – Wybong Road (west of Bengalla Road) forms the major road. A gross load limit of 12 tonnes applies to the eastern section of Wybong Road (between Bengalla Road and Kayuga Road).

Wybong Road is constructed to a rural road standard and has single traffic lanes in each direction.

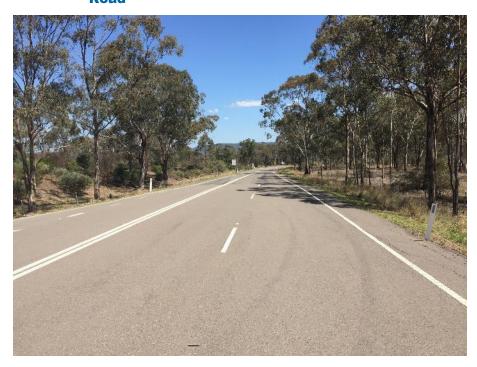
Wybong Road typically has a speed limit of 100 km/h. During the site visit completed by GHD, a number of 40 km/h construction zones were also located on Wybong Road, including construction works at the nearby Mount Pleasant Mine.

The Mangoola Coal Mine Access Road intersects Wybong Road at a priority controlled intersection. The intersection includes rural auxiliary left turn lane (AUL) and a rural auxiliary right turn treatment (AUR) to allow through vehicles to pass vehicles turning right into Mangoola Mine (see Figure 2-1 and Figure 2-2).

Figure 2-1 – Wybong Road looking west towards Mangoola Coal Mine Access Road



Figure 2-2 – Wybong Road looking west from Mangoola Coal Mine Access



2.1.3 Bengalla Road

Bengalla Road functions as a local road that provides a connection between Wybong Road to the north and Denman Road to the south (see Figure 2-3). Along with the western side of Wybong Road (to the west of the intersection with Bengalla Road), Bengalla Road provides a heavy vehicle traffic route, including for mine traffic, to the New England Highway south of Muswellbrook (via Thomas Mitchell Drive). Bengalla Road has single traffic lanes in each direction and provides direct access to the Bengalla Mine. The sign-posted speed limit on Bengalla Road is 100 km/h.





2.1.4 Thomas Mitchell Drive

Thomas Mitchell Drive functions as a local road that provides a connection between Denman Road and the New England Highway, which enables vehicles to bypass Muswellbrook. It provides access to the Muswellbrook Industrial Estate, the Mt Arthur Coal Mine and the Drayton Mine (also referred to as the Maxwell Infrastructure site).

Thomas Mitchell Drive has a single traffic lane in each direction with a sign-posted speed limit of 80 km/h for the northern section through the industrial estate and near Denman Road. The speed limit along Thomas Mitchell Drive is generally 100 km/h for the southern section, connecting to New England Highway.

At the intersection with Denman Road, Thomas Mitchell Drive provides a rural auxiliary left turn lane (AUL, see Figure 2-4).



Figure 2-4 - Thomas Mitchell Drive looking north to Denman Road

2.1.5 Denman Road

Denman Road (see Figure 2-5) functions as a sub-arterial road connecting to Sydney Street at Muswellbrook and continuing west to the Golden Highway near Denman. Denman Road is typically constructed to a rural highway standard, with single traffic lanes in each direction and additional turn lanes at key intersections. The posted speed limit is 100 km/h, west of Bengalla Road, and 80 km/h, east of Bengalla Road (to Muswellbrook).

At the intersection with Bengalla Road, Denman Road provides a channelised right turn lane (CHL) and an auxiliary left turn lane (AUL).

At the intersection with Thomas Mitchell Drive, Denman Road provides an auxiliary right turn lane (AUR) and an auxiliary left turn lane (AUL).

Figure 2-5 – Denman Road looking west from Bengalla Road



2.1.6 Golden Highway

The Golden Highway (B84) functions as a sub-arterial road connecting Dubbo and Newcastle. The Golden Highway is typically constructed to a rural highway standard, with single traffic lanes in each direction and additional turn lanes at key intersections. The sign-posted speed limit along the Golden Highway is generally 100 km/h.

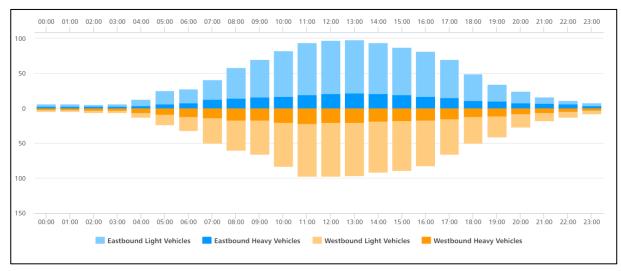
The Golden Highway (see Figure 2-6 and Figure 2-7) provides an auxiliary right turn lane (AUR) at its intersection with Wybong Road.

Figure 2-6 - Golden Highway looking east from Wybong Road



A Roads and Maritime Count Station is located on the Golden Highway approximately 4.2 km to the north-west of Wybong Road (Station Id: 6164). The 2017 traffic count data indicates that during peak periods (12:00 pm – 2:00 pm) the Golden Highway has approximately 100 veh/h in each direction, with approximately 20 percent being heavy vehicles.

Figure 2-7 – Average Daily Traffic Volumes on the Golden Highway (Station Id: 6164)



Source: http://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=6

2.1.7 Wybong Post Office Road

Wybong Post Office Road (see Figure 2-8) is a local road connecting Yarraman Road and Wybong Road that has a road reserve width of approximately 4.5 m and provides bi-directional traffic flows. As described in Section 1.1 and shown on Figure 1-2 a portion of this road will be realigned as part of the MCCO Project.

Wybong Post Office Road forms a priority controlled intersection with Wybong Road.

Figure 2-8 – Wybong Post Office Road looking west from Wybong Road

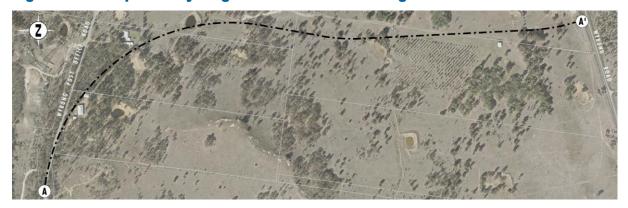


As displayed in Figure 2-8, Wybong Post Office Road is in a relatively poor condition and the realignment provides an opportunity to improve this.

Wybong Post Office Road intersects Wybong Road at an angle less than 70 degrees, which does not comply with Austroads Design Guidelines.

The plan of the proposed realignment of a portion of Wybong Post Office Road is displayed in Figure 2-9. The realignment will tie back into the section of Wybong PO Road that does not form part of the Project.

Figure 2-9 – Proposed Wybong Post Office Road Realignment



Source: Umwelt

The realigned section of the road will be constructed in accordance with Austroads Design Guidelines, including two line marked travel lanes and sealed shoulders. Further, it will intersect Wybong Road at approximately ninety degrees which will comply with Austroads Design Guidelines.

The road network to the east and west of the Mangoola Coal Mine is displayed in Figure 2-10.

MANOSALAI NATURE RESERVE Mine Access Road WYBONG POST OFFICE ROAD Muswellbrook Q Sandy Legend MCCO Project Area Denman o Approved Project Area MCCO Additional Project Area

Figure 2-10 - Road Network surrounding the Mangoola Coal Mine

Source: Umwelt

2.1.8 Freight Routes

The Roads and Maritime Restricted Access Vehicle Map identifies the Golden Highway, Denman Road, Thomas Mitchell Drive and a section of Bengalla Road (between Denman Road and the Bengalla Mine Access Road) as being approved to accommodate vehicles up to the size of a 26 m B-Double.

The outputs of the classified tube counts completed for the MCCO Project (see Section 2.5 - Traffic Surveys) indicate that the roads in proximity to the Mangoola Coal Mine accommodate heavy vehicle movements that predominantly consist of:

- Rigid vehicles up to 14.5 m in length.
- B-Double Trucks.

2.1.9 Active Transport and Public Transport

Active Transport

There are no formal pedestrian or bicycle facilities provided in the vicinity of the Mangoola Coal Mine or the wider regional area, which reflects the rural location of the MCCO Project.

Public Transport

Osborn's Transport operates a school bus service between Sandy Hollow and Muswellbrook that traverses Wybong Post Office Road, Yarraman Road and Wybong Road, with one morning and one afternoon school bus service on weekdays.

The realignment of a portion of Wybong Post Office Road will result in slightly longer travel times for buses (approximately 55 seconds) as discussed in Section 4.2.

There are no bus stops currently located on the section of Wybong Post Office Road that is proposed to be realigned.

As discussed previously, Wybong Post Office Road currently has a poor road surface condition and the realignment of a portion of this road provides an opportunity to improve the road condition and the safety for road users including students utilising the school bus service, compared to the current condition.

2.2 Site Access Restrictions

A condition of consent for the Mangoola Coal Mine with respect to access is detailed below:

"No project related traffic shall use Reedy Creek Road, Mangoola Road (apart from that section forming part of Construction Route 1 during construction of the project pipeline), Roxburgh Road or Castlerock Road to get to or from the site, except in an emergency to avoid the loss of lives, property and/or to prevent environmental harm. No project-related heavy vehicle traffic shall use Wybong Road west of the mine access road (to the intersection with the Golden Highway) to access the site, except in any emergency to avoid the loss of lives, property and/or prevent environmental harm.

Note: This condition does not apply to any employees that may reside on Reedy Creek Road, Mangoola Road, Roxburgh Road or Castlerock Road, or the infrequent use of the roads for consultation, environmental monitoring, and inspection and maintenance of nearby infrastructure."

Staff are permitted to use all other roads (not listed above) in the regional road network to access and egress Mangoola Coal Mine. These site access restrictions will continue to be applied and abided by for the MCCO Project.

2.3 Crash Data

Crash data was requested from Roads and Maritime for the previous five years (2013 – 2017) at the following locations:

- Golden Highway and Wybong Road
- Denman Road and Bengalla Road
- Denman Road and Thomas Mitchell Drive
- Wybong Road and Bengalla Road between the Golden Highway and Denman Road.

The data provided by Roads and Maritime indicates that there were no recorded crashes at the Golden Highway / Wybong Road and Denman Road / Bengalla Road intersections.

A single crash was recorded at the Denman Road / Thomas Mitchell Drive intersection, involving two vehicles travelling in adjacent directions which resulted in one serious injury.

Nineteen crashed were recorded on Wybong Road and Bengalla Road between the Golden Highway and Denman Road, as follows:

- Crash by type:
 - Ten crashes involved vehicles coming off the road and hitting an object or drivers losing control of their vehicles.
 - Five crashes involved a vehicle hitting an animal.
 - Four were listed as other types of crashes.
- Injury classification:
 - Four were other types of crashes.
 - Five crashes resulted in serious injuries.
 - Eight crashes resulted in moderate injuries.
 - Six crashes were designated as "non-casualty".

Ten crashes over approximately a 35 km length of road and a five year period suggests that there are no significant safety deficiencies in the road network near the intersections of interest.

2.4 Emergency Vehicle Access

As detailed in the *Mangoola Emergency Response Control Plan*, managing the responses to emergencies is the responsibility of a designated communications officer. The role includes liaising with key internal personnel (such as response coordinators) and the emergency services to designate the appropriate emergency vehicle access point, which is typically the Mangoola Mine Access Road. The mine also provides a helipad (located adjacent to the main administration area), which can also be used by helicopter medical services (if required).

During the construction period of the MCCO Project, access to the mine and the broader area may be interrupted for short periods by traffic controllers. In these circumstances, emergency services vehicles would be allocated priority through the work zones.

Construction work is planned to limit the disruption to the road network with a bypass road around the work zone for the haul road overpass over Big Flat Creek and Wybong Road, and the construction of the majority of the realigned section of Wybong Post Office Road away from existing roads.

2.5 Traffic Surveys

2.5.1 Intersection Surveys

In order to identify the existing traffic conditions in proximity to the Mangoola Coal Mine (and respond to the SEARs requirements), weekday AM and PM peak period traffic counts were undertaken o by Northern Transport Planning and Engineering (NTPE) on Thursday 2 November 2017 at the following intersections:

- Denman Road / Bengalla Road.
- Golden Highway / Wybong Road.
- Wybong Road / Mangoola Coal Mine Access Road.

Traffic surveys that were undertaken at the intersection of Denman Road and Thomas Mitchell Drive by NTPE on Wednesday 16 November 2016 (as part of another Traffic Assessment completed by GHD) have been used for the TTIA. ² Traffic volumes at this intersection was scaled up to be consistent with the 2017 survey data recorded at the adjacent intersection of Denman Road and Bengalla Road.

The traffic counts were undertaken in 15 minute intervals for the following times, to coincide with peak periods of road network activity:

- 5:00 am 9:00 am
- 3:00 pm 7:00 pm.

The observed traffic network peak hours were identified as the following:

- 5:45 am 6:45 am
- 5:00 pm 6:00 pm.

The intersection survey outputs are included in Appendix A. The peak hour volumes identified in the traffic surveys are displayed in Appendix B.

2.5.2 Tube Counts

Wybong Road

A classified "tube" traffic count was undertaken on Wybong Road in proximity to the Mangoola Coal Mine Access Road (300 m west of Ridgelands Road) for a two week period between 2 November 2017 and 15 November 2017.

The observed average weekday traffic volumes, for each week, are displayed in Figure 2-11 and Figure 2-12.

² Muswellbrook Council approved the 2016 surveys for use in this traffic assessment

Figure 2-11 – Wybong Road - Average Weekday Traffic Volumes (02/11/17 – 08/11/2017)

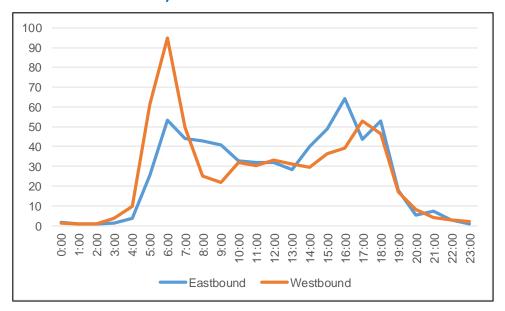
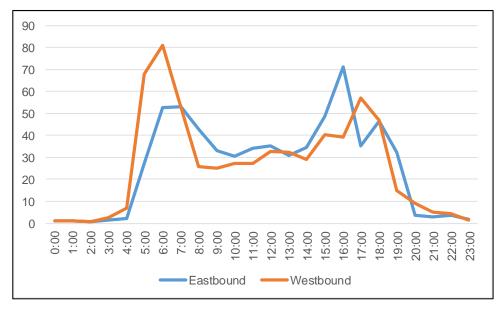


Figure 2-12 - Wybong Road - Average Weekday Traffic Volumes (09/11/17 – 15/11/2017)



The data in Figure 2-11 and Figure 2-12 indicates:

- Peak vehicle activity on Wybong Road of approximately 130 150 vehicles per hour, occurs during morning period (approximately 6:00 am – 7:00 am).
- During peak morning periods there are higher westbound traffic flows (towards the mine) than eastbound traffic flows.
- During afternoon peak period, (approximately 4:00 pm 5:00 pm) the vehicle activity on Wybong Road is approximately 100 – 110 vehicles per hour and are predominantly eastbound.

The tube counts further indicate that:

- Heavy vehicle traffic constitutes approximately 14 percent of the total daily traffic.
- Heavy vehicle traffic constitutes approximately 10 percent of the AM and PM peak hour traffic.

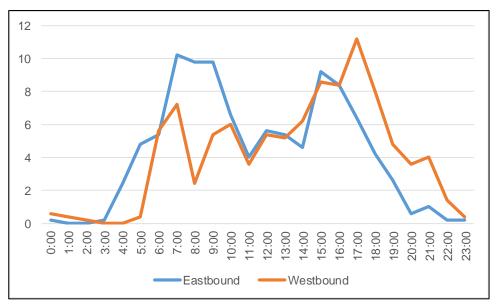
Other Roads

Further classified week long "tube" traffic counts were undertaken at the following locations:

- Ridgelands Road, 300 m to the west of Wybong Road between 10 November 2017 and 16 December 2017.
- Wybong Post Office Road, 500 m to the east of Yarraman Road between 30 November 2017 and 6 December 2017.
- Yarraman Road, 300 m to the south of Wybong Post Office Road, between 31 January 2018 and 6 February 2018.

The observed average weekday traffic volumes on Ridgelands Road are displayed in Figure 2-13.

Figure 2-13 – Ridgelands Road - Average Weekday Traffic Volumes (10/11/17 – 16/11/2017)

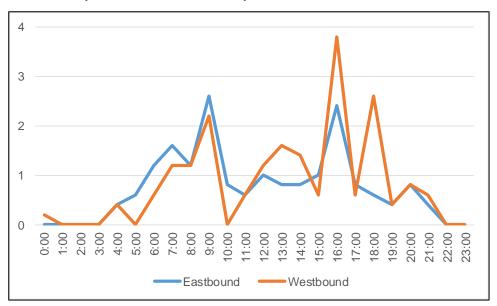


The data in Figure 2-13 indicates that:

- The weekday traffic volumes on Ridgelands Road are relatively low, with approximately 200 (bi-directional) vehicles per day.
- During peak periods, there was observed to be up to 18 (bi-directional) vehicles per hour on Ridgelands Road.

The observed average weekday traffic volumes on Wybong Post Office Road are displayed in Figure 2-14.

Figure 2-14 – Wybong Post Office Road - Average Weekday Traffic Volumes (30/11/17 – 06/12/2017)

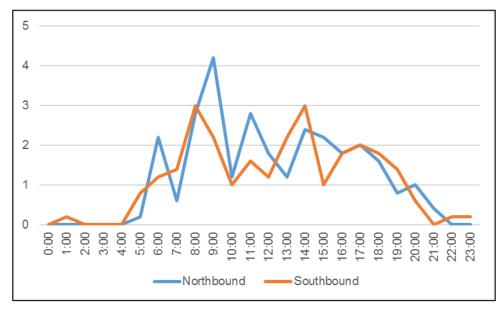


The data in Figure 2-14 indicates:

- The weekday traffic volumes on Wybong Post Office Road are low, with approximately 40 (bi-directional) vehicles per day.
- During peak periods, there was observed to be up to six (bi-directional) vehicles per hour on Wybong Post Office Road.

The observed average weekday traffic volumes on Yarraman Road are displayed in Figure 2-15.

Figure 2-15 - Yarraman Road - Average Weekday Traffic Volumes (31/01/18 - 06/02/2018)



The data in Figure 2-15 indicates:

- The weekday traffic volumes on Yarraman Road are low, with approximately 55 (bidirectional) vehicles per day.
- During peak periods, there was observed to be up to six (bi-directional) vehicles per hour on Yarraman Road.

The Roads and Maritime Guide to Traffic Generating Developments specifies that rural roads with a speed limit of 100 km/h, a single travel lane in each direction, level terrain and ten percent heavy vehicles have a mid-capacity (to a LOS D) of 1,480 vehicles 1(bi-directional traffic).

The traffic data indicates that all roads of interest are operating well within the acceptable limits of their mid-block capacities

In summary, the daily and peak hour traffic on Ridgelands Road, Wybong Post Office Road and Yarraman Road are negligible.

2.6 Current Network Operation

2.6.1 Intersection Analysis

The intersections of interest for the MCCO Project include the following:

- Golden Highway / Wybong Road
- Wybong Road / the Mangoola Coal Mine Access Road
- Denman Road / Bengalla Road
- Denman Road / Thomas Mitchell Drive.

The operation of the intersections of interest has been assessed using SIDRA 7.0.

SIDRA calculates the amount of delay to vehicles using an intersection and, amongst other performance measures, gives a Level of Service (LoS) rating which indicates the relative performance of traffic movements within the intersection.

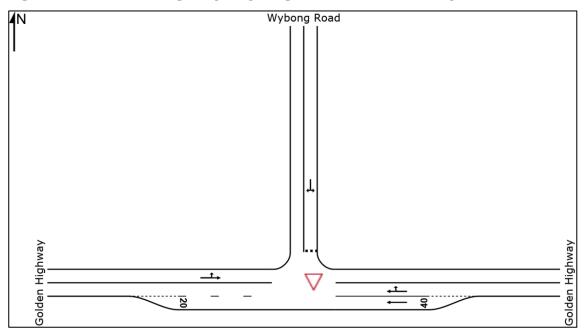
Table 2-1 presents the criteria generally applied to intersection performance. The LoS is determined from the calculated delay to traffic movements, which is a representation of driver frustration, fuel consumption and increased travel time. There are six LoS measures ranging from A (very low delay and very good operating conditions) to F (over saturation where arrival rates exceed intersection capacity) Typically a LoS D or better is considered to be acceptable, however a LoS E may be acceptable if it also operates with a low degree of saturation.

Table 2-1 – Intersection Level of Service Criteria

LoS	Average Delay/ Vehicle (sec)	Traffic Signals & Roundabouts	Give-way & Stop signs
А	Less than 15	Good operation	Good operation
В	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
С	28 to 42	Satisfactory	Satisfactory, but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
Е	56 to 70	At capacity, excessive delays; roundabout requires other control mode	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory; requires additional capacity	Unsatisfactory, requires other control mode.

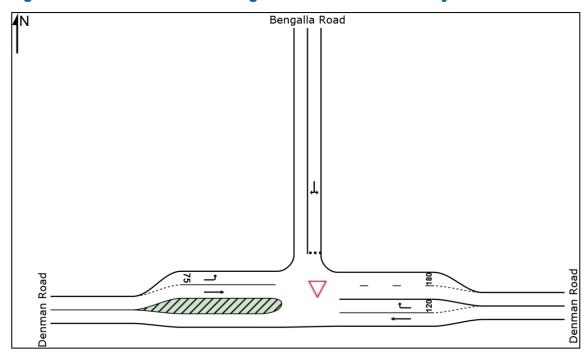
The layout of the intersections of interest (as modelled in SIDRA) are displayed below in Figure 2-16 to Figure 2-19.

Figure 2-16 - Golden Highway / Wybong Road Intersection Layout



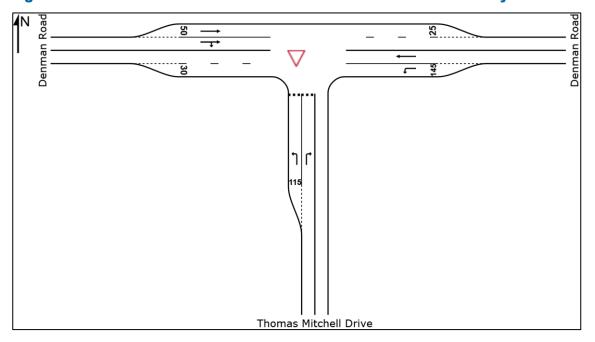
Source: SIDRA 7

Figure 2-17 - Denman Road / Bengalla Road Intersection Layout



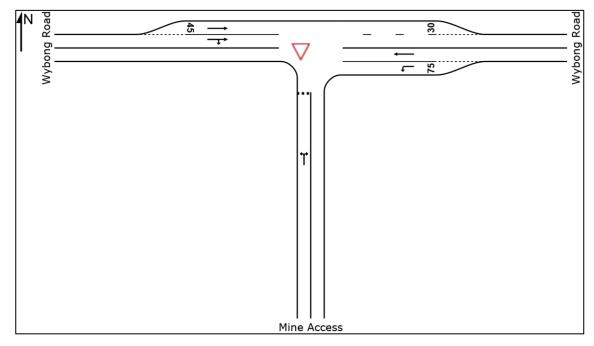
Source: SIDRA 7

Figure 2-18 - Denman Road / Thomas Mitchell Drive Intersection Layout



Source: SIDRA 7

Figure 2-19 – Wybong Road / Mangoola Coal Mine Access Road Intersection Layout



Source: SIDRA 7

The results of the SIDRA intersection modelling analysis, based on the existing traffic volumes and road geometry, are summarised in Table 2-2.

The SIDRA Results indicate that all of the intersections of interest currently operate with good levels of service, at LoS C or better, during the weekday AM and PM peak periods.

SIDRA outputs for the existing situation are included in Appendix C.

Table 2-2 - Current Intersection Performance

Intersection	AM Peak		PM Peak			
	Av Delay (sec)	LOS	95 th % Queue (m)	Av Delay (sec)	LOS	95 th % Queue (m)
	Golden Highway and Wybong Road					
Golden Highway (east)	1.6	А	1	0.9	Α	1
Wybong Road	5.9	А	0	8.2	Α	1
Golden Highway (west)	2.5	А	0	1.4	Α	0
All vehicles	2.3	Α	1	2.7	Α	1
	Denma	an Road and	Bengalla Ro	ad		
Denman Road (east)	6.6	Α	17	2.2	Α	2
Bengalla Road	7.8	Α	1	11.6	В	24
Denman Road (west)	1.5	Α	0	0.3	Α	0
All vehicles	5.7	Α	17	6.0	Α	24
Denman Road and Thomas Mitchell Drive						
Thomas Mitchell Drive	12.0	В	8	15.5	С	18
Denman Road (east)	3.6	Α	0	1.9	Α	0
Denman Road (west)	6.7	А	0	2.0	Α	6
All vehicles	6.0	Α	8	5.5	Α	18
Wybong Road and mine access road						
mine access road	6.9	Α	1	6.1	А	1
Wybong Road (east)	7.3	А	0	2.3	А	0
Wybong Road (west)	4.3	Α	1	0.8	Α	0
All vehicles	6.6	Α	1	3.2	Α	1

2.6.2 Link Analysis

The Roads and Maritime Guide to Traffic Generating Developments specificities that for rural roads with a speed limit of 100 km/h, a single travel lane in each direction, level terrain and 10 percent heavy vehicles have a mid-block capacity (to a LOS D) of 1,480 vehicles ³(bi-directional traffic).

The existing traffic volumes displayed in Appendix B and the traffic data in Figure 2-11 - Figure 2-14 indicates that Wybong Road, Denman Road, Thomas Mitchell Drive, Bengalla Road, Wybong Post Office Road, Ridgelands Road and the Golden Highway are operating well within the acceptable limits of their mid-block capacities.

2.7 Future Road Network Changes

The Muswellbrook Mine Affected Roads Stage 1 – Road Network Plan report (Cardno 2015) was endorsed by Muswellbrook Shire Council in October 2015. The report identifies several key road network changes which may be considered in the short, medium and long-term.

³ As detailed in Table 4.5 of the Roads and Maritime Guide

The strategies identified to address the future demand associated mine related activity and background traffic growth in proximity to the Mangoola Coal Mine include:

- Upgrade of Wybong Road (west of Ridgelands Road) to Local Road Standard from the Mangoola Coal Mine Access Road to Reedy Creek Road.
- Reconstruct the Reedy Creek Road / Golden Highway Intersection and close the current Wyong Road / Golden Highway Intersection.
- Close Wybong Road (between Bengalla Road and Kayuga Road) and develop a new link that intersects Bengalla Road to the west of Thomas Mitchell Drive.

The Muswellbrook Mine Affected Roads Stage 1 – Road Network Plan report indicates that the proposed closure of Wybong Road and the development on a new link to Bengalla Road is expected to be implemented by 2026. The upgrade of Wybong Road and the Reedy Creek Road / Golden Highway are identified as long term priorities.

These road network changes are therefore thought unlikely to occur during the construction period of the MCCO Project, with construction expected to be complete by 2022, and have not been incorporated into the analysis undertaken in this TTIA.

2.8 Existing Rail Network

Coal is transported from mines in the Hunter Valley to the port of Newcastle via the Hunter Valley rail network. The Hunter Valley rail network consists of a dedicated double track 'coal line' between Port Waratah and Maitland, a shared double track line (with some significant stretches of third track) from Maitland to Muswellbrook in the upper Hunter Valley, and a shared single track with passing loops from that point north and west (ARTC, 2018).

The primary users of the Hunter Valley rail network include a number of existing and approved coal mines, one of which is Mangoola Coal Mine, other commodities and freight container trains as well as passenger trains. The Hunter Valley coal rail network is managed by the ARTC. The primary role of the ARTC is to ensure that rail corridor capacity in the Hunter Valley can stay ahead of coal demand.

Coal from Mangoola Coal Mine is currently transported via rail on the Hunter Valley rail network with an approved capacity of up to ten trains per day

3. Proposed Development

3.1 Mangoola Coal Mine

As described in Section 1.1, the MCCO Project will allow for the continuation of mining operations at Mangoola Coal Mine into a new mining area located immediately to the north of the existing operations area (see Figure 1-1 and Figure 1-2).

The MCCO Project includes the following points relevant for consideration in this TTIA:

- Approximately eight years of mining in additional resource in the proposed additional mining area. This represents one additional year beyond existing approval (to 2030) assuming commencement of mining occurs in 2022, as planned.
- Construction of a haul road overpass over Big Flat Creek and Wybong Road to provide access from the existing mine to the proposed additional mining area.
- The realignment of a section of Wybong Post Office Road to the west of the MCCO Project area.
- Continued use of the Mangoola Coal Mine Access Road for the existing mine operation.
- Access to/from MCCO Additional Project Area via Wybong Road, Wybong Post Office Road and Ridgelands Road to the MCCO Additional Project Area for construction vehicles, emergency services, ongoing operational environmental monitoring and property maintenance.
- A likely construction workforce of approximately 145 people, with no change to the existing approved operational workforce.
- The current peak production of 13.5 Mtpa of coal will not change.

As there is no change proposed to the currently approved maximum rate of production (13.5 Mtpa) or the existing approved operational workforce, the operational traffic volumes are not expected to change as a result of the MCCO Project.

3.2 Trip Generation

3.2.1 Operational Traffic

With regard to the proposed continuation of the mine operations:

- Mangoola Coal Mine currently is approved for up to approximately 540 total full time equivalent operational personnel which would not be surpassed for the MCCO Project.
- Mangoola Coal Mine currently operates 24 hours a day, seven days a week which will continue for the MCCO Project.

As the approved maximum operational traffic volumes are not expected to increase above those previously assessed and approved, the TTIA has only been undertaken for the construction phases of the MCCO Project.

In this regard, the current vehicle activity associated with the operation of the Mangoola Coal Mine has been captured in the traffic surveys detailed in Section 2.4 and the current network intersection performance detailed in Section 2.5.

3.2.2 Construction Traffic

Construction Activities

The MCCO Project has been designed to maximise the use of existing infrastructure. However, as outlined in Section 1.1, some new or relocated infrastructure will be required to establish access to and operate within the MCCO Additional Project Area. The construction phase for the MCCO Project is planned to occur over an approximately 16 month period and be completed by 2022.

Some of the key construction activities will include:

- Establishment of construction access points, temporary office and equipment laydown areas within the MCCO Additional Project Area.
- Establishment of the Proposed Wybong Road / Big Flat Creek Overpass and haul road connection to Mangoola Coal Mine.
- Realignment of a portion of Wybong Post Office Road.
- Establishment of water management infrastructure including clean water diversion drains, dams and pipelines.
- Relocation of 11kV transmission lines out of the MCCO Additional Disturbance Area.

With the exception of the establishment of the Proposed Wybong Road / Big Flat Creek Overpass and the Wybong Post Office Road Realignment, construction of the above key construction activities will be undertaken 24 hours per day, seven days a week.

The construction hours for the Proposed Wybong Road / Big Flat Creek Overpass, Wybong Post Office Road Realignment will generally be during the hours of 7.00 am to 6.00 pm, Monday to Friday and 8.00 am to 1.00 pm on weekends and public holidays. Workforce arrival at site, workforce pre-start communications, work site inspections and workforce leaving of site may occur outside of the construction hours.

A maximum construction workforce of approximately 145 people is anticipated, although this could vary, depending on the timing of construction of the various components of the MCCO Project.

During the construction phase, it will also be necessary to establish direct access to the MCCO Project Area from Wybong Road, Wybong Post Office Road and Ridgelands Road. Access via these proposed construction routes will be managed based on a Construction Traffic Management Plan (CTMP), as required.

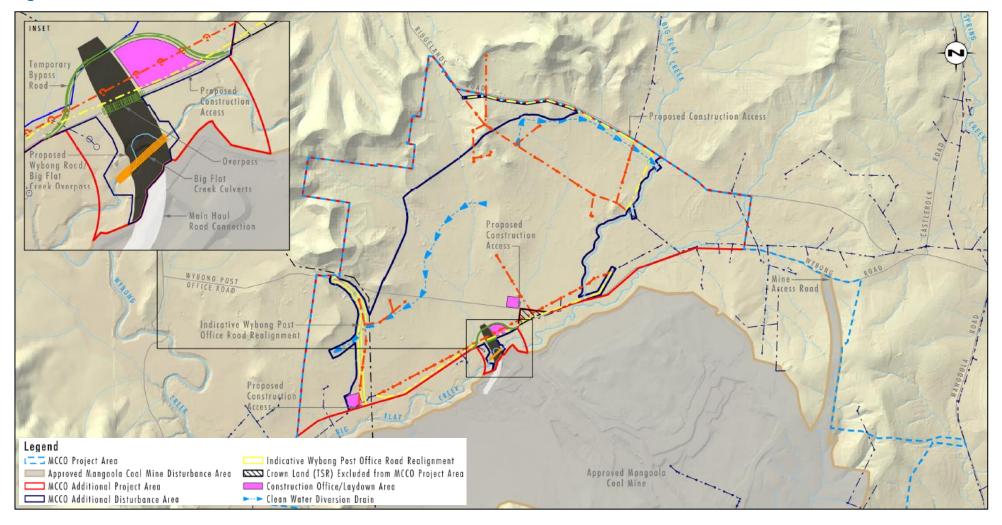
The CTMP will be developed in consultation with MSC prior to the commencement of construction activities. The plan will identify measures to be implemented in order to manage potential construction related traffic impacts; including any construction vehicle access.

During the construction of the Wybong Road/Big Flat Creek Overpass it is proposed to provide a temporary bypass on Wybong Road.

The location of the proposed MCCO Project construction access roads and the temporary bypass road are shown in Figure 3-1.

.

Figure 3-1 – MCCO Construction Activities



Source: Umwelt

Construction Staging

The main stages of construction for the MCCO Project and their anticipated mobilisation and completion dates are summarised in Table 3-1. It is noted that the timing of the MCCO Project construction activities may be subject to change depending on the timing of the final granting of development consent. In accordance with the analysis completed in Section 4, any changes in timing are not anticipated to significantly impact the operation of the road network in proximity to the MCCO Project.

Table 3-1 – MCCO Project Stages of Construction

Construction Stage	Commencement	Completion
Establishment of construction access, temporary office/equipment laydown areas and relocation of transmission lines	Quarter 1 in 2021	Quarter 3 in 2021
Haul road crossing of Wybong Road and Big Flat Creek	Quarter 2 in 2021	Quarter 3 in 2022
Construction of a water management system, including construction of dams and clean water diversion drains	Quarter 4 in 2021	Quarter 2 in 2022
Wybong Post Office Road realignment	Quarter 2 in 2021	Quarter 2 in 2022

Total Traffic Volumes

The MCCO Project construction workforce will peak at approximately 145 workers.

The assumed heavy vehicle activity associated with the MCCO Project is expected to generate:

- An average of up to approximately 31 heavy vehicle movements (inbound and outbound) per day over the course of the construction period.
- A peak of approximately 70 heavy vehicle movements (inbound and outbound) per day.

This includes heavy vehicle activity associated with 28 tonnes gravel trucks, related to the construction of the proposed Wybong Road Overpass, Wybong Post Office Road, internal access roads and water management systems components. The majority of gravel is proposed to be sourced "internally" from within the Mangoola Coal Mine.

These vehicles will turn left from the Mangoola Coal Mine Access Road onto Wybong Road and then turn right into the MCCO Project site, via the proposed construction access driveways on Wybong Road or on Wybong Post Office Road.

The gravel trucks undertaking the return loop would turn onto Wybong Road from the proposed construction access driveways, travelling east and make a right turn onto the Mangoola Coal Mine Access Road.

If it is determined that site sourced material is not suitable it will be sourced offsite. The number of external heavy vehicle deliveries that have been assumed and assessed for the construction phase account for this scenario should it be required.

It is anticipated that workers will arrive at the site in the morning peak and exit the site in the afternoon peak, while the heavy vehicle activity will occur over the course of the day. For the purpose of analysis, it has been assumed that up to five heavy vehicles will be on site at any one time.

Peak Hour Traffic Volumes

For the purposes of this assessment, the highest peak hour traffic generation for the mine under the peak construction scenario has assumed to be 169 vehicle trips in total, which would consist of the following:

AM peak hour:

- Six inbound heavy vehicle movements and six outbound heavy vehicle movements (external).
- Six inbound heavy gravel truck movements and six outbound gravel truck movements (internal).
- 145 inbound worker movements (light vehicles).

PM peak hour:

- Six inbound heavy vehicle movements and six outbound heavy vehicle movements (external).
- Six inbound heavy gravel truck movements and six outbound gravel truck movements (internal).
- 145 outbound worker movements (light vehicles).

There is expected to be opportunities for construction workers to car share, however to provide a conservative assessment of the MCCO Project, a car occupancy of one person per car has been assumed for worker trips.

Daily Traffic Volumes

Using the peak heavy vehicle activity the MCCO Project is expected to generate up to 430 daily trips, as follows:

- 70 inbound and 70 outbound heavy vehicle movements
- 145 inbound and 145 outbound worker movements.

As detailed in Section 3.2.2, construction activities are typically expected to occur 24 hours per day.

Tube counts undertaken on Wybong Road between 9th November 2017 and 15th November 2017 indicate that it accommodates an average of 1,260 weekday traffic volumes.

Accordingly, the peak daily traffic volumes associated with the construction phase of the MCCO Project are expected to be approximately 34 percent of the current daily traffic on Wybong Road in the section between the Mangoola Mine Access Road and the MCCO Additional Project Area.

However, the analysis indicates that the adjacent road network can accommodate these volumes and continue to operate with a good LoS (see Section 4.1).

3.2.3 Construction Traffic Distribution

Light Vehicles

The Mangoola Coal Mine has provided a list of the residential locations of employees. For the purposes of analysis it has been assumed that the construction workforce will have a similar breakdown of residential locations to accommodate workers travelling to site from various directions.

The key residential locations and the associated expected volumes of construction workers as included in the TTIA are detailed in Table 3-2.

Table 3-2 - Construction Worker Residential Distribution

Residential Location	Proportion of Employees	Traffic Movements (vehicles)
Muswellbrook	47%	68
Singleton	14%	20
Denman	13%	19
Scone	13%	19
Merriwa	7%	10
Aberdeen	6%	9
Total	100%	145

For the purposes of this assessment, it has been assumed that:

- Workers residing in Muswellbrook will access the MCCO Project via Denman Road, Bengalla Road, Kayuga Road and Wybong Road. It has been assumed that:
 - 50 percent will access the MCCO Project via Denman Road and Bengalla Road.
 - 50 percent will access the MCCO Project via Kayuga Road and Wybong Road.
- Workers residing in Singleton will access the MCCO Project via Thomas Mitchell Drive, Denman Road, Bengalla Road and Wybong Road.
- Workers residing in Denman will access the MCCO Project via the Golden Highway and Wybong Road.
- Workers residing in Scone will access the MCCO Project via the New England Highway, Kayuga Road and Wybong Road.
- Workers residing in Merriwa will access the MCCO Project via the Golden Highway and Wybong Road.
- Workers residing in Aberdeen will access the MCCO Project via the New England Highway, Kayuga Road and Wybong Road.

Heavy Vehicles

In accordance with the condition of consent (detailed in Section 2.2) it is assumed that all heavy vehicles will access / egress the MCCO Project from Wybong Road, to the east of the Mangoola Coal Mine Access Road.

Entry and egress to/from the MCCO Project construction site is proposed via access points on Wybong Road, Wybong Post Office Road and Ridgelands Road, as shown in Figure 3-1.

Information provided by the Client indicates that it is expected that the majority of construction heavy vehicles will access the site from Muswellbrook, Scone or Singleton. For the purposes of this assessment, it has been assumed that:

- 60 percent of heavy vehicles will access the MCCO Project from Muswellbrook.
- 20 percent of heavy vehicles will access the MCCO Project from Scone.
- 20 percent of heavy vehicles will access the MCCO Project from Singleton.

The AM and PM peak hour trip generation characteristics of the MCCO Project construction vehicles are displayed in Appendix B.

4. Impact Assessment

4.1 Construction Traffic

Construction of the MCCO Project is expected to take approximately 16 months and would be completed in 2022, prior to the commencement of mining operations in the MCCO Additional Project Area. Intersection traffic modelling, using the SIDRA 7 modelling software, has been undertaken for the following two scenarios in the 2022 horizon year:

- A "no-build" scenario, accounting for background traffic growth only.
- A "build" scenario accounting for the background traffic growth and the expected peak construction traffic associated with the MCCO Project.

Forecast AM and PM peak hour traffic volumes for both of the above scenarios are displayed in Appendix B.

A linear annual growth rate of 1.5 percent has been applied to the 2016 and 2017 surveyed traffic volumes to determine the 2022 "no build" traffic volumes. This traffic growth rate is consistent with information included in the *Muswellbrook Mine Affected Roads Stage 1 – Road Network Plan* report (Cardno, 2015).

The results of the SIDRA analysis are summarised in Table 4-1. The intersection modelling analysis indicates that in the 2022 horizon year, all intersections are expected to operate with a good LoS for both the "no-build" and "build" traffic scenarios.

The SIDRA outputs for the 2022 horizon year are included in Appendix D.

Table 4-1 – Intersection Performance (2022)

Intersection			No I	Build					Ви	ıild			
		AM Peak			PM Peak			AM Peak			PM Peak		
	Av Delay (sec)	LOS	95 th % Queue (m)	Av Delay (sec)	LOS	95 th % Queue (m)	Av Delay (sec)	LOS	95 th % Queue (m)	Av Delay (sec)	LOS	95 th % Queue (m)	
				Golden	Highway a	and Wybong R	oad						
Golden Highway (east)	1.7	Α	1	1.0	А	1	3.3	Α	1	1.0	Α	1	
Wybong Road	6.0	Α	0	8.2	Α	1	6.1	Α	0	8.2	Α	2	
Golden Highway (west)	2.4	Α	0	1.4	А	0	3.1	Α	0	1.4	Α	0	
All vehicles	2.3	Α	1	2.7	Α	1	3.3	Α	1	3.3	Α	2	
				Denma	Denman Road and Bengalla Road			oad					
Denman Road (east)	6.7	Α	19	2.2	Α	2	7.1	Α	25	2.4	Α	2	
Bengalla Road	7.8	Α	1	6.5	Α	10	8.1	Α	2	6.5	Α	13	
Denman Road (west)	1.5	Α	0	0.3	Α	0	1.5	Α	0	0.3	Α	0	
All vehicles	5.8	Α	19	3.8	Α	10	6.1	Α	25	4.0	Α	13	
				Denman F	Road and T	homas Mitche	II Drive						
Thomas Mitchell Drive	12.8	В	10	17.6	С	22	13.8	В	11	20.5	С	26	
Denman Road (east)	3.6	Α	0	1.9	Α	0	3.4	Α	0	1.9	Α	0	
Denman Road (west)	7.0	Α	5	2.1	Α	7	7.3	Α	6	2.4	Α	8	
All vehicles	6.2	Α	10	6.1	Α	22	6.4	Α	11	6.7	Α	26	
	Wybong	Road and	mine access	road									
mine access road	7.0	А	1	6.2	Α	1	8.3	Α	1	7.1	Α	2	
Wybong Road (east)	7.3	Α	0	2.2	Α	0	4.3	Α	0	2.6	Α	0	
Wybong Road (west)	4.3	Α	1	0.8	Α	0	5.1	Α	2	0.6	Α	0	
All vehicles	6.6	Α	1	3.2	Α	1	4.7	Α	2	2.4	Α	2	

4.2 Wybong Post Office Road

Mining within the MCCO Additional Project Area will require the realignment of Wybong Post Office Road. At the western boundary of the MCCO Additional Project Area, it is intended to divert Wybong Post Office Road to the south, where it will intersect Wybong Road via a new priority controlled T-intersection, as shown Figure 1-2.

This proposed road realignment of Wybong Post Office Road will extend the trip distance of some road users travelling in the direction to/from Muswellbrook by approximately 1.6 km. Assuming that vehicles travel at a speed of 100 km/h (the sign-posted speed limit) along this additional route, this will increase travel times by 55 seconds. When travelling to/from Sandy Hollow or Reedy Creek Road the travel distance will decrease. Based on this, the proposed realignment of Wybong Post Office Road is expected to have a minor impact on travel times.

As discussed in Section 2.3, a review of Roads and Maritime crash data indicates that there have been two crashes recorded in proximity to the Wybong Road / Wybong Post Office Road intersection in the last five years. The crash history suggests that there are no specific safety deficiencies at this location.

"Tube" traffic counts undertaken on Wybong Post Office Road between 30 November 2018 and the 6 December 2018 indicate traffic volumes are low, with up to six (bi-directional) vehicles in an hour. It is noted, that with the exception of Wybong Hall, all property along Wybong Post Office Road is owned by Mangoola Coal and approximately six of these properties will be vacated due to the MCCO Project works, further reducing the traffic levels on this road, post construction.

As discussed previously, Wybong Post Office Road is currently has a poor quality road surface condition. Further, Wybong Post Office Road intersects Wybong Road at an angle less than 70 degrees, which does not comply with Austroads Design Guidelines.

The realigned section of the road will be constructed in accordance with Austroads Design Guidelines, including two line marked travel lanes and sealed shoulders. Further, it will intersect Wybong Road at approximately ninety degrees.

Accordingly, the proposed road realignment provides an opportunity to improve the road condition and safety for road users.

The current condition of Wybong Post Office Road (left) and a representation of the proposed realigned portion (right) are displayed in Figure 4-1.



Figure 4-1 – Current and Proposed condition of Wybong Post Office Road

4.3 Rail Transport Assessment

With regard to transporting product coal from the site as discussed in Section 2.8, the MCCO Project will not result in any changes to the existing approved capacity of up to ten trains per

day, however, the MCCO Project will extend the life of the Mangoola Coal Mine by approximately one year beyond that currently approved. The MCCO Project will not result in any additional trains on the Hunter Valley rail network and will continue to operate within the approved capacity. In this regard Mangoola has consulted with the ARTC regarding the MCCO Project and they have confirmed that "the MCCO Project does not affect rail network capacity and poses no change to existing rail access arrangements for Mangoola".

The productive life of the mine will continue for approximately one further year than is currently approved. This small life extension is not considered likely to result in any significant impact on rail transport capacity as the existing network has adequate capacity for existing mine production and no increases in annual train movements are proposed.

4.4 Oversize Vehicles

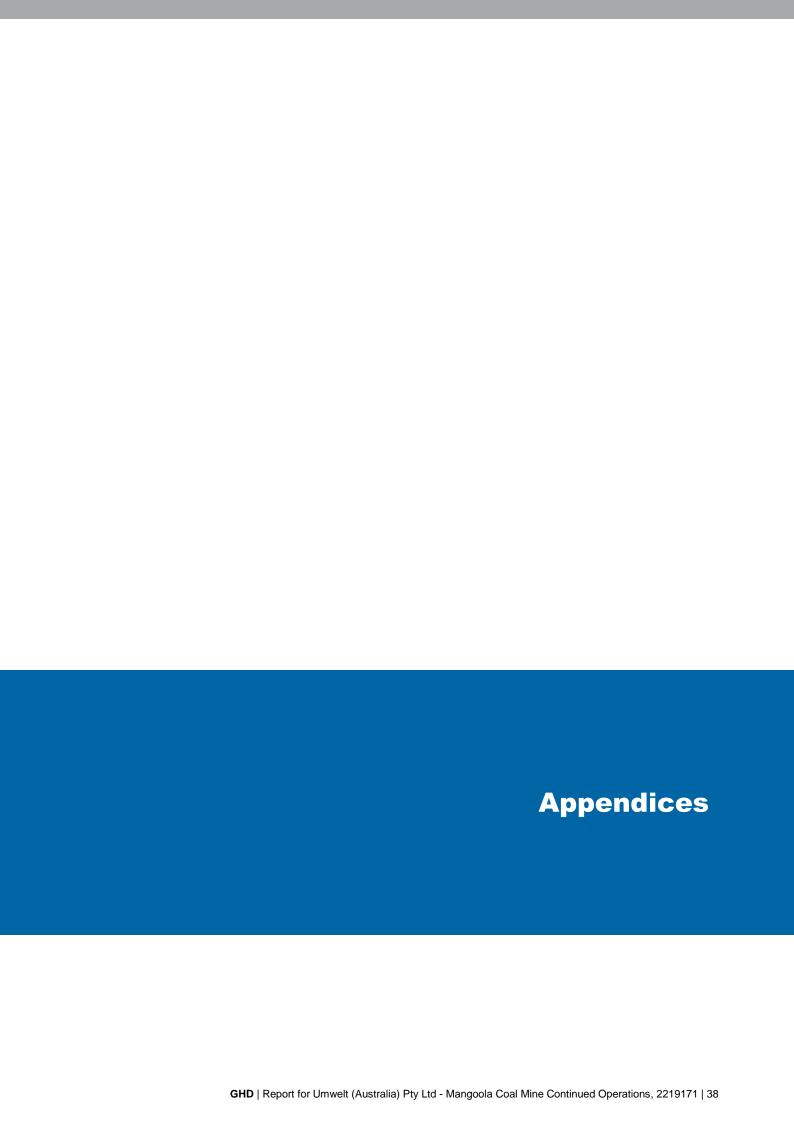
Any movement of oversize vehicles will be undertaken in accordance with Roads and Maritime and the National Heavy Vehicle Regulator Guidelines. This will include the preparation and approval of a NSW Load Declaration Form.

5. Management and Mitigation

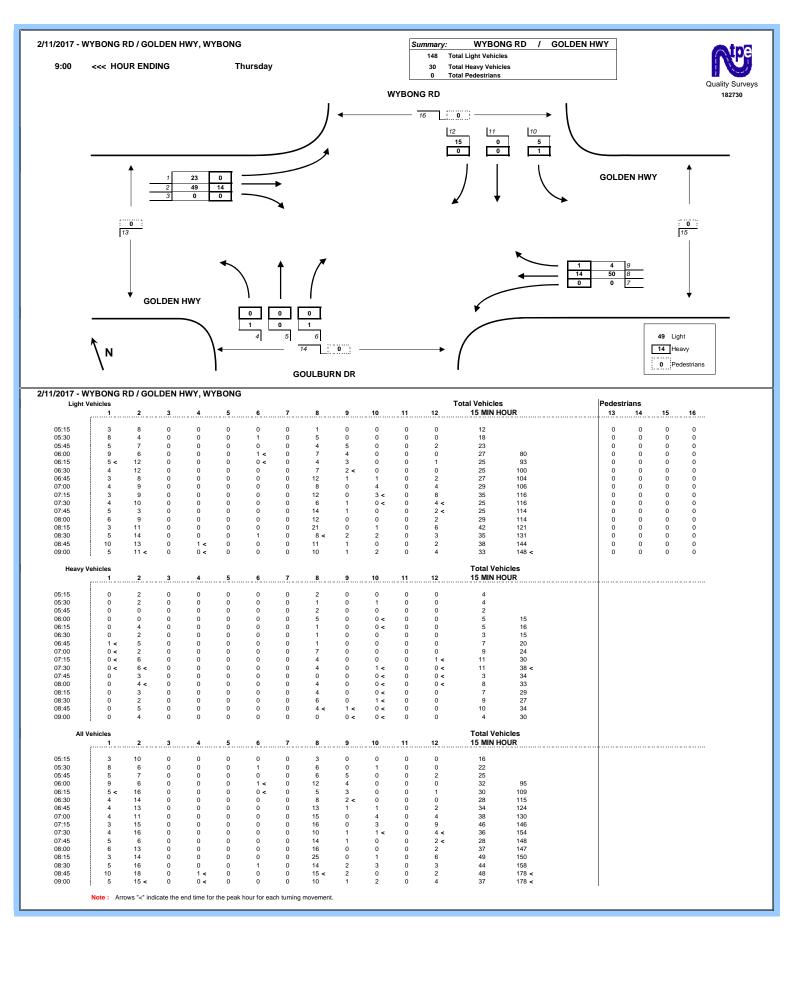
The results of the SIDRA intersection modelling indicate that each of the intersections of interest are expected to operate with an acceptable Level of Service (LoS) in the 2022 horizon year with the additional traffic generated associated with the construction of the MCCO Project.

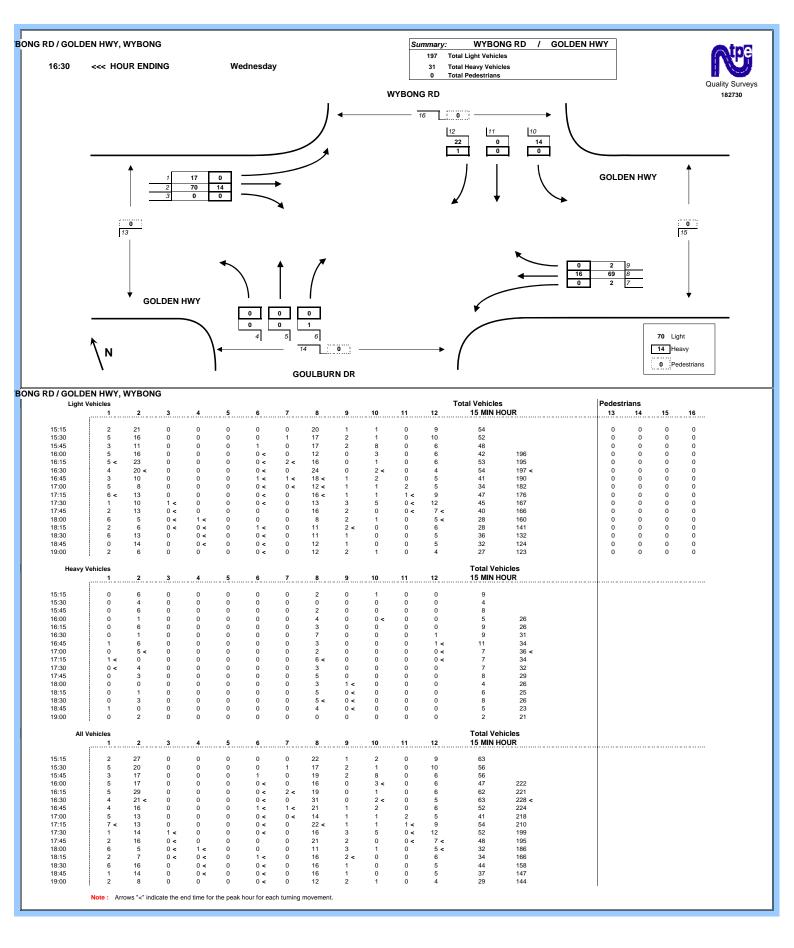
As such no road upgrades or changes are required to the regional road network as a result of the MCCO Project. In order to guide traffic management during the construction phase the following mitigation measures to minimise the potential traffic and access impacts associated with the Project are recommended:

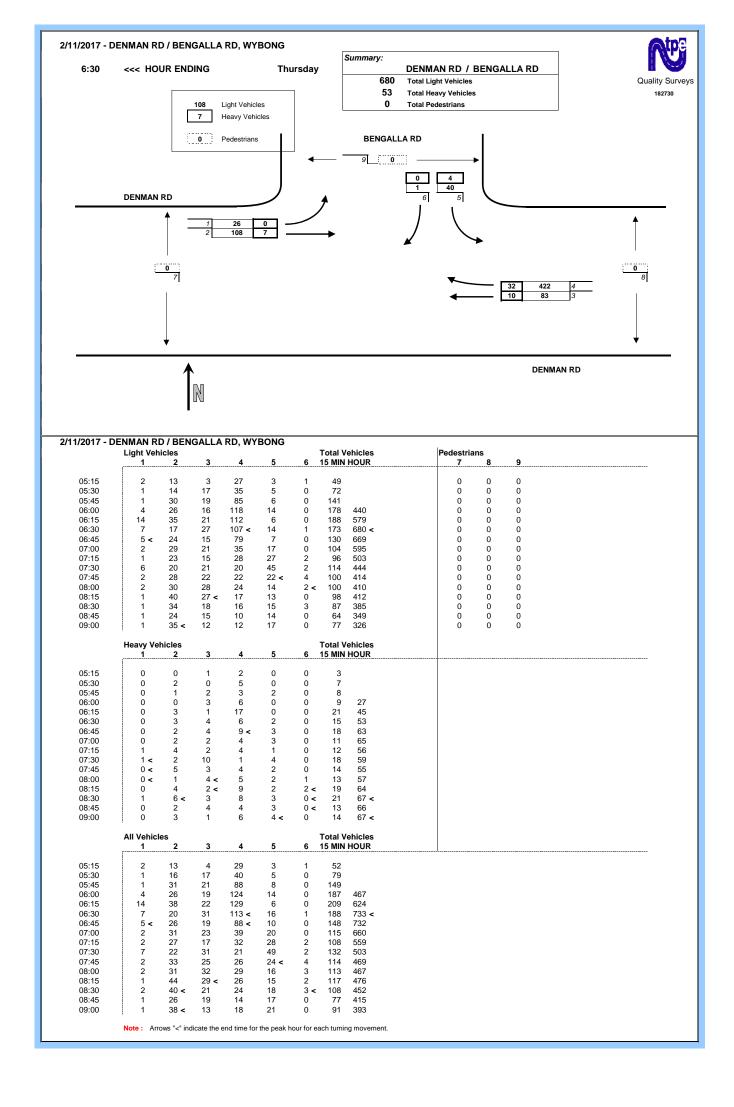
- A Construction Traffic Management Plan (CTMP) should be prepared in consultation with MSC prior to construction commencing. The CTMP would include appropriate Traffic Control Plans and include detail with respect to:
 - Traffic control measures in works areas.
 - Controls associated with the delivery of heavy plant and materials to site during peak traffic periods.
 - Appropriate entry/exit points for the proposed construction compound area(s) i.e.
 Wybong Road and Wybong Post Office Road.
 - Advising motorists of the change in traffic conditions associated with the work.
- Appropriate exclusion barriers, signage and site supervision is to be employed so that the
 project site is controlled and that unauthorised vehicles and pedestrians are excluded from
 the works area.
- Only existing roads and access roads are to be utilised.
- The community is to be kept informed about the project through appropriate means such as advertisements in the local media, notices and / or signs.
- All traffic control devices are to be in accordance with AS 1742.3-2009 Manual of uniform traffic control Devices: Traffic control for works on roads and Roads and Maritime Traffic control at worksites manual.
- Provide a preconstruction and post construction, pavement assessment report, on the section of Wybong Road from the Mangoola Coal access road to the MCCO Project construction areas with a view to repairing any impacted pavement to pre-construction standards.

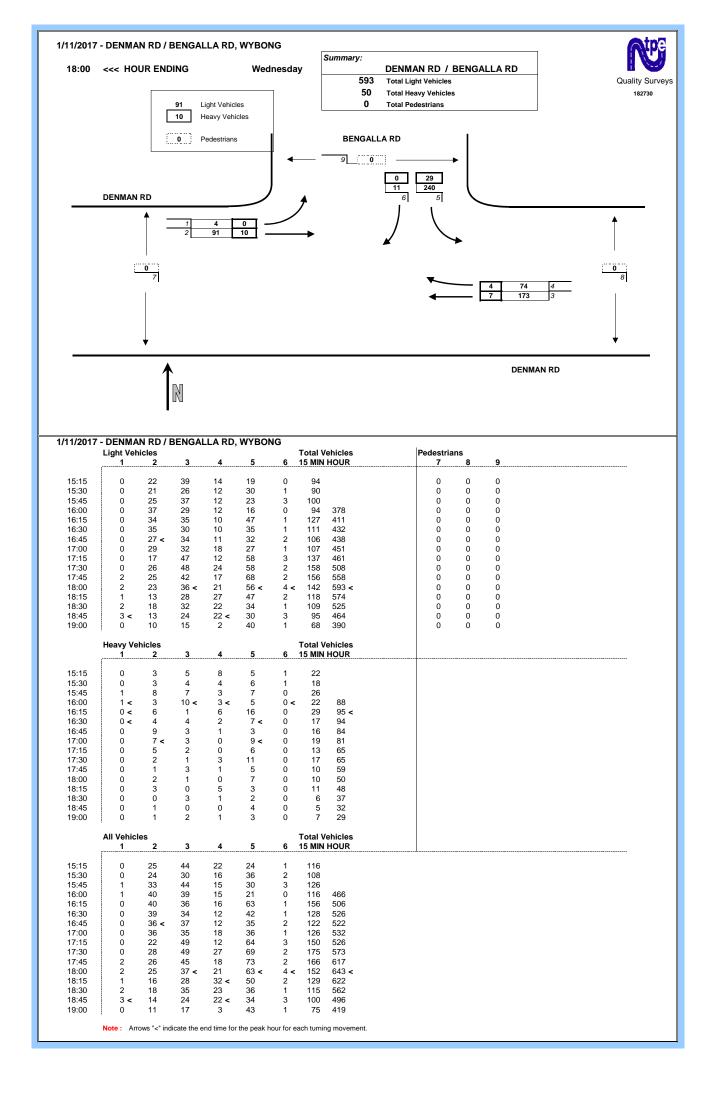


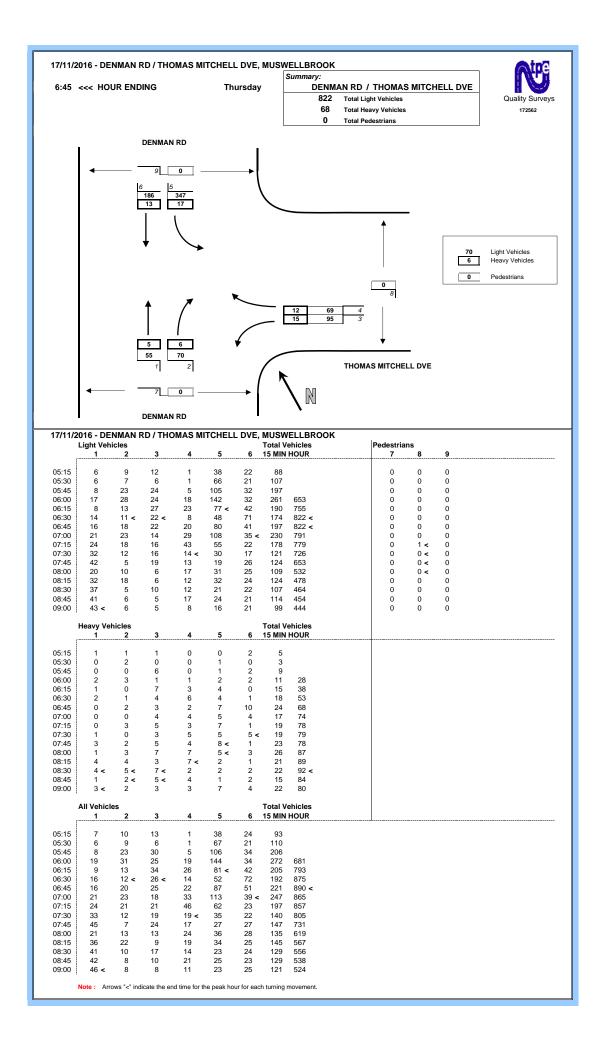
Appendix A – Traffic Survey Outputs

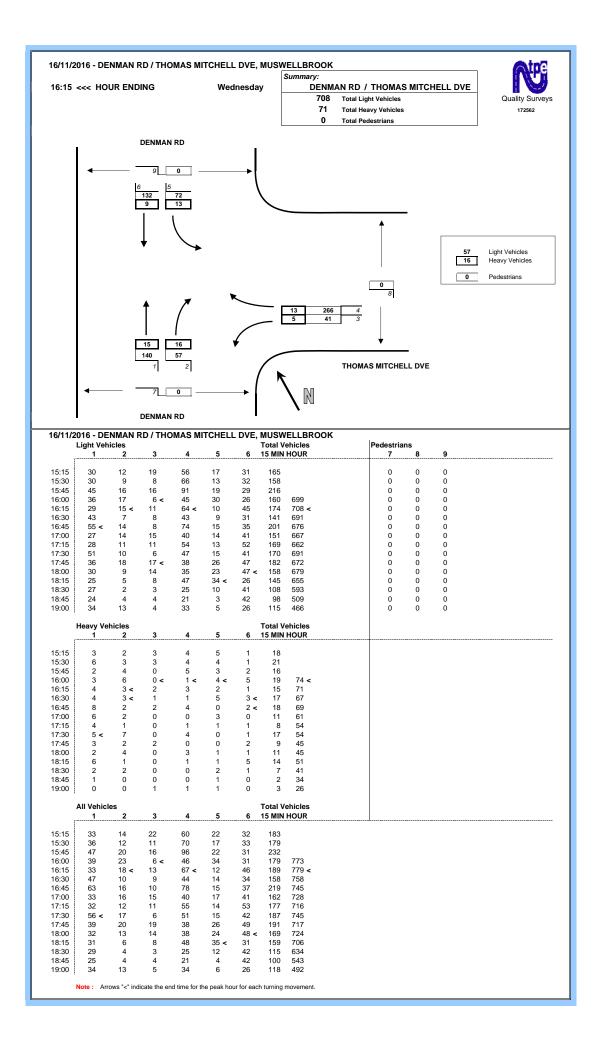


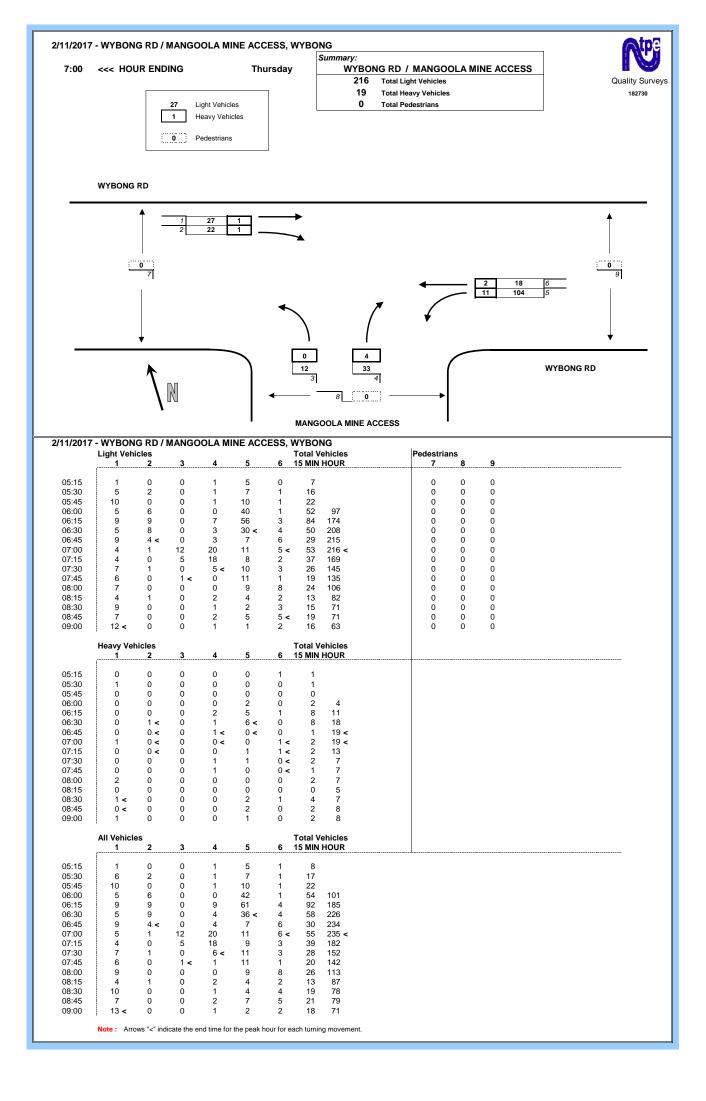


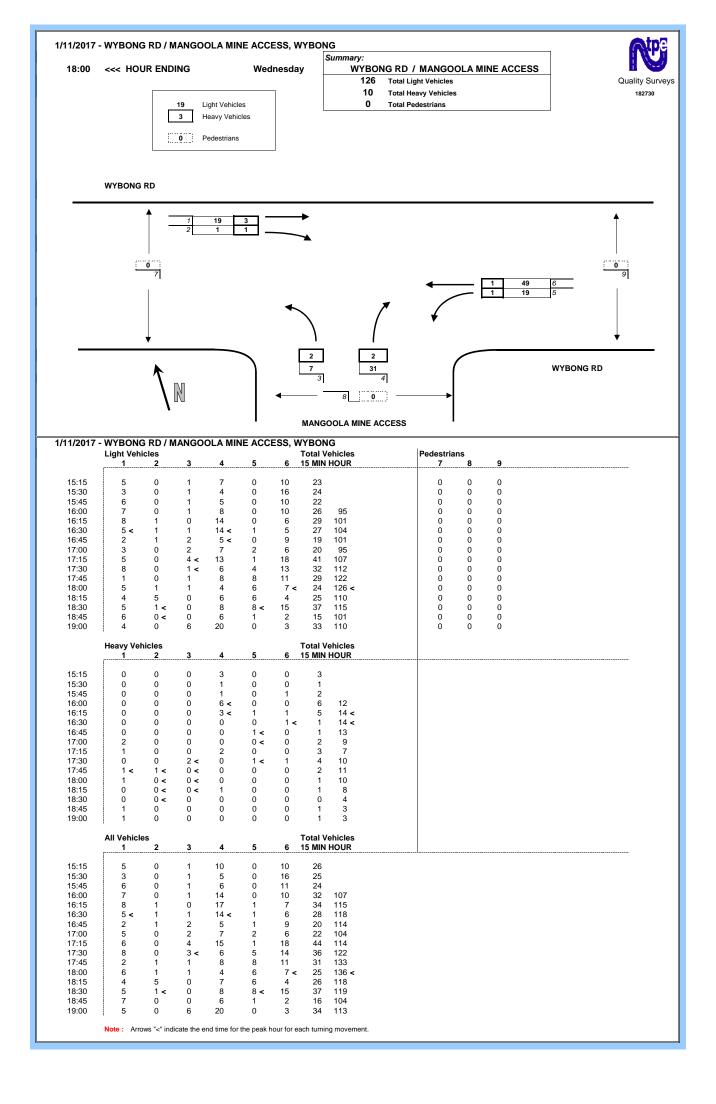




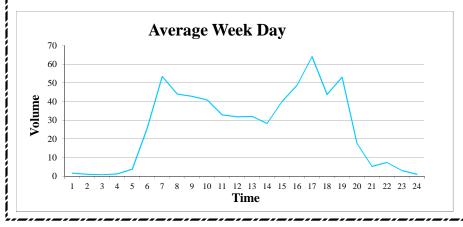






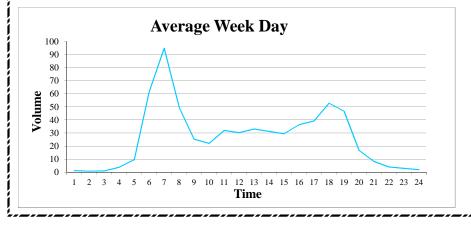


Site 1	Wybong RI	D 300m W of	Ridgelands	RD [100]				Eastbound		
Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
Time	02/11/17	3/11/2017	4/11/2017	5/11/2017	6/11/2017	7/11/2017	8/11/2017	Ave.	Ave.	Ave
0:00	2	3	0	0	2	1	0	2	0	1
1:00	2	2	1	0	1	0	0	1	1	1
2:00	1	0	0	1	0	1	2	1	1	1
3:00	1	1	0	0	3	0	1	1	0	1
4:00	6	3	4	5	4	4	2	4	5	4
5:00	25	29	7	11	20	26	28	26	9	21
6:00	61	44	36	34	51	59	52	53	35	48
7:00	55	39	10	10	45	36	45	44	10	34
8:00	39	45	18	17	42	48	40	43	18	36
9:00	42	68	26	19	33	31	30	41	23	36
10:00	32	44	22	19	28	34	26	33	21	29
11:00	48	30	19	26	25	31	25	32	23	29
12:00	32	31	21	31	29	34	34	32	26	30
13:00	33	34	17	9	25	20	29	28	13	24
14:00	47	46	12	21	42	28	37	40	17	33
15:00	55	56	18	29	46	40	47	49	24	42
16:00	78	49	23	29	58	72	63	64	26	53
17:00	58	40	15	28	34	42	45	44	22	37
18:00	56	57	59	58	34	58	60	53	59	55
19:00	21	13	10	17	16	19	19	18	14	16
20:00	8	5	4	5	6	4	3	5	5	5
21:00	20	4	1	2	6	2	5	7	2	6
22:00	5	4	1	1	0	1	5	3	1	2
23:00	2	0	1	1	0	3	0	1	1	1 747
Total	729	647	325	373	550	594	598	624	349	545



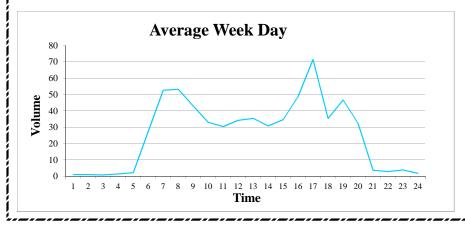
Sui	mmary		
	from	to	
AM Peak	9:00 AM	10:00 AM	68
PM Peak	4:00 PM	5:00 PM	78
	Week D	ay Average	624
	Weekend D	ay Average	349
	7 D	ay Average	545

Site 1	Wybong RI	D 300m W of	Ridgelands	RD [100]				Westbound		
Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
Time	02/11/17	3/11/2017	4/11/2017	5/11/2017	6/11/2017	7/11/2017	8/11/2017	Ave.	Ave.	Ave
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1:00	3	0	1	1	1	0	0	1	1	1
2:00	2	0	1	0	0	2	1	1	1	1
3:00	11	2	0	1	4	2	0	4	1	3
4:00	23	5	1	4	7	7	6	10	3	8
5:00	71	62	37	31	58	58	58	61	34	54
6:00	131	97	29	36	78	82	86	95	33	77
7:00	55	41	18	12	62	48	42	50	15	40
8:00	30	29	23	10	28	19	20	25	17	23
9:00	21	35	9	5	17	25	12	22	7	18
10:00	29	37	15	15	31	32	31	32	15	27
11:00	27	35	21	6	23	31	35	30	14	25
12:00	32	38	29	19	35	27	33	33	24	30
13:00	34	41	26	17	29	33	19	31	22	28
14:00	26	43	28	29	27	23	28	29	29	29
15:00	30	37	24	27	34	37	44	36	26	33
16:00	37	47	24	29	35	36	41	39	27	36
17:00	60	51	37	35	44	49	60	53	36	48
18:00	49	42	25	26	41	52	49	47	26	41
19:00	17	20	16	15	15	17	15	17	16	16
20:00	9	7	3	8	11	6	8	8	6	7
21:00	3	5	3	5	3	3	6	4	4	4
22:00	5	3	1	2	3	1	3	3	2	3
23:00 Total	708	681	373	335	590	3 593	599	634	2 354	5 54



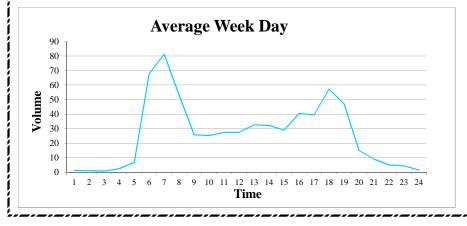
Su	mmary		
	from	to	
AM Peak	6:00 AM	7:00 AM	131
PM Peak	5:00 PM	6:00 PM	60
	Week Da	ay Average	634
	Weekend Da	ay Average	354
	7 Da	ay Average	554

Site 1	Wybong RI	O 300m W of	Ridgelands	RD [100]				Eastbound		
Day	Thu	Fri	Sat	Sun	Mon	Тие	Wed	W/Day	W/End	7 Day
Time	09/11/17	10/11/2017	11/11/2017	12/11/2017	13/11/2017	14/11/2017	15/11/2017	Ave.	Ave.	Ave
0:00	0	2	0	1	0	1	2	1	1	1
1:00	0	2	3	2	0	1	2	1	3	1
2:00	1	2	0	0	1	0	0	1	0	1
3:00	3	1	1	1	2	1	0	1	1	1
4:00	4	3	0	0	1	3	0	2	0	2
5:00	28	25	10	3	29	32	22	27	7	21
6:00	52	46	34	33	47	52	66	53	34	47
7:00	49	58	32	17	49	60	50	53	25	45
8:00	38	42	19	14	47	47	41	43	17	35
9:00	35	30	21	21	30	34	36	33	21	30
10:00	38	27	23	18	29	29	29	30	21	28
11:00	43	34	22	24	34	33	27	34	23	31
12:00	30	35	29	22	44	38	30	35	26	33
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15:00	36	63	23	22	48	46	51	49	23	41
16:00	63	66	18	28	75	84	69	71	23	58
17:00	43	35	16	15	34	31	34	35	16	30
18:00	48	46	44	54	37	51	51	47	49	47
19:00	39	30	31	20	33	27	33	32	26	30
20:00	4	3	5	8	1	4	6	4	7	4
21:00	3	3	1	3	5	2	1	3	2	3
22:00	2	8	0	4	2	3	4	4	2	3
23:00	1	3	1	1	0	3	2	2	1	2
Total	610	631	366	354	609	657	630	627	360	551



Su	mmary		
	from	to	
AM Peak	6:00 AM	7:00 AM	66
PM Peak	4:00 PM	5:00 PM	84
	Week Da	ay Average	627
	Weekend Da	ay Average	360
	7 Da	ay Average	551

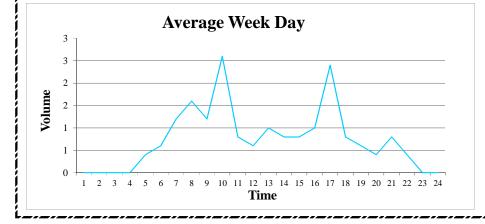
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Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
Time	09/11/17	10/11/2017	11/11/2017	12/11/2017	13/11/2017	14/11/2017	15/11/2017	Ave.	Ave.	Ave
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5:00	92	59	23	17	62	62	64	68	20	54
6:00	58	87	39	35	85	86	90	81	37	69
7:00	49	45	12	6	55	69	46	53	9	40
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17:00	67	50	38	39	59	69	41	57	39	52
18:00	55	34	25	26	48	52	46	47	26	41
19:00	19	18	7	14	12	16	10	15	11	14
20:00	5	15	5	8	5	6	14	9	7	8
21:00	4	10	5	4	0	6	5	5	5	5
22:00	5	3	3	1	3	6	5	4	2	4
23:00	2	1	2	1	2	1	1	1	2	1
Total	631	629	355	330	612	672	618	632	343	550



Su	mmary		
	from	to	
AM Peak	5:00 AM	6:00 AM	92
PM Peak	5:00 PM	6:00 PM	69
	Week Da	ay Average	632
	Weekend Da	ay Average	343
	7 Da	ay Average	550

!	Site 1	Wybong PC	O RD 500m I	E of Yarrama				Eastbound		
!	Day	Thu	Fri	Sat	Sun	Mon	Тие	Wed	W/Day	
ļ	Time	30/11/17	1/12/2017	2/12/2017	3/12/2017	4/12/2017	5/12/2017	6/12/2017	Ave.	
ı										

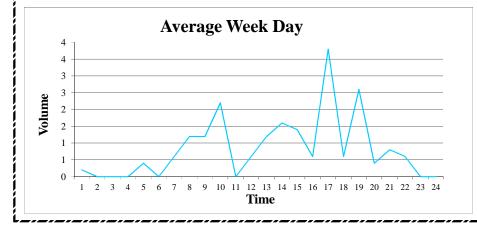
4 -		, <u></u>									
	Day	Thu	Fri	Sat	Sun	Mon	Tue	Wed	W/Day	W/End	7 Day
	Time	30/11/17	1/12/2017	2/12/2017	3/12/2017	4/12/2017	5/12/2017	6/12/2017	Ave.	Ave.	Ave
,											
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	1:00	0	0	0	0	0	0	0	0	0	0
ĺ	2:00	0	0	0	0	0	0	0	0	0	0
	3:00	0	0	0	0	0	0	0	0	0	0
i	4:00	0	0	0	0	1	0	1	0	0	0
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ĺ	17:00	1	1	0	0	1	0	1	1	0	1
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l	19:00	0	1	1	1	0	1	0	0	1	1
	20:00	3	1	0	1	0	0	0	1	1	1
	21:00	1	1	0	0	0	0	0	0	0	0
	22:00	0	0	0	0	0	0	0	0	0	0
	23:00	0	0	0	0	0	0	0	0	0	0
	Total	17	19	11	12	19	17	18	18	12	16



Su	mmary		
	from	to	
AM Peak	10:00 AM	11:00 AM	4
PM Peak	4:00 PM	5:00 PM	4
	Week D	ay Average	18
	Weekend D	ay Average	12
	7 D:	ay Average	16

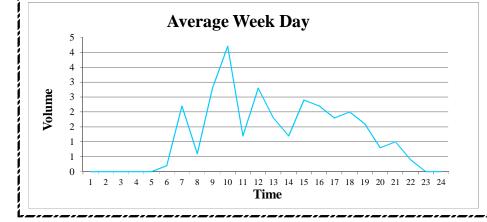
!	Site 1	Wybong PC	RD 500m I	E of Yarrama	an RD [80]				Westbound	ł
}	Day	Thu	Fri	Sat	Sun	Mon	Тие	Wed	W/Day	
ļ	Time	30/11/17	1/12/2017	2/12/2017	3/12/2017	4/12/2017	5/12/2017	6/12/2017	Ave.	
1										

Day	Thu	Fri	Sat	Sun	Mon	Тие	Wed	W/Day	W/End	7 Day
Time	30/11/17	1/12/2017	2/12/2017	3/12/2017	4/12/2017	5/12/2017	6/12/2017	Ave.	Ave.	Ave
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4:00	0	0	0	0	1	0	1	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0
6:00	2	0	0	0	0	0	1	1	0	0
7:00	2	1	0	0	1	1	1	1	0	1
8:00	1	1	0	0	1	1	2	1	0	1
9:00	1	2	1	0	4	3	1	2	1	2
10:00	0	0	1	0	0	0	0	0	1	0
11:00	0	0	2	0	1	2	0	1	1	1
12:00	0	1	0	1	2	2	1	1	1	1
13:00	2	1	1	0	2	2	1	2	1	1
14:00	1	3	1	2	1	1	1	1	2	1
15:00	2	1	0	3	0	0	0	1	2	1
16:00	3	5	0	1	4	3	4	4	1	3
17:00	1	0	3	1	0	1	1	1	2	1
18:00	3	2	0	2	3	2	3	3	1	2
19:00	0	0	2	1	0	0	2	0	2	1
20:00	2	1	0	1	0	1	0	1	1	1
21:00	0	1	0	1	0	1	1	1	1	1
22:00	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	1	0	0	0	0	1	0
Total	20	19	11	14	20	20	21	20	13	18



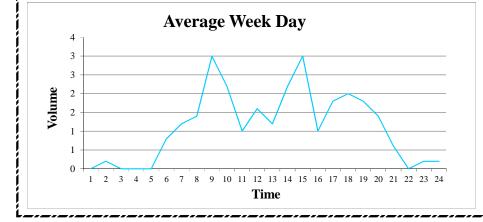
Su	mmary		
	from	to	
AM Peak	9:00 AM	10:00 AM	4
PM Peak	4:00 PM	5:00 PM	5
	Week D	ay Average	20
	Weekend D	ay Average	13
	7 D	ay Average	18

Site 1	Yarraman F	RD 300m S c	of Wybong F	O RD [80]				Northboun	d	
Day	Wed	Thu	Fri	Sat	Sun	Mon	Tue	W/Day	W/End	7 Day
Time	31/01/18	1/02/2018	2/02/2018	3/02/2018	4/02/2018	5/02/2018	6/02/2018	Ave.	Ave.	Ave
0:00	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	1	0	0	0
6:00	2	1	2	0	0	3	3	2	0	2
7:00	2	1	0	1	1	0	0	1	1	1
8:00	4	3	2	1	0	2	3	3	1	2
9:00	3	5	2	2	1	6	5	4	2	3
10:00	1	1	3	0	3	0	1	1	2	1
11:00	4	2	5	0	4	3	0	3	2	3
12:00	1	2	2	1	1	2	2	2	1	2
13:00	0	1	5	3	1	0	0	1	2	1
14:00	2	6	1	2	1	0	3	2	2	2
15:00	1	1	4	0	3	2	3	2	2	2
16:00	1	1	3	2	2	2	2	2	2	2
17:00	3	2	2	0	1	1	2	2	1	2
18:00	1	2	3	2	2	2	0	2	2	2
19:00	0	1	0	1	2	3	0	1	2	1
20:00	1	1	2	2	0	0	1	1	1	1
21:00	0	1	1	0	1	0	0	0	1	0
22:00	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
Total	26	31	37	17	23	26	26	29	20	27



Su	mmary		
	from	to	
AM Peak	9:00 AM	10:00 AM	6
PM Peak	2:00 PM	3:00 PM	6
	Week D	ay Average	29
	Weekend D	ay Average	20
	7 D	ay Average	27

Site 1	Yarraman F	RD 300m S c	of Wybong F	PO RD [80]				Southboun	d	
Day	Wed	Thu	Fri	Sat	Sun	Mon	Tue	W/Day	W/End	7 Day
Time	31/01/18	1/02/2018	2/02/2018	3/02/2018	4/02/2018	5/02/2018	6/02/2018	Ave.	Ave.	Ave
0:00	0	0	0	0	0	0	0	0	0	0
1:00	0	1	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0
5:00	3	0	1	0	0	0	0	1	0	1
6:00	1	1	1	0	0	1	2	1	0	1
7:00	1	2	1	4	3	2	1	1	4	2
8:00	4	4	2	1	2	2	3	3	2	3
9:00	3	1	2	4	1	3	2	2	3	2
10:00	0	3	1	3	0	1	0	1	2	1
11:00	2	0	4	0	3	0	2	2	2	2
12:00	1	2	2	0	1	0	1	1	1	1
13:00	0	3	3	2	0	1	4	2	1	2
14:00	2	2	5	1	2	4	2	3	2	3
15:00	3	2	0	1	2	0	0	1	2	1
16:00	1	4	2	0	2	1	1	2	1	2
17:00	1	1	3	1	0	2	3	2	1	2
18:00	1	3	1	2	3	1	3	2	3	2
19:00	1	3	1	1	0	2	0	1	1	1
20:00	0	0	3	0	0	0	0	1	0	0
21:00	0	0	0	0	0	0	0	0	0	0
22:00	0	0	1	0	0	0	0	0	0	0
23:00	0	1	0	0	0	0	0	0	0	0

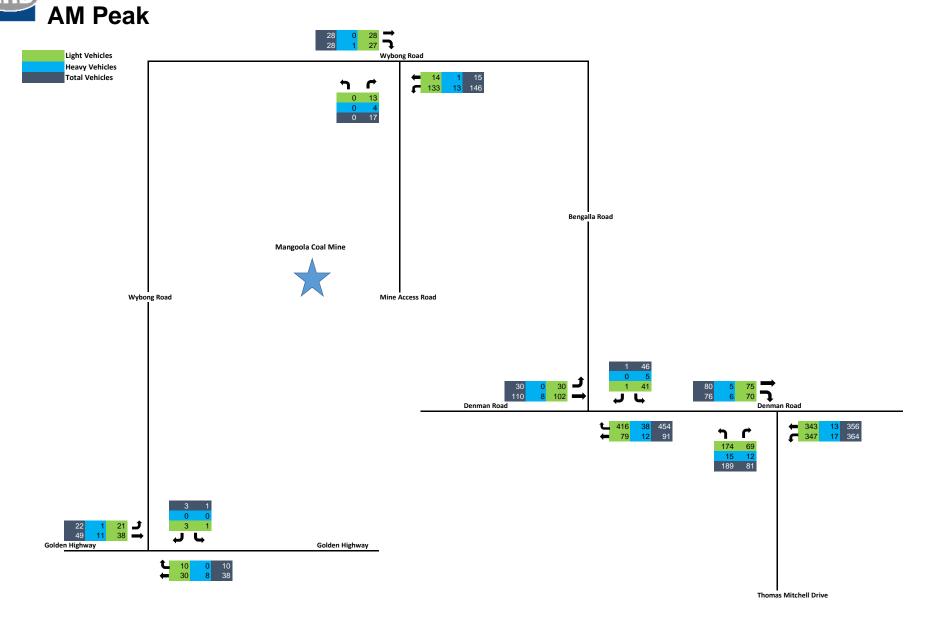


Total

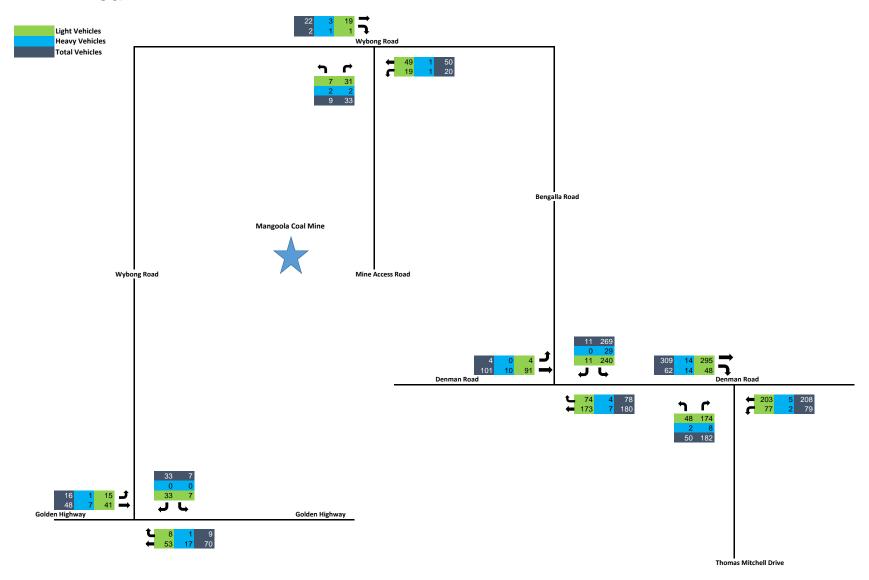
Su	mmary		
	from	to	
AM Peak	8:00 AM	9:00 AM	4
PM Peak	2:00 PM	3:00 PM	5
	Week Da	ny Average	27
	Weekend Da	ny Average	20
	7 Da	ny Average	25

Appendix B – Traffic Volumes

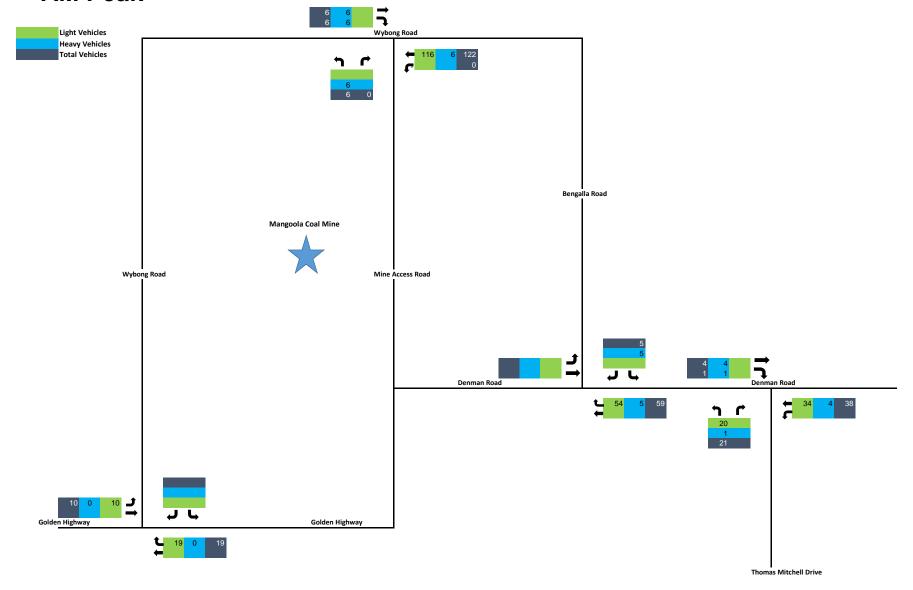
2016/17 Surveyed Flows



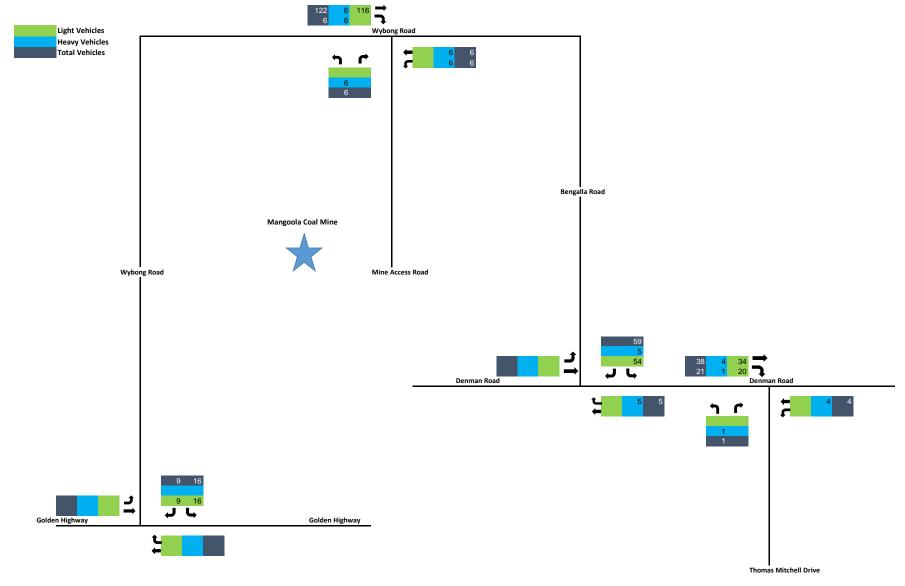
2016/17 Surveyed Flows PM Peak



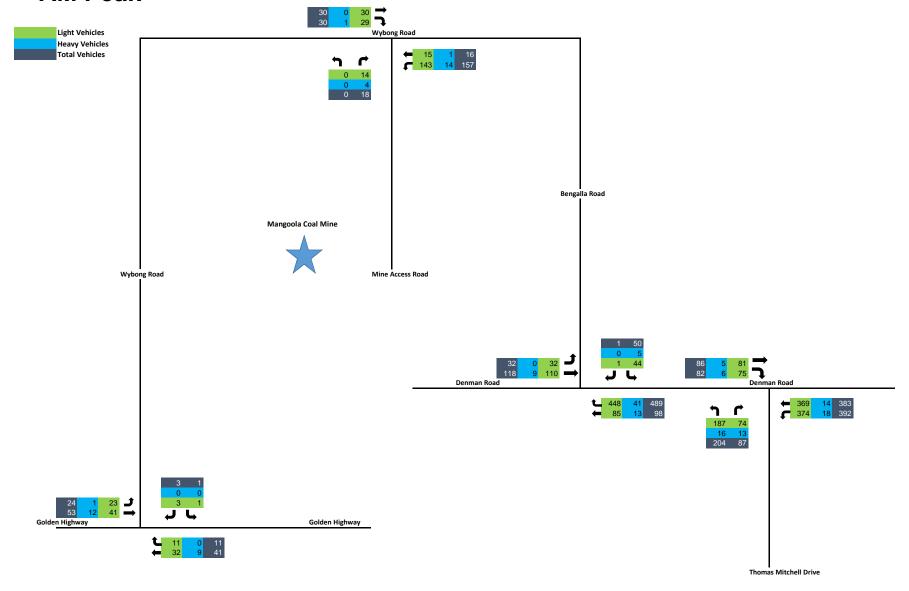
Trip Distribution AM Peak



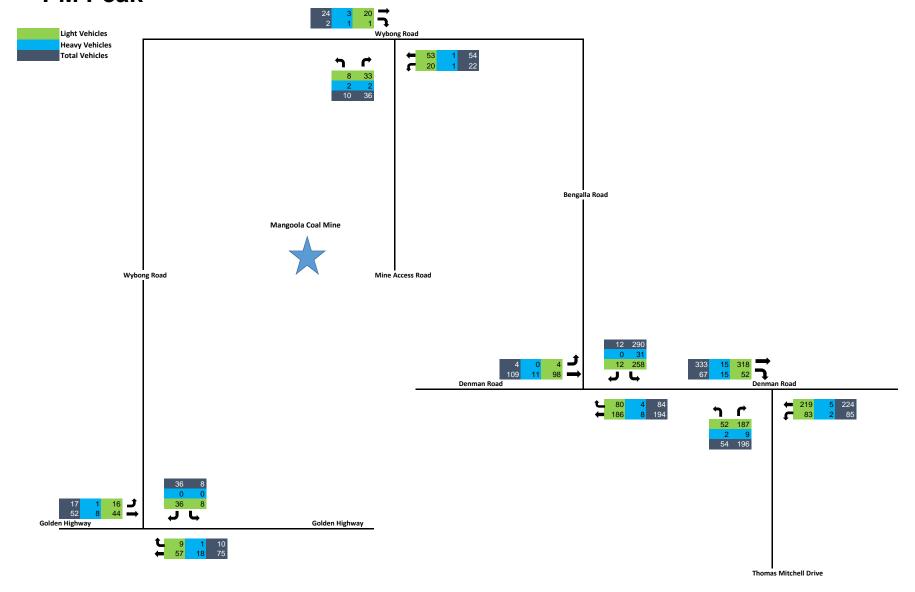
Trip Distribution PM Peak



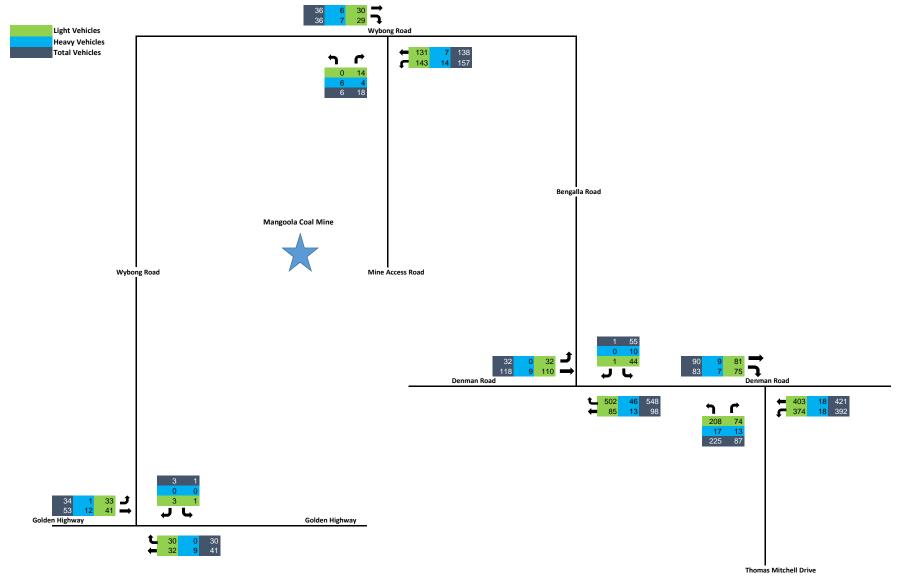
2022 "No Build" AM Peak

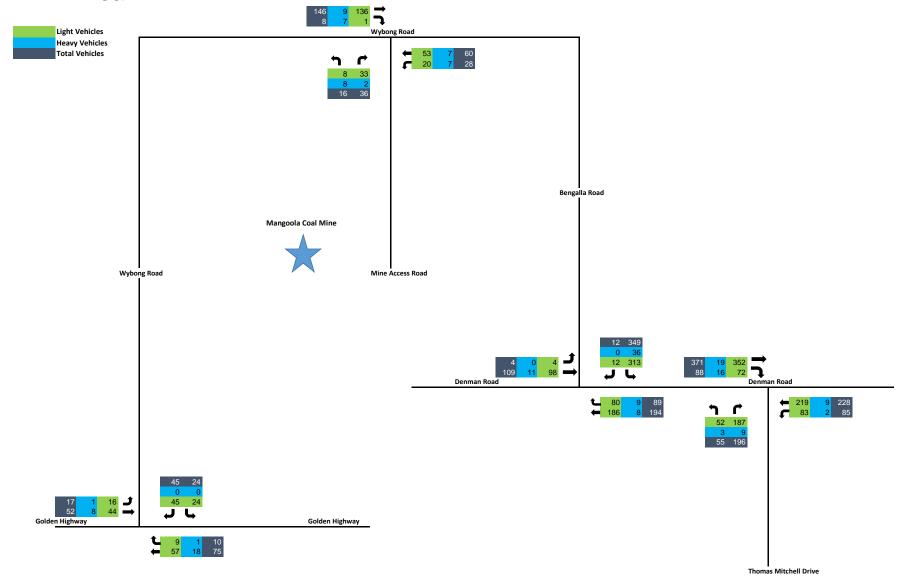


2022 "No Build" PM Peak



2022 "Build" AM Peak





Appendix C – SIDRA Outputs - Existing

MOVEMENT SUMMARY

 ∇ Site: [Wybong and Golden Highway AM Peak - Existing]

Giveway / Yield (Two-Way)

Moveme	nt Performanc	e - Vehicles									
Mov ID	OD Mov	Dema Total veh/h	nd Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/r
East: Gold	den Highway										
5	T1	40	21.1	0.024	0.1	LOSA	0.1	0.5	0.07	0.13	94.6
6	R2	11	0.0	0.024	7.6	LOSA	0.1	0.5	0.09	0.16	82.9
Approach		51	16.7	0.024	1.6	NA	0.1	0.5	0.08	0.14	91.9
North: Wy	bong Road										
7	L2	1	0.0	0.004	5.7	LOSA	0.0	0.1	0.19	0.55	53.1
9	R2	3	0.0	0.004	6.0	LOSA	0.0	0.1	0.19	0.55	52.6
Approach		4	0.0	0.004	5.9	LOSA	0.0	0.1	0.19	0.55	52.7
West: Gol	lden Highway										
10	L2	23	4.5	0.043	8.0	LOSA	0.0	0.0	0.00	0.21	80.9
11	T1	52	22.4	0.043	0.0	LOSA	0.0	0.0	0.00	0.21	92.9
Approach		75	16.9	0.043	2.5	NA	0.0	0.0	0.00	0.21	88.8
All Vehicle	es	129	16.3	0.043	2.3	NA	0.1	0.5	0.04	0.19	88.0

MOVEMENT SUMMARY

 $\overline{\lor}$ Site: [Denman and Bengalla AM Peak - Existing]

New Site Giveway / Yield (Two-Way)

Moveme	nt Performan	ce - Vehicles									
Mov ID	OD Mov	Demai Total veh/h	nd Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Den	man Road										
5	T1	96	13.2	0.053	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	478	8.4	0.402	7.9	LOSA	2.2	16.8	0.36	0.63	61.0
Approach		574	9.2	0.402	6.6	NA	2.2	16.8	0.30	0.53	63.5
North: Ber	ngalla Road										
7	L2	48	10.9	0.046	7.6	LOSA	0.2	1.2	0.22	0.60	60.9
9	R2	1	0.0	0.046	14.9	LOS B	0.2	1.2	0.22	0.60	64.2
Approach		49	10.6	0.046	7.8	LOSA	0.2	1.2	0.22	0.60	61.0
West: Der	nman Road										
10	L2	32	0.0	0.017	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	116	7.3	0.062	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		147	5.7	0.062	1.5	NA	0.0	0.0	0.00	0.13	76.3
All Vehicle	es	771	8.6	0.402	5.7	NA	2.2	16.8	0.24	0.46	65.5

MOVEMENT SUMMARY

abla Site: [Denman and Thomas Mitchell AM Peak - Existing]

New Site Giveway / Yield (Two-Way)

Movem	ent Perforn	nance - Vehicle	es								
Mov ID	OD Mov	Demano Total veh/h	d Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: T	homas Mitch	ell Drive									
1	L2	199	7.9	0.234	9.4	LOSA	0.9	6.8	0.47	0.75	60.4
3	R2	85	14.8	0.259	18.2	LOS C	1.0	8.1	0.74	0.93	51.1
Approac	h	284	10.0	0.259	12.0	LOS B	1.0	8.1	0.55	0.80	57.3
East: De	enman Road										
4	L2	383	4.7	0.213	7.1	LOSA	0.0	0.0	0.00	0.63	63.8
5	T1	375	3.7	0.197	0.0	LOSA	0.0	0.0	0.00	0.00	79.9
Approac	h	758	4.2	0.213	3.6	NA	0.0	0.0	0.00	0.32	70.8
West: D	enman Road										
11	T1	84	6.3	0.152	1.3	LOSA	0.7	5.0	0.16	0.17	75.5
12	R2	80	7.9	0.152	12.4	LOS B	0.7	5.0	0.63	0.68	58.9
Approac	h	164	7.1	0.152	6.7	NA	0.7	5.0	0.39	0.42	66.4
All Vehic	eles	1206	5.9	0.259	6.0	NA	1.0	8.1	0.18	0.45	66.5

 ∇ Site: [Wybong and Mine Access - AM Peak - Existing]

New Site Giveway / Yield (Two-Way)

Movem	ent Perform	ance - Vehicl	es								
Mov ID	OD Mov		d Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back o Vehicles veh	f Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: N	line Access										
1	L2	1	0.0	0.023	5.6	LOSA	0.1	0.7	0.22	0.57	60.7
3	R2	18	23.5	0.023	7.0	LOSA	0.1	0.7	0.22	0.57	55.0
Approac	h	19	22.2	0.023	6.9	LOSA	0.1	0.7	0.22	0.57	55.3
East: Wy	bong Road										
4	L2	154	8.9	0.088	8.1	LOSA	0.0	0.0	0.00	0.66	71.3
5	T1	16	6.7	0.008	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approac	h	169	8.7	0.088	7.3	NA	0.0	0.0	0.00	0.60	73.2
West: W	ybong Road										
11	T1	29	0.0	0.033	0.3	LOSA	0.1	1.0	0.14	0.21	92.3
12	R2	29	3.6	0.033	8.2	LOSA	0.1	1.0	0.27	0.42	63.9
Approac	h	59	1.8	0.033	4.3	NA	0.1	1.0	0.21	0.32	75.5
All Vehic	les	247	8.1	0.088	6.6	NA	0.1	1.0	0.07	0.53	71.9

MOVEMENT SUMMARY

∇ Site: [Wybong and Golden Highway PM Peak - Existing]

Giveway / Yield (Two-Way)

Movement Performance - Vehicles Mov OD Demand Flows Deq. Average Level of 95% Back of Queue Prop. Effective Average												
Mov ID	OD Mov	Demano Total veh/h	d Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	f Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
East: Go	lden Highwa	у										
5	T1	74	24.3	0.041	0.0	LOSA	0.1	0.5	0.04	0.07	96.9	
6	R2	9	11.1	0.041	7.9	LOSA	0.1	0.5	0.05	0.09	79.7	
Approac	h	83	22.8	0.041	0.9	NA	0.1	0.5	0.04	0.08	94.6	
North: W	lybong Road											
7	L2	7	0.0	0.039	8.0	LOSA	0.2	1.1	0.22	0.63	74.5	
9	R2	35	0.0	0.039	8.2	LOSA	0.2	1.1	0.22	0.63	74.0	
Approac	h	42	0.0	0.039	8.2	LOSA	0.2	1.1	0.22	0.63	74.1	
West: Go	olden Highwa	ay										
10	L2	17	6.3	0.038	5.6	LOSA	0.0	0.0	0.00	0.15	56.7	
11	T1	51	14.6	0.038	0.0	LOSA	0.0	0.0	0.00	0.15	58.6	
Approac	h	67	12.5	0.038	1.4	NA	0.0	0.0	0.00	0.15	58.1	
All Vehic	les	193	14.2	0.041	2.7	NA	0.2	1.1	0.07	0.22	73.9	

MOVEMENT SUMMARY

 \overline{igvee} Site: [Denman and Bengalla PM Peak - Existing]

Mov	OD	Deman	d Flows	Deg.	Average	Level of	95% Back o	of Queue	Prop.	Effective	Average
ID	Mov	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh			per veh	km/h
East: De	enman Road										
5	T1	189	3.9	0.100	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	82	5.1	0.065	7.4	LOSA	0.3	1.9	0.23	0.60	62.6
Approac	:h	272	4.3	0.100	2.2	NA	0.3	1.9	0.07	0.18	73.8
North: B	engalla										
7	L2	283	10.8	0.267	6.3	LOSA	1.2	8.9	0.26	0.57	52.4
9	R2	12	0.0	0.267	9.4	LOSA	1.2	8.9	0.26	0.57	52.6
Approac	:h	295	10.4	0.267	6.4	LOSA	1.2	8.9	0.26	0.57	52.4
West: D	enman Road										
10	L2	4	0.0	0.002	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	106	9.9	0.058	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approac	:h	111	9.5	0.058	0.3	NA	0.0	0.0	0.00	0.02	79.3
All Vehic	cles	677	7.8	0.267	3.7	NA	1.2	8.9	0.14	0.33	63.2

 ∇ Site: [Denman and Thomas Mitchell PM Peak - Existing]

New Site Giveway / Yield (Two-Way)

Movem	ent Perform	ance - Vehicl	es								
Mov	OD		d Flows	Deg.	Average	Level of	95% Back o		Prop.	Effective	Average
ID	Mov	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
South: T	Thomas Mitche	veh/h	%	v/c	sec		veh	m		per veh	km/f
South. 1											
1	L2	53	4.0	0.050	7.9	LOSA	0.2	1.3	0.31	0.62	62.7
3	R2	192	4.4	0.455	17.6	LOS C	2.4	17.5	0.74	0.99	53.8
Approac	ch	244	4.3	0.455	15.5	LOS C	2.4	17.5	0.65	0.91	55.5
East: De	enman Road										
4	L2	83	2.5	0.046	7.0	LOSA	0.0	0.0	0.00	0.63	64.5
5	T1	219	2.4	0.114	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approac	ch	302	2.4	0.114	1.9	NA	0.0	0.0	0.00	0.17	75.0
West: D	enman Road										
11	T1	325	4.5	0.203	0.6	LOSA	0.8	5.8	0.18	0.10	77.0
12	R2	65	22.6	0.203	9.3	LOSA	0.8	5.8	0.24	0.14	62.9
Approac	ch	391	7.5	0.203	2.0	NA	0.8	5.8	0.19	0.11	74.2
All Vehic	cles	937	5.1	0.455	5.5	NA	2.4	17.5	0.25	0.34	68.4

MOVEMENT SUMMARY

abla Site: [Wybong and Mine Access - PM Peak - Existing]

Movem	ent Perform	ance - Vehicle	es								
Mov ID	OD Mov	Demano Total veh/h	d Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: N	line Access										
1	L2	9	22.2	0.045	6.0	LOSA	0.2	1.3	0.19	0.55	55.9
3	R2	35	6.1	0.045	6.2	LOSA	0.2	1.3	0.19	0.55	59.4
Approac	h	44	9.5	0.045	6.1	LOSA	0.2	1.3	0.19	0.55	58.6
East: Wy	bong Road										
4	L2	21	5.0	0.012	8.0	LOSA	0.0	0.0	0.00	0.66	72.7
5	T1	53	2.0	0.027	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approac	h	74	2.9	0.027	2.3	NA	0.0	0.0	0.00	0.19	90.2
West: W	ybong Road										
11	T1	23	13.6	0.012	0.1	LOSA	0.0	0.2	0.04	0.05	98.5
12	R2	2	50.0	0.012	9.2	LOSA	0.0	0.2	0.05	0.07	66.8
Approac	h	25	16.7	0.012	0.8	NA	0.0	0.2	0.04	0.06	94.7
All Vehic	les	143	7.4	0.045	3.2	NA	0.2	1.3	0.07	0.28	77.9

Appendix D – SIDRA Outputs - 2022

 ∇ Site: [Wybong and Golden Highway AM Peak - 2022 No Build]

Giveway / Yield (Two-Way)

Movement	Performance - V	ehicles									
Mov ID	OD Mov	De Total veh/h	mand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Quet Vehicles veh	ue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Golder	Highway	Vetilii	70	V/C	SCL		VCII			per veri	MIVII
5	T1	43	22.0	0.027	0.1	LOSA	0.1	0.5	0.08	0.13	94.5
6	R2	12	0.0	0.027	7.6	LOSA	0.1	0.5	0.10	0.17	82.7
Approach		55	17.3	0.027	1.7	NA	0.1	0.5	0.08	0.14	91.7
North: Wybo	ng Road										
7	L2	1	0.0	0.004	5.7	LOSA	0.0	0.1	0.20	0.55	53.1
9	R2	3	0.0	0.004	6.1	LOSA	0.0	0.1	0.20	0.55	52.5
Approach		4	0.0	0.004	6.0	LOSA	0.0	0.1	0.20	0.55	52.7
West: Golde	n Highway										
10	L2	25	4.2	0.047	7.9	LOSA	0.0	0.0	0.00	0.21	81.1
11	T1	57	22.2	0.047	0.0	LOSA	0.0	0.0	0.00	0.21	92.9
Approach		82	16.7	0.047	2.4	NA	0.0	0.0	0.00	0.21	88.9
All Vehicles		141	16.4	0.047	2.3	NA	0.1	0.5	0.04	0.19	88.1

MOVEMENT SUMMARY

 \overline{igvee} Site: [Denman and Bengalla AM Peak - 2022 No Build]

New Site Giveway / Yield (Two-Way)

Mov	OD	Derr	and Flows	Deg.	Average	Level of	95% Back of Q	IDIID	Prop.	Effective	Average
ID	Mov	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h		v/c	sec		veh			per veh	km/h
East: Denma	an Road										
5	T1	103	13.3	0.057	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	515	8.4	0.438	8.1	LOSA	2.5	19.0	0.39	0.64	60.9
Approach		618	9.2	0.438	6.7	NA	2.5	19.0	0.33	0.53	63.4
North: Beng	alla Road										
7	L2	52	10.2	0.049	7.7	LOSA	0.2	1.3	0.23	0.60	61.1
9	R2	1	0.0	0.049	16.1	LOS C	0.2	1.3	0.23	0.60	64.1
Approach		53	10.0	0.049	7.8	LOSA	0.2	1.3	0.23	0.60	61.1
West: Denm	nan Road										
10	L2	34	0.0	0.018	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	125	7.6	0.067	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		159	6.0	0.067	1.5	NA	0.0	0.0	0.00	0.13	76.4
All Vehicles		829	8.6	0.438	5.8	NA	2.5	19.0	0.26	0.46	65.4

MOVEMENT SUMMARY

Site: [Denman and Thomas Mitchell AM Peak - 2022 No Build]
New Site
Giveway / Yield (Two-Way)

Movement	Performance - Vehi	cles									
Mov	OD		and Flows	Deg.	Average	Level of	95% Back of Qu		Prop.	Effective	Average
	Mov	Total		Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Thom	nas Mitchell Drive										
1	L2	214	7.9	0.261	9.6	LOSA	1.0	7.7	0.50	0.77	60.1
3	R2	91	14.0	0.302	20.3	LOS C	1.2	9.6	0.78	0.95	49.8
Approach		304	9.7	0.302	12.8	LOS B	1.2	9.6	0.58	0.83	56.7
East: Denma	an Road										
4	L2	413	4.6	0.229	7.1	LOSA	0.0	0.0	0.00	0.63	63.8
5	T1	403	3.7	0.212	0.0	LOSA	0.0	0.0	0.00	0.00	79.9
Approach		816	4.1	0.229	3.6	NA	0.0	0.0	0.00	0.32	70.9
West: Denm	an Road										
11	T1	91	5.8	0.173	1.2	LOSA	0.7	5.5	0.14	0.15	75.9
12	R2	85	7.4	0.173	13.1	LOS B	0.7	5.5	0.67	0.72	58.2
Approach		176	6.6	0.173	7.0	NA	0.7	5.5	0.40	0.43	66.1
All Vehicles		1296	5.8	0.302	6.2	NA	1.2	9.6	0.19	0.45	66.3

MOVEMENT SUMMARY

Site: [Wybong and Mine Access - AM Peak - No Build]
New Site
Giveway / Yield (Two-Way)

Movement	Performance - V	ehicles									
Mov ID	OD Mov	Den Total veh/h	nand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Que Vehicles veh	ue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mine /	Access										
1	L2	1	0.0	0.025	5.6	LOSA	0.1	0.8	0.24	0.57	60.6
3	R2	19	22.2	0.025	7.0	LOSA	0.1	0.8	0.24	0.57	55.3
Approach		20	21.1	0.025	7.0	LOSA	0.1	8.0	0.24	0.57	55.5
East: Wybong	g Road										
4	L2	165	8.9	0.095	8.1	LOSA	0.0	0.0	0.00	0.66	71.3
5	T1	17	6.3	0.009	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approach		182	8.7	0.095	7.3	NA	0.0	0.0	0.00	0.60	73.2
West: Wybon	ng Road										
11	T1	32	0.0	0.035	0.3	LOSA	0.2	1.1	0.14	0.21	92.3
12	R2	32	3.3	0.035	8.2	LOSA	0.2	1.1	0.29	0.42	63.8
Approach		63	1.7	0.035	4.3	NA	0.2	1.1	0.21	0.32	75.5
All Vehicles		265	7.9	0.095	6.6	NA	0.2	1.1	0.07	0.53	72.0

 $\overline{\lor}$ Site: [Wybong and Golden Highway PM Peak - No Build]

Giveway / Yield (Two-Way)

Movement F	Performance - Ve	hicles									
Mov	OD		and Flows	Deg.	Average	Level of	95% Back of Quet		Prop.	Effective	Average
	Mov	Total	HV.	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
East: Golden	Liahuay	veh/h	%	v/c	sec		veh	m		per veh	km/h
Last. Goldell											
5	T1	79	24.0	0.044	0.0	LOSA	0.1	0.5	0.04	0.08	96.8
6	R2	11	10.0	0.044	7.9	LOSA	0.1	0.5	0.06	0.10	80.1
Approach		89	22.4	0.044	1.0	NA	0.1	0.5	0.05	0.08	94.5
North: Wybon	ig Road										
7	L2	8	0.0	0.043	8.0	LOSA	0.2	1.2	0.23	0.63	74.5
9	R2	38	0.0	0.043	8.3	LOSA	0.2	1.2	0.23	0.63	74.0
Approach		46	0.0	0.043	8.2	LOSA	0.2	1.2	0.23	0.63	74.1
West: Golden	Highway										
10	L2	18	5.9	0.041	5.6	LOSA	0.0	0.0	0.00	0.15	56.7
11	T1	55	15.4	0.041	0.0	LOSA	0.0	0.0	0.00	0.15	58.6
Approach		73	13.0	0.041	1.4	NA	0.0	0.0	0.00	0.15	58.1
All Vehicles		208	14.1	0.044	2.7	NA	0.2	1.2	0.07	0.22	73.8

MOVEMENT SUMMARY

 ∇ Site: [Denman and Bengalla PM Peak - 2022 No Build]

New Site Giveway / Yield (Two-Way)

Movement	Performance - Ve	hicles									
Mov ID	OD Mov	Dem Total	and Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Que Vehicles	eue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h		v/c	sec		veh			per veh	km/h
East: Denma	n Road										
5	T1	204	4.1	0.108	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	88	4.8	0.071	7.4	LOSA	0.3	2.1	0.24	0.60	62.7
Approach		293	4.3	0.108	2.2	NA	0.3	2.1	0.07	0.18	73.8
North: Benga	illa										
7	L2	304	10.7	0.290	6.3	LOSA	1.3	9.9	0.28	0.58	52.3
9	R2	13	0.0	0.290	10.0	LOSA	1.3	9.9	0.28	0.58	52.5
Approach		317	10.3	0.290	6.5	LOSA	1.3	9.9	0.28	0.58	52.3
West: Denma	an Road										
10	L2	4	0.0	0.002	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	115	10.1	0.063	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		119	9.7	0.063	0.3	NA	0.0	0.0	0.00	0.02	79.3
All Vehicles		728	7.8	0.290	3.8	NA	1.3	9.9	0.15	0.33	63.2

MOVEMENT SUMMARY

 $\overline{\lor}$ Site: [Denman and Thomas Mitchell PM Peak - No Build]

New Site Giveway / Yield (Two-Way)

Movement	Performance - Veh	nicles									
Mov ID	OD Mov	Dem Total veh/h	and Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Que Vehicles veh	ue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Thom	nas Mitchell Drive	VOIDII	,,,	***	500		7011			per ven	101111
1	L2	57	3.7	0.055	8.0	LOSA	0.2	1.4	0.32	0.63	62.7
3	R2	206	4.6	0.535	20.2	LOS C	3.0	22.0	0.79	1.04	51.7
Approach		263	4.4	0.535	17.6	LOS C	3.0	22.0	0.69	0.95	53.7
East: Denma	an Road										
4	L2	89	2.4	0.049	7.0	LOSA	0.0	0.0	0.00	0.63	64.6
5	T1	236	2.2	0.123	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		325	2.3	0.123	1.9	NA	0.0	0.0	0.00	0.17	75.0
West: Denma	an Road										
11	T1	351	4.5	0.220	0.6	LOSA	0.9	6.5	0.19	0.10	76.9
12	R2	71	22.4	0.220	9.6	LOSA	0.9	6.5	0.25	0.14	62.9
Approach		421	7.5	0.220	2.1	NA	0.9	6.5	0.20	0.11	74.1
All Vehicles		1009	5.0	0.535	6.1	NA	3.0	22.0	0.26	0.35	67.7

MOVEMENT SUMMARY

Site: [Wybong and Mine Access - PM Peak - No Build]
New Site
Giveway / Yield (Two-Way)

Mov			nand Flows	Deg. Satn	Average	Level of	95% Back of Q		Prop.	Effective	Average
		Total veh/h	HV %	Satn v/c	Delay sec	Service	Vehicles veh	Distance m	Queued	Stop Rate per veh	Speed km/
South: Mine	Access		-								
1	L2	11	20.0	0.048	6.0	LOSA	0.2	1.4	0.20	0.56	56.
3	R2	37	5.7	0.048	6.2	LOSA	0.2	1.4	0.20	0.56	59.5
Approach		47	8.9	0.048	6.2	LOSA	0.2	1.4	0.20	0.56	58.
East: Wybor	ng Road										
4	L2	22	4.8	0.012	8.0	LOSA	0.0	0.0	0.00	0.66	72.7
5	T1	57	1.9	0.030	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approach		79	2.7	0.030	2.2	NA	0.0	0.0	0.00	0.18	90.
West: Wybo	ng Road										
11	T1	24	13.0	0.013	0.1	LOSA	0.0	0.2	0.04	0.05	98.5
12	R2	2	50.0	0.013	9.2	LOSA	0.0	0.2	0.05	0.07	66.8
Approach		26	16.0	0.013	0.8	NA	0.0	0.2	0.04	0.05	94.9
All Vehicles		153	6.9	0.048	3.2	NA	0.2	1.4	0.07	0.28	78.0

 ∇ Site: [Wybong and Golden Highway AM Peak - 2022 Build]

Giveway / Yield (Two-Way)

Mov		Dem	and Flows	Deg.	Average	Level of	95% Back of (Queue	Prop.	Effective	Average
	Mov	Total		Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/t
East: Golde	en Highway										
5	T1	43	22.0	0.036	0.1	LOSA	0.1	1.1	0.12	0.23	91.3
6	R2	32	0.0	0.036	7.7	LOSA	0.1	1.1	0.17	0.32	78.7
Approach		75	12.7	0.036	3.3	NA	0.1	1.1	0.14	0.27	85.5
North: Wyb	ong Road										
7	L2	1	0.0	0.004	5.7	LOSA	0.0	0.1	0.21	0.55	53.0
9	R2	3	0.0	0.004	6.2	LOSA	0.0	0.1	0.21	0.55	52.5
Approach		4	0.0	0.004	6.1	LOSA	0.0	0.1	0.21	0.55	52.7
West: Gold	len Highway										
10	L2	36	2.9	0.053	7.9	LOSA	0.0	0.0	0.00	0.26	80.4
11	T1	57	22.2	0.053	0.0	LOSA	0.0	0.0	0.00	0.26	91.3
Approach		93	14.8	0.053	3.1	NA	0.0	0.0	0.00	0.26	86.8
All Vehicles	s	172	13.5	0.053	3.3	NA	0.1	1.1	0.07	0.27	84.9

MOVEMENT SUMMARY

 ∇ Site: [Denman and Bengalla AM Peak - 2022 Build]

New Site Giveway / Yield (Two-Way)

Mov	OD	Dem:	and Flows	Deg.	Average	Level of	95% Back of C	عالماله	Prop.	Effective	Average
ID	Mov	Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/t
East: Denm	an Road										
5	T1	103	13.3	0.057	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	577	8.4	0.491	8.3	LOSA	3.4	25.3	0.42	0.65	60.8
Approach		680	9.1	0.491	7.1	NA	3.4	25.3	0.36	0.55	63.1
North: Beng	alla Road										
7	L2	57	18.5	0.057	7.9	LOSA	0.2	1.6	0.24	0.60	58.6
9	R2	1	0.0	0.057	17.9	LOS C	0.2	1.6	0.24	0.60	64.1
Approach		58	18.2	0.057	8.1	LOSA	0.2	1.6	0.24	0.60	58.7
West: Denn	nan Road										
10	L2	34	0.0	0.018	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	125	7.6	0.067	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		159	6.0	0.067	1.5	NA	0.0	0.0	0.00	0.13	76.4
All Vehicles		897	9.2	0.491	6.1	NA	3.4	25.3	0.29	0.48	64.8

MOVEMENT SUMMARY

 $\overline{igwedge}$ Site: [Denman and Thomas Mitchell AM Peak - 2022 Build]

Mov	OD	Dem	and Flows	Deg.	Average	Level of	95% Back of C	Queue	Prop.	Effective	Average
	Mov	Total		Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%				veh			per veh	km/
South: Tho	mas Mitchell Drive										
1	L2	237	7.6	0.305	10.3	LOS B	1.3	9.9	0.54	0.83	59.6
3	R2	92	14.9	0.342	22.8	LOS C	1.4	11.1	0.81	0.98	47.9
Approach		328	9.6	0.342	13.8	LOS B	1.4	11.1	0.61	0.87	55.8
East: Denn	nan Road										
4	L2	413	4.6	0.229	7.1	LOSA	0.0	0.0	0.00	0.63	63.8
5	T1	443	4.3	0.234	0.0	LOSA	0.0	0.0	0.00	0.00	79.9
Approach		856	4.4	0.234	3.4	NA	0.0	0.0	0.00	0.30	71.2
West: Denr	man Road										
11	T1	95	10.0	0.187	1.3	LOSA	0.8	6.0	0.14	0.15	75.9
12	R2	86	8.5	0.187	13.8	LOS B	0.8	6.0	0.70	0.73	57.2
Approach		181	9.3	0.187	7.3	NA	0.8	6.0	0.41	0.43	65.7
All Vehicles		1365	6.3	0.342	6.4	NA	1.4	11.1	0.20	0.46	66.1

 ∇ Site: [Wybong and Mine Access - AM Peak - 2022 Build]

New Site Giveway / Yield (Two-Way)

Mov	OD	Dema	and Flows	Deg.	Average	Level of	95% Back of	Queue	Prop.	Effective	Average
	Mov	Total		Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/l
South: Min	e Access										
1	L2	7	85.7	0.040	7.7	LOSA	0.1	1.4	0.39	0.63	44.1
3	R2	19	22.2	0.040	8.6	LOSA	0.1	1.4	0.39	0.63	54.3
Approach		26	40.0	0.040	8.3	LOSA	0.1	1.4	0.39	0.63	51.0
East: Wyb	ong Road										
4	L2	165	8.9	0.095	8.1	LOSA	0.0	0.0	0.00	0.66	71.3
5	T1	145	5.1	0.077	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approach		311	7.1	0.095	4.3	NA	0.0	0.0	0.00	0.35	82.3
West: Wyb	ong Road										
11	T1	38	16.7	0.051	0.7	LOSA	0.2	1.9	0.18	0.22	92.1
12	R2	38	19.4	0.051	9.6	LOSA	0.2	1.9	0.40	0.47	62.0
Approach		76	18.1	0.051	5.1	NA	0.2	1.9	0.29	0.34	74.1
All Vehicle	s	413	11.2	0.095	4.7	NA	0.2	1.9	0.08	0.37	77.7

MOVEMENT SUMMARY

 \overline{V} Site: [Wybong and Golden Highway PM Peak - 2022 Build]

Giveway / Yield (Two-Way)

Movemen	t Performance -	Vehicles									
Mov ID	OD Mov	Dema Total veh/h	and Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of C Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Golde	en Highway	VCIDII	70	V/C	366		VCII			per ven	MINI
5	T1	79	24.0	0.044	0.0	LOSA	0.1	0.5	0.04	0.08	96.8
6	R2	11	10.0	0.044	7.9	LOSA	0.1	0.5	0.06	0.10	80.1
Approach		89	22.4	0.044	1.0	NA	0.1	0.5	0.05	0.08	94.5
North: Wyb	ong Road										
7	L2	25	0.0	0.064	8.0	LOSA	0.3	1.8	0.20	0.63	74.5
9	R2	47	0.0	0.064	8.3	LOSA	0.3	1.8	0.20	0.63	74.0
Approach		73	0.0	0.064	8.2	LOSA	0.3	1.8	0.20	0.63	74.2
West: Gold	en Highway										
10	L2	18	5.9	0.041	5.6	LOSA	0.0	0.0	0.00	0.15	56.7
11	T1	55	15.4	0.041	0.0	LOSA	0.0	0.0	0.00	0.15	58.6
Approach		73	13.0	0.041	1.4	NA	0.0	0.0	0.00	0.15	58.1
All Vehicles	•	235	12.6	0.064	3.3	NA	0.3	1.8	0.08	0.27	73.9

MOVEMENT SUMMARY

 ∇ Site: [Denman and Bengalla PM Peak - 2022 Build]

Movemen	t Performance -	Vehicles									
Mov ID	OD Mov	Dema Total veh/h	and Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Qu Vehicles veh	ueue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Denm	nan Road	70.017		.,,	555		70			por ron	
5	T1	204	4.1	0.108	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
6	R2	94	10.1	0.077	7.5	LOSA	0.3	2.4	0.24	0.60	61.0
Approach		298	6.0	0.108	2.4	NA	0.3	2.4	0.08	0.19	72.8
North: Beng	galla										
7	L2	367	10.3	0.346	6.4	LOSA	1.6	12.5	0.29	0.58	52.3
9	R2	13	0.0	0.346	10.4	LOS B	1.6	12.5	0.29	0.58	52.5
Approach		380	10.0	0.346	6.5	LOSA	1.6	12.5	0.29	0.58	52.3
West: Denr	man Road										
10	L2	4	0.0	0.002	6.9	LOSA	0.0	0.0	0.00	0.63	65.4
11	T1	115	10.1	0.063	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		119	9.7	0.063	0.3	NA	0.0	0.0	0.00	0.02	79.3
All Vehicles	3	797	8.5	0.346	4.0	NA	1.6	12.5	0.17	0.35	61.9

 $\overline{igwedge}$ Site: [Denman and Thomas Mitchell PM Peak - 2022 Build]

New Site Giveway / Yield (Two-Way)

Mov	OD	Dema	and Flows	Deg.	Average	Level of	95% Back of 0	Queue	Prop.	Effective	Average
	Mov	Total		Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/t
South: Tho	mas Mitchell Drive										
1	L2	58	5.5	0.057	8.1	LOSA	0.2	1.5	0.33	0.63	62.1
3	R2	206	4.6	0.605	23.9	LOS C	3.5	25.7	0.84	1.09	49.1
Approach		264	4.8	0.605	20.5	LOS C	3.5	25.7	0.73	0.99	51.5
East: Denm	nan Road										
4	L2	89	2.4	0.049	7.0	LOSA	0.0	0.0	0.00	0.63	64.6
5	T1	240	3.9	0.126	0.0	LOSA	0.0	0.0	0.00	0.00	80.0
Approach		329	3.5	0.126	1.9	NA	0.0	0.0	0.00	0.17	75.1
West: Denn	man Road										
11	T1	391	5.1	0.257	0.7	LOSA	1.1	8.4	0.21	0.12	76.4
12	R2	93	18.2	0.257	9.5	LOSA	1.1	8.4	0.29	0.17	63.8
Approach		483	7.6	0.257	2.4	NA	1.1	8.4	0.23	0.13	73.6
All Vehicles		1077	5.7	0.605	6.7	NA	3.5	25.7	0.28	0.35	67.0

MOVEMENT SUMMARY

 $\overline{\lor}$ Site: [Wybong and Mine Access - PM Peak - 2022 Build]

Mov	OD		and Flows	Deg.	Average	Level of	95% Back of 0	Queue	Prop.	Effective	Average
	Mov	Total veh/h	HV %	Satn v/c	Delay sec	Service	Vehicles veh	Distance m	Queued	Stop Rate per veh	Speed km/
South: Min	ie Access										
1	L2	17	50.0	0.065	6.5	LOSA	0.2	2.0	0.26	0.59	50.0
3	R2	37	5.7	0.065	7.4	LOSA	0.2	2.0	0.26	0.59	58.9
Approach		54	19.6	0.065	7.1	LOSA	0.2	2.0	0.26	0.59	55.8
East: Wybo	ong Road										
4	L2	28	25.9	0.018	8.5	LOSA	0.0	0.0	0.00	0.66	65.8
5	T1	63	11.7	0.035	0.0	LOSA	0.0	0.0	0.00	0.00	100.0
Approach		92	16.1	0.035	2.6	NA	0.0	0.0	0.00	0.21	86.1
West: Wyb	ong Road										
11	T1	153	6.2	0.076	0.1	LOSA	0.1	0.8	0.04	0.03	99.3
12	R2	8	87.5	0.076	10.6	LOS B	0.1	0.8	0.05	0.04	64.7
Approach		161	10.5	0.076	0.6	NA	0.1	0.8	0.04	0.04	96.6
All Vehicle:	s	306	13.7	0.076	2.4	NA	0.2	2.0	0.06	0.18	82.9

Appendix E – Correspondence with Roads and Maritime Services

Mark Lucas

From: COLLAGUAZO David < David.COLLAGUAZO@rms.nsw.gov.au>

Sent: Tuesday, 7 November 2017 4:47 PM

To: Mark Lucas

Cc: Development hunter

Subject: RE: Mangoola Coal Mine - Attention Peter Marler

Hi Mark,

Further to our discussion regarding your email request dated 27/10/2017, I can confirm that the 10 year growth projection is not required for this proposal as there will not be an increase in operational traffic volumes as a result of the project.

If you require any further information, please contact development.hunter@rms.nsw.gov.au

Regards,

David Collaguazo

Development Assessment Officer Network & Safety Hunter | Regional & Freight T 02 4908 7734

www.rms.nsw.gov.au

Roads and Maritime Services Level 8, 266 King Street, Newcastle NSW 2300

From: Mark Lucas [mailto:Mark.Lucas@ghd.com] Sent: Tuesday, 31 October 2017 10:17 AM

To: Development hunter

Subject: RE: Mangoola Coal Mine - Attention Peter Marler

Hi Peter,

I've left a few messages, can you please call me to discuss the Mangoola Coal Mine Continuation.

Cheers,

Mark Lucas

Principal Transport Planner

GHD

T: +61 2 9239 7141 | V: 217141 | M: 0428 269819 | E: mark.lucas@ghd.com Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

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From: Mark Lucas

Sent: Friday, 27 October 2017 9:45 AM

To: 'development.hunter@rms.nsw.gov.au' < <u>development.hunter@rms.nsw.gov.au</u> >

Subject: Mangoola Coal Mine - Attention Peter Marler

Hi Pete,

I am completing the Traffic Assessment for the Mangoola Cola Mine Continuation. I have a few comments / questions re the letter issued by Roads and Maritime on the 15th August 2017.

In accordance with your instructions the following intersections will be included in the analysis:

- Wybong Road and the Mine Access Road
- Wybong Road and Golden Highway
- Bengalla Road and Denman Road

The operational traffic volumes are not expected to change (i.e. the approved rate of 13.5 million tonnes per annum will not change). Any new impacts will be associated with the construction traffic. Accordingly please confirm if the 10 year growth projection scenario is required.

I would be happy to meet you to discuss the project.

Can you call me when you are free?

Regards,

Mark Lucas

Principal Transport Planner

GHD

T: +61 2 9239 7141 | V: 217141 | M: 0428 269819 | E: mark.lucas@ghd.com Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

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Document Status

Revision	Author	Reviewer		Approved for Issue				
		Name	Signature	Name	Signature	Date		
Α	ML	OP	ORP	PY		05/12/17		
В	ML	OP	ORP					
1	ML					08/03/2019		

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