

12 Road transport

12.1 Assessment objectives

The DGRs that relate specifically to road transport aspects of the EA are:

- Detailed assessment of the potential impacts of the Project on the safety and performance of the 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; and
- A detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road networks in the surrounding area over the life of the project.

The traffic impact assessment for the project was prepared by EMM (Appendix K) and the results are summarised in this chapter. The assessment was made in accordance with the methods and guidelines specified in the DGRs, namely:

- *Road Design Guide*, which was published by the Roads and Traffic Authority (RTA 1999), now Roads and Maritime Services (RMS); and
- *Guide to Traffic Generating Developments* (RTA 2002).

The road design requirements for rural intersections that RTA (1999) specifies are now superseded by a more recent standard, the *Austroads Road Design Guide* (Austroads 2010).

The assessment considers the whole road network affected by the Project, including the two state highways (SH 27 Golden Highway and SH 18 Castlereagh Highway), other classified roads and local roads.

Level crossing operations (safety and delays) are described in Chapter 13.

12.2 Assessment method

12.2.1 Road assessment criteria

The relevant road and traffic impact assessment criteria and applicable design standards contained in the DGRs for the assessment of the Project's general road capacity and traffic safety impacts follow.

i Road widths and capacity

Sealed road width traffic capacity guidelines are provided by RTA (1999). These are summarised in Table 12.1. The road centre line is not normally marked and the road shoulders are not normally sealed on the locality sealed road network, where daily traffic volumes are less than 500 vehicles per day.

Table 12.1 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 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 1,000	3 to 3.5	1.0 to 2.0	0.5
1,000 to 2,000	3 to 3.5	2.0 to 3.0	0.5
Over 2,000	3.5	2.0 to 3.0	1.0

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

ii Levels of service

For major rural highways, such as the Golden Highway and the Castlereagh Highway, the hourly traffic volume standards for levels of service are effectively defined by the road width and design traffic parameters, which are:

- typical lane is 3.5 m wide;
- typical shoulder is 2 m wide (0.5 m sealed);
- typical terrain is level, with no overtaking for about 20% of the route length;
- 25% of traffic is heavy vehicles; and
- weekday peak hour traffic is approximately 8% of average daily traffic.

The approximate hourly traffic volumes (RTA 2002) for levels of service A–F, for the major rural highways in the Project study area, are summarised in Table 12.2 below.

Table 12.2 RMS level of service standards for rural roads

Level of service	Description	Traffic volume range (vehicles per hour)
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	up to 420 vehicles per hour
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	
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 in the traffic stream. The general level of comfort and convenience for traffic declines noticeably at this level	420 to 690 vehicles per hour

Table 12.2 RMS level of service standards for rural roads (Cont'd)

Level of service	Description	Traffic volume range (vehicles per hour)
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.	690 to 1,140 vehicles per hour
E	This level of service 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.	1,140 to 1,880 vehicles per hour
F	This level of service 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.	over 1,880 vehicles per hour

iii Additional intersection turning lanes

The existing intersection capacity and safety assessment is based on the standards for rural left and right turning deceleration lanes in RTA (1999). However, alternative intersection designs for new right turning deceleration lanes at rural intersections on major roads are now specified in (Austroads 2010). Intersection sight distance (visibility) standards for major road intersections are also specified in these guidelines.

Where new intersections are proposed to include a right turning deceleration lane, the more recent standard (Austroads 2010) will be used to design the lane. The Signalised Intersection Design and Research Aid (SIDRA) analysis and design program will be used to determine the required future length of the right turn deceleration lane.

iv Overtaking lanes

Standards for overtaking lanes in RTA (1999) and Austroads (2010) show generally a minimum daily traffic flow of about 2,500 vehicles per day is required for overtaking lanes to be considered necessary on rural roads that are generally level terrain and have either average or good overtaking opportunities.

v Road safety standards

The most recent published NSW traffic accident data is summarised in (RTA 2009a). The NSW average accident rate for all roads in the state between 2004 and 2008 is 0.73 accidents per million vehicle kilometres travelled. The average number of fatalities was 0.74 per 100 million vehicle kilometres travelled (vkt).

Road safety audits of highway routes and individual sections of road networks are routinely undertaken by the road authorities in NSW, in accordance with guidelines (RTA 2011), to identify and address road safety deficiencies on major roads.

12.2.2 Assessment of road widths and surface condition

A visual survey of the existing road and shoulder widths and surface condition of the roads in and next to the PAA was undertaken in September 2011. The daily and peak hour traffic volumes on these roads were determined from tube traffic counts at 14 locations during the same one-week period in October 2011. Traffic data for other roads in the Project area was also sourced from:

- tube traffic surveys for the Golden Highway and Castlereagh Highway, which were undertaken during preliminary environmental studies for the Project in February 2010;
- daily traffic volume surveys on three classified roads, main road (MR) 233, MR 353 and regional road (RR) 7512, which provide access to the Project area from the Goolma, Gollan and Wellington directions (RTA 2005); and
- a daily traffic volume count on Beryl Road, west of the Castlereagh Highway, which was undertaken by the Mid-Western Regional Council (MWRC) in 2000.

The current peak hourly traffic volumes on all these roads are lower than 100 vehicles per hour. At these low hourly traffic volumes, the levels of service are all generally level of service A. The relevant road design width standards for traffic capacity assessment are those defined by the daily traffic volumes, as summarised in Table 12.1.

The existing traffic volumes on the road network were compared with the RTA (1999) daily traffic volume and road width standards (Table 12.1) to determine the extent of current compliance of the study area traffic volumes with defined road width standards.

The cumulative additional daily traffic volumes from all the project areas and worksites that will be generated on each road were then also assessed with reference to the design traffic limits (Table 12.1).

12.2.3 Intersections

The assessment considered traffic volumes at the affected intersections, as shown in Figure 12.1. Nine intersections that could experience increases in the peak hour turning traffic movements during construction were assessed. Similarly, traffic increases at four intersections were assessed during operations.

The assessment of each intersection considered whether additional intersection left and/or right turning lanes were required for future traffic volumes.

For the Project peak construction traffic, the following six peak hourly periods were analysed:

- 5.00 am to 6.00 am – workforce arrivals;
- 8.00 am to 9.00 am – existing morning peak for the road network, coinciding with some daytime mine construction deliveries and site visitor traffic;
- 11.00 am to 12.00 midday – the existing daytime peak 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, coinciding with some daytime mine construction deliveries and visitor traffic and an early afternoon departure period for some construction workforce traffic;

- 5.00 pm to 6.00 pm – the likely peak departure period for most construction workforce traffic; and
- 6.00 pm to 7.00 pm – a late afternoon departure period for some construction workforce traffic.

For the Project peak operations traffic, the following seven peak hourly periods were analysed:

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

12.2.4 Road safety conditions

Existing traffic safety conditions were quantified by comparing the accident records for major roads with the 2004 to 2008 NSW averages. The intersection sight distances for all existing and proposed intersections on the major roads were compared against the current Austroads intersection standards for safe intersection sight distance (SISD). Future Project-specific workforce driver safety training and road safety auditing were also considered.

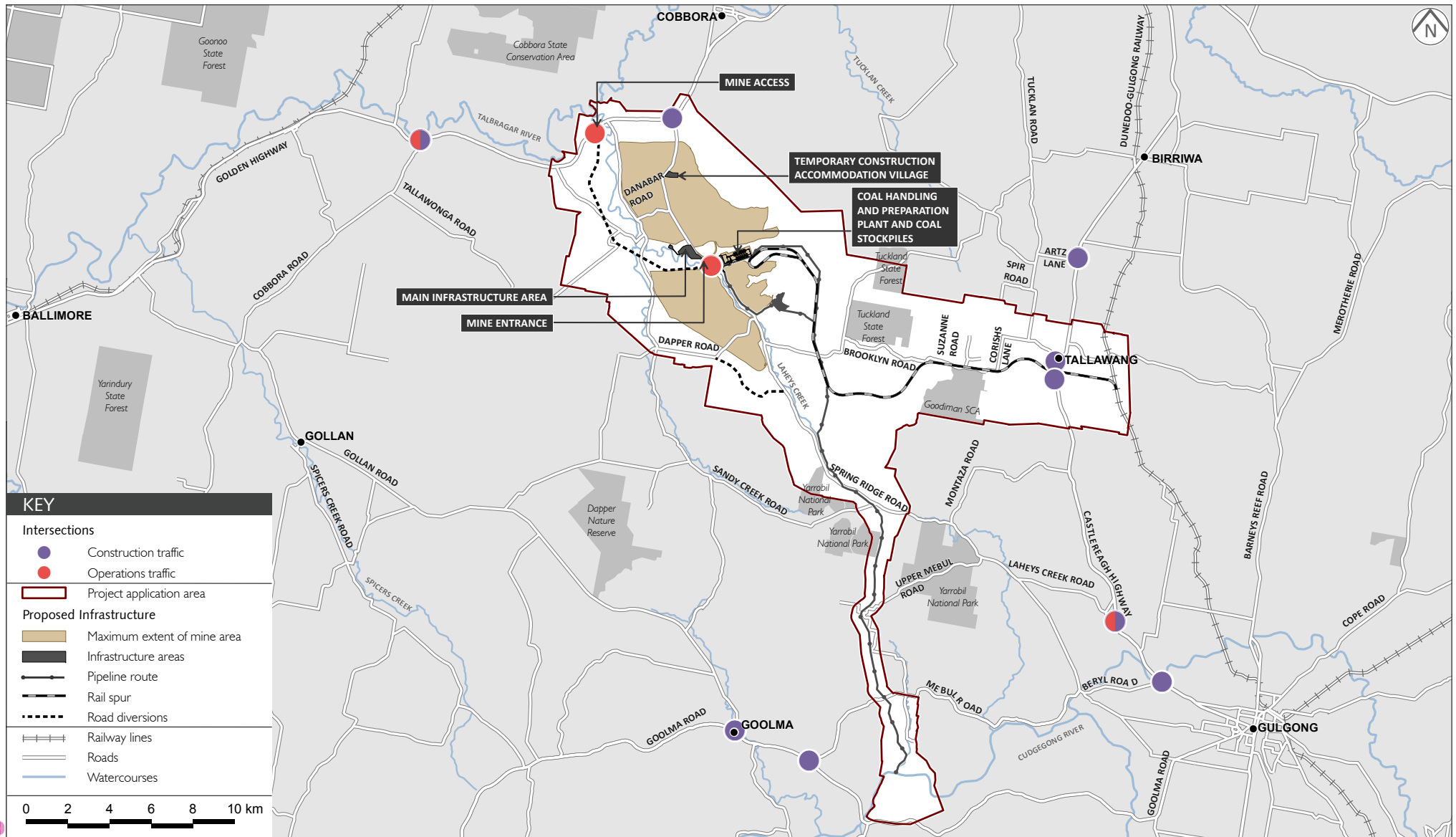
12.2.5 Vehicular traffic generation

Traffic generated during peak operations was estimated based on a workforce 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 daily car and other light vehicle traffic that the workforce will generate will normally arrive at the mine entrance shortly before 7.00 am and 7.00 pm and depart shortly after 7.00 pm and 7.00 am. The mine management, technical and administration staff will normally arrive at the mine between 7.00 am and 9.00 am on weekdays and depart between 4.00 pm and 6.00 pm on weekdays.

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, as discussed in Chapter 21.

At the peak of the construction activity, there will be a construction workforce of about 550 distributed around the four main project worksite areas. About 340 workers will live temporarily in the construction accommodation village. Construction workers will generally travel by buses between the accommodation village and worksites.



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

Key Intersections on the Road Network
Cobbora Coal Project - Environmental Assessment
Figure 12.1

Up to 210 construction workers are expected to commute directly to and from their homes or other accommodation each day. Proposed normal construction site work hours will be 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 day at all worksites. There will generally be a number of lesser peaks of construction traffic activity each afternoon as departure times will be distributed between 4.00 pm and 6.00 pm each day.

The traffic impact assessment has also considered truck deliveries, specialist contractors and site visitor car traffic movements during the Project's construction and operation.

12.3 Existing environment

12.3.1 Road network

The roads that connect the Project to the surrounding townships of Dubbo, Wellington, Cobbora, Dunedoo, Gulgong and Mudgee are shown in Figure 12.2 and Figure 12.3.

Project traffic will use state highways (SH) 27 Golden Highway and 18 Castlereagh Highway, several other classified roads (MR 233, MR 353 and RR 7512) and a number of sealed and unsealed local roads. There are two local roads named Laheys Creek Road within the PAA. Laheys Creek Road, which connects between Spring Ridge Road and Tucklan in the Warrumbungle LGA, is an unsealed road and is referred to as Laheys Creek Road (north) in the assessment. Laheys Creek Road, which connects from Spring Ridge Road to the Castlereagh Highway in the MWRC area, is referred to as Laheys Creek Road (south).

The Golden Highway and Castlereagh Highway have both been designed and constructed as high speed rural highways with generous traffic lane widths, sealed shoulders and frequent overtaking opportunities. These roads are maintained in a good condition with few visible surface defects. Both also have at least one isolated railway level crossing in the study area. However, the railway lines at these level crossings are used only occasionally by seasonal grain and mineral ore trains (typically one train a week).

Spring Ridge Road and its continuation via Laheys Creek Road (south) form the major local traffic route through the PAA. The route typically has a sealed width of 6 m or less, with no centre line marking or sealed shoulders. The road is generally constructed for 80 km/hr or 100 km/hr travel speeds, although some sections are a lower standard, most notably the causeway crossing at Laheys Creek, just north of the intersection with Dapper Road. To the south of Laheys Creek Road (south), Spring Ridge Road (south) continues as an unsealed road, mainly providing local property access, and does not carry much through traffic.

Sweeneys Lane, Sandy Creek Road, Dapper Road and Danabar Road are all unsealed local roads in or around the north-western boundary of the PAA, near the route of the proposed Spring Ridge Road realignment detour. The existing traffic volumes on these roads are very low, typically less than 10 to 20 vehicle movements daily. Sections of these roads, such as Sweeneys Lane, will generally be closed by 2015 where they pass through the future mine area, except for where they are required to remain open to provide access to areas of Crown land. The eastern end of Dapper Road will be closed when a replacement road deviation is constructed in Year 8.

Brooklyn Road, Suzanne Road, Corishs Lane and Laheys Creek Road (north) are all unsealed roads that pass through and around the eastern boundary of the PAA near the future rail spur line. They will remain open. Their future use by project-related traffic is expected to be minimal, as the future operations workforce will all be based in the mine infrastructure area.

The northern section of Tucklan Road (or Wargundy Street) is sealed for about 10 km south of Dunedoo. Artz Lane is an unsealed road that provides a connection between Tucklan Road and the Castlereagh Highway between Tallawang and Birriwa. Beryl Road is sealed over its full length between the Castlereagh Highway and Mebul Road. Mebul Road and Upper Mebul Road are both unsealed roads, except for a short section of Mebul Road through Beryl. These roads will be used mainly for construction access to the rail spur line and water pipeline worksites, and generally will not be used during operations.

12.3.2 Traffic volumes

The existing daily traffic volumes are shown in Figure 12.3. In all cases, the road width and design standard of these roads are compatible with the existing traffic usage. The existing pavement surface condition of these roads, at the time of the site visit inspection in September 2011, was generally good with many sections of both sealed and unsealed roads showing signs of recent resurfacing and regrading works and only a few sections showing poor surface condition or signs of edge distress.

12.3.3 Intersections

The intersections at which the potential future changes to traffic conditions have been investigated for the Project operations and construction traffic stages are shown in Figure 12.1. The existing intersections on all the project area roads have been constructed to appropriate design standards for traffic usage. The peak hourly traffic volumes at most intersections are too low to require any additional turning lanes, except for on the Golden Highway at Spring Ridge Road and at Goolma, at the intersection between MR 233 Goolma Road and Gollan Road.

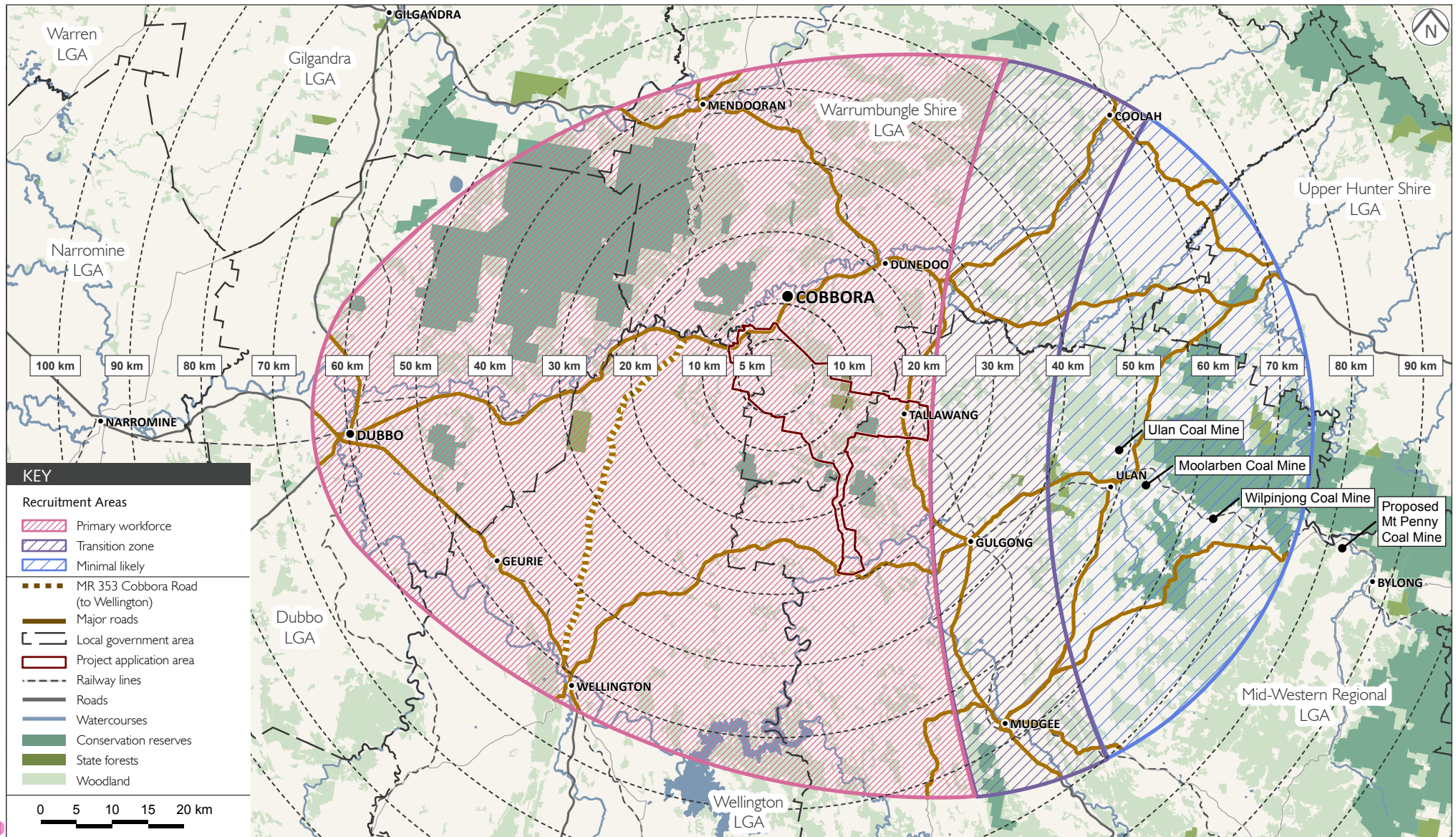
12.3.4 Accident history

The existing accident rates for the major roads in the study area (as summarised in Table 12.3) are all significantly below the five-year NSW average accident rate of 0.73 per million vkt. The Golden Highway (rural section) is statistically the safest road in the study area, with a five-year average accident rate of 0.18 per million vkt (75% lower than the NSW average).

Table 12.3 Accident history for major roads in the study area

Road	Total accidents 2006 to 2010	Fatalities	Route length (km)	5 – year million vkt	Average accident rate per million vkt	Fatalities per 100 million vkt
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 and 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

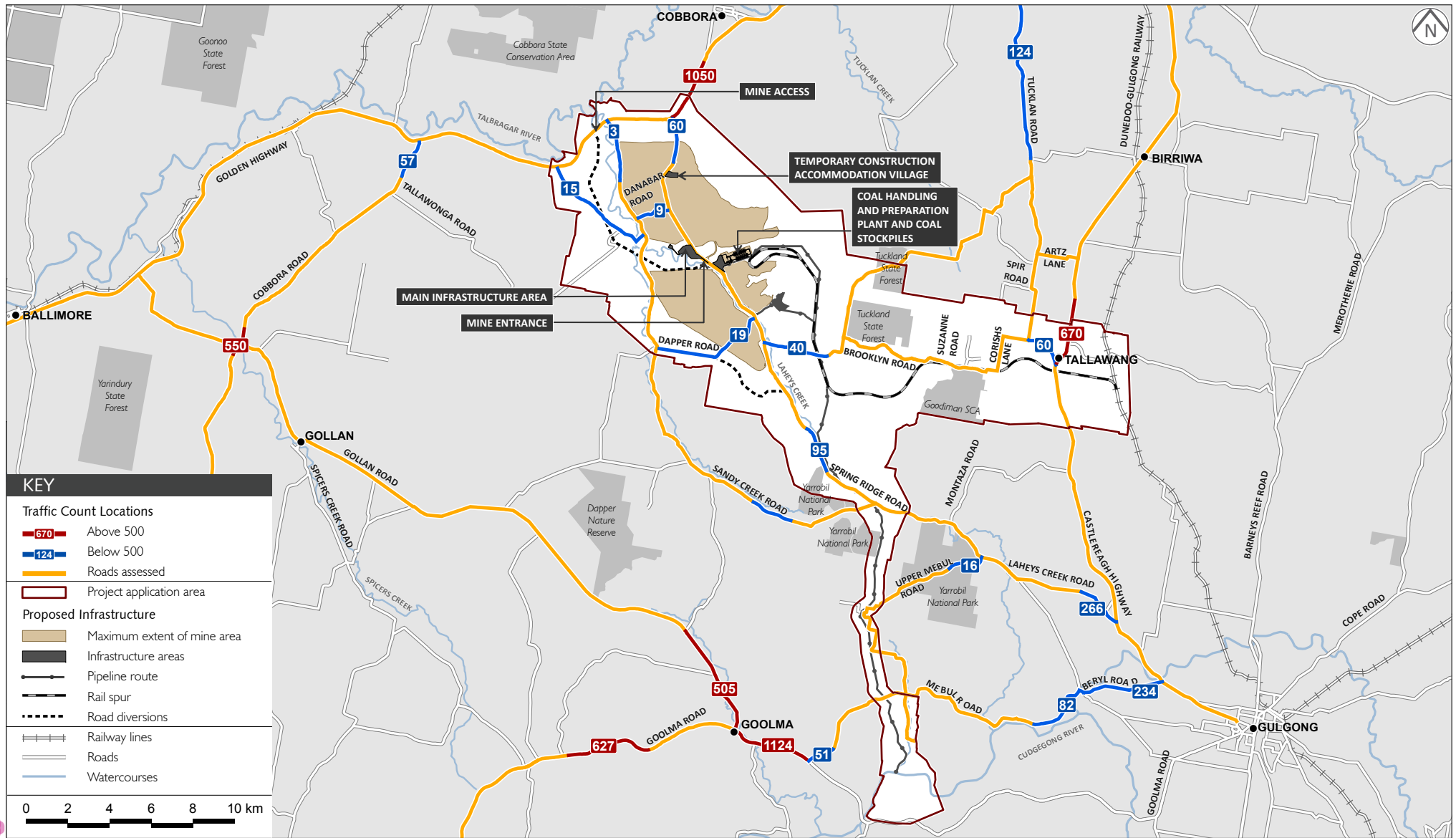
Notes: *Excludes the Dubbo urban area (western 5 km of the route between Dunedoo and Dubbo).



Regional Study Area

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Figure 12.2



Existing Daily Traffic Volumes

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Figure 12.3

The fatality rates on the major roads in the study area are mostly lower than the NSW average of 0.74 fatalities per 100 million vkt. The fatality rates of 1.97 and 2.87 per million vkt on Goolma Road (MR 233) and Gollan Road (RR 7512) were higher than the NSW average. These comparatively high fatality rates are the result of two and one fatal accidents during the period 2006 to 2010, which may not be statistically representative of the overall longer-term trend of road safety on these two roads.

12.3.5 School bus routes

The main public transport services in the study area are school buses. The major school bus routes operate via Spring Ridge Road, Laheys Creek Road (south), the Castlereagh Highway and the Golden Highway. Typical school bus stops on Spring Ridge Road have widened gravel road shoulders. Typical school bus stops on the Castlereagh Highway have bus stop signs and widened gravel road shoulders. The design of the new realigned section of Spring Ridge Road will incorporate additional school bus stops where these are required for local resident access to school bus services in the future.

12.4 Mitigation measures

12.4.1 Traffic management plan

A project traffic management plan will be prepared to detail road traffic management measures for the Project's operations and construction. It will include travel demand management and road traffic impact mitigation measures, including traffic monitoring and enforcement measures for the proposed Project truck access routes. The main management measures are described below.

12.4.2 Traffic generation

During operations there will be a high level of car sharing for the mine shift workforce commuting to and from work, which will result in an average car occupancy ratio of two workers per car.

During the construction, the majority of the workforce will be resident in the construction accommodation village. This workforce will generally travel to and from the project worksites by bus each day, which will greatly reduce the project area vehicular traffic demand generated on the local road network each day, throughout construction.

12.4.3 Road network

After construction is completed, some local roads will be closed where their access function is replaced by the proposed Spring Ridge Road realignment (Figure 12.4).

The road capacity improvements, road maintenance measures and traffic management controls will be implemented to mitigate the project operations and construction traffic impacts, including:

- sealed shoulder widening;
- traffic management (priority signs);
- increased routine maintenance frequency; and
- road-specific truck traffic prohibitions, including contractual conditions with suppliers.

Specific improvements on each road affected by the Project are described in Tables 12.5 and 12.7.

12.4.4 Intersections

Additional intersection turning lanes will be constructed to maintain intersection levels of service. Specific improvements on each intersection affected by the Project are described in Tables 12.5 and 12.7.

12.4.5 Road safety

Project-specific management measures that will be put in place to maintain and improve road safety will include:

- driver safety training for the new workforce relocating to the area will be incorporated into the workforce health and safety (H&S) training;
- a safety audit will be made of identifiable accident cluster locations on the two state highways and other roads used by Project traffic;
- a safety audit will be made of school bus stop locations on the Golden Highway, Castlereagh Highway, Laheys Creek Road (south), the existing Spring Ridge Road route and the new Spring Ridge Road realignment; and
- installation and application of associated signage and other traffic management improvements that may arise from safety audits (see Section 12.6.2).

12.5 Impacts

12.5.1 Traffic generation

The daily road traffic volumes that will be generated during peak operations and peak construction are summarised for each section of the road network in Figure 12.5 and Figure 12.6 respectively.

i Operations traffic

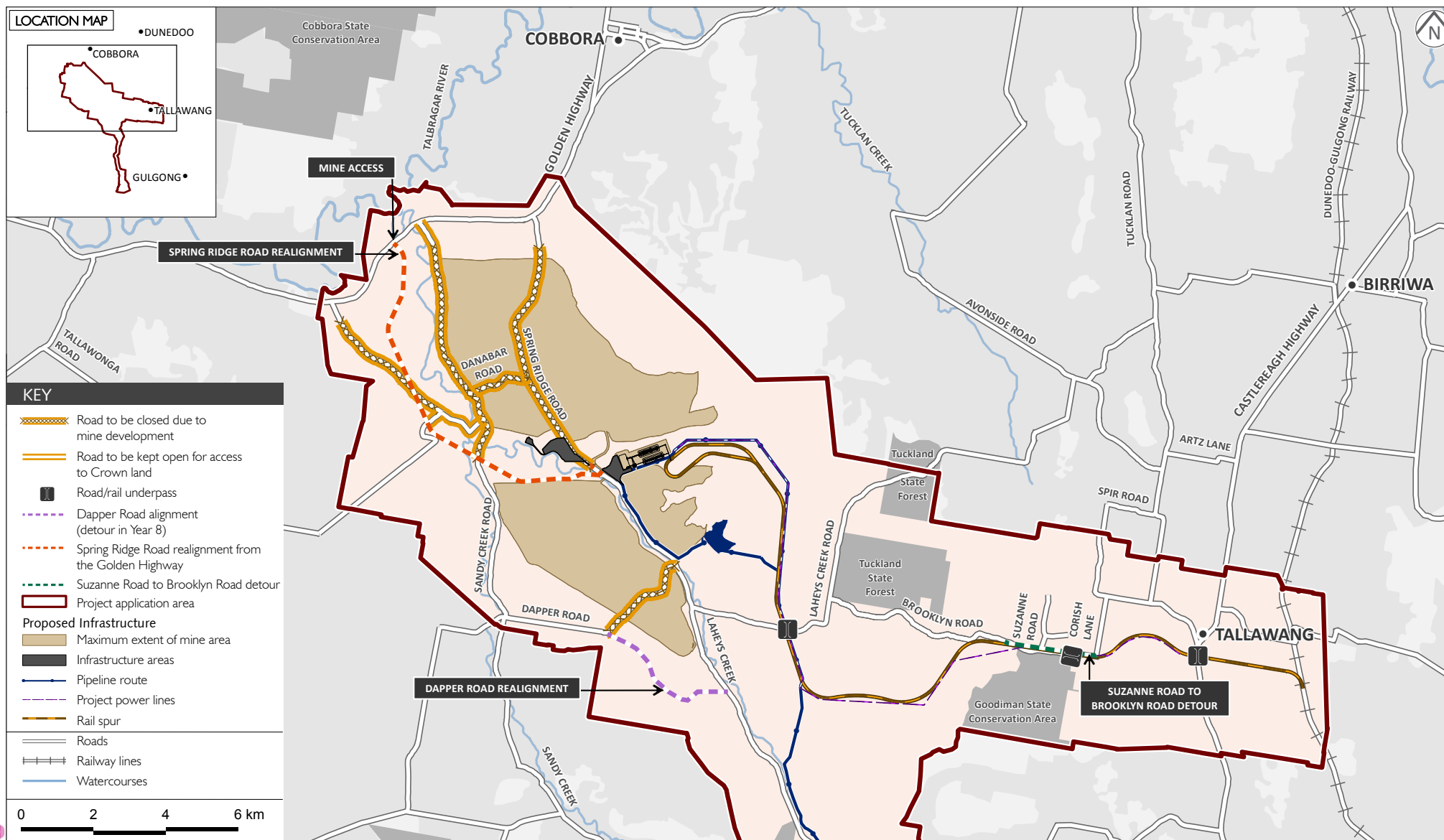
The peak daily car and other light vehicle traffic that will be generated will be:

- operations day and night shift changeover traffic — about 63 car driver trips each way for 125 mineworkers, all 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 will generate about 23 car driver trips each way for 30 people, 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.

The forecast future approach directions for this traffic will be as follows:

- 60% to and from the west, generally from Dubbo;
- 15% to and from the south-west, generally from Wellington;
- 15% to and from the north, generally from Dunedoo, Coolah or Mendooran; and
- 10% to and from the south-east, from either Mudgee or Gulgong.

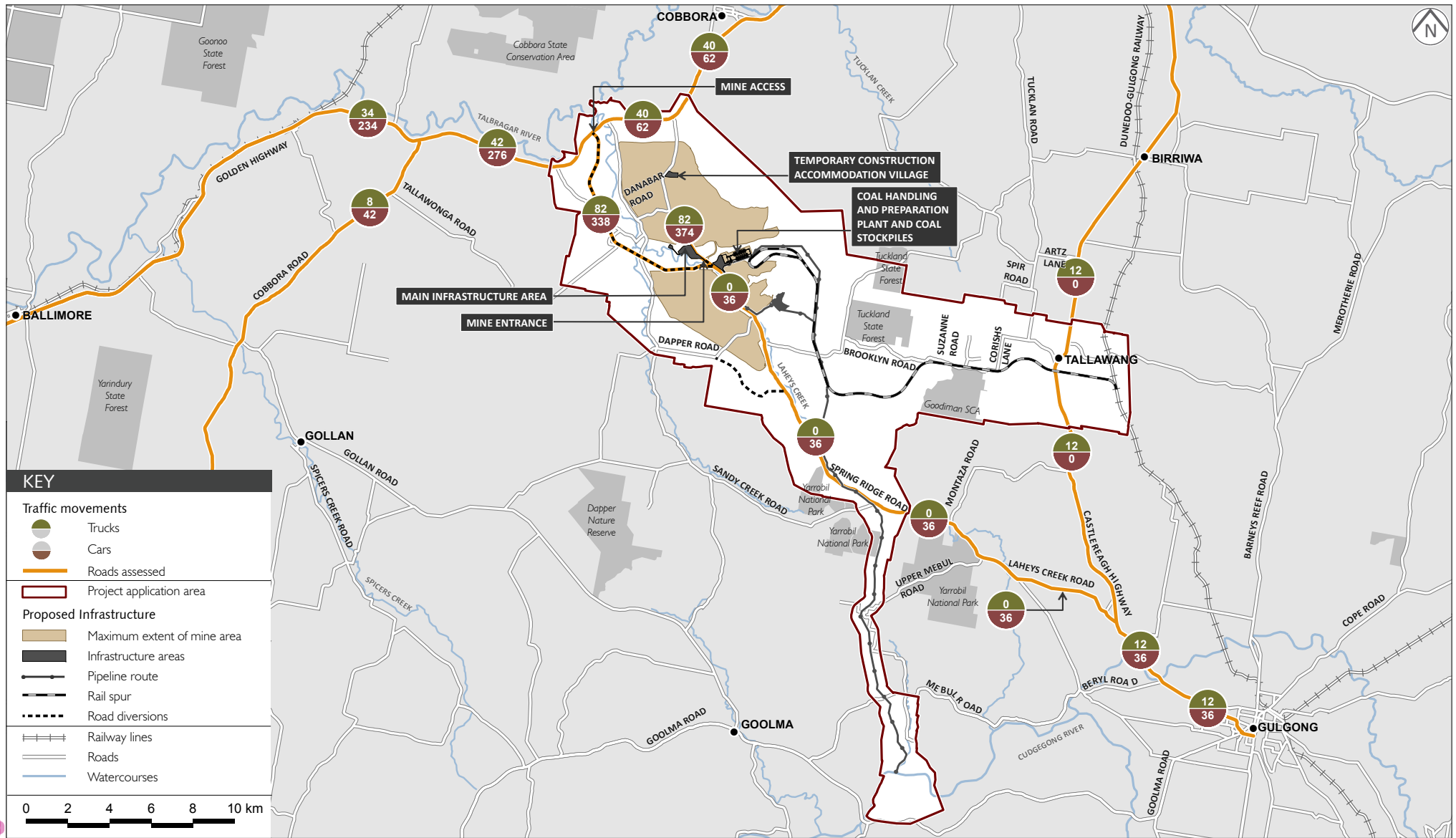
Truck deliveries, specialist contractors and site visitor car traffic movements will be typically 41 trucks daily and 38 cars daily during operations.



Proposed Road Closures and Realignment for Mine Operations

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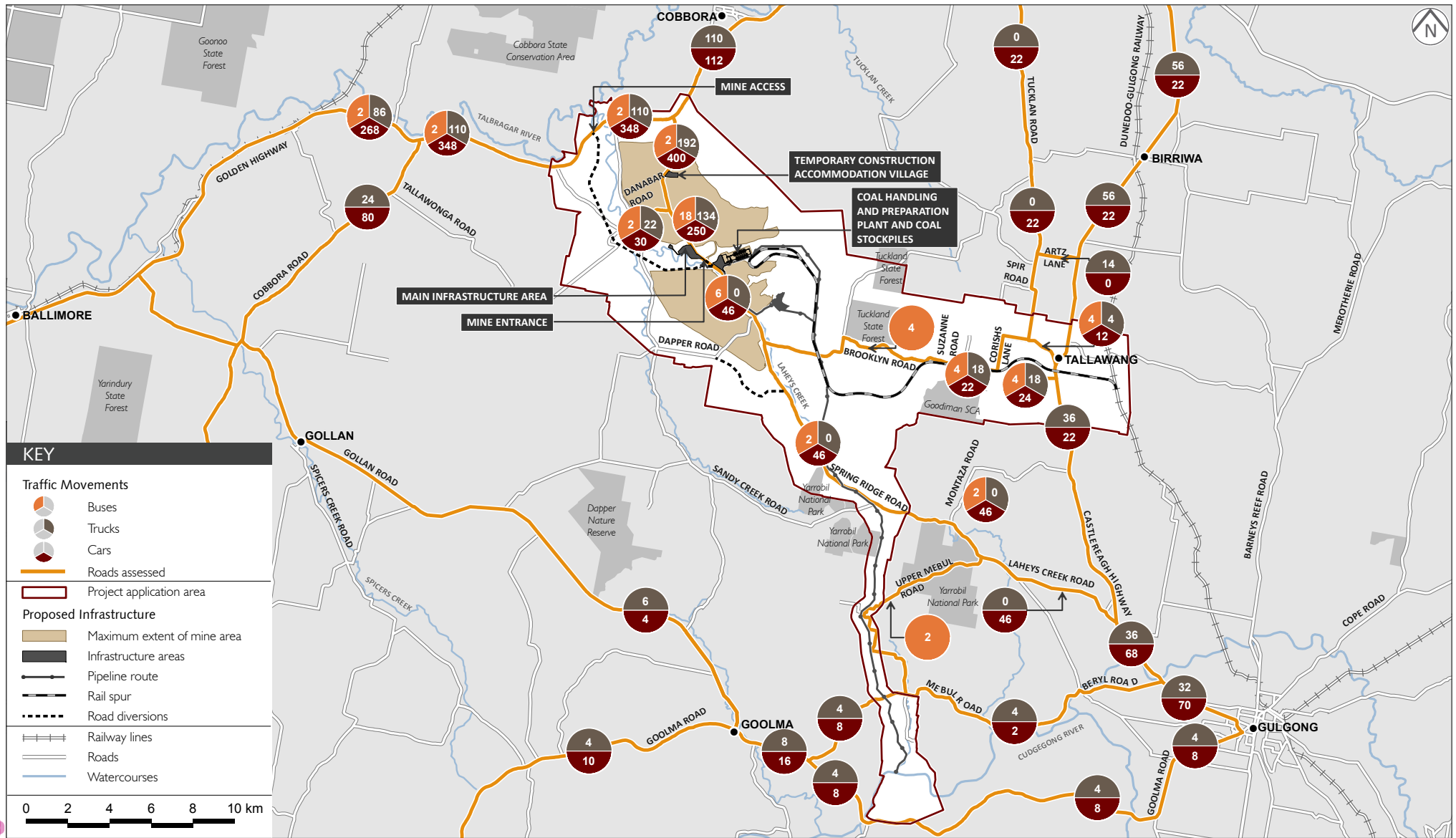
Figure 12.4



Daily Operations Traffic Movements

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Figure 12.5



Daily Construction Traffic Movements

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Figure 12.6

ii Construction traffic

The peak daily car and other light vehicle traffic that will be generated by the peak workforce of 550 will be as follows.

About 340 workers living in the accommodation village will generally travel by buses (about 10 return bus trips daily) between the accommodation village and the four principal worksite areas. Up to 210 construction workers are expected to commute daily by car resulting in about 133 return car trips daily from the following general directions:

- 60% to and from the west — 82 car driver trips each way for 130 people;
- 20% to and from the south-west — 25 car driver trips each way for 40 people;
- 10% to and from the south-east — 13 car driver trips each way for 20 people; and
- 10% to and from the north — 13 car driver trips each way for 20 people.

Truck deliveries, specialist contractors and site visitor car traffic movements have been estimated as a maximum of 100 trucks daily and 38 cars daily at the peak of construction.

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.

12.5.2 Road width and capacity impacts

The roads that will experience significant traffic volume increases are summarised below.

i Operations traffic

Road traffic increases and recommended operations traffic impact mitigation measures are summarised in Table 12.4, Table 12.5 and Figure 12.7. On other roads, operations traffic increases will generally be less than 15% of the existing daily traffic volume (see Figure 12.3) and will not be significant.

Table 12.4 Operations traffic increases

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, Sandy Creek Road and Sweeneys Lane at the north end	78(1)	7(1)	420	82	538	1,171
New Mine Access Road (near Spring Ridge Road)	0	0	456	82	N/A	N/A
Cobbora Road MR 353 (north end)	57(2)	7(2)	50	8	88	114
Spring Ridge Road from MWR LGA boundary to Laheys Creek Road (south)	95	11	36	0	38	0
Golden Highway SH 27 (west of Sweeneys Lane)	990(2)	267(2)	318	42	32	16
Golden Highway SH 27 (west of Cobbora Road)	909(2)	245(2)	268	34	29	14
Cobbora Road MR 353 (south end)	237(2)	30(2)	50	8	21	27
Laheys Creek Road (south) at the Castlereagh Highway	266	35	36	0	14	0

Notes: (1) Existing daily traffic combined from Spring Ridge Road, Sweeneys Lane and Sandy Creek Road.

(2) Year 2005 traffic count – no heavy vehicle information. Heavy vehicle % is assumed to be similar to nearby sections.

Table 12.5 Operations traffic impact mitigation measures

Road	Existing road width and condition	Improvement to meet RMS standards
Spring Ridge Road realignment, replaces Spring Ridge Road, Sandy Creek Road and Sweeneys Lane at the north end	Sweeneys Lane is an unsealed road, typically one lane wide	The new road will be 10 m wide and sealed (lanes 3.5 m wide 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, north of the road realignment intersection	The new road will be 10 m wide and sealed (lanes 3.5 m wide and 1.5 m sealed shoulders) due to the forecast traffic volume and heavy vehicle traffic proportion
Cobbora Road MR 353 (north end)	The sealed road is typically less than 6 m wide, except for unsealed sections	No improvement is required. It is understood Wellington Council intends to complete the road sealing within the next two years, independent of the Project

Table 12.5 Operations traffic impact mitigation measures (Cont'd)

Road	Existing road width and condition	Improvement to meet RMS standards
Spring Ridge Road from MWR LGA boundary to Laheys Creek Road (south)	The sealed road is typically less than 6 m wide	No improvement is required. However, Project truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed (via contractual conditions) to travel on the Castlereagh Highway route via Dunedoo
Golden Highway SH 27 (west of Sweeneys Lane)	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 volume
Golden Highway SH 27 (west of Cobbora Road)	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 volume
Cobbora Road MR 353 (south end)	The sealed road is typically 6 m wide, no sealed shoulders	No widening required
Laheys Creek Road (south) at the Castlereagh Highway	The sealed road is typically 6 m wide, no sealed shoulders	No improvement is required. However, Project truck traffic travelling to and from the Gulgong direction will be prohibited from using this road and will be instructed (via contractual conditions) to travel on the Castlereagh Highway route via Dunedoo

ii Construction traffic

Traffic increases and construction traffic impact mitigation measures for each section of the roads affected by the Project are summarised in Table 12.6 and Table 12.7. On other roads the predicted project construction traffic increases will generally be less than 15% of the existing daily traffic volume (see Figure 12.3) and will not be significant.

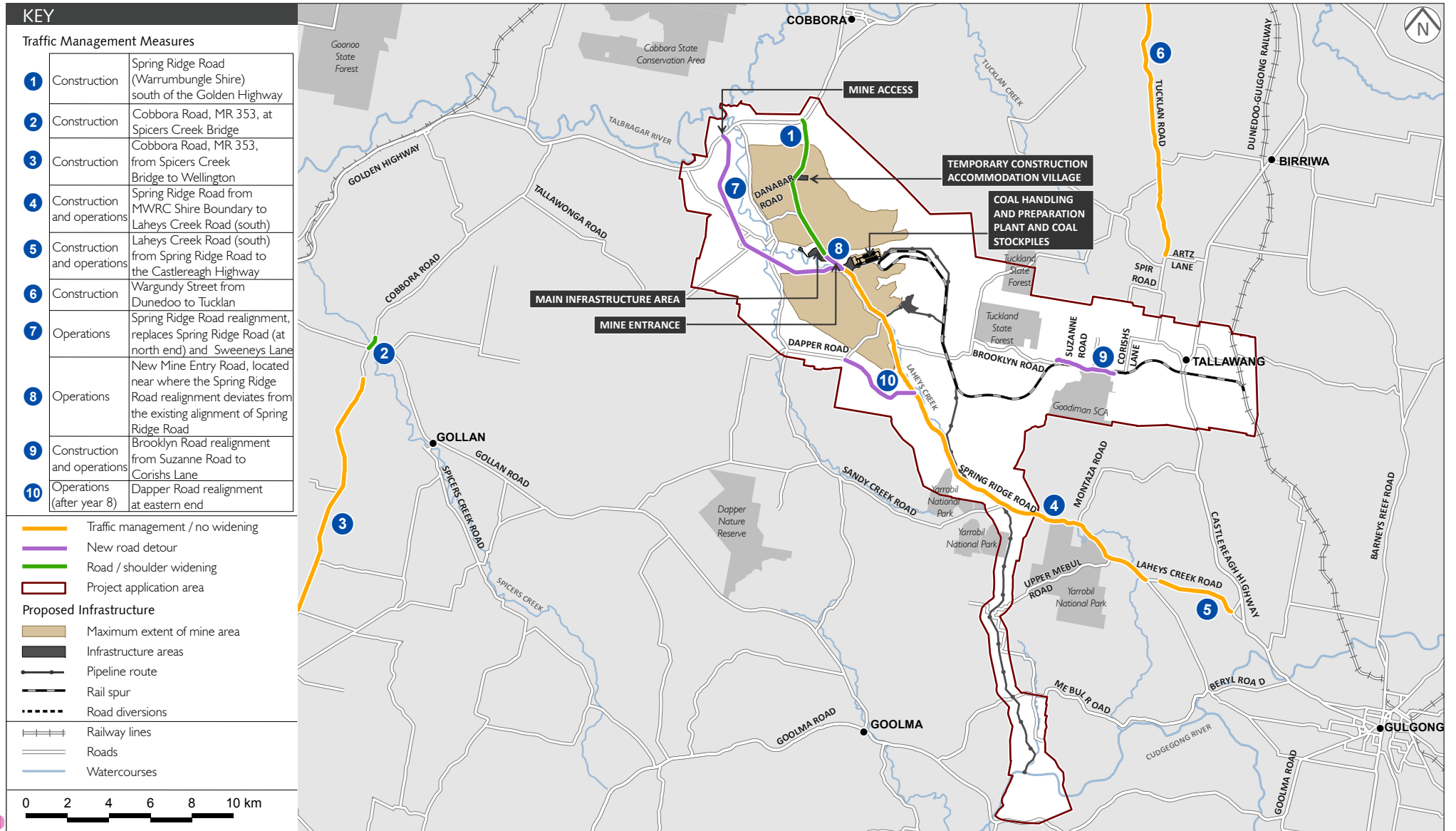
Table 12.6 Construction traffic increases

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
Danabar Road	9	1	54	24	600	2,400
Cobbora Road MR 353 (north end)	57*	7*	104	24	182	343
Artz Lane at the Castlereagh Highway	20	2	14	14	70	700
Spring Ridge Road from MWR LGA boundary to Laheys Creek Road (south)	95	11	48	2	51	18
Golden Highway SH 27 (west of Sweeneys Lane)	990*	267*	460	112	46	42
Cobbora Road MR 353 (south end)	237*	30*	104	24	44	80

Table 12.6 Construction traffic increases (Cont'd)

Road	Existing daily traffic	Existing heavy vehicles	Additional daily traffic	Additional heavy vehicles	Increase in daily traffic (%)	Increase in heavy vehicle traffic (%)
Golden Highway SH 27 (west of Cobbora Road)	909*	245*	356	88	39	36
Tucklan Road at the Castlereagh Highway	60	15	20	8	33	53
Mebul Road (West)	51	3	12	4	24	133
Golden Highway SH 27 (east of Spring Ridge Road)	1,050	290	222	110	21	38
Cobbora Road MR 353 (at Spicers Creek)	550*	69*	114	28	21	41
Tucklan Road (Wargundy Street) 6 km south of Dunedoo	124	8	22	0	18	0
Golden Highway SH 27 (near Dunedoo)	1,234*	333*	222	110	18	33
Laheys Creek Road (south) at the Castlereagh Highway	266	35	46	0	17	0

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



Location of Required Traffic Management Measures

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Figure 12.7

Table 12.7 Construction stage road widening and traffic impact mitigation measures

Road	Existing road width and condition	Requirement for improvement
Spring Ridge Road (south of the Golden Highway)	The sealed road is typically 6 m wide, with no sealed shoulders	The section between the Golden Highway and the mine infrastructure area will be widened to provide a minimum 7 m wide sealed road (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
Danabar Road	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 after which it will be closed
Cobbora Road MR 353 (north end)	The sealed road is typically 6 m wide, except for unsealed sections	No improvement is required. It is understood Wellington Council intends to complete the road sealing within the next two years, independent of the Project
Artz Lane at the Castlereagh Highway	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 MWR LGA boundary to Laheys Creek Road (south)	The sealed road is typically less than 6 m wide 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 (via contractual conditions) to use the Castlereagh Highway route via Dunedoo
Golden Highway SH 27 (west of Sweeneys Lane)	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 volume
Cobbora Road MR 353 (south end)	The sealed road is typically 6 m wide with no sealed shoulders	No widening is required. However, the additional heavy vehicle traffic may increase the frequency of maintenance repairs required to this road
Golden Highway SH 27 (west of Cobbora Road)	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 volume
Tucklan Road at the Castlereagh Highway	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
Mebul Road (West)	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
Golden Highway SH 27 (east of Spring Ridge Road)	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 are wide enough for the predicted traffic volume
Cobbora Road MR 353 (at Spicers Creek)	The sealed road is typically 6 m wide, with 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	The sealed road is typically less than 6 m wide 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 (via contractual conditions) to use the Castlereagh Highway route via Birriwa
Golden Highway SH 27 (near Dunedoo)	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 volume

Table 12.7 Construction stage road widening and traffic impact mitigation measures (Cont'd)

Road	Existing road width and condition	Requirement for improvement
Laheys Creek Road (south) at the Castlereagh Highway	The sealed road is typically 6 m wide, with 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 (via contractual conditions) to use the Castlereagh Highway route via Dunedoo

12.5.3 Intersection impacts

i Operations

The impacts of operations traffic have been assessed at four intersections where potentially significant traffic increases are likely (see Figure 12.1). The recommended additional left and right turning deceleration lanes at intersections are summarised in Table 12.8.

Table 12.8 Assessment of intersection traffic impacts during peak operations

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	7.00 am to 8.00 am	12	Yes*	11.00 am to 12.00 midday	1	No (as part of the intersection left turn upgrade a basic Type BAR right turn safety treatment will also be provided)
Golden Highway/Spring Ridge Road realignment (new intersection)	6.00 pm to 7.00 pm	12	Yes*	6.00 am to 7.00 am	47	Yes*
New mine access road intersection (near 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 (as part of the intersection left turn upgrade a basic Type BAR right turn safety treatment will also be provided)

Notes: *Intersections will be designed in accordance with Austroads (2010).

ii Project construction

The impacts of construction traffic have been assessed at nine locations where potentially significant increases in the forecast peak hour turning traffic movements, are likely (see Figure 12.1). The recommended additional intersection deceleration lanes are summarised in Table 12.9.

Table 12.9 Assessment of intersection traffic impacts during peak construction

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 12.00 midday	1	No (as part of the intersection left turn upgrade a basic Type BAR right turn safety treatment will also be provided)
Golden Highway/Spring Ridge Road	5.00 am to 6.00 am	15	No (a type AUL lane is already provided. The minor road will be widened to facilitate heavy vehicle access)	5.00 am to 6.00 am	116	No (a type AUR lane is already provided. The minor road will be widened 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
Castlereagh Highway/new worksite access	5.00 am to 6.00 am	3	(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 (as part of the intersection left turn upgrade a basic Type BAR right turn safety treatment will also be provided)
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 Austroads (2010).

12.5.4 Road safety impacts

The accident and fatality rates on the major roads the Project traffic will use have been generally lower than recent NSW five-year averages. The road safety conditions in the area, including traffic from the Project, are expected to remain good given the proposed road and intersection upgrades.

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 SISD visibility requirement in both directions along the major road.

While future driving conditions on the major roads in the PAA are likely to remain generally safe, after consulting the NSW Police Force and others a number of future road safety measures are recommended for the Project. These are summarised in Section 12.4.5 Mitigation.

There are defined standards for overtaking lanes in RTA (1999). Generally a minimum daily traffic flow of 2,500 vehicles is required for overtaking lanes to be considered necessary on rural roads in level terrain with either average or good overtaking opportunities.

The increases in the daily traffic flows from the Project (see Figure 12.5 and Figure 12.6) will be a maximum of 460 vehicles on the Golden Highway and 100 vehicles on the Castlereagh Highway. This will not increase the existing base daily traffic flows on these roads (which are in the range of 600 to 1,200 vehicles) to reach the threshold level of 2,500 vehicles where future overtaking lanes would be considered necessary.

12.5.5 Road closures and traffic detour impacts

The proposed realignment of Spring Ridge Road, north of the mine infrastructure area is shown in Figure 12.8. The new road will be about 3 km longer than the existing alignment of Spring Ridge Road between the new mine entry intersection and the Golden Highway. The realigned Spring Ridge Road will intersect with the Golden Highway about 4 km west of the existing Spring Ridge Road intersection.

This realignment will replace the existing alignments of Sweeneys Lane, Danabar Road and Sandy Creek Road, north of the main mine infrastructure area. All of these roads have minimal daily traffic usage (three to 15 vehicle movements in October 2011). There are 60 vehicle movements daily on Spring Ridge Road at the northern end (see Figure 12.3). This traffic travels more frequently to/from the Dunedoo direction (in about 75:25 proportion) than the Dubbo direction.

About 23 daily traffic movements in each direction on Spring Ridge Road at the northern end will be inconvenienced by the increased distance travelled to/from the Dunedoo direction between the existing and proposed intersections of Spring Ridge Road on the Golden Highway. This traffic will typically need to travel an extra 7 km (five minutes) in each direction. However, traffic using Spring Ridge Road to travel to and from the Dubbo direction will have shorter journeys with the proposed realignment.

The other two existing local roads that will be affected by road realignments, Brooklyn Road and Dapper Road, are both unsealed local roads with low daily traffic volumes.

At Brooklyn Road, near Suzanne Road, the proposed realignment will follow the same general east–west route as the existing Brooklyn Road. However, the new alignment will be on the northern side of the proposed rail spur. There will be a minor additional traffic detour distance for the affected local traffic. A road underpass will be provided for local traffic to cross the railway line to maintain the existing access to land on the southern side of the rail line easement.

The realignment of Dapper Road, which will take place after Year 8, will divert the eastern end of Dapper Road to the south. As most traffic using this section of Dapper Road is generally travelling to and from the south, there will generally be a net travel distance saving of about 1.5 km in each direction for each vehicle using the road.

12.5.6 Road transport outcomes

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 put in place, including new road realignments, wider sealed shoulders and additional routine road pavement maintenance. Also, five intersections will be provided with additional turning lanes.

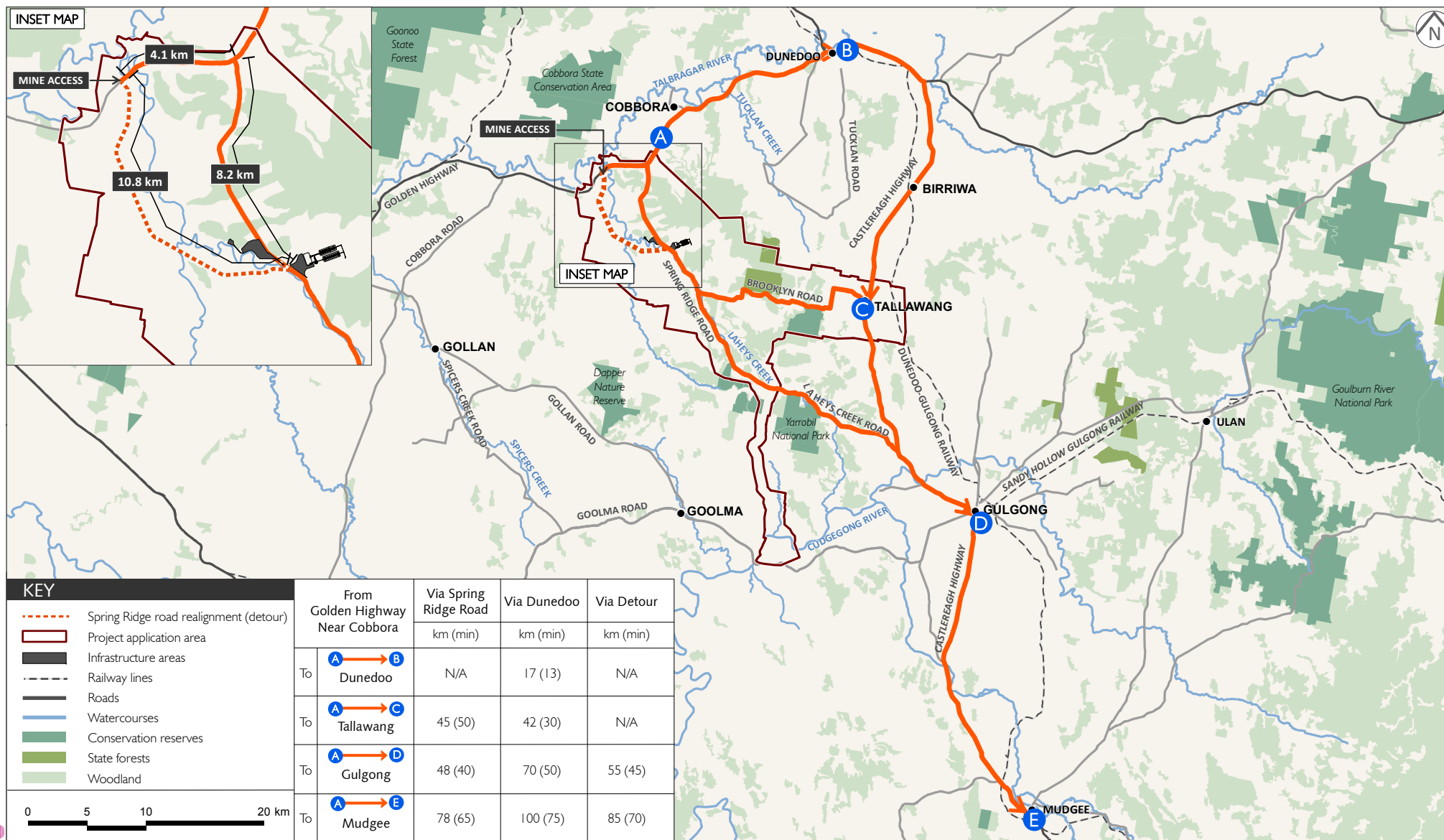
In addition to these improvements, major traffic safety improvements for the Project will also be put in place, including workforce driver safety training, road safety audits to identify general route signage and traffic management improvements and a safety audit of all school bus stops.

A 11 km realignment of Spring Ridge Road will be constructed from the Golden Highway to the mine entrance, CHPP and mine infrastructure area. The realigned road will result in some additional detour distances for some existing local traffic. It will provide the main future access route to the mine for all traffic and will have appropriate high standard intersection treatments constructed with additional intersection turning lanes at its intersections with major roads.

Other road realignments will be provided at Brooklyn Road to construct the new rail spur and at Dapper Road to excavate the south-eastern corner of the mine pit area, after Year 8 of the mine operations.

There will be no public level crossings on the rail spur line, which will have three grade-separated road/rail crossings constructed at the Castlereagh Highway, Laheys Creek Road and to maintain access south of Brooklyn Road, including for emergency vehicles.

All of the mine operations staff will generally live within a one hour commute from the mine. The shift workforce at the mine will share cars a lot, which will result in an overall average of two people per car for travel to and from work. The construction workforce traffic impacts will be mitigated by providing a mine workforce accommodation village on Spring Ridge Road, which will let the majority of the mine construction workforce live locally and use shuttle bus travel to and from the four main project worksite areas.



Effect of Proposed Road Detour on Journey Times

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Figure 12.8

12.6 Monitoring

12.6.1 Road works and traffic management

A range of road widening and related traffic management measures were identified as required for access to the Project's construction and operations (see Figure 12.7). The construction traffic management plan will be based on all construction traffic, both light and heavy vehicles, using a network of designated construction access routes (Figure 12.9), which include truck access prohibitions on a number of roads.

Some heavy vehicle access prohibitions will be continued throughout the Project. Monitoring procedures (including daily travel and site heavy vehicle entry–exit records) will be maintained to ensure the prohibition on truck access is effective.

12.6.2 Road safety

Appropriate reporting records will be maintained by the Project for the workforce road safety training and the outcomes of the road safety audits listed in Section 10.4.5.

The road safety monitoring system will allow CHC to proactively manage all road safety issues relating to the Project and prevent or minimise potential disruptions to existing road users in the region.

12.6.3 Road maintenance

During operations, most heavy vehicles will use approved travel routes travelling generally via the two state highways and the Spring Ridge Road realignment, south of the Golden Highway. The operations heavy vehicle access requirements are not anticipated to generate any additional Project-specific road maintenance requirement for these roads.

During construction, a number of other roads such as the MR 353 Cobbora Road route to Wellington, Tucklan Road, Mebul Road and Danabar Road, will have potentially much more truck traffic (Table 12.6). The additional truck traffic will require a routine program of road surface condition monitoring (weekly inspections) for these roads to ensure any road surface defects, which may develop during Project construction, are rapidly identified and repaired so they are not a hazard for road users.

12.6.4 Sensitivity analysis for MWRC roads

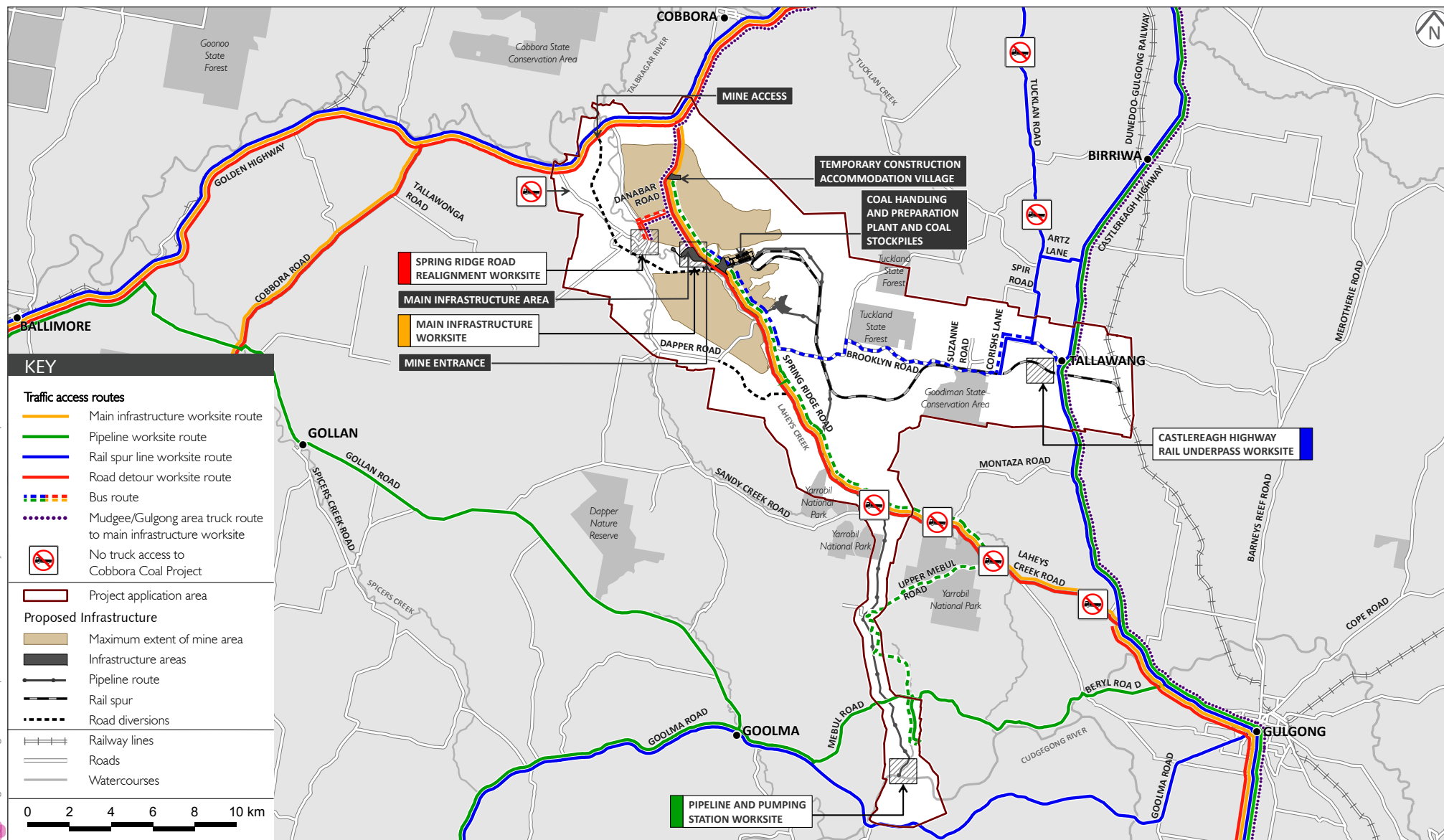
The future volumes of both light and heavy vehicle traffic which will be generated by the Project on roads within the MWRC area will be primarily determined by the proportions of the project workforce who will be residents of that area, during construction and operations.

A sensitivity analysis of the potential impacts 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 would be required.

This sensitivity analysis has determined that the following additional upgrades would be required during the project construction or operations stages as summarised in Table 12.10. 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 scenario, CHC would still apply the proposed contractual conditions for the Project, which are to prevent any project generated truck traffic from using this road.

Table 12.10 Additional upgrades required for extra workers 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 would require a minimum 6 m sealed width. Any additional Project generated truck traffic, which may be travelling to and from the Gulgong direction would 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 would 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



Construction Traffic Access Routes

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Figure 12.9

