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Nowa Nowa Iron Project (5 Mile Deposit)

Traffic Impact Assessment

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Traffic Impact Assessment

Client: Eastern Iron Limited

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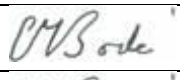
B	31-Jul-2013	Revised Draft	Christian Bodé	
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Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Eastern Iron Limited (Eastern Ion) to prepare a Traffic Impact Assessment (TIA) for the proposed Nowa Nowa Iron Project (5 Mile Deposit). The Project is located approximately seven kilometres north of the township of Nowa Nowa, which is situated on the Princes Highway between Bairnsdale and Orbost in East Gippsland, Victoria. The Project involves an open cut mining operation from a single pit with dry processing at site to upgrade the material to a saleable product. It is anticipated that the Project will produce up to 1Mt of ore per annum, over an initial mine life of 10 years.

It is proposed to transport the ore by road via B-Double trucks to the existing port at South East Fibre Exports (SEFE) in Edrom, NSW. A depot will be established from which the transport route would be split into two sections, the 'mine-to-depot' run and 'depot-to-port' run. At the depot, trailers will be decoupled and collected; driver rest breaks and changeovers made; and vehicles refuelled. Both sections of the transport route will operate two 12 hour shifts (24 hours) Monday to Friday, with additional daylight services on weekends if required.

Trip generation and distribution calculations were undertaken for both the construction and operational phases of the project. These indicate that the mine is likely to increase traffic volumes on the surrounding road network as follows:

- 128 light vehicles and 6 heavy vehicle trips per day during the construction phase; and
- 216 light vehicles and 368 heavy vehicle trips per day during the operational phase.

It is expected that the existing road network will be able to accommodate this increase in traffic and, as a result, no upgrades to the road network are proposed.

Following a site inspection, consultation with stakeholders and a review of all available existing data, a number of potential risks and impacts associated with the project were identified, including:

- Increased traffic volumes may require road or intersection upgrades;
- Potential conflicts between school bus routes and mine generated traffic;
- Safety of mine access road with Bruthen-Buchan Road;
- Mine related traffic degrades road pavement below acceptable levels;
- Night time operation of the transport route presents road safety and amenity concerns;
- Local community may be impacted by trucks using the road network; and
- Mining operations potentially impact upon the use of Nowa Nowa-Buchan Road.

To mitigate the identified impacts to an acceptable level, the following measures are recommended:

- Monitor and review mine operations;
- Ensure correct design and location of the mine access;
- Ensure any road maintenance contribution obligations are met;
- Implement a driver code of behaviour;
- Locate the depot at an appropriate site; and
- Implement temporary traffic management measures during mining operations which impact upon the surrounding road network.

It is considered that these measures can be readily addressed in a traffic management plan as a condition of any relevant approval.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been engaged by Eastern Iron Limited (Eastern Iron) to prepare a Traffic Impact Assessment (TIA) for the proposed Nowa Nowa Iron Project (5 Mile Deposit), referred to as 'the Project' throughout this report. This assessment will inform the planning approval process.

1.1 Project Overview

The Project is located approximately seven kilometres north of the township of Nowa Nowa, which is situated on the Princes Highway between Bairnsdale and Orbost in East Gippsland, Victoria. The site is located wholly within the Tara State Forest (Crown land) which has been primarily managed for logging within the vicinity of the proposed works.

The Project is a greenfield development of a high grade magnetite/hematite body generally referred to as 'Five Mile'. The Project represents an existing global resource of 9.6Mt at 50% Fe, at a lower cut-off of 40% Fe.

The Project involves an open cut mining operation from a single pit with dry processing at site to upgrade the material to a saleable product. It is anticipated that the Project will produce up to 1Mt of ore per annum, over an initial mine life of 10 years. The mine will be operated using a local mining contractor and local employees (ie. no FIFO workforce).

Assuming 1 million tonne of ore is mined per year, it is expected that approximately 800,000 tonne of product will be produced for export. These rates will be dependent on the final mine scheduling and any variations within the ore body, which means that product outputs are likely to vary year-to-year. For the purposed of this assessment, it has been assumed that a maximum of 1 million tonne of product will be transported to the port and exported in any one year.

It is proposed to transport the ore by road to the existing port at South East Fibre Exports (SEFE) in Edrom, NSW ('the Port'), as shown in Figure 1. The material will be temporarily stockpiled before being loaded and exported to international markets.

The proposed project layout is provided in Appendix A and outlines the project components relevant to this assessment, including:

- The proposed mine access road with Bruthen-Buchan Road; and
- The proposed Nowa Nowa-Buchan Road diversion.

Figure 1 Proposed Transport Route

1.2 Report Structure

This impact assessment report is structured as follows:

Section 2.0 An existing conditions assessment of the proposed transport route.

Section 3.0 An overview of the proposed mine in both its construction and operational phase.

Section 4.0 Forecast traffic volumes for the roads around the proposed mine and transport route.

Section 5.0 Traffic risks and impacts associated with the proposed mine.

Section 6.0 Measures developed to mitigate the identified risks and impacts.

Section 7.0 Assessment findings and concluding remarks.

1.3 Reference Documents

The following sources and documents (or standards) were consulted in the preparation of this TIA report:

- VicRoads, VIC, Crash stats data and AADT data.
- Roads and Maritime Services (RMS), NSW, Crash stats data and AADT data.
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis.
- Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections.

1.4 Report Abbreviations / Referrals

The following abbreviations/referrals have been used in this report as outlined below in Table 1:

Table 1 Report Abbreviations

Abbreviation	Unabbreviated Wording
AADT	Annual Average Daily Traffic
AECOM	AECOM Australia Pty Ltd
Eastern Iron	Eastern Iron Limited
Fe	Iron
FIFO	Fly-In-Fly-Out
km	Kilometers
km/h	Kilometres per hour
m	Metres
NSW	New South Wales
SEFE	South East Fibre Exports
The Project	Nowa Nowa Iron Project (5 Mile Deposit).
TIA	Traffic Impact Assessment
VIC	Victoria

2.0 Existing Conditions

2.1 Location

The proposed mine is located approximately seven kilometres north of the township of Nowa Nowa in East Gippsland, Victoria, shown in Figure 2. The site is wholly located within the Tara State Forest. Access to the mine site will be provided via a priority intersection with Bruthen-Buchan Road, generally within the vicinity of the existing Tomato Track.

Figure 2 Proposed Mine Location

2.2 Road Network

The proposed transport route, shown in Figure 1, includes roads in both Victoria (VIC) and New South Wales (NSW). The managing road authorities are VicRoads (VIC), Roads and Maritime Services (NSW) and Forestry Corporation (NSW).

The existing Nowa Nowa-Buchan Road is affected by the southern extent of the open pit and waste dump locations and, consequently, is proposed to be realigned as part of the project (as shown in Appendix A).

The following section discusses the road network expected to be impacted upon by the project.

2.2.1 Bruthen-Buchan Road (C608)

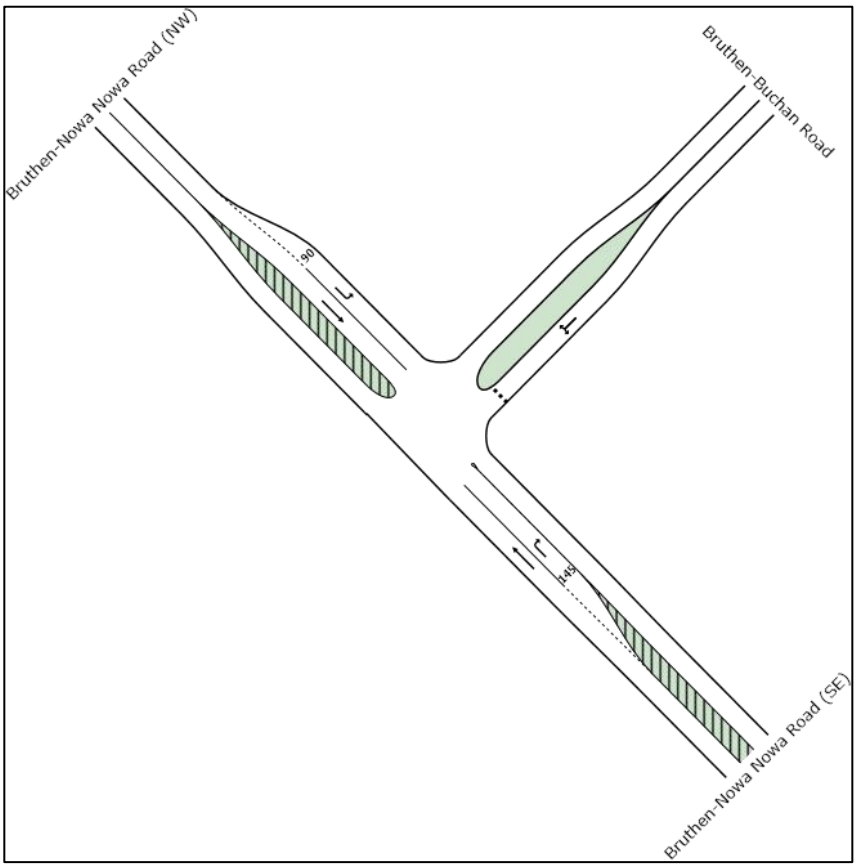
Bruthen-Buchan Road is under the control of VicRoads and is classified as an Arterial Road. The road is sealed and provides a single lane in each direction between Bruthen-Nowa Nowa Road and the proposed mine access road. Lane widths are approximately 3 metres and an unsealed verge of approximately 2 metres wide is provided on each side of the roadway. The road is approved for use by B-Double trucks and has a posted speed limit of 100 km/h. A typical cross section of Bruthen-Buchan Road is shown in Figure 3.

Figure 3 Bruthen-Buchan Road Typical Cross Section

2.2.2 Intersection of Bruthen-Buchan Road and Bruthen-Nowa Nowa Road

The layout of the Bruthen-Buchan Road and Bruthen-Nowa Nowa Road intersection is shown schematically in Figure 4. A single lane approach is provided on Bruthen-Buchan Road. A channelised right turn lane and auxiliary left turn lane is provided on Bruthen-Nowa Nowa Road. The intersection is well signed from all directions and sealed shoulders are provided on each approach. Street lighting is also provided at the intersection, although a street lighting assessment at night has not been undertaken to determine its suitability.

Figure 4 Schematic Intersection Layout of Bruthen-Buchan Road and Bruthen-Nowa Nowa Road



2.2.3 Bruthen-Nowa Nowa Road (C620)

Bruthen-Nowa Nowa Road is under the control of VicRoads and is classified as an Arterial Road, providing the preferred route between Bairnsdale and the Princes Highway east of Nowa Nowa. The road is sealed and provides a single lane in each direction between Princes Highway and Bruthen-Buchan Road. Lane widths are approximately 3.5 metres with an approximately 1.7 metre wide sealed shoulder provided on each side of the roadway. The road is approved for use by B-Double trucks and has a posted speed limit of 100 km/h, before reducing to 60 km/h through Nowa Nowa.

An overtaking lane is provided in the north-west bound direction on the departure from Nowa Nowa as the road grade increases. Guard fence is located at a number of locations and tactile edge lines are present on the edges of the carriageway to alert drivers that they are going off the road.

Figure 5 Bruthen-Nowa Nowa Road Typical Cross Section

2.2.4 Princes Highway

The section of the Princes Highway relevant to this study is between Bruthen-Nowa Nowa Road in Victoria and Edrom Road in NSW. In Victoria, the Princes Highway is under the control of VicRoads and is classified as an Arterial Highway. In NSW, the road is under the control of Roads and Maritime Services (NSW) and is classified as a State Road.

This length of the Princes Highway provides a single lane in each direction and is approved for use by B-Double trucks. Overtaking lanes are provided in locations of steep grade increases where corridor space permits. The posted speed limit on Prices Highway is 100 km/h, with reduced posted speed limits through local towns.

Between Nowa Nowa and Orbost, the Princes Highway has few changes in grade and adequate sight distances are provided (see Figure 6). Between Orbost and Edrom Road, as the Princes Highway enters a series of state forests, the road environment changes (see Figure 7). This section is generally winding with steep grades, resulting in reduced sight distances. The number of overtaking opportunities is also limited due to the narrower road corridor and geometry.

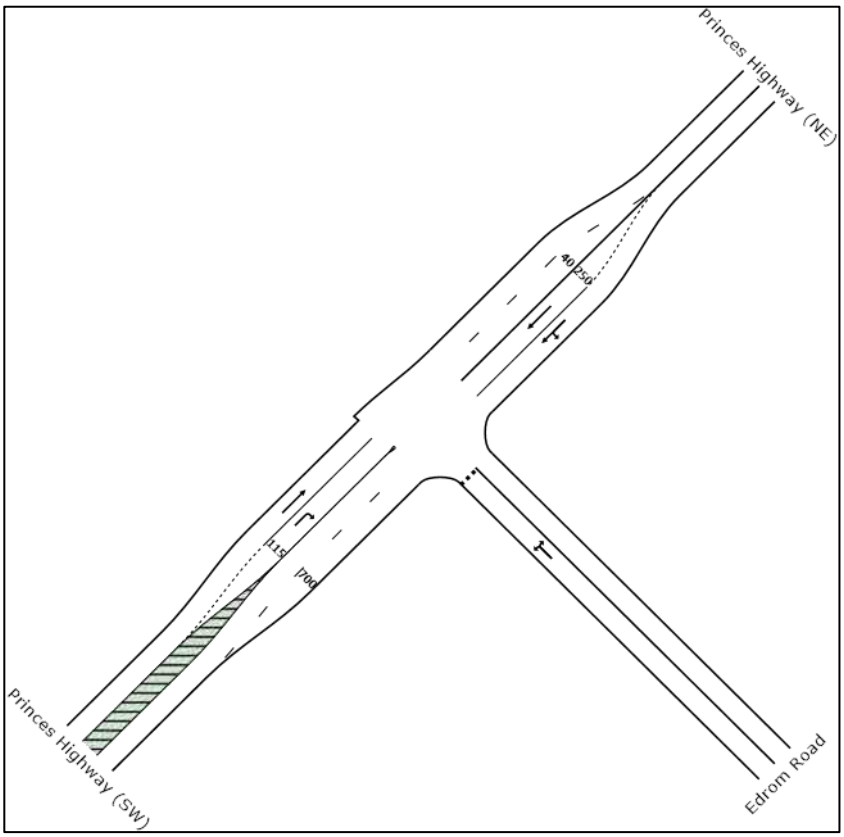
Figure 6 Princes Highway (Orbost)

Figure 7 Princes Highway (East of Orbost)

2.2.5 Intersection of Princes Highway and Edrom Road

The layout of the Princes Highway and Edrom Road intersection is shown schematically in Figure 8. A single lane approach is provided on Edrom Road. A channelised right turn lane and auxiliary left turn lane is provided on the Princes Highway. The intersection is well signed from all directions.

Figure 8 Schematic Intersection Layout of Princes Highway and Edrom Road



2.2.6 Edrom Road

Edrom Road is classified as a Forestry Road and is controlled by the Forestry Corporation of NSW. Whilst providing access to South East Fibre Exports (SEFE), the road also carries tourist traffic to Edrom Lodge, Boyd's Tower and a number of other attractions within East Boyd State Forest. The road is sealed and provides a single approximately 3.5 metre wide lane in each direction between Princes Highway and the SEFE entrance. The road is approved for use by B-Double trucks. The posted speed limit on Edrom Road is 100km/h.

Figure 9 Edrom Road Typical Cross Section

2.2.7 Nowa Nowa-Buchan Road

Nowa Nowa-Buchan Road connects Foresty Road in Nowa Nowa to Bruthen-Buchan Road via the Tara State Forest. It is controlled by the Department of Environment and Primary Industries (DPEI). Although it is not proposed to be utilised as part of the transport route it is proposed to realign the road in the vicinity of the Project site. No traffic data was available in the vicinity of the project site, however anecdotal evidence suggests it is predominantly used for forestry activities and as a result carries low volumes of traffic.

2.3 Traffic Volumes

Traffic volume data has been obtained for the roads discussed in the previous section and is summarised in Table 2. These were sourced from VicRoads in Victoria and RMS and Forestry Corporation of NSW in NSW. Due to its length, traffic volumes have been presented at a number of locations along the Princes Highway. Traffic volumes are presented as annual average daily traffic (AADT) volumes.

Table 2 Existing Traffic Volumes

Road	Direction	AADT	Heavy Vehicle %	Data Date	Source
Bruthen-Buchan Road	North-East Bound	200	15%	2011	VicRoads
	South-West Bound	210			
Bruthen-Nowa Nowa Road	North-West Bound	770	19%	2011*	VicRoads
	South-East Bound	750			
Princes Highway (Nowa Nowa)	East Bound	1,100	18%	2011	VicRoads
	West Bound	1,100			
Princes Highway (Orbost)	East Bound	990	20%	2011#	VicRoads
	West Bound	1,000			
Princes Highway (Cann River)	East Bound	670	26%	2011*	VicRoads
	West Bound	660			
Princes Highway (at VIC/NSW border)	North Bound	393	22%	2011	RMS
	South Bound	410			
Princes Highway (at Edrom Road)	North Bound	510	32%	2011	RMS
	South Bound	530			
Edrom Road	North-East Bound	203	68%	2013	Forestry Corporation of NSW
	South-West Bound	203			

* VicRoads estimate based on previously collected data
# VicRoads estimate based on traffic data from surrounding roads

Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis states that the operational capacity of a single lane road is approximately 1800 passenger cars per hour. The traffic data obtained shows that flows do not exceed 1,100 vehicles per day on any of the roads considered, indicating a large amount of spare capacity, excluding intersections.

Peak hour turning movement counts were not available at either of the intersections on the transport route. As a result no analysis was undertaken on the performance of these intersections. Due to the low volumes on the road network however, and considering the design of the intersections, both are expected to be able to accommodate the traffic volumes listed above.

2.4 Crash History

To understand the current crash trends for all roads in the vicinity of the proposed mine and transport route, a review was undertaken of the latest five years of available crash data.

In Victoria, crash history data was obtained from VicRoads. This data included all casualty crash data from 1 January 2008 to 31 December 2012. In New South Wales, crash data was obtained from Roads and Maritime Services (RMS). This data included all casualty crashes from 1 October 2007 to 30 September 2012.

The crash data has been reviewed to identify any crash trends or patterns that have occurred. This will then be used to determine how the traffic generated by the mine may affect such trends.

2.4.1 Bruthen-Buchan Road (C608)

A single crash was recorded on Bruthen-Buchan Road between the proposed mine access road and Bruthen-Nowa Nowa Road (approximately 7.5 kilometres). The crash involved a car leaving the roadway on a curve and colliding with a tree. This was a fatal injury crash that occurred approximately 100 metres east of Gorge Road.

Crash Trend: As there was only one crash, a crash trend could not be determined

2.4.2 Bruthen-Nowa Nowa Road (C620)

A single crash was recorded on Bruthen-Nowa Nowa Road between Bruthen-Buchan Road and Princes Highway (approximately 6.9 kilometres). It involved a collision between a B-Double truck turning right from Bruthen-Nowa Nowa Road and a station wagon traveling west on the Princes Highway. The crash resulted in serious injuries to the vehicle occupants.

This movement would not be completed by vehicles as part of the proposed transport route.

Crash Trend: As there was only one crash, a crash trend could not be determined

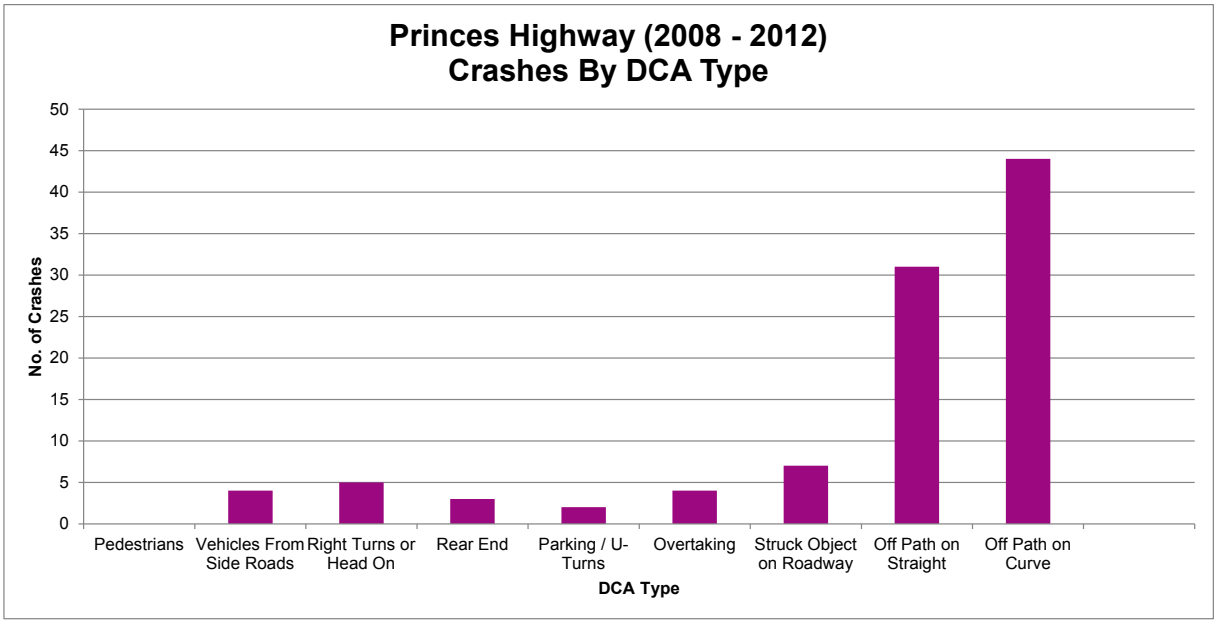
2.4.3 Princes Highway (Victoria)

In the five year period surveyed from Bruthen-Nowa Nowa Road to the Victoria – New South Wales border (approximately 171 kilometres), a total of 100 crashes were recorded on the Princes Highway. Five of these were fatal crashes, 50 serious injury crashes and 45 crashes were other injury crashes.

The occurrence of crashes during this five year period is relatively uniform (between 16 and 19), with the exception being in 2011 when 30 crashes were recorded. A slight peak in crash numbers occurs in April indicating holiday traffic and the lowest number of crashes occurs in July. Crash numbers are distributed quite evenly across the year. Approximately three quarters of crashes occurred during weekdays which are as expected. A majority of crashes occurred during the day (71%) and in dry and clear conditions (65%).

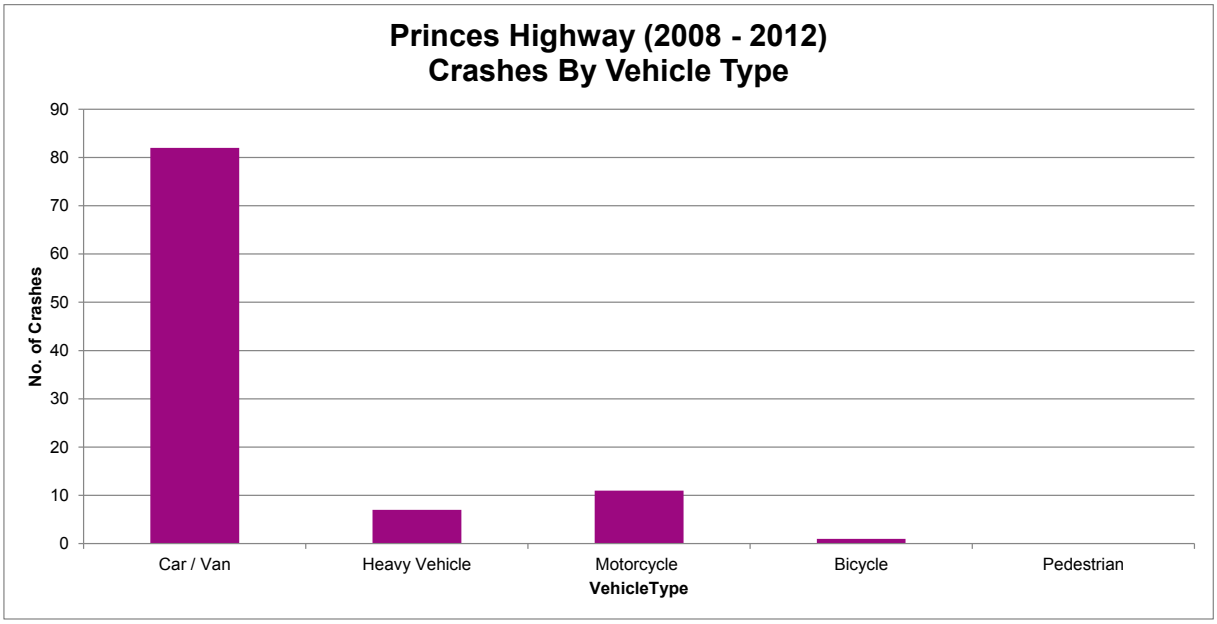
The types of crashes recorded on the Princes Highway are shown in Figure 10. Run-off road crashes, in which a vehicle leaves the roadway, account for 75 of the 100 crashes. Of these, 31 crashes occurred on straight road sections and 44 occurred on curved road sections.

Figure 10 Princes Highway (Victoria) Crashes by Type



The types of vehicles involved in crashes on the Princes Highway are shown in Figure 11. Of the 100 crashes recorded on Princes Highway 82 were single vehicle crashes. Cars were involved in 82 of all crashes, heavy vehicles in 7 and motorcycles in 11. There was a single crash involving a bicycle. Most of the heavy vehicle crashes involved a loss of control on curves (four) with the remainder (three) occurring in overtaking and turning manoeuvres. Most of the motorcycle crashes involved loss of control on curves (five crashes) or straights (two crashes).

Figure 11 Princes Highway (Victoria) Crashes by Vehicle Type



Crash Trend: Loss of control on curved and straight sections.

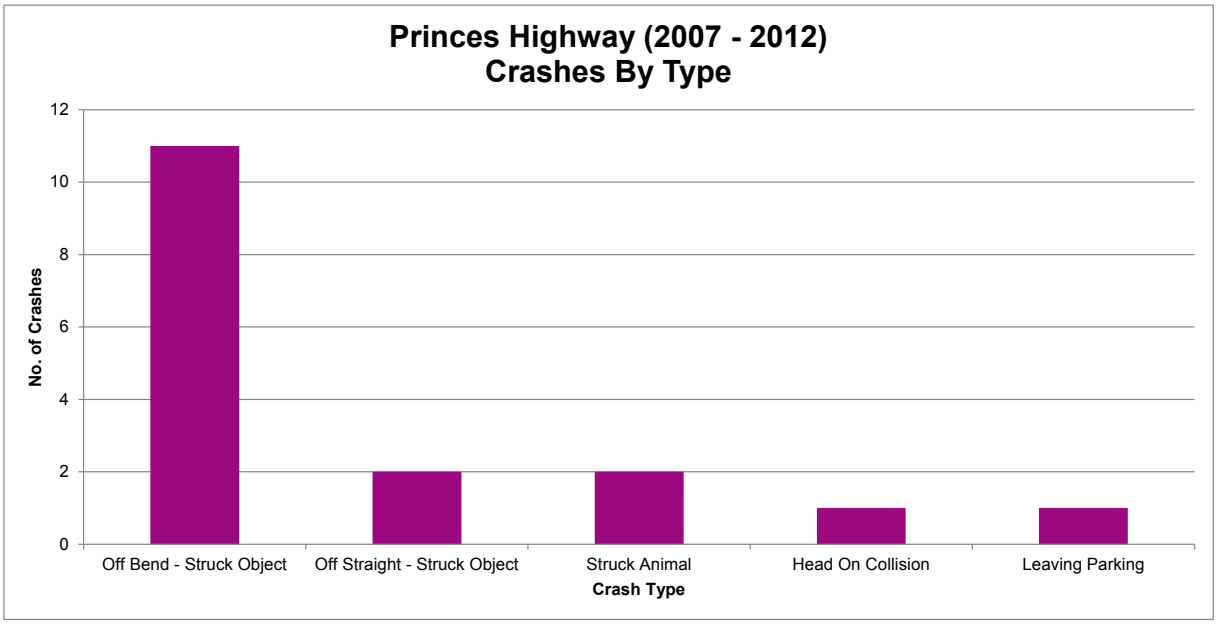
2.4.4 Princes Highway (New South Wales)

In the five year period surveyed, from the border with Victoria to Edrom Road (approximately 30.1 kilometres), a total of 17 crashes were recorded on the Princes Highway. Of these, none resulted in fatalities, six in injuries to one or more vehicle occupants and 11 were classified as no-casualty crashes.

The occurrence of crashes across the five year period is relatively uniform (two or three crashes per annum), with the exception of 2008 when six crashes were recorded. A slight peak in crash numbers occurs in the months of April, December and January, accounting for 53% of total crashes. This indicates that holiday and tourist traffic may have an impact on crash numbers along the Princes Highway. This is further supported by the high proportion of crashes on a weekend (52%) along the corridor. The majority of the crashes (76%) occurred in dry conditions.

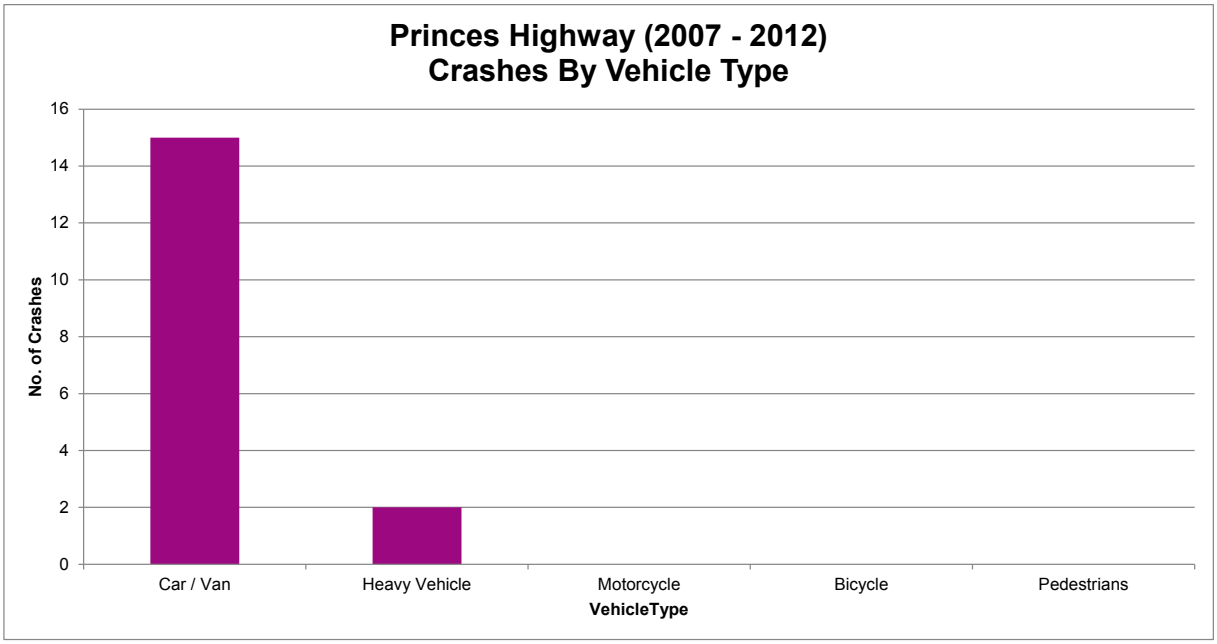
The types of crashes recorded on the Princes Highway are summarised in Figure 12. Off road incidents, in which a vehicle leaves the roadway and strikes an object, account for 76% of crashes. Of these, the majority occur on bends in the roadway. Speed was considered a contributing factor in 59% crashes, whilst fatigue contributed to 18%.

Figure 12 Princes Highway (New South Wales) Crashes by Type



The types of vehicles involves in crashes on the Princes Highway are shown in Figure 13. The majority of crashes involved cars or vans (88%) with remaining crashes involving heavy vehicles. No crashes involving motorcycles, bicycles or pedestrians were recorded.

Figure 13 Princes Highway (New South Wales) Crashes by Vehicle Type



Crash Trend: Loss of control on bends, likely to be attributed to travelling at a speed not suitable to the road environment.

2.4.5 Edrom Road

Five crashes were recorded on Edrom Road (approximately 15 kilometre length) in the five year period reviewed, all of which resulted in injuries to the vehicle occupants. Four of the crashes involved a vehicle leaving the roadway on a bend, with speed identified as a contributing factor in each of these. The other crash involved a car colliding with an animal on the roadway. Trucks were involved in two of the crashes.

Crash Trend: Single vehicle loss of control crashes which occurred around bends and are likely to be attributed to travelling at a speed not suitable to the road environment.

2.5 Public Transport and School Bus Routes

Both public transport and school bus routes operate on the roads surrounding the mine site, including some sections of the proposed transport route.

The Route 12 service from Bairnsdale to Gelantipy, operates along Bruthen-Buchan Road, Bruthen-Nowa Nowa Road towards Nowa Nowa, and then west to Bairnsdale along the Princes Highway. A number of additional bus services operate along the Princes Highway including:

- Bairnsdale to Marlo service (Route 10);
- Bairnsdale to Batemans Bay service;
- Bairnsdale to Canberra service (Capital Link); and
- Melbourne to Sydney service.

School buses operate along the proposed transport route between the mine site and Orbost, except for the section of the Princes Highway between Simpsons Creek Road and Corringle Road (Newmerella). These operate on school days from 7:30AM to 9:00AM and 3:15PM to 4:30PM. A total of five services either to or from Orbost operate in each of the outlined AM and PM periods.

3.0 Proposed Mine

The following section discusses the proposed mine, including its construction and operational phases, and the ancillary components such as the mine access road and the proposed Nowa Nowa-Buchan Road diversion.

3.1 Construction Phase

The construction phase of the project is expected to last between eight to ten months. Detailed construction planning is currently underway and the duration of individual construction tasks is yet to be determined. As a result this impact assessment has been based on the preliminary construction plan provided in Table 3.

This preliminary plan shows workforce numbers of the construction contractors, the owners' team and mining contractor at the site throughout construction. The length of each construction phase has not been confirmed but it still indicates the various stages during which tasks occur concurrently.

It is expected that the peak workforce at the mine site during the construction phase will be 70 workers per day during construction phase number 9.

Table 3 Construction Phase Workforce Numbers

Task No.	Description	Construction Phase No.										
		1	2	3	4	5	6	7	8	9	10	11
1	Logging of mine site	10	10	10								
2	Clear access to mine site		6									
3	Clear lay down areas			7								
4	Establish temporary infrastructure				5							
5	Establish construction water					10						
6	Strip vegetation and topsoil from mine site				9	9						
7	Bulk earthworks						11	17	20			
8	Establish administration area							12	14			
9	Construction of access intersection								5			
10	Construction of ROM pad									6		
11	Construction of mining infrastructure									16		
12	Dewatering bores									10	6	
13	Construction of processing plant									15	24	15
Owners Team Workforce		3	3	3	4	4	4	5	5	7	5	4
Mining Contractor Workforce		0	0	0	0	16	16	16	16	16	16	16
Total Workers per day		**13**	**19**	**20**	**18**	**39**	**31**	**50**	**60**	**70**	**51**	**35**

No on-site accommodation will be provided at the mine and it is expected that the majority of the workforce will commute from Bairnsdale with additional workers from Orbost, Lakes Entrance and other surrounding towns.

It is not expected that any over dimensional truck deliveries will be required.

3.2 Operational Phase

Once operational, it is anticipated that the mine will operate two 12 hour shifts (24 hours per day), 7 days a week. Whilst the export product volumes will vary depending on the staging of the development, this impact assessment has been based on the assumption that a maximum of 1 million tonnes of product will be exported from the mine per annum.

The haulage contract will also operate on two 12 hour shifts (24 hours per day), however only 5 days a week (Monday – Friday). Additional weekend services may be required on occasion, however these trips will generally be limited to daylight hours and infrequent.

The proposed transport route between the mine and the port is approximately 234 km, as discussed in Section 1.1. The product will be transported via road between the mine and the port via B-Double trucks, which assumes an average of 42 tonnes of product per trip.

A depot will be established from which the transport route would be split into two sections - the 'mine-to-depot' run and 'depot-to-port' run. At the depot trailers will be decoupled and collected; driver rest breaks and changeovers made; and vehicles refuelled. Both sections of the transport route will operate two 12 hour shifts (24 hours) Monday to Friday, with additional daylight services on weekends (if required).

Anticipated workforce numbers per day are summarised below in Table 4. No on-site accommodation will be provided at the mine and it is expected that the majority of the workforce will commute from Bairnsdale with additional workers from Orbost, Lakes Entrance and other surrounding towns.

Table 4 Operational Phase Workforce Numbers

Task	Mine Site Workforce	Depot Site Workforce
Management and Ore Processing	20	0
Mining Operations	30	0
Crushing and Screening	11	0
Haulage	0	55
Cleaning and Site Services	2	0
Total	**63 workers per day**	**55 workers per day**

3.3 Mine Access

Three potential locations for the mine site access on to Bruthen-Buchan Road have been identified. These are the blue, orange and red options. The location of these options is detailed in Table 5, including sight distances along Bruthen-Buchan Road. Plan and elevation layouts are also shown in Figure 14 and Figure 15.

Further consideration of the mine access is provided subsequently in section 6.2.

Table 5 Mine Site Access Location Properties

Option	Chainage* (km)	Sight Distance (m)	
		To South-West	To North-East
Blue	7.1	148	> 400
Orange	7.4	> 450	240
Red	7.5	> 480	255

*Measured from the intersection of Bruthen-Nowa Nowa Road and Bruthen-Buchan Road

Figure 14 Mine Access – Bruthen-Buchan Road Intersection Location Options (Plan View)

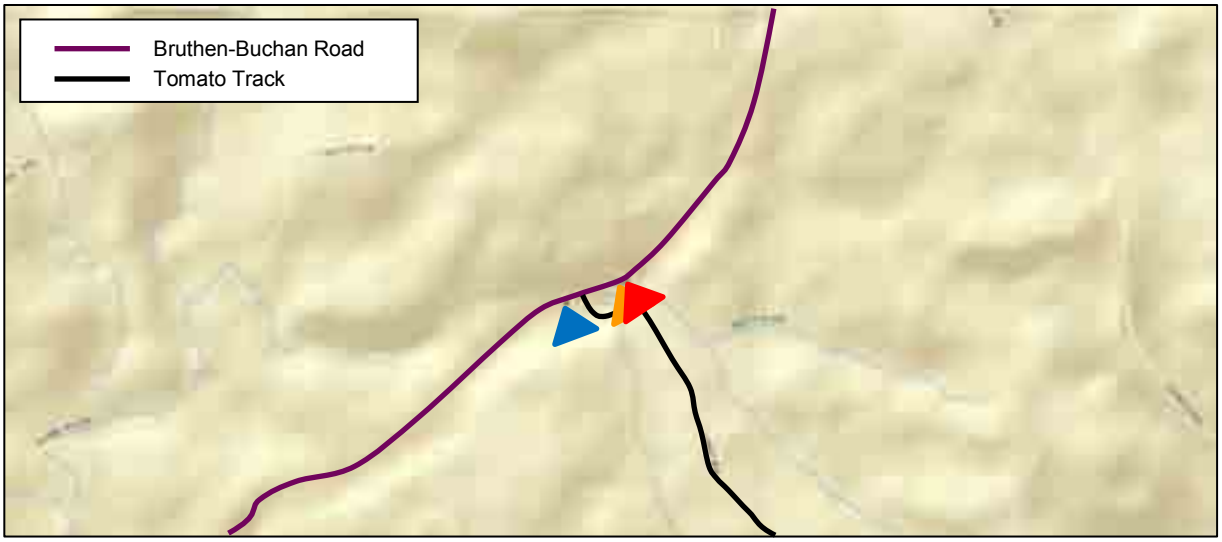
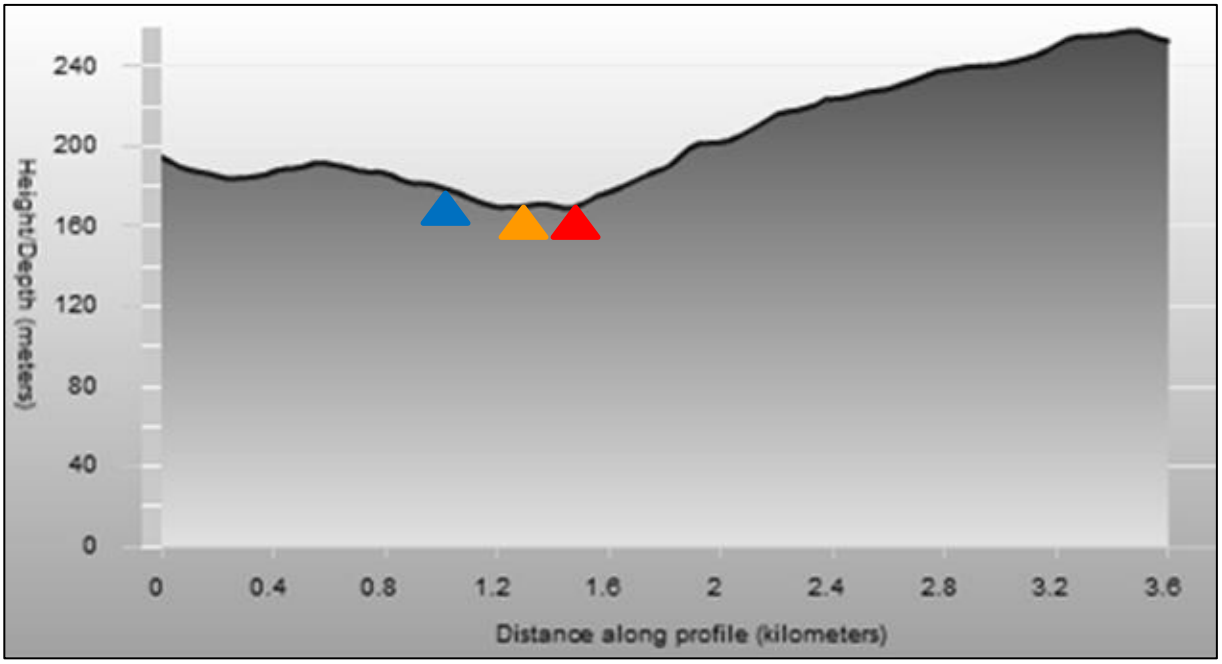


Figure 15 Mine Access – Bruthen-Buchan Road Intersection Location Options (Elevation View)



3.4 Nowa Nowa-Buchan Road Diversion

The footprint of the proposed mine impacts upon the existing alignment of Nowa Nowa-Buchan Road, affecting approximately 1.8 kilometres of its length. To maintain continuous connection between Forest Road and Bruthen-Buchan Road, it is proposed to divert the Nowa Nowa-Buchan Road as shown in Appendix A.

The proposed diversion has been located with the aim of reducing grade changes along its length and to ensure its use by heavy vehicles can be safely maintained. Alternative routes utilising existing tracks were considered but had the disadvantages of significantly lengthening the route and also severing Nowa Nowa-Buchan Road.

The diverted section of Nowa Nowa-Buchan Road would be constructed to a level which matched that of the existing sections of road. Further discussions on this proposal are required with DPEI and the design and alignment of the road requires further investigation.

3.5 Depot Location

It is proposed to locate the transport depot at either Orbost or Newmerella. The exact location of the depot is the responsibility of the haulage contractor; accordingly it does not form part of the project and will be subject to separate approval. The following sections describe and highlight the benefits and disadvantages of each option.

3.5.1 Orbost

Orbost is located approximately 57 kilometres east of the proposed mine site. The town is to the north of the Princes Highway, with access provided via Lochiel Street or Salisbury Street. Potential depot sites in Orbost are located to the north of the town centre.

Accessing potential depot sites in Orbost is likely to require trucks travelling through the town centre using either of Bonang Highway, Tennyson Street or Livingstone Street, as each is approved for use by B-Double trucks. Bonang Highway intersects the town's main activity centre and Tennyson Street and Livingstone Street pass through mainly residential areas. Each option has potential impacts on local amenity, considering 24 hour operation along the transport route.

Notwithstanding the above, a planning scheme amendment could allow suitable sites adjacent to the Princes Highway to be used as a road freight terminal.

The major benefit of locating the depot in Orbost is the close proximity to potential workforce, supporting services and amenities.

3.5.2 Newmerella

Newmerella is located approximately 50 kilometres east of the proposed mine site. The Princes Highway intersects the town, providing direct access to a number of potential depot sites. These are located in industrial or business zones that allow a permit to be granted for a road freight terminal.

During consultation, Council nominated Newmerella as their preferred option for the following reasons:

- Direct access to appropriate land from the Princes Highway, removing the need for upgrade of local roads to B-Double approved route standard;
- Low number of nearby residential dwellings, therefore reducing the potential impact on local amenity during 24 hour operation along the transport route; and
- Potential economic benefits to the Newmerella township.

4.0 Traffic Generation and Distribution

The following sections summarise the expected traffic generation and distribution for both the construction and operational phases of the project. Traffic generation has been based on the details outlined in Section 3.1 and Section 3.2. In order to determine the maximum impact of the project, only the peak traffic generation has been considered. The resultant volumes were then analysed to determine if the road network had sufficient capacity to cater for the expected traffic demand.

4.1 Construction Phase

4.1.1 Trip Generation

Daily trip generation rates by vehicle class is summarised in Table 6. The following assumptions were made in developing these trip generation rates:

- A vehicle occupancy rate of 1.1 workers per vehicle; and
- An average of 3 truck deliveries per day, as per preliminary construction plan.

Table 6 Construction Phase Trip Generation

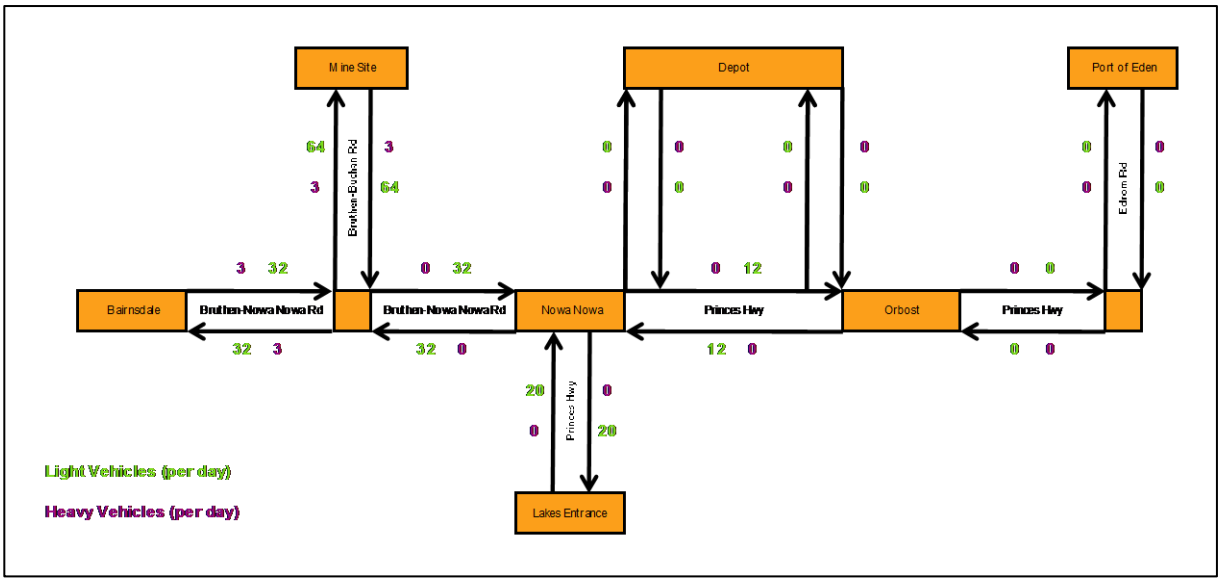
Direction	Light Vehicles (per day)	Trucks (per day)	Total Vehicles (per day)
INTO Mine Site	64	3	67
OUT OF Mine Site	64	3	67
Total Trips	**128**	**6**	**134**

4.1.2 Trip Distribution

The assumed daily trip distribution is shown schematically in Figure 16. The following assumptions were made in developing the trip distribution:

- Workforce is distributed proportionally between Bairnsdale, Lakes Entrance and Orbost based on population.

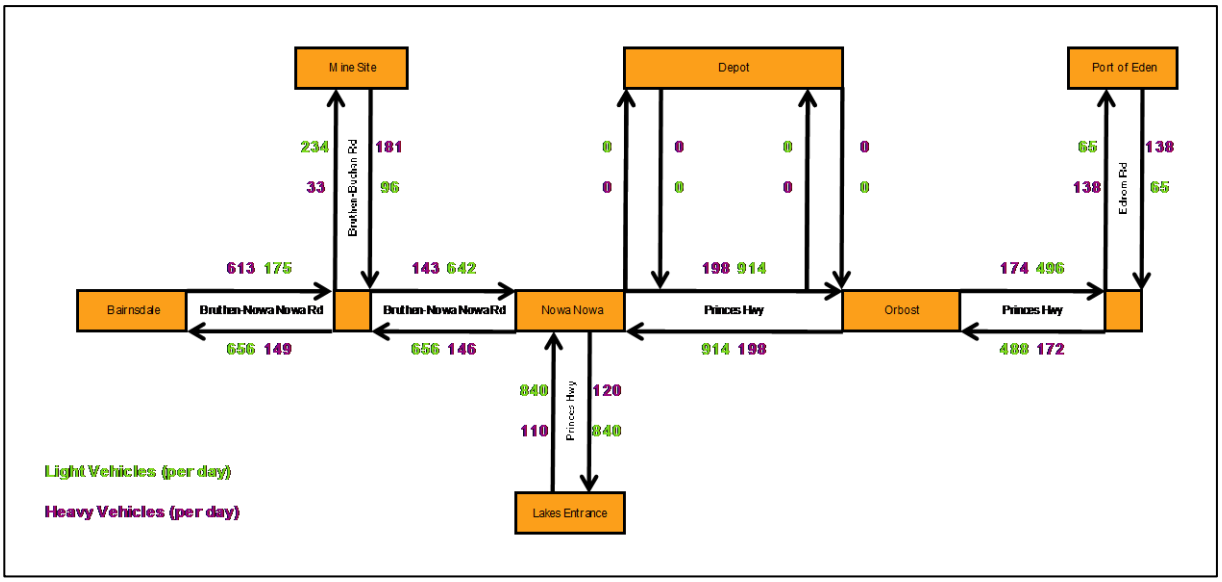
Figure 16 Construction Phase Trip Distribution (vehicles per day)



4.1.3 Resultant Traffic Volumes

The resultant traffic flows on the road network during the construction phase are shown schematically in Figure 17. Using the *Austroads* operational capacity of 1,800 passenger cars per hour as a guide, each section of the road network is likely to have spare capacity. Based on these volumes, it is not proposed to upgrade any of the road network. The increase in traffic volumes during the construction phase is not sufficient to trigger the warrants for upgrades. During the construction phase, all mine related trips are expected to occur during daylight hours.

Figure 17 Construction Phase Resultant Traffic Volumes (per day)



As existing peak hour turning movement counts were not available at either of the intersections on the transport route, no intersection analysis was undertaken. Due to the low volumes on the road network however, even with the addition of the mine related traffic, both intersections are expected to be able to accommodate the volumes generated in the construction phase.

4.2 Operational Phase

4.2.1 Trip Generation

Daily trip generation rates by vehicle class is summarised in Table 7. The following assumptions were made in developing these trip generation rates:

- A vehicle occupancy rate of 1.1 workers per vehicle;
- Maximum product of 1,000,000 tonnes per annum; and
- Haulage occurring 24 hours a day, Monday to Friday, with average truck load of 42 tonnes.

Therefore, the rates presented in this section represent the maximum peak loads. Should less product or, daylight services on weekends eventuate, there may be a consequential reduction in the number of truck trips per day.

Table 7 Operational Phase Trip Generation

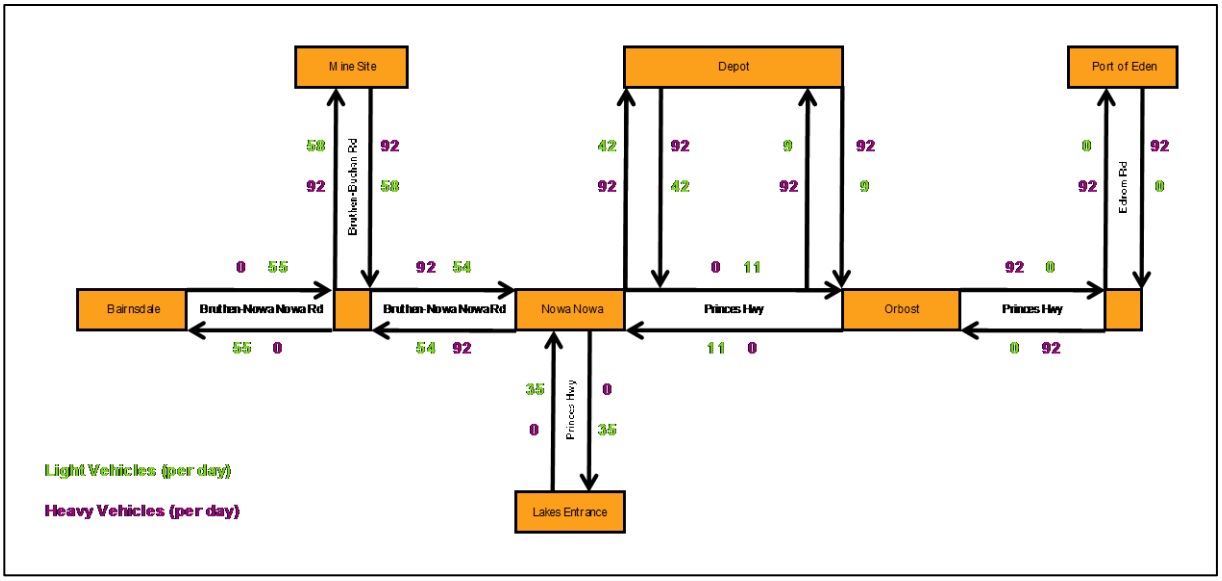
Direction	Light Vehicles (per day)	Trucks (per day)	Total Vehicles (per day)
INTO Mine Site	58	0	58
OUT OF Mine Site	58	0	58
INTO Depot	50	0	50
OUT OF Depot	50	0	50
Mine to Depot	0	92	92
Depot to Mine	0	92	92
Depot to Port	0	92	92
Port to Depot	0	92	92
Total	**216**	**368**	**584**

4.2.2 Trip Distribution

The daily trip distribution is shown schematically in Figure 18. The following assumptions were made in developing the trip distribution:

- Workforce is distributed proportionally between Bairnsdale, Lakes Entrance and Orbost based on population
- Depot location not yet confirmed so it was treated as separate of both Newmerella and Orbost.

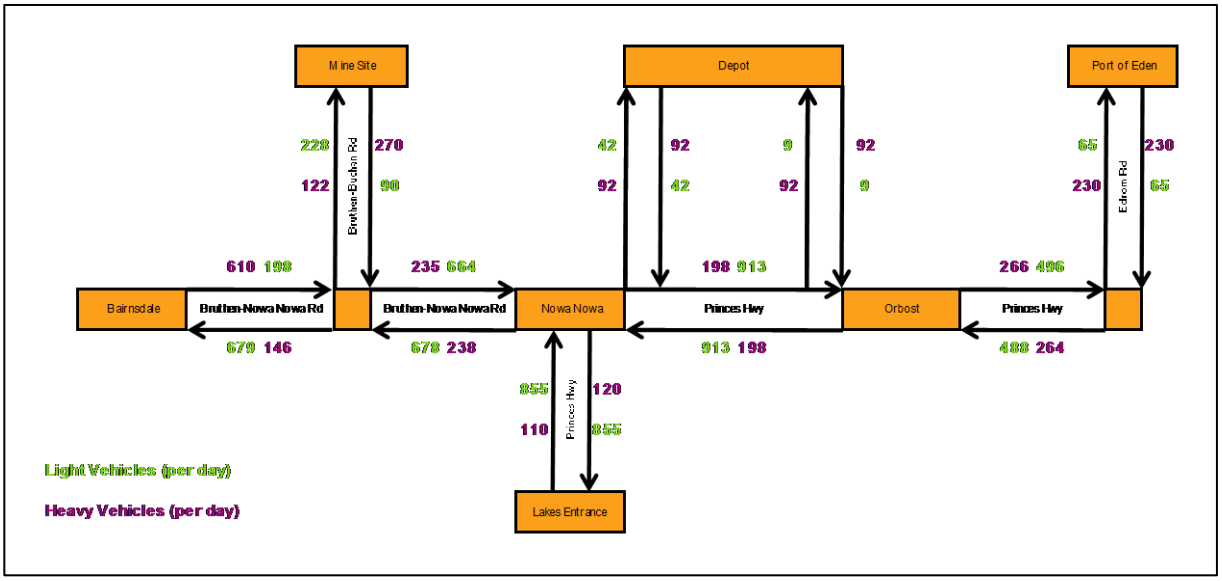
Figure 18 Operational Phase Trip Distribution (vehicles per day)



4.2.3 Resultant Traffic Volumes

The resultant traffic flows on the road network during the operational phase are shown schematically in Figure 19. Using the *Austroads* operational capacity of 1,800 passenger cars per hour as a guide, each section of the road network is likely to have spare capacity. Based on these volumes, it is not proposed to upgrade any of the road network. The increase in traffic volumes during the operational phase is not sufficient to trigger the warrants for upgrades. During the construction phase, the majority of mine related vehicle trips are expected to occur during daylight hours. At night, it is expected that most mine related trips will be associated with the transport of product between the mine and the port.

Figure 19 Operational Phase Resultant Traffic Volumes (per day)



As existing peak hour turning movement counts were not available at either of the intersections on the transport route, no intersection analysis was undertaken. However, due to the low traffic volumes on the road network, even with the addition of the mine related traffic, both intersections are expected to be able to accommodate the volumes generated in the operational phase.

5.0 Potential Risks and Impacts

Following an inspection of the proposed mine site and transport route, consultation with stakeholders and a review of the available traffic data, a number of potential risks and impacts have been identified as discussed in the following sections.

5.1 Additional Traffic Volumes

Under the current construction plan and operational specifications, the road network is likely to be able to accommodate the expected increase in traffic (see Section 4.1.3 and 4.2.3). Although there is likely to be a significant amount of spare capacity on the road network, a further increase in traffic created by a change in mine operations (in excess of 1,000,000 tonnes of product per annum) could potentially trigger the warrants for road upgrades or the implementation of road safety measures.

Risk: Increased traffic volumes requires road or intersection upgrade

5.2 School Bus Routes

As discussed in Section 2.5, school bus routes operate along the proposed transport route and a significant increase in traffic along these routes, especially heavy vehicles, has the potential to create safety concerns.

Assuming the trucks generated from the site are distributed evenly across the 24 hours of operation, only five to six additional B-Double trips are likely to be on the road network during the hours of school bus operation. This small increase in volumes is unlikely to result in conflicts with school buses.

Risk: Conflict between school bus routes and mine generated traffic

5.3 Mine Access Road

The mine will require the construction of an access intersection on to Bruthen-Buchan Road. This has the potential to create a number of new conflict points as vehicles enter, exit and continue past the access point along Bruthen-Buchan Road. These conflict points need to be managed through the design of the proposed mine access road and to ensure that sight distance and advance warning is adequate.

Risk: Safety of mine access road with Bruthen-Buchan Road

5.4 Degradation of Roadway Pavement

Although all sections of the transport route are approved for use by B-Double vehicles, there is the potential that the increase in traffic volumes generated by the mine could cause degradation of the road pavements. This could have negative implications for all road users, including the mine operator and haulage contractor.

Risk: Mine related traffic degrades pavement below acceptable levels

5.5 Night Time Operation

The night time operation of the transport route presents a set of risks unique from daylight operation. Road safety issues specific to travelling at night include the increase in wildlife on the roadway, especially through forested areas and driver fatigue both during and after shifts. The operation of heavy vehicles at night also has the potential to impact upon the amenity of communities along the transport route.

Risk: Night time operation has an adverse impact on the safety of road users and the amenity of local communities

5.6 Local Amenity

The proposed transport route passes through a number of local communities which are intersected by the Princes Highway. The depot may also impact on the local community, depending on its final location. Potential impacts for the local community could include an increase in traffic related noise, especially during night shift operation and an increase in dust and debris on the road network from mining related vehicles.

Risk: Local community may be impacted by trucks using road network 24 hours a day

5.7 Mining Operations

The southern end of the mine pit is close to the existing alignment of Nowa Nowa-Buchan Road. Blasting will take place within the pit and when this occurs at the southern end of the pit it has the potential to impact on the safe and efficent use of Nowa Nowa-Buchan Road.

Risk: Mining operations impacting upon the safe and efficient use of Nowa Nowa-Buchan Road

6.0 Mitigation Measures

To address the potential risks and impacts identified, a number of mitigation measures have been developed. These are summarised in Table 8 and explained in more detail in the following sections.

Table 8 Summary of Mitigation Measures

Potential Risk or Impact	Mitigation Measure	Section
Additional Traffic Volumes	Monitor Mine Operations	6.1
School Bus Routes		
Mine Access Road	Mine Access Design and Location	6.2
Degradation of Roadway Pavement	Road Maintenance	6.3
Night Time Operation	Driver Code of Behaviour	6.4
Local Amenity		
	Location of Depot	6.5
Mining Operations	Temporary Traffic Management	6.6

6.1 Monitor Mine Operations

As discussed, the existing road network is likely to be able to cater for the additional traffic volumes generated by the mine. To ensure that changes to the mines operation do not increase traffic volumes to a level which requires additional road safety and capacity upgrades, it is recommended to monitor the operation of the mine and the associated traffic volumes.

Any significant changes to the construction plan or operational specifications, outlined in Section 3.0 , should result in a revisiting of the trip generation and distribution, and subsequently a revised analysis of the capacity of the road network.

6.2 Mine Site Access Design and Location

In order to manage the potential risks of introducing a new intersection on Bruthen-Buchan Road, both the location and the design needs to be considered.

6.2.1 Location

The location of the intersection should ensure that sight distances from the mine access in both directions are sufficient to observe vehicles travelling along Bruthen-Buchan Road. *Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections* states that on a 100 km/h road, a sight distance of 248 metres is required in both directions. As a result, the 'red' access location is the recommended option, as it provides 255 metres sight distance to the north-east and over 480 metres to the south-west (see Section 3.3).

The 'red' option is also the preferred option in terms of road grades (see Figure 15). It is located at the start of a relatively flat section of roadway, allowing the left turning heavy vehicles on the transport route approximately 400 metres of flat road to build speed before the climbing section begins.

The 'red' option is depicted as part of the project layout plan at Appendix A.

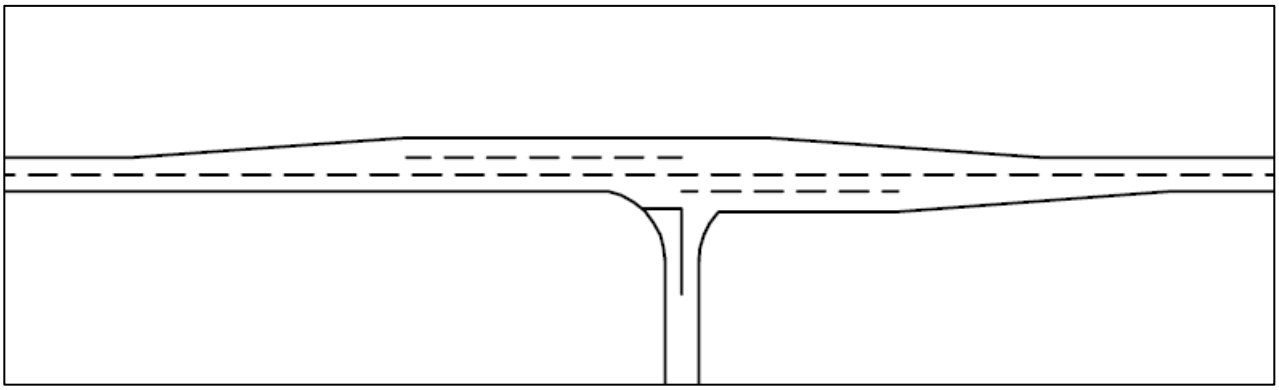
6.2.2 Design

Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections provides guidance and warrants for the selection of intersection types. Based on the volumes expected at the intersection a Basic Rural Turn Treatment is sufficient. In summary this treatment involves:

- The right turn treatment (BAR) features a widened shoulder on Bruthen-Buchan Road that allows through vehicles, having slowed, to pass to the left of turning vehicles.
- The left turn treatment (BAL) on Bruthen-Buchan Road has a widened shoulder, which assists turning vehicles to move further off the through carriageway making it easier for through vehicles to pass
- The left turn treatment (BAL) on the minor road allows turning movements from a single lane with a shoulder that is too narrow to be used by left turning vehicles (to prevent drivers from standing two abreast at the holding line)

Each of these turn treatments should be incorporated into the intersection design, as shown in the concept sketch in Figure 20. Detailed design guidance is provided in Appendix B.

Figure 20 Basic Rural Turn Treatment Concept Design



Consideration has been given to introducing an acceleration lane at the intersection to allow trucks exiting the mine site to reach higher speeds before entering the traffic stream on Bruthen-Buchan Road. There are no simple numerical warrants for the provision of acceleration lanes; however, *Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections* states the following.

Acceleration lanes maybe provided at major intersections depending on traffic analysis. However they are usually provided only where:

- *Insufficient gaps exist for the vehicles to enter the traffic stream*
- *Turning volumes are high (e.g. 300 to 500 vph)*
- *The observation angle falls below the requirements of the minimum gap sight distance model*
- *Heavy vehicles pulling into the traffic stream would cause excessive slowing of major road vehicles*

Due to the low traffic volumes, both along Bruthen-Buchan Road and in and out of the mine site, there is likely to be sufficient gaps for vehicles to enter the traffic stream and entering vehicles are unlikely to cause excessive slowing. Sight lines are also shown to be adequate. As a result, an acceleration lane is not considered to be required at the mine access intersection.

6.3 Road Maintenance

The maintenance of the road surface is the responsibility of the relevant road authority (VicRoads, RMS or Forestry Corporation of NSW). As a result these road authorities may request a maintenance fee or levy. A brief summary of the status of these fees are listed below.

- VicRoads are in the process of developing guidelines which could result in the mine attracting a maintenance fee for the use of its roads. Any such requirement could apply to the use of Bruthen-Buchan Road/Bruthen-Nowa Nowa Road; however, it is unlikely to apply to the Princes Highway given its current role and function.
- RMS does not currently have any maintenance fee scheme in place.
- Forestry Corporation of NSW currently has a scheme in place in which commercial users of Edrom Road pay an annual levy for use of the infrastructure. This levy would be negotiated between the mine operator and Forestry Corporation of NSW prior to commencement of operations.

These fees could be based on a range of factors including the increase in total traffic volumes as a result of the mine, tonnage of product transported and kilometres travelled. Adequate approvals are required from each of the authorities which may incorporate such levies or capital works.

It is understood that Eastern Iron has commenced these negotiations already.

6.4 Driver Code of Behaviour

It is recommended that a truck driver code of behaviour be developed and implemented for drivers. Such codes have been developed for a number of logging operations in the region and typically include guidance on:

- Use of engine brakes in towns;
- Dropping of dust;
- Load security;
- Allowing traffic to pass;
- Mass Limits;
- Travelling through towns and school crossings;
- Fatigue Management; and
- Night time operations.

Adherence to such a code will assist in improving the safety of the truck drivers, the amenity of the local community and all other road users.

6.5 Location of Depot

In order to reduce the impact on local amenity and safety, it is recommended to locate the depot at Newmerella or, alternatively, at a new site near Orbost. The depot location should ideally have the following characteristics:

- Direct access from the Princes Highway using B-Double approved routes;
- Low number of adjacent residential dwellings to reduce disruption to local community during 24 hour operation; and
- Separate from local activity centres where possible, including shopping strips, sporting precincts and schools.

6.6 Temporary Traffic Management

When blasting is occurring at the southern end of the mine pit (within 500 metres of Nowa Nowa-Buchan Road for example), a temporary traffic management plan should be implemented to restrict the use of the road. This could involve a range of measures including temporary road closures, advanced warning signage and the advertisement of planned closures amongst logging contractors and the community. Given the low flows and usage this impact should be easily mitigated and managed through these measures.

7.0 Conclusion

In conclusion, this TIA report has considered and demonstrated the following.

The trip generation and distribution calculations indicate that the mine is likely to increase traffic volumes on the surrounding network by up to:

- 128 light vehicles and 6 heavy vehicle trips per day during the construction phase; and
- 216 light vehicles and 368 heavy vehicle trips per day during the operational phase.

It is expected that the existing road network will be able to accommodate this increase in traffic and as a result no upgrades to the road network are proposed.

Following a site inspection, consultation with stakeholders and a review of all existing data a number of potential risks and impacts associated with the mine were identified:

- Increased traffic volumes may requires road or intersection upgrades;
- Potential conflicts between school bus routes and mine generated traffic;
- Safety of mine access road with Bruthen-Buchan Road;
- Mine related traffic degrades pavement above acceptable levels;
- Night time operation of the transport route presents road safety and amenity concerns;
- Local community may be impacted by trucks using the road network; and
- Mining operations impact upon the use of Nowa Nowa-Buchan Road.

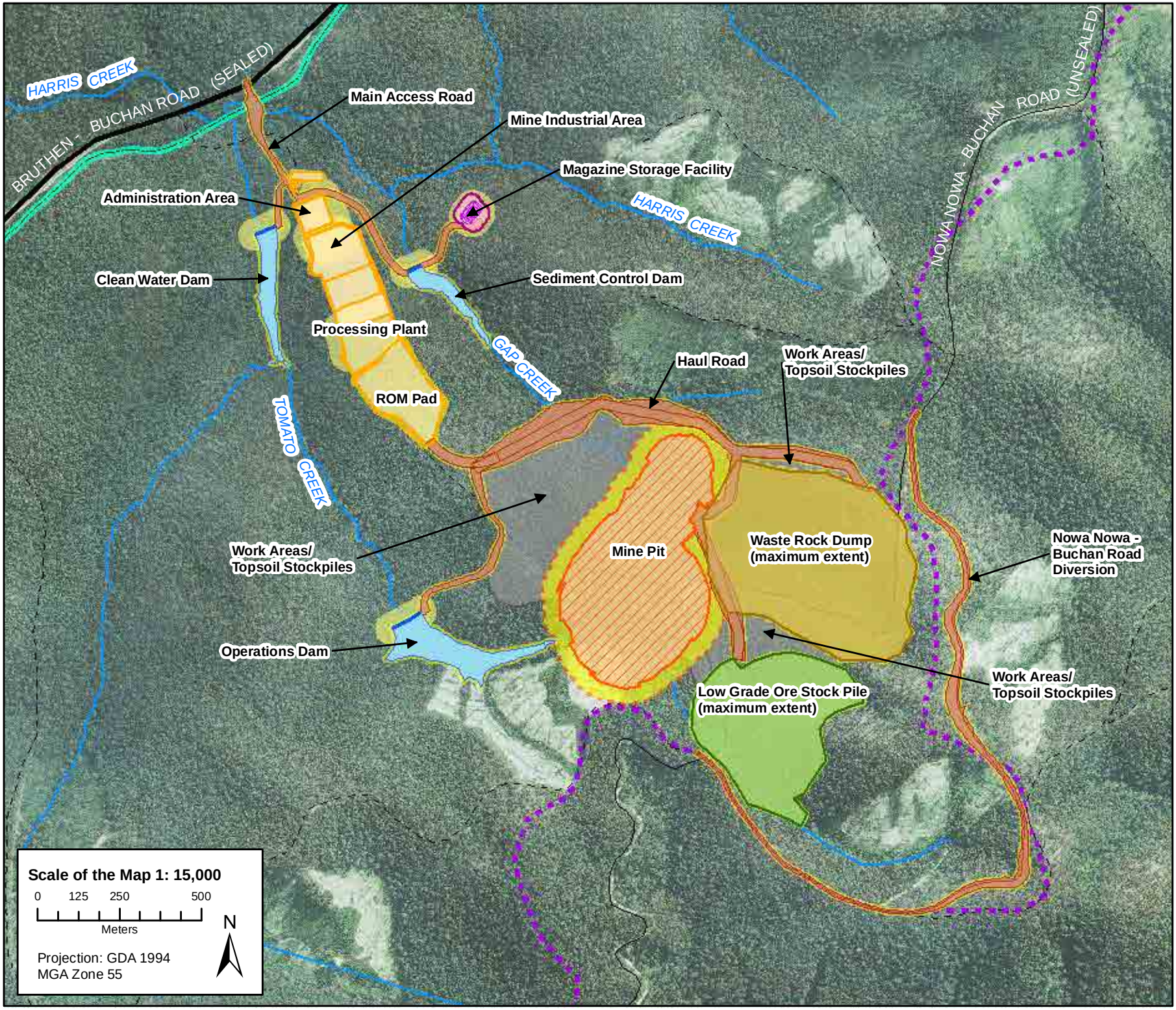
To mitigate the identified impacts to an acceptable level, the following measures are recommended:

- Monitor mine operations;
- Ensure correct design and location of the mine access;
- Ensure any road maintenance contribution obligations are met;
- Implement a driver code of behaviour;
- Locate the depot at an appropriate site; and
- Implement temporary traffic management measures during mining operations which impact upon the surrounding road network.

It is considered that these measures can be readily addressed in a traffic management plan as a condition of any relevant approval.

Appendix A

Nowa Nowa Iron Project Infrastructure and Layout



Nowa Nowa Iron Project Infrastructure and Layout

Legend

- Towns/ Settlements
- Rivers / Streams
- Major/ Secondary Roads
- Tracks
- Existing Transmission Line
- Catchment Boundary (Boggy Creek / Hospital Creek)

Project Components

- Mine Pit
- Mine Infrastructure
- Waste Rock Dump
- Low Grade Ore Stock Pile
- Project Access Roads
- Magazine Storage Facility
- Dams
- Work Areas/ Topsoil Stockpiles

Buffer Zones

- Construction and Bushfire Management Buffers

Satellite Imagery:
Quickbird (April 2012)
Note: Cleared areas are logging coupes

Author : Earth Systems

Client : Eastern Iron Ltd.

Revision : Draft

Date : September 2013

Appendix B

Mine Access Design Guidelines

Appendix B Mine Access Design Guidelines

Source: Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections

Figure 21 Basic Turn Treatment

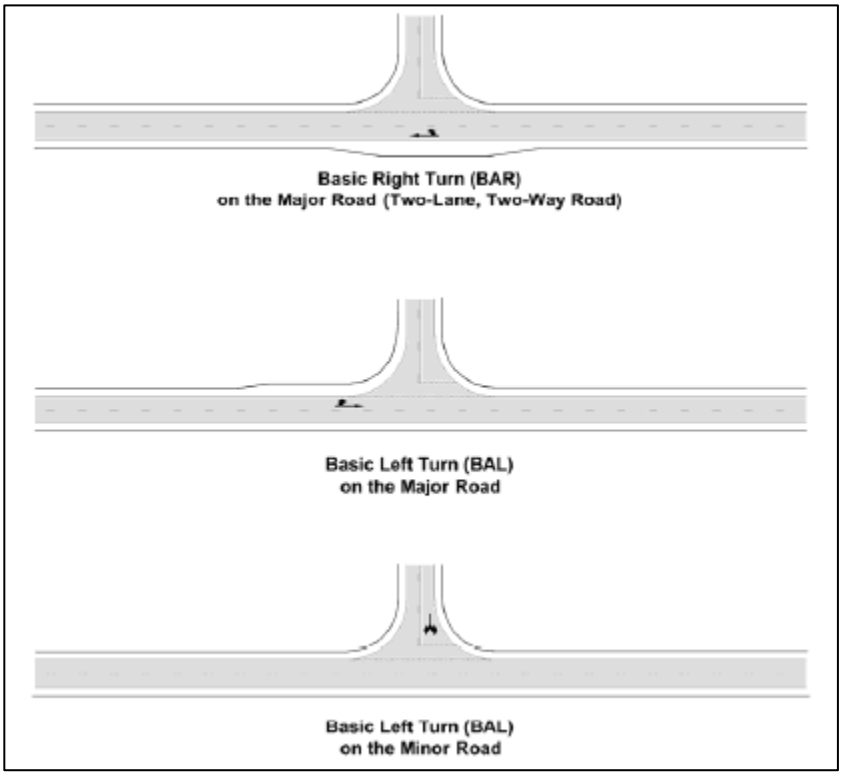
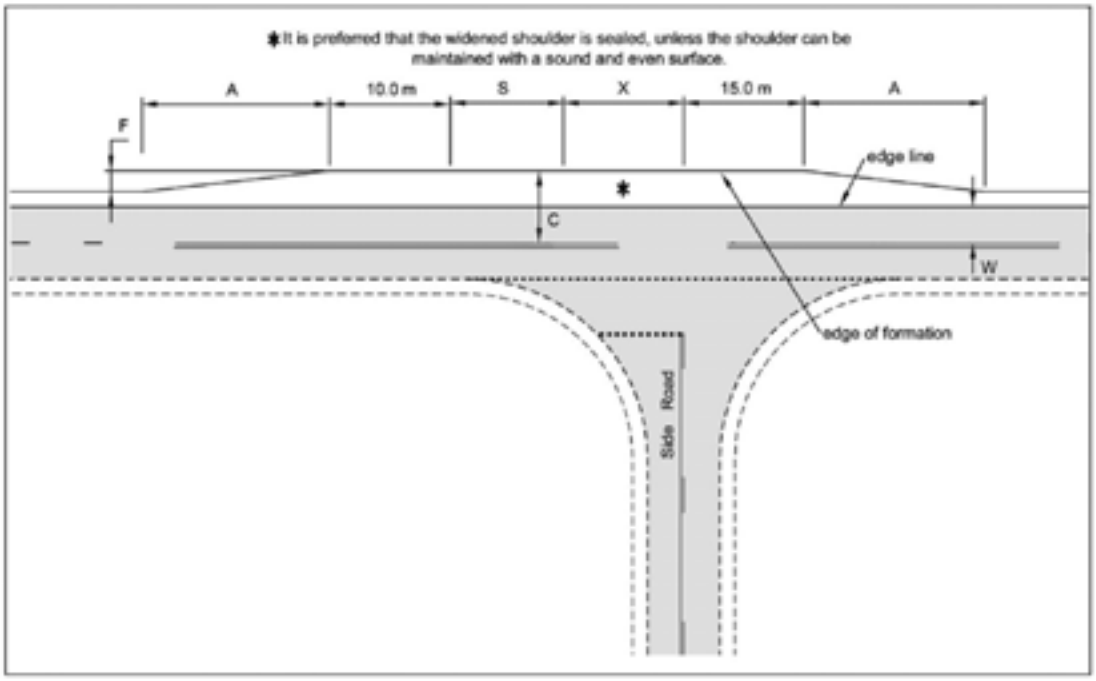


Figure 22 Basic Right Turn (BAR) Treatment Design Guidance



Notes:

1. This treatment applies to the right turn from a major road to a minor road.
2. The dimensions of the treatment are defined thus:

W = Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.

C = On straights – 6.5 m minimum

7.0 m minimum for Type 1 & Type 2 road trains

On curves – widths as above + curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

A = $\frac{0.5VF}{3.6}$

Increase length A on tighter curves (e.g. those with a side friction demand greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer the minimum speed used to calculate A is 80 km/h.

V = Design speed of major road approach (km/h).

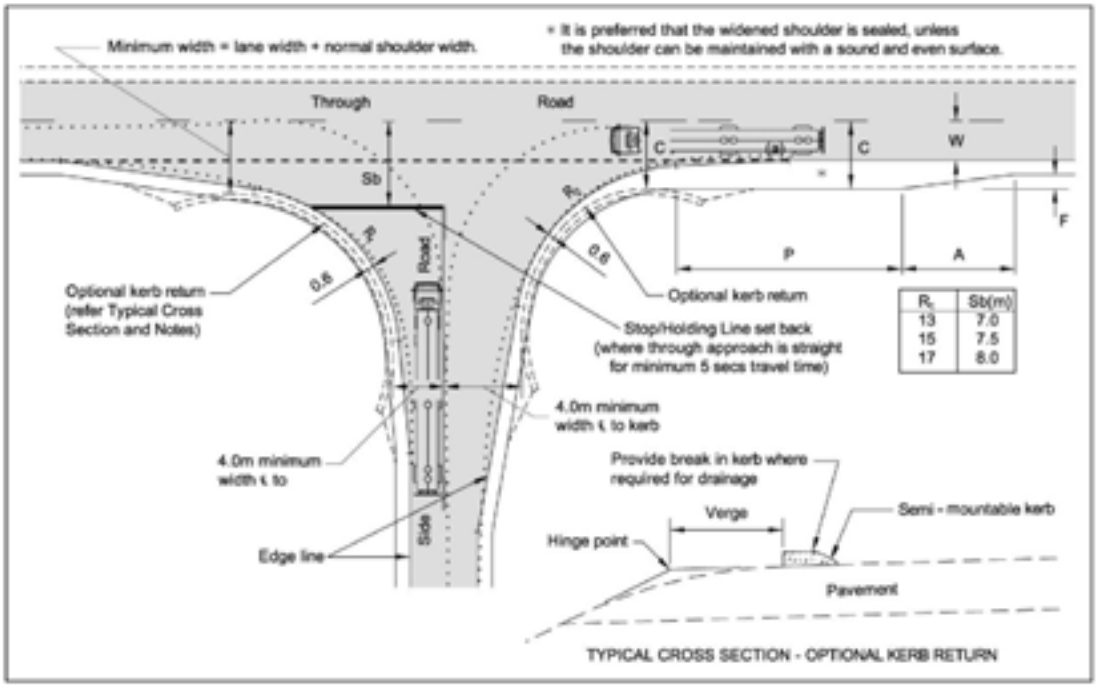
F = Formation/carriageway widening (m).

S = Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).

X = Distance based on design vehicle turning path, typically 10–15 m.

Source: QDMR (2006).

Figure 23 Basic Left Turn (BAL) Treatment Design Guidance



Notes:

1. R1 and R2 are determined by the swept path of the design vehicle.
2. The dimensions of the treatment are defined thus:

W = Nominal through lane width (m) (including widening for curves).

C = On straights – 6.0 m minimum.
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

A = $\frac{0.5VF}{3.6}$

V = Design speed of major road approach (km/h).

F = Formation/carriageway widening (m).

P = Minimum length of parallel widened shoulder (Table 8.1).

Source: QDMR (2006).

Figure 8.2: Rural basic left-turn treatment (BAL)

Table 8.1: Minimum length of widened parallel shoulder

Design speed of major road approach (km/h)	Minimum length of parallel widened shoulder P (m)
50	0
60	5
70	10
80	15
90	20
100	25
110	35
120	45

Note: Adjust the length for grade using the 'correction to grade' factor in Table 5.3

Source: QDMR (2006).