

VICKERY EXTENSION PROJECT

ENVIRONMENTAL IMPACT STATEMENT

APPENDIX I

ROAD TRANSPORT

ASSESSMENT



Vickery Extension Project Gunnedah Basin, NSW Road Transport Assessment

Client // Whitehaven Coal Limited
Office // NSW
Reference // 16S9027000
Date // 8/08/18

Vickery Extension Project

Gunnedah Basin, NSW

Road Transport Assessment

Issue: A 8/08/18

Client: Whitehaven Coal Limited
Reference: 16S9027000
GTA Consultants Office: NSW

Quality Record

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1. Introduction

The former Vickery Coal Mine and the former Canyon Coal Mine are located approximately 25 kilometres (km) north of Gunnedah, in New South Wales (NSW) (Figure 1-1). Open cut and underground mining activities were conducted at the former Vickery Coal Mine between 1986 and 1998. Open cut mining activities at the former Canyon Coal Mine ceased in 2009. The former Vickery and Canyon Coal Mines have been rehabilitated following closure.

The approved Vickery Coal Project (herein referred to as the Approved Mine) is an approved, but yet to be constructed, project involving the development of an open cut coal mine and associated infrastructure, and would facilitate a run-of-mine (ROM) coal production rate of up to approximately 4.5 million tonnes per annum (Mtpa) for a period of 30 years.

Whitehaven Coal Limited (Whitehaven) is seeking a new Development Consent for extension of open cut mining operations at the Approved Mine (herein referred to as the Vickery Extension Project [the Project]). This would include a physical extension to the Approved Mine footprint to gain access to additional ROM coal reserves, an increase in the footprint of waste rock emplacement areas, an increase in the approved ROM coal mining rate and construction and operation of a Project Coal Handling and Preparation Plant (CHPP), train load-out facility and rail spur. This infrastructure would be used for the handling, processing and transport of coal from the Project, as well as other Whitehaven mines.

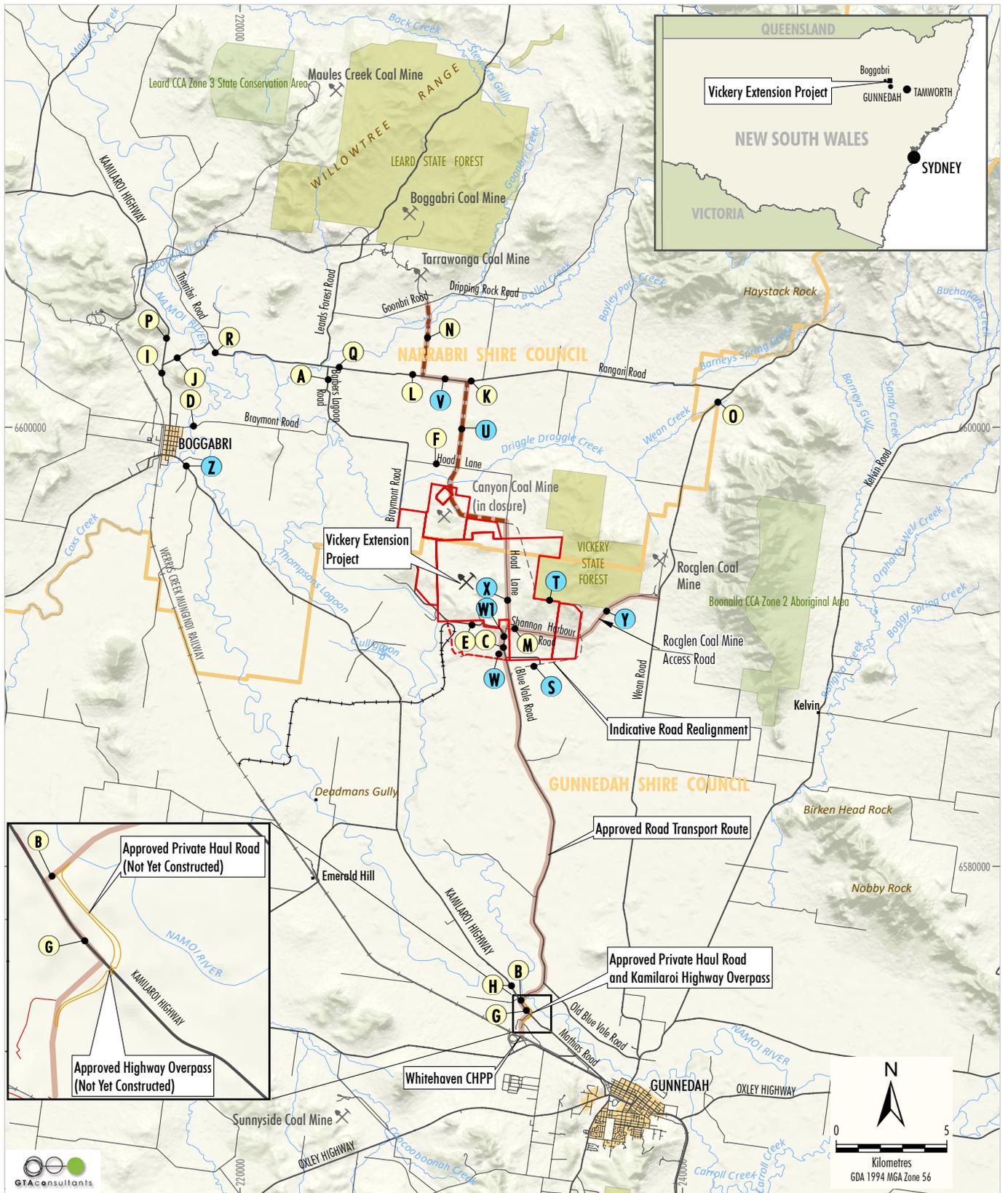
This report accompanies an Environmental Impact Statement (EIS), prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This report has been prepared with reference to the road transport components of the Secretary's Environmental Assessment Requirements (SEARs):

*- **Transport** – including an assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the local and State road and the rail network, having regard to Transport for NSW's and RMS's requirements (see Attachment 2);*

In accordance with the SEARs for the Project, this report has regard for the Transport for NSW, Roads and Maritime Services (RMS), Gunnedah Shire Council and Narrabri Shire Council input to the SEARs outlined in Attachment 2 of the SEARs. Attachment A summarises where in the EIS this agency input is addressed.

In addition, the SEARs refer to guidelines that are relevant to the assessment, including the RMS's (formerly Roads and Traffic Authority [RTA]) *Guide to Traffic Generating Developments* (RTA, 2002) and the RMS's *Road Design Guide* (N.D). It is noted that RMS and other road agencies have adopted the Austroads guides and the Australian Standards as the primary technical references, together with RMS Supplements, rather than the RMS Road Design Guide referred to in the SEARs.

An assessment of the potential impacts of the Project on the rail network is provided in the EIS.



WVIC-15-33_Amp_RTA_2017



- LEGEND**
- Mining Tenement Boundary (ML & CL)
 - Mining Lease Application (MLA)
 - Local Government Boundary
 - NSW State Forest
 - State Conservation Area, Aboriginal Area
 - Major Roads
 - Railway
 - Whitehaven Private Haul Road
 - Approved Road Transport Route
 - Indicative Project Rail Spur
 - A Traffic Count Location
 - S Traffic Forecast Location

Source: LPMA - Topographic Base (2010); NSW Department of Industry (2015)

VICKERY EXTENSION PROJECT
 Local Road Network and
 Traffic Survey Locations

Figure 1-1

2. Relevant Approved Mining Operations

Whitehaven operates several operations in the Gunnedah Basin. In addition to the Approved Mine, relevant approved mining operations near the Project include (Figure 1-1):

- Rocglen Coal Mine;
- Tarrawonga Coal Mine;
- Boggabri Coal Mine (note: operated by Idemitsu Australia);
- Maules Creek Coal Mine;
- Sunnyside Coal Mine; and
- Canyon Coal Mine (currently in closure).

The Whitehaven CHPP (Figure 1-1) processes ROM coal from the surrounding operating Whitehaven coal mining operations (namely the Tarrawonga, Rocglen and Sunnyside Coal Mines). ROM coal from the Approved Mine (Section 2.6) is approved to be transported by road to the Whitehaven CHPP for processing (and transport reject material from the Whitehaven CHPP to Whitehaven mines consistent with approved operations).

2.1 Rocglen Coal Mine

The Rocglen Coal Mine (Figure 1-1) is approved to extract 1.5 Mtpa of ROM coal until December 2022. Sized ROM coal from the Rocglen Coal Mine is trucked to the Whitehaven CHPP via Blue Vale Road for processing (where required) and train loading, and coal reject material from the Whitehaven CHPP is trucked back to the Rocglen Coal Mine for disposal in accordance with Project Approval 10_0015 (as modified).

2.2 Tarrawonga Coal Mine

The Tarrawonga Coal Mine (Figure 1-1) is approved for production and transport of up to approximately 3 Mtpa of ROM coal to the Whitehaven CHPP until 2030. Sized ROM coal from the Tarrawonga Coal Mine is trucked to the Whitehaven CHPP for processing (where required) and train loading, and coal reject material from the Whitehaven CHPP is trucked back to the Tarrawonga Coal Mine for disposal in accordance with Project Approval 11_0047 (as modified).

2.3 Boggabri Coal Mine

The Boggabri Coal Mine (Figure 1-1) is operated by Idemitsu Australia and is approved (Project Approval 09_0182 [as modified]) to produce up to 8.6 Mtpa of ROM coal and 7 Mtpa of product coal, with an on-site CHPP, private rail spur and rail loop. The Boggabri Coal Mine includes the construction of a permanent mine access from the Kamilaroi Highway. The mine is approved to operate until 2033.

2.4 Maules Creek Coal Mine

The Maules Creek Coal Mine (Figure 1-1) (Project Approval 10_0138 [as modified]) is an open cut mining operation with an extraction rate of up to approximately 13 Mtpa ROM coal, with an on-site CHPP, private rail spur and rail loop. The mine site is approved to operate until 2034.

2.5 Sunnyside Coal Mine

The Sunnyside Coal Mine (Figure 1-1) (Project Approval 06_0308 [as modified]) is an open cut mining operation with an extraction rate of up to approximately 1 Mtpa. Product coal is approved to be transported by road to the Whitehaven CHPP until the end of 2020.

2.6 The Approved Mine

A Road Transport Assessment was prepared for the Approved Mine in 2012 (GTA Consultants, 2012). With regard to the road transport environment, the Approved Mine includes:

- vehicular access to the Approved Mine site via Blue Vale Road;
- realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoad Lane to the east and south of the open cut;
- realignment of the southern extent of Braymont Road to the south of the open cut;
- construction of an approximately 1 km long section of private haul road (including an overpass over the Kamilaroi Highway) between Blue Vale Road and the Whitehaven CHPP (referred to as the approved private haul road and Kamilaroi Highway overpass) prior to any cumulative road haulage of ROM coal along the Approved Road Transport Route (from all Whitehaven mines) exceeding 3.5 Mtpa;
- transport of up to a total of 3.5 Mtpa, or up to 4.5 Mtpa of ROM coal via the Approved Road Transport Route to the Whitehaven CHPP located approximately 5 km north-west of Gunnedah subject to the construction of the approved private haul road and Kamilaroi Highway overpass;
- transport of coal rejects generated at the Whitehaven CHPP via truck to the Approved Mine for emplacement and/or disposal in existing off-site licensed facilities; and
- extraction of up to 90,000 cubic metres (m³) of gravel from the site for collection by customers, utilising the Approved Road Transport Route from Gunnedah, or via Kamilaroi Highway, Rangari Road and the Approved Road Transport Route from Boggabri and surrounding areas.

2.7 Whitehaven CHPP and Train Load-out Facility

The Whitehaven CHPP is located approximately 5 km north-west of Gunnedah and is approved (Development Consent DA 0079.2002) to process ROM coal from the surrounding Whitehaven coal mining operations (namely the Tarrawonga, Rocglen and Sunnyside Coal Mines and the Approved Mine) until October 2022.

Up to 3 Mtpa of sized ROM coal is approved to be processed at the Whitehaven CHPP, and the train load-out facility is approved to handle up to 4.1 Mtpa of product coal (i.e. including loading of CHPP bypass coal).

3. Vickery Extension Project

3.1 Overview

The Project involves mining the coal reserves associated with the Approved Mine, as well as accessing additional coal reserves within the Project mining area. ROM coal would be mined by open cut methods at a rate up to approximately 10 Mtpa, over a mine life of approximately 25 years.

As described in Section 1, the Project would include a physical extension to the Approved Mine footprint to gain access to additional ROM coal reserves, an increase in the footprint of waste rock emplacement areas, an increase in the approved ROM coal mining rate and construction and operation of a Project CHPP, train load-out facility and rail spur (Figures 3-1 and 3-2). This infrastructure would be used for the handling, processing and transport of coal from the Project, as well as other Whitehaven mines.

Whitehaven is seeking Development Consent under Part 4 of the NSW EP&A Act for the Project.

Figures 3-1 and 3-2 illustrate the general arrangement of the Project. A detailed description of the Project is provided in Section 2 in the Main Report of the EIS.

This assessment forms part of an EIS that has been prepared to accompany a Development Application made for the Project in accordance with Part 4 of the EP&A Act.

3.2 Changes to Local Road Network

3.2.1 Blue Vale Road Realignment

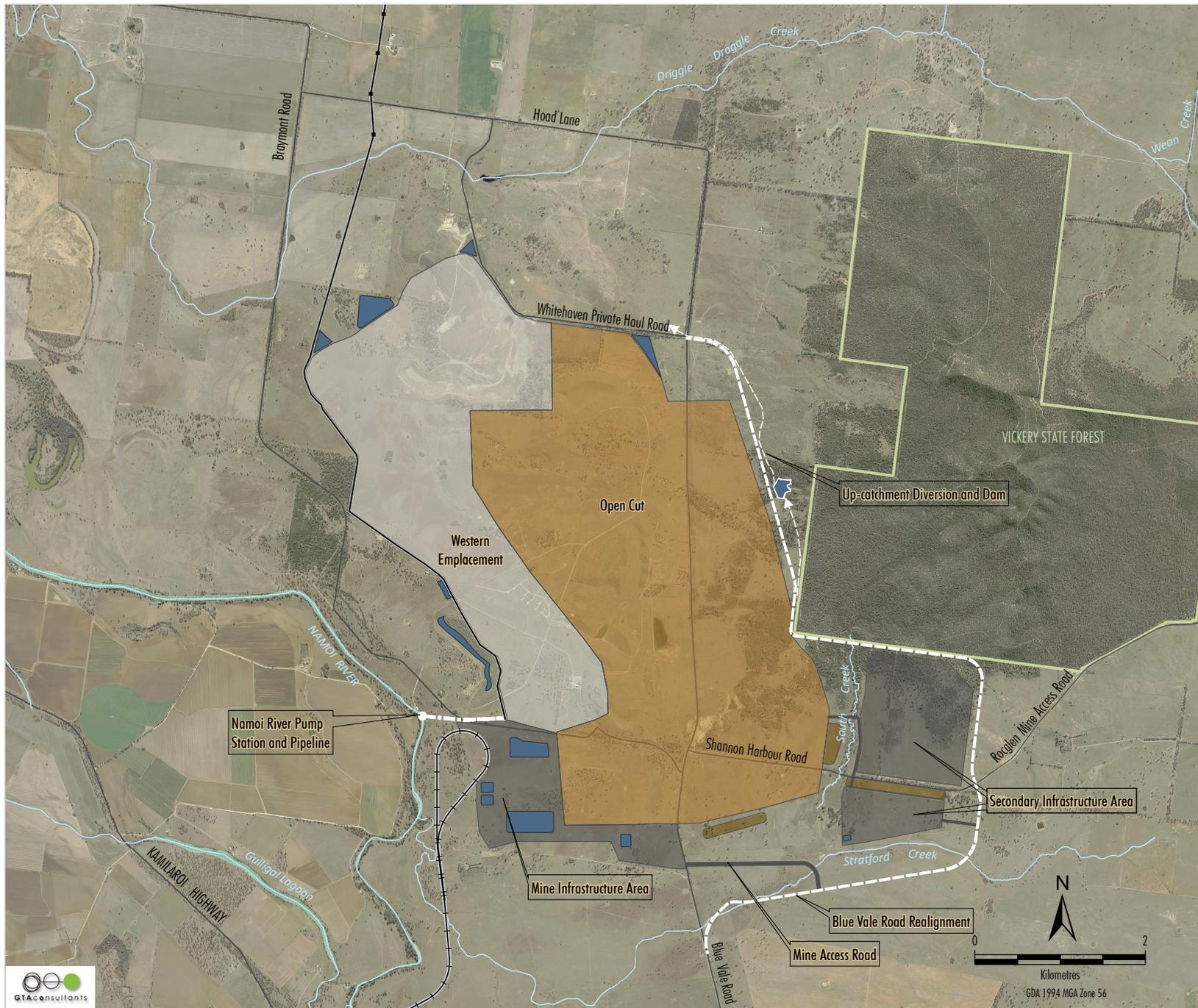
Realignment of Blue Vale Road is required to allow continued public access around the Project (Figure 3-1). The Blue Vale Road realignment was assessed as part of the Approved Mine.

The Blue Vale Road realignment would be constructed adjacent to the western and southern boundaries of the Vickery State Forest and secondary infrastructure areas, and would be designed and constructed in accordance with the Austroads guidelines, in consultation with the Gunnedah and Narrabri Shire Councils.

The Blue Vale Road realignment would generally follow the existing topography, in the section to the south of the open cut and to the west of the Vickery State Forest, where up to 10 metres (m) of cut and fill may be required in some areas. Appropriately sized culverts would be installed where the road realignment crosses drainage lines.

Construction of the Blue Vale Road realignment would be undertaken prior to disturbance of Hoad Lane/Blue Vale Road.

The Blue Vale Road realignment would add approximately 5 km to the travel distance along Hoad Lane and Blue Vale Road.



- LEGEND**
- State Forest
 - Project Components**
 - Indicative Extent of Open Cut
 - Indicative Extent of Out of Pit Waste Rock Emplacement
 - Indicative Extent of Infrastructure Area
 - Indicative Extent of Soil Stockpile
 - Indicative Extent of Water Storage
 - Indicative Mine Access Road Alignment
 - Indicative Namo River Pump Station and Pipeline
 - Indicative Road Realignment
 - Indicative Up-catchment Diversion and Dam Location
 - Indicative Rail Spur Alignment
 - Indicative Location of Groundwater Bores and Pipeline

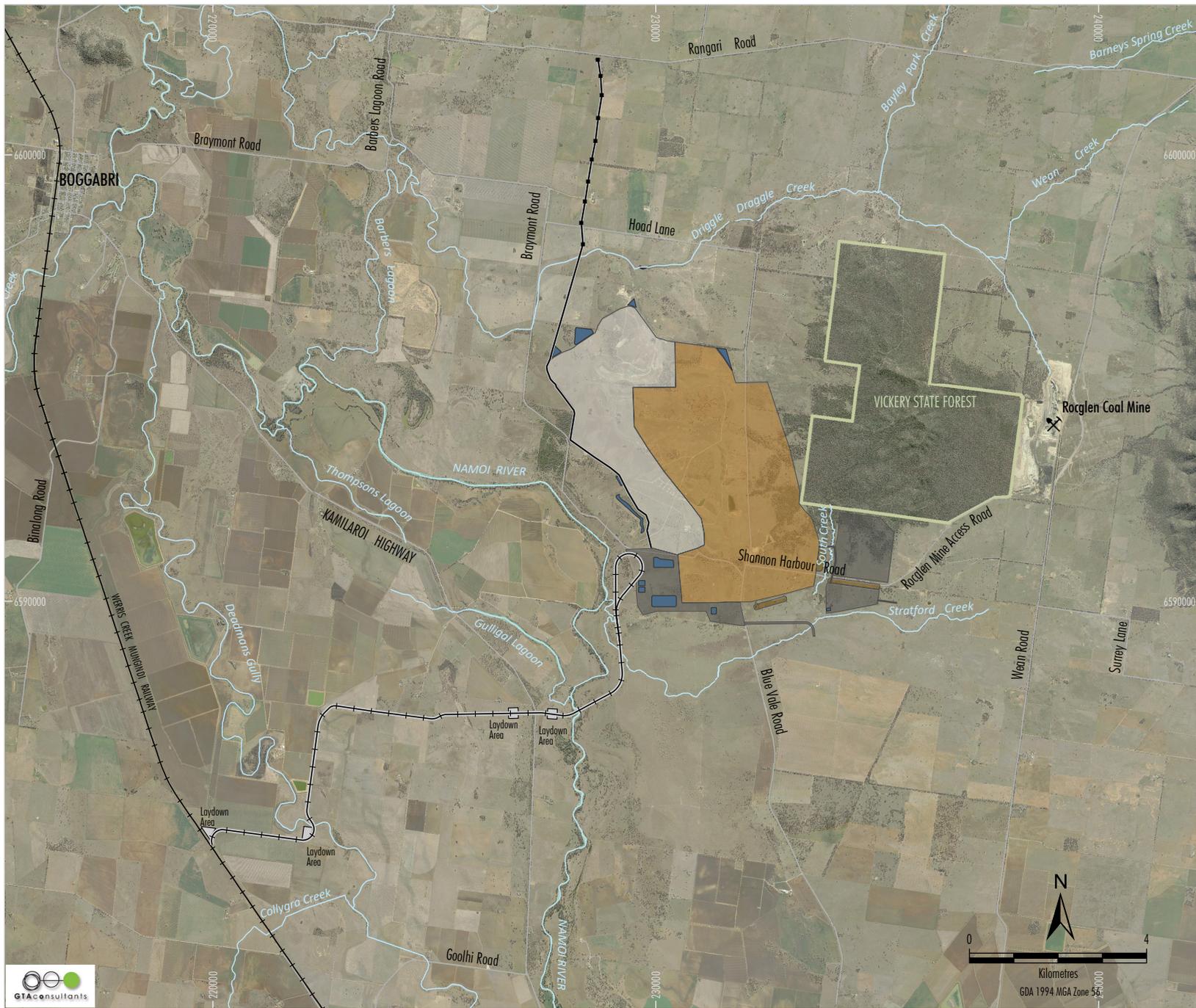
Source: Orthophoto - Department of Land and Property Information, Aerial Photography (July 2011); Department of Industry (2015); Essential Energy (2015)



VICKERY EXTENSION PROJECT
Project General Arrangement -
Project Mining Area

Figure 3-1





- LEGEND**
- State Forest
 - Railway
- Project Components**
- Indicative Extent of Open Cut
 - Indicative Extent of Out of Pit Waste Rock Emplacement
 - Indicative Extent of Infrastructure Area
 - Indicative Extent of Soil Stockpile
 - Indicative Extent of Water Storage
 - Indicative Mine Access Road Alignment
 - Indicative Rail Spur Alignment
 - Indicative Location of Groundwater Bores and Pipeline

Source: Orthophoto - Department of Land and Property Information, Aerial Photography (July 2011); Department of Industry (2015)



VICKERY EXTENSION PROJECT
Indicative Project Rail Spur Alignment

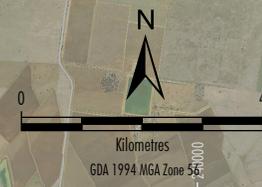


Figure 3-2

3.2.2 Public Road Closures

Extension of the open cut south of the Approved Mine open cut extent requires the closure of approximately 3.5 km of Braymont Road from its intersection with Blue Vale Road, to the north-west of the Project rail loop (Figure 3-1).

There is no privately-owned land along the section of Braymont Road proposed to be closed. A Crown Land parcel located adjacent to the Namoi River that is currently accessed from Braymont Road from both the north and south would continue to be accessible from the north.

The section of Shannon Harbour Road west of its intersection with the Blue Vale Road realignment would be closed. There is no privately-owned land on this section of road and the existing Blue Vale Road would remain accessible via the Blue Vale Road realignment.

3.3 Project Site Access

Access to the mine infrastructure area would be provided by Braymont Road, via Blue Vale Road, prior to construction of the Blue Vale Road realignment (Section 3.2.1), and from the Blue Vale Road realignment south of Shannon Harbour Road thereafter (Figure 3-1).

These access road intersections would be constructed in accordance with the Austroads design requirements for rural road intersections (Austroads, 2017a), and in consultation with the relevant council.

There would also be continued use of ancillary site accesses from Blue Vale Road, Shannon Harbour Road and Braymont Road for environmental monitoring, general land management, exploration activities, construction and other ancillary activities.

3.4 Project Rail Spur and Rail Loop

The Project would include construction of a Project rail spur and rail loop connecting to the Werris Creek Mungindi Railway (Figure 3-2).

The Project rail spur would include the construction of a rail-over-road crossing at Kamilaroi Highway, approximately 15 km south-east of Boggabri.

It is anticipated that construction of the Project rail spur and rail loop would take approximately 12 months, with bulk earthworks expected to be completed within the first six months of the Project.

The design and construction of the Project rail spur and rail loop would be undertaken in accordance with relevant engineering standards. The rail-over-road crossing would be constructed in accordance with Australian Rail Track Corporation (ARTC) requirements, and traffic controls during construction and operations would be provided in accordance with Australian Standards (AS) (AS 1742.7, 2016) in consultation with RMS, the Narrabri Shire Council, Gunnedah Shire Council and the ARTC. Initial consultation with RMS indicates no objections to the proposed location of the rail over road crossing, subject to detailed design to minimise impacts on sight lines, and consideration of any impact on existing property accesses.

3.5 Blasting

Drill and blast techniques would be used for the removal of overburden and interburden material for the open cut.

As the open cut mining operations advance towards Braymont Road, Blue Vale Road, the Blue Vale Road realignment and Hoad Lane, sections of these roads would be temporarily closed for short intervals during blast events within 500 m of the public roads.

3.6 Product Transport

3.6.1 Continued Transport to the Whitehaven CHPP

Until the Project CHPP, train load-out facility and rail spur are operating at full capacity, road transport of ROM coal from the Project and other relevant Whitehaven mines to the Whitehaven CHPP (5 km north-west of Gunnedah) would be consistent with the existing road transport related approval conditions for these mining operations.

Once the Project CHPP, train load-out facility and rail spur are operating at full capacity, ROM coal from the Project would be processed at the Project CHPP. ROM coal from other Whitehaven mines may also be processed at the Project CHPP.

Transport of coal reject material from the Whitehaven CHPP to the Project via the Approved Road Transport Route may occur consistent with the Approved Mine.

3.6.2 Product Coal Transport

Once the Project CHPP, train load-out facility and rail spur are operating at full capacity, product coal would be loaded onto trains for transportation to market via the Project rail spur, and the Werris Creek Mungindi Railway.

An average of up to 10 train movements per day would be required (i.e. five arrivals and five departures), with a maximum of 16 train movements per day (i.e. eight arrivals and eight departures).

Project train arrivals and departures would occur 24 hours per day.

From the Werris Creek Mungindi Railway, product coal would typically be transported on the Main Northern Railway to the Port of Newcastle for export.

3.7 Road Transport Assessment Scenarios

Three future scenarios have been identified for assessment of future traffic conditions with the Project:

- Year 1 (nominally 2019) – would include Project construction activities only.
- Year 2 (nominally 2020) – would include mining at a rate of approximately 1 Mtpa of ROM coal and haulage thereof via the Approved Road Transport Route to the Whitehaven CHPP.
- Year 12 (nominally 2030) – would include mining and processing at the Project CHPP at a rate of approximately 10 Mtpa of ROM coal and product coal transported from the site by rail. This scenario would, therefore, consider the maximum case operational activities.

These assessment scenarios are discussed in more detail below.

3.7.1 Year 1 Assessment Scenario

The major Project construction period is anticipated to be in Year 1 of the Project. Construction activities during Year 1 of the Project would be focused on development of the following key Project infrastructure components:

- the mine infrastructure area (incorporating the Project CHPP) and mine access road;
- the Project rail spur and rail loop;
- water management infrastructure; and
- water and electricity supply and distribution infrastructure.

Construction activity is expected to generate a peak workforce of 500 personnel, and would generally be restricted to daylight hours up to seven days a week.

Unrelated to the Project, ROM coal from the other Whitehaven mines and coal reject material from the Whitehaven CHPP would continue to be transported along the Approved Road Transport Route during Year 1.

3.7.2 Year 2 Assessment Scenario

Some mining activity is expected to occur during Year 2 of the Project resulting in the production of approximately 1 million tonnes (Mt) of ROM coal. This mining activity is expected to employ an additional 80 full-time on-site personnel, and would occur 24 hours per day, seven days per week.

As described above, the Project CHPP, rail spur and loop are proposed to be constructed in Project Year 1 and, therefore, ROM coal would be transported from site to market by rail in Year 2. However, this assessment conservatively assumes that the Project CHPP, train load-out facility and rail spur do not reach full operational capacity by Year 2, and that ROM coal would be transported by road from the Project to the Whitehaven CHPP. Unrelated to the Project, additional ROM coal from the other Whitehaven mines and coal reject material from the Whitehaven CHPP has also been assumed to continue to be transported along the Approved Road Transport Route during Year 2.

Road transport would be conducted in accordance with the relevant road transport conditions within those operations' approvals. Those conditions specify the transport route, operational hours and annual tonnage restrictions.

3.7.3 Year 12 Assessment Scenario

At full capacity, the Project would extract up to approximately 10 Mtpa of ROM coal, which would be processed on-site, and transported to market by rail. ROM coal may also be transported by road from other Whitehaven mines (nominally the Tarrawonga Coal Mine) to the Project for processing at the Project CHPP, and then be transported to market by rail from the Project. The cumulative transport of product coal from the Project is expected to be up to approximately 11.5 Mtpa.

Operational activity is expected to employ up to 450 full-time on-site personnel, and would occur 24 hours per day, seven days per week. Road transport of ROM coal from other Whitehaven mines would be conducted in accordance with the relevant road transport conditions within those operations' approvals, including any conditions specifying the transport route, operational hours and annual tonnage restrictions.

The maximum ROM coal mining rate (i.e. up to approximately 10 Mtpa) has been conservatively assumed to occur during Year 12, so that the peak Project-related traffic (e.g. employees and deliveries) can be considered in this scenario.

4. Existing Traffic Conditions

4.1 Road Network

The existing road network in the vicinity of the Project is described below and presented on Figure 1-1.

Kamilaroi Highway (Route B51) is a State Road which runs generally north-south to the west of the Project mining area, and provides a link between the Upper Hunter Region and the north-west of NSW, providing access to regional centres such as Gunnedah, Boggabri, Narrabri and Bourke. In the vicinity of the Project, the Kamilaroi Highway has a single travel lane in each direction, with auxiliary turn lanes at some intersections, and a posted speed limit of 100 kilometres per hour (km/h). At its intersection with Rangari Road, a separate right turn lane and a left turn deceleration lane are provided on the Kamilaroi Highway to allow through traffic to pass vehicles slowing to turn into Rangari Road. The intersections with Blue Vale Road and the Whitehaven CHPP access road have separate deceleration and acceleration lanes to accommodate the slower moving coal trucks on the Approved Road Transport Route with minimum disruption to through traffic.

Rangari Road (Main Road 357) is a Regional Road which runs approximately east-west to the north of the Approved Mine, and links between Kamilaroi Highway to the west and Manilla to the east. Rangari Road typically has a single travel lane in each direction, and a posted speed limit of 80 km/h. Rangari Road crosses the Namoi River about 1.6 km to the east of its intersection with the Kamilaroi Highway. At this bridge, known as "Iron Bridge", Rangari Road is narrowed to a single lane and eastbound traffic is required to give way to westbound traffic. It is understood that plans are underway to replace the Iron Bridge. This is likely to result in a bridge of sufficient width to carry two-way traffic, with a higher load limit than the current 42.5 tonne (t) limit. Rangari Road is also known as Boggabri Manilla Road and Manilla Road. Rangari Road has a sealed surface between the Kamilaroi Highway and the Approved Road Transport Route, with an unsealed surface east of the Approved Road Transport Route.

Hoad Lane provides a local road connection northwards from Blue Vale Road at Braymont Road to north-east of the former Canyon Coal Mine, then an east-west connection from there to the intersection with Braymont Road to the north-west of the Canyon Coal Mine. A private road access to the Canyon Coal Mine intersects with Hoad Lane at a T-intersection. South of the Canyon Coal Mine Access Road, Hoad Lane has a sealed surface, with a single travel lane in each direction, and centre road markings along most of its length. A right-turn deceleration lane is provided in Hoad Lane for northbound vehicles turning right into Shannon Harbour Road, and a southbound acceleration lane is provided in Hoad Lane for vehicles turning left from Shannon Harbour Road. To the north of the Canyon Coal Mine Access Road, and to the east of Braymont Road, Hoad Lane has an unsealed surface.

Blue Vale Road is a local road that provides a north-south connection from the Kamilaroi Highway to the north-west of Gunnedah to the intersection of Hoad Lane and Braymont Road. At this intersection, Hoad Lane and Blue Vale Road form the main road, with Braymont Road being the minor road. Braymont Road and Shannon Harbour Road form staggered T-intersections along the Hoad Lane/Shannon Harbour Road route. Blue Vale Road has a sealed surface with a single travel lane in each direction and centre line marking along much of its length.

Braymont Road provides a local road link from the township of Boggabri east and south-east to meet with Blue Vale Road some 20 km north of Gunnedah. Braymont Road crosses the Namoi River via a bridge to the east of Boggabri. To the west of the river, Braymont Road has a sealed surface with a single travel lane in each direction, and to the east of the river, it has an unsealed surface, and follows a straight east-west alignment for about 6 km, before a 90 degree bend where it intersects with Barbers Lagoon Road at a three-way intersection.

Barbers Lagoon Road is a local road that extends in a north-south direction between Braymont Road in the south and Rangari Road in the north. The northernmost 700 m of Barbers Lagoon Road has a sealed surface, with a single travel lane in each direction and a marked centre line on its approach to Rangari Road. The remaining length of Barbers Lagoon Road has an unsealed surface and follows a reasonably straight north-south alignment, with the exception of a dog-leg about 1.2 km north of Braymont Road.

Shannon Harbour Road is a local road and extends in an east-west direction, to the east of Hoad Lane. The eastern section of Shannon Harbour road is unformed and is not accessible to the public. The western section of Shannon Harbour Road is formed, and provides access to the Rocglen Coal Mine Access Road from Blue Vale Road. The Rocglen Coal Mine Access Road (which is commonly referred to as Shannon Harbour Road) provides a link from Shannon Harbour Road to Wean Road (via Riordan Road).

The **Approved Road Transport Route** consists of (Figure 1-1):

- Whitehaven Private Haul Road north-south between the Tarrowonga Coal Mine and Rangari Road;
- Rangari Road;
- Whitehaven Private Haul Road south of Rangari Road, which crosses Hoad Lane and passes through the former Canyon Coal Mine and east-west past the Project mining area to Hoad Lane;
- Hoad Lane between the Whitehaven Private Haul Road and Blue Vale Road;
- Shannon Harbour Road between the Rocglen Coal Mine Access Road and Hoad Lane;
- Blue Vale Road between Hoad Lane and Kamilaroi Highway;
- the Kamilaroi Highway between Blue Vale Road and Whitehaven CHPP access road;
- and
- the Whitehaven CHPP access road.

Road haulage of ROM coal from the Project would use only the southern portion of the Approved Road Transport Route from Blue Vale Road. If constructed, the approved private haul road and Kamilaroi Highway overpass will form the Approved Road Transport Route in place of the southern section of Blue Vale Road and the Kamilaroi Highway (Figure 1-1).

4.2 Traffic Surveys

Traffic survey data has been collated on roads around the Project. The majority of the available data was from surveys conducted over one week during November-December 2010, with some exceptions, namely two locations surveyed during February 2011, and three during October-November 2011. Some additional surveys were conducted in 2015 and 2016.

The traffic surveys provided data on the composition of the traffic based on standard vehicle classifications. Light vehicles include motorcycles, cars, vans, four-wheel drives, and utilities (including those towing a trailer or caravan). Heavy vehicles include single unit trucks and buses, and articulated vehicles such as semi-trailers, rigid trucks with trailers, B-Doubles and road trains.

The average weekday traffic volume results of the traffic surveys are summarised in Table 4.1, noting that the time of the hour with the highest traffic volume varied from location to location. The selected hours of between 6.00 am and 7.00 am, and between 6.00 pm and 7.00 pm represent the hours during which mining activity associated with the Project and the other mining projects in the region are expected to generate their highest traffic volumes.

At some locations, data availability was limited such that some results in Table 4.1 are based on the average of less than one week of data. Surveys undertaken in 2016 overlapped with the week of AgQuip, a rural industry showcase event which attracts significant numbers of visitors and exhibitors and increases traffic in the local region. The 2016 results presented in Table 4.1 are for days close to, but not including, AgQuip and are considered conservatively high relative to average conditions, as assessment of the data suggests that the hourly volumes were moderately impacted by AgQuip, and daily traffic volumes were significantly impacted by AgQuip.

The survey results indicate that the volumes of traffic carried on the roads are generally consistent with the function each road is expected to fulfil within the local region. The Kamilaroi Highway is the major road transport route in the region, reflecting its designation of State Road and the inter-regional function it fulfils, and carries the highest volumes of traffic. Rangari Road provides an east-west intra-regional access function, linking towns on the Kamilaroi Highway such as Narrabri and Boggabri to the Fossickers Way (B95) at Manilla. Rangari Road is also a key access route for several major mining developments in the region. A significant proportion of traffic on Blue Vale Road relates to its designation as part of the Approved Road Transport Route. The surveyed traffic volumes on the local roads are typically low.

Table 4.1: Surveyed Average Weekday Traffic Volumes

Site ^A	Location	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
Surveyed During 2010 and 2011							
A	Barbers Lagoon Road South of Rangari Road	1	0	3	0	46	5
B	Blue Vale Road North-east of Kamilaroi Highway	30	27	40	32	912	603
C	Blue Vale Road South of Shannon Harbour Road	33	25	4	25	196	456
D	Braymont Road East of Boggabri	1	0	5	0	82	16
E	Braymont Road West of Blue Vale Road	13	21	8	4	156	118
F	Hoad Lane West of Approved Road Transport Route	5	0	6	1	42	7
G	Kamilaroi Highway South-east of Blue Vale Road	83	28	120	52	2,223	1,065
H	Kamilaroi Highway North-west of Blue Vale Road	64	46	50	70	1,122	1,366
I	Kamilaroi Highway South of Rangari Road	80	15	95	18	1,613	416
J	Rangari Road East of Kamilaroi Highway	27	3	19	2	330	38
K	Rangari Road East of Approved Road Transport Route	7	0	7	0	62	6
L	Rangari Road West of Approved Road Transport Route	51	29	14	20	293	343
M	Shannon Harbour Road East of Hoad Lane	7	6	7	8	83	134
N	Approved Road Transport Route South of Dripping Rock Road	23	14	9	16	143	325
O	Wean Road South of Rangari Road	3	1	2	1	33	16
Surveyed During 2015							
A	Barbers Lagoon Road South of Rangari Road	4	0	4	1	45	21
P	Kamilaroi Highway North of Rangari Road	69	30	75	31	1,517	683
I	Kamilaroi Highway South of Rangari Road	153	33	115	28	2,129	666
J	Rangari Road East of Kamilaroi Highway	102	10	61	3	808	149
Q	Rangari Road East of Barbers Lagoon Road	34	9	21	5	279	106
R	Rangari Road East of Therribri Road	62	6	43	4	534	135
Surveyed During 2016 (Non-AgQuip Period)							
B	Blue Vale Road North-east of Kamilaroi Highway	32	11	59	32	1,152	589
G	Kamilaroi Highway South-east of Blue Vale Road	138	31	146	56	2,997	1,188

^A Refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

4.3 Road Safety

Validated crash data was obtained from the RMS for the most recent five year period available, being from 1 January 2011 to 31 December 2015. The data is based on crashes reported to the NSW Police Service, and included the area approximately bounded by the Werris Creek Mungindi Railway to the west, north to Baan Baa, east to Wean Road and south to the boundary of Gunnedah township. There were 85 reported crashes in the study area, which included two fatal crashes, 50 injury crashes, and 33 non-injury tow-away crashes.

Of the 85 crashes reported in the study region, 43 occurred on Kamilaroi Highway. The data shows that over the five year period, four crashes occurred along the Approved Road Transport Route, of which three occurred on the Kamilaroi Highway. The crashes on the Approved Road Transport Route are summarised in Table 4.2.

Table 4.2: Crash History of the Approved Road Transport Route (1 January 2011 to 31 December 2015)

Location	Time Date	Description	Conditions	Factors
Kamilaroi Highway 2 m south of Blue Vale Road	1.00 pm 20/5/2011	Northbound semitrailer travelling at 100 km/h struck an object falling from a southbound B-Double	Fine weather, dry road	None
Blue Vale Road 11 km north of Kamilaroi Highway	6.00 pm 8/6/2011	Southbound utility travelling at 100 km/h struck a kangaroo	Fine weather, dry road	None
Kamilaroi Highway 30 m south of Blue Vale Road	7.40 am 16/7/2012	Southbound semitrailer travelling at 55 km/h lost control on a bend	Fog or mist, wet road surface	Speed
Kamilaroi Highway 5 km north of Warrabungle Street ^A	8.30 am 4/9/2013	Northbound large rigid truck struck an object falling from a northbound "other" motor vehicle ^B	Fine weather, dry road	None

^A near intersection of Kamilaroi Highway with Whitehaven CHPP access road

^B "other" includes motor vehicles not otherwise specified by the classification system, and includes taxis

The crashes that have occurred on the Approved Road Transport Route do not highlight any particular causation factors on the route or at its intersections with public roads. Further, Whitehaven has indicated only one crash was related to coal haulage activities.

Rangari Road is a key access road for the various mines in the region and for the Project, and the crash history along this route (between the Kamilaroi Highway and Wean Road) indicates:

- 13 crashes occurred over the five-year period;
- four of the crashes involved a vehicle striking an animal or other object on the roadway;
- nine of the crashes involved loss of control of a single vehicle, which subsequently left the carriageway (inappropriate speed was nominated as a contributing factor in four of these crashes and fatigue was nominated as a contributing factor in three); and
- the crashes were spread along the route with no clustering of crashes at any particular location.

The crashes that have occurred on the Approved Road Transport Route and Rangari Road do not highlight any particular causation factors on these routes.

4.4 Railway Level Crossings

The rail network in the region is currently owned by the ARTC. The Project lies some 13 km to the east of the Werris Creek Mungindi Railway, which joins the Main Northern Railway approximately 85 km to the south-east, at Werris Creek. The Main Northern Railway links to Muswellbrook and Newcastle. The Werris Creek Mungindi Railway, which is also known as the Main North-West Line, passes through Gunnedah, Boggabri and Narrabri, extending north through Moree to the NSW border at Mungindi; however, passenger services run only to Moree and freight services are truncated at Camurra, north-east of Moree.

The ARTC releases annual strategies for its Hunter Valley infrastructure, which set out how it intends to ensure sufficient rail corridor capacity is provided to meet coal transport demand. The *2016-2025 Hunter Valley Corridor Capacity Strategy* (ARTC, 2016) and the *2017 Hunter Valley Corridor Capacity Strategy – Consultation Draft* (ARTC, 2017) identify the future constraints on the coal network's capacity, the options to resolve these constraints and a proposed course of action to achieve increased coal throughput.

The 2016 strategy identifies three major new mines proposed for the Werris Creek Mungindi Railway (Muswellbrook to the junction for the Narrabri Mine), these being Vickery South (now owned by Whitehaven), Caroon Coal Project and Watermark Coal Mine. Vickery South is assumed to load in the vicinity of Gunnedah, and Watermark is assumed to load north of Breeza. Immediately prior to the release of the 2016 Strategy, the mining licence for the Caroon Coal Project was sold back to the NSW Government and, therefore, that mine will not be proceeding. This is reflected in the consultation draft of the 2017 strategy.

The Maules Creek Coal Mine and Boggabri Coal Mine each load from balloon loops off the new branch, which connects to the Main North-West Line north of Boggabri.

The ARTC Master Train Plan (MTP) is a complete listing of all contracted path schedules and associated information for the ARTC network. The MTP for the track between Moree and Muswellbrook (effective 6 March 2016) includes contracted paths on the Werris Creek Mungindi Railway for 311 train movements per week at the Whitehaven CHPP junction (referred to as the Gunnedah Colliery Junction in the MTP) and 297 train movements per week at Boggabri. This is equivalent to an average of fewer than two train movements per hour, noting that the scheduled paths are reasonably evenly spread throughout the day and night. The actual number of trains operating each day depends on the demands for coal and freight transport, with trains operating to match the demand.

The Werris Creek Mungindi Railway is a single track with passing loops, the majority of which are between 1,330 m and 1,450 m long, and a small number of short loops. Several of the short loops present specific challenges which make extension difficult. To date, the primary mechanism for volume growth has been the lengthening of passing loops. Only two loops remain for potential extension, these being at Aberdeen and Murrurundi. The potential for additional mid-section loops is constrained due to grades and level crossings; however, they remain the preferred solution to accommodate volume growth. Potential new loops, loop extensions and passing lanes proposed on the basis of addressing the capacity constraints include Aberdeen loop extension; South Gunnedah loop; Togar North Loop; Parkville South loop; Wingen loop; Blandford loop; Pages River North extension; Braefield north extension; Kankool–Ardglen; Bells Gate south extension; the 407 km loop (Werris Creek South) and the 414 km loop (Werris Creek North).

The Werris Creek Mungindi Railway is crossed by roads at a number of level crossings. Signage and road marking requirements associated with railway level crossings are set out in the *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings* (AS 1742.7, 2016). This Australian Standard does not provide guidance on when a crossing should progress from one treatment to another, as such guidance is found in risk assessment models such as the Australian Level Crossing Assessment Model.

The ARTC identifies a number of risk factors associated with the level crossings, including:

- conformance risk (i.e. whether the signage and road marking requirements associated with railway level crossings comply with AS 1742.7 [2016]);
- queuing risk (i.e. whether vehicles can queue back across the crossing from an adjacent road intersection);
- short stacking risk (i.e. whether the distance between the crossing and adjacent road intersection is long enough to accommodate the largest stationary gazetted vehicles without the rear of the vehicle fouling the track); and
- proximity to siding/shunting yard - a guide as to whether an adjacent siding, signal, etc. can cause trains to block the crossing or shunt across the crossing.

Information regarding each of the public level crossings between Narrabri and Gunnedah has been collated from the Transport for NSW Public Level Crossing Finder and information provided to GTA Consultants by the ARTC's Third Party Works Manager (by email, 15 March 2016), and is tabulated in Table 4.3. Where a risk and number is shown in Table 4.3, then that identified risk may be an issue. The risk factor numbers 0 to 5 represent an increasing risk level for each of these categories as identified by the ARTC.

Table 4.3 also notes information about the level crossings as provided by the ARTC, such as its use by school buses, and those crossings where the road surface is unsealed.

As noted in Table 4.3, the existing level crossing at New Street in Gunnedah is planned to be replaced with a road over rail bridge. This has been the subject of a Review of Environment Factors, including a traffic and transport impact assessment which reviewed the traffic conditions in Gunnedah for a scenario 10 years after opening of the bridge, nominally 2026.

As the railway remains on the western side of Kamilaroi Highway between Gunnedah and Narrabri, aside from locations within towns such as Gunnedah and Boggabri, the railway level crossings are typically on minor local roads, which would be expected to carry low traffic volumes.

Table 4.3: Railway Level Crossings between the Outskirts of Narrabri and Gunnedah

LXM ID ^A	Road Location	Rail Location (km)	Control	Risks	Notes
522	Carroll Street Gunnedah	474.213	Active – lights	Proximity 5	-
523	Marquis Street Gunnedah	475.461	Active – lights and boom gates	Proximity 3 Queuing 5	School bus
524	New Street Gunnedah	476.333	Active – lights	Proximity 5	To be closed when second road over rail bridge opens
526	“Rothsay” Access Emerald Hill	486.424	Passive – stop	-	Unsealed road
527	Gunnedah Road Emerald Hill	493.063	Active – lights and boom gates	Proximity 5	School bus
528	Binnaalong Road Emerald Hill	509.036	Passive – stop	-	School bus Unsealed road
529	Boston Street Boggabri	515.78	Active – lights and boom gates	Proximity 5 Conformance 3	School bus
530	Stock Route Boggabri	516.78	Passive – stop	-	Unsealed road
531	Baranbah Street Baan Baa	530.78	Active – lights and boom gates	Proximity 5	School bus
532	“Longsight” Access Baan Baa	532.472	Passive – stop	-	School bus Unsealed road
1826	Local Road Baan Baa	535.147	Passive – stop	-	-
533	“Pineview” Access Turrawan	537.259	Passive – stop	-	Unsealed road
534	Mayfield Road Turrawan	540.297	Active – lights and boom gates	Proximity 5	Unsealed road
535	Greylands Road Turrawan	544.072	Passive – stop	-	Unsealed road
1900	Public Road Turrawan	546.811	Passive – stop	-	-
536	Turrawan Yard Turrawan	547.57	Passive – stop	Proximity 5 Conformance 3	Unsealed road

A = Level Crossing Management system identification number

Sources: ARTC (pers. comm.) and Transport for NSW Public Level Crossing Finder
<https://apph.transport.nsw.gov.au/mapservices/proxy/levelCrossings/map.html>

The ARTC provided information regarding incidents reported at the level crossings since January 2014, which are briefly described below.

LWM 522 Carroll Street Gunnedah (Active)

- 8.55 am – a vehicle travelled through a level crossing while the crossing was activated for an approaching train (200-300 m).

LXM 523 Marquis Street Gunnedah (Active with boom gates)

- 10.33 am – a train departing Gunnedah Station at 20 km/h had a near miss (20 m) with a pedestrian;
- 9.34 am – a train travelling at 40 km/h had a near miss with cyclist; and
- 8.20 pm – a train travelling at 40 km/h had a near miss (60 m) with a car which crossed as the lights were activated and the booms were lowering.

LXM 524 New Street Gunnedah (Active)

- 1.57 pm – a train travelling at 20 km/h had a near miss (50 m) with a car.

LXM 529 Boston Street Boggabri (Active)

- 12.40 pm – a vehicle drove across the crossing while activated, in front of a train approaching at 48 km/h approximately 150-200 m away.

LXM534 Mayfield Road Turrawan (Active with boom gates)

- 8.33 am – a dump truck ran through the crossing and damaged the boom gate; and
- 7.35 am – a vehicle passed through the gates approximately 50-70 m in front of a train approaching at 15 km/h.

LXM 536 Turrawan Yard (Passive)

- 9.28 am – a train travelling at 110 km/h had a near miss (10 m) with a car.

A review of the incidents suggests that the majority of incidents have occurred during the daytime and at level crossings which are actively controlled with flashing lights, including some with boom gates. They typically relate to a driver (or other road user) attempting to cross the railway tracks contrary to the activation of the lights or booms. These incidents are not expected to be related to any aspect of the design of the level crossings, rather as a result of the impatience of the road users.

4.5 School Buses

School buses operate on several of the roads that are expected to be used by vehicles travelling to and from the Project, primarily along the Kamilaroi Highway and on Blue Vale Road.

Hopes Bus Service runs the Willala Bus Service which starts and ends in Gunnedah and travels to Willala. The morning service operates between 6.10 am and 9.00 am, and the afternoon service operates between 2.55 pm and 5.45 pm.

Two school bus services are operated by GJ & SJ Haire Warragrah Bus Service. The Boggabri Primary School Service starts and ends in Boggabri and operates between 7.20 am and 9.05 am, and between 2.50 pm and 4.45 pm. The Boggabri to Gunnedah High School service operates from Boggabri, starting at 7.40 am and ending in Gunnedah at 8.35 am. In the afternoon, it starts in Gunnedah at 3.15 pm and ends at Boggabri at 4.15 pm.

The Blue Vale School Bus Service operates a school bus service along Blue Vale Road.

The MW & JA Roy Bus Service operates the Wallah Road Bus Service, which starts at Narrabri and operates to Harparary Road, Maules Creek Road, Browns Lane, Old Gunnedah Road and then returns to Narrabri. It also operates the Davis Nursery to Narrabri School Bus Service, which starts at Narrabri, and operates along Leards Forest Road, Black Mountain Creek Road, Old Gunnedah Road and returns to Narrabri.

Some of the school bus routes vary times, routes and services in response to the changing needs of the student population.

4.6 Public Transport and Alternative Transport Modes

There are no public transport services to or from the Project or its surrounds.

As the Project is located wholly outside of the Narrabri, Gunnedah and Boggabri walking (2 km) and cycling (5 km) catchments as outlined in the *New England North West Regional Transport Plan* (Transport for NSW, 2013a), the Project is not expected to have any significant impacts on alternative transport modes.

5. Baseline Future Traffic Conditions

This section describes the expected changes to traffic conditions in the region during Year 1 (nominally 2019), Year 2 (nominally 2020) and Year 12 (nominally 2030) of the Project with approved and planned developments and growth in traffic compared with the surveyed traffic conditions. These are the conditions which are expected to occur without the Project, and thus their cumulative impacts form the baseline conditions against which the Project can be assessed. As the traffic survey data for 2010-2011 is extensive and mining operational characteristics in the region for that period are known, changes since those traffic surveys were conducted are identified. The 2010-2011 survey results have, therefore, been used as the basis of the development of baseline future conditions.

5.1 The Approved Mine

The Road Transport Assessment undertaken for the Approved Mine (GTA Consultants, 2012) identified the volumes and distributions of traffic expected to be generated by the Approved Mine during different phases of its mine life. Based on the findings of the GTA Consultants (2012) assessment and operating conditions assuming the Approved Mine proceeds in the absence of the Project, the expected traffic conditions in 2019, 2020 and 2030 without the Project have been estimated, and are summarised below. For ease of comparison, this assumes that the approved private haul road and Kamilaroi Highway overpass are not commissioned.

It is noted that GTA Consultants (2012) assumed that coal haulage from the Approved Mine to the Whitehaven CHPP via the Approved Road Transport Route would occur 24 hours per day, seven days per week, and that 4.5 Mtpa of ROM coal would be transported. Development Consent (SSD-5000) for the Approved Mine limits the amount of coal permitted to be transported prior to commissioning of the highway overpass and the hours during which road haulage is permitted, thus the average weekday and peak hourly trips generated by coal haulage have been adjusted accordingly in the following assessment of likely conditions with the Approved Mine operating.

At the time of the traffic surveys, the Approved Mine was not in operation. All Approved Mine traffic in 2019, 2020 and 2030 would, therefore, occur in addition to the surveyed traffic.

5.1.1 Approved Mine – 2019 Traffic

Key aspects of the Approved Mine relevant to the road transport implications during 2019 are (GTA Consultants, 2012):

- construction workforce of 60 personnel, generating 120 light vehicle trips per day;
- construction visitors generating 20 light vehicle trips per day;
- construction deliveries generating 10 heavy vehicle trips per day;
- operational workforce of 80 personnel, generating 134 light vehicle trips per day;
- operational visitors generating 58 light vehicle trips per day; and
- operational deliveries generating 10 heavy vehicle trips per day.

Table 5.1 summarises the average weekday peak hourly and daily traffic generation of the Approved Mine during 2019. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm.

Table 5.1: Approved Mine Indicative Total Traffic – 2019

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Construction Activity						
Workforce	60	0	60	0	120	0
Visitors and Deliveries	0	0	0	0	20	10
Operational Activity						
Workforce	40	0	40	0	134	0
Visitors and Deliveries	5	1	0	0	58	10
ROM Coal Haulage	0	0	0	0	0	0
Domestic Coal Haulage ^C	0	0	0	0	0	0
Gravel Haulage ^C	0	0	0	0	0	0
Total	105	1	100	0	332	20
Total All Vehicles	106		100		352	

^A vehicles per hour

^B vehicles per day

^C not operated by Whitehaven

The Approved Mine construction facilities area will be located on the southern side of Shannon Harbour Road, between Blue Vale Road and the Rocglen Coal Mine Access Road. Vehicles travelling to and from the construction facilities area in 2019 are assumed to use the following routes (GTA Consultants, 2012, modified for trips to/from Boggabri):

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road, Shannon Harbour Road;
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Shannon Harbour Road;
- to/from Narrabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Shannon Harbour Road; and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road.

During 2019, vehicular access to the operational component of the Approved Mine will be via an access road from Braymont Road from the east. Vehicles travelling to the operational area in 2019 (with the exception of those heavy vehicles constrained to the Approved Road Transport Route) are assumed to use the following routes (GTA Consultants, 2012, modified for trips to/from Boggabri):

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road, Braymont Road (from the east);
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Braymont Road (from the east);
- to/from Narrabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Braymont Road (from the east); and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road, Hoad Lane, Braymont Road (from the east).

Table 5.2 summarises the peak hourly and daily traffic distribution which is expected to be generated by the Approved Mine during 2019.

Table 5.2: Distribution of Approved Indicative Mine Traffic – 2019

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road Kamilaroi Highway to Shannon Harbour Road	59	1	55	0	202	18
Approved Road Transport Route Rangari Road to Hoad Lane	36	0	36	0	106	2
Approved Road Transport Route Hoad Lane to Hoad Lane	36	0	36	0	106	2
Kamilaroi Highway Blue Vale Road to Gunnedah	59	1	55	0	202	18
Kamilaroi Highway Rangari Road to Narrabri	13	0	14	0	42	0
Kamilaroi Highway Boggabri to Rangari Road	23	0	22	0	64	2
Rangari Road Kamilaroi Highway to Approved Road Transport Route	36	0	36	0	106	2
Rangari Road Approved Road Transport Route Section	36	0	36	0	106	2
Shannon Harbour Road Blue Vale Road to Approved Mine Access	45	0	44	0	112	10
Shannon Harbour Road Approved Mine Access to Wean Road	10	0	9	0	24	0
Approved Mine Operational Access Road off Braymont Road	45	1	40	0	192	10
Approved Mine Construction Access Road off Shannon Harbour Road	60	0	60	0	140	10
Wean Road Shannon Harbour Road to Manilla	10	0	9	0	24	0

^A vehicles per hour

^B vehicles per day

5.1.2 Approved Mine – 2020 Traffic

Key aspects of the Approved Mine relevant to the road transport implications during 2020 are (GTA Consultants, 2012):

- operational workforce of 124 personnel, generating 206 light vehicle trips per day;
- operational visitors, generating 90 light vehicle trips per day;
- operational deliveries, generating 16 heavy vehicle trips per day; and
- ROM coal haulage of 1.45 Mtpa by road to Whitehaven CHPP, generating 254 heavy vehicle trips per weekday (assuming the Kamilaroi Highway overpass is not commissioned).

While it is estimated that approximately 1.45 Mt of ROM coal would be hauled from the Approved Mine to the Whitehaven CHPP via the Approved Road Transport Route during Year 2, for the purposes of this study, a conservative “maximum case” scenario has been assessed, in which ROM coal is transported from the Approved Mine along the Approved Road Transport Route at the maximum rate permitted in the Approved Mine’s Development Consent. This assessment, therefore, assumes that 3.5 Mt of ROM coal is hauled by road from the Approved Mine to the Whitehaven CHPP during Year 2.

Table 5.3 summarises the average weekday peak hourly and daily traffic generation of the Approved Mine during 2020. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm.

Table 5.3: Approved Mine Indicative Total Traffic – 2020

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce	62	0	62	0	206	0
Visitors and Deliveries	8	1	0	0	90	16
ROM Coal Haulage	0	40	0	40	0	612
Total	70	41	62	40	296	628
Total All Vehicles	111		102		924	

^A vehicles per hour

^B vehicles per day

^C not operated by Whitehaven

During 2020, vehicular access to the Approved Mine will be via the same access road from Braymont Road from the east as used in Year 1. Vehicles travelling to the operational area in 2020 (with the exception of those heavy vehicles constrained to the Approved Road Transport Route) are assumed to use the following routes (GTA Consultants, 2012, modified for trips to/from Boggabri):

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road, Braymont Road (from the east);
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Braymont Road (from the east);
- to/from Narrabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Braymont Road (from the east); and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road, Hoad Lane, Braymont Road (from the east).

Table 5.4 summarises the peak hourly and daily traffic distribution expected to be generated by the Approved Mine during 2020.

Table 5.4: Distribution of Approved Indicative Mine Traffic – 2020

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road Kamilaroi Highway to Shannon Harbour Road	41	41	35	40	186	626
Approved Road Transport Route Rangari Road to Hoad Lane	23	0	23	0	92	2
Approved Road Transport Route Hoad Lane to Hoad Lane	23	0	23	0	92	2
Kamilaroi Highway Blue Vale Road to Gunnedah	41	41	35	40	186	626
Kamilaroi Highway Rangari Road to Narrabri	9	0	8	0	36	0
Kamilaroi Highway Boggabri to Rangari Road	14	0	15	0	56	2
Rangari Road Kamilaroi Highway to Approved Road Transport Route	23	0	23	0	92	2
Rangari Road Approved Road Transport Route Section	23	0	23	0	92	2
Shannon Harbour Road Blue Vale Road to Wean Road	6	0	5	0	18	0
Approved Mine Access Road off Braymont Road	70	41	63	40	296	628
Wean Road Shannon Harbour Road to Manilla	6	0	5	0	18	0

^A vehicles per hour

^B vehicles per day

5.1.3 Approved Mine – 2030 Traffic

Key aspects of the Approved Mine relevant to the road transport implications during 2030 are summarised below (GTA Consultants, 2012):

- operational workforce of 250 personnel, generating 416 light vehicle trips per day;
- operational visitors, generating 178 light vehicle trips per day;
- operational deliveries, generating 32 heavy vehicle trips per day;
- ROM coal haulage of 3.5 Mtpa by road to Whitehaven CHPP, generating 612 heavy vehicle trips per weekday (assuming Kamilaroi Highway overpass is not commissioned and taking into account the time limits on ROM coal haulage);
- domestic coal haulage (by customers) generating 24 heavy vehicle trips per day; and
- domestic gravel haulage (by customers) generating 44 heavy vehicle trips per day.

Table 5.5 summarises the average weekday peak hourly and daily traffic generation of the Approved Mine during 2030. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm.

Table 5.5: Approved Mine Indicative Total Traffic – 2030

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce	125	0	125	0	416	0
Visitors and Deliveries	15	3	0	0	178	32
ROM Coal Haulage	0	40	0	40	0	612
Domestic Coal Haulage ^C	0	0	0	0	0	24
Gravel Haulage ^C	0	0	0	0	0	44
Total	140	43	125	40	594	712
Total All Vehicles	183		165		1,306	

^A vehicles per hour

^B vehicles per day

^C not operated by Whitehaven

During 2030, operational traffic will access the mine infrastructure area via a new access road (mine infrastructure area Access Road) at the intersection connecting the Shannon Harbour Road with the Blue Vale Road realignment. ROM coal haulage trucks will have dedicated access to the mine infrastructure area via the ROM Coal Haulage Truck Access Road off the Blue Vale Road realignment, to the south of Shannon Harbour Road. Approved Mine vehicles (excluding ROM coal haulage vehicles) travelling to the mine infrastructure area during 2030 are assumed to use the following routes (GTA Consultants, 2012, modified for trips to/from Boggabri):

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road, Blue Vale Road realignment, mine infrastructure area Access Road;
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Blue Vale Road realignment, mine infrastructure area Access Road;
- to/from Narrabri – Rangari Road, Approved Road Transport Route, Blue Vale Road realignment, mine infrastructure area Access Road; and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road, mine infrastructure area Access Road.

ROM coal haulage vehicles will use the mine infrastructure area Access Road, Blue Vale Road realignment, Blue Vale Road and Kamilaroi Highway to access the Whitehaven CHPP prior to construction of the approved private haul road and Kamilaroi Highway overpass. Following commissioning of the Kamilaroi Highway overpass, the ROM coal haulage vehicles will use the Kamilaroi Highway overpass rather than the Kamilaroi Highway and the portion of Blue Vale Road between Kamilaroi Highway and the Whitehaven Private Haul Road. For the purpose of this assessment, it has been assumed that with the Approved Mine in 2030, the Kamilaroi Highway overpass is not constructed, as this scenario will result in higher impacts from the Approved Mine on Kamilaroi Highway and the portion of Blue Vale Road that forms part of the Approved Road Transport Route.

Table 5.6 summarises the resulting peak hourly and daily traffic volumes expected to be generated by the Approved Mine as approved during 2030.

Table 5.6: Distribution of Approved Indicative Mine Traffic – 2030

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road realignment and Kamilaroi Highway to mine infrastructure area Access Road	82	43	70	40	374	648
Blue Vale Road realignment Shannon Harbour Road to Hoad Lane	47	0	44	0	182	64
Blue Vale Road realignment mine infrastructure area Access to Shannon Harbour Road	58	0	55	0	220	64
Approved Road Transport Route Rangari Road to Hoad Lane	47	0	44	0	182	64
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP	82	43	70	40	374	648
Kamilaroi Highway Whitehaven CHPP to Gunnedah	82	3	70	0	374	36
Kamilaroi Highway Rangari Road to Narrabri	18	0	17	0	74	64
Mine infrastructure area Access Road off Blue Vale Road realignment	140	43	125	40	594	712
Rangari Road Kamilaroi Highway to Approved Road Transport Route	47	0	44	0	182	64
Rangari Road Approved Road Transport Route Section	47	0	44	0	182	64
Shannon Harbour Road Blue Vale Road realignment to Wean Road	11	0	11	0	38	0
Wean Road Shannon Harbour Road to Manilla	11	0	11	0	38	0

^A vehicles per hour

^B vehicles per day

5.2 Tarrawonga Coal Mine

The Tarrawonga Coal Mine is located approximately 10 km to the north of the Project. It utilises the Approved Road Transport Route past the Project to transport coal and coal reject material between the Tarrawonga Coal Mine and the Whitehaven CHPP.

Until the approved private haul road and Kamilaroi Highway overpass are commissioned, up to 3.0 Mtpa of ROM coal may be transported from the Tarrawonga Coal Mine, including up to 150,000 t for direct distribution to domestic markets via the Approved Road Transport Route to Kamilaroi Highway. Up to 90,000 m³ of gravel is permitted to be extracted and transported from the Tarrawonga Coal Mine to the Kamilaroi Highway using the Approved Road Transport Route.

The road transport implications of the Tarrawonga Coal Mine were assessed by Halcrow (2011), road transport implications of Modification 1 were assessed by GTA Consultants (2014) and those of Modification 3 were assessed by GTA Consultants (2016). These assessments identified the volumes and distributions of traffic expected to be generated by the Tarrawonga Coal Mine.

5.2.1 Tarrawonga Coal Mine Traffic During Traffic Surveys

At the time of the traffic surveys, the volume of traffic generated by the Tarrawonga Coal Mine was determined (Halcrow, 2011) as follows in Table 5.7. It is noted that the estimated volume of trucks hauling ROM coal to the Whitehaven CHPP is based on the average production rate at the time, which was less than the maximum production rate.

Table 5.7: Tarrawonga Coal Mine Total Traffic Generation during Traffic Surveys

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce	43	0	43	0	144	0
Visitors and Deliveries	7	1	0	0	80	14
ROM Coal Haulage	0	18	0	18	0	264
Domestic Coal Haulage ^C	0	0	0	0	0	14
Total	50	19	43	18	224	292
Total All Vehicles	69		61		516	

^A vehicles per hour

^B vehicles per day

^C not operated by Whitehaven

The distribution of the traffic generated by the Tarrawonga Coal Mine during the traffic survey period is summarised in Table 5.8, noting that this simplifies some of the assumptions used in the Halcrow (2011) assessment, namely that all employee traffic travelling to and from Rangari Road would use the Approved Road Transport Route, rather than shared use of both the Approved Road Transport Route and Leards Forest Road-Goonbri Road.

Table 5.8: Distribution of Tarrawonga Coal Mine Traffic during Traffic Surveys

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Barbers Lagoon Road Braymont Road to Rangari Road	3	0	3	0	10	0
Blue Vale Road Kamilaroi Highway to Hoad Lane	29	19	24	18	144	290
Braymont Road Boggabri to Barbers Lagoon Road	3	0	3	0	10	0
Approved Road Transport Route Tarrawonga Coal Mine to Rangari Road	50	19	43	18	224	292
Approved Road Transport Route Rangari Road to Hoad Lane	29	19	24	18	144	290
Kamilaroi Highway Narrabri to Rangari Road	6	0	6	0	28	2
Kamilaroi Highway Boggabri to Rangari Road	8	0	6	0	28	0
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	29	19	24	18	144	290
Kamilaroi Highway Whitehaven CHPP Access to Gunnedah	29	1	24	0	144	26
Rangari Road Kamilaroi Highway to Barbers Lagoon Road	14	0	12	0	56	2
Rangari Road Barbers Lagoon Road to Approved Road Transport Route	17	0	15	0	66	2
Rangari Road on Approved Road Transport Route	33	19	28	18	158	290
Rangari Road Approved Road Transport Route to Manilla	4	0	4	0	14	0

^A vehicles per hour

^B vehicles per day

5.2.2 Tarrawonga Coal Mine – 2019, 2020 and 2030 Traffic

Key aspects of the Tarrawonga Coal Mine relevant to its road transport implications during 2019, 2020 and 2030 are summarised below (Halcrow, 2011):

- operational workforce of approximately 120 personnel, generating 200 light vehicle trips per day;
- operational visitors, generating approximately 86 light vehicle trips per day;
- operational deliveries, generating approximately 16 heavy vehicle trips per day;
- approximately 3.0 Mtpa ROM coal haulage to the Whitehaven CHPP, generating 524 heavy vehicle trips per weekday (assuming highway overpass is not commissioned);
- domestic coal haulage (by customers), generating approximately 24 heavy vehicle trips per day; and
- domestic gravel haulage (by customers), generating approximately 44 heavy vehicle trips per day.

It is noted that this assumes that the haulage of coal by customers to domestic markets occurs at its maximum permitted rate of 150,000 tonnes per annum, and that ROM coal haulage by road to the Whitehaven CHPP also occurs at the maximum permitted rate of 3.0 Mtpa. The combined limit on transport of coal from the site is 3.0 Mtpa, thus the assessment overestimates the number of vehicle trips generated by the transport of coal from the Tarrawonga Coal Mine. It is also noted that the actual rate of ROM coal transport from the Tarrawonga Coal Mine would vary over the Project life subject to operational requirements, market conditions and the requirements of Project Approval 11_0047.

Table 5.9 summarises the expected average weekday peak hourly and daily traffic generation of the approved Tarrawonga Coal Mine during 2019, 2020 and 2030. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm.

Table 5.9: Tarrawonga Coal Mine Indicative Total Traffic – 2019, 2020 and 2030

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce	60	0	60	0	200	0
Visitors and Deliveries	7	1	0	0	86	16
3.0 Mtpa ROM Coal Haulage	0	34	0	34	0	524
Domestic Coal Haulage ^C	0	0	0	0	0	24
Gravel Haulage ^C	0	0	0	0	0	44
Total	67	35	60	34	286	608
Total All Vehicles	102		94		894	

^A vehicles per hour

^B vehicles per day

^C not operated by Whitehaven

The distribution of the traffic expected to be generated by the Tarrawonga Coal Mine during 2019, 2020 and 2030 is summarised in Table 5.10, noting that as above, this simplifies some of the assumptions used in the Halcrow (2011) assessment regarding routes used by employees.

Table 5.10: Distribution of Tarrawonga Coal Mine Indicative Mine Traffic – 2019, 2020 and 2030

Road and Section	6.00am to 7.00am ^A		6.00pm to 7.00pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Barbers Lagoon Road Braymont Road to Rangari Road	4	0	4	0	14	0
Blue Vale Road Kamilaroi Highway to Hoad Lane	38	35	33	34	180	562
Braymont Road Boggabri to Barbers Lagoon Road	4	0	4	0	14	0
Approved Road Transport Route Tarrawonga Coal Mine to Rangari Road	67	35	60	34	286	608
Approved Road Transport Route Rangari Road to Hoad Lane	38	35	33	34	180	562
Kamilaroi Highway Narrabri to Rangari Road	8	0	8	0	34	44
Kamilaroi Highway Boggabri to Rangari Road	11	0	9	0	38	2
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	38	35	33	34	180	562
Kamilaroi Highway Whitehaven CHPP Access to Gunnedah	38	1	33	0	180	38
Rangari Road Kamilaroi Highway to Barbers Lagoon Road	19	0	17	0	72	46
Rangari Road Barbers Lagoon Road to Approved Road Transport Route	23	0	21	0	86	46
Rangari Road on Approved Road Transport Route	44	35	39	34	200	562
Rangari Road Approved Road Transport Route to Manilla	6	0	6	0	20	0

^A vehicles per hour

^B vehicles per day

5.3 Rocglen Coal Mine

The Rocglen Coal Mine is owned and operated by Whitehaven and is located approximately 5 km to the east of the Project. Sized ROM coal from the Rocglen Coal Mine is trucked to the Whitehaven CHPP at up to 1.5 Mtpa via Blue Vale Road for processing (where required) and train loading, and coal reject material from the Whitehaven CHPP is trucked back to the Rocglen Coal Mine for disposal in accordance with Project Approval 10_0015.

Traffic volumes associated with the Rocglen Coal Mine and included in the traffic surveys have been assumed to continue through 2019 and 2020, but would cease by the end of 2022 (i.e. before 2030). The main component of traffic generated by Rocglen Coal Mine is expected to be the haulage of ROM coal from the Rocglen Coal Mine to the Whitehaven CHPP, which occurred at a rate of 0.5 Mtpa at the time of the traffic surveys (i.e. 2010 and 2011).

Coal haulage from the Rocglen Coal Mine occurs on the Approved Road Transport Route within the approved coal haulage hours, for the majority of the year. At the time of the traffic surveys, the Rocglen Coal Mine is estimated to have generated an average of 44 truck departures per weekday to the Whitehaven CHPP, which would be matched by the return of vehicles. ROM coal haulage from the Rocglen Coal Mine to the Whitehaven CHPP, therefore, generated an average of 88 vehicle trips per weekday at the time of the traffic surveys.

During 2019 and 2020, the amount of ROM coal transported from the Rocglen Coal Mine to the Whitehaven CHPP is expected to remain unchanged from that which was occurring during the traffic surveys, and its contribution to traffic on the surrounding roads would remain the same. For the purpose of this study, however, it is assumed that in 2019 and 2020, the production rate at the Rocglen Coal Mine would be at the maximum permitted rate of 1.5 Mtpa. It is noted that the actual rate of ROM coal transport from the Rocglen Coal Mine would vary over the Project life subject to operational requirements, market conditions and the requirements of Project Approval 10_0015.

Operations at the Rocglen Coal Mine would cease prior to 2030 (the nominal year for the Year 12 scenario), so the traffic associated with the Rocglen Coal Mine would be removed from the road network.

Table 5.11 summarises the estimated truck movements associated with the transport of ROM coal from the Rocglen Coal Mine to the Whitehaven CHPP.

Table 5.11: Rocglen Coal Mine ROM Coal Transport Indicative Traffic – 2010, 2019, 2020 and 2030

Road and Section	6.00 am to 7.00 am ^A			6.00 pm to 7.00 pm ^A			Daily ^B		
	2010	2019 2020	2030	2010	2019 2020	2030	2010	2019 2020	2030
Rocglen Coal Mine Access Road	6	18	0	6	18	0	88	264	0
Shannon Harbour Road Rocglen Coal Mine Access Road to Blue Vale Road	6	18	0	6	18	0	88	264	0
Blue Vale Road Shannon Harbour Road to Kamilaroi Highway	6	18	0	6	18	0	88	264	0
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	6	18	0	6	18	0	88	264	0

^A heavy vehicles per hour

^B heavy vehicles per day

Rocglen Coal Mine contributed other light and heavy vehicle movements on the road system at the time of the traffic surveys, as a result of the movement of the workforce, visitors and delivery vehicles. This activity is expected to continue until operational activity ceases. Following cessation of mining activity, it is expected that there would be a period of rehabilitation and decommissioning activities, which would involve continued light and heavy vehicle trips to and from the Rocglen Coal Mine. For the purpose of this assessment, it has been assumed that the volume of traffic generated by the Rocglen Coal Mine during the traffic surveys, excluding ROM coal haulage trips, would continue beyond the operational life of the mine. This assumption will tend to result in an overestimation of future traffic volumes.

5.4 Boggabri Coal Mine

The Boggabri Coal Mine is located to the north of the Project, and was expected to reach its peak production of approximately 7 Mtpa in 2016. It has its vehicular access off Leards Forest Road, and a recent modification to the consent (09_0182) amends the access arrangements to allow access via new intersections with the Kamilaroi Highway north and south of the existing coal haul road overbridge. These intersections are assumed to be used by a significant proportion of the operational traffic associated with the Boggabri Coal Mine.

A traffic impact assessment for the Boggabri Coal Mine Environmental Assessment (Parsons Brinckerhoff, 2010) estimated that at peak production, the workforce at the Boggabri Coal Mine would increase to a total of 500 personnel. The traffic impact assessment for the modification (Constructive Solutions, 2013) estimated that operational activity would generate 26 heavy vehicle trips per day.

5.4.1 Boggabri Coal Mine Traffic During Traffic Surveys

Parsons Brinckerhoff (2010) indicates that the workforce at the Boggabri Coal Mine was approximately 147 personnel at the time of the traffic surveys. Based on the shift information provided in Parsons Brinckerhoff (2010), the busiest hours for the Boggabri Coal Mine would be between 6.00 am and 7.00 am, and between 4.00 pm and 5.00 pm. Adjusting the workforce traffic generation pro rata using the same assumptions as Parsons Brinckerhoff (2010), the traffic generated by the Boggabri Coal Mine in 2010 is estimated in Table 5.12. This conservatively assumes that the heavy vehicle traffic generation was similar to that estimated by Constructive Solutions (2013).

Table 5.12: Boggabri Coal Mine Traffic During Traffic Surveys

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce (147 personnel)	30	0	25	0	220	0
Deliveries	0	2	0	2	0	26
Total	30	2	25	2	220	26
Total All Vehicles	32		27		246	

Based on Parsons Brinckerhoff (2010) and Constructive Solutions (2013)

^A vehicles per hour

^B vehicles per day

At the time of the traffic surveys, vehicular access to the Boggabri Coal Mine was via Leards Forest Road. Table 5.13 summarises the estimated two-way hourly and daily traffic volumes which were generated by the Boggabri Coal Mine at the time of the traffic surveys during the peak hours associated with the Project.

Table 5.13: Distribution of Boggabri Coal Mine Traffic During Traffic Surveys

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Goonbri Road East of Leards Forest Road	3	0	2	0	22	0
Kamilaroi Highway Rangari Road to Narrabri	6	2	5	0	44	6
Kamilaroi Highway Rangari Road to Boggabri	15	0	13	2	110	14
Leards Forest Road Boggabri Coal Mine to Goonbri Road	30	2	25	2	220	26
Leards Forest Road Goonbri Road to Rangari Road	27	2	23	2	198	26
Rangari Road Kamilaroi Highway to Leards Forest Road	21	2	18	2	154	20
Rangari Road East of Leards Forest Road	6	0	5	0	44	6

^A vehicles per hour

^B vehicles per day

5.4.2 Boggabri Coal Mine Traffic – 2019, 2020 and 2030

For the purpose of this assessment, it is assumed that in 2019, 2020 and 2030, the left in/left out intersections on the Kamilaroi Highway are used by the Boggabri Coal Mine operational traffic, which approaches from the north and south on Kamilaroi Highway, while the Leards Forest Road access would continue to be used by the operational traffic approaching from the east along Goonbri Road and Rangari Road.

Based on the shift information provided in Parsons Brinckerhoff (2010), the busiest hours for the Boggabri Coal Mine would be between 6.00 am and 7.00 am, and between 4.00 pm and 5.00 pm. The expected traffic generation during the peak hours associated with the Project are summarised in Table 5.14.

Table 5.14: Boggabri Coal Mine Indicative Total Traffic – 2019, 2020 and 2030

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce (500 personnel)	103	0	86	0	748	0
Deliveries	0	2	0	2	0	26
Total	103	2	86	2	748	26
Total All Vehicles	105		88		774	

Source: Parsons Brinckerhoff (2010)

^A vehicles per hour

^B vehicles per day

Table 5.15 summarises the two-way hourly and daily traffic volumes expected to be generated by the Boggabri Coal Mine during 2019, 2020 and 2030 during the peak hours associated with the Project.

Table 5.15: Distribution of Boggabri Coal Mine Indicative Traffic – 2019, 2020 and 2030

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Goonbri Road East of Leards Forest Road	10	0	9	0	74	0
Kamilaroi Highway Boggabri to Boggabri Coal Mine Access	21	0	17	0	150	6
Kamilaroi Highway Narrabri to Boggabri Coal Mine Access	51	2	43	2	374	14
Leards Forest Road Boggabri Coal Mine to Goonbri Road	31	0	26	0	224	6
Leards Forest Road Goonbri Road to Rangari Road	21	0	17	0	150	6
Rangari Road East of Leards Forest Road	21	0	17	0	150	6

^A vehicles per hour

^B vehicles per day

5.5 Maules Creek Coal Mine

The Maules Creek Coal Mine includes the development of surface infrastructure and open cut mining activities for a period of 21 years (Hansen Bailey, 2010) and is located approximately 20 km to the north-northwest of the Project. Since the traffic surveys were conducted, the Maules Creek Coal Mine has commenced operations, and the site access from Therribri Road has been commissioned.

Indicative traffic volumes for Maules Creek Coal Mine have been developed based on the longer term expected peak workforce of 470 personnel and assuming that the current levels of shuttle bus and private vehicle usage continue to occur at the Maules Creek Coal Mine (based on the investigation of 2015 travel characteristics by GTA Consultants [2016]). The average weekday peak hourly and daily traffic expected to be generated by the Maules Creek Coal Mine operational workforce is summarised in Table 5.16. It is noted that the busiest hour for traffic generation in the evening at Maules Creek Coal Mine occurs earlier than that expected at the Project and, due to changes in shift arrangements at Maules Creek Coal Mine, the peak hourly volumes in Table 5.16 are expected to overestimate conditions in the busiest hours.

Table 5.16: Maules Creek Coal Mine Indicative Total Traffic – 2019, 2020 and 2030

	6.00 am to 7.00 am ^A		5.00 pm to 6.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Private Vehicles	83	0	51	0	416	0
Shuttle Buses	0	12	0	7	0	46
Total	83	12	51	7	416	46
Total All Vehicles	95		58		462	

Source: GTA Consultants (2016) using 2015 workforce travel characteristics

^A vehicles per hour

^B vehicles per day

For the purpose of this assessment, the higher volumes in Table 5.16 are assumed to be generated by the Maules Creek Coal Mine during 2019, 2020 and 2030, and would occur during the same peak hours as those expected to occur at the Project.

The Maules Creek Coal Mine has an option to access its site via the proposed left in and left out intersections on the Kamilaroi Highway used by the Boggabri Coal Mine (Section 5.4). For the purpose of this assessment, it is assumed that during 2019, 2020 and 2030, the Maules Creek Coal Mine traffic that approaches from the north and south on the Kamilaroi Highway would use the highway intersections. Maules Creek Coal Mine traffic which approaches from the east would continue to use the existing access from Therribri Road during 2019, 2020 and 2030.

The resulting two-way traffic volumes expected to be generated by the Maules Creek Coal Mine operational workforce during 2019, 2020 and 2030 are summarised in Table 5.17.

Table 5.17: Distribution of Maules Creek Coal Mine Indicative Traffic – 2019, 2020 and 2030

Road and Section	6.00 am to 7.00 am ^A		5.00 pm to 6.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Kamilaroi Highway Gunnedah to Boggabri	5	6	3	4	28	26
Kamilaroi Highway Boggabri to Boggabri Coal Mine Access	93	10	45	6	368	40
Kamilaroi Highway Narrabri to Boggabri Coal Mine Access	6	2	4	1	30	6
Rangari Road East of Therribri Road	4	0	2	0	18	0
Therribri Road Rangari Road to Maules Creek Coal Mine	4	0	2	0	18	0

^A vehicles per hour

^B vehicles per day

5.6 Background Growth

Historic annual average daily traffic data for the Kamilaroi Highway was examined by Halcrow (2012) which found that daily traffic volumes have tended to fluctuate without resulting in significant increases or decreases over time. Notwithstanding, and for the purpose of this assessment, a background growth in daily traffic of 1.0 percent per annum has been assumed to occur on the routes used by Project traffic.

As the contribution of mining traffic at the time of the traffic surveys has been estimated, and future changes to that mining traffic has also been forecast, applying this background growth rate to the entirety of the surveyed traffic volumes will tend to overestimate the future traffic volumes (i.e. the assessment is inherently robust). The effect of this overestimation will be more significant on those routes where the proportional contribution of the mining activity on traffic volumes is high, e.g., Rangari Road, Blue Vale Road, Kamilaroi Highway between Blue Vale Road and the Whitehaven CHPP, and Kamilaroi Highway north of Boggabri. The effect will be less significant on roads such as Kamilaroi Highway between Blue Vale Road and Boggabri.

5.7 Baseline Future Traffic Volumes

The cumulative implications of the various developments and background growth in Year 1 have been determined, and the resulting peak hourly and daily traffic volumes at key locations are summarised in Table 5.18. It should be noted that, while maximum ROM coal haulage has been assumed from both the Tarrawonga Coal Mine (3.0 Mtpa) and the Rocglen Coal Mine (1.5 Mtpa) during Year 1, the cumulative permitted maximum of 3.5 Mtpa applies on the Approved Road Transport Route. The baseline scenario, therefore, assumes a simultaneous “maximum case” situation on the Approved Road Transport Route north of Shannon Harbour Road and on Shannon Harbour Road east of Blue Vale Road.

Table 5.18: Indicative Average Weekday Peak Hourly and Daily Traffic – 2019 without the Project

Site ^A	Road and Section	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Highway	101	47	107	51	1,232	947
C	Blue Vale Road South of Shannon Harbour Road	103	44	68	43	450	782
G	Kamilaroi Highway South-east of Blue Vale Road	163	53	197	77	2,689	1,476
H	Kamilaroi Highway North-west of Blue Vale Road	74	56	57	81	1,251	1,515
I	Kamilaroi Highway South of Rangari Road	222	28	203	26	2,465	497
J	Rangari Road East of Kamilaroi Highway	50	1	44	0	328	67
K	Rangari Road East of Approved Road Transport Route	29	0	23	0	198	6
L	Rangari Road West of Approved Road Transport Route	116	31	72	22	567	417
M	Shannon Harbour Road East of Hoad Lane	52	18	51	20	201	331
O	Wean Road South of Rangari Road	13	1	11	1	59	18
P	Kamilaroi Highway North of Rangari Road	204	42	177	41	2,324	800
S	Blue Vale Road realignment South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	74	35	69	34	286	564
V	Rangari Road On Approved Road Transport Route	105	35	94	34	474	570
X	Hoad Lane North of Shannon Harbour Road	67	36	36	36	326	671
Y	Shannon Harbour Road East of Blue Vale Road realignment	52	18	51	20	201	331
Z	Kamilaroi Highway South of Boggabri	74	56	57	81	1,251	1,515
-	Approved Mine Operational Access Off Braymont Road	45	1	40	0	192	10
-	Approved Mine Construction Access Off Shannon Harbour Road	60	0	60	0	140	10

^A Refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

The cumulative implications of the various developments and background growth in 2020 have been determined, and the resulting peak hourly and daily traffic volumes at key locations are summarised in Table 5.19.

Table 5.19: Indicative Average Weekday Peak Hourly and Daily Traffic – 2020 without the Project

Site ^A	Road and Section	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Hwy	83	47	88	51	1,225	950
C	Blue Vale Road South of Shannon Harbour Road	86	45	48	43	436	782
G	Kamilaroi Highway South-east of Blue Vale Road	147	53	179	77	2,695	1,484
H	Kamilaroi Highway North-west of Blue Vale Road	75	56	58	81	1,262	1,528
I	Kamilaroi Highway South of Rangari Road	214	28	198	26	2,472	501
J	Rangari Road East of Kamilaroi Highway	37	1	31	0	317	68
K	Rangari Road East of Approved Road Transport Route	29	0	23	0	198	6
L	Rangari Road West of Approved Road Transport Route	103	31	59	22	555	419
M	Shannon Harbour Road East of Hoad Lane	14	18	12	20	109	322
O	Wean Road South of Rangari Road	9	1	7	1	54	18
P	Kamilaroi Highway North of Rangari Road	202	42	172	41	2,332	808
S	Blue Vale Road realignment South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	61	35	56	34	272	564
V	Rangari Road On Approved Road Transport Route	92	35	81	34	460	570
X	Hoad Lane North of Shannon Harbour Road	68	36	36	37	342	674
Y	Shannon Harbour Road East of Blue Vale Road realignment	14	18	12	20	109	322
Z	Kamilaroi Highway South of Boggabri	75	56	58	81	1,262	1,528
-	Approved Mine Operational Access Off Braymont Road	70	41	63	40	296	628

^A Refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

The cumulative implications of the various developments and background growth in 2030 have been determined, and the resulting peak hourly and daily traffic volumes at key locations are summarised in Table 5.20.

Table 5.20: Indicative Average Weekday Peak Hourly and Daily Traffic – 2030 without the Project

Site ^A	Road and Section	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Hwy	127	86	127	89	1,504	1,555
C	Blue Vale Road South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
G	Kamilaroi Highway South-east of Blue Vale Road	219	113	226	116	3,105	2,136
H	Kamilaroi Highway North-west of Blue Vale Road	105	82	63	88	1,375	1,666
I	Kamilaroi Highway South of Rangari Road	532	60	219	28	2,686	541
J	Rangari Road East of Kamilaroi Highway	64	1	54	0	440	133
K	Rangari Road East of Approved Road Transport Route	43	0	25	0	205	7
L	Rangari Road West of Approved Road Transport Route	147	35	80	24	675	517
M	Shannon Harbour Road East of Hoad Lane	n/a	n/a	n/a	n/a	n/a	n/a
O	Wean Road South of Rangari Road	14	1	13	1	77	19
P	Kamilaroi Highway North of Rangari Road	512	74	188	44	2,522	940
S	Blue Vale Road realignment South of Shannon Harbour Road	131	83	84	80	644	1,373
T	Blue Vale Road realignment North of Shannon Harbour Road	96	39	58	38	452	772
U	Approved Road Transport Route South of Rangari Road	85	35	33	34	360	652
V	Rangari Road On Approved Road Transport Route	130	35	102	34	573	762
X	Hoad Lane North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
Y	Shannon Harbour Road East of Blue Vale Road realignment	19	1	20	4	137	71
Z	Kamilaroi Highway South of Boggabri	105	82	63	88	1,375	1,666
-	Approved Mine mine infrastructure area Access Off Blue Vale Road	140	43	125	40	594	712

^A Refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

5.8 Baseline Future Road Network Performance

The Austroads (2017b) *Guide to Traffic Management Part 3: Traffic Studies and Analysis* provides guidelines for the capacity and performance of two-lane, two-way rural roads, which in turn, refers to the *Highway Capacity Manual (HCM)* (Transportation Research Board, 2016).

The capacity of a road is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions. The capacity of a single traffic lane will be affected by factors such as the pavement width and restricted lateral clearances, the presence of heavy vehicles and grades.

Level of Service (LOS) is defined as a qualitative measure describing the operational conditions within a traffic stream as perceived by drivers and/or passengers. A LOS definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. LOS A provides the best traffic conditions, with no restriction on desired travel speed or overtaking. LOS B to D describes progressively worse traffic conditions. LOS E occurs when traffic conditions are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre in the traffic stream. The service flow rate for LOS E is taken as the capacity of a lane or roadway. In rural situations, LOS C is generally considered to be acceptable. At LOS C, most vehicles are travelling in platoons, and travel speeds are curtailed. At LOS D, platooning increases significantly, and the demand for passing is high, but the capacity to do so is low.

The LOS experienced by drivers on two-way rural roads is dependent on the drivers' expectations regarding the road, and three classes of road are defined in the HCM. Class I roads are those on which motorists expect to travel at relatively high speeds. They most often serve long-distance trips or provide connecting links between facilities that serve long-distance trips. Class II roads are those on which motorists do not necessarily expect to travel at high speeds, and may function as access routes to Class I facilities, and serve as scenic or recreational routes or pass through rugged terrain. Class III roads serve moderately developed areas, and may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas, where local traffic mixes with through traffic, and the density of unsignalised roadside access points increases.

Most arterial roads, such as the Kamilaroi Highway, are considered to be Class I; however, the primary determinant of a road's classification for operational analysis is the drivers' expectations, which may not necessarily agree with the functional classification. Aside from the Kamilaroi Highway, the surveyed two-lane, two-way roads would typically be considered Class II roads under the HCM descriptions, as drivers would expect some level of restriction to their freedom of movement along the routes as a result of characteristics of the route, such as limits on the opportunities for overtaking (e.g. centre linemarking, sight distances, lack of overtaking lanes).

On Class I roads, LOS is defined in terms of Percent Time Spent Following (PTSF) and Average Travel Speed (ATS). On Class II roads, LOS is defined only in terms of PTSF. The PTSF is a measure of the level of opportunities to overtake, and is estimated from the demand traffic volumes, the directional distribution of that traffic, and the percentage of no-passing zones. The LOS criteria for Class I and Class II two-lane roads are as shown in Table 5.21, noting that the HCM defines ATS in miles per hour (mi/h).

Table 5.21: LOS Criteria for Class I and Class II Two Lane Roads

LOS	Class I		Class II
	PTSF (percent)	ATS (mi/h) ^A	PTSF (percent)
A	≤ 35	≥ 55	≤ 40
B	> 35 – 50	> 50 – 55	> 40 – 55
C	> 50 – 65	> 45 – 50	> 55 – 70
D	> 65 – 80	> 40 – 45	> 70 – 85
E	≥ 80	≤ 40	≥ 85

^A note that 1 mi/h is equivalent to approximately 1.6 km/h

Table 5.22 presents the results of the assessment of midblock conditions at key locations on the road network during 2019 with the combined effects of the likely major developments and background growth. It is noted that the HCM method does not strictly apply to the section of Kamilaroi Highway between the Whitehaven CHPP and Blue Vale Road (Location G) due to the significant contribution of the auxiliary lanes to its capacity in both directions of travel. The results for that location are, therefore, considered to be indicative only, and are presented here to provide a basis for generalised comparison with future conditions. No reliance should be placed on the specific results for any scenario for that location.

Table 5.22: Indicative Average Weekday Midblock Road Performance – 2019 without the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^B)	LOS
B	Blue Vale Road North-east of Kamilaroi Highway	36	A	9	A	22	A	30	A
C	Blue Vale Road South of Shannon Harbour Road	32	A	6	A	15	A	26	A
G	Kamilaroi Highway South-east of Blue Vale Road ^B	42 (61)	B (A)	11 (60)	A (A)	27 (60)	A (A)	42 (60)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	32 (62)	A (A)	16 (62)	A (A)	20 (61)	A (A)	30 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	45 (61)	B (A)	12 (60)	A (A)	18 (60)	A (A)	40 (61)	B (A)
J	Rangari Road East of Kamilaroi Highway	28	A	6	A	16	A	20	A
K	Rangari Road East of Approved Road Transport Route	8	A	24	A	24	A	6	A
L	Rangari Road West of Approved Road Transport Route	29	A	21	A	21	A	21	A
M	Shannon Harbour Road East of Hoad Lane	30	A	7	A	7	A	30	A
O	Wean Road South of Rangari Road	2	A	24	A	23	A	12	A
P	Kamilaroi Highway North of Rangari Road	41 (61)	B (A)	20 (60)	A (A)	20 (61)	A (A)	39 (61)	B (A)
S	Blue Vale Road realignment South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^B)	LOS
U	Approved Road Transport Route South of Rangari Road	27	A	19	A	29	A	15	A
V	Rangari Road On Approved Road Transport Route	20	A	30	A	22	A	26	A
X	Hoad Lane North of Shannon Harbour Road	17	A	28	A	19	A	21	A
Y	Shannon Harbour Road East of Blue Vale Road realignment	30	A	7	A	7	A	30	A
Z	Kamilaroi Highway South of Boggabri	32 (62)	A (A)	16 (62)	A (A)	20 (61)	A (A)	30 (62)	A (A)

^A Refer to Figure 1-1

^B percent

^C mi/h

^D indicative result only, HCM model doesn't strictly apply, due to lane arrangements on this section of Kamilaroi Highway

The results indicate that, even with conservative traffic forecasts, drivers would be expected to experience good levels of service on the surrounding road network.

Table 5.23 presents the results of the assessment of midblock conditions at key locations on the road network during 2020 with the combined effects of the likely major developments and background growth. As above, it is noted that the HCM method does not strictly apply to the section of Kamilaroi Highway between the Whitehaven CHPP and Blue Vale Road, with the results for that location considered to be indicative only.

Table 5.23: Indicative Average Weekday Midblock Road Performance – 2020 without the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^B)	LOS
B	Blue Vale Road North-east of Kamilaroi Highway	33	A	11	A	26	A	23	A
C	Blue Vale Road South of Shannon Harbour Road	29	A	9	A	24	A	15	A
G	Kamilaroi Highway South-east of Blue Vale Road ^B	41 (61)	B (A)	13 (60)	A (A)	31 (60)	A (A)	37 (60)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	32 (62)	A (A)	16 (62)	A (A)	20 (61)	A (A)	30 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	44 (61)	B (A)	12 (60)	A (A)	20 (61)	A (A)	39 (61)	B (A)
J	Rangari Road East of Kamilaroi Highway	24	A	9	A	25	A	6	A
K	Rangari Road East of Approved Road Transport Route	8	A	24	A	24	A	6	A
L	Rangari Road West of Approved Road Transport Route	26	A	22	A	26	A	15	A
M	Shannon Harbour Road East of Hoad Lane	19	A	16	A	15	A	19	A

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^C)	LOS	PTSF ^B (ATS ^B)	LOS
O	Wean Road South of Rangari Road	3	A	23	A	26	A	19	A
P	Kamilaroi Highway North of Rangari Road	41 (61)	B (A)	19 (61)	A (A)	18 (60)	A (A)	38 (61)	B (A)
S	Blue Vale Road realignment South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	30	A	12	A	25	A	18	A
V	Rangari Road On Approved Road Transport Route	15	A	29	A	20	A	19	A
X	Hoad Lane North of Shannon Harbour Road	15	A	29	A	20	A	19	A
Y	Shannon Harbour Road East of Blue Vale Road realignment	19	A	16	A	15	A	19	A
Z	Kamilaroi Highway South of Boggabri	39 (61)	B (A)	15 (60)	A (A)	28 (60)	A (A)	31 (61)	A (A)

^A Refer to Figure 1-1

^B percent

^C mi/h

^D indicative result only, HCM model doesn't strictly apply due to lane arrangements on this section of Kamilaroi Highway

The results indicate that, even with conservative traffic forecasts, drivers would be expected to experience good levels of service on the surrounding road network.

Table 5.24 presents the results of the assessment of midblock conditions at key locations on the road network during 2030 with the combined effects of the likely major developments and background growth.

Table 5.24: Indicative Average Weekday Midblock Road Performance – 2030 without the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS						
B	Blue Vale Road North-east of Kamilaroi Highway	40	A	15	A	33	A	28	A
C	Blue Vale Road South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
G	Kamilaroi Highway South-east of Blue Vale Road ^B	50 (59)	B (A)	23 (59)	A (A)	39 (59)	B (A)	43 (59)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	34 (61)	A (A)	22 (61)	A (A)	21 (61)	A (A)	31 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	61 (57)	C (A)	46 (58)	B (A)	23 (60)	A (A)	40 (61)	B (A)
J	Rangari Road East of Kamilaroi Highway	29	A	6	A	26	A	10	A
K	Rangari Road East of Approved Road Transport Route	13	A	23	A	24	A	7	A

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS						
L	Rangari Road West of Approved Road Transport Route	33	A	22	A	28	A	16	A
M	Shannon Harbour Road East of Blue Vale Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
O	Wean Road South of Rangari Road	2	A	24	A	10	A	21	A
P	Kamilaroi Highway North of Rangari Road	57 (57)	C (A)	52 (58)	C (A)	19 (60)	A (A)	39 (61)	B (A)
S	Blue Vale Road realignment South of Shannon Harbour Road	35	A	25	A	31	A	23	A
T	Blue Vale Road realignment North of Shannon Harbour Road	10	A	35	A	20	A	24	A
U	Approved Road Transport Route South of Rangari Road	22	A	25	A	23	A	17	A
V	Rangari Road On Approved Road Transport Route	23	A	29	A	28	A	21	A
X	Hoad Lane North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Y	Shannon Harbour Road East of Blue Vale Road realignment	15	A	18	A	11	A	22	A
Z	Kamilaroi Highway South of Boggabri	34 (61)	A (A)	22 (61)	A (A)	21 (61)	A (A)	31 (62)	A (A)

^A Refer to Figure 1-1

^B percent

^C mi/h

^D indicative result only, HCM model doesn't strictly apply, due to lane arrangements on this section of Kamilaroi Highway

The results indicate that drivers would be expected to experience good levels of service on the surrounding road network.

5.9 Operation of Railway Level Crossings

In 2030, the number of trains operating on the Werris Creek Mungindi Railway between Gunnedah and the junction for the Maules Creek Coal and Boggabri East Coal spur has been estimated as presented in Table 5.25.

Table 5.25: Indicative Daily Train Movements – 2030 without the Project

	Werris Creek Mungindi Railway North of Whitehaven CHPP Junction		Werris Creek Mungindi Railway South of Whitehaven CHPP Junction	
	Average	Peak	Average	Peak
Boggabri Coal Mine	5.5	5.5	5.5	5.5
Cotton, grain and general freight	9	9	9	9
Narrabri Coal Mine	8	16	8	16
XPT Passenger	2	2	2	2
Maules Creek Coal Mine	10	20	10	20
Whitehaven CHPP ^A	0	0	4	4
Total per Day	34.5	52.5	38.5	56.5
Average per Hour	1.4	2.2	1.6	2.4

^A includes transport of product coal sourced from the Approved Mine and the Tarrawonga Coal Mine

Thus, with peak conditions in 2030, it is estimated that there would be an average of 2.2 and 2.4 train movements per hour on the Werris Creek Mungindi Railway north and south of the Whitehaven CHPP junction, respectively.

In order to gauge the conditions experienced by drivers as a result of trains passing through the crossings, the probability of a vehicle and a train occupying the level crossing simultaneously (and therefore resulting in delay to vehicles) has been estimated. To estimate this probability, the following assumptions have been made regarding travel through the level crossings:

- a train occupies the crossing for 3 minutes; and
- vehicles occupy the space for the equivalent time of 30 m of travel at the posted speed limit, advisory speed or estimated typical travel speed, plus an additional 4 seconds per vehicle at passive crossings to account for the requirement to stop to allow the driver to ascertain if it is safe to cross.

The time during which a train occupies the level crossing may vary at each location and at different times of day due to operational characteristics, such as the need to accelerate or decelerate for signals, as well as for varying train lengths and speeds. The ARTC strategy indicates that train lengths vary between 1,250 m and 1,572 m, with certain wagons limited to 60 km/h when loaded. As the roads at the majority of the level crossings carry only very low volumes of traffic due to their local access nature, an allowance of 20 vehicles per hour during the busiest hours has been made for the purpose of this assessment. The estimated probabilities are presented in Table 5.26 for the level crossings between Gunnedah and the location of the junction for the Project rail spur.

Farther to the north of that junction, the number of trains will decrease to below that occurring south of the junction, and the road traffic at the level crossings will be low, with the possible exception of the Boston Street level crossing in Boggabri, which is included in Table 5.26. The probability of vehicles being delayed at those crossings north of the junction for the Project rail spur would be lower than those presented in Table 5.26 for the crossings south of the junction.

Table 5.26: Probability of Delay to Vehicles at Level Crossings – 2030 without the Project

Level Crossing	Vehicles per Hour	Vehicle Travel Speed (km/h)	Trains per Hour	Probability of Delay (percent)
526 "Rothsay" Access Emerald Hill (passive)	20	20	2.2	0.53
527 Gunnedah Road Emerald Hill (active)	20	50	2.2	0.12
529 Boston Street Boggabri (active)	90 [^]	50	2.2	0.55

[^] Estimated from Parsons Brinckerhoff (2010) with growth

The results indicate that the probability of a vehicle being delayed by a train on the level crossings outside of Gunnedah is expected to be low. The highest probability is estimated at the Boston Street level crossing in Boggabri, at 0.55 percent, which is equivalent to 1 in 183.

6. Year 1 Project Traffic Generation

The characteristics of traffic generated by the Project during Year 1 (nominally 2019) are described in this section. Where relevant, the traffic generation and distribution characteristics used in the road transport assessment for the Approved Mine (the EIS assessment) (GTA Consultants, 2012) have been applied here.

6.1 Year 1 Construction Workforce

Construction activity during Year 1 would generate a peak of 500 personnel, and would occur up to seven days a week, between 7.00 am and 6.00 pm. On a typical day, it is expected that 90 percent of the construction workforce (450 personnel) would be present.

Due to the location of the Project and local transport conditions, it is expected that all construction workers would drive to and from the site at the start and end of shifts. Based on observations from neighbouring mines, car pooling for construction employees is anticipated to be limited, and it is assumed that car pooling would result in an average car occupancy of 1.2 personnel per vehicle. The construction workers would, therefore, generate 750 vehicle trips per day on the surrounding road network, where a trip is a one-way movement. A vehicle arriving and departing the site generates two vehicle trips.

The construction workers would tend to arrive in the morning before 7.00 am, and leave in the evening after 6.00 pm. Some arrivals and departures would, however, occur outside those hours. For the purpose of this assessment, it is estimated that the construction workforce would arrive and depart throughout the day as follows:

- 6.00 am to 7.00 am 80 percent of arrivals;
- 7.00 am to 8.00 am 20 percent of arrivals;
- 5.00 pm to 6.00 pm 20 percent of departures; and
- 6.00 pm to 7.00 pm 80 percent of departures.

Construction areas would be located and staffed as follows, based on the typical daily attendance of 450 personnel:

- 50 personnel to/from the construction access off the Kamilaroi Highway at the rail over road crossing (Rail over Road Crossing Construction Area); and
- 400 personnel to/from the construction access off Braymont Road via Blue Vale Road (Main Site Construction Area).

Braymont Road (accessed from the east) would be used as access to the construction site during Year 1, and vehicular access would be provided via its intersection with Blue Vale Road. Vehicular access for the Rail over Road Crossing Construction Area would be provided on both the eastern and western sides of the Kamilaroi Highway near the crossing location, and designed and constructed in accordance with Austroads guidelines and in consultation with RMS.

Whitehaven has advised that it expects that 90 percent of the construction workforce would reside at the Boggabri Accommodation Camp, which is located on the western side of Boggabri on Caloola Road. It is anticipated that the remaining 10 percent would reside in the local area (assumed to be in Gunnedah).

The routes used by the construction workforce to and from the three construction areas would be:

To/from Boggabri Accommodation Camp:

- Caloola Road, Kamilaroi Highway (Rail over Road Crossing Construction Area); and
- Caloola Road, Kamilaroi Highway, Rangari Road, Approved Road Transport Route (south), Hoad Lane, Braymont Road (Main Site Construction Area).

To/from Gunnedah:

- Kamilaroi Highway (Rail over Road Crossing Construction Area); and
- Kamilaroi Highway, Blue Vale Road, Braymont Road (Main Site Construction Area).

6.2 Year 1 Construction Deliveries and Visitors

The Project is expected to generate delivery and visitor vehicle trips each day associated with construction activity. The construction delivery and visitor activity for the Project is expected to generate 168 light vehicle trips per day and 84 heavy vehicle trips per day during Year 1. These trips would be spread evenly across the day between 7.00 am and 6.00 pm. Delivery and visitor vehicle trips are assumed to approach and depart the Project from and to the following locations:

- Gunnedah 80 percent;
- Boggabri 10 percent; and
- Narrabri 10 percent.

The delivery and visitor vehicles would travel to and from the various construction locations using the same routes as the construction workforce.

6.3 Year 1 Total Project Traffic

The total volume of traffic generated by the Project over an average weekday during Year 1 (based on the scenario described in Sections 6.1 and 6.2) is summarised in Table 6.1. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm. This assumes that all construction workers travel by private vehicle.

Table 6.1: Indicative Total Project Traffic – Year 1

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Construction Workforce	300	0	300	0	750	0
Construction Visitors and Deliveries	0	0	0	0	168	84
Total	300	0	300	0	918	84
Total All Vehicles	300		300		1,002	

^A vehicles per hour

^B vehicles per day

Table 6.1 indicates that the Project would generate 1,002 vehicle trips per day during Year 1, with 300 vehicles trips during the morning peak hour and 300 vehicle trips during the evening peak hour.

The resulting distribution of this traffic on the surrounding roads during the peak hours and on a daily basis is summarised in Table 6.2.

Table 6.2: Indicative Distribution of Project Traffic – Year 1

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Approved Road Transport Route Rangari Road to Hoad Lane	240	0	240	0	628	16
Blue Vale Road Kamilaroi Highway to Braymont Road	27	0	27	0	188	58
Braymont Road Main Site Construction Access to Blue Vale Road	240	0	240	0	628	16
Hoad Lane Braymont Road to Approved Road Transport Route	240	0	240	0	628	16
Kamilaroi Highway Narrabri to Rangari Road	0	0	0	0	16	10
Kamilaroi Highway Rangari Road to Boggabri	240	0	240	0	616	10
Kamilaroi Highway Boggabri to Project Construction Access	30	0	30	0	78	2
Kamilaroi Highway Construction Access to Blue Vale Road	3	0	3	0	24	8
Kamilaroi Highway Blue Vale Road to Gunnedah	30	0	30	0	212	66
Main Site Construction Access off Braymont Road	267	0	267	0	816	74
Rail Over Road Crossing Construction Access off Kamilaroi Highway	33	0	33	0	102	10
Rangari Road Kamilaroi Highway to Approved Road Transport Route	240	0	240	0	628	16

^A vehicles per hour

^B vehicles per day

6.4 Year 1 Other ROM Coal Haulage with Project

Unrelated to the Project, during Year 1, haulage of ROM coal is expected to occur along the Approved Road Transport Route from other Whitehaven mines to the Whitehaven CHPP. The cumulative maximum amount of coal transported along the Approved Road Transport Route in Year 1 (assumed to be from Tarrawonga Coal Mine, Rocglen Coal Mine and the Project) would not exceed 3.5 Mtpa. With the Project, the cumulative total of ROM coal haulage would remain unchanged; however, the tonnage moved from each source would be altered.

For the purpose of this study, as for the baseline assessment (Section 5), a 'maximum case' scenario has been assessed with regard to ROM coal haulage. This assessment assumes that ROM coal haulage occurs at the permitted maximum rates simultaneously from both the Tarrawonga Coal Mine (3.0 Mtpa) and Rocglen Coal Mine (1.5 Mtpa) during Year 1.

Coal haulage would occur on the Approved Road Transport Route within the approved coal haulage hours. During Year 1 of the Project, the Tarrawonga Coal Mine would generate an average of approximately 262 truck departures per weekday to the Whitehaven CHPP, which would be matched by the return of the vehicles, with a total of 524 heavy vehicle trips on the Approved Road Transport Route. Similarly, the Rocglen Coal Mine would generate an average of approximately 132 truck departures per weekday to the Whitehaven CHPP, matched by the return of the vehicles, with a total of 264 heavy vehicle trips per day on the Approved Road Transport Route. The cumulative haulage on the Approved Road Transport Route south of Shannon Harbour Road would be capped at 3.5 Mtpa, equivalent to 612 heavy vehicle trips per weekday. Table 6.3 summarises the truck movements associated with the transport of ROM coal by road from Tarrawonga Coal Mine and Rocglen Coal Mine to the Whitehaven CHPP for the Year 1 scenario.

Table 6.3: Indicative ROM Coal Haulage from Tarrawonga Coal Mine and Rocglen Coal Mine – Year 1

Road and Section	6.00 am to 7.00 am ^A	6.00 pm to 7.00 pm ^A	Daily ^B
Approved Road Transport Route Tarrawonga Coal Mine to Rangari Road	34	34	524
Rangari Road on Approved Road Transport Route	34	34	524
Approved Road Transport Route Rangari Road to Hoad Lane (south-east)	34	34	524
Hoad Lane Approved Road Transport Route to Shannon Harbour Road	34	34	524
Shannon Harbour Road Rocglen Coal Mine to Hoad Lane	18	18	264
Hoad Lane Shannon Harbour Road to Blue Vale Road	40	40	612
Blue Vale Road Hoad Lane to Kamilaroi Highway	40	40	612
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	40	40	612

^A heavy vehicles per hour

^B heavy vehicles per day

7. Year 2 Project Traffic Generation

The characteristics of traffic generated by the Project during Year 2 (nominally 2020) are described in this section. Where relevant, the traffic generation and distribution characteristics used in the road transport assessment for the Approved Mine (the EIS assessment) (GTA Consultants, 2012) have been applied here.

7.1 Year 2 Operational Workforce

The assumed operational workforce of 80 personnel during Year 2 would function on a shift basis, and employees would typically travel to and from the Project by car, with an average car occupancy of 1.2 personnel per vehicle. With 90 percent of the operational workforce present on a typical day, the operational workers would, therefore, generate 120 vehicle trips per day on the surrounding road network.

The expected shift times are:

- Administration personnel – 7.00 am to 5.00 pm weekdays (20 percent of employees);
- Mining Operations (Day) Personnel – 6.30 am to 7.00 pm (40 percent of employees); and
- Mining Operations (Night) Personnel – 6.30 pm to 7.00 am (40 percent of employees).

The operational workers would typically arrive during the hour prior to the start of their shift, and depart during the hour following the end of their shift. On this basis, it is estimated that the operational workforce would arrive and depart throughout the day as follows:

- 5.00 am to 6.00 am 20 percent of arrivals;
- 6.00 am to 7.00 am 40 percent of arrivals;
- 7.00 am to 8.00 am 40 percent of departures;
- 5.00 pm to 6.00 pm 20 percent of arrivals and 20 percent of departures;
- 6.00 pm to 7.00 pm 20 percent of arrivals; and
- 7.00 pm to 8.00 pm 40 percent of departures.

The operational workforce is assumed to reside in the following areas:

- Gunnedah (54 percent);
- Boggabri (21 percent);
- Narrabri (13 percent);
- Manilla (9 percent); and
- other (3 percent).

During Year 2, vehicular access to the operational component of the Project would be via the proposed access road directly from Blue Vale Road south of Braymont Road. Vehicles travelling to the operational area in Year 2 are assumed to use the following routes:

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road;
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route (south), Hoad Lane, Blue Vale Road;
- to/from Narrabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route (south), Hoad Lane, Blue Vale Road; and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road, Hoad Lane, Blue Vale Road.

7.2 Year 2 Operational Deliveries and Visitors

For the purpose of this assessment, it is assumed that the Project would generate delivery and visitor trips at the same rate as the Approved Mine, adjusted pro rata for the lower expected production rate of approximately 1.0 Mtpa at the Project during Year 2. During Year 2, deliveries and visitors are, therefore, assumed to generate:

- 14 light vehicle trips per day; and
- 2 heavy vehicle trips per day.

These trips would be spread evenly throughout the day, generally between 6.00 am and 6.00 pm. Delivery and visitor vehicle trips are assumed to approach and depart the Project from and to the following locations:

- Gunnedah 80 percent;
- Boggabri 10 percent; and
- Narrabri 10 percent.

Vehicular access locations and routes used by the operational visitors and delivery vehicles would be the same as those described for the operational workforce.

7.3 Year 2 ROM Coal Haulage

By Year 2, the Project CHPP and Project rail spur are expected to be completed, and ROM coal would be transported from site to market by rail. However, this assessment conservatively assumes that the Project CHPP, train load-out facility and rail spur do not reach full operational capacity by Year 2, and that ROM coal would be hauled from the Project to the Whitehaven CHPP, located 5 km north-west of Gunnedah.

It is estimated that approximately 1.0 Mt of ROM coal would be hauled from the Project to the Whitehaven CHPP during Year 2. However, for the purposes of this study, a conservative 'maximum case' scenario has been assessed, in which 3.5 Mt of ROM coal is transported from the Project to the Whitehaven CHPP using the Approved Private Haul Road and Kamilaroi Highway overpass, within the operating hours as permitted in the Approved Mine's Development Consent.

The Project would generate an average of approximately 306 truck departures per weekday in Year 2 (based on nominal truck capacity and operational availability), which would be matched by the return of vehicles. ROM coal haulage from the Project to the Whitehaven CHPP would, therefore, generate an average of 612 vehicle trips per weekday.

The coal haulage trips would be spread throughout the day, with an average of 20 departures of laden trucks from the Project each hour, and 20 arrivals of returning trucks each hour.

7.4 Year 2 Total Project Traffic

The total volume of traffic generated by the Project over an average weekday during Year 2 (based on the scenario described in Sections 7.1 to 7.3) is summarised in Table 7.1. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 6.00 pm and 7.00 pm.

Table 7.1: Indicative Total Project Traffic – Year 2

	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Operational Workforce	24	0	12	0	120	0
Operational Visitors and Deliveries	2	0	0	0	14	2
ROM Coal Haulage	0	40	0	40	0	612
Total	26	40	12	40	134	614
Total All Vehicles	66		52		748	

^A vehicles per hour

^B vehicles per day

Table 6.1 indicates that the Project would generate 748 vehicle trips per day during Year 2, with 66 vehicle trips during the morning peak hour and 52 vehicle trips during the evening peak hour.

The resulting distribution of this traffic on the surrounding roads during the peak hours and on a daily basis is summarised in Table 6.2.

Table 7.2: Indicative Distribution of Project Traffic – Year 2

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Approved Road Transport Route Rangari Road to Hoada Lane	8	0	4	0	44	0
Blue Vale Road Kamilaroi Highway to Main Site Construction Access	15	40	6	40	78	614
Blue Vale Road Main Site Construction Access to Braymont Road	11	0	6	0	56	0
Hoada Lane Braymont Road to Approved Road Transport Route	8	0	4	0	44	0
Kamilaroi Highway Narrabri to Rangari Road	3	0	2	0	18	0
Kamilaroi Highway Rangari Road to Boggabri	5	0	2	0	26	0
Kamilaroi Highway Blue Vale Road to Gunnedah	15	40	6	40	78	614
Project Access off Blue Vale Road	26	40	12	40	134	614
Rangari Road Kamilaroi Highway to Approved Road Transport Route	0	0	0	0	0	0

^A vehicles per hour

^B vehicles per day

7.5 Year 2 Other ROM Coal Haulage with Project

Unrelated to the Project, during Year 2, haulage of ROM coal is expected to occur along the Approved Road Transport Route from other Whitehaven mines to the Whitehaven CHPP. The cumulative maximum amount of coal transported along the Approved Road Transport Route in Year 2 (assumed to be from Tarrawonga Coal Mine, Rocglen Coal Mine and the Project) would not exceed 3.5 Mtpa. With the Project, the cumulative total of ROM coal haulage would remain unchanged; however, the tonnage moved from each source would be altered.

For the purpose of this study, as for the baseline assessment (Section 5), a 'maximum case' scenario has been assessed with regard to ROM coal haulage. This assessment assumes that ROM coal haulage occurs at the permitted maximum rates simultaneously from both the Tarrawonga Coal Mine (3.0 Mtpa) and Rocglen Coal Mine (1.5 Mtpa) during Year 2.

Coal haulage would occur on the Approved Road Transport Route within the approved coal haulage hours. During Year 2 of the Project, the Tarrawonga Coal Mine would generate an average of approximately 262 truck departures per weekday to the Whitehaven CHPP, which would be matched by the return of the vehicles, with a total of 524 heavy vehicle trips on the Approved Road Transport Route. Similarly, the Rocglen Coal Mine would generate an average of approximately 132 truck departures per weekday to the Whitehaven CHPP, matched by the return of the vehicles, with a total of 264 heavy vehicle trips per day on the Approved Road Transport Route. The cumulative haulage on the Approved Road Transport Route south of Shannon Harbour Road would be capped at 3.5 Mtpa, equivalent to 612 heavy vehicle trips per weekday. Table 6.3 summarises the truck movements associated with the transport of ROM coal from Tarrawonga Coal Mine and Rocglen Coal Mine to the Whitehaven CHPP for the Year 2 scenario.

Table 7.3: Indicative ROM Coal Haulage from Tarrawonga Coal Mine and Rocglen Coal Mine – Year 2

Road and Section	6.00 am to 7.00 am ^A	6.00 pm to 7.00 pm ^A	Daily ^B
Approved Road Transport Route Tarrawonga Coal Mine to Rangari Road	34	34	524
Rangari Road on Approved Road Transport Route	34	34	524
Approved Road Transport Route Rangari Road to Hoad Lane (south-east)	34	34	524
Hoad Lane Approved Road Transport Route to Shannon Harbour Road	34	34	524
Shannon Harbour Road Rocglen Coal Mine to Hoad Lane	18	18	264
Hoad Lane Shannon Harbour Road to Blue Vale Road	40	40	612
Blue Vale Road Hoad Lane to Kamilaroi Highway	40	40	612
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	40	40	612

^A heavy vehicles per hour

^B heavy vehicles per day

8. Year 12 Project Traffic Generation

The characteristics of traffic generated by the Project during Year 12 are described in this section. Where relevant, the traffic generation and distribution characteristics used in the EIS assessment (GTA Consultants, 2012) have been applied here.

8.1 Year 12 Operational Workforce

The operational workforce of 450 personnel would function on a shift basis, and employees would typically travel to and from the Project by car, with an average car occupancy of 1.2 personnel per vehicle. With 90 percent of the operational workforce present on a typical day, the operational workers would, therefore, generate 675 vehicle trips per day on the surrounding road network.

The expected shift times are:

- Administration Personnel – 7.00 am to 5.00 pm weekdays (20 percent of employees);
- Mining Operations (Day) Personnel – 6.30 am to 7.00 pm (40 percent of employees);
and
- Mining Operations (Night) Personnel – 6.30 pm to 7.00 am (40 percent of employees).

The operational workers would typically arrive during the hour prior to the start of their shift, and depart during the hour following the end of their shift. On this basis, it is estimated that the operational workforce would arrive and depart throughout the day as follows:

- 5.00 am to 6.00 am 20 percent of arrivals;
- 6.00 am to 7.00 am 40 percent of arrivals;
- 7.00 am to 8.00 am 40 percent of departures;
- 5.00 pm to 6.00 pm 20 percent of arrivals and 20 percent of departures;
- 6.00 pm to 7.00 pm 20 percent of arrivals; and
- 7.00 pm to 8.00 pm 40 percent of departures.

The operational workforce would reside in the following areas:

- Gunnedah (54 percent);
- Boggabri (21 percent);
- Narrabri (13 percent);
- Manilla (9 percent); and
- other (3 percent).

During Year 12, the operational workforce would access an access road directly from the Blue Vale Road realignment. Vehicles travelling to the operational area in Year 12 are assumed to use the following routes:

- to/from Gunnedah – Kamilaroi Highway, Blue Vale Road, Blue Vale Road realignment;
- to/from Boggabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Blue Vale Road realignment;
- to/from Narrabri – Kamilaroi Highway, Rangari Road, Approved Road Transport Route, Hoad Lane, Blue Vale Road realignment; and
- to/from Manilla – Rangari Road, Wean Road, Shannon Harbour Road, Blue Vale Road realignment.

8.2 Year 12 Operational Deliveries and Visitors

The Project proposes a maximum production rate of up to approximately 10.0 Mtpa during Year 12, equivalent to five times the Tarrawonga Coal Mine's maximum production rate of up to approximately 2.0 Mtpa at the time of the traffic surveys. For the purpose of this assessment, it is assumed that the Project would generate delivery and visitor trips at the same rate as the Tarrawonga Coal Mine, adjusted pro rata for the maximum production rate at the Project during Year 12. Deliveries and visitors are, therefore, assumed to generate:

- 396 light vehicle trips per day; and
- 72 heavy vehicle trips per day.

These trips would be spread evenly throughout the day, generally between 6.00 am and 6.00 pm. Delivery and visitor vehicle trips are assumed to approach and depart the Project from and to the following locations:

- Gunnedah 80 percent;
- Boggabri 10 percent; and
- Narrabri 10 percent.

Vehicular access locations and routes used by the operational visitors and delivery vehicles would be the same as those described for the operational workforce.

8.3 Year 12 ROM Coal Haulage

During Year 12, ROM coal haulage from the Project would be undertaken by rail, thus would generate no trips on the road network.

8.4 Year 12 Total Project Traffic

The total volume of traffic generated by the Project over an average weekday during Year 12 is summarised in Table 8.1. The busiest hour during the morning would occur between 6.00 am and 7.00 am, and the busiest hour during the evening would occur between 5.00 pm and 6.00 pm.

Table 8.1: Indicative Total Project Traffic – Year 12

	6.00 am to 7.00 am ^A		5.00 pm to 6.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Workforce	135	0	135	0	676	0
Visitors and Deliveries	34	6	34	6	396	72
Total	169	6	169	6	1,072	72
Total All Vehicles	175		175		1,144	

^A vehicles per hour

^B vehicles per day

The resulting distribution of this traffic on the surrounding roads during the peak hours and on a daily basis is summarised in Table 8.2.

Table 8.2: Indicative Distribution of Project Traffic – Year 12

Road and Section	6.00 am to 7.00 am ^A		5.00 pm to 6.00 pm ^A		Daily ^B	
	Light	Heavy	Light	Heavy	Light	Heavy
Blue Vale Road / Blue Vale Road realignment Kamilaroi Highway to Project Access	101	4	101	4	692	56
Blue Vale Road realignment Project Access to Shannon Harbour Road	68	2	68	2	380	16
Blue Vale Road realignment Shannon Harbour Road to Hoad Lane	55	2	56	2	318	16
Approved Road Transport Route Hoad Lane (south-east) to Rangari Road	55	2	56	2	318	16
Kamilaroi Highway Blue Vale Road to Gunnedah	101	4	101	4	692	56
Kamilaroi Highway Rangari Road to Narrabri	22	0	22	0	130	8
Kamilaroi Highway Boggabri to Rangari Road	33	2	34	2	188	8
Rangari Road Kamilaroi Highway to Approved Road Transport Route	55	2	56	2	318	16
Rangari Road on Approved Road Transport Route	55	2	56	2	318	16
Shannon Harbour Road Blue Vale Road realignment to Wean Road	13	0	12	0	62	0
Wean Road Shannon Harbour Road to Manilla	13	0	12	0	62	0
Project Access Road	169	6	169	6	1,072	72

^A vehicles per hour

^B vehicles per day

8.5 Year 12 Other ROM Coal Haulage with Project

Unrelated to the Project, during Year 12, haulage of ROM coal is expected to occur from the Tarrawonga Coal Mine to the Project CHPP. The Rocglen Coal Mine would have ceased operating by Year 12, thus its contribution to traffic conditions would also cease.

The baseline conditions assume that up to 3.0 Mtpa of ROM coal is transported by road from the Tarrawonga Coal Mine to the Whitehaven CHPP. In Year 12 of the Project, approximately 3.0 Mtpa of ROM coal from Tarrawonga Coal Mine is expected to be transported to the Project CHPP, using the Approved Road Transport Route.

Coal haulage from the Tarrawonga Coal Mine to the Project CHPP would occur on the Approved Road Transport Route, within the approved coal haulage hours. During Year 12 of the Project, the Tarrawonga Coal Mine would generate an average of approximately 262 truck departures per weekday to the Project CHPP, which would be matched by the return of the vehicles. ROM coal haulage from the Tarrawonga Coal Mine to the Project CHPP would, therefore, generate an average of 524 vehicle trips per weekday. Table 8.3 summarises the forecast truck movements associated with the transport of ROM coal from Tarrawonga Coal Mine to the Project CHPP in Year 12, and compares this with the forecast movements under the baseline conditions (Section 5).

Table 8.3: Indicative ROM Coal Haulage from Tarrawonga Coal Mine – Year 12 (with and without the Project)

Road and Section	6.00 am to 7.00 am ^A		6.00 pm to 7.00 pm ^A		Daily ^B	
	No Project	Project	No Project	Project	No Project	Project
Approved Road Transport Route Tarrawonga Coal Mine Access to Rangari Road	34	34	34	34	524	524
Rangari Road on Approved Road Transport Route	34	34	34	34	524	524
Approved Road Transport Route Rangari Road to Hoad Lane	34	34	34	34	524	524
Blue Vale Road realignment Hoad Lane to Project Access	34	34	34	34	524	524
Blue Vale Road / realignment Project Access to Kamilaroi Highway	34	0	34	0	524	0
Kamilaroi Highway Blue Vale Road to Whitehaven CHPP Access	34	0	34	0	524	0

^A heavy vehicles per hour

^B heavy vehicles per day

9. Future Traffic Conditions with the Project

9.1 Future Traffic Volumes

9.1.1 Year 1 Future Traffic Volumes

The cumulative implications of the various developments and background growth in Year 1 (nominally 2019) have been determined, and the resulting peak hourly and daily traffic volumes for key locations are summarised in Table 9.1. As noted, as a 'maximum case' assessment of traffic on all sections of the Approved Road Transport Route, this scenario assumes simultaneous maximum ROM coal haulage from each of the possible sources (3.0 Mtpa from Tarrawonga Coal Mine, 1.5 Mtpa from Rocglen Coal Mine and 3.5 Mtpa from the Project), with a cumulative maximum of 3.5 Mtpa applied. It also assumes the Project construction workforce all travel by private vehicle. The reported volumes on the northern and eastern legs of the Approved Road Transport Route would, therefore, not occur simultaneously.

Table 9.1: Indicative Average Weekday Peak Hourly and Daily Traffic – 2019 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Highway	69	46	79	51	1,218	987
C	Blue Vale Road South of Shannon Harbour Road	284	43	36	18	436	822
G	Kamilaroi Highway South-east of Blue Vale Road	134	52	172	77	2,699	1,524
H	Kamilaroi Highway North-west of Blue Vale Road	77	56	60	81	1,275	1,523
I	Kamilaroi Highway South of Rangari Road	439	28	421	26	3,017	505
J	Rangari Road East of Kamilaroi Highway	254	1	248	0	850	81
K	Rangari Road East of Approved Road Transport Route	29	0	23	0	198	6
L	Rangari Road West of Approved Road Transport Route	320	31	276	22	1,089	431
M	Shannon Harbour Road East of Hoad Lane	7	18	7	20	89	145
O	Wean Road South of Rangari Road	3	1	2	1	35	18
P	Kamilaroi Highway North of Rangari Road	191	42	163	41	2,298	810
S	Blue Vale Road realignment South of Project Access	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Project Access	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	278	35	273	34	808	578
V	Rangari Road On Approved Road Transport Route	309	35	298	34	996	584

W1	Main Site Construction Access off Braymont Road	267	0	267	0	816	74
X	Hoad Lane North of Shannon Harbour Road	284	36	253	35	876	685
Y	Shannon Harbour Road East of Blue Vale Road realignment	7	18	7	20	89	145
Z	Kamilaroi Highway South of Boggabri	104	56	87	81	1,329	1,517
-	Rail Over Road Crossing Construction Access off Kamilaroi Highway	33	0	33	0	102	10

^A refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

9.1.2 Year 2 Future Traffic Volumes

The cumulative implications of the various developments and background growth in Year 2 (nominally 2020) have been determined, and the resulting peak hourly and daily traffic volumes for key locations are summarised in Table 9.2. As noted, as a 'maximum case' assessment of traffic on all sections of the Approved Road Transport Route, this scenario assumes simultaneous maximum ROM coal haulage from each of the possible sources (3.0 Mtpa from Tarrawonga Coal Mine, 1.5 Mtpa from Rocglen Coal Mine and 3.5 Mtpa from the Project), with a cumulative maximum of 3.5 Mtpa applied. The reported volumes on the northern and eastern legs of the Approved Road Transport Route would, therefore, not occur simultaneously.

Table 9.2: Indicative Average Weekday Peak Hourly and Daily Traffic – 2020 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Highway	57	46	59	51	1,117	938
C	Blue Vale Road South of Shannon Harbour Road	56	44	15	18	328	770
G	Kamilaroi Highway South-east of Blue Vale Road	121	52	150	77	2,587	1,472
H	Kamilaroi Highway North-west of Blue Vale Road	75	56	58	81	1,262	1,528
I	Kamilaroi Highway South of Rangari Road	205	28	185	26	2,442	499
J	Rangari Road East of Kamilaroi Highway	22	1	12	0	269	66
K	Rangari Road East of Approved Road Transport Route	29	0	23	0	198	6
L	Rangari Road West of Approved Road Transport Route	88	31	40	22	507	417
M	Shannon Harbour Road East of Hoad Lane	11	18	9	20	103	146
O	Wean Road South of Rangari Road	6	1	4	1	48	18
P	Kamilaroi Highway North of Rangari Road	196	42	166	41	2,314	808
S	Blue Vale Road realignment South of Project Access	n/a	n/a	n/a	n/a	n/a	n/a

T	Blue Vale Road realignment North of Project Access	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	46	35	37	34	224	562
V	Rangari Road On Approved Road Transport Route	77	35	62	34	412	568
W	Project Access Road off Blue Vale Road	26	40	12	40	134	614
X	Hoad Lane North of Shannon Harbour Road	56	36	19	35	306	672
Y	Shannon Harbour Road East of Blue Vale Road realignment	11	18	9	20	103	146
Z	Kamilaroi Highway South of Boggabri	75	56	58	81	1,262	1,528

^A refer to Figure 1-1

^B vehicles per hour

^C vehicles per day

9.1.3 Year 12 Future Traffic Volumes

The cumulative implications of the various developments and background growth in Year 12 have been determined, and the resulting peak hourly and daily traffic volumes for key locations are summarised in Table 9.3. These results assume that the peak traffic generation of the Project during the evening peak hour would occur between 6.00 pm and 7.00 pm, and thus coincide with the peak generation of the other activity in the region.

Table 9.3: Indicative Average Weekday Peak Hourly and Daily Traffic – 2030 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am ^B		6.00 pm to 7.00 pm ^B		Daily ^C	
		Light	Heavy	Light	Heavy	Light	Heavy
B	Blue Vale Road North-east of Kamilaroi Highway	146	13	158	19	1,822	439
C	Blue Vale Road South of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
G	Kamilaroi Highway South-east of Blue Vale Road	238	40	257	46	3,423	1,020
H	Kamilaroi Highway North-west of Blue Vale Road	105	82	63	88	1,375	1,666
I	Kamilaroi Highway South of Rangari Road	536	62	226	30	2,766	549
J	Rangari Road East of Kamilaroi Highway	72	3	66	2	576	85
K	Rangari Road East of Approved Road Transport Route	43	0	25	0	205	7
L	Rangari Road West of Approved Road Transport Route	155	37	92	26	811	469
M	Shannon Harbour Road East of Hoad Lane	21	1	21	4	161	71
O	Wean Road South of Rangari Road	16	1	14	1	101	19
P	Kamilaroi Highway North of Rangari Road	516	74	193	44	2,578	884

S	Blue Vale Road realignment South of Project Access	150	10	115	10	962	257
T	Blue Vale Road realignment North of Project Access	117	41	82	40	650	724
U	Approved Road Transport Route South of Rangari Road	93	37	89	36	496	604
V	Rangari Road On Approved Road Transport Route	138	37	114	36	709	678
W	Project Access Road Off Blue Vale Road realignment	169	40	169	40	1,072	596
X	Hoad Lane North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a
Y	Shannon Harbour Road East of Blue Vale Road realignment	21	1	21	4	161	71
Z	Kamilaroi Highway South of Boggabri	105	82	63	88	1,375	1,666

^a refer to Figure 1-1

^b vehicles per hour

^c vehicles per day

9.2 Road Network Performance

9.2.1 Year 1 Road Network Performance

The operational performance of the road network has been assessed for the forecast future conditions with the Project and the results for key locations are summarised in Table 9.4.

Table 9.4: Indicative Average Weekday Midblock Road Performance – 2019 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS						
B	Blue Vale Road North-east of Kamilaroi Highway	32	A	11	A	19	A	29	A
C	Blue Vale Road South of Project Access	7	A	52	B	10	A	26	A
G	Kamilaroi Highway South-east of Blue Vale Road ^B	39 (62)	B (A)	12 (61)	A (A)	24 (60)	A (A)	40 (60)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	31 (62)	A (A)	15 (62)	A (A)	20 (61)	A (A)	31 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	60 (59)	C (A)	11 (59)	A (A)	14 (59)	A (A)	57 (60)	C (A)
J	Rangari Road East of Kamilaroi Highway	50	B	2	A	3	A	49	B
K	Rangari Road East of Approved Road Transport Route	8	A	24	A	24	A	6	A
L	Rangari Road West of Approved Road Transport Route	53	B	14	A	9	A	50	B
M	Shannon Harbour Road East of Hoad Lane	21	A	12	A	15	A	19	A
O	Wean Road South of Rangari Road	9	A	20	A	17	A	13	A
P	Kamilaroi Highway North of Rangari Road	42 (61)	B (A)	17 (60)	A (A)	17 (61)	A (A)	38 (62)	B (A)
S	Blue Vale Road realignment South of Project Access	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Project Access	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	13	A	50	B	51	B	7	A
V	Rangari Road On Approved Road Transport Route	51	B	20	A	12	A	51	B
W1	Project Access Off Braymont Road	0	A	53	B	53	B	0	A
X	Hoad Lane North of Shannon Harbour Road	7	A	52	B	50	B	5	A
Y	Shannon Harbour Road East of Blue Vale Road realignment	21	A	12	A	15	A	19	A
Z	Kamilaroi Highway South of Boggabri	28 (62)	A (A)	23 (62)	A (A)	26 (61)	A (A)	26 (61)	A (A)

^A refer to Figure 1-1 ^B percent c mi/h ^D indicative result only, HCM model doesn't strictly apply due to lane arrangements on this road

The results demonstrate that the forecast conditions are expected to remain at satisfactory levels with the Project in Year 1.

9.2.2 Year 2 Road Network Performance

The operational performance of the road network has been assessed for the forecast future conditions with the Project (Year 2) and the results for key locations are summarised in Table 9.5.

Table 9.5: Indicative Average Weekday Midblock Road Performance – 2020 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSF ^B (ATS ^C)	LOS						
B	Blue Vale Road North-east of Kamilaroi Highway	29	A	12	A	23	A	22	A
C	Blue Vale Road South of Project Access	13	A	29	A	22	A	13	A
G	Kamilaroi Highway South-east of Blue Vale Road ^B	37 (62)	B (A)	13 (61)	A (A)	28 (60)	A (A)	36 (61)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	32 (62)	A (A)	16 (62)	A (A)	20 (61)	A (A)	30 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	43 (61)	B (A)	12 (60)	A (A)	18 (61)	A (A)	38 (62)	B (A)
J	Rangari Road East of Kamilaroi Highway	20	A	14	A	25	A	0	A
K	Rangari Road East of Approved Road Transport Route	8	A	24	A	24	A	6	A
L	Rangari Road West of Approved Road Transport Route	22	A	23	A	25	A	13	A
M	Shannon Harbour Road East of Hoad Lane	21	A	14	A	15	A	20	A
O	Wean Road South of Rangari Road	4	A	22	A	10	A	20	A
P	Kamilaroi Highway North of Rangari Road	42 (61)	B (A)	18 (60)	A (A)	17 (61)	A (A)	38 (61)	B (A)
S	Blue Vale Road realignment South of Project Access	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T	Blue Vale Road realignment North of Project Access	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U	Approved Road Transport Route South of Rangari Road	27	A	14	A	22	A	18	A
V	Rangari Road On Approved Road Transport Route	11	A	32	A	24	A	20	A
W	Project Access Off Blue Vale Road	13	A	27	A	15	A	23	A
X	Hoad Lane North of Shannon Harbour Road	12	A	29	A	18	A	19	A
Y	Shannon Harbour Road East of Blue Vale Road realignment	21	A	14	A	15	A	20	A
Z	Kamilaroi Highway South of Boggabri	32 (62)	A (A)	16 (62)	A (A)	20 (61)	A (A)	30 (62)	A (A)

^A refer to Figure 1-1 ^B percent c mi/h ^D indicative result only, HCM model doesn't strictly apply due to lane arrangements on this road

The results demonstrate that the forecast conditions are expected to remain at satisfactory levels with the Project in Year 1.

9.2.3 Year 12 Network Performance

The operational performance of the road network has been assessed for the forecast future conditions with the Project during Year 12 and the results for key locations are summarised in Table 9.6.

Table 9.6: Indicative Average Weekday Midblock Road Performance – 2030 with the Project

Site ^A	Road and Location	6.00 am to 7.00 am				6.00 pm to 7.00 pm			
		North or Eastbound		South or Westbound		North or Eastbound		South or Westbound	
		PTSFB ^B (ATS ^C)	LOS						
B	Blue Vale Road North-east of Kamilaroi Highway	38	A	7	A	26	A	27	A
C	Blue Vale Road South of Project Access	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
G	Kamilaroi Highway South-east of Blue Vale Road ^D	46 (61)	B (A)	16 (60)	A (A)	33 (60)	A (A)	42 (60)	B (A)
H	Kamilaroi Highway North-west of Blue Vale Road	34 (61)	A (A)	22 (61)	A (A)	21 (61)	A (A)	31 (62)	A (A)
I	Kamilaroi Highway South of Rangari Road	61 (57)	C (A)	46 (58)	B (A)	22 (60)	A (A)	41 (61)	B (A)
J	Rangari Road East of Kamilaroi Highway	30	A	8	A	23	A	17	A
K	Rangari Road East of Approved Road Transport Route	13	A	23	A	24	A	7	A
L	Rangari Road West of Approved Road Transport Route	34	A	23	A	26	A	20	A
M	Shannon Harbour Road East of Hoad Lane	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
O	Wean Road South of Rangari Road	2	A	25	A	16	A	15	A
P	Kamilaroi Highway North of Rangari Road	57 (57)	C (A)	52 (58)	C (A)	21 (60)	A (A)	40 (61)	B (A)
S	Blue Vale Road realignment South of Project Access	32	A	19	A	24	A	22	A
T	Blue Vale Road realignment North of Project Access	10	A	37	A	24	A	22	A
U	Approved Road Transport Route South of Rangari Road	22	A	26	A	26	A	22	A
V	Rangari Road On Approved Road Transport Route	25	A	29	A	26	A	24	A
W	Project Access Off Blue Vale Road realignment	10	A	42	B	30	A	29	A
X	Hoad Lane North of Shannon Harbour Road	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Y	Shannon Harbour Road East of Blue Vale Road realignment	14	A	19	A	15	A	19	A
Z	Kamilaroi Highway South of Boggabri	26 (63)	A (A)	8 (63)	A (A)	22 (63)	A (A)	7 (63)	A (A)

^A Refer to Figure 1-1 ^B percent c mi/h ^D indicative result only, HCM model doesn't strictly apply due to lane arrangements on this road

The results demonstrate that the forecast conditions are expected to remain at satisfactory levels with the Project in Year 12.

9.2.4 Impact of the Project on Operational Performance

By comparing the forecast midblock operational conditions with and without the Project, the impacts of the Project on the road conditions experienced by drivers during the peak hours can be identified.

During Year 1, the Project can be expected to impact the LOS compared with the baseline conditions experienced by drivers at the following locations:

- Kamilaroi Highway south of Rangari Road from B to C, northbound in the morning peak and southbound in the evening peak;
- Approved Road Transport Route from A to B, southbound in the morning peak and northbound in the evening peak; and
- Rangari Road between Kamilaroi Highway and the Approved Road Transport Route (including Rangari Road on the Approved Road Transport Route) from A to B, eastbound in the morning peak and westbound in the evening peak.

During Year 2, the Project can be expected to impact the LOS compared with the baseline conditions experienced by drivers at the following locations:

- Kamilaroi Highway south of Boggabri improves from B to A northbound in the morning peak hour.

During Year 12, the Project can be expected to impact the LOS compared with the baseline conditions experienced by drivers at the following locations:

- Blue Vale Road north-east of Kamilaroi Highway from B to A (improved) northbound during the evening peak hour.

9.3 Impact on Railway Level Crossings

With regard to generation of train movements, the main impact of the Project would be that, after commissioning of the Project rail spur, rather than loading at the Whitehaven CHPP on the Whitehaven CHPP rail loop near Gunnedah, the trains intending to carry coal sourced from the Project coal handling facilities would continue along the Werris Creek Mungindi Railway past the Whitehaven CHPP rail loop, on to the Project rail spur and rail loop. The laden trains would return along the same route.

The Project would thus generate additional train movements along that portion of the Werris Creek Mungindi Railway between the Whitehaven CHPP rail loop and the junction for the Project rail spur, and on the Project rail spur off the Werris Creek Mungindi Railway. The increase in total coal haulage would increase train movements south of the Project rail spur junction.

With regard to the road network, the Project rail spur and rail loop would introduce a new rail over road crossing at the Kamilaroi Highway, approximately 15 km south-east of Boggabri.

In Year 12, the Project is expected to result in an average of five laden trains per day from the Project rail spur, or 10 train movements per day on the main line south of the Project rail spur. Table 9.7 summarises the estimated train movements with the Project in Year 12 with the Project.

Table 9.7: Indicative Daily Train Movements on the Werris Creek Mungindi Railway in Year 12

	Werris Creek Mungindi Railway North of Whitehaven CHPP Junction		Werris Creek Mungindi Railway South of Whitehaven CHPP Junction	
	Average	Peak	Average	Peak
Boggabri Coal Mine	5.5	5.5	5.5	5.5
Cotton, grain and general freight	9	9	9	9
Narrabri Coal Mine	8	16	8	16
XPT Passenger	2	2	2	2
Maules Creek Coal Mine	10	20	10	20
Approved Mine/Project ^A	10	16	10	16
Total per Day	44.5	68.5	44.5	68.5
Average per Hour	1.9	2.9	1.9	2.9

^A includes transport of product coal sourced from Tarrawonga Coal Mine

Thus, with peak conditions in 2030, it is estimated that there would be an average of 2.9 train movements per hour with the Project both north and south of the Whitehaven CHPP junction, and as far north as the Project rail spur junction. At peak times, the Project rail spur would carry an average of 0.7 train movements per hour. The impact of these changes on the likelihood of road traffic being delayed by rail traffic has been reassessed using the same methodology as described in Section 5.9, and the results are summarised in Table 9.8.

Table 9.8: Probability of Delay to Vehicles at Level Crossings Year 12 With Project

Level Crossing	Vehicles per Hour	Vehicle Travel Speed (km/h)	Trains per Hour	Probability of Delay (percent)
526 "Rothsay" Access Emerald Hill (passive)	20	20	2.9	0.69
527 Gunnedah Road Emerald Hill (active)	20	50	2.9	0.16
529 Boston Street Boggabri (active) ^A	120	50	2.2	0.72

^A Project trains would not pass through Boggabri, allowance made for additional road traffic increase with the Project

The results indicate that, with the Project, the probability of a vehicle being delayed by a train on the level crossings outside of Gunnedah is expected to remain low. The highest probability is estimated at the Boston Street level crossing, at 0.72 percent, which is equivalent to 1 in 138. This assumes that the majority of vehicle trips made between Boggabri and the Project would travel through that level crossing, which overestimates future traffic volumes through the level crossing. With lower traffic volumes, the probability of delay would also be lower.

9.4 Road Safety Implications

The increase in traffic expected to occur on the road network as a result of changes directly associated with the Project, and unrelated to the Project would typically result in an increase in exposure to crashes, with a corresponding increase in the number of crashes.

The review of historic crashes in the region (Section 4.3) did not highlight any particular causation factors on the Approved Road Transport Route or Rangari Road, thus the Project traffic is not expected to exacerbate any specific safety concerns at any particular location.

9.5 Changes to Local Road Network

As described in Section 3.2, the Project would include the Blue Vale Road realignment and the closure of a section of Shannon Harbour Road and Braymont Road.

The Blue Vale Road realignment was approved as part of the Approved Mine, and the Project would not significantly alter traffic conditions, aside from the forecast changes in traffic volumes travelling along the realigned road. The Blue Vale Road realignment, in consultation with the Gunnedah and Narrabri Shire Councils, would consist of a sealed two-lane road, suitable for use by heavy vehicles.

The section of Shannon Harbour Road west of its intersection with the Blue Vale Road realignment would be closed as part of the realignment of Blue Vale Road. There is no privately-owned land on this section of road, and the existing Blue Vale Road would remain accessible via the Blue Vale Road realignment.

The closure of approximately 3.5 km of Braymont Road west of Blue Vale Road would impact its use as a through route from Boggabri and its surrounds to Blue Vale Road. Through traffic currently using Braymont Road would divert to Hoad Lane to access Blue Vale Road, with an overall increase in travel distance of approximately 6 km, including the impact of the Blue Vale Road realignment. The traffic surveys (Table 4.1) indicate that Braymont Road carried 274 vehicles per day in 2011, with peak hourly traffic of 34 and 12 vehicles per hour during the morning and evening peaks, respectively. A portion of this would be through traffic, and is considered sufficiently low that the impact on conditions experienced by drivers on Hoad Lane and Blue Vale Road would be negligible.

There is no privately-owned land along the section of Braymont Road proposed to be closed. A Crown Land parcel located adjacent to the Namoi River, which is currently accessed from Braymont Road from both the north and south, would continue to be accessible from the north, with a resulting increase in travel distance for access from the south.

9.6 Blasting

As described in Section 3.5, during mining operations there would be occasions when blasting would be required within 500 m of Blue Vale Road, Hoad Lane, Braymont Road, and the Blue Vale Road realignment. Approvals would be sought from the Gunnedah Shire Council and/or Narrabri Shire Council to temporarily close sections of the local roads (depending on the location of the road closure) to allow blasting to occur.

It is recommended that the existing Whitehaven Traffic Management Plan be revised to include the Project in consultation with the Gunnedah Shire Council and Narrabri Shire Council to manage road closures due to blasting, including aspects such as signage and notification processes, and emergency services access.

9.7 Road Maintenance

Whitehaven has entered into road maintenance agreements with both Narrabri Shire Council and Gunnedah Shire Council for the public road sections of the Approved Road Transport Route.

The road maintenance agreement with Narrabri Shire Council covers the section of the Approved Road Transport Route within the Narrabri Shire Local Government Area, and requires the road and intersections to be maintained in good condition at all times at Whitehaven's cost.

Maintenance requirements are determined through joint inspections carried out every four months.

The road maintenance agreement with the Gunnedah Shire Council covers the maintenance of roads used by Whitehaven (in particular Hoad Lane and Blue Vale Road) in association with the Whitehaven mines and facilities in the region, e.g. the Whitehaven CHPP and the Tarrowonga and Rocglen Coal Mines.

It is anticipated that these road maintenance agreements would remain in place for the sections of the Approved Road Transport Route that would be utilised for the Project (i.e. initial road transport to the Whitehaven CHPP and the transport of ROM coal from other Whitehaven mines).

In addition, it is anticipated that Whitehaven would enter into a Voluntary Planning Agreement with the Narrabri Shire Council and Gunnedah Shire Council for the Project.

9.8 School Buses

Whitehaven's existing Traffic Management Plan considers interaction with school buses. This Plan will be revised to include the Project.

9.9 Public Transport and Alternative Transport Modes

There are no public transport services to or from the Project or its surrounds, thus the Project would have no impact on public transport services.

As the Project is located wholly outside of the Narrabri, Gunnedah and Boggabri walking (2 km) and cycling (5 km) catchments as outlined in the *New England North West Regional Transport Plan* (Transport for NSW, 2013a), the Project is not expected to have any significant impacts on alternative transport modes.

9.10 Car Parking

During the construction stage, car parking facilities at the mine infrastructure area and temporary parking in the vicinity would be utilised.

Car parking for employees and visitors during operational stages would be located in the mine infrastructure area and/or secondary infrastructure areas (Figure 3-1).

9.11 Oversize Vehicles

A number of oversize vehicle movements may be generated on an occasional basis during the life of the Project. These oversize vehicle movements would be associated with the transport of mining equipment and infrastructure to and from the Project.

The proposed movement for any oversize vehicles would be negotiated with RMS and relevant local councils on a case-by-case basis. All oversize loads would be transported with the relevant permits obtained in accordance with *Additional Access Conditions for oversize and overmass heavy vehicles and loads* (RMS, 2017), and any other licences and escorts as required by the regulatory authorities.

9.12 Dangerous Goods

The transportation, handling and storage of all dangerous goods at the Project would be conducted in accordance with the requirements of the *Storage and Handling of Dangerous Goods – Code of Practice 2005* (WorkCover, 2005).

Dangerous goods required for the Project would be transported in accordance with the appropriate State legislation.

9.13 Impacts during Decommissioning Phase

Rehabilitation would be conducted progressively during the Project; however, following conclusion of operations, it is expected that there would be a period of final rehabilitation and decommissioning of remaining Project infrastructure. This would involve some continued heavy and light vehicle usage of the surrounding road network that would involve materially lower employee traffic volumes than during the peak operational phase. Traffic impacts during the final rehabilitation and decommissioning phase would be substantially less than assessed herein for the peak operational phase. Decommissioning of Project road and rail infrastructure is described in Section 5 of the Main Report of the EIS.

9.14 Consideration of NSW Government Transport Policy

9.14.1 NSW Long Term Transport Master Plan

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) sets the framework for the NSW Government to deliver an integrated, modern transport system. The associated regional sub-plan for the Project area is the *New England North West Regional Transport Plan* (Transport for NSW, 2013a).

Amongst other things, these plans aim to deliver a transport system that provides a safer road transport system and enables businesses and services to operate efficiently and prosper in regional areas (Transport for NSW, 2012 and Transport for NSW, 2013a).

The Project is not expected to exacerbate any specific safety concerns at any particular locations.

9.14.2 NSW Freight and Ports Strategy

The *NSW Freight and Ports Strategy* (Transport for NSW, 2013b) outlines how Transport for NSW will work with commercial interests and across government to provide both an efficient network and a framework for managing growth.

As discussed in Section 3.1 in the Main Report of the EIS, Whitehaven consulted with RailCorp, Transport for NSW and Newcastle Port Corporation in relation to the Project.

9.15 Mitigation Measures

This assessment has found that the existing road system would satisfactorily accommodate the expected future traffic generated by the Project without need for additional specific measures or upgrades.

The existing Traffic Management Plan for the Whitehaven operations should be revised before commencement of operations at the Project, in consultation with RMS, the Gunnedah Shire Council and Narrabri Shire Council.

Where new roads and intersections are to be constructed for the Project, these should be designed and constructed in accordance with Austroads Guide to Road Design requirements, and in consultation with Narrabri Shire Council and Gunnedah Shire Council as relevant.

Where new railway crossings are to be constructed for the Project, these should be designed and constructed in accordance with the Australian Standard and in consultation with the relevant authorities.

10. Conclusions

This study has examined the likely road transport implications of the Project. It is concluded that no specific measures or upgrades to mitigate the impacts of the development on the capacity, safety and efficiency of the road network would be required as a result of the changed road traffic conditions associated with the Project.

The existing Traffic Management Plan for the Whitehaven operations should be revised before commencement of operations at the Project, in consultation with RMS, the Gunnedah Shire Council and Narrabri Shire Council.

Where new roads and intersections are to be constructed for the Project, these should be designed and constructed in accordance with Austroads Guide to Road Design requirements and in consultation with Narrabri Shire Council and Gunnedah Shire Council as relevant.

Where the new rail over road crossing is to be constructed for the Project, this should be designed and constructed in accordance with the Australian Standard and in consultation with the relevant authorities.

Attachment A

Relevant Agency Input to the SEARs

Table A.1: Transport for NSW Comments for the SEARs

Agency	Description	Addressed in
Transport for NSW	<i>The following assessments requirements should be addressed in the EIS for the proposed Vickery Extension Project.</i>	
	Environmental Planning Instruments, Policies and Guidelines <i>Address the relevant provisions, goals and strategic objectives in the following:</i>	Section 6 of EIS
	<ul style="list-style-type: none"> • <i>State Environmental Planning Policy (Infrastructure) 2007</i> 	Section 6.4 of EIS
	<ul style="list-style-type: none"> • <i>Roads Act 1993</i> 	Section 6.3 of EIS
	<ul style="list-style-type: none"> • <i>NSW State Priorities</i> 	Section 6 of EIS
	<ul style="list-style-type: none"> • <i>NSW Long Term Transport Master Plan (TfNSW 2012)</i> 	Section 9.14 of this Report
	<ul style="list-style-type: none"> • <i>NSW Freight and Ports Strategy (TfNSW 2013)</i> 	Section 9.14 of this Report
	<ul style="list-style-type: none"> • <i>Guide to Traffic Generating Developments (RTA 2002)</i> 	Throughout this Report
	<ul style="list-style-type: none"> • <i>Rail Infrastructure Noise Guidelines (EPA 2013)</i> 	Appendix D of EIS
	<ul style="list-style-type: none"> • <i>NSW Industrial Noise Policy (EPA 2000)</i> 	Appendix D of EIS
	<ul style="list-style-type: none"> • <i>New England North West Regional Transport Plan (TfNSW 2013)</i> 	Section 9.14 of this Report
	<ul style="list-style-type: none"> • <i>Construction of New Level Crossing Policy (TfNSW)</i> 	Section 4.4 of this Report
	<ul style="list-style-type: none"> • <i>Australian Standards, Austroads Guidelines and RMS Supplements</i> 	Throughout this Report
	Project Description	
	<i>Provide details of the project including:</i>	
	<ul style="list-style-type: none"> • <i>Likely staging of the development, including construction and operational stages.</i> 	Section 2.4 of EIS
	<ul style="list-style-type: none"> • <i>The resource to be extracted, demonstrating efficient resource recovery within environmental constraints.</i> 	Sections 2.3 and 2.4 of EIS
	<ul style="list-style-type: none"> • <i>Minerals processing and transport.</i> 	Sections 2.8 and 2.9 of EIS
	<ul style="list-style-type: none"> • <i>Proposed infrastructure and facilities (including any existing infrastructure or infrastructure that would be required for the development, but the subject of a separate approvals process).</i> 	Section 2.14 of EIS
	<ul style="list-style-type: none"> • <i>The proposed interactions between the development and the approved operations at the Vickery Mine.</i> 	Section 2.1 of EIS
	<ul style="list-style-type: none"> • <i>The likely interactions between the development and any other existing approved or proposed mining development in the vicinity of the site.</i> 	Section 2.5 of EIS

Table A.1: Transport for NSW Comments for the SEARs (Continued)

Agency	Description	Addressed in
Transport for NSW (continued)	<p>Transport and Accessibility: Undertake a transport and accessibility assessment, which details:</p> <p><i>Rail</i></p>	
	<ul style="list-style-type: none"> Detailed design and engineering drawings of the proposed rail spur, rail loop and other associated infrastructure, including staging likely works of construction and operation. 	Section 2 of EIS
	<ul style="list-style-type: none"> Details of train operating plans, including likely rail routes and destinations, train size and configuration, service frequency, anticipated train path requirements, expected ramp up periods and peak demand. 	Section 2.9 of EIS
	<ul style="list-style-type: none"> Demonstrated engagement with and confirmation from all relevant rail network owners and coal terminals regarding train path availability and future network enhancements which may be required to support the proposed operations and maintain sufficient capacity for other rail network users over the life of the project. 	Section 3.1.5 of EIS
	<ul style="list-style-type: none"> Detailed assessment of the proposed project on the capacity, efficiency and safety of the rail networks, including level crossings. 	Section 3 of EIS and Section 9.3 of this Report
	<ul style="list-style-type: none"> Assessment of the noise impacts of rail and siding operations in line with relevant NSW noise policy and guidelines. 	Appendix D of EIS
	<p><i>Road</i></p>	
	<ul style="list-style-type: none"> Accurate predictions of the road traffic generated by the development during construction and operation, including details of transport routes and types of vehicles likely to be used, and expected ramp up period. 	Sections 6 to 9 of this Report
	<ul style="list-style-type: none"> The daily and peak vehicle movements impact on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works (if required). 	Section 9 of this Report
	<ul style="list-style-type: none"> Details on access to the site from the road network, including intersection location, design and sight distance. 	Sections 2 and 3 of this Report
	<ul style="list-style-type: none"> An assessment of potential traffic impacts on the safety and efficiency of the road network and public transport services, including railway crossings that would be impacted and detail of measures to mitigate any impacts. 	Section 9 of this Report
	<ul style="list-style-type: none"> A description and plans of any road upgrades required for the development. 	Section 2 of EIS and Section 9.5 of this Report
	<ul style="list-style-type: none"> Detailed plans of the proposed layout of the internal road network and parking on site in accordance with the relevant Australian standards. 	Section 2 of EIS
	<ul style="list-style-type: none"> Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times), with particular regard to dangerous goods (explosives, fuel and chemicals). 	Section 9 of this Report
<ul style="list-style-type: none"> Traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, public transport, road safety, active transport and railway including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of any impact. Active and public transport, access and facilities should be maintained at all times. Should closure of these facilities be required, adequate safety and diversion measures should be put in place to limit time delay and detour distances. 	Sections 6 and 9.15 of this Report	
<ul style="list-style-type: none"> An assessment of the likely road noise impacts of the development under the NSW Road Noise Policy. 	Appendix D of EIS	

Table A.2: Roads and Maritime Services Comments for the SEARs

Agency	Description	Addressed in
NSW Roads and Maritime Services (RMS)	<i>Roads and Maritime requests that the Environmental Assessment be supported by a Traffic Impact Assessment (TIA) prepared by a suitably qualified person in accordance with Austroads Guide to Traffic Management Part 12, the Complementary Roads and Maritime Supplement and RTA Guide to Traffic Generating Developments. The TIA is to address the following;</i>	Throughout this Report
	<ul style="list-style-type: none"> • <i>The total impact of existing and proposed development on the road network with consideration for a 10 year horizon.</i> 	Section 9 of this Report
	<ul style="list-style-type: none"> • <i>The volume and distribution of traffic generated by the proposed development.</i> 	Sections 6, 7 and 8 of this Report
	<ul style="list-style-type: none"> • <i>Intersection sight distances at key intersections along the primary haul route.</i> 	Section 4.3 of this Report
	<ul style="list-style-type: none"> • <i>Existing and proposed site access standards.</i> 	Sections 3 and 9 of this Report
	<ul style="list-style-type: none"> • <i>Details of proposed improvements to affected intersections.</i> 	Section 9 of this Report
	<ul style="list-style-type: none"> • <i>Impact of rail corridors on the road network and details of proposed interface treatments.</i> 	Section 9 of this Report
	<ul style="list-style-type: none"> • <i>Details of servicing and parking arrangements.</i> 	Section 9 of this Report
	<ul style="list-style-type: none"> • <i>Impact on public transport (public and school bus routes) and consideration for alternative transport modes such as walking and cycling.</i> 	Section 9 of this Report
	<ul style="list-style-type: none"> • <i>Impacts of road traffic noise and dust generated along the primary haul route/s.</i> 	Appendix D and Appendix E of EIS
	<ul style="list-style-type: none"> • <i>Consideration for Clause 16(1) of the Mining SEPP regarding;</i> <ul style="list-style-type: none"> o <i>Impact on school zones and residential areas.</i> o <i>Code of Conduct for haulage operators.</i> o <i>Road safety assessment of key haulage route/s.</i> 	Attachment 5 of EIS
	<i>Should Council wish to condition the preparation of a Code of Conduct for haulage operators, this could include, but not be limited to;</i>	Section 9.15 of this Report
	a) <i>A map of the primary haulage routes highlighting critical locations.</i>	Section 9.15 of this Report
	b) <i>Safety initiatives for haulage through residential areas and/or school zones.</i>	Section 9.15 of this Report
	c) <i>An induction process for vehicle operators & regular toolbox meetings.</i>	Section 9.15 of this Report
	d) <i>A complaint resolution and disciplinary procedure.</i>	Section 9.15 of this Report
	e) <i>Any community consultation measures for peak haulage periods.</i>	Section 9.15 of this Report
	<i>Where road safety concerns are identified at a specific location along the identified haulage route/s, Roads and Maritime suggests that the TIA be supported by a targeted Road Safety Audit undertaken by suitably qualified persons.</i>	Section 9.15 of this Report

Table A.3: Local Government Authorities Comments for the SEARs

Agency	Description	Addressed in
Gunnedah Shire Council	<p>Road Infrastructure</p> <p>...</p> <p>Council is the Road Authority for this local road network. Council requires all realignments, adjustments and proposed closures of the public road network in the environs of the project to be completed as part of the construction phase of the project and to be funded by the Proponent and designed and constructed subject to Council's approval. The traffic impact assessment should also provide a detailed analysis of the impact of the proposed road closure on local traffic movements.</p>	Section 9 of this Report
	<p>Kamilaroi Highway Overpass</p> <p>... Table 1 notes a private haul road and Kamilaroi Highway overpass to be constructed if the combined road transport was to exceed 3.5Mtpa. Council requires clarifications as to the proposed transportation of coal.</p>	Section 2 of EIS
	<p>Road Maintenance Agreement</p> <p>... the Road Maintenance Agreement needs to be reviewed and renegotiated prior to any planning consent being issued.</p>	Section 3.1 of EIS
Narrabri Shire Council	<p>Council has reviewed the project description and preliminary SEARs and provides the following comments for consideration in the drafting of the SEARs, to be included in the Environmental Impact Statement (EIS), for the proposed development:</p> <p>1) Likely and potential impacts on Council infrastructure, in particular Council's road network and any consequent need for upgrades or increased maintenance, and how this will be managed and funded.</p> <p>...</p>	Section 9 of this Report and Section 3.1 of EIS

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