APPENDIX K

Road transport assessment

Cobbora Holding Company Pty Limited

EMM
EMGA Mitchell McLennan

Road transport assessment

Cobbora Coal Project

Prepared for Cobbora Holding Company Pty Limited | 17 September 2012

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Road transport assessment

Final

Report J11030RP12| Prepared for Cobbora Holding Company Pty Limited | 17 September 2012

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Executive Summary

ES1 Introduction

The Cobbora Coal Project (the Project) is an open cut coal mine proposed by the Cobbora Holding Company Pty Limited (CHC). The mine will supply thermal coal, primarily to power stations in NSW. Some coal from the Project may also be exported. The Project is located approximately 5 km south of Cobbora, 22 km south-west of Dunedoo, 64 km north-west of Mudgee and 60 km east of Dubbo in the central west of NSW (see Figure E.1).

This traffic impact assessment has studied the potential traffic impacts and necessary mitigation measures required for the Project. It covers an extensive road network which includes two state highways (Castlereagh Highway SH 18, Golden Highway SH 27), major and minor local roads in the Warrumbungle, Mid Western Regional and Wellington local government areas and other classified roads, generally to the south and west of the mine project area (Goolma Road, Cobbora Road and Gollan Road).

A related report has also been prepared by EMGA Mitchell McLennan Pty Limited (EMM) which assesses the rail transport impacts for the Project. The rail transport report presents details of the proposed mine to end user transport operation and the assessment of rail corridor freight transport capacity constraints and upgrading strategies. The future operating safety and traffic delays at railway level crossings are also assessed in the rail transport report as the operational control of railway level crossings is normally determined by the rail transport authorities.

ES2 Key traffic related details of the Project

The Project will consist of three mining areas, a central infrastructure area and a number of associated facilities, specifically:

- a coal handling and processing plant (CHPP);
- a 28 km rail line spur with loading loop and train refuelling facility;
- a realignment of Spring Ridge Road around the mine site to the Golden Highway and other road realignment/reconstruction works on Brooklyn Road and Dapper Road;
- a proposed water pipeline from the Cudgegong River and pumping stations;
- upgrades to the local area electricity supply, including a new power line easement; and
- an accommodation village for the construction stage workforce.

All of the above are shown in Figure E.2. At the peak of the mine construction activity, expected around September and October 2014, there will be a construction workforce of approximately 550 persons distributed around the four main Project worksites area as follows:

- main mine infrastructure and CHPP area (370 persons or 67%);
- rail loop and spur line construction (100 persons or 18%);
- local road realignment construction (60 persons or 11%); and

- water pipeline corridor and pump station construction (20 persons or 4%).

Approximately 340 workers will reside temporarily in the accommodation village which will be located on Spring Ridge Road, approximately 3 km south of the Golden Highway. These workers will generally travel by buses each day between the accommodation village and the four key Project area worksites.

It is anticipated that additional charter flights to and from Dubbo Airport will be operated when required, for temporary construction workers who will be flying in and flying out at the beginning and end of their weekly or fortnightly shifts. This will minimise the impact of workforce movements on seat availability and price.

Up to 210 construction workers are expected to commute directly from their homes or other accommodation in nearby townships, resulting in approximately 133 car trips each way daily from the following general directions:

- 60% to and from the west eg Dubbo LGA (local government area) (82 car driver trips each way for 130 persons);
- 20% to and from the south-west eg Wellington LGA (25 car driver trips each way for 40 persons);
- 10% to and from the south-east eg Gulgong/Mudgee (13 car driver trips each way for 20 persons); and
- 10% to and from the north eg Dunedoo/Coolah/Mendooran (13 car driver trips each way for 20 persons).

The proposed construction work hours are 6.00 am to 6.00 pm, seven days per week. There will generally be one peak of construction workforce traffic arrivals around 6.00 am each morning at all worksites. There will be several lesser peaks of construction traffic activity each afternoon as workers' departure times from each worksite will be distributed over a longer period between 4.00 pm to 6.00 pm.

During the peak years of operation, which are predicted to be between 2027 and 2030 inclusive, the Project workforce will reach a peak of about 590 people. This will consist of about 30 management and technical staff and four shift teams, each of nominally 140 people but averaging 125 per day to account for leave and other absences. The peak daily car and other light vehicle traffic which will be generated by this workforce will be as follows:

- mine operations day and night shift changeovers with approximately 63 car driver trips each way for 125 mine workers, generally arriving shortly before 7.00 am and 7.00 pm daily and departing shortly after 7.00 pm and 7.00 am; and
- mine management, technical and administration staff, approximately 23 car driver trips each way for 30 persons, generally arriving at the mine between 7.00 am and 8.00 am on weekdays and departing between 4.00 pm and 6.00 pm.

It is expected that most of the future Project operational workforce will reside in Dubbo where the major regional educational, retail, recreational and medical services are found. The proportions travelling from the Gulgong and Mudgee areas are expected to be much lower as there are already mining labour shortages for the mine expansion projects (at Ulan, Moolarben and Wilpinjong) in these areas.

The forecast future approach directions for the Project operational workforce traffic will be as follows:

- 60% to and from the west, that is Dubbo;
- 15% to and from the south west, that is Wellington;
- 15% to and from the north, that is Dunedoo/Coolah/Mendooran; and
- 10% to and from the south east, that is Mudgee/Gulgong.

During both the construction and operational stages of the Project there will also be significant numbers of truck deliveries, specialist contractor vehicles and site visitor car traffic movements. These movements have been estimated as a maximum of 100 trucks per day and 38 cars per day at the peak of the Project construction and typically 41 trucks per day and 38 cars per day at the peak of the Project operations. These traffic movements have been included in this traffic impact assessment.

ES3 Effects on the road network

The forecast need for road upgrading as a result of construction and operational workforce commuting, and other vehicle movements, is based on applicable NSW Roads and Maritime Services (RMS) standards. These are summarised in Table E.1.

Table E.1 RMS recommended rural road lane and shoulder widths

Daily traffic volume (vehicles per day)	Sealed lane width (m)	Total shoulder width, each side (m)	Sealed shoulder width, where provided (m)
0-150*	3.5 (single lane)	1.0 to 1.5	0.5*
150-500	3.0	1.0 to 2.0	0.5*
500-1000	3.0 to 3.5	1.0 to 2.0	0.5
1000-2000	3.0 to 3.5	2.0 to 3.0	0.5
Over 2000	3.5	2.0 to 3.0	1.0

*Note: * Existing roads carrying daily traffic volumes less than 100 or 150 vehicles per day may be unsealed and either single lane or two lanes wide. Sealed shoulders are not normally provided on existing roads carrying daily traffic volumes lower than 500 vehicles per day.*

The traffic impact assessment has identified ten locations where either new road realignments, road widening or additional traffic management works are likely to be required to properly accommodate forecast peak traffic movements. These locations and the works involved are given in Table E.2 and shown in Figure E.3.

Table E.2 Summary of road network improvements and mitigation measures required

Item ref	Project stage	Road	Existing road width and condition	Improvement required
1	Construction	Spring Ridge Road (Warrumbungle Shire) south of the Golden Highway	Typically 6 m sealed width, no sealed shoulders	The section between the Golden Highway and the mine infrastructure area will be widened to provide a minimum 7 m sealed road width (3 m lanes and 0.5 m sealed shoulders), during project construction
2	Construction	Cobbora Road, MR 353, at Spicers Creek Bridge	Typically 6 m sealed width, no sealed shoulders and a narrow bridge at Spicers Creek	Seal widening will be required to provide 0.5 m to 1 m wide sealed road shoulders. Traffic management improvements (additional traffic priority or warning signage and/or guardrails) will be provided on the approaches to the narrow bridge
3	Construction	Cobbora Road, MR 353, from Spicers Creek Bridge to Wellington	Typically 6 m sealed width, no sealed shoulders	No further widening is required. It is assumed that the current upgrading program of sealing this road by Wellington Council will be completed in the next two years. However, the additional Project truck traffic may increase the frequency of the need for maintenance repairs to road
4	Construction and operations	Spring Ridge Road from Mid Western Regional Council (MWRC) boundary to Laheys Creek Road (south)	The sealed width is typically less than 6 m	No improvement is required. However, Project related truck traffic travelling to and from the south should be prohibited from using this road and will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
5	Construction and operations	Laheys Creek Road (south) from Spring Ridge Road to the Castlereagh Highway	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, Project related truck traffic travelling to and from the south should be prohibited from using this road and will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
6	Construction	Wargundy Street from Dunedoo to Tuckland	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the project related truck traffic travelling to and from the Dunedoo direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Birriwa
7	Operations	Spring Ridge Road realignment, replaces Spring Ridge Road (at north end) and Sweeneys Lane	Sweeneys Lane is an unsealed road, one lane wide typically	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion

Table E.2 Summary of road network improvements and mitigation measures required *(Cont'd)*

Item ref	Project stage	Road	Existing road width and condition	Improvement required
8	Operations	New mine access road, located near where the Spring Ridge Road realignment deviates from the existing alignment of Spring Ridge Road	The future alignment is close to the existing alignment of Spring Ridge Road	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
9	Construction and operations	Brooklyn Road realignment from Suzanne Road to Corishs Lane	Existing unsealed road	There is no predicted additional traffic usage from the Project. However the new road connection will be required to maintain access to local residential properties
10	Operations (after year 8)	Dapper Road realignment at eastern end	Existing unsealed road	As above in 9

ES4 Intersection traffic impacts

This study has assessed the future traffic operations at likely affected intersections. During the peak Project construction period nine intersections which are expected to experience measurable increases in peak hour turning traffic movements were assessed. Similarly, four intersections were assessed for the peak Project operations period.

The capacity of each intersection was assessed by reference to the *Road Design Guide Warrant Chart for additional turning lanes at rural intersections* (RTA, 1999). This involves assessment of whether additional left and/or right turning deceleration lanes are required for the Project traffic.

During the Project construction, the following six peak hour traffic periods were analysed:

- 5.00 am to 6.00 am, the peak workforce arrivals period;
- 8.00 am to 9.00 am, the existing morning peak period for the road network generally, coinciding with some daytime mine construction deliveries and site visitor traffic;
- 11.00 am to 12.00 midday, the existing daytime peak traffic period for commercial traffic, coinciding with some daytime mine construction deliveries and site visitor traffic;
- 4.00 pm to 5.00 pm, the existing afternoon peak period for the road network generally, coinciding with some daytime mine construction deliveries and visitor traffic and an early pm departure period for some construction workforce traffic;
- 5.00 pm to 6.00 pm, likely mid-pm peak departure period for most construction workforce traffic; and
- 6.00 pm to 7.00 pm additional late pm peak departure period for some construction workforce traffic.

During the Project operational phase, the following seven peak hour traffic periods were analysed:

- 6.00 am to 7.00 am, peak morning arrivals period for dayshift;
- 7.00 am to 8.00 am, peak morning departures period for nightshift;
- 8.00 am to 9.00 am, existing morning peak period for the road network generally, coinciding with some mine daytime delivery, site visitor traffic and mine administration staff arrivals;
- 11.00 am to 12.00 midday, existing daytime peak traffic period for commercial traffic, coinciding with mine daytime delivery traffic;
- 4.00 pm to 5.00 pm, existing afternoon peak period for the road network generally, coinciding with mine daytime delivery and site visitor traffic and mine administration staff departure traffic;
- 6.00 pm to 7.00 pm, peak evening arrivals period for nightshift; and
- 7.00 pm to 8.00 pm peak evening departures period for dayshift.

The results of these intersection traffic assessments have shown that five intersections will require additional left and/or right turning deceleration lanes. The five identified intersections and the upgrading works are summarised in Table E.3 and shown in Figure E.4. Additionally, localised widening of the minor road approach and departure lanes will be provided for the Project construction access on Spring Ridge Road at the Golden Highway intersection.

Table E.3 Summary of required additional intersection deceleration lanes

Item ref	Project stage	Intersection	Warrant for additional right or left turning traffic lane
1	Construction and operations	Golden Highway at MR 353 Cobbora Road	Additional left turning deceleration lane for westbound traffic on the Golden Highway. An additional basic right turn treatment (Type BAR- basic right turn treatment) will also be provided with the intersection upgrade
2	Construction and operations	Castlereagh Highway at Laheys Creek Road (south)	Additional left turning deceleration lane for northbound traffic on the Castlereagh Highway. An additional basic right turn treatment (Type BAR) will also be provided with the intersection upgrade
3	Operations	Golden Highway at new Spring Ridge Road realignment intersection,	Additional left turning deceleration lane for westbound traffic and right turning deceleration lane for eastbound traffic on the Golden Highway
4	Operations	New mine access road intersection at Spring Ridge Road	Additional left turning deceleration lane for eastbound traffic approaching the mine site entry and right turning deceleration lane for westbound traffic on Spring Ridge Road
5	Construction	Castlereagh Highway/new worksite access south of Tucklan Road	Additional left and right turning deceleration lanes will be provided on the Castlereagh Highway (temporary construction bypass detour) to ensure the safety of heavy vehicle access during Project construction

Note: The design of intersections will be undertaken in accordance with the Austroads Road Design Guide (Austroads 2010).

ES5 Road safety

Accident frequency and accident fatality rates for major roads in the study area have been investigated and the results are summarised in Table E.4. They show that the general accident rates for all the roads considered were significantly below the most recent NSW State five year average rate of 0.73 accidents per million vehicle kilometre travelled (Mvkt).

Table E.4 Accident frequency rates for major roads

Road	Total accidents	Fatalities	Route length (km)	5 year Mvkt	5 year accident rate per Mvkt	Fatality rate per 100 Mvkt
Golden Highway SH 27 (rural section)*	32*	1*	86*	173.5	0.18	0.58
Castlereagh Highway SH 18	17	0	41	62.4	0.27	0
Spring Ridge Rd & Laheys Creek Rd (south)	3	0	35	8.8	0.34	0
Cobbora Road MR 353	4	0	52	13.2	0.30	0
Goolma Road MR 233	37	2	66	101.6	0.36	1.97
Gollan Road RR 7512	19	1	41	34.9	0.54	2.87

Notes: **Excluding the Dubbo urban area (western 5 km of the route between Dunedoo and Dubbo).*
Five year accident records 2006 to 2010 inclusive.

The Golden Highway (rural section) is statistically the safest road in the study area, with a five year accident frequency rate of 0.18 per mvkt, which is 75% lower than the State average.

The accident fatality rates on the major roads in the study area were mostly lower than the recent NSW State five year average of 0.74 fatalities per 100 mvkt. Three of the four recorded fatalities were on two roads, Goolma Road (MR 233) and Gollan Road (RR 7512). The resulting five year accident fatality rates for these roads were higher than the NSW State average. However, these comparatively high accident fatality rates are based on either one or two fatalities which may not be statistically representative of the overall longer term accident history of these two roads.

The intersection sight distances at all the existing and proposed major road intersections have been reviewed. This review has confirmed that the sight distances at each intersection will meet the minimum safe intersection sight distance (SISD) visibility requirement in both directions along the major road.

The identified road and intersection upgrades which will be implemented for the Project (Table E.2 and Table E.3) will improve traffic safety at the identified locations. From analysis of the current RMS design standards for overtaking lane warrants on rural roads, there will not be any general future requirement for the provision of overtaking lanes on sections of the Golden Highway and Castlereagh Highway, between Dubbo, Dunedoo and Gulgong, as a result of the future mine construction or operations stage traffic movements.

Whilst future driving conditions on the major roads in the study area are likely to remain safe, a number of additional future road safety measures have been identified for implementation with the Project, following consultation with the NSW Police Force and others. These are:

- driver safety training for the new workforce relocating to the area;
- a safety audit of identifiable accident cluster locations on the two state highways and other existing roads within the study area;
- safety audits of existing and proposed school bus stop locations on the Castlereagh Highway, Laheys Creek Road (south), Spring Ridge Road and the new Spring Ridge Road realignment; and
- the implementation of the associated signage and other traffic management measures which may arise from the safety audits.

ES6 Local road closures and traffic detours

The future traffic detour effects of the Project road realignments have been assessed. The proposed realignment of Spring Ridge Road at the northern end will result in an additional 7 km (five minutes) travel time and distance for approximately 22 to 23 vehicles per day each way of local traffic which is currently using Spring Ridge Road at the northern end. This traffic is either local residents travelling to and from the Dunedoo direction or through traffic from the Golden Highway near Cobbora, which is travelling to and from the Gulgong or Mudgee directions.

The other two proposed local road realignments for the Project at Brooklyn Road and Dapper Road will generally have no significant adverse traffic detour effects for local traffic.

ES7 Conclusion

This assessment has considered the road system capacity, operating efficiency, traffic safety and road infrastructure requirements of the Project.

The Project will cause increases in traffic during construction and operations. As a result, a range of traffic impact mitigation measures and transport infrastructure improvements will be implemented including new road realignments, sealed shoulder widening and additional routine pavement maintenance. Also, five intersections will be provided with additional turning lanes.

In addition to the road infrastructure improvements, significant traffic safety improvements for the Project will also be implemented, including workforce driver safety training, road safety audits to identify general route signage and traffic management improvements and a safety audit of all school bus stops on the affected roads.

All of the mine operations staff will generally live within a one hour commuting travel time distance from the mine. There will be significant levels of car sharing by the mine shift workforce which will result in an overall average of two persons per car for travel to and from work. The construction workforce traffic impacts will be mitigated by the provision of a mine workforce accommodation village on Spring Ridge Road which will enable the majority of the mine construction workforce to live locally and use shuttle bus travel to and from the four main project worksite areas.

ES8 Sensitivity analysis for MWRC roads

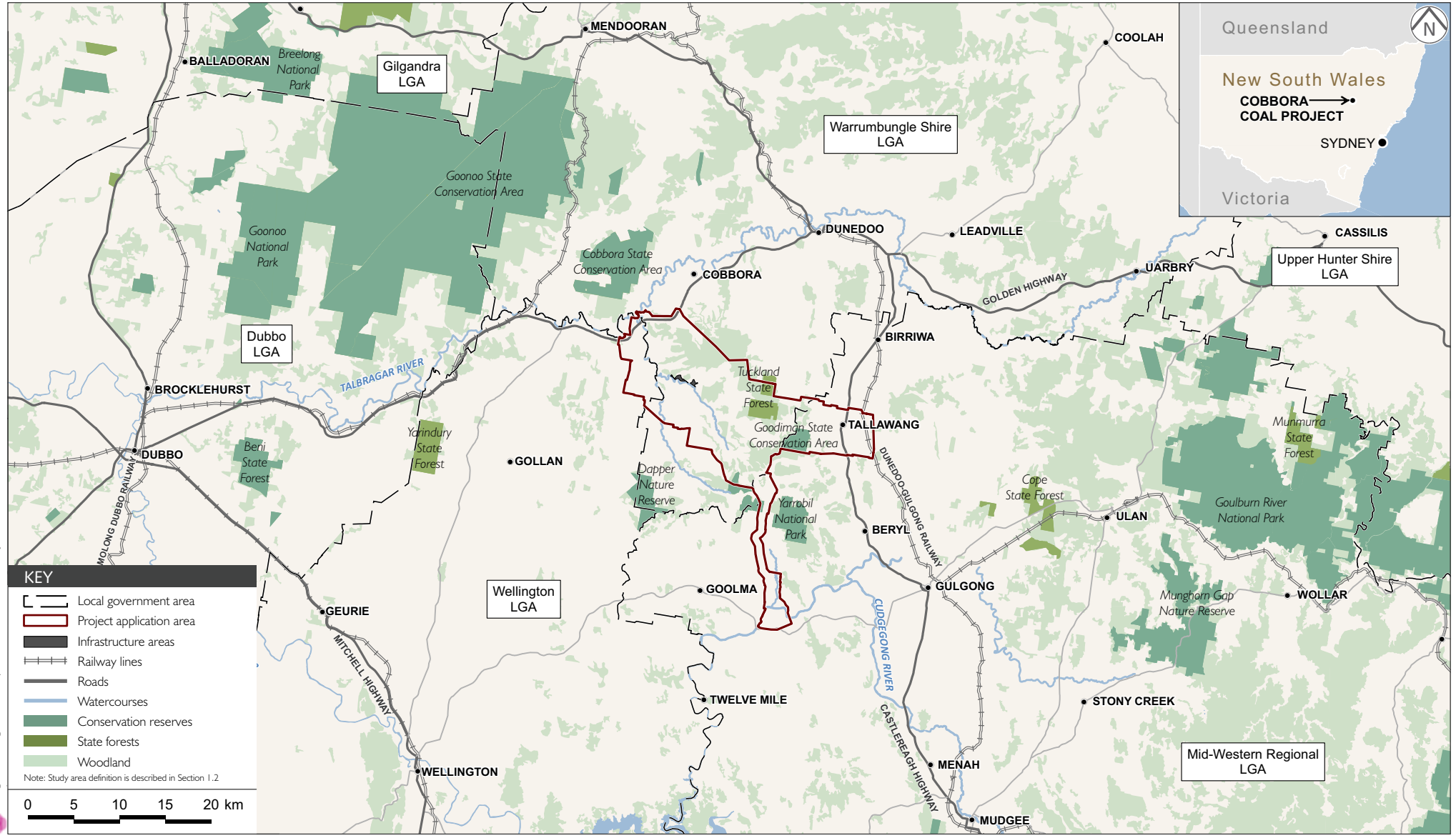
The future volumes of both light and heavy vehicle traffic which will be generated by the Project on roads within MWRC will be primarily determined by the proportions of the project workforce who will be residents of that area, during construction and operations,

A sensitivity analysis of the impact of an additional component of the Project workforce (increasing from 10% to 30%) travelling to and from the Project area each day from the MWRC area, has been undertaken to determine whether additional road widening, intersection improvements or any other related road maintenance and traffic management works will be required.

This sensitivity analysis has determined that the following additional upgrades will be required during the project construction or operations stages as summarised in Table E.5. Although the MWRC section of Spring Ridge Road, which currently has a typical sealed width of less than 6 m, would be upgraded to a minimum sealed width of 6 m in this sensitivity analysis, CHC will still apply the proposed contractual requirements for the Project which are to prevent any project generated truck traffic from using this road.

Table E.5 Additional upgrades required for additional workforce travelling from MWRC area

Item	Project stage	Road	Existing road width and condition	Improvement required
A1	Construction and operations	Spring Ridge Road (MWRC section) north of Laheys Creek Road	The sealed width is typically 6 m or less	Sections of the road which are currently less than 6 m sealed width will require a minimum 6 m sealed width. Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
A2	Construction and operations	Laheys Creek Road (MWRC section) west of the Castlereagh Highway	The sealed width is typically 6 m with no sealed shoulders	No improvement is generally required. However, any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
A3	Construction and operations	Castlereagh Highway, SH 18, south of Beryl Road	Typically two 3.5 m lanes and 0 m to 1 m sealed shoulders	The existing traffic lane and sealed shoulder widths are generally adequate for the predicted traffic. However a minimum 0.5 m sealed shoulder width is required



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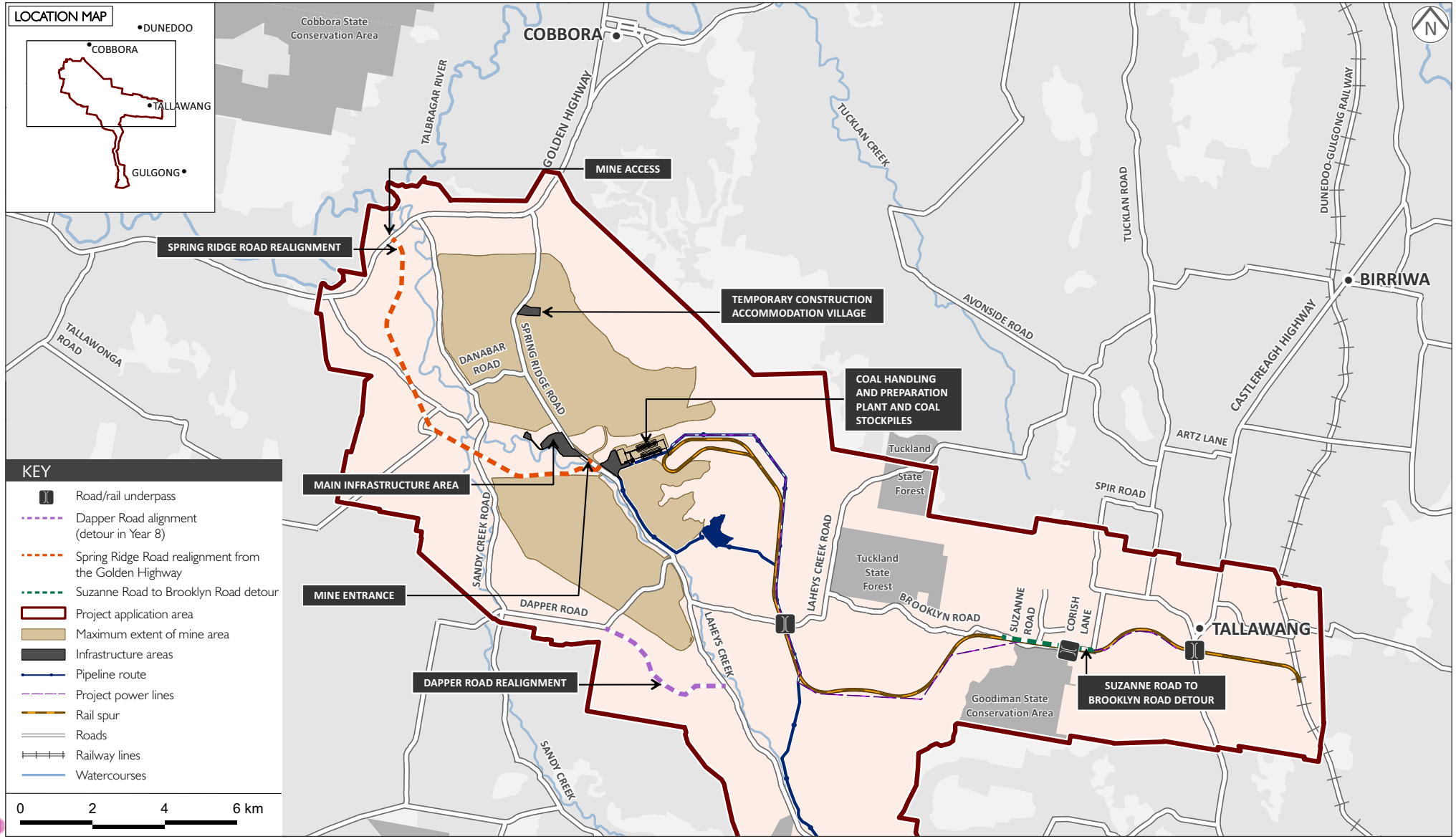
Cobbora Holding Company Pty Limited

Location of the Cobbora Coal Project

Cobbora Coal Project - Traffic Assessment

Figure E.1



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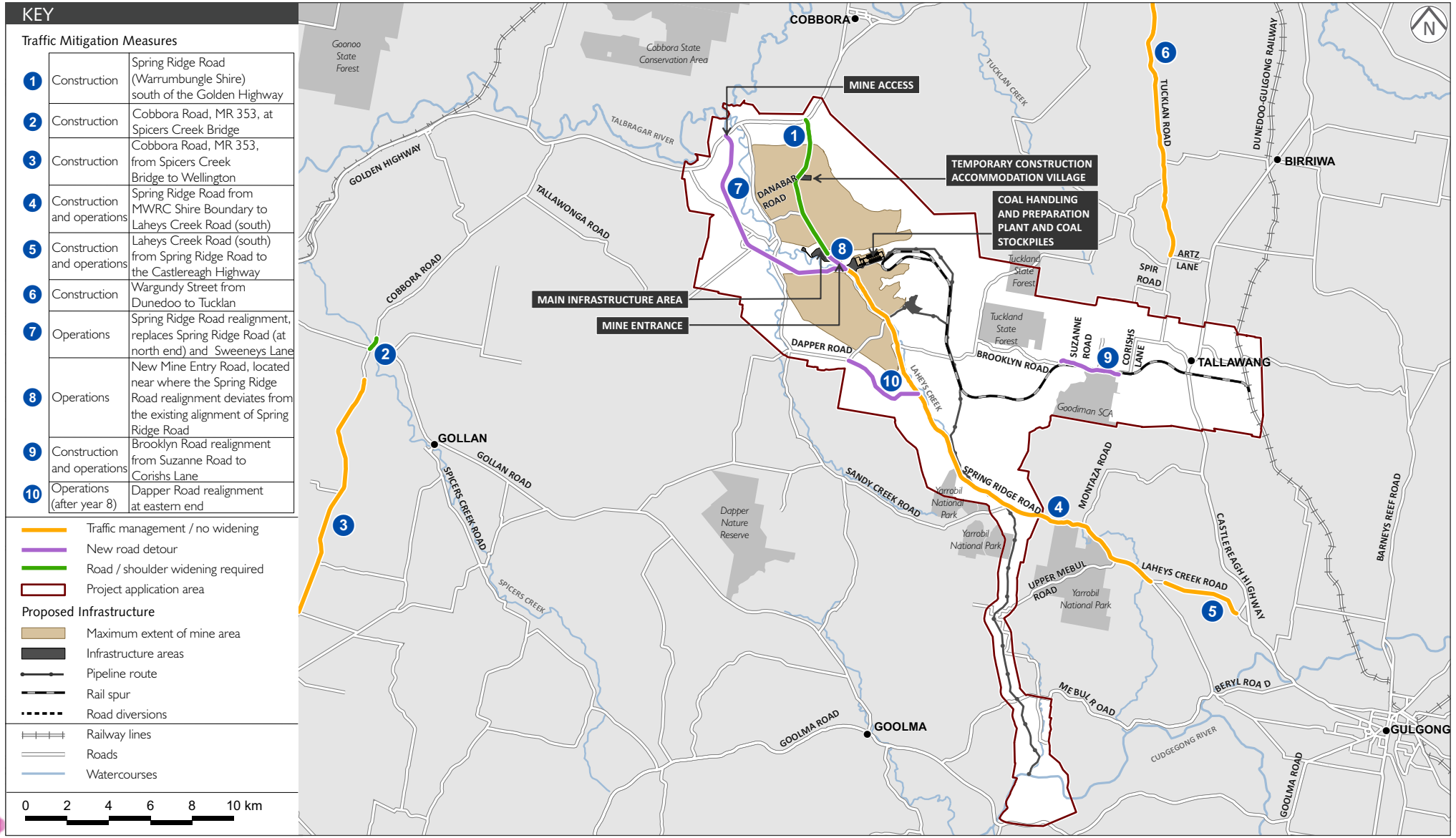
Traffic Assessment - Location of the Main Mine Infrastructure and Facilities

Cobbora Coal Project - Traffic Assessment

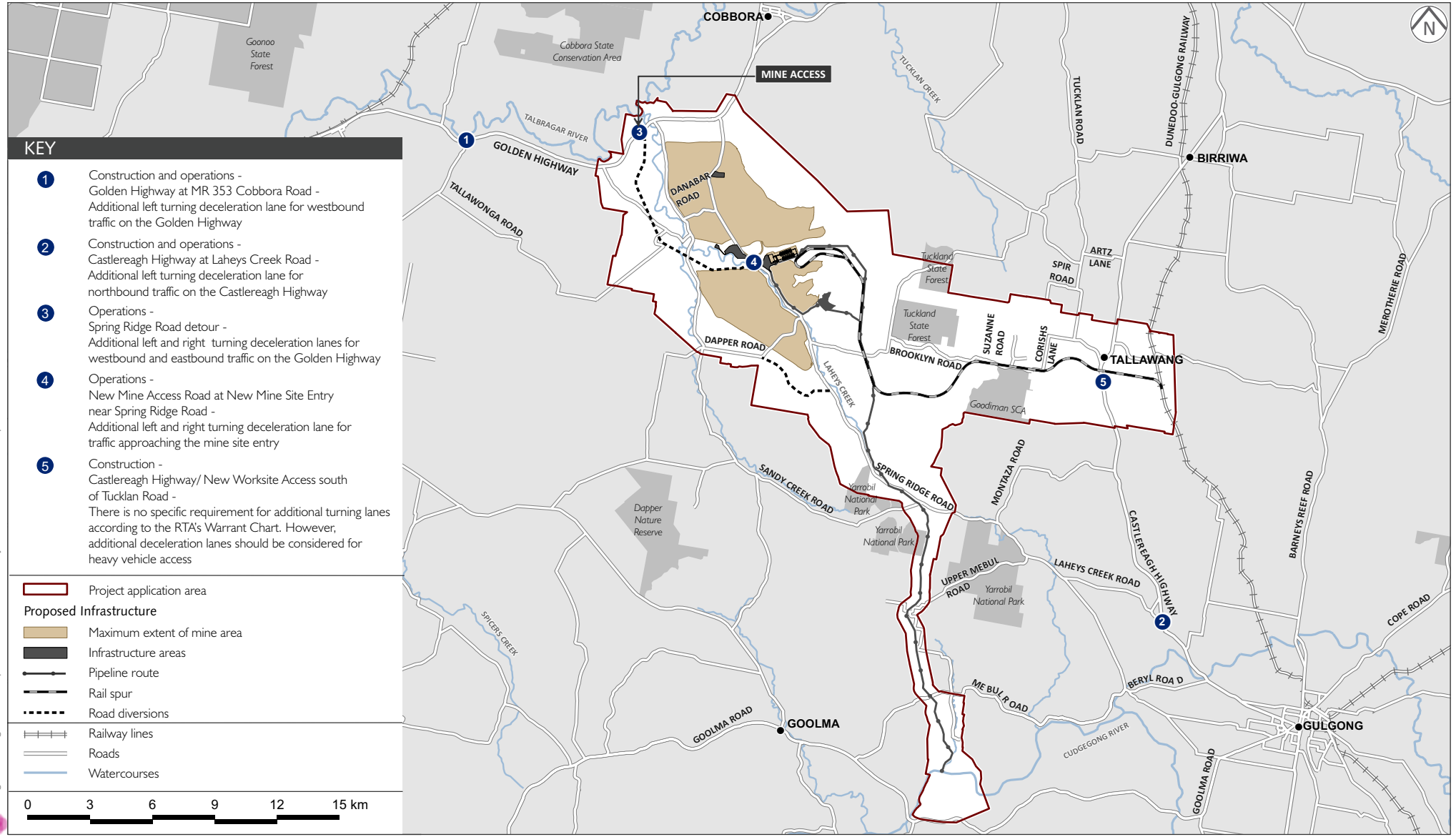
Figure E.2



Traffic Assessment - Location of Required Traffic Mitigation Measures for Project Traffic

Cobbora Coal Project - Traffic Assessment

Figure E.3



Traffic Assessment - Location of Required Intersection Improvement for Project Traffic

Cobbora Coal Project - Traffic Assessment

Figure E.4

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Abbreviations

Abbreviation	Full Term
CHC	Cobbora Holding Company Pty Limited
CHPP	coal handling and preparation plant
EA	environmental assessment
EMM	EMGA Mitchell McLennan Pty Limited
DGRs	Director General's environmental assessment requirements
H&S	health and safety
km	kilometres
LGA	local government area
MR	main roads
M	metres
mvkt	million vehicle kilometres travelled
MWRC	Mid Western Regional (Council)
NSW	New South Wales
PAA	Project application area
Project	Cobbora Coal Project
RMS	Roads and Maritime Services
RR	regional road
RTA	Roads and Traffic Authority, NSW
SH	state highway
SIDRA	Signalised Intersection Design and Research Aid
TFNSW	Transport for NSW
vkt	vehicle kilometres travelled
BAR	basic right turn treatment
BAL	basic left turn treatment

1 Introduction

1.1 Study area

The Cobbora Coal Project (the Project) is located in a predominantly rural area of central western NSW, approximately 5 km south of Cobbora, 22 km south-west of Dunedoo, 64 km north-west of Mudgee and 60 km east of Dubbo, as shown in Figure 1.1. The study area encompasses and will have effects on the transport networks of four local government areas (LGA) as shown in Figure 1.2.

1.2 Project overview

The Project is an open cut coal mine proposed by Cobbora Holding Company Pty Limited (CHC). The mine will supply thermal coal, primarily to power stations in NSW. Some coal from the Project may also be exported.

The Project will include an open cut coal mine, a coal handling and preparation plant (CHPP), mine infrastructure area, stockpiles and train loading facility. Associated infrastructure will include a rail spur line, water supply pipeline, pumping station, access roads, power lines and an electricity substation. Mine construction is planned to commence in mid-2013. Mine operations are expected to start in the first half of 2015. An operating mine life of 21 years is proposed.

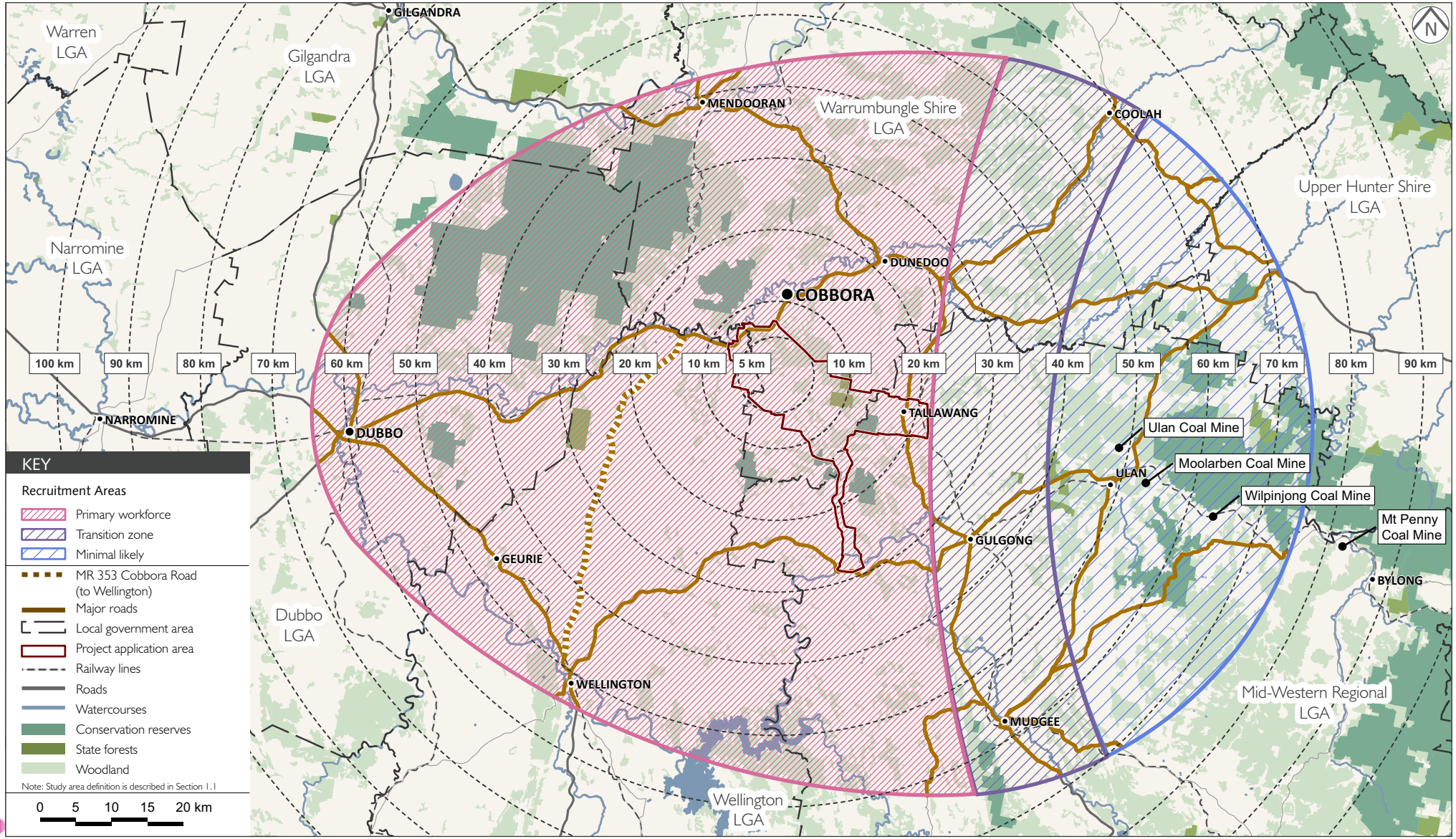
A Major Project application under Part 3A of the *Environmental Planning and Assessment* Act 1979 (NSW) (EP&A Act) was submitted to the NSW Department of Planning on 5 January 2010 (application number MP 10_0001). The Director General's environmental assessment requirements (DGRs) for the Project were issued on 4 March 2010. Revised DGRs were issued for the Project on 23 December 2011 in response to changes in the proposed project and government assessment requirements.

1.3 Background

This road transport impact report has been prepared as part of the Project EA. Coal mining is a relatively new economic activity in the locality although other types of mining, particularly gold mining, have historically been important and have contributed significantly to economic development.

The Project represents a westerly extension of the historic areas of coal mining in the Upper Hunter Valley and Western Coalfields of NSW, beyond the existing limit at Ulan. This extension of coal mining to the central inland region of NSW requires consideration of the need for regional road and rail transport infrastructure upgrades for transport of the following persons and materials:

- Project construction workers, materials and equipment during construction;
- diesel and other consumables during mine operations;
- product coal to power stations at Bayswater, Liddell, Eraring, Munmorah and Vales Point, and for export via the Port of Newcastle; and
- Project operations workers, the majority of whom will commute by car to work day or night shifts at the mine, which will operate seven days per week.



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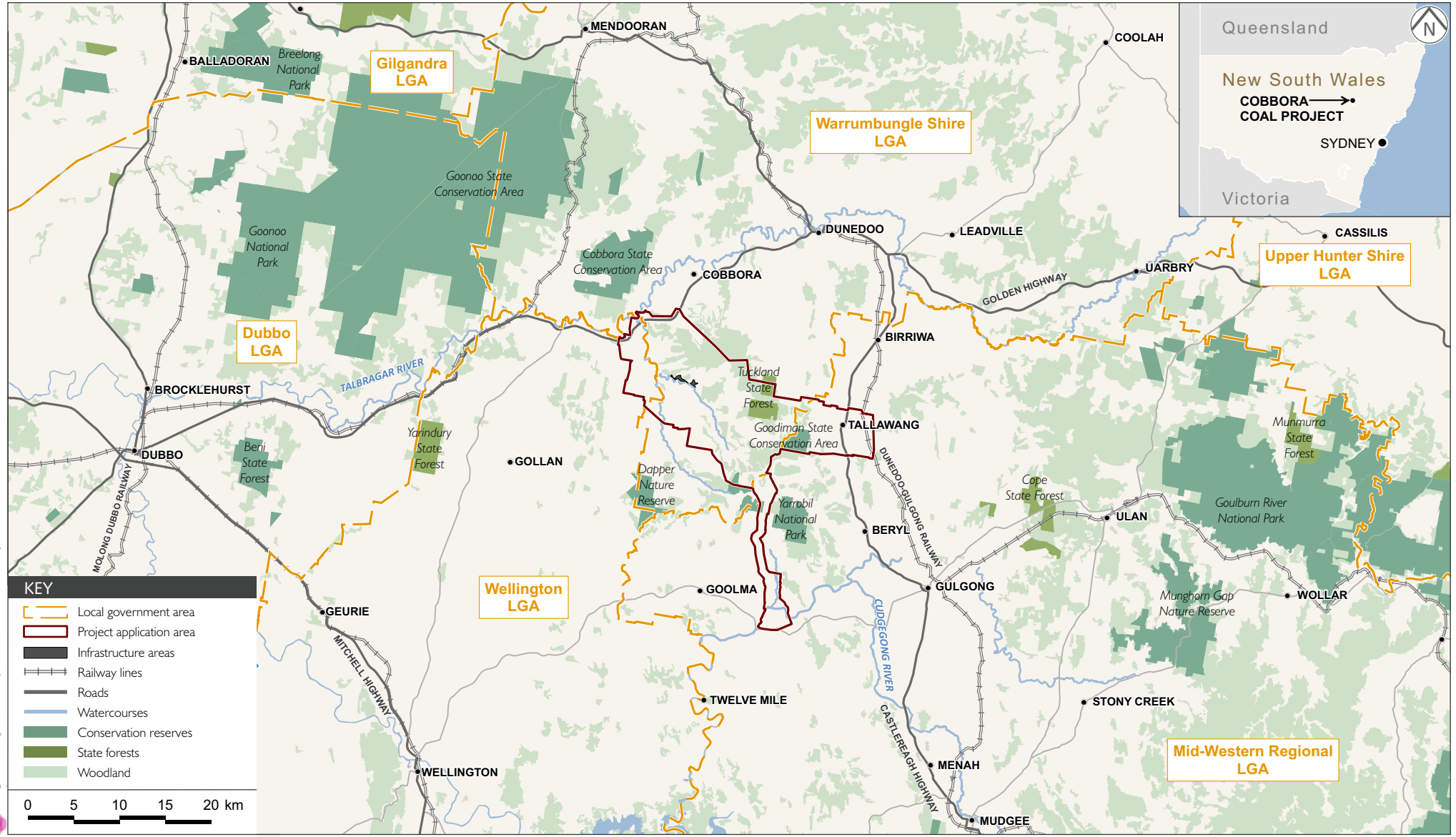
Regional Study Area

Cobbora Coal Project - Traffic Assessment

Figure 1.1



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Local Government Areas

Cobbora Coal Project - Traffic Assessment

Figure 1.2

1.4 Study objectives

This report addresses the requirements for road transport, including relevant traffic engineering design standards and references nominated in the Project DGRs.

The report structure is based on *Guide to Traffic Generating Developments* (RTA, 2002), the standard RTA template for the preparation of a traffic impact study for a major project.

Road realignment designs and intersection upgrades required for the Project have been determined in accordance with the requirements of *Road Design Guides* (RTA, 1999) and (Austroads, 2010).

Table 1.1 combines and summarises road and rail transport DGRs for the Project. Additional road transport planning issues, which were also raised in submissions by other State and local government agencies including the Mid Western Regional Council based in Mudgee are listed in Table 1.2.

Table 1.1 Director General's requirements and guidelines for the Project traffic and transport assessment

Requirement	Where assessed
Detailed assessment of the potential impacts of the Project on the safety and performance of the: Local and regional rail network having regard to the strategic objectives and cumulative impacts for the passenger and freight rail network. Local and regional road network with particular regard to a cumulative traffic impact assessment, condition assessment of the existing road network, proposed new road infrastructure and impacts of coal trains on level crossing operations.	The road traffic impacts are assessed for the Project construction and operations stages in Sections 4.1 and 4.2 of this report A railway level crossing delay and safety assessment for crossings in the Newcastle urban area is included in the *Rail Transport Assessment Report* (EMM, 2012b) Additionally, the future traffic delays and safety control at level crossings in the Ulan, Gulgong and Tallawang areas have also been reviewed in that report
Details of mine to port or other domestic customer transport movements, train path availability, and any required rail infrastructure works.	Details of the proposed destinations of the product coal from Cobbora are included in EMM (2012b) The future availability of coal train paths and the need for infrastructure upgrades on the Hunter Valley and RailCorp lines to transport this coal has been assessed in EMM (2012b) and will be assessed separately by ARTC and RailCorp in their own network capacity investigations
A detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road and rail networks in the surrounding area over the life of the Project.	Proposed road transport capacity improvements and mitigation measures for the Project are given in Chapter 5. Grade separated crossings will be provided for the proposed Cobbora rail spur line to cross underneath the Castlereagh Highway and over two other local roads A detailed railway level crossing safety and risk assessment of railway level crossings in the Gulgong area will be undertaken by ARTC as part of the Gulgong-Tallawang rail line upgrading works (ARTC ULAN + Alliance, 2009)

Table 1.2 Additional clarifications to the transport issues

Issue	Clarification
Transport for NSW (TFNSW) is concerned about the potential rail transport impacts of the transport of Cobbora coal to the Central Coast Power Stations. In view of the scarce rail paths available, TFNSW should be included in liaison on this proposal.	The rail transport operating authorities (RailCorp and ARTC) have been consulted regarding the likely availability of coal train paths and other rail operational issues, in particular for the RailCorp controlled section of the Central Coast railway line corridor, south of Broadmeadow. TFNSW has been included in this consultation
Mid Western Regional Council	
A detailed traffic management plan for all traffic (type and frequency) anticipated as part of the Project and proposed routes. Particular attention should be made to the assessment of commuter traffic and the routes taken.	Traffic management measures are recommended for construction and operations in Sections 4.1 and 4.2 of this report
An assessment of the likely travel distances for the workforce and the measures that will be implemented to address the OH&S issues in relation to both the distances likely to be travelled as well as condition of the routes.	The likely mine workforce residential locations have been determined for the Project construction and operations stages (EMM 2012a). The workforce roster design will consider travel times, assuming travel to and from work on sealed roads
An assessment of the suitability and capability of the existing road network to accommodate the additional traffic generated by the proposal.	The existing road network of state highways, main roads, sealed local roads and unsealed local roads has been reviewed in Sections 2.2 and 2.4 of this report. In Sections 4.1 and 4.2 an assessment of the proposed future daily and peak hour traffic flows is made to identify road and intersection improvements
A dilapidation report that surveys the transport routes and establishes the physical conditions of the road network, prior to any work being carried out.	Existing road widths and their surface condition have been identified in this report and existing levels of heavy vehicle traffic documented (Sections 2.3 and 2.5 and Appendix A).
A detailed strategy outlining the measures that would be implemented to upgrade and maintain road infrastructure over the life of the Project including the initial upgrade of Spring Ridge Road.	The strategy for road corridor deviation and upgrade works including traffic impact mitigation measures is summarised in Sections 5.1 and 5.2
A detailed assessment of the impact of the increase in rail transport on the town of Gulgong and other affected residences. In conducting the assessment, consultation should be undertaken with council and emergency service providers. The assessment should include an audit of existing rail crossings taking into account current levels of road traffic, and identify the necessary upgrades required with particular regard to the following: • Access for emergency vehicles; • Impacts of potential temporary workers' accommodation proposed to be located on the Cope Road, north of Gulgong; • Upgrade of all level crossings to a minimum standard that will include the installation of barrier arms for all crossings, with particular regard to Barney's Reef Road and the road extending off Ulan Road providing access to Ulan village; • Split level crossing where the proposed rail line crosses Station/Cope Road; and • Split level crossing where the proposed spur line crosses the Castlereagh Highway.	A detailed assessment of the impact of the Project on rail level crossings in the Gulgong area will be undertaken by ARTC as part of the Tallawang-Gulgong rail corridor track capacity upgrade works (ARTC Ulan + Alliance, 2009). This work will be undertaken using a standard railway level crossing risk assessment procedure

Also, the provisions of clause 84 of the NSW Infrastructure SEPP, 2007 may apply to the assessment of transport related impacts of the Project at any existing railway level crossing where there are likely to be significant road or rail traffic increases or where there is any requirement to construct a new railway level crossing on a public road. These provisions specify:

- the consent authority must within seven days, give written notice of the application to the Chief Executive Officer of the rail infrastructure authority for the rail corridor; and

- the consent authority must not grant consent to the development without the concurrence of the Chief Executive Officer of the rail infrastructure authority for the rail corridor.

2 Existing traffic conditions

2.1 The locality

The Project is located approximately 70 km travel distance by road, east of Dubbo, as shown in Figure 1.1. The mine area is also approximately 60 km to 70 km from Mudgee by road. The nearest townships to the Project are Gulgong and Dunedoo, both of which are approximately 20 km to 25 km by road from the general Project area. Other townships within the potential employment catchment area of the mine include Wellington to the south-west and Coolah and Mendooran to the north, each of which are approximately 50 km to 60 km by road from the Project area.

Smaller settlements, including the villages of Cobbora, Elong Elong and Ballimore on the Golden Highway and Goolma and Geurie to the south towards Wellington, are also within the potential employment catchment area of the mine. However, their current small populations will limit their potential to contribute significantly towards the Project's future workforce requirements. There is, nevertheless, some scope for new residential developments to occur in all these localities, where new residences could either be purchased or rented by the Project's future workforce.

The main mine pit and infrastructure areas where the majority of the future Project construction and operations stage workforces will be employed will be in the northern part of the Project area. Most vehicle access will be by a new road from the Golden Highway in the north with lesser amount of traffic using Spring Ridge Road to the south. During construction, three other areas of proposed mine infrastructure construction will also be significant employment locations, namely:

- the new 28 km rail spur line and loading loop, extending east from the main mine area towards Brooklyn Road, Tucklan Road and the Castlereagh Highway near the locality of Tallawang;
- the water pipeline corridor and pumping station sites, extending south from the main mine area to the Cudgegong River, towards the localities of Mebul, Beryl and Goolma; and
- the construction of the new mine access road and local road realignments which will generally occur around the western edge of the mine infrastructure area, near roads such as Sweeneys Lane, Sandy Creek Road and Dapper Road, and also Brooklyn Road towards Tallawang.

The existing daily traffic usage of the roads which provide access to these locations is shown in Figure 2.1.

2.2 Existing road network

The road network which has been evaluated in this assessment comprises two state highways (the Golden Highway and the Castlereagh Highway) several main roads (MR 233, MR 353, RR 7512) and a number of sealed and unsealed local roads which will also be potentially by mine related traffic during either construction or operations.

The general design standard and current condition of these roads is illustrated by the photographic survey in Appendix A, and is summarised below.

2.2.1 Golden Highway and Castlereagh Highway

These two roads have both been designed and constructed as high speed rural highways with generous traffic lane and sealed shoulder widths and frequent overtaking opportunities. Both these roads are currently maintained in a generally good condition with few visible surface defects and have at least one isolated railway level crossing within the study area. The railway line which crosses the Castlereagh Highway at Birriwa (the Gulgong to Dunedoo section of the Wallerawang to Gwabegar Railway Line), is used relatively infrequently by rail traffic, as are the railway level crossings on the Golden Highway.

2.2.2 Spring Ridge Road and Laheys Creek Road (south)

These two roads form the major local traffic route through the Project area, connecting the Castlereagh Highway (8 km northwest of Gulgong) to the Golden Highway (71 km east of Dubbo and 20 km west of Dunedoo). There are numerous intersections with other local roads along the 35 km route length. The road primarily carries local traffic to and from Gulgong or Dunedoo, with only a small amount of regional traffic travelling through. It typically has a sealed width of approximately 6 m or less, with no centre line marking or sealed shoulders. The road is generally constructed to a high standard 80 km/h or 100 km/h design speed alignment, although some sections are constructed to a lower standard, most notably the causeway crossing Laheys Creek, just north of the intersection with Dapper Road.

To the south of Laheys Creek Road, Spring Ridge Road continues as an unsealed road primarily only providing local property access and not carrying significant through traffic movements. Laheys Creek Road, which is sealed, provides the main connection route for traffic to and from the northern section of Spring Ridge Road, to and from Gulgong and other areas further south, including Mudgee and Lithgow.

2.2.3 Sweeneys Lane, Sandy Creek Road, Danabar Road and Dapper Road

These roads are all unsealed local roads within and around the north-western boundary of the Project area. Existing traffic volumes on these roads are low, as many of the farming properties which were previously served by these roads have now been purchased by the mine. Sections of some of these roads, such as Sweeneys Lane, may be incorporated into the new Spring Ridge Road realignment route around the mine which will be upgraded with a new sealed road and access intersection at the Golden Highway. The remainder of these roads or sections thereof, will generally be closed in 2015 where they pass through the future mine area. The eastern end of Dapper Road will have a deviation, constructed approximately mid way through the mine operations period, in Year 8 of the mine plan.

2.2.4 Tucklan Road, Brooklyn Road, Artz Lane and Laheys Creek Road (north)

These roads are all generally unsealed roads which pass within and around the eastern boundary of the Project area and future rail spur line easement. The northern section of Tucklan Road (or Wargundy Street) is sealed for approximately 10 km south of the township of Dunedoo. These roads will be kept open, where required for local access around the mine site and rail spur line construction. Their future usage by Project related traffic after 2015 is expected to be minimal, as the future operations workforce for the Project will all be based at the main mine infrastructure area.

2.2.5 Beryl Road, Mebul Road and Upper Mebul Road

Beryl Road is sealed between the Castlereagh Highway and the junction with Spring Ridge Road and Mebul Road. Mebul Road and Upper Mebul Road are both unsealed roads, except for a short section of Mebul Road through the Beryl village. These roads will be used at a range of locations to provide construction stage access to the proposed water pipeline corridor worksites, including the main pumping station and water intake site on the Cudgegong River, which will also be accessed via Wrights Lane, south of the junction of Mebul Road and Upper Mebul Road.

Photograph 2.1 Golden Highway intersection with Cobbora Road (MR 353 to Wellington)

Photograph 2.2 **Golden Highway intersection with Sweeneys Lane**

Photograph 2.3 **Golden Highway intersection with Spring Ridge Road**

Photograph 2.4 **Castlereagh Highway intersection with Tucklan Road**

Photograph 2.5 **Castlereagh Highway intersection with Laheys Creek Road (south)**

Photograph 2.6 Castlereagh Highway at intersection with Beryl Road

Photograph 2.7 Spring Ridge Road at intersection with Danabar Road

Photograph 2.8 **Causeway on Spring Ridge Road near the Dapper Road intersection**

Photograph 2.9 **Intersection of Spring Ridge Road with Laheys Creek Road (north)**

Photograph 2.10 Intersection of Spring Ridge Road with Sandy Creek Road

Photograph 2.11 Intersection of Spring Ridge Road with Upper Mebul Road

Photograph 2.12 **Intersection of Laheys Creek Road (south) with Spring Ridge Road**

Photograph 2.13 **Intersection of Laheys Creek Road (north) with Brooklyn Road**

Photograph 2.14 Intersection of Brooklyn Road with Suzanne Road

Photograph 2.15 Intersection of Tucklan Road with Corishs Lane

Photograph 2.16 Intersection of Beryl Road with Spring Ridge Road (south)

Photograph 2.17 Intersection of Beryl Road, Mebul Road and Spring Ridge Road (north)

Photograph 2.18 Intersection of Mebul Road with Upper Mebul Road and Wrights Lane

Photograph 2.19 Intersection of Sandy Creek Road with Dapper Road and Geurie Road

2.3 Existing traffic volumes and heavy vehicle traffic

The existing daily and peak hour traffic volumes on the major and local roads in the Project area were determined from an extensive program of tube traffic counts undertaken during a one week period in October 2011. The traffic count survey results are included as Appendix B. Other traffic data for other sources was also utilised namely:

- two week traffic surveys for the Golden Highway and Castlereagh Highway undertaken during preliminary environmental studies for the Project in February 2010;
- daily traffic volume surveys on three classified roads, MR 233, MR 353 and RR 7512 which provide access to the Cobbora mine Project area from the Wellington direction (RTA, 2005); and
- a daily traffic volume count on Beryl Road, west of the Castlereagh Highway undertaken in the year 2000 by the MWRC.

The traffic survey results are illustrated in Figure 2.1 and Tables 2.1 and 2.2. The existing daily traffic volumes and percentage of heavy vehicles on each road are summarised in Table 2.1.

Table 2.1 Existing daily traffic and heavy vehicle volumes

Road name	Average daily traffic (all vehicles)	Average daily heavy vehicles	% Heavy vehicles
Golden Highway (Year 2010) SH 27	1058	290	27
Castlereagh Hwy (Year 2010) SH 18	673	128	19
Spring Ridge Road (Warrumbungle Shire)	60	7	12
Spring Ridge Road (MWRC)	95	11	12
Laheys Creek Road (south)	266	35	13
Sandy Creek Road (at north end)	3	0.3	9
Sweeneys Lane	15	0.1	1
Danabar Road	9	0.9	10
Dapper Road	19	2	11
Laheys Creek Road (north)	40	6	15
Tucklan Road	60	15	25
Wargundy Street	124	8	6
Mebul Road (east)	82	4	5
Mebul Road (west)	51	3	6
Upper Mebul Road	16	1	6
Sandy Creek Road (at south end)	5	0	0
Beryl Road	234	N/A*	N/A*
Goolma Road (east of Beryl Road) MR 233	571	N/A*	N/A*
Goolma Road (east of Goolma) MR 233	1124	N/A*	N/A*
Goolma Road (west of Goolma) MR 233	627	N/A*	N/A*
Gollan Road (north of Goolma) RR 7512	505	N/A*	N/A*
Cobbora Road (at north end) MR 353	57	N/A*	N/A*
Cobbora Road (at Spicers Creek) MR 353	550	N/A*	N/A*
Cobbora Road (at south end) MR 353	237	N/A*	N/A*

*Note: *No heavy vehicle traffic information is available from the traffic surveys.*

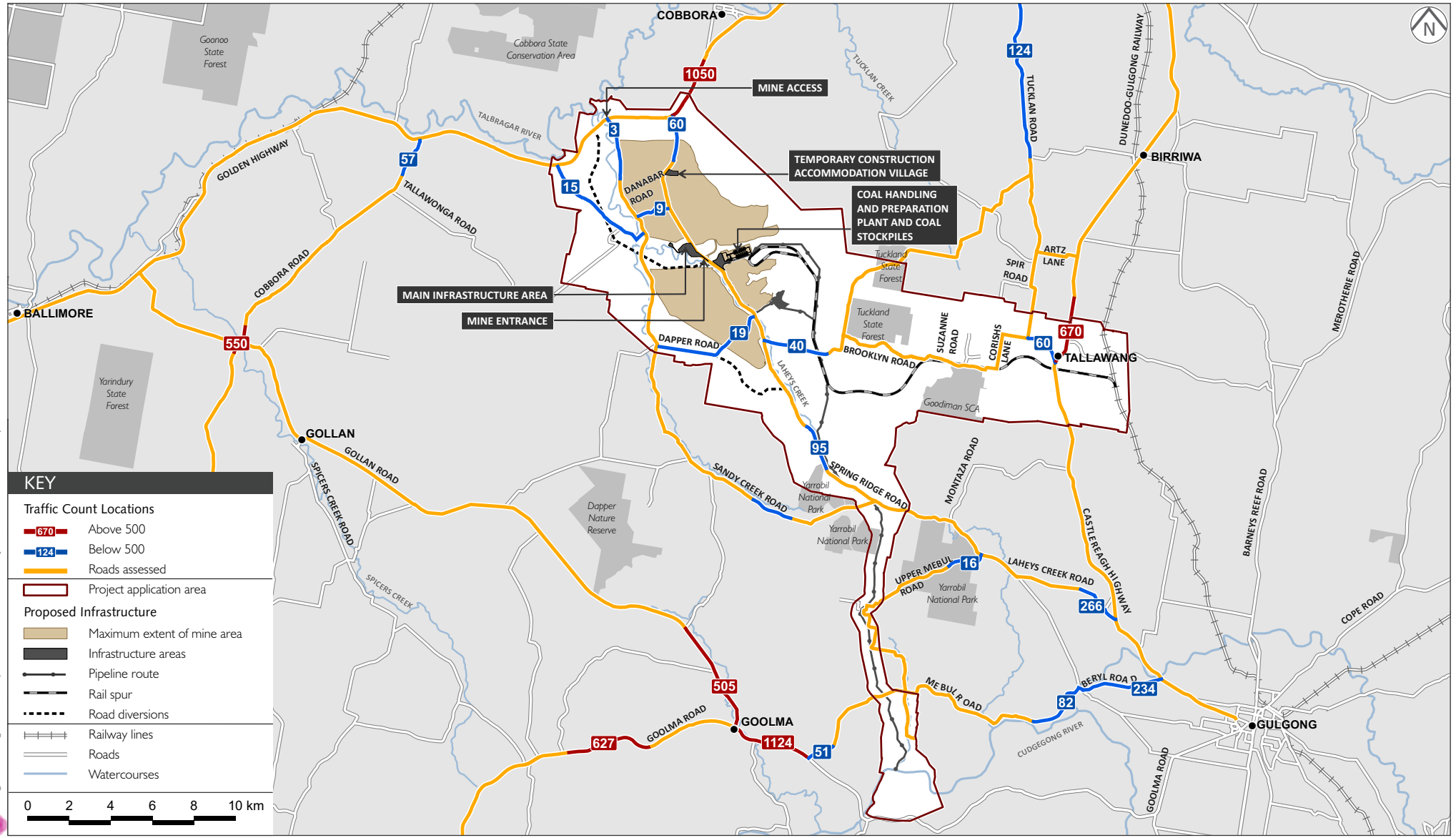
Both the Golden Highway and Castlereagh Highway currently carry relatively high proportions of heavy vehicle traffic, representing between 20-30% of all traffic.

On the local council-maintained roads within and around the Project area, the volumes and proportions of heavy vehicle traffic are generally much lower. Only Tucklan Road, east of the Castlereagh Highway was recorded as currently carrying a notably high proportion of heavy vehicles (approximately 25%).

Spring Ridge Road, Laheys Creek Road (north), Laheys Creek Road (south), Danabar Road and Dapper Road were all recorded as carrying heavy vehicle proportions in the general range 10-15% of total traffic.

On other local roads (Sandy Creek Road, Sweeneys Lane, Mebul Road, Upper Mebul Road and Wargundy Street), the surveyed heavy vehicle traffic proportions were less than 10%.

Detailed traffic surveys were not undertaken on Beryl Road, Brooklyn Road, Corishs Lane, Artz Lane and the three main road routes to the south and west of the Project area (Goolma Road MR 233, Gollan Road, RR 7512 and Cobbora Road MR 353). The existing proportions of heavy vehicle traffic on these roads are not known, but are assumed to be in the range 10% to 15% of all traffic.



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EMM

Cobbora Holding Company Pty Limited

Existing Daily Traffic Volumes

Cobbora Coal Project - Traffic Assessment

Figure 2.1

In Table 2.2, the existing Project area peak hour traffic volumes for various peak traffic periods are summarised for:

- 6.00 am to 7.00 am, 7.00 am to 8.00 am, 6.00 am to 7.00 pm and 7.00 pm to 8.00 pm for mine shift changes;
- 8.00 am to 9.00 am and 4.00 pm to 5.00 pm for school and commuter peaks; and
- 11.00 am to 12 noon for truck deliveries.

Table 2.2 Summary of surveyed peak hour traffic volumes

Road name and (daily traffic volume)	Early am hourly volume	Early am hourly volume	Am peak hourly volume	Mid day peak hourly volume	Pm peak hourly volume	Evening hourly volume	Evening hourly volume
	6.00 am to 7.00 am	7.00 am to 8.00 am	**8.00 am to 9.00 am**	**11.00 am to 12.00 pm**	**4.00 pm to 5.00 pm**	6.00 pm to 7.00 pm	7.00 pm to 8.00 pm
Golden Highway (1058)	33	61	**64**	70	**87**	61	42
Castlereagh Hwy (673)	17	32	**47**	48	**52**	32	24
Spring Ridge Road (60) Warrumbungle Shire	1	3	**8**	3	**4**	2	1
Spring Ridge Road (95) MWRC	4	7	**9**	4	**10**	5	4
Laheys Creek Road – south (266)	9	16	**33**	16	**23**	15	8
Sandy Creek Road (3) (north end)	0	0	**1**	1	**1**	0	0
Sweeneys Lane (15)	0	1	**1**	1	**2**	1	0
Danabar Road (9)	0	1	**1**	1	**1**	1	0
Dapper Road (19)	0	1	**3**	2	**3**	1	0
Laheys Creek Road – north (40)	1	2	**2**	1	**2**	1	0
Tucklan Road (60)	3	4	**7**	5	**4**	2	2
Wargundy Street (124)	5	12	**14**	7	**12**	6	6
Mebul Road (82) east end	3	4	**6**	5	**9**	4	4
Mebul Road (51) west end	1	4	**6**	4	**5**	4	2
Upper Mebul Road (16) north end	0	0	**2**	2	**0**	0	0

Note: Colours highlight the times of day at which peak traffic volumes occur currently.

2.4 Traffic capacity standards - levels of service

Daily and peak hourly traffic volume standards for major rural roads are set by RTA (2002). The RTA defines six levels of service for rural roads (A, B, C, D, E and F), as described below.

- **Level of service A**

  - The top level of service is a free flow condition in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of comfort and convenience provided to traffic is excellent.

- **Level of service B**

  - This level of service is termed stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience for traffic is a little less than that of level of service A.

- **Level of service C**

  - This level of service is also in the stable flow zone, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience for traffic declines noticeably at this level.

- **Level of service D**

  - This level of service is close to the limit of stable flow, approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor and small increases in traffic flow will generally cause operational problems.

- **Level of service E**

  - This occurs when traffic volumes are at or close to capacity and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause a traffic-jam.

- **Level of service F**

  - This service level is termed forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs and queuing and delays result.

In most cases, there is little practical difference between the traffic operating conditions for level of service A and B on rural roads. The maximum hourly traffic volume standards are only defined in RTA (2002) for rural roads for levels of service B to E. However, more detailed calculations are able to be made by reference to the *Austroads Guide to Traffic Engineering Practice–Part 2 Roadway Capacity* (Austroads, 1988).

For major rural highways such as the Golden Highway and the Castlereagh Highway, the hourly traffic volume standards for each level of service are defined by the following route characteristics:

- typical lane width is 3.5 m;

- typical shoulder width is 2 m (0.5 m sealed);

- typical terrain is level, with no overtaking for 20% of route length;
- 20% to 30% of traffic is heavy vehicles; and
- weekday peak hour traffic is approximately 8% of average daily traffic.

The defined hourly and daily traffic volumes ranges for levels of service for roads with these route design and traffic characteristics are specified in (RTA, 2002) as:

- level of service A or B, up to 420 vehicles per hour (5,250 vehicles per day);
- level of service C, range 420 to 690 vehicles per hour (5,250 to 8,620 vehicles per day);
- level of service D, range 690 to 1,140 vehicles per hour (8,620 to 14,250 vehicles per day);
- level of service E, range 1,140 to 1,880 vehicles per hour (14,250 to 23,500 vehicles per day); and
- level of service F, over 1,880 vehicles per hour (23,500 vehicles per day).

On all the sections of the Golden and Castlereagh Highway within the study area, current peak hourly traffic volumes are all generally lower than 100 vehicles per hour. These hourly volumes correspond to Level of Service A or B, mostly A.

The other main roads and local roads currently have peak hourly traffic volumes around 20-30 vehicles per hour or less. For these roads, e.g. Spring Ridge Road, Laheys Creek Road, Beryl Road and Wargundy Street, the relevant road capacity and design standards are defined by daily traffic volumes in the *Road Design Guide* (RTA, 1999) as summarised in Table 2.3 below.

Table 2.3 RMS recommended rural road lane and shoulder widths

Daily traffic volume (vehicles per day)	Sealed lane width (m)	Total shoulder width, each side (m)	Sealed shoulder width, where provided (m)
0 to 150*	3.5 (single lane)	1.0 to 1.5	0.5*
150 to 500	3	1.0 to 2.0	0.5*
500 to 1000	3 to 3.5	1.0 to 2.0	0.5
1000 to 2000	3 to 3.5	2.0 to 3.0	0.5
Over 2000	3.5	2.0 to 3.0	1.0

*Note: *Sealed Shoulders are not normally provided on existing roads carrying daily traffic volumes lower than 500 vehicles per day.*

It should be noted when interpreting these standards that many rural roads with daily traffic volumes of less than 100 or 150 vehicles per day, can either be single lane or two lane unsealed roads. Usually these roads are only sealed for dust control purposes in proximity to houses. Also, the road centre line is not normally marked and the road shoulders are not normally sealed on existing rural roads with daily traffic volumes of less than 500 vehicles per day.

2.5 Existing road widths and surface condition assessment

A visual survey of the existing road and shoulder widths and surface condition of the roads within and adjacent to the Project area, has been undertaken and is provided in Appendix A. An inventory of the general current width and typical surface condition of each road in September 2011 is listed in Table 2.4 below.

Table 2.4 Existing sealed width and surface condition of the study area roads

Road	Typical sealed lane widths	Typical shoulder widths (m)	Comment
Golden Highway SH 27	3.5 m typically	Varies- 0.5 m to1 m sealed	Many newly sealed and resurfaced sections
Castlereagh Hwy SH 18	3.5 m typically	Varies- 0 m to 1 m sealed	Some newly sealed and resurfaced sections
Spring Ridge Road – south of the Golden Highway	3 m typically	Varies- 0 m to 0.5 m unsealed	Mostly in good condition. No marked centre line
Spring Ridge Road – south of the proposed mine infrastructure area	Less than 3 m typically	Minimal	Variable condition. No marked centre line
Laheys Creek Road (south)- MWRC area	3 m typically	Varies- 0 to 0.5 m unsealed	Mostly in good condition. No marked centre line
Sandy Creek Road	Unsealed	None	Single lane wide at the northern and southern ends. Two lanes wide typically on the central section
Sweeneys Lane	Unsealed	None	Single lane width typically, some wider sections
Danabar Road	Unsealed	None	Two lanes wide typically, mostly in good condition
Dapper Road	Unsealed	None	Two lanes wide typically, mostly in good condition
Laheys Creek Road (north) – Warrumbungle Council area	Unsealed	None	Two lanes wide typically, mostly in good condition
Brooklyn Road	Unsealed	None	Single lane width typically, Some wider sections have recently been graded
Corishs Lane	Unsealed	None	Single lane width typically, some wider sections
Tucklan Road	Unsealed	None	Two lanes wide typically, mostly in good condition
Artz Lane	Unsealed	None	Two lanes wide typically, mostly in good condition
Wargundy Street	Less than 3 m typically	Varies- 0 m to 1 m unsealed	No marked centreline
Beryl Road	3-3.5 m typically	Varies- 0 to 0.5 m unsealed	In good condition with marked centre line
Mebul Road (eastern section)	Unsealed	None	Two lanes wide typically, many sections have recently been graded. The section near the houses at Beryl village is sealed
Mebul Road (western section)	Unsealed	None	Two lanes wide typically, mostly in good condition
Upper Mebul Road	Unsealed	None	Single lane width typically, some wider sections

Table 2.4 Existing sealed width and surface condition of the study area roads *(Cont'd)*

Road	Typical sealed lane widths	Typical shoulder widths	Comment
MR 353 Cobbora Road (to Wellington)	3 m typically, except for unsealed sections	Unsealed	There is currently 8 km of this route (two 4 km sections) which are unsealed. There is also a narrow bridge crossing Spicers Creek
MR 233 Goolma Road (to Wellington)	3 m typically	Unsealed	Some newly sealed and resurfaced sections
RR 7512 Gollan Road (also known as Ballimore Road)	Less than 3 m typically	Unsealed	The road merges with MR 353 and shares the narrow bridge section at the crossing of Spicers Creek

2.6 Intersection volumes and capacity standards

The existing intersections on the Project affected roads have mostly been constructed to appropriate design standards for the current traffic volumes, as illustrated by Photographs 2.1 to 2.17. These traffic volumes are too low to require any additional turning lanes at intersections except for Golden Highway at Spring Ridge Road and Goolma Road at Gollan Road.

A summary of the current design standard and provision of additional turning lanes at intersections is listed in Table 2.5 below. This existing intersection capacity and safety assessment is based on the standards for rural left and right turning deceleration lanes in RTA (1999), which are summarised in Appendix C.

However, alternative intersection designs for new right turning deceleration lanes at rural intersections on major roads are now specified (Austroads, 2010). Where new intersections are proposed which include a right turning deceleration lane, the more recent standard (Austroads, 2010) will be used to design the lane. The SIDRA intersection analysis and design program will be used to determine the required future length of the right turn deceleration lane.

Table 2.5 Existing intersections on study area roads

Major Road	Minor Road	Intersection Type	Comment
Golden Highway	MR 353 Cobbora Road (to Wellington)	No additional turning lane	Sealed road on minor road
Golden Highway	Sweeneys Lane	No additional turning lane	Unsealed road on minor road
Golden Highway	Sandy Creek Road	No additional turning lane	Unsealed road on minor road
Golden Highway	Spring Ridge Road	Type AUL* and AUR** additional turning lanes*** for eastbound and westbound traffic	Sealed road on minor road
Castlereagh Highway	Tucklan Road	No additional turning lane	Unsealed road on minor road
Castlereagh Highway	Artz Lane	No additional turning lane	Short sealed section on minor road approach

Table 2.5 Existing Intersections on study area roads *(Cont'd)*

Major Road	Minor Road	Intersection Type	Comment
Castlereagh Highway	Laheys Creek Road (south)	No additional turning lane	Sealed road on minor road
Castlereagh Highway	Beryl Road	No additional turning lane	Sealed road on minor road
Spring Ridge Road	Danabar Road	No additional turning lane	Unsealed road on minor road
Spring Ridge Road	Dapper Road	No additional turning lane	Unsealed road on minor road
Spring Ridge Road	Laheys Creek Road (north), road to Tucklan	No additional turning lane	Unsealed road on minor road
Spring Ridge Road	Sandy Creek Road	No additional turning lane	Unsealed road on minor road
Spring Ridge Road	Upper Mebul Road	No additional turning lane	Unsealed road on minor road
Laheys Creek Road (south)	Spring Ridge Road	No additional turning lane	Unsealed road on minor road
Laheys Creek Road (north)	Brooklyn Road	T- intersection of two unsealed roads	Good visibility generally at the intersection
Brooklyn Road	Suzanne Road	T- intersection of two unsealed roads	Good visibility generally at the intersection
Tucklan Road	Corishs Lane	T- intersection of two unsealed roads	Good visibility generally at the intersection
Beryl Road	Spring Ridge Road (south)	No additional turning lane	Unsealed road on minor road to south
Beryl Road	Mebul Road and Spring Ridge Road (north)	No additional turning lane	Unsealed road on minor road to north
Mebul Road	Upper Mebul Road and Wrights Lane	Cross intersection of two unsealed Roads	Good visibility generally at the intersection
Sandy Creek Road	Dapper Road and Geurie Road	Cross intersection of two unsealed Roads	Good visibility generally at the intersection, which is an offset cross-intersection
MR 233 Goolma Road (to Wellington)	Mebul Road	No additional turning lane	Initial 200 m sealed on minor road to east
MR 233 Goolma Road (to Wellington)	RR 7512 Gollan Road (to Ballimore and Dubbo)	Type AUR*** additional right turning lane for westbound traffic	Good visibility generally at the intersection

Note **AUL: auxiliary lane left turn treatment.*
***AUR: auxiliary lane right turn treatment.*
****The dimensions for Type AUL and Type AUR left and right turning lanes are defined in the RTA Road Design Guide (RTA 1999).*

2.7 Traffic safety

The existing traffic safety conditions in the study area have been quantified objectively by comparing the accident records for the locality with those for the State. The most recent published NSW figures (RTA 2009a) are summarised in Table 2.6.

For the major roads within the study area, the recent accident history is illustrated in Figures 2.2 to 2.6 and summarised in Table 2.7.

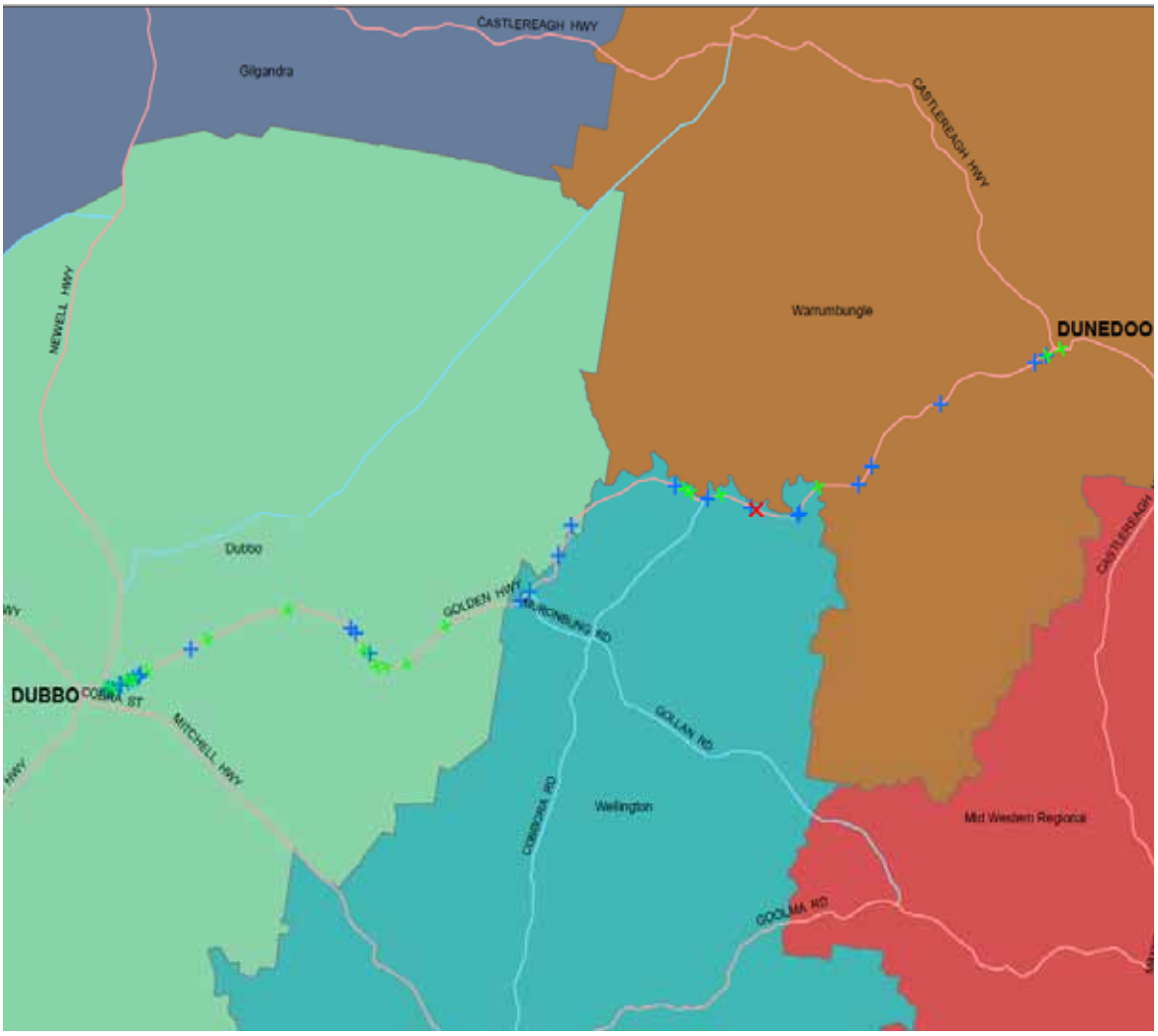
No accident history map is available for the Spring Ridge Road and Laheys Creek Road (south) route. However, the accident history data for the route shows three accidents occurred on the route during the years 2006-2010, all on the Laheys Creek Road (south) section.

Table 2.6 Recent NSW annual average accident rates for all roads

Year	Total accidents	Fatalities	Mvkt	Accidents per Mvkt	Fatalities per 100 Mvkt
2004	47,310	510	58.875	0.80	0.87
2005	45,554	508	63,717	0.71	0.80
2006	45,528	496	61,400	0.74	0.81
2007	45,395	435	62,732	0.72	0.69
2008	42,833	374	65,798	0.65	0.57
5 Year Average	**45,324**	**465**	**62,504**	**0.73**	**0.74**

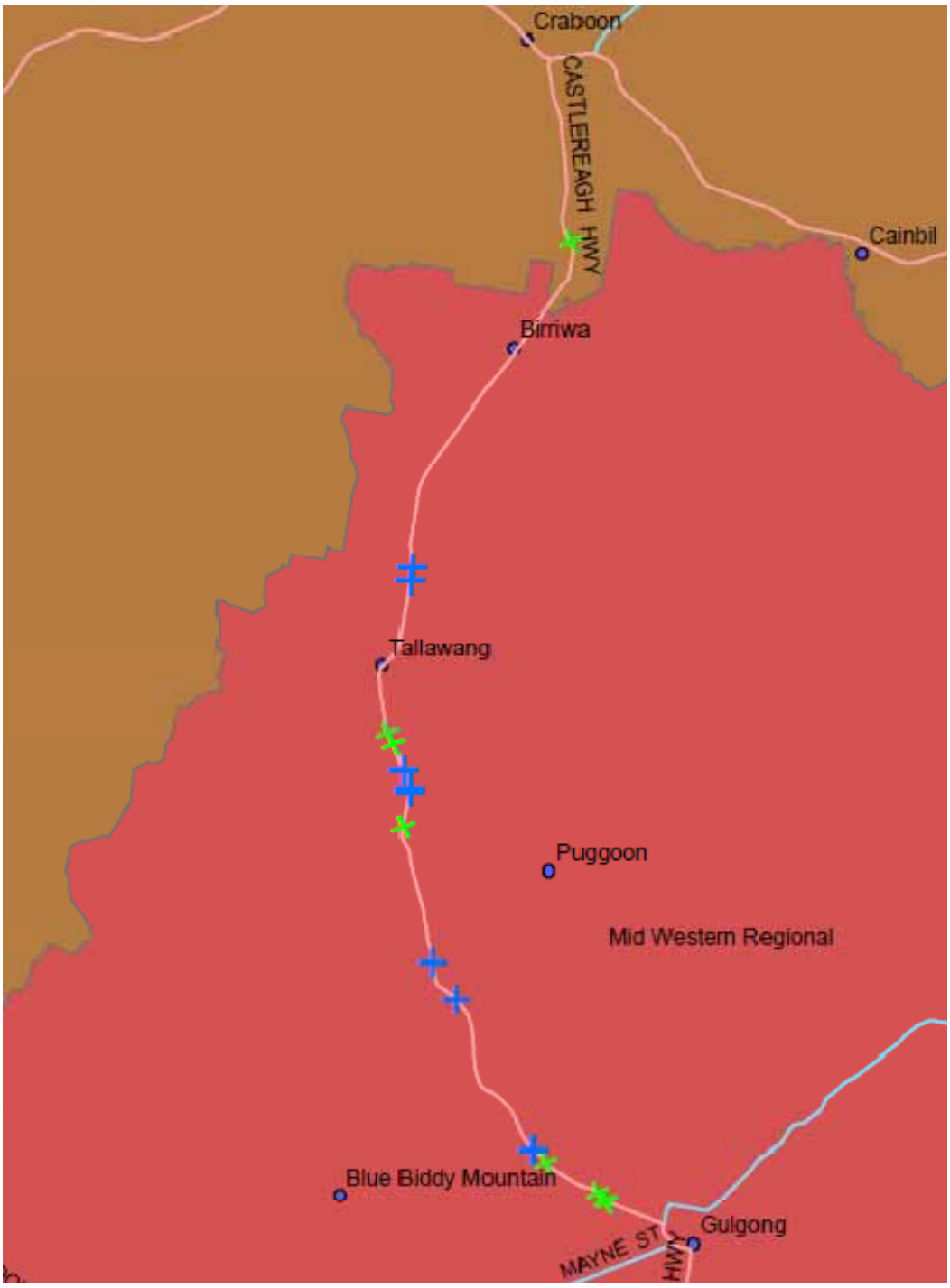
Source: (RTA 2009a), Statistical Statement- Road Traffic Crashes in New South Wales.

Figure 2.2 Study Area RMS Accident History Map for Golden Highway SH 27



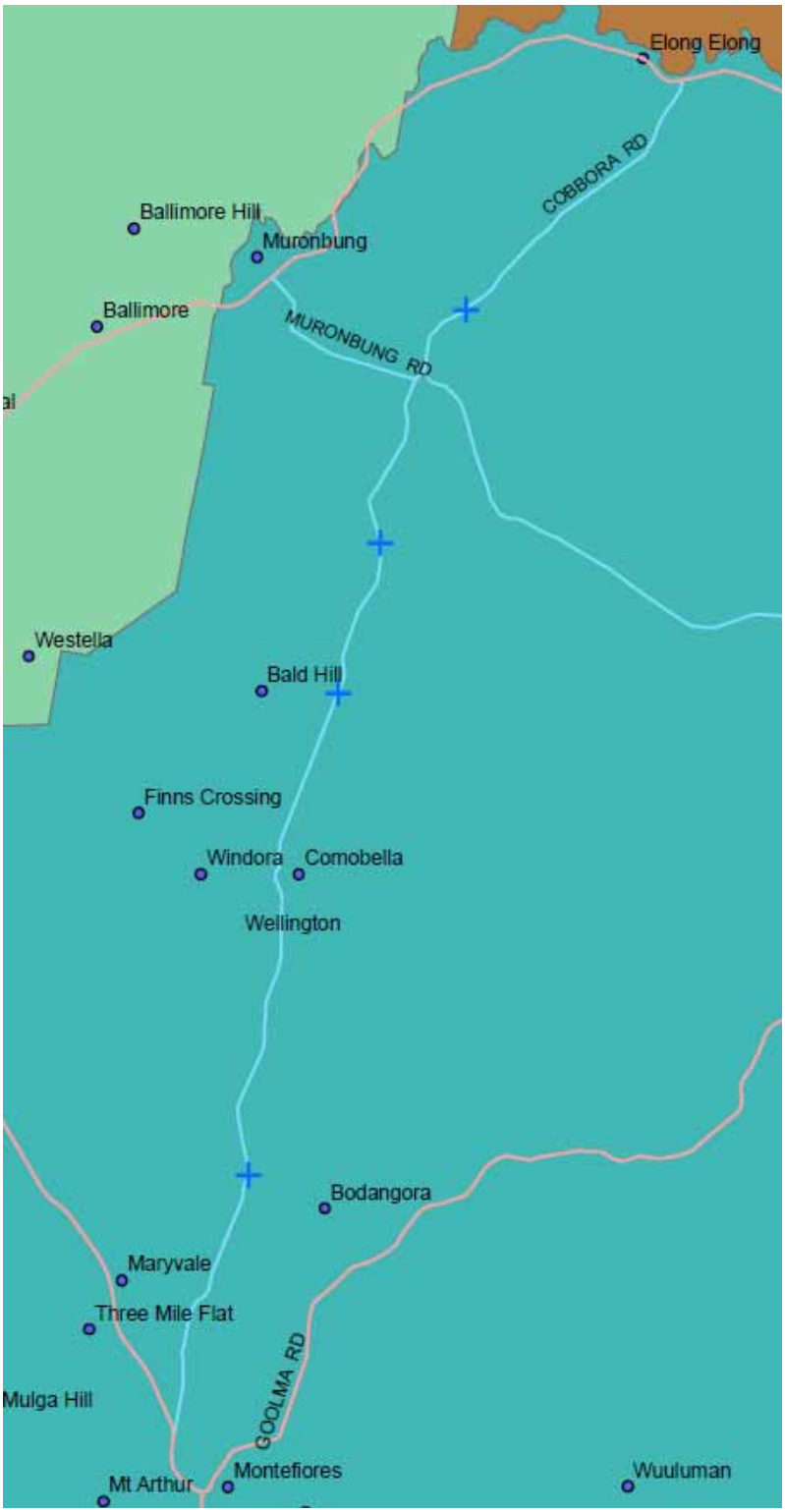
Key: + = Towaway accident + = Personal injury accident X = Fatality accident

Figure 2.3 Study Area RMS Accident History Map for Castlereagh Highway SH 18



Key: + = Towaway accident + = Personal injury accident X = Fatality accident

Figure 2.4 Study Area RMS Accident History Map for Cobbora Road MR 353



Key: + = Towaway accident + = Personal injury accident X = Fatality accident

Figure 2.5 Study Area RMS Accident History Map for Goolma Road MR 233

Key: + = Towaway accident + = Personal injury accident X = Fatality accident

Figure 2.6 Study Area RMS Accident History Map for Gollan Road RR 7512

Key: + = Towaway accident + = Personal injury accident X = Fatality accident

Table 2.7 Recent five year accident history for major roads in the study area

Road	Total accidents	Fatalities	Route length (km)	5 year Mvkt	5 year accident rate per Mvkt	Fatality rate per 100 Mvkt
Golden Highway SH 27 (rural section)*	32*	1*	86*	173.5	0.18	0.58
Castlereagh Highway SH 18	17	0	41	62.4	0.27	0
Spring Ridge Rd & Laheys Creek Road (south)	3	0	35	8.8	0.34	0
Cobbora Road MR 353	4	0	52	13.2	0.30	0
Goolma Road MR 233	37	2	66	101.6	0.36	1.97
Gollan Road RR 7512	19	1	41	34.9	0.54	2.87

Notes: **Excludes the Dubbo urban area (western 5 km of the route between Dunedoo and Dubbo).*
Accident history is for the years 2006 to 2010.

The five year accident rates for the major roads (Table 2.7) are all significantly below the most recent NSW state average rate of 0.73 per Mvkt. The Golden Highway (rural section) is statistically the safest road in the study area, with a five year accident frequency rate of 0.18 per Mvkt (75% lower than the State average).

The accident frequency rate on the Golden Highway is higher within the urban area outskirts of Dubbo with the more congested traffic operating conditions and generally increased traffic conflicts. However, in urban areas roads generally have lesser accident severity and fatality rates.

The accident fatality rates on the major rural roads in the study area (Table 2.7) are mostly lower than the recent State average rate of 0.74 fatalities per 100 Mvkt.

However, the recent five year accident fatality rates of 1.97 and 2.87 per Mvkt were higher than the State average on Goolma Road (MR 233) and Gollan Road (RR 7512). These comparatively high fatality rates were the result of one and two fatal accidents respectively on these two roads. This may not be statistically representative of the actual safety risk of travel on these roads.

2.8 Public transport, pedestrian and cyclist access

The primary usage of public transport within the study area is by school buses. The major school bus routes within the study area operate to and from Gulgong via Spring Ridge Road, Laheys Creek Road (south) and the Castlereagh Highway. Typical school bus stops are illustrated in Photographs 2.20 and 2.21.

Photograph 2.20 **Typical school bus stop on the Castlereagh Highway SH 18**

Photograph 2.21 **Typical school bus stop on Spring Ridge Road**

3 Details of the proposed development

3.1 Project construction schedule

Project construction is scheduled to commence with site clearing and mobilisation works in the second half of 2013. The main construction phase will commence in January 2014 and will be substantially complete by late 2015. A notable exception is the coal handling and preparation plant, which will be constructed in stages and will not be fully completed until May 2016, about one year after the commencement of coal production.

There will in effect be a small overlap of the mine construction and operations stages between mid 2015 and mid 2016. However, the relatively low mine operations workforce during the first two years of operation will mean that the peak combined mine workforce during this overlap period (543 persons) will still be lower than either the peak mine construction (550 persons) or the peak mine operations (590 persons) workforces. Therefore, this overlap period will not require further detailed assessment of its traffic implications in addition to that undertaken for the peak construction and operations stages.

The traffic impact assessment for the peak mine construction and operations stages is based on the two respective peak periods of activity which are anticipated to occur during September and October 2014 (for construction) and between 2027 and 2030 (for operations).

3.1.1 Proposed workforce and hours of operation

During the peak construction period, in September and October 2014, there will be a total Project construction workforce of approximately 550 persons distributed around the four main worksite areas as follows:

- 67% in the main infrastructure and CHPP area (370 persons);
- 18% in the rail spur line and Castlereagh Highway underpass construction (100 persons);
- 11% in local road realignments (60 persons); and
- 4% on water pipeline and pump station construction (20 persons).

Of the 550 person peak construction workforce, 340 will be living temporarily at the Project's accommodation village which will be located on Spring Ridge Road, approximately 3 km south of the Golden Highway. These construction workers will all generally travel by bus each day between the accommodation village and their worksites. The locations of the four main Project area worksites are shown in Figure 3.1.

It is anticipated that additional charter flights to and from Dubbo Airport will be operated when required, for temporary construction workers who will be flying in and flying out at the beginning and end of their weekly or fortnightly shifts. This will minimise the impact of workforce movements on seat availability and price. Up to 210 construction workers are expected commute to work by car each day to Project area worksites from their homes in nearby townships such as Dubbo, Wellington, Gulgong and Dunedoo.

Normal construction work hours will be 6.00 am to 6.00 pm, seven days per week at all worksites. There will generally be concentrated peaks of construction workforce traffic arrivals around 6.00 am on most weekdays and less concentrated peaks of departures each afternoon as the shift finish times of the construction workers may vary between 4.00 pm to 6.00 pm.

3.1.2 Construction materials transport

Various construction materials will be transported to and from the Project worksites, including equipment, sand, soil, gravel, pipes, steelwork, concrete, mechanical and electrical components and pre-manufactured items. Fuel and other consumables will also be delivered to the main Project worksites and construction waste removed on a regular basis.

3.2 Project operations

To meet its contractual obligations, the first product coal is required to be produced at the mine in mid 2015. Following this it will take approximately 10 years to reach full employment.

The Project will be operating at close to full production from the year 2020 onwards. The Project operational workforce requirement, for a selection of typical years during the mine life between 2015 and 2033, is shown in Table 3.1.

Table 3.1 Future mine operations workforce each year

Year	Total mine workforce	Mine operators per shift	Mine operators per shift adjusted for leave	Mine management administration and technical staff	Total persons travelling each day, all shifts
	persons	persons	persons	persons	persons
2015	171	38	34	23	91
2020	469	110	99	30	228
2027	590	140	125	30	280
2030	590	140	125	30	280
2033	248	55	50	20	120

3.2.1 Proposed workforce and hours of operation

The proposed shift change times for the future mine operations workforce will be around 7.00 am and 7.00 pm. The mine operations staff will generally be split into four shifts (with leave coverage). On each working day, two of the four shifts will travel to and from the mine, to work either the day shift or the night shift of mine operations.

In addition there will be a smaller number of management, technical and administration staff based at the mine who will work other shift times, more typical of those for office employees, typically 8.00 am to 5.00 pm or 7.00 am to 4.00 pm. A summary of the forecast future total mine operations and mine management technical and administration staff travelling to work each day at the mine is included in Table 3.1.

3.2.2 Operations materials transport

The following materials deliveries and contractor vehicle movements will occur at the mine:

- Materials
  - general: fuel, lubricants, explosives, emulsions, gravel, coolant, potable water, catering;

- maintenance: cranes, tyres, spare parts, refurbished components, tray/bucket replacement, maintenance equipment, support vehicles, hoses, pipes; and

- CHPP: magnetite, flocculant, consumables.

- Personnel

  - maintenance- shutdown crews; and

  - other- window crews, civil contractors, environmental monitoring staff and sales persons.

In addition, general waste and other used materials like oil and equipment needing repair will be removed from the mine on a regular basis. When the mine is operating fully there will typically be about 15,200 truck deliveries per year (approximately 41 truck deliveries per day) based on a 365 day working year.

3.2.3 Coal product transport

All coal product will be transported by rail either to power stations in the Hunter Valley or the NSW Central Coast or for export via the port of Newcastle. A separate report has been prepared assessing the rail transport impacts of the Project (EMM, 2012b).

A mine rail spur line and balloon loop will connect to the existing Gulgong to Dunedoo rail line near Tallawang, approximately 19 km north-west of Gulgong. The new rail spur line will cross underneath the Castlereagh Highway at a new grade separated rail underpass.

Interactions between the road and rail networks occur at level crossings. Additional traffic delays are expected at urban level crossings which are generally controlled by flashing lights. The traffic safety issues at existing 'passive' rural level crossings controlled by stop signs have also been considered, in particular on the section of the rail route west of the Ulan mine, where coal trains do not operate currently.

There will be no new public level crossings constructed on the new rail spur line.

3.3 Site access routes

Construction traffic management for the Project will seek to minimise the construction truck traffic usage of a number of existing roads where the existing road width and condition is not suitable for significant additional daily traffic movements.

Sweeneys Lane, at the Golden Highway will not generally be used for the Project construction access, or for the construction of the road realignment works around the western edge of the future mine area. The main construction access route for these works will be via Spring Ridge Road, for approximately 5 km south of the Golden Highway and then via Danabar Road towards the existing vicinity of Sweeneys Lane and Sandy Creek Road.

On Spring Ridge Road, south of the main mine infrastructure area, all construction access from the south (ie from the Gulgong direction) will be restricted to light vehicle access only. All Project construction stage heavy vehicle access from this direction will be required to travel on the Castlereagh Highway route via Dunedoo.

Also, on Tucklan Road (Wargundy Street) for approximately 10 kilometres south of Dunedoo, the narrow existing sealed width of this route means that the Project construction access should be restricted to light vehicles only.

The proposed construction traffic access routes, proposed road realignments and new roads for the Project are illustrated by the maps in Figure 3.1 and Figure 3.2. The new replacement roads and road realignments which will be required for the mine operations stage traffic movements are as follows.

- the main northern site access will be via the Spring Ridge Road realignment which will join the Golden Highway approximately 4 km west of Spring Ridge Road and connect to Spring Ridge Road at the southern side of the main mine infrastructure area;

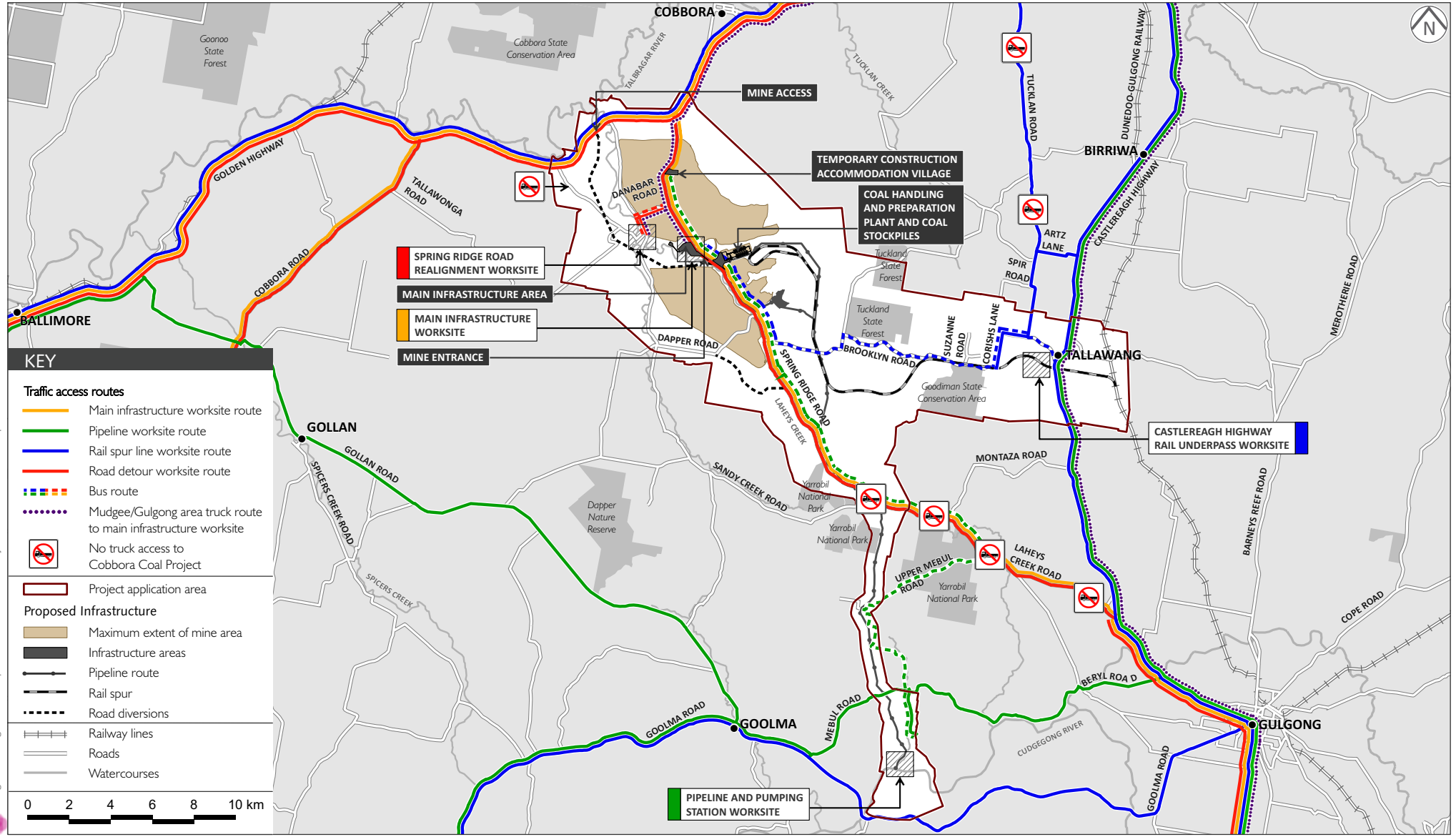
- the main southern site access (for light vehicle traffic only) will be maintained via the existing Spring Ridge Road and Laheys Creek Road (south), south of Spring Ridge Road;

- at Dapper Road, after about year 8 of the mine operations, an eastern end realignment will be required to maintain the connection with Spring Ridge Road. This will be reconstructed to a similar standard of construction as the current Dapper Road;

- a Brooklyn Road (north) realignment will be required to connect Suzanne Road to Corishs Lane, including a new alignment for Brooklyn Road passing alongside the northern side of the mine rail spur line. A new road underpass crossing underneath the railway line will be provided for agricultural and forestry access to land on the south side of new railway line; and

- the existing Brooklyn Road (west) connection to Spring Ridge Road will remain via Laheys Creek Road (north), which will incorporate an underpass for Laheys Creek Road (north) passing under the rail spur line approximately two km east of Spring Ridge Road.

During construction, at the worksite of the new rail spur line underpass crossing the Castlereagh Highway, it is likely that an 80 km/hr construction speed zone and staged realignments of the highway will be required.



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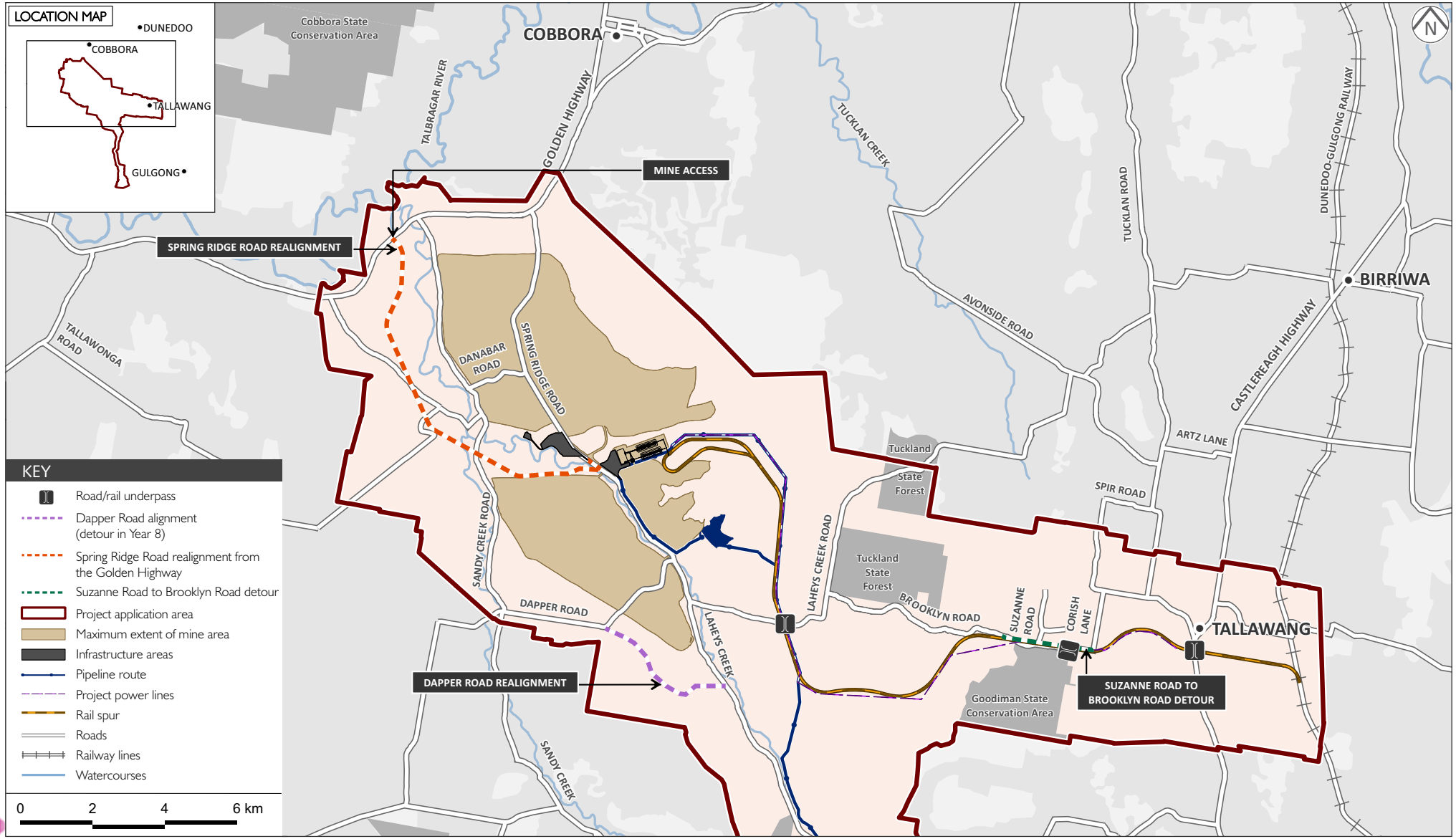
Construction Traffic Access Routes

Cobbora Coal Project - Traffic Assessment

Figure 3.1



Proposed Road Detours and Realignment for Mine Operations

Cobbora Coal Project - Traffic Assessment

Figure 3.2

3.4 Construction stage traffic generation

3.4.1 Worksite light vehicle and car traffic

During construction, the mine will generate light vehicle traffic movements from both the workforce and site visitors.

The majority of the peak construction workforce (340 persons approximately) will be temporarily living at the Project's accommodation village and will generally travel by bus each day to one of the four main worksites. Assuming a maximum capacity of 40 people per bus, approximately 10 bus trips each way per day will be required to transport the workforce, as follows:

- six buses to/from the main mine infrastructure and CHPP area (228 persons);
- two buses to/from the rail spur line construction worksites (61 persons);
- one bus to/from local road realignment construction worksites (37 persons); and
- one bus to/from water pipeline and pump station construction worksites (16 persons).

The remaining 210 peak construction workers will generally commute by car each day, with an approximate 63% car driver ratio, resulting in 133 light vehicles travelling each day from the Dubbo, Wellington, Gulgong/Mudgee and Dunedoo directions. The distribution of this traffic has been determined from the likely residential locations of the locally based construction workforce EMM (2012a), with approximately:

- 60% travelling to and from the west, that is Dubbo (82 car driver trips each way);
- 20% travelling to and from the south-west, that is Wellington (25 car driver trips each way);
- 10% travelling to and from the south-east, that is Gulgong/Mudgee (13 car driver trips each way); and
- 10% travelling to and from the north, that is Dunedoo/Coolah/Mendooran (13 car driver trips each way).

The additional daytime site visitor car traffic has been estimated as approximately 50 site visitors per day at the peak of construction, with an approximate 75% car driver ratio, generating about 38 car driver trips each way per day travelling to and from the following directions approximately:

- 55% to and from the west (Dubbo), mainly visitors flying in from Sydney and interstate;
- 30% to and from the east, mainly persons driving from Newcastle/Hunter Valley locations via Dunedoo;
- 10% to and from the south-east, mainly persons driving to and from Sydney/Mudgee via Gulgong; and
- 5% to and from the south-west, mainly supervisory staff, based in Wellington LGA.

3.4.2 Worksite truck traffic

At the peak of construction, there will be an estimated 100 truck deliveries to the worksites each day. These daily truck deliveries will be distributed to and from the four main Project area worksites in similar proportions to the peak construction workforce numbers at each location, that is:

- 67% main mine infrastructure and CHPP area (67 trucks per day);
- 18% rail spur line construction (18 trucks per day);
- 11% local road realignment construction (11 trucks per day); and
- 4% water pipeline and pump station construction (4 trucks per day).

During the construction stage, the Project related truck traffic will be prohibited from using Spring Ridge Road, south of the mine infrastructure area. The likely approach routes of the Project related truck traffic will therefore be as follows:

- approximately 40% to and from the Golden Highway west (mainly general supplies and fabricated steel from Dubbo);
- approximately 40% to and from the Golden Highway east (mainly mining equipment and infrastructure supplies) including some trucks from Brisbane travelling via the Castlereagh Highway north of Dunedoo;
- approximately 10% to and from the south-east (Gulgong/Mudgee/Lithgow/Sydney) via the Castlereagh Highway; and
- approximately 10% to and from the south-west via Cobbora Road from Bathurst, Orange and Wellington.

3.4.3 Construction stage accommodation village traffic

The workforce accommodation village will also generate its own external traffic movements from the locality, which will be approximately as follows:

- village staff car traffic movements, approximately 40 per day each way for 40 staff, mostly travelling to and from the surrounding local area;
- truck deliveries for water supply and waste water removal (eight truck loads per day) mostly travelling to and from the south-east or south-west via Cobbora Road or the Castlereagh Highway;
- truck deliveries for food, drink, laundry, other cleaning, garbage removal and general maintenance, (ten truck deliveries per day) mostly to and from the east and west via the Golden Highway;
- fly in, fly out workforce bus transfer movements mostly travelling to and from Dubbo Airport, 40 people per day each way on average, which will require one bus/coach per day in each direction; and
- drive in, drive out workforce car travel movements, 40 people per day each way on average, generating 40 car traffic movements each way, travelling via various routes to and from the north, south, east and west in NSW with roughly equal proportions in each direction.

3.5 Operations stage traffic generation

3.5.1 Light vehicle and car traffic

In the peak years of the Project operations, which are currently predicted to be the years 2027 to 2030 inclusive, the Project generated car and other light vehicle traffic movements will be the following:

- mine operations dayshift staff with 50% car to person ratio that is approximately 63 cars each way for 125 persons, generally arriving at the mine around 7.00 am each day, including weekends, and departing around 7.00 pm;
- mine operations nightshift staff with 50% car to person ratio that is approximately 63 cars each way for 125 persons, generally arriving at the mine around 7.00 pm each day, including weekends, and departing around 7.00 am the following day; and
- mine management, technical and administration staff with 75% car to person ratio that is approximately 23 cars each way for 30 persons, generally arriving at the mine between 7.00 am to 8.00 am each weekday and departing between 4.00 pm to 6.00 pm.

The likely approach routes for this traffic would be similar to the construction workforce traffic and would be heavily drawn from the major townships such as Dubbo, Wellington and Gulgong/Mudgee where the major regional schools, medical and other essential facilities are located and the potential supply of new housing is greatest. The estimated future residential distribution of the operations workforce will be approximately:

- 60% to the west (Dubbo);
- 15% to the south west (eg Wellington);
- 15% to the east (Dunedoo/Coolah/Mendooran); and
- 10% to the south north (eg Gulgong/Mudgee).

The daily site visitor car traffic which will be generated during mine operations would be similar in magnitude and distribution to that during the construction stage. This is estimated as 38 site visitor cars/ute visits per day for approximately 50 site visitors throughout the majority of the operational life of the Project. This traffic will generally be travelling via the four main approach routes in the following approximate proportions:

- 70% to and from the west (Dubbo);
- 20% to and from the east (Dunedoo/Hunter Valley/Newcastle);
- 10% to and from the south east (Gulgong/Mudgee/Lithgow/Sydney); and
- minimal eg 0% to and from the south west (Wellington).

3.5.2 Truck traffic

The annual average truck movements required to service the mine has been calculated over the life of the Project. There will typically be about 15,200 truck deliveries per year (41 truck deliveries per day) over the majority of the mine operational life. It is anticipated that all the proposed mine delivery truck traffic travelling to and from the south-east will be prohibited from using Spring Ridge Road when travelling between Gulgong and the mine. The likely delivery routes for this truck traffic have been determined on this basis. These are as summarised in Table 3.2.

Table 3.2 Future Project operations – daily truck deliveries (% by route)

Source	Route	Average daily truck deliveries	% by route
Dubbo	Golden Highway west	17	40
Newcastle/Hunter	Golden Highway east	12	30
Sydney/Gulgong/Mudgee	Castlereagh Highway south	6	15
Wellington	Via Cobbora Road	4	10
Brisbane	Via Dunedoo	1	2.5
Gunnedah	Via Dunedoo	1	2.5
Total	**All Routes**	**41**	**100**

3.6 Car parking supply

Gravel surfaced car parking areas will be provided at each worksite and the accommodation village to meet the anticipated demand from the workforce and site visitors at each location.

At the accommodation village 230 car parking spaces will be provided for use by staff and residents. It is anticipated that approximately 50% of the temporary workforce residing at the village will commute either weekly or fortnightly on a fly in fly out basis via Dubbo Airport and will not require car parking at the village. The remainder (170 persons approximately) will probably require car parking at the village.

After the commencement of mine operations in July 2015, sealed car parking areas will be provided at the main mine infrastructure area, for the anticipated daily peak parking requirement for the dayshift workforce (86 vehicles) plus additional parking (63 vehicles) for the shift changeover period.

The additional parking capacity for 63 vehicles, which would normally be vacant for much of the daytime period between 8.00 am and 6.00 pm, would generally be available for use by site visitors during this period.

4 Impact of proposed development

4.1 Construction stage traffic impacts

Traffic impacts on the road network and at intersections during Project construction have been determined with reference to the road width and intersection design standards for rural roads, as defined by RTA (1999) and Austroads (2010).

4.1.1 Road network

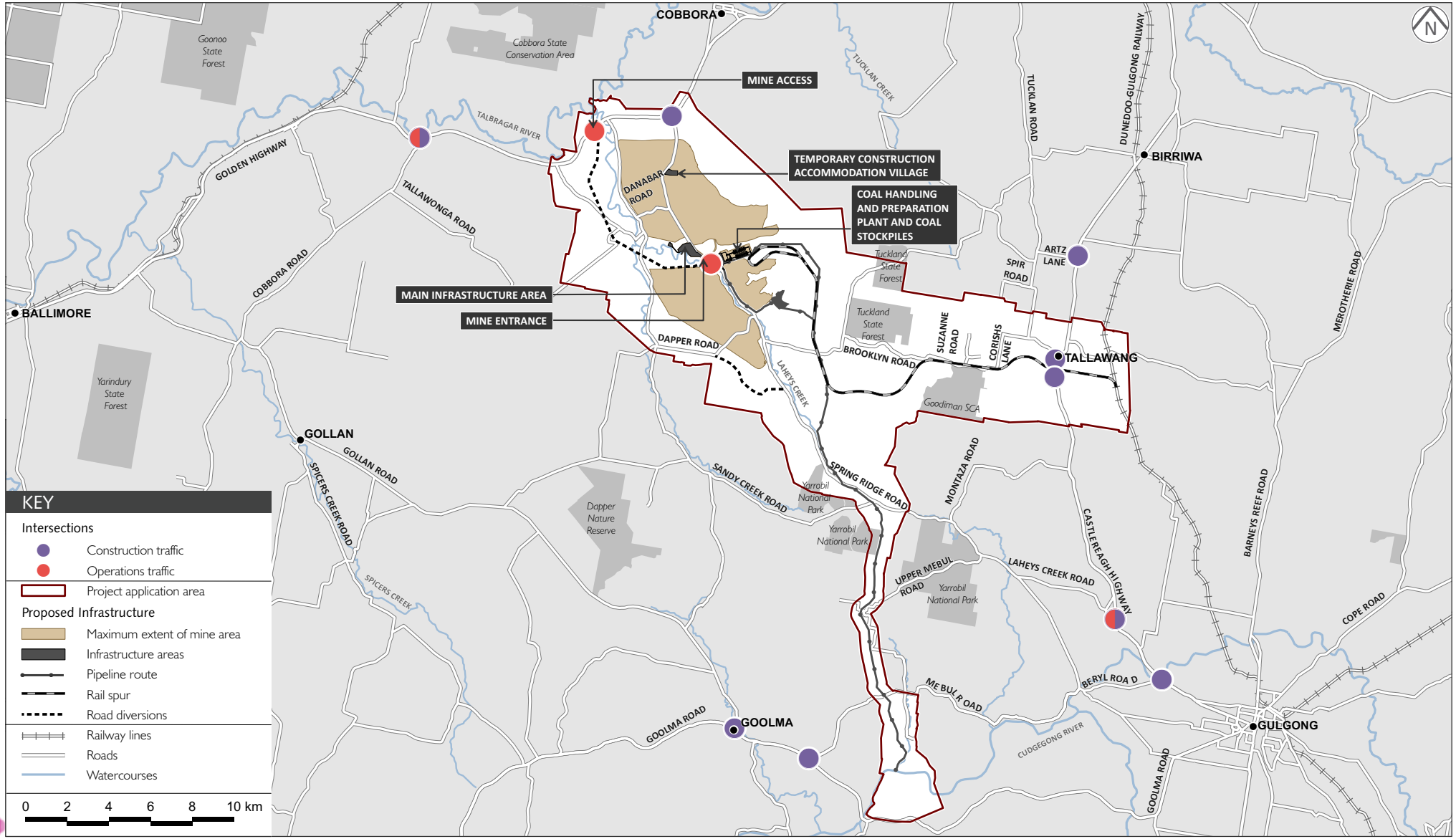
The peak period for construction workforce traffic will be 5.00 am to 6.00 am on weekday mornings. This is well before the current morning peak traffic period for the surrounding roads which, as summarised in Table 2.2, is generally 8.00 am to 9.00 am. In the afternoons, the times of completion of construction work at each worksite will be more variable and the afternoon construction workforce traffic peaks will be more dispersed, occurring between 4.00 pm and 6.00 pm typically.

Future construction stage traffic impacts at intersections (see Figure 4.1) and the need for road or shoulder widening works have been determined. The assessment is based on the cumulative additional daily traffic volumes from all worksites which will be generated on each road (see Figures 4.2 and 4.3), with reference to RTA (1999) design traffic limits (see Table 2.3). The roads where there will be significant increases in total daily traffic volumes as a result of the Project construction are identified and summarised in the following Tables 4.1 to 4.5.

Table 4.1 Forecast construction traffic increases on state highways

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Golden Highway (near Dunedoo)	1,234*	333*	222	110	18	33
Golden Highway (east of Spring Ridge Road)	1,050	290	222	110	21	38
Golden Highway (west of Sweeneys Lane)	990*	267*	460	112	46	42
Golden Highway (west of Cobbora Road)	909*	245*	356	88	39	36
Castlereagh Highway (north of Tallawang)	608*	116*	78	56	13	48
Castlereagh Highway (south of Tallawang)	670	128	58	36	9	28
Castlereagh Highway (south of Beryl Road)	1,221*	232*	102	32	8	14

Notes: **Year 2005 Traffic Count – no heavy vehicle Information. Heavy vehicle % is assumed to be similar to adjacent sections.*
Colours indicate forecast traffic increases are 15% or more for general traffic.



Source: RTA Traffic Survey (2005), MWRC Traffic Survey (2000)

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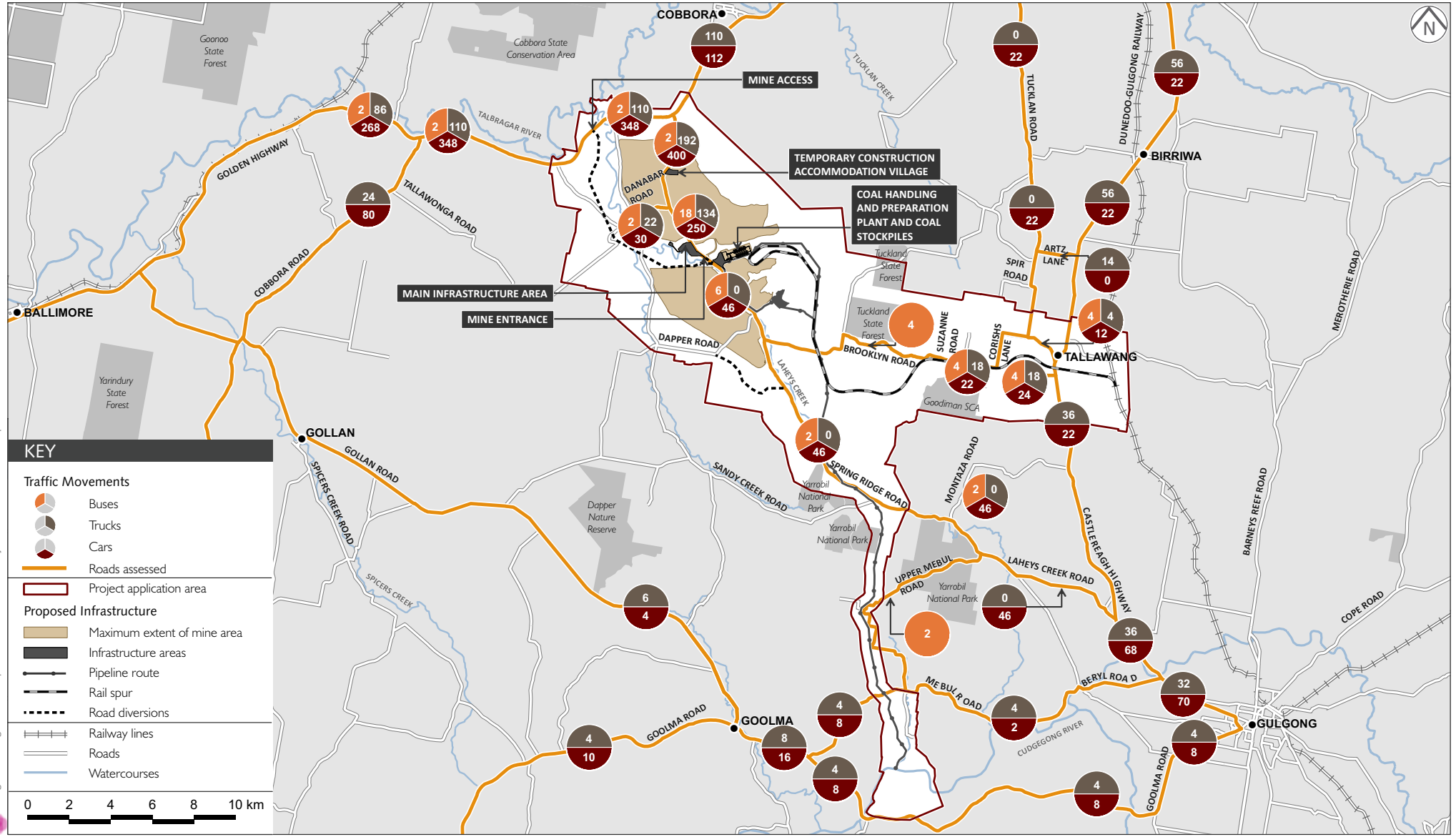
Future Intersection Traffic Movements Assessed

Cobbora Coal Project - Traffic Assessment

Figure 4.1



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Total Daily Construction Traffic Movements Assessed

Cobbora Coal Project - Traffic Assessment

Figure 4.2

Table 4.2 Forecast construction traffic increases on major local roads

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Spring Ridge Road (south of the Golden Highway)	60	7	594	194	990	2,770
Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	95	11	48	2	51	18
Laheys Creek Road (south) at Castlereagh Highway	266	35	46	0	17	0
Wargundy Street (6 km south of Dunedoo)	124	8	22	0	18	0
Beryl Road at Castlereagh Highway	234*	31*	6	4	3	13

Notes: **Year 2000 Traffic Count – No heavy vehicle Information. Heavy vehicle % is assumed to be similar to adjacent roads.*

Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 4.3 Forecast construction traffic increases on other local roads

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Sandy Creek Road (at north end)	3	0	0	0	0	0
Sweeneys Lane at Golden Highway	15	0	0	0	0	0
Danabar Road	9	1	54	24	600	2,400
Dapper Road	19	2	0	0	0	0
Laheys Creek Road (north)	40	6	4	4	10	67
Tucklan Road at Castlereagh Highway	60	15	20	8	33	53
Artz Lane at the Castlereagh Highway	20	2	14	14	70	700
Mebul Road (east)	82	4	6	4	7	100
Mebul Road (west)	51	3	12	4	24	133
Upper Mebul Road	16	1	2	2	13	200
Sandy Creek Road (at south end)	5	0	0	0	0	0

Notes *Colours indicate forecast traffic increases are 15% or more for general traffic.*

Table 4.4 Forecast construction traffic increases on other classified roads

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Goolma Road (east of Guntawang Road) MR 233	571*	71*	12	4	2%	6%
Goolma Road (east of Goolma) MR 233	1,124*	141*	24	8	2%	6%
Goolma Road (west of Goolma) MR 233	627*	78*	14	4	2%	5%
Gollan Road (north of Goolma) RR 7512	505*	63*	10	4	2%	6%
Cobbora Road (at north end) MR 353	57*	7*	104	24	182%	343%
Cobbora Road (at Spicers Creek) MR 353	550*	69*	114	28	21%	41%
Cobbora Road (at south end) MR 353	237*	30*	104	24	44%	80%

Notes: **Year 2005 Traffic Count no heavy vehicle Information. Heavy vehicles assumed to be approximately 10-15%, e.g. 12.5% typically*

Colours indicate forecast traffic increases are 15% or more for general traffic

Table 4.5 Summary of roads with significant increases in forecast construction traffic

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Spring Ridge Road (south of the Golden Highway)	990	2,770	654	201	Typically 6 m sealed width, no sealed shoulders	The section between the Golden Highway and the mine infrastructure area will be widened to provide a minimum 7 m sealed road width (3 m lanes and 0.5 m sealed shoulders), during project construction. The necessary standard for these works has been considered in the context the road will only be used for a further 2 to 3 years during Project construction, after which it will be closed.

Table 4.5 Summary of roads with significant increases in forecast construction traffic *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Danabar Road	600	2,400	63	25	Unsealed two lanes wide typically	No improvement is required. The existing road width and condition are adequate for it to be used for the Project construction access after which it will be closed
Cobbora Road, MR 353, at northern end near the Golden Highway	182	343	161	31	Typically 6 m sealed width, except for unsealed sections	No improvement is required. It is understood that road sealing is intended to be completed during the next two years by Wellington Council independently of the Project
Artz Lane at the Castlereagh Highway	70	700	34	16	Unsealed road, typically two lanes wide	No improvement is required. The existing road width and condition are adequate for it to be used for construction access
Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	51	18	143	13	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo instead
Golden Highway, SH 27, west of Sweeneys Lane	46	42	1450	379	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage
Cobbora Road, MR 353, at southern end near Wellington	44	80	341	54	Typically 6 m sealed width, no sealed shoulders	No widening is required. However, the additional truck traffic may increase the frequency of the need for maintenance repairs to this road
Golden Highway, SH 27, west of Cobbora Road	39	36	1,265	333	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage
Tucklan Road at the Castlereagh Highway	33	53	80	23	Unsealed road, typically two lanes wide	No improvement is required. The existing road width and condition are adequate for it to be used for construction access

Table 4.5 Summary of roads with significant increases in forecast construction traffic *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Mebul Road (western section)	24	133	63	7	Unsealed road two lanes wide typically	No improvement is required. The existing road width and condition are adequate for it to be used for the Project construction access
Golden Highway, SH 27, east of Spring Ridge Road	21	38	1,272	400	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage
Cobbora Road, MR 353, at Spicers Creek	21	41	664	97	Typically 6 m width, no sealed shoulders. There is a narrow bridge at Spicers Creek	Seal widening will be required to provide 0.5 m to 1 m wide sealed road shoulders. Traffic management improvements (additional traffic priority or warning signage and/or guardrails) will be provided on the approaches to the narrow bridge
Tucklan Road (Wargundy Street) 6 km south of Dunedoo	18	0	146	8	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the project related truck traffic travelling to and from the Dunedoo direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Birriwa
Golden Highway, SH 27, near Dunedoo	18	33	1,456	443	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage
Laheys Creek Road (south) west of the Castlereagh Highway	17	0	312	35	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, the Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo instead

Notes: Colours indicate roads where road widening, traffic monitoring or other traffic impact mitigation measures will be required.

4.1.2 Traffic impacts at intersections

The assessment of construction stage traffic impacts at intersections has been undertaken at nine locations based on increases in the peak hour turning traffic movements at the peak stage of Project construction. The assessment is undertaken based on the warrant chart for rural turn lanes which is published as Figure 4.5.12 in RTA (1999). The warrant chart is shown in Appendix C of this report. The potential warrants for additional left or right turning lanes at intersections have been examined in Table 4.6 for the peak construction stage traffic, at six time periods of the day, namely is:

- 5.00 am to 6.00 am, peak arrivals period for construction workforce traffic;
- 8.00 am to 9.00 am, existing morning peak period for the road network generally, coinciding with some daytime mine construction deliveries and site visitor traffic;
- 11.00 am to 12.00 midday, existing daytime peak traffic period for commercial traffic, coinciding with some daytime mine construction deliveries and site visitor traffic;
- 4.00 pm to 5.00 pm, existing afternoon peak period for the road network generally, coinciding with some daytime mine construction deliveries and visitor traffic, and an early afternoon peak departure period for some of the mine construction workforce traffic;
- 5.00 pm to 6.00 pm, likely mid-pm peak departure period for most construction workforce traffic; and
- 6.00 pm to 7.00 pm, likely late pm peak departure period for some construction workforce traffic.

Table 4.6 Assessment of intersection traffic impacts at peak mine construction stage

Intersection	Time of peak hour for left turning traffic	Peak hour left turning traffic volume	Additional left turning lane required	Time of peak hour for right turning traffic	Peak hour right turning traffic volume	Additional right turning lane required
Golden Highway/ Cobbora Road	4.00 pm to 5.00 pm	18	Yes*	11.00 am to 12.0 midday	1	No (however, a basic right turn treatment, Type BAR, will be constructed as part of the intersection upgrade works)
Golden Highway/ Spring Ridge Road	5.00 am to 6.00 am	15	No (A type AUL lane is already provided. Widening of the minor road will be undertaken to facilitate heavy vehicle access)	5.00 am to 6.00 am	116	No (a type AUR lane is already provided. Widening of the minor road will be undertaken to facilitate heavy vehicle access)
Castlereagh Highway/ Artz Lane	4.00 pm to 5.00 am	2	No	8.00 am to 9.00 am	2	No
Castlereagh Highway/ Tucklan Road	5.00 am to 6.00 am	3	No	5.00 am to 6.00 am	3	No

Table 4.6 Assessment of intersection traffic impacts at peak mine construction stage *(Cont'd)*

Intersection	Time of peak hour for left turning traffic	Peak hour left turning traffic volume	Additional left turning lane required	Time of peak hour for right turning traffic	Peak hour right turning traffic volume	Additional right turning lane required
Castlereagh Highway/ new worksite access	5.00 am to 6.00 am	3	Yes (a turning lane is required for heavy vehicle access safety)*	5.00 am to 6.00 am	10	Yes (a turning lane is required for heavy vehicle access safety)*
Castlereagh Highway/ Laheys Creek Road (south)	5.00 am to 6.00 am	15	Yes*	8.00 am to 9.00 am	2	No (however, a basic right turn treatment, Type BAR, will be constructed as part of the intersection upgrade works)
Castlereagh Highway/ Beryl Road	4.00 pm to 5.00 pm	9	No	4.00 pm to 5.00 pm	2	No
Goolma Road/Gollan Road	4.00 pm to 5.00 pm	1	No	4.00 pm to 5.00 pm	25	No (a type AUR lane is already provided
Goolma Road/Mebul Road	5.00 am to 6.00 am	3	No	4.00 pm to 5.00 pm	2	No

Note **Intersections will be designed in accordance with the Austroads Road Design Guide (Austroads, 2010).*

The warrants for additional turning lanes at intersections on rural roads with significant volumes of heavy vehicle traffic are generally triggered when there are significant volumes of high speed through traffic on the road and the left or right turning traffic volumes are in the range 10 to 20 vehicles per hour. The intersection analysis in Table 4.6 shows there will be a need to construct additional intersection left turn deceleration lanes, at two locations where these lanes are not already provided, namely:

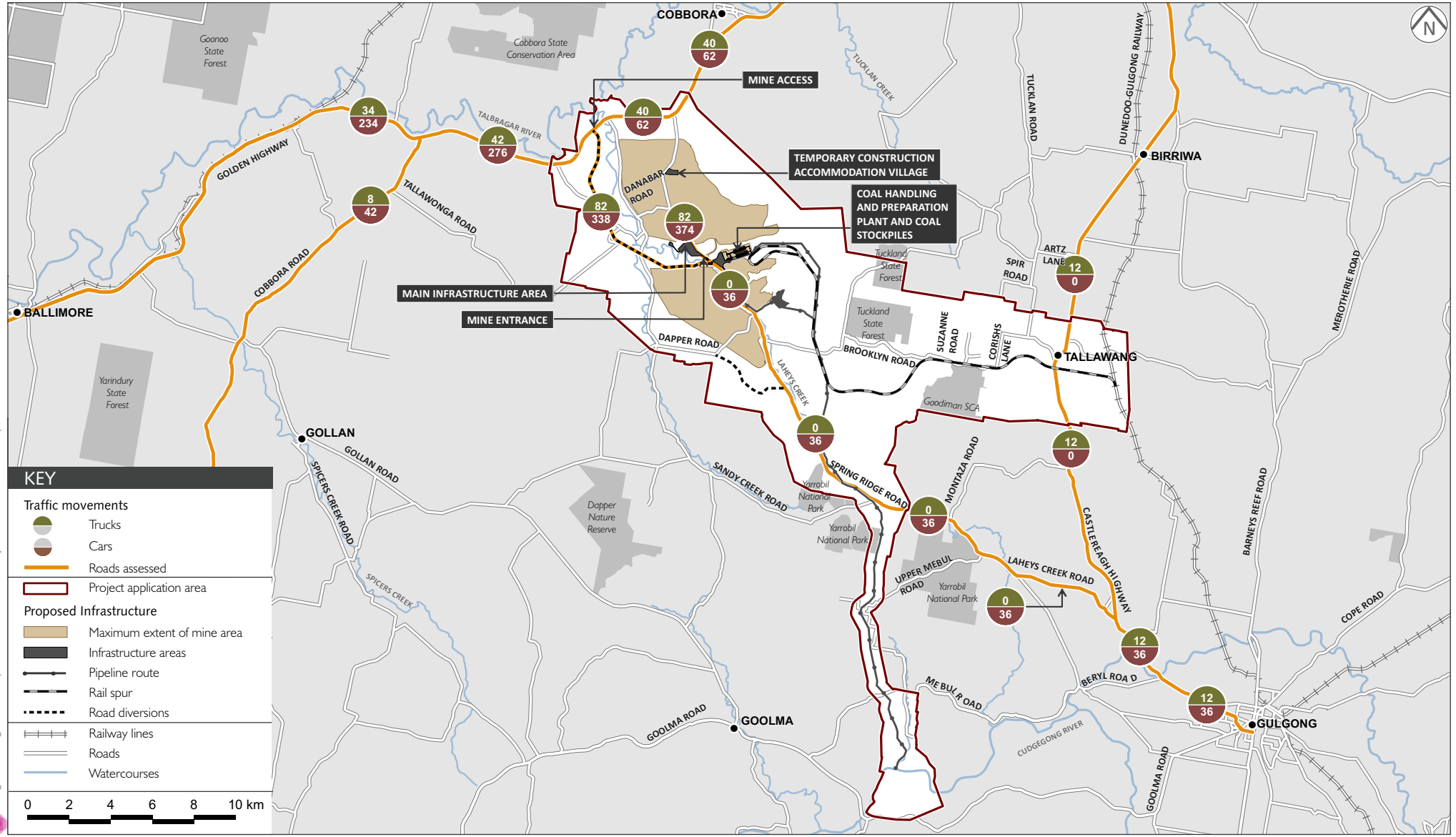
- for westbound traffic on the Golden Highway at MR 353 Cobbora Road (road to Wellington); and
- for northbound traffic on the Castlereagh Highway at Laheys Creek Road (south).

Although the formal intersection turning lane warrants are not generally met at the Castlereagh Highway/new worksite access intersection, south of Tucklan Road, additional left and right turning deceleration lanes should also be provided because of the likely usage of this intersection by significant volumes of heavy vehicle traffic and oversize vehicles at peak times during Project construction.

4.2 Operations stage traffic impacts

The traffic impacts on the road network and intersections during peak Project operations have been determined with reference to RTA and Austroads design standards for rural roads and intersections, (RTA, 1999 and Austroads, 2010).

Traffic generation (see Figure 4.3) will be more concentrated during Project operations than construction, and focussed on the main workforce access and infrastructure area on Spring Ridge Road. This will result in a less extensive network of roads and intersections being affected. Also, after 2015, the existing road alignments of Spring Ridge Road, Sandy Creek Road and Sweeneys Lane, north of the main infrastructure area will no longer exist having been closed and replaced by the new mine access road (Spring Ridge Road realignment), constructed to appropriate road design standards.



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EMM

Cobbora Holding Company Pty Limited

Daily Operations Traffic Movements

Cobbora Coal Project - Traffic Assessment

Figure 4.3

4.2.1 Road network

Additional mine operations generated traffic will mostly occur around the proposed shift change times at 7.00 am and 7.00 pm. These times are also generally outside the current morning or afternoon peak traffic periods for the surrounding roads as summarised in Table 2.2.

The need for additional road or shoulder widening works can be assessed based on the additional daily traffic which will be generated by Project operations on each of the affected routes (Figure 4.3) in comparison with RTA (1999) traffic limits (Table 2.3). The operations stage traffic growth on the affected roads is summarised in Tables 4.7 to 4.11.

Table 4.7 Forecast peak mine operations traffic increases on the two state highways

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Golden Highway (near Dunedoo)	1,234*	333*	102	40	8	12
Golden Highway (east of Sweeneys Lane)	1,050	290	102	40	10	14
Golden Highway (west of Sweeneys Lane)	990*	267*	318	42	32	16
Golden Highway (west of Cobbora Road)	909*	245*	268	34	29	14
Castlereagh Highway (north of Tallawang)	608*	116*	12	12	2	10
Castlereagh Highway (south of Tallawang)	670	128	12	12	2	10
Castlereagh Highway (South of Beryl Road)	1,221*	232*	48	12	4	5

Notes: **Year 2005 Traffic Count – No heavy vehicle Information. Heavy vehicle % is assumed to be similar to adjacent sections.*
Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 4.8 Forecast peak mine operations traffic increases on the major local roads

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Spring Ridge Road (south of the Golden Highway)	This section of the road will be closed after the completion of mine construction work– no assessment required					
Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	95	11	36	0	38	0
Laheys Creek Road (south) at Castlereagh Highway	266	35	36	0	14	0

Notes: ** Including detoured traffic from roads which will be closed*
Colours indicate forecast traffic increases are 15% or more for general traffic

Table 4.9 Forecast peak mine operations traffic increases on new mine access roads

Road	Existing daily traffic*	Existing heavy vehicles*	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Spring Ridge Road realignment, replaces Spring Ridge Road at the northern end and Sweeneys Lane	78*	7*	420	82	538	1,171
New mine access road (near Spring Ridge Road)	0	0	456	82	N/A	N/A

Notes: ** Including detoured traffic from roads which will be closed.*

Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 4.10 Forecast peak mine operations traffic on other classified roads

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Cobbora Road (at north end) MR 353	57*	7*	50	8	88	114
Cobbora Road (at Spicers Creek) MR 353	550*	69*	50	8	9	12
Cobbora Road (at south end) MR 353	237*	30*	50	8	21	27

Notes: **Year 2005 Traffic Count. No heavy vehicle information. Heavy vehicles assumed to be approximately 10-15%, eg 12.5% typically.*

Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 4.11 Summary of roads with significant increases in forecast operations traffic

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic at peak operations	Predicted daily heavy vehicles at peak operations	Existing road width and condition	Requirement for improvement
Spring Ridge Road realignment, (replaces Spring Ridge Road at northern end and Sweeneys Lane)	538	1,171	498	89	Sweeneys Lane is an unsealed road, typically one lane wide	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion

Table 4.11 Summary of roads with significant increases in forecast operations traffic *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic at peak operations	Predicted daily heavy vehicles at peak operations	Existing road width and condition	Requirement for improvement
New mine access road (near Spring Ridge Road)	N/A	N/A	456	82	Parts of the existing alignment of Spring Ridge Road may be used, north of the Road Detour intersection	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
Cobbora Road MR 353 (at northern end near the Golden Highway)	88	114	107	15	Typically 6 m sealed width, except for unsealed sections	No improvement is required. It is understood that the road sealing is intended to be completed by Wellington Council within the next 2 years, independently of the Project
Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	38	0	131	11	The sealed road width is typically less than 6 m	No improvement is required. However, Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
Golden Highway SH 27 west of Sweeneys Lane	32	16	1,308	309	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage
Golden Highway SH 27 west of Cobbora Road	29	14	1,177	279	Typically two 3.5 m lanes and 0.5 m to 1 m sealed shoulders	No improvement is required, the existing traffic lane and sealed shoulder widths are adequate for the predicted traffic usage

Table 4.11 Summary of roads with significant increases in forecast operations traffic *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic at peak operations	Predicted daily heavy vehicles at peak operations	Existing road width and condition	Requirement for improvement
Cobbora Road MR 353 (at the southern end) near Wellington	21	27	287	38	Typically 6 m sealed width, no sealed shoulders	No widening required
Laheys Creek Road (south) at Castlereagh Highway	14	0	302	35	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo

Notes: Colours indicate roads where road widening, traffic monitoring or other traffic impact mitigation measures will be required.

4.2.2 Traffic impacts at intersections

The impacts of the Project operations traffic have been examined at all intersections where potentially significant traffic increases are likely. The benchmark used is the RTA's warrant chart for rural turn lanes, as published in Figure 4.5.12 of RTA (1999). The potential traffic Impacts at four intersections have been assessed in Table 4.12 for seven time periods of the day, namely:

- 6.00 am to 7.00 am, peak arrivals period for dayshift mine operators;
- 7.00 am to 8.00 am, peak departures period for nightshift mine operators;
- 8.00 am to 9.00 am, existing morning peak period for the road network generally, coinciding with mine daytime delivery and site visitor traffic and mine admin staff arrivals traffic;
- 11.00 am to 12.00 midday, existing daytime peak traffic period for commercial traffic, coinciding with mine daytime delivery traffic;
- 4.00 pm to 5.00 pm, existing afternoon peak period for the road network generally, coinciding with mine daytime delivery and site visitor traffic and mine admin staff departure traffic;
- 6.00 pm to 7.00 pm, peak arrivals period for nightshift mine operators; and
- 7.00 pm to 8.00 pm, peak departures period for dayshift mine operators.

Table 4.12 Assessment of intersection traffic impacts at peak mine operations stage

Intersection	Time of peak hour for left turning traffic	Peak left turning traffic volume	Warrant for additional left turning lane	Time of peak hour for right turning traffic	Peak right turning traffic volume	Warrant for additional right turning lane
Golden Highway/Cobbora Road	7.00 am to 8.00 am	12	Yes*	11.00 am to 12.00 midday	1	No (however a basic right turn treatment, Type BAR, will be constructed as part of the intersection upgrade
Golden Highway/Spring Ridge Road realignment	6.00 pm to 7.00 pm	12	Yes*	6.00 am to 7.00 am	47	Yes*
New mine access road intersection with Spring Ridge Road	6.00 pm to 7.00 pm	57	Yes*	6.00 pm to 7.00 pm	6	Yes (a turning lane is required for traffic safety)*
Castlereagh Highway/ Laheys Creek Road (south)	6.00 pm to 7.00 pm	11	Yes*	8.00 am to 9.00 am	2	No (however a basic right turn treatment, Type BAR, will be constructed as part of the intersection upgrade)

Note ** Intersections will be designed in accordance with the Austroads Road Design Guide (Austroads, 2010).*

The analysis in Table 4.12 identifies the future need to construct additional intersection left and/or right turn deceleration lanes at four locations, namely:

- a left turning deceleration lane for westbound traffic on the Golden Highway at Cobbora Road (road to Wellington), this lane is also required for the Project construction stage traffic movements;
- a left turning deceleration lane for northbound traffic on the Castlereagh Highway at Laheys Creek Road (south), this lane is also required for the Project construction stage traffic movements;
- both left and right turning deceleration lanes for westbound and eastbound traffic on the Golden Highway at the Spring Ridge Road detour; and
- both left and right turning deceleration lanes for westbound and eastbound traffic at the new mine access road intersection, which will be located near where the Spring Ridge Road realignment deviates from the existing alignment of Spring Ridge Road.

4.3 Traffic safety

The review of the recent five year accident history of all the affected major roads (see Section 2.7), has determined that the overall accident and fatality rates on these roads are generally better than the NSW averages. The exceptions are Goolma Road (MR 233) and Gollan Road (RR 7512). The relative isolation of rural sections of these roads is a likely contributory factor in the comparatively high accident fatality rates recorded during the most recent five year period.

The intersection sight distances at all the existing and proposed major road intersections have been observed as summarised in Table 4.13. This has confirmed that the sight distances at each of these intersections will meet the minimum safe intersection sight distance (SISD) visibility requirement in both directions along the major road.

Table 4.13 Observed major road intersection sight distances

Intersection	Visibility for left turn traffic	Visibility for right turn traffic
Golden Highway – Cobbora Road	Over 500 m to the east	Approx. 250 m to the west
Golden Highway – Spring Ridge Road	Approx. 450 m to the east	Approx. 330 m to the west
Golden Highway – Spring Ridge Road Detour	Approx. 450 m to the east	Over 500 m to the west
Spring Ridge Road- New Mine Access[1]	Minimum 250 m to the west[1]	Minimum 250 m to the east[1]
Goolma Road – Gollan Road	Over 500 m to the west	Approx. 300 m to the east
Goolma Road – Mebul Road	Approx. 250 m to the west	Over 500 m to the east
Castlereagh Highway – Beryl Road	Approx. 250 m to the east	Approx. 300 m to the west
Castlereagh Highway – Laheys Creek Road	Approx. 350 m to the south	Approx. 300 m to the north
Castlereagh Highway – new worksite access	Over 500 m to the south	Approx. 280 m to the north
Castlereagh Highway – Tucklan Road	Approx. 300 m to the south	Over 500 m to the north
Castlereagh Highway – Artz Lane	Approx. 450 m to the south	Approx. 450 m to the north

Notes: 1. The intersection is not yet constructed. The appropriate minimum safe intersection sight distances will be provided.

For the two state highways (the Golden Highway and the Castlereagh Highway) and the other major roads, a range of appropriate future road safety measures, including road safety audits, are recommended for implementation with the Project, in consultation with the NSW Police Force and others, including:

- driver safety training for the new workforce relocating to the area; and
- road safety audits at identifiable existing accident cluster locations.

An analysis has also been undertaken of whether the future construction of overtaking lanes, on any sections of the Golden Highway between Dubbo and Dunedoo or the Castlereagh Highway between Gulgong and Dunedoo, will be required as a result of the Project.

There are defined warrants for overtaking lanes in RTA (1999) and Austroads (2010). These are included in Appendix C of this report. These warrants show that generally a minimum daily traffic flow of 2,500 vehicles per day is required for overtaking lanes to be considered necessary on rural roads that are in level terrain, with either average or good overtaking opportunities.

The estimated increases in the future daily traffic flows from the Project, which will be 300 to 400 vehicles per day maximum on any section of these roads, will not increase the existing base traffic flows on the relevant sections of either the Golden Highway or the Castlereagh Highway (which are in the range 600 to 1200 vehicles per day currently) to reach the future likely minimum threshold level of 2,500 vehicles per day, where future overtaking lanes would be considered necessary.

4.4 Effect of Spring Ridge Road realignment traffic detour

The proposed realignment of Spring Ridge Road, north of the mine infrastructure area will have a longer length (approximately 3 km longer) than the existing Spring Ridge Road between the intersection point and the Golden Highway. Also, the new road realignment will intersect with the Golden Highway approximately 4 km west of the existing Spring Ridge Road intersection.

This new road will also replace the existing alignments of Sweeneys Lane and Sandy Creek Road, north of Danabar Road. Both these roads have minimal daily traffic usage currently (3 to 15 vehicle movements daily).

The Spring Ridge Road realignment will potentially provide shorter travelling distances for local and through traffic currently using Spring Ridge Road south of the Golden Highway, which is travelling to and from the Dubbo direction, but potentially up to seven km longer travel distances each way for traffic which is travelling to and from the Dunedoo direction (see Figure 4.4).

The traffic which is currently using Spring Ridge Road at the northern end was surveyed in October 2011 as 60 vehicle movements per day on average (Table 2.1). This traffic travels more frequently to and from the Dunedoo direction (in an approximate 75:25 proportion) compared to the Dubbo direction. The total amount of traffic using Spring Ridge Road at the northern end which will be adversely affected by traffic detours with the Spring Ridge Road realignment will be approximately 22 to 23 vehicles in each direction daily. This traffic will have to travel an extra 7 km (five minutes) in each direction daily.

The most recent NSW economic valuations (RTA, 2009b) of travel time and travel distance are typically $33/hr and $0.33 per kilometre respectively for rural traffic which includes a significant proportion of heavy vehicles. These valuations include the opportunity cost of additional travel time and detour distance based fuel and vehicle wear costs.

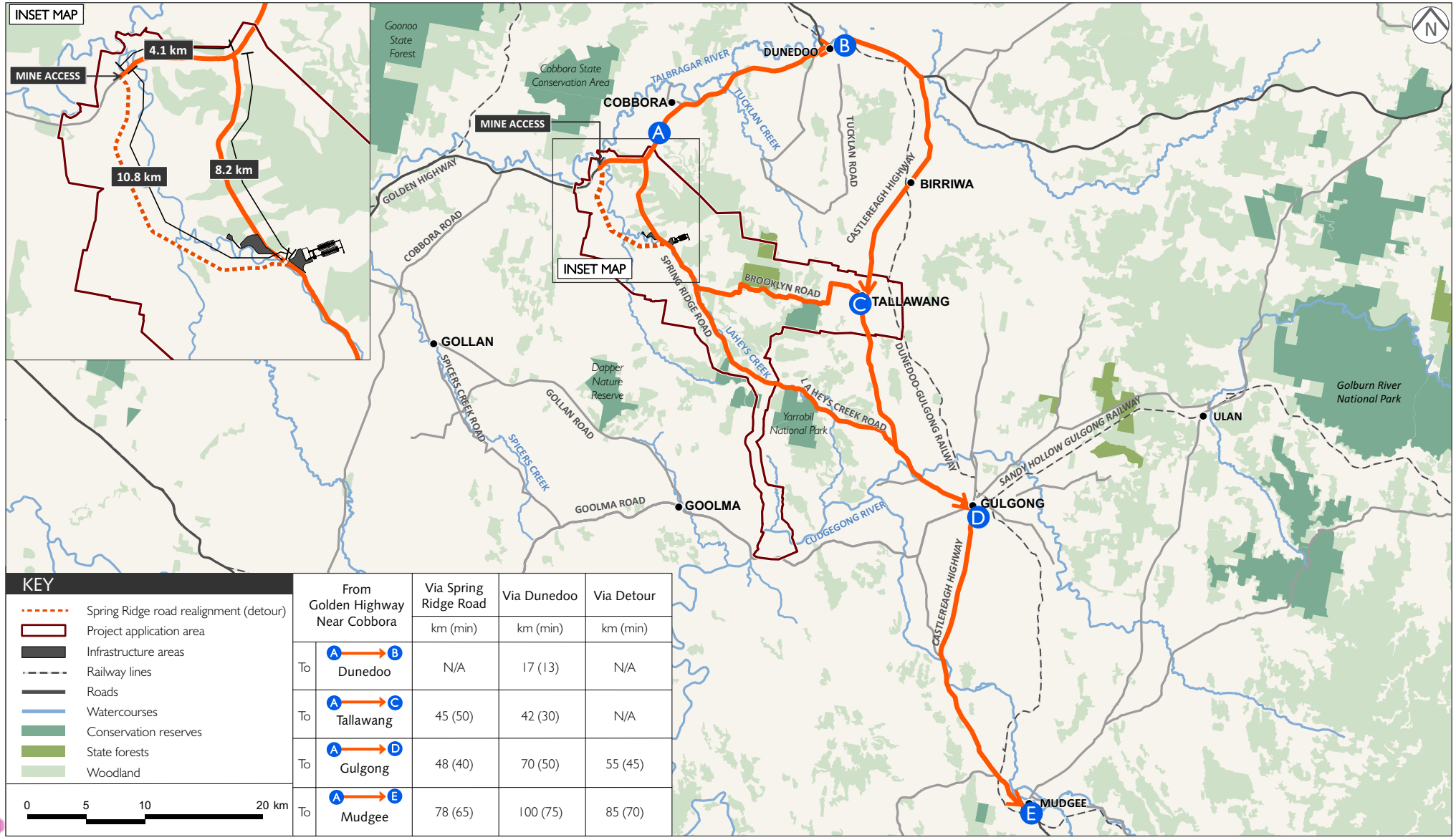
The estimated additional travel detour costs for the existing Spring Ridge Road traffic will be approximately $90,000 per year for the combined additional travel time and distance travelled. These additional annual detour costs for local traffic will be considered in the economic assessment of the proposed mining activity at Cobbora.

The other two existing local roads which will be affected by Project traffic detours (Brooklyn Road and Dapper Road) are both unsealed local roads with minimal daily traffic usage currently (less than 20 vehicle movements per day typically).

At Brooklyn Road, near Suzanne Road, the proposed traffic detour will follow the same general east-west alignment as the existing Brooklyn Road, as the new road will be located on the northern rather than the southern side of the proposed rail spur line easement. There will be minimal additional traffic detour distance for the affected local traffic. Also a road underpass will be provided for local traffic to cross the railway line to maintain the existing local access to land on the southern side of the rail line easement.

The proposed traffic detour to Dapper Road, which will be implemented by year eight of the Project life, will divert the eastern end of Dapper Road approximately 1.5 km to the south. As the majority of traffic which is currently using this section of Dapper Road is generally travelling to and from the south (the Gulgong direction), this will result in a net travel distance saving of approximately 1.5 km for each vehicle trip which is using the road currently.

These two local road realignments will be necessary to maintain access for nearby private properties which are adjacent to proposed mine lease or infrastructure areas, but will have no net additional cost to the local community as a result of the future travel detours.



From Golden Highway Near Cobbora		Via Spring Ridge Road	Via Dunedoo	Via Detour
		km (min)	km (min)	km (min)
To	A → B Dunedoo	N/A	17 (13)	N/A
To	A → C Tallawang	45 (50)	42 (30)	N/A
To	A → D Gulgong	48 (40)	70 (50)	55 (45)
To	A → E Mudgee	78 (65)	100 (75)	85 (70)

Effect of Proposed Road Detour on Local and Regional Journey Times

Cobbora Coal Project - Traffic Assessment

Figure 4.4

4.5 Car parking

On site car parking will be provided to meet the anticipated car parking needs for the Project workforce and site visitor numbers during both the Project construction and operations stages.

4.6 Public transport

No specific improvements are required for the Project. However, a safety audit of school bus stop locations will be undertaken on all the major roads surrounding the Project area.

This will include all existing and proposed school bus stop locations on the Castlereagh Highway, between Gulgong and Dunedoo, the Golden Highway between Dunedoo and Ballimore, Laheys Creek Road (south) and Spring Ridge Road (including the new Spring Ridge Road realignment section) between the Laheys Creek Road (south) and the Golden Highway.

4.7 Pedestrian and cyclist access

Existing and predicted future pedestrian and cyclist traffic movements are minimal within the rural roads section of the Project study area. Therefore, no specific improvements are required.

5 Mitigation measures

5.1 Construction stage road widening

A range of road widening and related traffic management measures have been identified as being required for the Project construction stage access. These are summarised in Table 5.1.

Table 5.1 Summary of Project construction stage traffic impact mitigation measures

Road	Existing road width and condition	Requirement for improvement
Spring Ridge Road (Warrumbungle Shire) south of the Golden Highway	Typically 6 m sealed width, no sealed shoulders	The section between the Golden Highway and the mine infrastructure area will be widened to provide a minimum 7 m sealed road width (3 m lanes and 0.5 m sealed shoulders), during project construction
Cobbora Road, MR 353, at northern end near the Golden Highway	Typically 6 m sealed width, except for unsealed sections	No improvement is required. It is understood that road sealing is intended to be completed during the next two years by Wellington Council independently of the Project
Cobbora Road, MR 353, at Spicers Creek Bridge	Typically 6 m sealed width, no sealed shoulders. There is a narrow bridge at Spicers Creek	Seal widening will be required to provide 0.5 m to 1 m wide sealed road shoulders. Traffic management improvements (additional traffic priority or warning signage and/or guardrails) will be provided on the approaches to the narrow bridge
Cobbora Road, MR 353, from Spicers Creek Bridge to Wellington	Typically 6 m sealed width, no sealed shoulders	It is understood that the current program of road sealing is intended to be completed during the next two years by Wellington Council. However, additional Project construction stage truck traffic may increase the frequency of the need for structural repairs to this road
Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, construction truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
Laheys Creek Road (south) west of the Castlereagh Highway	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, construction truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
Wargundy Street (south of Dunedoo)	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the project related truck traffic travelling to and from the Dunedoo direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Birriwa

5.2 Operations stage road widening and road realignment

Five items of future road widening or related traffic management measures have been identified for the Project operations stage traffic, as summarised in Table 5.2.

Two of these improvements are the Spring Ridge Road realignment and the new mine access road. The Spring Ridge Road realignment will effectively replace Spring Ridge Road north of the mine infrastructure area as the main local road connection through the area and also replace the existing local access functions of Sandy Creek Road (at the northern end), Danabar Road and Sweeneys Lane.

Table 5.2 Summary of Project operations stage traffic impact mitigation measures

Road	Existing road width and condition	Requirement for improvement
Spring Ridge Road realignment, (replaces Spring Ridge Road at northern end and Sweeneys Lane)	Sweeneys Lane is an unsealed road, one lane wide typically	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
New mine access road (near Spring Ridge Road)	Parts of the existing alignment of Spring Ridge Road may be used	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
Cobbora Road MR 353 (at northern end near the Golden Highway)	Typically 6 m sealed width, except for unsealed sections	No improvement is required. It is understood that the road sealing is intended to be completed by Wellington Council within the next 2 years, independently of the Cobbora Project
Spring Ridge Road from MWRC Shire Boundary to Laheys Creek Road (south)	The sealed road width is typically less than 6 m.	No improvement is required. However, Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
Laheys Creek Road (south) at Castlereagh Highway	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, Project related truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo

Notes: ***These road improvements or related traffic impact mitigation measures are also required during Project construction.***

Tallawonga Road will connect to the new Spring Ridge Road alignment at the same location at which it currently connects to Sweeneys Lane, resulting in only minimal change to its existing vehicular traffic access and travel distances, to and from The Golden Highway.

Three other identified road improvements and traffic impact mitigation measures will be triggered during both the Project construction and operations stages. These will have already been implemented by the time Project operations commence in mid 2015. In addition, road detour/realignments will also be required for Brooklyn Road and Dapper Road (after year 8 of mine operations) to maintain the local property access in these areas.

5.3 Intersection improvements

Three intersection improvements will be required for the Project construction traffic access, namely:

- an additional intersection left turn deceleration lane for westbound traffic on the Golden Highway at Cobbora Road (road to Wellington). An additional basic right turn treatment (Type BAR) will also be provided with the intersection upgrade;
- an additional intersection left turn deceleration lane for northbound traffic on the Castlereagh Highway at Laheys Creek Road (south). An additional basic right turn treatment (Type BAR) will also be provided with the intersection upgrade; and
- additional left and right turning deceleration lanes should both be provided at the new worksite access from the Castlereagh Highway, south of Tucklan Road because of the likely usage by significant proportions of heavy vehicle traffic and/or oversize vehicles at peak times.

Four intersection improvements will be required for the Project operations stage traffic access. However, two of these intersection improvements are also required for the Project construction stage traffic access and will have already been implemented before the Project operations commence in mid 2015, namely:

- an additional intersection left turn deceleration lane including Type BAR basic right turn treatment on the Golden Highway at Cobbora Road (road to Wellington); and

- an additional intersection left turn deceleration lane including Type BAR basic right turn treatment on the Castlereagh Highway at Laheys Creek Road (south).

The other two operations stage intersection improvements which will be constructed as part of the Spring Ridge Road realignment detour works, will connect around the western side of the mine infrastructure area and replace the existing local access and through traffic functions of Spring Ridge Road, Sweeneys Lane, Danabar Road and Sandy Creek Road, in the local area, namely:

- additional left and right turning deceleration lanes for eastbound and westbound traffic on the Golden Highway at the New Spring Ridge Road realignment Intersection. This is to be located on the Golden Highway, approximately 4 km west of the existing Spring Ridge Road intersection; and

- additional left and right turning deceleration lanes for eastbound and westbound traffic at the new mine access road intersection. This is to be located where the Spring Ridge Road realignment deviates from the existing alignment of Spring Ridge Road.

6 Conclusion

6.1 Method

This report addresses the road transport related DGRs for the Project, including consideration of RTA (2002). An accompanying Rail Transport Assessment (EMM, 2012b) assesses the Project's impact on traffic safety and traffic delays at railway level crossings.

The report considers all the roads that will be affected by car, truck and bus movements during both the Project's construction and operations phases. To determine the access routes which will be used by cars, the forecast accommodation locations of the two workforces were established by reference to the *Cobbora Coal Project Workforce Accommodation Study* (EMM, 2012a). For truck movements, the forecast volumes and likely approach routes were determined in mine planning studies by Engenicom for both the construction and operations stages.

The existing traffic levels on the affected road network were estimated using the following sources.

- a traffic count program which was undertaken by EMM in October 2011 at sixteen locations on the Golden Highway, Castlereagh Highway, Spring Ridge Road, Laheys Creek Road (south) and other local roads; and

- for roads further away from the Project area, traffic count data from the RMS and MWRC was used. This data covers Beryl Road, MR 353 (Cobbora Road), MR 233 (Goolma Road) and RR 7512 (Gollan Road).

The width and condition of all the potentially affected roads were determined by field inspections conducted in September 2011.

The design details of principal components of the proposed development, including road realignments and the new grade separated crossing of the proposed railway line at the Castlereagh Highway, Brooklyn Road and Laheys Creek Road (north), have been determined by the Project engineers Engenicom and Parsons Brinkerhoff Pty Limited.

6.2 Findings

This assessment shows that at ten locations, either new road construction, road widening, additional maintenance or additional traffic management controls will be required for the Project's construction and/or operations stage traffic management.

These locations and the proposed road works and/or traffic impact mitigation measures which are required are summarised in Table 6.1. Additional turning lanes will also be required for the Project at five intersections. These are summarised in Table 6.2.

Table 6.1 Summary of required road network improvements

Item	Project stage	Road	Existing road width and condition	Improvement required
1	Construction	Spring Ridge Road (Warrumbungle Shire) south of the Golden Highway	Typically 6 m sealed width, no sealed shoulders	The section between the Golden Highway and the mine infrastructure area will be widened to provide a minimum 7 m sealed road width (3 m lanes and 0.5 m sealed shoulders), during project construction
2	Construction	Cobbora Road, MR 353, at Spicers Creek Bridge	Typically 6 m sealed width, no sealed shoulders and a narrow bridge at Spicers Creek	Seal widening will be required to provide 0.5 - 1 m wide sealed road shoulders. Traffic management improvements (additional traffic priority or warning signage and/or guardrails) will be provided on the approaches to the narrow bridge
3	Construction	Cobbora Road, MR 353, from Spicers Creek Bridge to Wellington	Typically 6 m sealed width, no sealed shoulders	It is understood that the current program of road sealing is intended to be completed during the next two years by Wellington Council. However, additional Project construction stage truck traffic may increase the frequency of the need for maintenance repairs to this road
4	Construction and operations	Spring Ridge Road from MWRC boundary to Laheys Creek Road (south)	The sealed width is typically less than 6 m	No improvement is required. However, construction truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
5	Construction and operations	Laheys Creek Road (south) from Spring Ridge Road to the Castlereagh Highway	Typically 6 m sealed width, no sealed shoulders	No improvement is required. However, construction truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Dunedoo
6	Construction	Wargundy Street from Dunedoo to Tucklan	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the project related truck traffic travelling to and from the Dunedoo direction will be prohibited from using this road and will be instructed to use the Castlereagh Highway route via Birriwa
7	Operations	Spring Ridge Road realignment, replaces Spring Ridge Road (at north end) and Sweeneys Lane	Sweeneys Lane is an unsealed road, one lane wide typically	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion

Table 6.1 Summary of required road network improvements *(Cont'd)*

Item	Project stage	Road	Existing road width and condition	Improvement required
8	Operations	New mine access road, located where the Spring Ridge Road realignment deviates from the existing alignment of Spring Ridge Road	The future alignment is close to the existing alignment of Spring Ridge Road	The new road will be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
9	Construction and operations	Brooklyn Road realignment from Suzanne Road to Corishs Lane	Existing unsealed road	There is no predicted additional traffic usage from the Project. However the new road connection will be required to maintain access to local residential properties
10	Operations (after year 8)	Dapper Road realignment at eastern end	Existing unsealed road	As above in 9

Table 6.2 Required intersection upgrades

Item	Project stage	Intersection	Warrant for additional right or left turning traffic lane
1	Construction and operations	Golden Highway at MR 353 Cobbora Road	Additional left turning deceleration lane for westbound traffic on the Golden Highway. An additional basic right turn (Type BAR) treatment will also be provided with the intersection upgrade
2	Construction and operations	Castlereagh Highway at Laheys Creek Road (south)	Additional left turning deceleration lane for northbound traffic on the Castlereagh Highway. An additional basic right turn (Type BAR) treatment will also be provided with the intersection upgrade
3	Operations	Golden Highway at new Spring Ridge Road realignment intersection,	Additional left turning deceleration lane for westbound traffic and right turning deceleration lane for eastbound traffic on the Golden Highway
4	Operations	New mine access road at mine site entry near Spring Ridge Road	Additional left turning deceleration lane for eastbound traffic approaching the mine site entry and right turning deceleration lane for westbound traffic on Spring Ridge Road
5	Construction	Castlereagh Highway/new worksite access south of Tucklan Road	Additional left and right turning deceleration lanes will be provided on the Castlereagh Highway (temporary construction bypass detour) to ensure the safety of heavy vehicle access during Project construction

The future road safety implications of the Project traffic have also been determined with reference to the existing safety levels on all the major roads in the Project study area.

These traffic safety levels are generally good currently and are expected to remain so in comparison to the prevailing NSW state average accident frequency and fatality rates. There will not be any general future requirement for the future provision of overtaking lanes on sections of the Golden and Castlereagh Highways between Dubbo, Dunedoo and Gulgong as a result of the Project construction or operations traffic increases. This has been determined by analysis of the recommended traffic volume design standards (RTA and Austroads) for overtaking lanes on rural roads.

A number of desirable future road safety measures have been identified, for implementation with the Project from consultations with the NSW Police Force and others. These are:

- driver safety training for the new workforce relocating to the area;
- a safety audit of identifiable accident cluster locations on the two state highways and other roads within the study area;
- safety audits of existing and proposed school bus stop locations on the Castlereagh Highway, Laheys Creek Road (south), Spring Ridge Road and new Spring Ridge Road realignment; and
- the implementation of the recommended signage and other traffic management measures identified by the safety audits.

The future traffic detour effects of the Project road realignments have been assessed. The proposed Spring Ridge Road realignment at the northern end will result in an additional 7 km (five minutes) travel time and detour distance each way for approximately 22 to 23 vehicles per day of local traffic which is currently using Spring Ridge Road at the northern end, travelling to and from the Dunedoo direction. The other two proposed local road realignments for the Project at Brooklyn Road and Dapper Road will generally have no significant adverse travel detour distances for local traffic.

7 Sensitivity analysis for MWRC roads

7.1 Introduction

The estimate of 10% for the future Project workforce resident in the MWRC LGA was determined by EMM (2012a), which assumed the potential MWRC workforce recruitment would be significantly constrained by a number of factors, including competition for workforce recruitment between the Project and a number of other existing and proposed mines in the MWRC LGA.

A sensitivity analysis of the predicted Project related traffic impacts on the road network of the MWRC LGA and some adjoining roads, has been undertaken to identify the potential additional road upgrades which may be required if the proportion of the Project workforce which is resident in the LGA is as high as 30%. This high estimate of 30% corresponds to an unconstrained situation estimate of the potential Project MWRC workforce recruitment.

A difference in the estimated workforce distribution will influence the future proportions of the project related traffic which will be using roads such as the Castlereagh Highway between Gulgong and Laheys Creek Road and other major local roads within the MWRC, including:

- Spring Ridge Road, south of the main mine infrastructure area; and
- Laheys Creek Road, between Spring Ridge Road and the Castlereagh Highway.

7.2 Construction traffic sensitivity analysis

7.2.1 Worksite light vehicle and car traffic

With the MWRC resident proportion of the workforce at 30%, the construction workforce and site visitor light vehicle traffic movements, will be as summarised below.

The majority of the construction workforce (340 persons) will be living at the Project's accommodation village and will travel by bus each day to the one of the four main worksites. Assuming a maximum capacity of 40 people per bus, approximately 10 bus trips each way will be required to transport this workforce each day between the accommodation village and worksites.

The remaining 210 peak construction workers will generally commute by car each day, with an approximate 63% car driver ratio, resulting in 133 light vehicles commuting each day from the Dubbo, Wellington, Gulgong/Mudgee and Dunedoo directions. The potential distribution of this traffic has been determined from the likely residential locations of the construction workforce, as follows:

- 30% to and from the south- west, that is mainly Wellington (40 car driver trips each way);
- 30% to and from the west, that is mainly Dubbo (40 car driver trips each way);
- 30% to and from the south- east, that is Gulgong/Mudgee (40 car driver trips each way); and
- 10% to and from the north, that is Dunedoo/Coolah/Mendooran (10 car driver trips each way).

With this locally sourced workforce distribution, the additional daytime site visitor car traffic movements will be approximately 38 site visitor cars/utes per day at the peak of construction, generally travelling to and from the surrounding townships in the following proportions:

- approximately 30% to and from the south east (Mudgee/Gulgong);
- approximately 30% to and from the west (Dubbo);
- approximately 20% to and from the north (Dunedoo/Coolah/Mendooran); and
- approximately 20% to and from the south west (Wellington).

7.2.2 Worksite heavy vehicle and accommodation village traffic

During construction, the worksite heavy vehicle traffic and accommodation village traffic will be the same as previously estimated in Section 3.4.2 and Section 3.4.3 for a Project MWRC resident workforce proportion of 10%.

There will be a maximum of approximately 100 truck deliveries to the combined project worksites each day at the peak stages of project construction, which will distributed as previously summarised in Section 3.4.2. This estimate is based on experience from other new mining projects in the region and the adjoining Hunter Valley, Upper Hunter and Gunnedah regions of NSW.

In addition to the shuttle bus traffic, the workforce accommodation village would also generate its own external traffic movements for staff transfers, service staff and deliveries. These will be as summarised in Section 3.4.3 of this report.

7.3 Operations traffic sensitivity analysis

7.3.1 Light vehicle and car traffic

The relatively long distances involved in car commuting for the majority of the Project operations staff, who will mainly be based in the five townships of Dubbo, Wellington, Mudgee, Gulgong and Dunedoo, together with the relatively compact urban nature of most parts of these townships, will provide strong financial incentives for a high level of car sharing to occur for commuting journeys by this workforce, in particular for the mine shift workers. In the peak years of operation, the predicted Project workforce car and other light vehicle traffic generation will be as follows:

- mine operations dayshift staff, 50% car driver ratio, will result in approximately 63 cars each way for 125 persons, generally arriving at the mine shortly before 7.00 am each day and departing after 7.00 pm;
- mine operations nightshift staff, 50% car driver ratio, will result in approximately 63 cars each way for 125 persons, generally arriving at the mine shortly before 7.00 pm each day and departing after 7.00 am the following day; and
- mine management, technical and administration staff, 75% car driver ratio, will result in approximately 23 cars each way for 30 persons, generally arriving at the mine between 7.00 am to 8.00 am each weekday and departing between 4.00 pm to 6.00 pm.

The likely approach routes for this traffic will be heavily focussed on the major traffic routes from the surrounding townships, in particular Dubbo, Mudgee/Gulgong and Wellington. The potential distribution of this traffic, including a 30% proportion travelling from Mudgee or Gulgong within the MWRC area, will be as follows:

- 40% from the west (Dubbo);
- 30% from the south east (Mudgee/Gulgong);
- 15% from the south west (Wellington); and
- 10% from the north (eg Dunedoo/Coolah/Mendooran).

The daily site visitor car traffic during mine operations will in most cases be similar in its magnitude and distribution to the mine construction stage site visitor car traffic. This traffic has been estimated as 38 site visitor cars/utes per day on average throughout the majority of the operational life of the Project, generally travelling to and from the major surrounding townships of Dubbo, Mudgee/Gulgong, Wellington and Dunedoo.

7.3.2 Mine operations truck traffic

The average daily truck traffic movements required to service the mine will be the same as previously estimated in Section 3.5.2 and will not change with the Project MWRC resident workforce proportion. This traffic has been calculated as about 15,200 truck deliveries per year over the life of the Project (41-42 truck deliveries per day) and the likely truck delivery routes will be mainly concentrated on routes to and from the east and west via the Golden Highway.

7.4 Road network traffic impacts sensitivity analysis

7.4.1 Construction

Traffic impacts on the road network and the need for upgrading on the MWRC area roads and some sections of adjoining roads, during Project construction, assuming 30% of the construction workforce is sourced from within the LGA, have been determined in Table 7.1 and 7.2.

Table 7.1 Construction traffic increases on MWRC area roads sensitivity analysis

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Castlereagh Highway (south of Beryl Road)	1,221*	232*	196	38	16	16
Spring Ridge Road (South of the Golden Highway)	60	7	508	194	847	2,770
Spring Ridge Road (MWRC) at boundary	95	11	130	2	137	18
Laheys Creek Road (MWRC) west of Castlereagh Highway	266	35	128	0	48	0
Wargundy Street (6 km south of Dunedoo)	124	8	8	0	6	0

Table 7.1 Construction traffic increases on MWRC area roads sensitivity analysis *(Cont'd)*

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Beryl Road at Castlereagh Highway	234*	31*	10	4	4	13
Laheys Creek Road (Warrumbungle Shire)	40	6	4	4	10	67
Tucklan Road at the Castlereagh Highway	60	15	22	8	37	53
Artz Lane at the Castlereagh Highway	20	2	14	14	70	700
Mebul Road (east)	82	4	10	4	12	100
Mebul Road (west)	51	3	12	4	24	133
Upper Mebul Road	16	1	2	2	13	200
Goolma Road (east of Beryl Road) MR 233	571*	71*	18	4	3	6%
Goolma Road (east of Goolma) MR 233	1,124*	141*	30	8	3	6
Goolma Road (west of Goolma) MR 233	627*	78*	22	4	4	5%
Gollan Road (north of Goolma) RR 7512	505*	63*	8	4	2	6

Notes: **Year 2005 traffic count – no heavy vehicle Information Heavy Vehicle % is assumed to be similar to adjacent sections.*

Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 7.2 Sensitivity analysis of upgrades for MWRC roads

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Spring Ridge Road (south of the Golden Highway)	847	2,770	568	201	Typically 6 m sealed width, no sealed shoulders	The section between the Golden Highway and the mine infrastructure area would be widened to provide a minimum 7 m sealed road width (3 m lanes and 0.5 m sealed shoulders), during project construction The necessary standard for these works has been considered in the context the road would only be used for a further 2 to 3 years during Project construction, after which it would be closed

Table 7.2 Sensitivity analysis of upgrades for MWRC roads *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Artz Lane at the Castlereagh Highway	70	700	34	16	Unsealed road, typically two lanes wide	No improvement is required. The existing road width and condition are adequate for it to be used for construction access
Spring Ridge Road (MWRC section) north of Laheys Creek Road	137	18	225	13	The sealed width is typically 6 m or less	Sections of the road which are currently less than 6 metres sealed width would require widening to 6 m sealed width The road centre line should be marked but no edge lines Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
Tucklan Road (west of the Castlereagh Highway	37	53	82	23	Unsealed road, two lanes wide typically	No improvement is required. The existing road width and condition are adequate for it to be used for construction access
Mebul Road (western Section)	24	133	63	7	Unsealed road two lanes wide typically	No improvement is required. The existing road width and condition are adequate for it to be used for construction access
Tucklan Road (Wargundy Street) 6 km south of Dunedoo	6	0	132	8	The sealed width is typically less than 6 m with variable shoulder width	No improvement is required. However, the project related truck traffic travelling to and from the Dunedoo direction would be prohibited from using this road and would be instructed to use the Castlereagh Highway route via Birriwa and Artz Lane
Laheys Creek Road (MWRC) west of the Castlereagh Highway	48	0	394	35	Typically 6 m sealed width, no sealed shoulders	No improvement is generally required. Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo

Table 7.2 Sensitivity analysis of upgrades for MWRC roads *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic	Predicted daily heavy vehicles	Existing road width and condition	Requirement for improvement at peak construction
Castlereagh Highway, SH 18, south of Beryl Road	16	16	1,416	270	Typically two 3.5 m lanes and 0 m to 1 m sealed shoulders	The existing traffic lane and sealed shoulder widths are generally adequate for the predicted traffic usage. However, a minimum 0.5 m sealed shoulder width should be provided

Notes: Colours indicate roads where road widening, traffic monitoring or other traffic impact mitigation measures would be required.

7.4.2 Operations

During operations, Project generated traffic will be more concentrated than during construction, as it will focus on the main infrastructure area. Therefore, a smaller network of roads and intersections will be affected.

Also, the existing alignments of Spring Ridge Road, Sandy Creek Road and Sweeneys Lane, north of the main infrastructure area will no longer exist as they will have been closed and replaced by a new mine access road (Spring Ridge Road realignment), which will be constructed to appropriate standards.

Traffic impacts and the need for upgrades on the MWRC area roads and some sections of adjoining roads, during the Project operations stage, with approximately 30% of the operations stage workforce resident within the LGA, have been determined in Table 7.3 and 7.4.

Table 7.3 Operations traffic increases on MWRC area roads sensitivity analysis

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	% Increase in daily traffic	% Increase in heavy vehicle traffic
Castlereagh Highway (south of Beryl Road)	1,221*	232*	124	12	10	5
Spring Ridge Road (section north of Laheys Creek Road)	95	11	112	0	118	0
Laheys Creek Road (MWRC) at Castlereagh Highway	266	35	112	0	42	0
Spring Ridge Road realignment, combines existing traffic from Spring Ridge Road, Sandy Creek Road and Sweeneys Lane at the northern end	78	7	344	82	441	1,171
New mine access road (near Spring Ridge Road)	0	0	456	82	N/A	N/A

*Notes: *Year 2005 Traffic Count – No heavy vehicle Information. Heavy Vehicle % is assumed to be similar to adjacent sections.*
Colours indicate forecast traffic increases are 15% or more for general traffic.

Table 7.4 Sensitivity analysis of upgrades for MWRC roads

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic at peak operations	Predicted daily heavy vehicles at peak operations	Existing road width and condition	Requirement for improvement
Spring Ridge Road realignment, (replaces Spring Ridge Road at northern end and Sweeneys Lane)	441	1,171	422	89	Sweeneys Lane is an unsealed road, typically one lane wide	The new road would be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
New Mine Access Road (near Spring Ridge Road)	N/A	N/A	456	82	Parts of the existing alignment of Spring Ridge Road may be used, north of the road detour intersection	The new road would be constructed with a 10 m sealed width (3.5 m lane widths and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
Spring Ridge Road (MWRC) north of Laheys Creek Road	118	0	207	11	The sealed road width is typically less than 6 m	Sections of the road which are currently less than 6 m would require a minimum 6 m sealed width. The road centre line should be marked but no edge lines These works would be undertaken during project construction Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo

Table 7.4 Sensitivity analysis of upgrades for MWRC roads *(Cont'd)*

Road	% Increase in daily traffic	% Increase in heavy vehicles	Predicted daily total traffic at peak operations	Predicted daily heavy vehicles at peak operations	Existing road width and condition	Requirement for improvement
Castlereagh Highway, SH 18, south of Beryl Road	10	5	1,345	244	Typically two 3.5 m lanes and 0 m to 1 m sealed shoulders	The existing traffic lane and sealed shoulder widths are generally adequate for the predicted traffic usage. However, a minimum 0.5 m sealed shoulder width should be provided These works would be undertaken during project construction
Laheys Creek Road (MWRC) at Castlereagh Highway	42	0	378	35	Typically 6 m sealed width, no sealed shoulders	No improvement is generally required. Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo

Notes: Colours indicate roads where road widening, traffic monitoring or other traffic impact mitigation measures would be required.

7.5 Sensitivity analysis of traffic impacts at intersections

7.5.1 Construction

The construction traffic impact has been assessed in Section 4.1.2 at the following nine intersections where there are likely to be significant increases in the peak hour turning traffic movements:

- Golden Highway/Cobbora Road;
- Golden Highway/Spring Ridge Road;
- Castlereagh Highway/Artz Lane;
- Castlereagh Highway/Tucklan Road;
- Castlereagh Highway/new worksite access;
- Castlereagh Highway/Laheys Creek Road;

- Castlereagh Highway/Beryl Road;
- Goolma Road/Gollan Road; and
- Goolma Road/Mebul Road.

At only one of these intersections (Castlereagh Highway/Laheys Creek Road) will the sensitivity analysis assumption (30% local construction workforce recruitment from the MWRC area) significantly change the predicted peak hour intersection turning traffic movements.

However, the previously recommended intersection improvement measure at this intersection (a Type AUL left turn intersection deceleration lane, plus a Type BAR basic right turn treatment) will continue to be appropriate for the higher predicted peak hour turning traffic movements at the intersection (45 vehicles per hour turning left compared to 15 vehicles per hour estimated previously).

7.5.2 Operations

The operations traffic impact assessment for the Project in Section 4.2.2 has assessed four intersections where there are likely to be significant increases in the peak hour turning traffic movements, eg:

- Golden Highway/Cobbora Road;
- Golden Highway/Spring Ridge Road realignment;
- Spring Ridge Road realignment/new mine entry road intersection; and
- Castlereagh Highway/Laheys Creek Road.

At only one of these intersections (Castlereagh Highway/Laheys Creek Road) will the sensitivity analysis assumption (30% operations workforce recruitment from the MWRC area) significantly change the predicted peak hour intersection left or right turning traffic movements.

However, the previously recommended improvement measure (a Type AUL left turn intersection deceleration lane, plus a Type BAR basic right turn treatment) will continue to be appropriate for the higher predicted peak hour turning traffic movements at the intersection (28 vehicles per hour turning left compared to 11 vehicles per hour estimated previously).

7.6 Sensitivity analysis of required upgrades for MWRC roads

The future volumes of both light and heavy vehicle traffic which will be generated by the Project on roads within the MWRC will be primarily determined by the proportions of the project workforce who will be residents of that area, during construction and operations.

A sensitivity analysis of the impact of an additional component of the Project workforce (increasing from 10% to 30%) travelling to and from the Project area each day from the MWRC area, has been undertaken to determine whether additional road widening, intersection improvements or any other related road maintenance and traffic management works will be required.

This sensitivity analysis has determined that the following additional upgrades will be required during the project construction or operations stages as summarised in Table 7.5. Although the MWRC section of Spring Ridge Road, which currently has a typical sealed width of less than 6 m, would be upgraded to a minimum sealed width of 6 m in this sensitivity analysis, CHC will still apply the proposed contractual requirements for the Project which are to prevent any project generated truck traffic from using this road.

Table 7.5 Summary of additional road works required for additional MWRC workforce

Item	Project Stage	Road	Existing road width and condition	Improvement required
A1	Construction and operations	Spring Ridge Road (MWRC section) north of Laheys Creek Road	The sealed width is typically 6 m or less	Sections of the road which are currently less than 6 m sealed width will require a minimum 6 m sealed width. Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
A2	Construction and operations	Laheys Creek Road (MWRC section) west of the Castlereagh Highway	The sealed width is typically 6 m with no sealed shoulders	No improvement is generally required. However, any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction will be instructed by signage and other means to use the Castlereagh Highway route via Dunedoo
A3	Construction and operations	Castlereagh Highway, SH 18, south of Beryl Road	Typically two 3.5 m lanes and 0 m to 1 m sealed shoulders	The existing traffic lane and sealed shoulder widths are generally adequate for the predicted traffic. However a minimum 0.5 m sealed shoulder width is required

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