In the matter of the Fingerboards Mineral Sands Project

Planning Panels Victoria

Proponent: Kalbar Operations Pty Ltd

Expert Witness Statement of Paul Carter

Expert of Kalbar Operations Pty Ltd

1. Name and address

Paul Carter – Associate Principal

Arup

Sky Park, 699 Collins Street

Docklands VIC 3008

2. Qualifications and area of expertise

I hold the degrees of Bachelor of Engineering (Civil) and a post-graduate Masters of Traffic both from Monash University in Melbourne.

For the past 18 years I have been involved in various traffic impact and traffic management studies for urban and rural development and infrastructure planning projects across a variety of industry sectors. This includes assessment of the construction and operation implications of a number of large mining, energy and infrastructure projects in Victoria, the Northern Territory, Western Australia and South Australia. In addition to my technical experience from working in a consulting environment, my experience includes working for both state and local government which provides a further understanding of the impacts of transport in the community.

My qualifications and experience are detailed in **Annexure A**.

3. Scope

3.1. Instructions

Arup was commissioned by Kalbar Operations Pty Ltd (Kalbar) to prepare a traffic and transport impact assessment of the proposed Fingerboards Mineral Sands project. This expert witness statement contains a summary of the assessment as publicly exhibited in the Environment Effects Statement (Appendix A012 - Traffic and Transport Impact Assessment). This is referred to as the 'Assessment' throughout the remainder of this expert witness statement. The Assessment forms the basis of my expert witness statement and evidence. My role on the project was as Project Director and I was involved in the investigations undertaken for the Assessment and was the primary reviewer of the associated report.

Following the preparation of the Assessment, further investigations into traffic volumes surrounding Lindenow South and Walpa were also undertaken, an additional site inspection was completed and additional detail was prepared on the requirements of the Transport Operational Management Plan (TOMP).

In addition, updated information was provided by Kalbar in relation to train movements, additional ancillary mining heavy vehicle movements and road construction vehicle movements.

Finally, additional information has been prepared by Kalbar that shows changes to the intended road deviation and intersection geometry in the vicinity of the project and the layout of the proposed haul road and rail siding.

Further detail in relation to each of these items outlined above is set-out and addressed in Section 4.2 of this statement.

The scope of this expert witness report is limited to road, traffic and transport related matters as defined in the letter provided by White & Case dated 15 September 2020.

3.2. Process and Methodology

The methodology for the preparation of the Assessment is outlined below and detailed in Section 4 of the Assessment.

3.2.1. Project Briefing

The Assessment commenced in March 2017 with an initial project briefing with Coffey Services Australia (Coffey) to understand the nature of the project proposal and outline key information requirements. Since 2017, the project has been refined by Kalbar across 2018, 2019 and 2020 and the project reassessed through an iterative process. The most recent project description was provided by Kalbar in April 2020, which forms the basis of the Assessment exhibited with the EES.

The purpose of the Assessment was to investigate the road, traffic and transport impacts of the proposed mineral sands mine and associated road infrastructure requirements during the construction and operation phases of the project. Specifically, it addresses the following key issues:

- The potential for changes to safety or operation of the transport network in the project area and in its vicinity including changes to local and declared roads as well as their interface with rail corridors; and
- The potential impact to local and declared road infrastructure with particular regard to the proposed product transport route/s.

The Assessment focussed specifically on impacts associated with transport safety, operational performance and road assets. It is understood that product transport has relevance to a number of other evaluation objectives and environmental values outside of this, such as dust, air pollution, noise or vibration effects attributed to the proposed B-double route. These were to be covered separately in the Environmental Effects Statement (EES) and in the relevant EES specialist reports.

It is also understood that the process for any land acquisition or planning changes that are required (e.g. for new road alignment associated with road diversions) are to be addressed within a proposed Planning Scheme Amendment (PSA). The PSA is also expected to address key planning and environmental considerations such as social and community values, significant native vegetation, areas of cultural significance, actively eroding areas, watercourses and wetlands.

Product transport route options

Product transport route options were developed as the project was refined by Kalbar, with the following options the primary focus of the Assessment:

- Pre-Avon River bridge: to Maryvale and Port Anthony or Barry Beach Marine Terminal;
- Post-Avon River bridge – Option 1: to a new Fernbank East rail siding; and
- Post-Avon River bridge – Option 2: to Bairnsdale rail siding.

A series of road diversions are also expected to take place throughout the life of the project to facilitate mining activities and are relevant for all product transport options.

Figure 1 and Figure 2 show the project location and product transport routes that were assessed as well as the proposed road diversions.

3.2.2. Assessment inputs

Key inputs into the Assessment were the logistics and project estimates prepared by Coffey and Kalbar. This includes:

- Timing of construction and mine operational phases.
- Proposed work force numbers and shift times.
- Proposed number and type of truck movements expected during construction and operational phases.
- Likely origin for workforce and plant materials.
- Proposed product transport routes.
- Proposed road diversions in diagrammatic form.

This information was used to determine the estimated traffic volumes during construction and operation phases of the project. Vehicle movements associated with construction and operation phases are detailed in Sections 6.1 and 6.2 of the Assessment, with future estimated traffic volumes detailed in Sections 7.1 and 9.1 of the Assessment.

Figure 1: Proposed Product Transport Routes (Figure 11 of the Assessment)

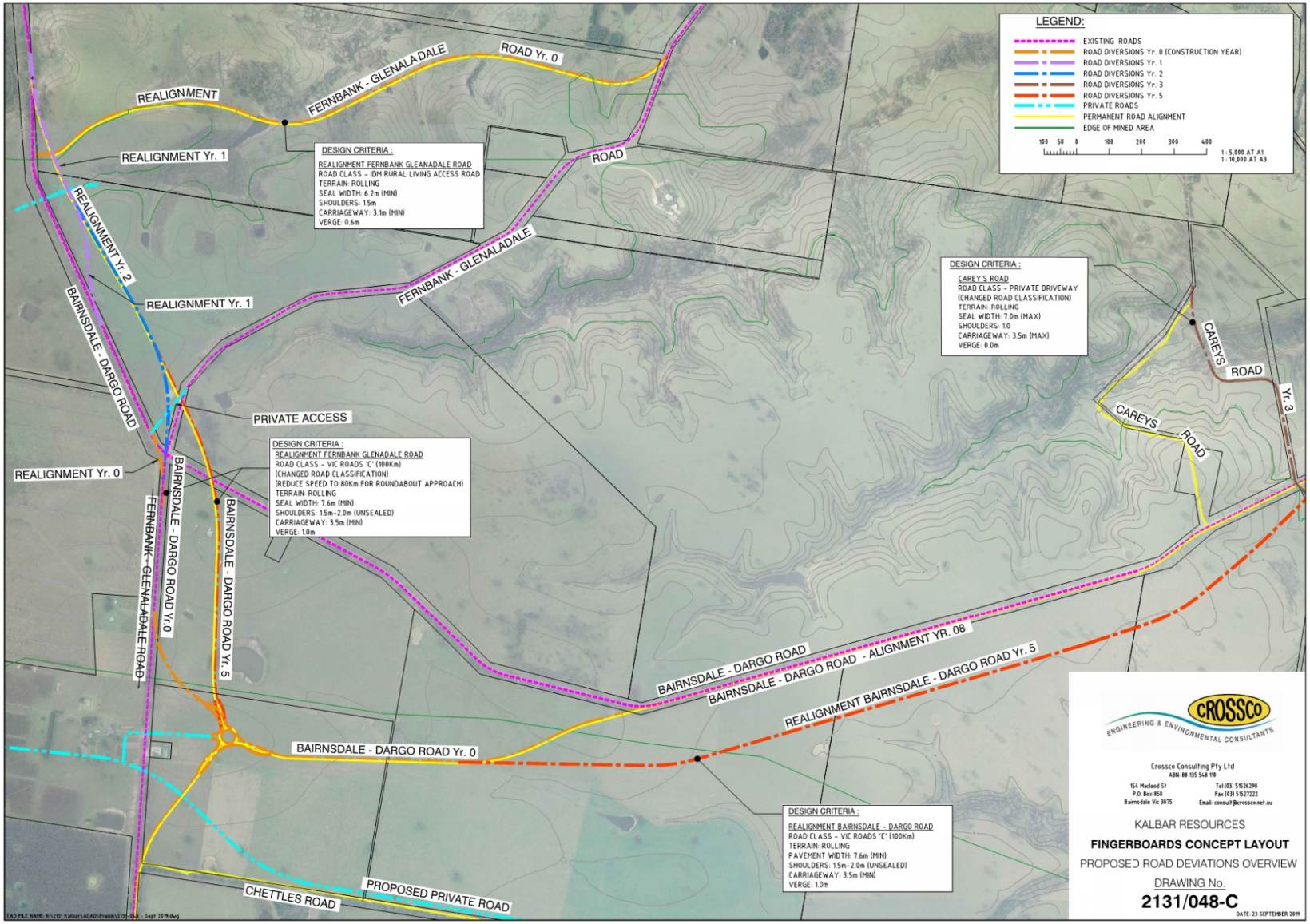


Figure 2: Overview of proposed road network diversions and staging (Figure 10 of the Assessment)

3.2.3. Legislation, policies and strategies

A number of Acts, policies and strategies underpin the Assessment and are detailed in Section 2 of the Assessment. In addition to the Environment Effects Act 1978, relevant documents to the Assessment included:

- The Transport Integration Act 2010 – this sets out the overarching objectives for development of the transport network including a focus on efficiency and safety.
- The Road Management Act 2004 – this provides the statutory framework for management of all Victorian roads, outlining the powers of state and local authorities.
- The Local Government Act 1989 – this defines the local government responsibility and requirements for local roads and their maintenance.
- A number of freight strategies and Gippsland transport strategies.
- Austroads and VicRoads guidelines – used for assessing the performance of the road network and identifying recommended mitigation measures.

3.2.4. Existing conditions assessment

The existing conditions assessment encompassed all the product transport options that were assessed. The study placed particular emphasis on the impact to local roads and the connections between the project area and Princes Highway. It focussed less on Princes Highway and South Gippsland Highway due to their current classification as B-double approved roads of a high standard.

A map of the study area is provided on the following page.

3.2.4.1. Field investigations

As part of the existing conditions review, initial field investigations were conducted during 16 – 18 May 2017. During this time, consultation was also undertaken with VicRoads and Wellington Shire Council (as well as subsequent teleconference meetings with East Gippsland Shire Council) to understand their concerns as road authorities within the study area. Additional field investigations were conducted on 24 – 25 October 2018 as the project proposal was further developead by Kalbar.

The field investigations involved inspecting the road route options to transport products during operations and general road conditions in the vicinity of the proposed project site. The primary focus included local roads and secondary arterial roads north of Princes Highway.

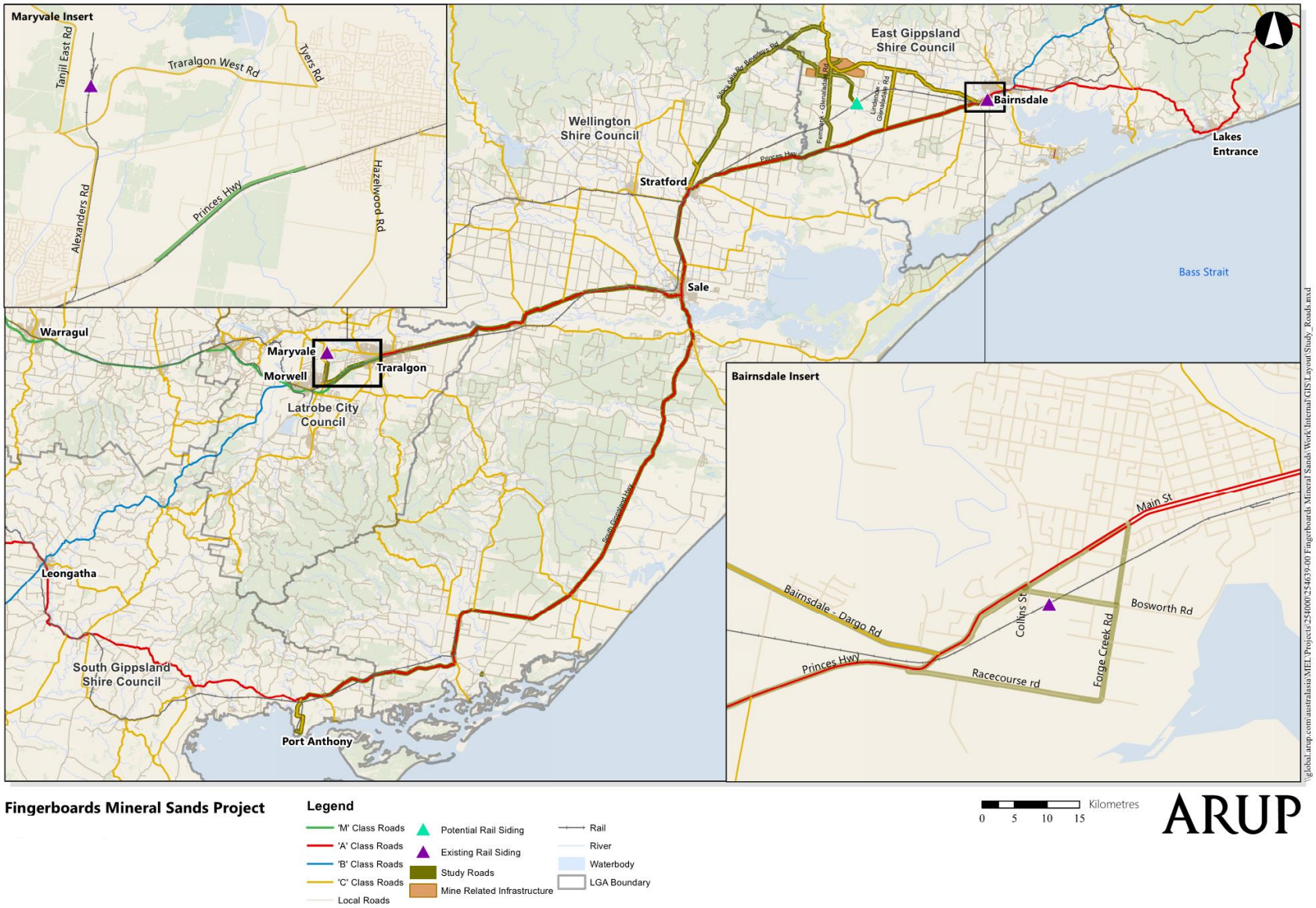


Figure 3: Study Area Roads (Figure 4 of the Assessment)

3.2.4.2. Desktop assessment

A desktop assessment was undertaken to provide an overview of the existing conditions. This included a review of the following:

- Collation and interpretation of traffic volume and seasonality data (i.e. the changes that may occur during holiday periods);
- Intersection geometry and road alignment compliance from aerial imagery and site observations;
- Crash data analysis and identification of locations with a high number of recorded casualty crashes;
- Identifying relevant bus routes (including school buses) and rail networks;
- Pedestrian and cycling routes and areas of likely activity; and
- Assessment of surrounding land uses from open data sources.

3.2.5. Impact assessment

An Impact Assessment Framework was developed following the existing conditions assessment. This framework was used to assess risks associated with the proposed product transport routes, considering environmental values, likelihood and consequences and mitigation measures.

Environmental values specific to the transport assessment were identified as follows:

- efficient road network;
- transport safety;
- asset performance; and
- traffic operations during road upgrades.

Any identified issues were assessed based on their impacts to these values and the sensitivities of these environmental values to change.

Each impact was rated for its likelihood, on a scale of rare to almost certain, and its consequence, from Negligible to Extreme. Prior to assessing the impacts, the basis for each likelihood and consequence rating was defined for all environmental values. Risk assessment criteria for the likelihood and consequence ratings are detailed in the following tables.

For each impact, it was first assessed with standard mitigation measures to obtain the inherent risk. These are typically generic measures, not specifically developed for the project and relate to minimum practice or legislative requirements. The impact was then assessed with additional mitigation measures identified and are recommended to reduce the risk of impacts as a result of the project, with a residual risk provided assuming the measure is adopted. A detailed register of all identified impacts with their associated risk level and mitigation measures are provided in Appendix E of the Assessment and are also summarised in the Executive Summary.

Table 1: Risk assessment criteria - Likelihood

Likelihood	Efficient road network	Transport safety	Asset performance	Traffic operations during road upgrades
Rare	Traffic delays are rare e.g. occurs less than once every 6 months	Conforming infrastructure and/or experience a low crash rate history (or potential to) and small increase in traffic over the length of the project	B-Double approved route and ESA % impact 0-2%	Traffic impact duration less than 24 hours
Unlikely	Traffic delays are unlikely e.g. occurs every 1-6 months	Non-conforming infrastructure and/or experience a low crash history (or potential to) and small increase in traffic over the length of the project	B-Double approved route and ESA % impact 2-5%	Traffic impacts for a 1-7 day duration
Possible	Traffic delays are possible e.g. occurs every 1-4 weeks	Non-conforming infrastructure and/or experience a moderate crash history (or potential to) and a small/moderate increase in traffic over the length of the project	Not approved B-Double route and ESA % impact 2-5%	Traffic impacts for a 1-12 week duration
Likely	Traffic delays are likely e.g. occurs about once a week	Non-conforming infrastructure and/or experience a high crash history (or potential to) and a small/moderate increase in traffic over the length of the project	Not approved B-Double route or ESA % impact < 5-15%	Traffic impacts for a 3-6 month duration
Almost Certain	Traffic delays are almost certain e.g. occurs everyday	Non-conforming infrastructure and/or experience a high crash rate history (or potential to) and a large increase in traffic over the length of the project	Not approved B-Double route or ESA % impact < >15%	Traffic impacts for a 6 month duration or longer

Note: ESA is Equivalent Standard Axles used to convert different axle configurations and loads to a standardised measure.

Table 2: Risk assessment criteria - Consequence

Consequence	Efficient road network	Transport safety	Asset performance	Traffic operations during road upgrades
Negligible	Negligible delays Level of Service A.	No injuries.	Negligible pavement damage.	Impacts to less than 100 people per day with negligible travel time impacts.
Minor	Minor delays Level of Service B.	Minor injury, hospitalisation not required.	Minor pavement damage requiring filling occasional potholes etc. Road authority reimbursed for costs.	Impacts to less than 100-500 people per day with negligible-minor travel time impacts.
Moderate	Moderate delays Level of Service C.	Serious injuries to at least one person.	Moderate pavement damage including reduction in pavement life to 10-40km of road network. Road authority not reimbursed for any costs.	Impacts to 500-5,000 people per day with minor-moderate travel time impacts.
Major	Major delays Level of Service D or E.	Serious injuries to multiple people.	Major reduction in pavement life to 40-100km of road network. Road authority not reimbursed for any costs.	Impacts to 5,000-10,000 people per day with moderate-large travel time impacts.
Extreme	Extreme delays Level of Service F.	Fatality to at least one person.	Extreme reduction in pavement life to over 100km of road network. Road authority not reimbursed for any costs.	Impacts to more than 10,000 people per day with large travel time impacts.

Table 3: Risk evaluation matrix

		Likelihood				
		Rare	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
Consequence	**Negligible**	Very low	Very low	Very low	Low	Moderate
	Minor	Very low	Low	Low	Moderate	Moderate
	Moderate	Low	Low	Moderate	High	High
	Major	Low	Moderate	High	Major	Major
	Extreme	Moderate	High	Major	Major	Major

3.3. Reports reviewed to prepare initial study or statement

Documents that were reviewed as part of the Assessment include:

- Environment Effects Act 1978;
- Local Government Act 1989;
- Road Management Act 2004;
- Transport Integration Act 2010;
- Victorian Freight and Logistics Plan 2013;
- Gippsland Freight Strategy 2013;
- Gippsland Freight Infrastructure Master Plan 2013;
- Gippsland Transport Strategy 2008 – 2020;
- National Heavy Vehicle Regulator;
- Australian Dangerous Goods Code;
- Over-dimensional Loads Legislation; and
- Relevant VicRoads and Austroads guidelines.

I note that the Victorian Freight and Logistics Plan 2013 was current at the time of the Assessment but has since been superseded by the 'Victorian Freight Plan Delivering the Goods'.

3.4. Persons assisting with this work

The persons that were involved in the preparation of the Assessment include myself (Project Director), Bruce Johnson (Specialist Review), Lily Xia (Traffic Engineer), Nick Yong (Traffic Engineer), Ash Bailey (Traffic Engineer) and Callan Jones (Senior Traffic Engineer). It is noted that the duration of the project is such that Ash Bailey (finishing early 2020) and Callan Jones (finishing mid 2018) are no longer working with Arup. Nick Yong remains with Arup but has been on a long-term international assignment since early 2019. The Experience of the remaining project team members are outlined in Annexure B.

4. Findings

4.1. Summary of Opinions

The Assessment was exhibited as part of the Environment Effects Statement and I adopt it as the basis for my expert witness statement and evidence. An overview of the key assumptions and a general description of my findings are provided below.

The Assessment considered implications of the construction and operation of the Fingerboards Mineral Sands Project based on the methodology outlined in Section 3.2 of this expert witness statement.

4.1.1. Key Assumptions

The key assumptions which form the basis for the Assessment are discussed below:

Construction activities

- Construction of the mine is expected to be a period of two years, with up to 130 workers on site on a typical day, working across two 12-hour shifts (commencing 6:00am and 6:00pm) with 75% working during the day and 25% working during the night.
- This is expected to generate 150 return trips a day at the peak of construction activities, consisting of 20 heavy vehicle and 130 light vehicle return trips. Daily traffic generation is expected to be consistent across a 7-day week. It is understood buses may be provided to transport workforce to and from the site, however for a conservative assessment, it is assumed that the workforce will travel all by light vehicle (1 vehicle per person).
- Traffic generation for the construction stage of the project was based on estimates provided by Kalbar and Coffey. The 20 return truck movements per day during construction is expected for construction plant and materials, including deliveries of crushed rock and concrete, pipes and building materials.
- Most building materials are expected to come from Bairnsdale or further east where quarries are located, however a portion of everything will be from Sale or Melbourne (west of the site). For assessment purposes, 75% and 25% split has been assumed from the east and west respectively.
- Construction workforce are expected to be accommodated in nearby towns of Lindenow, Bairnsdale, Briagolong, Stratford and Sale. Assumptions were made around workforce distribution around the towns based on information provided by Kalbar, population of these towns and proximity to site.

Operation activities

- Operation of the mine is expected to be ongoing for up to 20 years (minus construction time).

- The total operations workforce is expected to be approximately 200 people working shifts, with a workforce of approximately 120 on site on a typical day. Similar to construction, the workforce will work across two 12-hour shifts commencing at 6:00am and 6:00pm, with a maximum of 90 people during the day shift and remaining 30 people during the night shift. Traffic generation is expected to be consistent across a 7-day week and assumed conservatively that all workforce will travel by light vehicle with the same distribution as the construction workforce (same workforce origins).
- Transport of product will require B-doubles, expected to generate approximately 40 return trips per day, operating 24 hours a day, seven days a week. It is understood the loads will be covered and trucks will not travel in convoys.

Decommissioning activities

- The Assessment focusses on impacts during construction and operation phases of the project. Decommissioning activities are not included within the Assessment as these activities are expected to utilise the same routes as construction activities, however with lower volumes of traffic anticipated.

Product transport route

The Assessment considers three product transport routes identified by Kalbar:

- Kalbar's preferred option for product transport using a new, purpose-built rail siding at Fernbank East, assuming the Avon River Bridge upgrade is completed prior to operations beginning. This is referred to as Post-Avon River Bridge – Option 1 in the Assessment.
- An alternative Post-Avon River Bridge – Option 2, using the existing Bairnsdale rail siding.
- A Pre-Avon River Bridge Option in the event that the Avon River Bridge Upgrade is not completed on time, with half the product transported to Maryvale and the other half transported to Port Anthony or the Barry Beach Marine Terminal.

Traffic assessment

- Broadly and prior to mitigation, product transport is assumed to be distributed over a 24-hour period during operation (3 – 4 one way vehicle movements per hour) and workforce traffic movements are expected to occur in two peaks (5:00am – 7:00am and 5:00pm – 7:00pm).
- As specific turning movement data was generally not available for intersections along study roads in the Assessment, a series of assumptions were applied, detailed in Appendix C1 of the Assessment. This documents that for intersections outside of major activity areas, road link volumes were used in addition to origin destination assumptions. At intersections closer to major activity areas where there were generally higher demands, 15-minute spot turning movement counts were conducted in AM and PM peaks on 24 – 25 October 2018,

with factors applied to adjust these observations to the hourly flows in the peak periods identified.

- Background traffic growth was assumed to grow at a compound growth rate of 2.5% per annum for all roads in the study area, based on VicRoads historical traffic data identifying growth along Princes Highway in the order of 2% to 3% per annum. The assessment has been undertaken assuming 12 years of compound growth which represents an uplift of non-project related traffic by approximately 34%.

4.1.2. Overview of Findings

4.1.2.1. Road network

The road network along the product transport routes have been assessed for their impacts on traffic performance, transport safety, asset performance and traffic operations during road upgrades, with the findings summarised in the following sections.

Roads that form part of each product transport route are listed in Table 4 below. The majority of roads are declared roads, approved for B-double usage with the exception of Racecourse Road for which East Gippsland Shire Council is the responsible authority.

It is noted that Princes Highway and South Gippsland Highway have not been assessed as they are high standard routes, designed to facilitate the movement of heavy vehicles. Similarly, Barry Road and Alexanders Road have not been assessed in detail given their strategic role in the network, providing access to port and major intermodal facilities.

Table 4: Product transport route roads

Responsible Road Authority	Pre-Avon River Bridge Option	Post-Avon River Bridge Option 1 – Fernbank Siding	Post Avon River Bridge Option 2 – Bairnsdale Siding
VicRoads (Department of Transport) *Declared roads, approved for B-double and Higher Mass Limit trucks*	Bairnsdale-Dargo Road Lindenow-Glenaladale Road Princes Highway Princes Drive Alexanders Road South Gippsland Highway Barry Road	-	Bairnsdale-Dargo Road Lindenow-Glenaladale Road Princes Highway
East Gippsland Shire Council	-	Private Haulage Road (noting this crosses Fernbank-Glenaladale Road, Chettles Road and Cowells Lane)	Racecourse Road Forge Creek Road *(approved for B-double use)* Bosworth Road *(approved for B-double use)*

4.1.2.2. Traffic generation

Traffic volumes for assessment associated with each project phase and option are described in Section 6 of the Assessment.

The total light vehicle movements in Table 5 are based on the proposed daily workforce, distributed according to the workforce origin assumptions. It has been conservatively assumed all workforce will travel to the site by light vehicle (one vehicle per person).

The operations B-double traffic provided in Table 6 reflects the Pre-Avon River Bridge product transport route. For the Post-Avon River bridge – Option 1 (Fernbank East siding) option, B-double traffic is expected to be limited to private roads (other than where this private road crosses public roads). For the Post-Avon River bridge – Option 2 (Bairnsdale Siding) option, all B-double traffic is expected to travel to/from Bairnsdale and the project site.

Table 5: Mine construction traffic for assessment

Origin	Average Daily Traffic Generation (Return Trips)		
	Light Vehicles	Heavy Vehicles	Over Dimensional Loads
Bairnsdale	72	15	<1
Lindenow	7	0	<1
Lindenow South	5	0	<1
Sale	36	5	<1
Briagolong	4	0	<1
Stratford	7	0	<1
TOTAL	130	20	<1 (1/week)

Table 6: Mine operation traffic for assessment (Pre-Avon River Bridge Option 1)

Origin	Average Daily Traffic Generation (Return Trips)		
	Light Vehicles	**B-Doubles**	**Over Dimensional Loads**
Port Anthony	0	20	<1
Bairnsdale	66	0	<1
Lindenow	6	0	<1
Lindenow South	5	0	<1
Sale	34	0	<1
Briagolong	4	0	<1
Stratford	6	0	<1
Maryvale	0	20	<1
TOTAL	120	40	<1

4.1.2.3. Traffic performance assessment

Workforce traffic

An assessment of the operation of existing intersections and road links within the study area was undertaken. This assesses traffic at the expected peak times associated with workforce traffic, during the hours of 5:00am – 7:00am and 5:00pm – 7:00pm. Refer to Section 7.1 of the Assessment, noting this assessment is applicable to all transport route options.

The Level of Service (LOS) has been assessed at key intersections and road links. This is measured from A (best) to F (worst), categorising the intersection / road capacity and the level of delay users would experience. Typically, a LOS D is considered a threshold for reasonable performance.

Traffic performance has been assessed at the following intersections:

- Princes Highway / Bairnsdale-Dargo Road;
- Princes Highway / Fernbank-Glenaladale Road;
- Bairnsdale-Dargo Road / Lindenow-Glenaladale Road; and
- Bairnsdale-Dargo Road / Fernbank-Glenaladale Road.

Table 7: Mine operation AM Peak hour intersection volumes – 10 years after opening

Intersection	Relevance (workforce origin)	Approach[1]				Total	V/C[2]	LOS
		North	East	South	West			
Princes Hwy / Bairnsdale–Dargo Rd[3]	To/from Bairnsdale	570	n/a	250	400	1220	0.48[4]	A
Princes Hwy / Fernbank-Glenaladale Rd	To/from the west (Sale, Stratford, Briagolong, Maryvale)	50	280	n/a	280	610	0.34	A
Bairnsdale-Dargo Rd / Lindenow-Glenaladale Rd	To/from Lindenow and Lindenow South	20	90	30	30	170	0.09	A
Bairnsdale-Dargo Rd / Fernbank Glenaladale Rd (new roundabout)	To/from all towns	40	90	70	30	230	0.13	A

1. Rounded to nearest 10
2. V/C: Volume/Capacity determined using the simplified Cap-X methodology
3. Volumes based on 15-minute survey
4. V/C based on SIDRA output

Table 8: Mine operation PM Peak hour intersection volumes – 10 years after opening

Intersection	Relevance (workforce origin)	Approach[1]				Total	V/C[2]	LOS
		North	East	South	West			
Princes Hwy / Bairnsdale–Dargo Rd[3]	To/from Bairnsdale	340	n/a	240	200	780	0.25[4]	A
Princes Hwy / Fernbank-Glenaladale Rd	To/from the west (Sale, Stratford, Briagolong, Maryvale)	50	310	n/a	350	710	0.39	A
Bairnsdale-Dargo Rd / Lindenow-Glenaladale Rd	To/from Lindenow and Lindenow South	20	50	20	70	160	0.09	A
Bairnsdale-Dargo Rd / Fernbank Glenaladale Rd (new roundabout)	To/from all towns	20	40	20	90	190	0.10	A

1. Rounded to nearest 10
2. V/C: Volume/Capacity determined using the simplified Cap-X methodology
3. Volumes based on 15-minute survey
4. V/C based on SIDRA output

Traffic performance has been assessed for the following road links:

- Princes Highway;
- Bairnsdale-Dargo Road;
- Lindenow-Glenaladale Road; and
- Fernbank-Glenaladale Road.

Table 9: Mine operation AM peak hour road link volumes – 10 years after opening

Road	Location	South-bound*	North-bound*	East-bound*	West-bound*
Princes Highway	West of Lindenow-Glenaladale Road	n/a		250 (A)	270 (A)
	East of Lindenow-Glenaladale Road			250 (A)	260 (A)
	West of Fernbank-Glenaladale Road			280 (A)	290 (A)
	East of Bairnsdale-Dargo Road			1,050 (B)	1,080 (B)
Bairnsdale-Dargo Road	East of Lindenow	n/a		280 (A)	230 (A)
	East of Lindenow-Glenaladale Road			60 (A)	90 (A)
	East of Fernbank-Glenaladale Road			60 (A)	110 (A)

	West of Fernbank-Glenaladale Road			30 (A)	30 (A)
Lindenow-Glenaladale Road	South of Bairnsdale-Dargo Road	30 (A)	30 (A)	n/a	
Fernbank-Glenaladale Road	South of Bairnsdale-Dargo Road	120 (A)	60 (A)	n/a	
	North of Princes Highway	50 (A)	70 (A)		

* Rounded to nearest 10. Corresponding Level of Service (LOS) in brackets.

Table 10: Mine operation PM peak hour road link volumes – 10 years after opening

Road	Location	South-bound*	North-bound*	East-bound*	West-bound*
Princes Highway	West of Lindenow-Glenaladale Road	n/a		340 (A)	290 (A)
	East of Lindenow-Glenaladale Road			340 (A)	290 (A)
	West of Fernbank-Glenaladale Road			340 (A)	340 (A)
	East of Bairnsdale-Dargo Road			1,270 (B)	1,230 (B)
Bairnsdale-Dargo Road	East of Lindenow	n/a		280 (A)	180 (A)
	East of Lindenow-Glenaladale Road			90 (A)	50 (A)
	East of Fernbank-Glenaladale Road			80 (A)	100 (A)
	West of Fernbank-Glenaladale Road			20 (A)	20 (A)
Lindenow-Glenaladale Road	South of Bairnsdale-Dargo Road	30 (A)	30 (A)	n/a	
Fernbank-Glenaladale Road	South of Bairnsdale-Dargo Road	90 (A)	70 (A)	n/a	
	North of Princes Highway	40 (A)	20 (A)		

* Rounded to nearest 10. Corresponding Level of Service (LOS) in brackets.

The assessment indicates all intersections and road links are expected to have no issues from a capacity perspective during normal school term periods during hours when the project workforce is expected to commute. Given the distribution of B-double traffic throughout the day (3-4 on way movements per hour), no significant impacts are expected from product transport during normal weekday periods.

A key recommendation is to produce a travel plan encouraging travel by bus or carpooling for the mine workforce, which I consider appropriate given common shift times and likely commonality of some origins and the destination.

Product transport traffic

Traffic seasonality on Princes Highway may also result in difficulty for B-doubles associated with the operation phase turning onto or from Princes Highway. This occurs in the Pre-Avon River Bridge Option and Post-Avon River Bridge Option 2 at the following locations:

- Princes Highway / Lindenow-Glenaladale Road (both options); and
- Princes Highway / Racecourse Road (Post-Avon River Bridge Option 2).

While the infrequent nature of this issue may not warrant intersection upgrades in isolation, when combined with safety aspects associated with B-double movements, intersection upgrades are recommended. As such, intersection upgrades should be primarily considered from a safety perspective first. These are discussed in 4.1.2.4.

Road diversions

Road diversions proposed to facilitate mining activities also have the potential to introduce delays to road users, in particular with the Bairnsdale-Dargo Road diversion (refer Figure 2). The final permanent alignment would result in additional travel time for road users with the additional distance to travel (0.85km additional travel in the final stage road diversions) and additional time associated with the recommended roundabout at Bairnsdale-Dargo Road and Fernbank-Glenaladale Road. This would represent an inconvenience for local road users however in the broader network the overall impact is expected to be low.

Stakeholder consultation and advanced notice to the community of the proposed changes should be undertaken.

4.1.2.4. Transport safety assessment

The transport safety assessment was undertaken with regards to intersections, road geometry, lighting, driver safety, level crossings, pedestrians, schools, bus services and over-dimensional loads. This is discussed in detail in Sections 7.3, 8.1 and 9.3 of the Assessment.

Road and intersection geometry

A review of the existing intersection geometry found that many of the intersections have non-conforming geometry. This poses an increased risk of crashes when combined with the introduction of B-doubles and/or poor crash history. Identified road and intersection upgrades associated with the mine construction and operation are summarised below in Table 11.

It is noted that recommendations to upgrade intersections to roundabout control in preference to alternative intersection types (e.g. priority control with acceleration and deceleration lanes) has been informed by a safe system approach and focusses on reducing the speed differential of vehicles at the point of conflict. The safe system approach considers the interconnected system of safe roads, safe people, safe vehicles and safe speeds. This approach recognises that people will make mistakes and that the transport system should be ‘forgiving’ such that these mistakes don’t result in fatalities of serious injury.

Table 11: Recommended road and intersection upgrades

Recommended mitigation measures	Construction Phase	Pre-Avon River bridge Option	Post-Avon River Bridge – Option 1	Post-Avon River Bridge – Option 2
Provide a roundabout for the intersection of Fernbank-Glenaladale Road (south) / Bairnsdale-Dargo Road.	✓	✓	✓	✓
Provide channelised right turn lane treatment for the new Fernbank-Glenaladale Road (north) / Bairnsdale-Dargo Road intersection.	✓	✓	✓	✓
Upgrade of Princes Highway / Lindenow-Glenaladale Road intersection to roundabout control.		✓		✓
Extension of line marking along Bairnsdale-Dargo Road to prohibit overtaking, to just west of Lindenow-Glenaladale Road.		✓		✓
Provide rumble or shaker strips and physical (water) or chemical dust suppressants on the main site access road.	✓	✓	✓	✓
Upgrade of Fernbank-Glenaladale Road / Private Haulage Road intersection to signalised control with dynamic advanced warning signs.			✓	
Upgrade of Princes Highway / Racecourse Road intersection to roundabout control.				✓
Shoulder widening around the bends on Racecourse Road and Forge Creek Road.				✓

Lighting

A large proportion of traffic from the project, including both workforce and product transport traffic, will be travelling during the early morning, late evening and night. As such, flag lighting (a single light to highlight presence of intersections) and full intersection street lighting is recommended at a number of intersections to reduce the risk of crashes. The locations and relevant options are summarised in Table 12 below, with the relevant project phases identified.

Table 12: Recommended locations for lighting provision

Recommended locations to provide lighting	Construction Phase	Pre-Avon River bridge Option	Post-Avon River Bridge – Option 1	Post-Avon River Bridge – Option 2
Fernbank-Glenaladale Road / Bairnsdale-Dargo Road (proposed roundabout)	✓	✓	✓	✓
Princes Highway / Fernbank-Glenaladale Road	✓	✓	✓	✓
Princes Highway / Lindenow-Glenaladale Road	✓	✓		✓
Fernbank-Glenaladale Road / Private Haulage Road			✓	
Racecourse Road / Princes Highway				✓

Level crossings

There are seven level crossings along the study area roads. These are located on Fernbank-Glenaladale Road, Lindenow-Glenaladale Road, Bosworth Road, Fernbank-Lindenow South Road (Cowells Lane), Princes Highway (near Bairnsdale and Stratford) and Princes Drive near Maryvale.

All level crossings currently have active control with flashing lights, and all except Fernbank-Glenaladale Road and Lindenow-Glenaladale Road have boom gates. Recommended upgrades at level crossings due to introduction of regular B-double movements associated with the project include:

- Installation of boom gates at the Lindenow-Glenaladale Road level crossing (Pre-Avon River Bridge Option or Post-Avon River Bridge Option 2 – Bairnsdale Siding).
- At the Princes Drive level crossing, refresh existing keep clear line marking or considering linking rail signals with nearby traffic signals to avoid vehicles queuing into the crossing (Pre-Avon River Bridge Option only).

Over-dimensional loads

Over-dimensional loads are expected to be required on a number of infrequent occasions during the life of the project however further development of the project is required to understand the specific sizing and configuration of the loads. Any use of over-dimensional loads would require specific approval by VicRoads and/or Council which may include provisions for the use of escort or pilot vehicles.

It is recommended that prior to movement of over-dimensional loads, a route audit is undertaken with guidance from VicRoads and the National Heavy Vehicle Regulator. This audit would assess route options, safety and clearances to potential obstructions such as wires, structures, trees and rail crossing infrastructure. These loads should also seek to avoid travelling in peak traffic hours and during school bus operation hours.

Community concerns and pedestrian safety

Whilst proposed B-double movements are relatively low in comparison to total existing traffic volumes, community issues and pedestrians safety associated with the movements are important considerations. B-double movements should avoid times of school pick up and drop off (8:00am – 9:30am and 2:30pm – 4:00pm) on school days. This is to mitigate risks associated with pedestrian safety around schools and school buses travelling along the product transport routes. It is noted that these issues are primarily associated with the Pre-Avon River Bridge Option and the Post-Avon River Bridge Option 2 – Bairnsdale siding.

Generally pedestrian safety impacts are expected to be minor within the study area with two exceptions being the township of Lindenow South and along Racecourse Road. In these locations, heavy vehicle volumes will increase by about 80 vehicle movements per day as a result of product transport.

Risk of crashes involving pedestrians is also increased during times of major activity, for example, football matches at the Lindenow South football ground, school times and major public events at the Bairnsdale Racecourse. It is recommended that pedestrian surveys are undertaken to understand the patterns of demand at Lindenow South. There is also a marginal increase in safety risk for towns such as Stratford, Sale, Rosedale, Longford, Woodside, Yarram and Alberton (Pre-Avon River Bridge Option), however given existing freight traffic on these roads and generally small increase in percentage of heavy vehicles, the impacts are considered to be negligible.

Community concerns such as pedestrian safety at Lindenow South and at other townships along product transport routes may be addressed through mitigation measures such as limitations on time of operation, revision of speed limits, driver training and route familiarisation. These measures are recommended to be addressed as part of a Transport Operational Management Plan.

Transport Operational Management Plan

The ongoing movement of B-doubles on the road network over the 20-year life of the project is an important consideration for road safety. It is recommended that a transport operational management plan (TOMP) be produced. This would be developed in accordance with industry standards with implementation and monitoring guidance.

The TOMP should address and monitor key issues such as: hours of operation, driver fatigue, driver induction, fitness for work (including drug and alcohol testing), route familiarisation and management community of concerns (such as pedestrian safety).

The TOMP should be regularly monitored and reviewed in partnership with key stakeholders over the 20-year life of the project.

4.1.2.5. Asset performance assessment

A high-level road pavement assessment was undertaken given the increase in truck movements and concerns from road authorities on pavement deterioration. This is discussed in Sections 7.4, 8.2 and 9.4 of the Assessment.

Pavement impacts

A high-level assessment has been undertaken on the pavement impacts for roads along the product transport routes to provide an initial indication of potential pavement impacts. It is noted that the Princes Highway and South Gippsland Highway are both A class roads and therefore were not assessed for pavement impact given their strategic freight movement function in the transport network.

Locations and associated product transport routes where pavement deterioration from B-doubles used in product transport may result in reduced pavement life are listed in Table 13, noting pavement deterioration may also result in uneven and dangerous road surfaces.

For the Post-Avon River Bridge Option 2 – Bairnsdale Siding, notable occurrences of pavement deterioration were identified during site investigations in 2018 at the Bosworth Road / Forge Creek intersection and the Bosworth Road / Bairnsdale rail siding access. Resealing and strengthening of pavement at these locations may be required, noting it is likely the road will require resurfacing and regular maintenance.

Table 13: Potential for pavement deterioration

Road	Pre-Avon River bridge Option	Post-Avon River Bridge – Option 2
Lindenow-Glenaladale Road	✓	✓
Bairnsdale-Dargo Road	✓	✓
Barry Road	✓	
Racecourse Road		✓
Forge Creek Road		✓
Bosworth Road		✓

For the Post-Avon River Bridge Option 1 – Fernbank Siding, B-doubles use a private haulage road between the mine site and the rail siding. However, the private haulage road crosses Chettles Road and Cowells Lane which are both public unsealed roads.

As the proposal is further defined and through the associated design process, it is recommended that the project consults with East Gippsland Shire Council as to the proposed pavement treatment for Fernbank-Glenaladale Road and any required pavement improvements to Chettles Road and Cowells Lane. It is also recommended Chettles Road and Cowells Lane are sealed for a short distance on either side of the private haulage road crossing.

Monitoring and asset protection plan

It is recommended that a monitoring and asset protection plan be developed and agreed between the project and the relevant road authorities (Department of Transport, East Gippsland Shire Council, Wellington Shire Council) to manage pavement impacts due to product transport for the project. The purpose will be to ensure the road network is maintained to a suitable standard and an acceptable level of service, outlining:

- Agreed levels of service;
- Asset maintenance requirements;
- Intervention levels;
- Agreed remediation repairs for routine and programmed maintenance;
- Agreed process for how roads along the product transport route will be monitored; and
- Agreed responsibility for maintenance and method of reimbursement of costs between Kalbar and relevant road authorities.

A survey of existing conditions is recommended to be undertaken prior to construction commencing. This will be used to understand the initial road conditions and enable monitoring of any deterioration of the road asset due to the project. It is recommended that this includes surveys capturing the topography, civil infrastructure, detailed road surface conditions and a structural pavement evaluation.

Surveys should also be conducted on a systematic basis to review the road conditions throughout the project life cycle as agreed with relevant road authorities. The interventions and responsibility will be guided by the Asset Protection Plan agreed with the Responsible Authorities.

Racecourse Road

B-double approval for Racecourse Road will also be required if the Post-Avon River Bridge Option 2 – Bairnsdale Siding is to be taken forward. This will require consultation with East Gippsland Shire Council and may require works to ensure it is suitable for B-double use.

It should be noted that a high-level review of alternative routes investigations was carried out as part of the Assessment that identified alternate routes to Racecourse Road to access the Bairnsdale Siding via Main Street or Collins Street. These had their own set of associated challenges and complex issues. This is discussed in Section 6.4.2 of the Assessment.

4.1.2.6. Traffic operations during road upgrades

Traffic impacts may occur during road works associated with the formation of intersections and road upgrades. This may require traffic to slow or stop traffic for short period of time. Construction traffic management plans and emergency management plans will be required associated with these

temporary events to effectively manage the interface between project and non-project related traffic.

Traffic management

Preparation of traffic management plans should be completed in accordance with relevant standards and guidelines including safety and traffic management procedures. These are to be submitted to the responsible road authority (VicRoads and/or Council) as a requirement for approval for any road works or temporary traffic management to be undertaken on the public road network.

They should ensure traffic movements are maintained when constructing new intersections, subject to requirements of the relevant road authority. Timing of upgrades should also seek to avoid peak periods (note this includes weekday peak hours and peak times of year such as school holidays and long weekends).

Emergency management

An emergency management plan should capture procedures associated with notifying emergency services (such as police, fire, ambulance and state emergency services) when significant delays are to be expected. This should include contact details to allow emergency services to also notify when requiring access through an area of delay. Development of any traffic management procedure should also identify emergency access arrangements and seek comment from emergency services as part of the process.

4.1.2.7. Residual and legacy issues

It is recognised that there may be residual and legacy issues associated with the project. This includes increased traffic having a more significant impact on local roads, increased heavy vehicle proportions on roads along product transport routes and townships, and delays experienced due to road diversions and infrastructure upgrades.

Proposed road improvements to sections of the road network and intersections were identified to provide a project legacy of a safer transport network for the community beyond the project life.

In addition to monitoring requirements as part of the Transport Operational Management Plan and the Asset Protection Plans discussed previously, quarterly meetings with stakeholders and local councils should be conducted during the construction stages of the project. This allows feedback to be obtained on community concerns, the efficiency of the road network, transport safety, asset performance conditions and identifying the need for further monitoring tasks. Whilst not investigated as part of the Assessment, it is noted that mitigation measures to address any identified noise impacts should be considered, subject to community consultation and any required acoustic assessment. A separate specialist study has been prepared as part of the EES addressing noise and vibration impacts (Appendix A010 – Noise and Vibration Assessment of the EES).

4.2. Review of Summary Chapters of the EES

My role on the project as outlined previously has been in preparation of the Assessment forming an appendix to the EES. I note that I had no involvement in authoring or reviewing sections of the EES main report relating to traffic and transport as the EES was being prepared. However, in preparation of this statement, I have reviewed the sections of the EES that are relevant to traffic and transport including:

- Section 8.8 - Environmental and Socioeconomic context: Roads, traffic and transport;
- Section 9.8 - Environmental and Socioeconomic impact assessment: Roads, traffic and transport; and
- Attachment H – Mitigation register (Traffic and transport mitigations).

A summary of my review and key differences between the EES main report and the Assessment are described below.

4.2.1. EES Section 8.8

A key difference identified was that the EES Section 8.8 lists two environmental values that may be impacted by the project: *transport safety* and an *efficient road network.* The Assessment had identified four environmental values that formed the basis of the traffic impact assessment. The two other environmental values underpinning the Assessment (*asset performance* and *traffic operations during road upgrades*) are not explicitly referenced in this section of the EES.

There were also a number of minor issues (e.g. missing or incorrect information) however these are not considered to have any material impact on the findings of the Assessment.

4.2.2. EES Section 9.8

A number of areas were identified with key differences that would impact or change the findings of the Assessment. Key items include:

- A number of key assumptions underpinning the Assessment are excluded from EES Section 9.8.1.1 which focuses on traffic demand development. Examples of other key assumptions associated with future traffic demand include the volume of light and heavy vehicle traffic associated with each phase, peak hours adopted and time of assessment (i.e. 10 years after mine opening). This detail is provided in the Assessment and summarised in Section 4.1.1 of this statement.
- In the risk assessment tables (Tables 9.54, 9.56, 9.57 and 9.58 of the EES), there are a number of risks identified in the Assessment that are missing in each project phase, some that are listed in the incorrect project phase and some mitigation measures for risk items that are incorrect or differ to the Assessment. An example is from Table 9.56 and the discussion of crash risk for B-doubles crossing Fernbank-Glenaladale Road, the mitigation of traffic signals is not referenced. Note that further coverage of mitigation measure differences is discussed in the following section which focuses on Attachment H of the EES.

- The EES states there are 40 heavy vehicle movements through Lindenow South during the construction phase of the project which does not align with our assessment. It is assumed that 75% of construction heavy vehicles would originate from Bairnsdale (and use Bairnsdale-Dargo Road) and 25% from Sale or Melbourne (west of the site). Whilst heavy vehicles from Sale or west of the site would be encouraged to use Lindenow-Glenaladale Road (as it is a declared road), this would only result in 10 heavy vehicle movements per day (five return trips) and would be a much lower percentage increase than the 50% that is highlighted in the EES.
- Section 9.8.3.1 subsequently identifies risks to pedestrians in Lindenow South during the construction stage that is not aligned with the findings of the Assessment.
- Section 9.8.5 has excluded a number of road upgrades that are recommended by the Assessment from the list of changes proposed for the public road network during the operation phase of the project. Examples of upgrades that are missing include:
    - Upgraded intersection at Lindenow-Glenaladale Road and Princes Highway to roundabout control;
    - Shoulder widening of Racecourse Road and Forge Creek Road;
    - A channelised right turn for the Fernbank-Glenaladale Road North / Bairnsdale-Dargo Road intersection;
    - The upgrade of the Fernbank-Glenaladale Road / Private Haulage Road to a signalised control; and
    - A number of minor improvements including various line marking changes, lighting changes and increased monitoring and maintenance of the road network.
- The Assessment is based on a maximum daily workforce during operations 120 workers; the EES has noted a workforce of 130 (e.g. Section 9.8.5.1).
- Section 9.8.5.1 of the EES states the traffic growth rate was assumed to be 3% per year, however the Assessment has applied a growth rate of 2.5% per annum to non-project related traffic.

A number of other differences were identified in Section 9.8 of the EES however were considered moderate to minor and unlikely to have impact on the Assessment findings. Some examples of these include differences with the descriptions for the likelihood and consequence criteria and small differences in vehicle volumes and intersection capacity results.

4.2.3. EES Attachment H: Mitigation measures

As identified above, differences were identified in the mitigation measures outlined in the EES compared to recommendations made as part of the Assessment. A review of the committed mitigation measures provided in Attachment H of the EES relating to traffic and transport found the items included generally aligned with the Assessment. However, additional mitigation measures and amendments to the existing measures outlined in the EES would be required for full alignment with the Assessment.

Key additions to Attachment H regarding traffic and transport mitigation measures are outlined in the table below.

Table 14: Additions and amendments to Attachment H

Reference	Description
Mitigation to add to Attachment H	Post-Avon River Bridge Option 2 – Bairnsdale Siding and Pre-Avon River Bridge: A monitoring and asset protection plan to be developed and agreed between the project and relevant road authorities. This includes maintenance of shoulders (clearing of overgrowth) to improve drainage in addition to pavement treatments. A survey of the existing conditions for the final product transport route should be undertaken prior to construction commencing so that deterioration resulting from the project can be monitored. This includes a structural integrity assessment to understand the pavement comparison. Post-Avon River Bridge Option 2 – Bairnsdale Rail Siding only: resealing and strengthening of pavement for B-double use to be developed and agreed between the project and relevant road authorities, particularly around Bosworth Road / Forge Creek Road roundabout and Bosworth Road / Bairnsdale Siding access.
Mitigation to add to Attachment H	Upgrade of the Fernbank-Glenaladale Road / Private Haulage Road intersection to a signalised control with advanced warning signs upstream of the intersection location and consideration of appropriate spacing between intersections to reduce the risk of high speed vehicle collisions and providing awareness of the hazard (Post Avon River Bridge Upgrade Option 1 – Fernbank East Rail Siding only).
Mitigation to add to Attachment H	Public road sealing of a small section (~20-30m) either side of the Private Haulage Road crossing of Chettles Road and Cowells Lane (Post Avon River Bridge Upgrade Option 1 – Fernbank East Rail Siding only).
Mitigation to add to Attachment H	Seal the Bairnsdale Rail Siding access road (Post-Avon River Bridge Option 2 – Bairnsdale Rail Siding option only).
TT03 amendment	Incorrect project options were specified for the locations where standard road lighting should be provided. Standard road lighting should be provided at the following intersections (relevant product transport options in brackets): • Fernbank-Glenaladale Road and Bairnsdale-Dargo Road (for all product transport route options); • Lindenow-Glenaladale Road and Princes Highway (Pre-Avon River Bridge and the Post-Avon River Bridge Option 2 – Bairnsdale Siding);

Reference	Description
	• Fernbank-Glenaladale Road and Private Haulage Road (Post-Avon River Bridge Option 1 – Fernbank East Siding only); and • Racecourse Road and Princes Highway (Post-Avon River Bridge Option 2 – Bairnsdale Siding only).
TT04 amendment	Flag lighting provision at the Fernbank-Glenaladale and Private Haulage Road intersection is relevant for the Post-Avon River Bridge Option 1 – Fernbank East Rail Siding only.
TT20 amendment	An emergency management plan is also required as part of this as recommended in the Assessment.
TT22 amendment	A dedicated travel plan should be prepared that encourages the workforce to travel by bus or car pool.
TT25 amendment	The assessment identifies B-double movements should avoid travelling during school pick-up and drop-off times, i.e. 8:00am – 9:30am and 2:30pm – 4:00pm on school days.

4.3. Additional work undertaken since exhibition of EES

Following the completion of the Assessment and its public exhibition as part of the EES, further investigation has been undertaken including the following:

- Traffic counts have been undertaken on Lindenow-Glenaladale Road and Bairnsdale-Dargo Road (November 2020);
- Further development has been undertaken of the typical types of interventions that may form part of the Transport Operational Management Plan (TOMP);
- A review of additional information provided by Kalbar (January 2021) in relation to train movements associated with Post-Avon River Bridge options.
- A review of information provided by Kalbar (January 2021) in relation to construction traffic volumes associated with road upgrades and also with ancillary mining inputs during operation (e.g. diesel, flocculant) and outputs (e.g. waste).
- Additional information has been prepared by Kalbar that shows changes to the intended road deviation and intersection geometry in the vicinity of the project and the layout of the proposed haul road and rail siding (January 2021).
- A further site visit has been conducted in January 2021 to understand the site conditions and any changes from those assessed in the report.

The findings from the above additional investigations are detailed in Sections 4.3.1 to 4.3.6.

4.3.1. Lindenow South traffic counts

Additional traffic counts were conducted at the following locations in November 2020 to understand the current truck volumes surrounding Lindenow South:

- Bairnsdale-Dargo Road (550m west of Lindenow-Glenaladale Road)
- Lindenow-Glenaladale Road (south of Fernbank-Glenaladale Road)

These counts were undertaken to update or supplement the publicly available information sourced from VicRoads websites during the investigations to date undertaken for the Assessment.

Average weekday traffic volumes

The average weekday traffic volumes at these locations and their respective heavy vehicle percentages are provided in the table below.

Table 15: Two-way traffic volumes

Road name	Average weekday daily traffic	Heavy vehicle composition
Bairnsdale-Dargo Road (west)	994	25%
Lindenow-Glenaladale Road	585	15%

The Lindenow-Glenaladale Road volumes are similar to the volumes reported in the Assessment, however significantly higher volumes are observed in the traffic count for Bairnsdale-Dargo Road (west of Lindenow-Glenaladale Road) compared to volumes used for the Assessment (130 vehicles per day).

Volumes used in the Assessment were sourced from the VicRoads website. For Bairnsdale-Dargo Road (west), the description provided with the VicRoads data indicates that it is for the section between Lindenow-Glenaladale Road and the start of Bairnsdale-Dargo Road in the north. This assumes that the volumes are relatively consistent along this section rather than considering local movements in and around Walpa, and is likely the reason for a larger discrepancy in volumes observed in the traffic count.

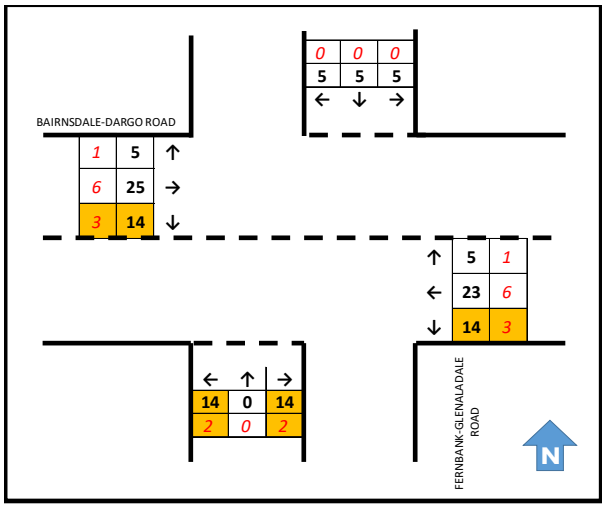
With the updated traffic volume information now available, traffic assessments at the following locations have been revised:

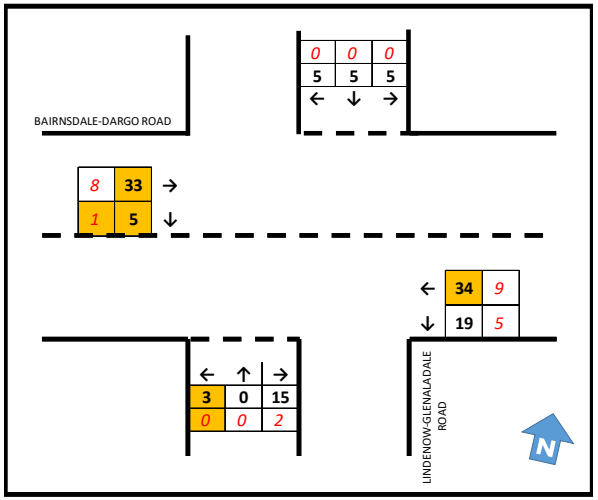
- Intersection of Bairnsdale-Dargo Road / Lindenow-Glenaladale Road
- Intersection of Bairnsdale-Dargo Road / Fernbank-Glenaladale Road
- Link volumes on Bairnsdale-Dargo Road west of Lindenow-Glenaladale Road.

Updated traffic assessment

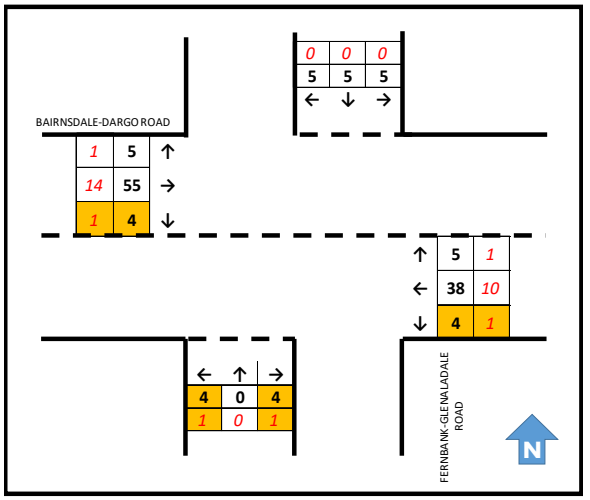
The turning movement diagrams (provided in Figure 4) have been developed using the weekday average link volumes on Bairnsdale-Dargo Road obtained in the November 2020 traffic survey. It retains all other assumptions used to determine specific turning movements for the project 10 years after opening, as described in Appendix C1 of the Assessment.

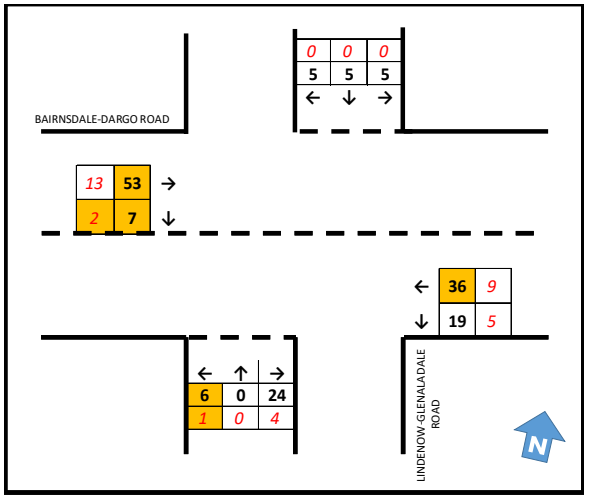
Existing conditions (AM peak hour volumes)





Existing conditions (PM peak hour volumes)

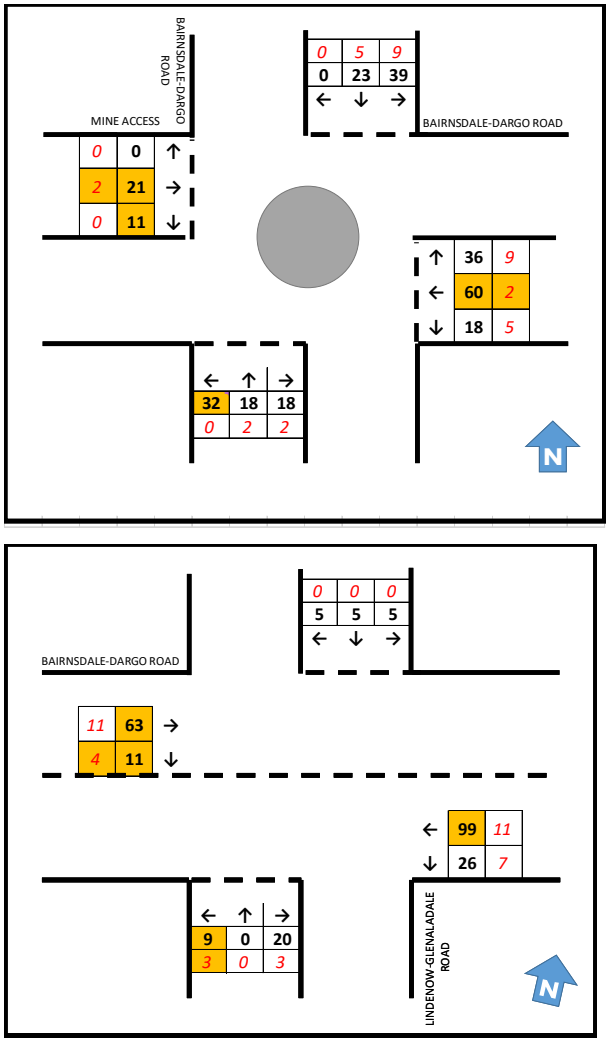




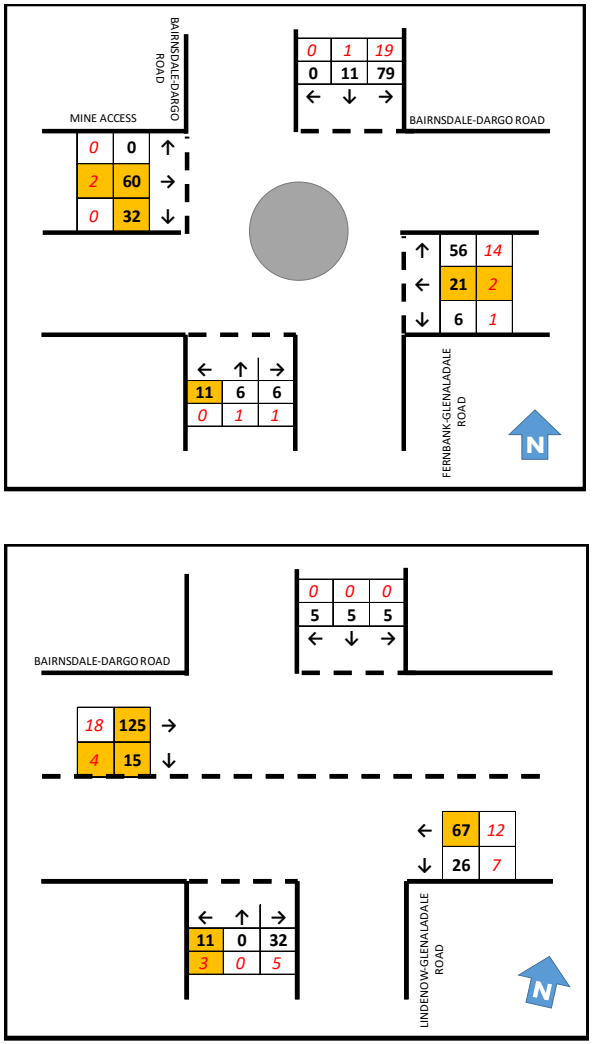
Note: Total turning movement volumes (black), heavy vehicle volumes (red), key project turning movements (orange)

Figure 4: Revised Existing Conditions Volumes (AM and PM Peak Period)

Future – 10 years after mine opening (AM peak hour volumes)



Future – 10 years after mine opening (PM peak hour volumes)



Note: Total turning movement volumes (black), heavy vehicle volumes (red), key project turning movements (orange)

Figure 5: Revised Future Traffic Volumes (AM and PM Peak Period)

The intersection performance for the revised turning movements are provided in the table below for the two intersections (10 years after mine opening). This shows both intersections still perform under capacity with a Level of Service (LOS) of A. This is consistent with the overall findings in the Assessment.

Table 16: Mine operation AM peak hour intersection performance

Intersection	Approach volume (rounded to nearest 10)				TOTAL	V/C	LOS
	North	East	South	West			
Bairnsdale-Dargo Road / Lindenow-Glenaladale Road	20	130	30	70	250	0.14	A
Bairnsdale-Dargo Road / Fernbank-Glenaladale Road	60	110	70	30	270	0.15	A

Note: V/C is volume/capacity ratio.

Table 17: Mine operation PM peak hour intersection performance

Intersection	Approach volume (rounded to nearest 10)				TOTAL	V/C	LOS
	North	East	South	West			
Bairnsdale-Dargo Road / Lindenow-Glenaladale Road	20	90	40	140	290	0.16	A
Bairnsdale-Dargo Road / Fernbank-Glenaladale Road	90	80	20	90	280	0.16	A

Note: V/C is volume/capacity ratio.

Road link performance for Bairnsdale-Dargo Road (east of Fernbank-Glenaladale Road) has also been assessed using the revised volumes. This shows that the road is expected to operate at a LOS A, consistent with findings in the Assessment. This is summarised in the table below (10 years after mine opening).

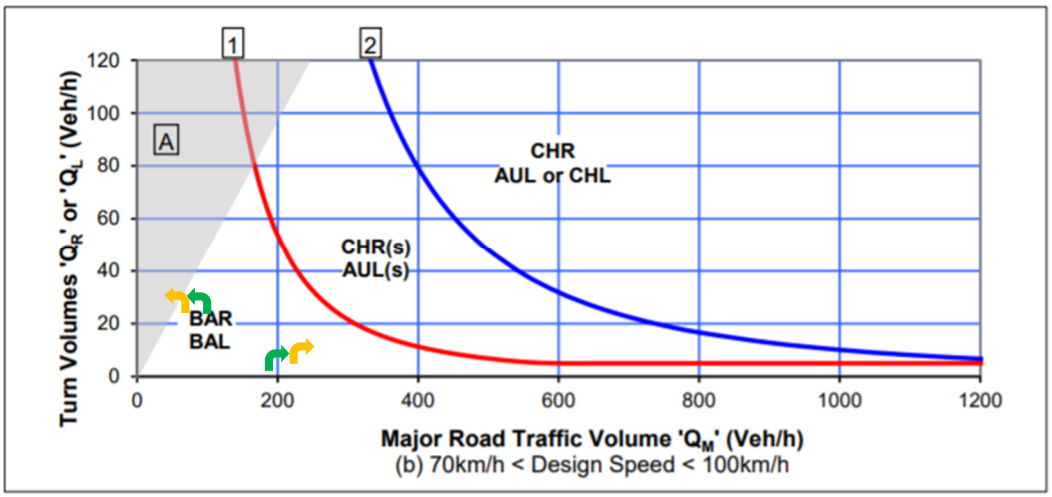
Table 18: Mine operation road link performance

Location	AM peak hour		PM peak hour	
	Eastbound*	Westbound*	Eastbound*	Westbound*
Bairnsdale-Dargo Road (east of Fernbank-Glenaladale Road)	80 (A)	110 (A)	150 (A)	80 (A)

*Rounded to nearest 10. Corresponding LOS in brackets.

Warrants for turning treatments

An analysis of the turning volumes at the intersection of Bairnsdale-Dargo Road and Lindenow-Glenaladale Road has been undertaken against Austroads warrants for turning treatments. A summary of this analysis is provided in Figure 6 utilising the turning volumes presented Figure 4 and Figure 5 and a design speed of 90km/h (reflecting the 80km/h speed limit). The outcomes of this analysis are consistent with the findings in Section 7.3.1 of the Assessment which indicate that no channelised turning treatments are warranted at this location. Therefore, the existing Basic Right (BAR) and Basic Left (BAL) turning treatments are appropriate.



Green = AM Peak Period Orange = PM Peak Period

Source: Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 6: Assessment of Turn Lane Warrants

The proposed roundabout at the intersection of Bairnsdale-Dargo Road and Fernbank-Glenaladale Road remains an appropriate treatment for safety and this recommendation does not change as a result of the updated traffic volumes.

Pedestrian safety

The updated traffic count data was also reviewed to assess the change in existing truck volumes travelling along Bairnsdale-Dargo Road (through Walpa) and Lindenow-Glenaladale Road (through Lindenow South).

A summary of the truck volumes is provided in Table 19 which shows the change in heavy vehicles should the alternative product transport routes be adopted. This shows a 32% increase in heavy vehicles on Bairnsdale-Dargo Road (west of Lindenow-Glenaladale Road) and 91% increase of heavy vehicles on Lindenow-Glenaladale Road (in Lindenow South).

The increase on Lindenow-Glenaladale Road is slightly lower but aligned with the findings of the Assessment which indicated a 108% increase in heavy vehicles as a result of the project. As such, there is no change to the recommendations already identified in the Assessment.

It is noted Bairnsdale-Dargo Road through Walpa (west of Lindenow-Glenaladale Road) was not specifically discussed in Section 7.3.7 of the Assessment given the pedestrian movements expected to be low. From the table below, there are higher truck volumes already using this route and hence a lower percentage increase in truck volumes at this location relative to existing conditions when compared to the previous counts. As such, the relative impact is expected to be lower at this location. It should be noted that the recommended restricted B-double operating hours during school pick-up and drop-off times will also mitigate safety impacts for pedestrians and cyclists in Walpa.

Table 19: Truck volumes from November 2020 traffic counts

Location	Vehicle type	Existing two-way weekday volume (daily)	Project volume (+80 B-doubles per day)	Percentage increase
Bairnsdale-Dargo Road	Heavy vehicles (all trucks)	253	333	+32%
Lindenow-Glenaladale Road	Heavy vehicles (all trucks)	88	168	+91%

Asset Performance

As outlined in Table 19 and discussed in earlier sections, the change in percentage heavy vehicle volumes, and therefore the equivalent standard axles, is greater than 15% for both Bairnsdale-Dargo Road and Lindenow-Glenaladale Road. This is consistent with findings outlined in Section 7.4.2 of the Assessment and therefore it remains recommended that an asset protection and monitoring plan include these sections of the product transport should either of the alternative product transport options be adopted.

In my opinion, the latest traffic count data does not change the findings, recommendation or conclusions from the Assessment.

4.3.2. Transport Operational Management Plan

The Transport Operational Management Plan (TOMP) was recommended as part of the Assessment. To provide further guidance on expectations for the TOMP an additional outline of the typical contents of a TOMP has been undertaken.

Note that the guidance provided here and within the Assessment are focussed on B-double movements during operational phases of the project associated with product transport only. It is recognised Kalbar will have broader responsibilities for safe movement and operation of heavy vehicles for other purposes (for example, heavy vehicles during construction).

NHVR and Chain of Responsibility

The National Heavy Vehicle Regulator (NHVR) is the regulatory body for all heavy vehicle operation in Australia. It provides standardised regulations for heavy vehicles under the Heavy Vehicle National Law (HVNL) and covers fatigue management, speed, mass, loading and dimensions as well as vehicle standards. As such, the TOMP should seek to align with all requirements set out by the NHVR and HVNL.

The Chain of Responsibility (CoR) described by the NHVR ensures all persons involved in the supply chain share responsibility for ensuring compliance with the HVNL. As such, Kalbar has a responsibility to ensure heavy vehicle movements associated with the project comply with the HVNL as they are the consigner of goods to be transported, and the executive in procuring and monitoring other parties in the CoR (e.g. a heavy haulage contractor).

Key risks and example control measures

A preliminary review has been undertaken of key risks and example control measures to provide guidance on what the likely requirements for the TOMP would be. This has been informed by the Registered Industry Code of Practice (RICP), also known as the Master Code.

The Master Code is an industry led, risk-based safety and compliance framework that has been endorsed by the NHVR and provides a practical guide to assist parties within the CoR to identify and mitigate risks to meet their obligations under the HVNL. It is expected the TOMP for the project would be developed to align with the risk-based framework outlined in this document.

Key risk items and example control measures are provided in the table below. Note this is not an exhaustive list and further identification of risks and mitigation measures are expected to be identified as part of the preparation of the TOMP.

Table 20: Summary of example risks and associated control measures

Risk	Typical Control Measures
Driver fitness for work	• Ensure drivers have regular medical checks at prescribed intervals by a medical practitioner according to the Austroads 'Assessing fitness to drive' guidelines (or similar documentation). • Conduct regular drug and alcohol testing (including random testing) where possible. • Prior to engaging drivers / subcontractors, complete a check to ensure they have a safe driving record or reputation for running a safe and compliant business (e.g. participation in the National Heavy Vehicle Accreditation Scheme).

Risk	Typical Control Measures
Driver fatigue	• Keep accurate records and monitor driver work and rest times (with regular reviews). • As part of the HVNL, minimum rest times and maximum work times are required by heavy vehicle drivers to mitigate driver fatigue. Three work and rest options are set out under the HVNL (standard, Basic Fatigue Management and Advanced Fatigue Management) and will depend on the operator's fatigue management accreditation. • If any person in the CoR becomes aware of the driver being fatigued, the driver should be immediately stopped, and arrangements made for them to have a rest break. This includes having a clear escalation process with agreed actions to be undertaken. • Schedule trips with appropriate timeframes and rest stops. Schedules should not result in drivers feeling directly or indirectly pressured to drive whilst fatigued or breach their work and rest hours.
Speeding	• Trips should be planned with appropriate time allowed for the required route, so drivers are not directly or indirectly pressured to speed. • Vehicle speed data should be regularly monitored and checked for compliance to posted speed limits and recommended speed limits for specific road environments. • Provide driver education that focuses on safe driving with information on speed limits (e.g. works zones, school zones) and different road conditions along the proposed route (e.g. places of high turnover activity, night-time movements). • Maintain an up-to-date register of drivers and their licences to confirm drivers are licenced for the class of vehicle they are operating.
Pedestrian safety	• Information on school zones, speed limits and school bus routes along routes to be provided for all parties including educating drivers on these areas. • Schedule product transport trips so that heavy vehicles do not travel through Lindenow South during school pick-up and drop-off times. • Engage with local government community events and/or sport matches where higher pedestrian activities are expected and schedule product transport trips around these events.
Route familiarisation	• Provide driver training as part of the induction process to the Project that provides them familiarisation with the product transport route and consult with drivers on route conditions and issues or concerns they have identified. • Include an operational overlay within the TOMP where guidance is provided at locations of increased crash risk identified along the product transport route. For example, "B-doubles must come to a complete stop before crossing Chettles Road and Cowells Lane".

Further development of the TOMP

It is expected the TOMP would be developed through a detailed risk assessment, including a route review and assessment of key operational procedures. It should be an evolving document, initially developed by Kalbar and further developed by the haulage contractor responsible for the product transport.

Given the specific details required in developing the TOMP, it should be developed following approval of the project and confirmation of the product transport route to be adopted. This will allow detailed assessment of the chosen product transport route and specific management measures such as operating hours and fatigue management.

4.3.3. Train Movements and Rail Operations

With respect to the Post-Avon Bridge Option 1 – Fernbank East Rail Siding, Kalbar has advised that V/line, in collaboration with Metro Trains Melbourne, has designed an indicative timetable for the use of five (5) freight train cycles per week (5 loaded trains travelling to Melbourne and 5 trains travelling back to Fernbank) for the duration of the Fingerboards Project. This timetable excludes train movements east of Rosedale between the hours of 22:00 and 07:00 and is also designed around avoiding peak morning and afternoon commuter periods in Melbourne. V-Line has advised indicative pathing times for the Fingerboards Project will be:

- 5:00am Estimated Time Departure - Melbourne
- 12:00pm Estimated Time Arrival – Fernbank East
- 8:30pm Estimated Time Departure – Fernbank East
- 3:00am Estimated Time Arrival - Melbourne

It is understood that the timetable will be finalised once a rail access agreement is executed.

4.3.4. Additional Construction and Operation Traffic Volumes

Kalbar has advised that there will be a small number of additional traffic movements associated with mining activities not previously included in the estimates provided to Arup as part of the Assessment. Kalbar has provided additional information in relation to construction and operation traffic volumes in January 2021. These additional traffic volumes are summarised as follows:

- Construction vehicles for road upgrades and diversions that occur during the operation of the mine:
  - Mobilisation and demobilisation of the following construction vehicles for each construction project: Grader, Roller, Water Cart, Loader, Spreader Truck Sweeper and a Digger.
  - Fuel trucks will access the site every two days (one return movement per two days).
  - 30 semi-trailer vehicles would be required per kilometre of road, for road construction, over two months.

- Small number of light vehicle return movements per day for construction personnel.
- All bulk earthworks construction and movement are expected to be contained within the site.
- The roads construction workforce will be separate from the operations workforce.
- Table 21 includes a summary of the number of vehicle movements for each construction phase required by the project based on the information provided by Kalbar.

Table 21: Additional construction traffic volumes (Kalbar)

Year	Construction Duration (months)	Average HV daily return trips[1]	Average LV daily return trips[1]
Year 1	2-3	5	5
Year 2	3-4	5	5
Year 3	8-10	4	4
Year 4	2-3	6	6
Year 12	6-8	4	4
Year 15	6-8	4	4

[1] Average daily return trips based on total return trips across duration and lower bound of expected construction duration

- Operations vehicles to support mining activities over the life of the mine:
  - Six return movement per week undertaken by B-doubles for the transport of for diesel;
  - One return movement every five to six days undertaken by a semi-trailer for transport of flocculant; and
  - Approximately 25 return movements by trucks per month (specific vehicles types not provided) for various waste types. These are expected to have varying frequencies depending on waste type (e.g. weekly or monthly).

Table 22 provides a summary of the additional daily heavy vehicle return trips expected based on the frequencies detailed above.

Table 22: Additional operations traffic volumes

Type	Average daily HV return trips
Diesel transport	0.9
Flocculant transport	0.2
Waste vehicles	0.8
Total	2*

*Rounded to the nearest whole number

The additional vehicle vehicles associated with construction of road upgrades is provided in Table 21. Based on the information provided, the average daily traffic movements is expected to be approximately additional ten return movements per day (four to six return trips per day for both heavy vehicles and

light vehicles). It is expected that local civil and earthworks contractors will undertake the proposed road construction work and vehicle movement would follow a similar pattern to construction traffic for the mine identified in the Assessment. It is noted that there may be additional adhoc movements for personnel across the day, some days would be busier than average and there may be periods of more intense construction activity. On this basis, it is conservatively assumed that this may result in up to 20 return trips per day for the purpose of this assessment.

For the additional operational movements, it is expected heavy vehicle movements for waste, flocculants and diesel would result in an additional two heavy vehicle trips per day on average. It is recommended that heavy vehicle movements be required to utilise declared roads and approved product transport routes for access to site.

Based on the above and the findings of the Assessment, it is my opinion that these additional traffic movements would not create any notable traffic efficiency impacts given the proposed upgrades and capacity of the surrounding road network.

Similarly, the proposed additional vehicle types and volumes are not considered to have a significant impact from a safety or road asset perspective when considered in isolation (e.g. under Post Avon River Bridge – Option 1). These additional movements also do not change my opinion of the recommended treatments when considered alongside either the Pre-Avon River Bridge Option or Post Avon-River Bridge Upgrade – Option 2.

4.3.5. Road diversions, haul road and rail siding

Additional information has been prepared by Kalbar that shows changes to the road deviations and intersection geometry in the vicinity of the project and the layout of the proposed haul road and rail siding. These drawings were provided by White and Case to the Inquiry and Advisory Committee on 18 January 2021. The proposed updated road layouts were also provided to Arup on 18 January 2021 for information in preparing this statement.

A preliminary review has been undertaken of the supplied information focusing on the proposed road diversions and to a lesser extent the haul road and rail siding (given the minimal interface with the public roads network).

Key findings from this preliminary review capturing issues relating to transport efficiency, safety and asset performance impacts are described as follows:

- It is not clear if the proposed road diversions apply for all product transport scenarios and options. For this review, is assumed that it only applies to Post Avon River Bridge – Option 1 which provides a rail siding in Fernbank East and a connecting private haul road.
- While the location and timing of the diversion of particular roads has changed from that included in the Assessment, the overall network functionality has been maintained (i.e. connections between key roads and permitted turning movements) across the stages of road diversions.

- The timing of the relocation of roads is such that the existing alignment of Fernbank-Glenaladale Road (a local road) south of Bairnsdale-Dargo Road would provide access to the site for construction and operation vehicles until year 3 or 4. Previously these diversions occurred at year 0 (pre-operation) meaning the access to the site was from Bairnsdale-Dargo Road (i.e. directly from the declared road network and no use of local roads). Increased asset maintenance along Fernbank-Glenaladale Road may be required to cater for the construction heavy vehicles given it is as a local road. Approval would be required of East Gippsland Shire given that some of the supporting operations heavy vehicle (i.e. diesel, waste, flocculant delivery/collection) would utilise larger vehicles such as B-doubles. The road would likely need to be regularly maintained until year 3 or 4 of operations when Fernbank-Glenaladale Road is proposed to be upgraded and realigned.
- Fernbank-Glenaladale Road currently varies in seal width from 5.1m to 6.6m. The increased width of 6.6m is provided in the northern segment between Bairnsdale-Dargo Road and the rail line and will allow for two-way movements of heavy vehicles.
- The proposed relocated 'Fingerboards' intersection (i.e. of Bairnsdale-Dargo Road and Fernbank-Glenaladale Road) has been reduced from four approaches to three approaches (year 3 or 4). The form of the intersection (i.e. a roundabout) is still appropriate for the proposed traffic movements. It is noted that the simplified intersection would improve driver wayfinding for those continuing along Bairnsdale-Dargo Road.
- The access to the site is now via a new intersection on Fernbank-Glenaladale Road between Bairnsdale-Dargo Road and the proposed private haul road. Key considerations for this arrangement include:
    - The proposed arrangement is such that there are four (previously three) separate intersections over approximately 500m (see drawing 2390-001A dated 7 January) to Chettles Road. This includes the roundabout at Bairnsdale-Dargo Road, the priority controlled intersection for the site access, the proposed signals at the private haul road (as recommended in the Assessment) and a priority controlled intersection on Chettles Road.
    - The Assessment provides commentary on this issue drawing upon Austroads and VicRoads guidance, noting that a spacing of between 150m and 200m between intersections is broadly recommended (see Section 8.1.1 of the Assessment) and that further consultation is required with key stakeholders and the responsible authority in determining the acceptability of this spacing. This recommended distance allows appropriate signage spacing and adequate driver reaction time as they travel through the various intersections.
    - The proposal, as it is developed, includes intersection spacings that vary between 130m and 210m.

    - While it would remain subject to the approval of the responsible authorities, as a minimum it is expected the proposed haul road and access to the site would need to be relocated north by between 20m and 30m. This would be alongside reducing the speed limit to 80km/h as per the Assessment.
- A combination of channelised right turn and auxiliary/ channelised left turn treatments are proposed for the new intersections including:
    - Fernbank-Glenaladale Road (south) and Bairnsdale-Dargo Road;
    - Fernbank-Glenaladale Road and the site access; and
    - Fernbank-Glenaladale Road (north x 2) and Bairnsdale-Dargo Road.

  While formal assessment would be required, the treatments appears suitable given that peak period volumes are low and B-double movements would not utilise this intersection.
- As a minimum, flag lighting is likely to be required at the following intersections:
    - Fernbank-Glenaladale Road and the site access
    - Fernbank-Glenaladale Road (south) and Bairnsdale-Dargo Road.

  This is required to highlight the presence of the intersection given workforce movements would occur during early morning and evening periods. Standard lighting for the proposed roundabout would be required as per the Assessment.
- The horizontal road geometry broadly appears to be appropriate and it is noted that the designs prepared by Kalbar highlights key considerations issues such as sight distance.
- No information is provided in relation to the vertical geometry of the proposed diverted roads. However, observations during the site inspection in January suggest that some of the proposed intersection locations would not meet the required sight distance requirements without a reduction in vehicle speeds (e.g. closer to 60km/h) and/or would require the proposed roundabout and site access intersections to be relocated further north.
- The proposed haul road and access to the rail siding is less developed in terms of the functional layout with instead a focus on vertical geometry. As such the design of the private haul road would require further refinement to incorporate the findings in the Assessment. This would include sealing sections of Chettles Road and Cowells Lane in the vicinity of the intersection with the haul road as well as detailing the signalised control for the haul road crossing Fernbank, Glenaladale Road.

4.3.6. January 2021 site visit

A site visit was conducted on 27 and 28 January 2021 to understand any significant changes to the conditions as presented in the assessment and to consider specific issues raised in submissions. This site visit supplements previous inspections undertaken in 2017 and 2018 as highlighted in the Assessment.

A summary of key findings from the site visit is listed below:

- The planned safety improvements on the Princes Highway between Sale and Bairnsdale that are highlighted in the Assessment are now complete which include:
    - New overtaking lanes between Fernbank-Glenaladale Road and Lindenow-Glenaladale Road;
    - Intersection improvements at Fernbank-Glenaladale Road that include separate auxiliary left turn treatments;
    - Intersection improvements at Lindenow-Glenaladale Road that include a separate auxiliary left turn lane into Lindenow-Meerlieu Road; and
    - New centre and left hand side barriers in sections to improve the safety of Princes Highway.
- A review of safety through Walpa given the vertical alignment of Bairnsdale-Dargo Road that presents two crests at either end of the settlement. Further discussion of this review and assessment is provided in the response to submission number 1 in Section 4.4.1.3.
- A review of safety was undertaken at the South Pines Golf Course in Lindenow South. Further discussion of this review and assessment is provided in the response to submission number 103 in Section 4.4.1.4.

4.4. Response to Key Submissions

A review of the submissions relative to traffic, roads and infrastructure indicated common comments surrounding the following themes:

- road safety;
- road asset management;
- traffic impacts;
- local access impacts;
- road function;
- product transport route options; and
- alternative routes.

The following sections provide general discussion regarding the above and respond to specific submissions within each theme. Responses are also provided for submissions raising concerns that fall outside of the themes identified.

I note that a significant number of submissions relate to the alternative product transport options. I understand Kalbar's preferred option is the Post Avon River Bridge – Option 1 which introduces a local rail siding in Fernbank East. Advice from Kalbar indicates that the remaining options to use the Bairnsdale rail siding or the Pre-Avon River Bridge option are alternatives only in the event that the preferred option does not procced. The use of a rail siding in close proximity to site would mitigate a number of the transport issues raised in submissions.

Several submissions raise issues, that while related to transport and traffic operations, fall outside my specific area of expertise. This includes:

- land acquisition, planning and land use impacts;
- social and cultural impacts;
- biodiversity and visual impacts;
- radiation and hazardous material impacts; and
- noise impacts.

I consider that these issues are best responded to by relevant specialists in those fields for which separate studies are provided as appendices to the EES.

I also note that some submissions raise issues with details of the preliminary road and intersection design and geometry. The Arup scope of services does not include design of these treatments and this has been undertaken by Kalbar with other specialists. On this basis, I have not responded to specific matters of the proposed road designs. However, where relevant I have commented on capacity and safety aspects of these proposed treatments as they relate to road assets, traffic and transport impacts including a preliminary review of the updated proposed designs provided to Arup on 18 January 2021 and described in Section 4.3.5.

4.4.1. Road Safety

A review of submissions found 29 submissions raising road safety concerns associated with project related traffic movements and proposed road infrastructure. Fourteen (14) of these submissions raised safety concerns of a general nature.

Impacts associated with road safety regarding intersections, road geometry, lighting, driver safety, level crossings, pedestrians, schools, bus services and over-dimensional loads have been assessed with mitigation measures identified. Mitigation measures included both infrastructure and operational measures. Detail of the transport safety assessments can be found in Sections 7.3, 8.1, 9.3 of the Assessment for each product transport route, and within the detailed risk assessment provided in Appendix E of the Assessment.

4.4.1.1. Safety for children

Summary of comments

The following is a summary of a common issue raised in submissions #1, #202, #463, #488, #546, #869, and #875.

Heavy vehicles on roads used by product transport was identified as a safety risk for children in seven of the submissions. This included concerns with children walking alongside the roadway to catch school buses, school buses sharing the road with heavy vehicles and heavy vehicles travelling through school areas.

Response to comments

For the product transport route, the primary mitigation measure recommended for addressing safety for children (in particular school children) identified in the Assessment is to avoid travel through Lindenow South during hours of school pickup and drop off (i.e. 8:00am – 9:30am and 2:30pm – 4:00pm). This mitigation would also address school trips that may be related to the townships of Walpa and Lindenow. It is expected that impact to other locations is minimal as schools are not located on the proposed product transport routes. It is noted that this risk would be mitigated should Kalbar's preferred option to utilise a rail siding in Fernbank East be adopted (i.e. Post-Avon River Bridge – Option 1).

4.4.1.2. Safety for other road users

Summary of comments

The following is a summary of a common issue raised in submissions #12, #202, #711, #712, #813, #822 and #893.

Heavy vehicles on the road for product transport will impact the safety of other road users including other vehicles, cyclists, agricultural vehicles and specialised transport such as horse floats.

Response to comment

The product transport routes requiring road transport utilised existing B-double approved routes (with the exception of Racecourse Road). In approving the use by B-doubles, the Department of Transport will have given consideration to the risk level for these vehicles to operate along these roads given the prevailing road and transport conditions. Notwithstanding, the Assessment has reviewed the road network along the product transport routes for safety impacts with increased B-double usage and identified infrastructure and mitigation measures as part of the Transport Safety Assessment (discussed in sections 7.3, 8.1, 9.3 of the Assessment).

It is recognised that in addition to light vehicles, other road users may include slow moving vehicles and/or more vulnerable road users including agricultural vehicles, people travelling with horse floats and recreational cyclists. It is recommended that the TOMP include protocols for drivers interacting with these road users to mitigate any potential impacts to other road users.

These protocols should include how truck drivers respond when sharing the road with specific road users (e.g. agricultural vehicles, cyclists), identifying circumstances where overtaking may be considered and appropriate vehicle speeds to adopt.

During operations, it is also recommended to include consultation with the community and local landowners to understand key periods for movement for some agricultural and specialised vehicles. This will allow product transport movement to be managed around these times and/or provide driver awareness.

Similar to the above, it is noted that this risk would be mitigated should Kalbar's preferred option to utilise a rail siding in Fernbank East be adopted (i.e. Post-Avon River Bridge – Option 1).

4.4.1.3. Submission Number 1

Summary of comment

'The current speed limit at Walpa is 80km/h which is far too fast and unsafe already because there is no vision until the driver reaches the top of the hill (both ends of the settlement).'

Response to comment

It is understood the location of concern refers to the section of Bairnsdale-Dargo Road west of Lindenow-Glenaladale Road.

Safety at this specific location was re-reviewed as part of the January 2021 site inspection that has informed this statement. This included measurement of road widths, review of pavement condition, access/intersection layout, a review of sight distance, assessment of existing controls such as signage and line marking as well as observations of behaviour. Crash history as documented in the Assessment was reviewed alongside new traffic volume data collected November 2020.

The speed limit through this section is 80km/h and traffic surveys from November 2020 suggest good compliance with 85th percentile speeds of 82.5km/h. There were no reported casualty crashes within this section of Bairnsdale-Dargo Road across the five year period outlined in the Assessment.

Site observations indicate that there are a number of property access points and a service road arrangement through the settlement that provide access to local properties as shown in Figure 7. The seal width through this section of Bairnsdale-Dargo Road is approximately 6.4m which is satisfactory.

Figure 7: Bairnsdale-Dargo Road, Walpa

As per the Assessment, Bairnsdale-Dargo Road is a B-double approved route. This indicates an assessment would have been undertaken on the risk level for B-doubles to operate along these roads based on the prevailing road conditions.

However, site observations indicate that the available site distance at these access points is limited by the vertical geometry and in some instances (at the western most access) further limited by the slight horizontal geometry and steep existing batter slope further west. The available sight distance relative to Austroads and VicRoads guidelines is satisfactory for most access points other than those at the western extent of Figure 7 above.

On the basis of the observations and updated traffic volumes from November 2020, it is recommended that additional signage be provided at both ends of the settlement to warn approaching drivers of vehicles entering the road – particularly eastbound vehicles. This would supplement the recommendation in the Assessment to prepare a TOMP which includes providing driver training as part of the induction process for the project that provides familiarisation and any risk areas to be aware of with the product transport route (e.g. reduce speeds across the top of the crest).

The above treatments are considered appropriate for the project related impacts. These treatments are recommended for the construction phase and operation phase of the Pre-Avon River Bridge and Post Avon River Bridge Option 2 scenarios.

However, in addition and subject to further discussion with the community, East Gippsland Shire Council and the Department of Transport, consideration should also be given to rationalising (reducing) the number of access points and the suitability of the posted speed limit (i.e. a potential further reduction to 60km/h).

4.4.1.4. Submission Number 103

Summary of comment

Regarding the '*Post-Avon River Bridge – Option 2 that goes through Lindenow South on the Lindenow-Glenaladale Road to Bairnsdale. It seems likely that at least in the construction phase this route would be used. In your presentation it is not highlighted that the B-doubles would travel past a golf club that has well over 200 members with many casual green fee payers using this road to access the club. It is stated that an onsite inspection was made, but the importance of many cars entering/leaving the course was not addressed.'*

'The entrance to the golf club is below a rise. Recently several B-doubles used this road for a short period of time and we noted there was a high degree of danger if a car was stopped to turn right into the golf club, waiting for a vehicle approaching from Lindenow South and a B-double came over the hill. It also became clear that a vehicle exiting the golf club could well be in danger if a B-double came over the hill.'

Response to comment

Safety at this specific location was reviewed as part of the January 2021 site inspection that has informed this statement. This included measurement of road widths, pavement condition, access/intersection layout, a review of sight distance, assessment of existing controls such as signage and line marking as well as observations of behaviour.

The speed limit through this section is 100km/h with Lindenow-Glenaladale Road transitioning to 80km/h approximately 600m north of the South Pines Golf Club access. There were no reported casualty crashes within this section of Lindenow-Glenaladale Road across the five year period outlined in the Assessment.

The road width in the vicinity of the intersection varies and is marginally narrower than other sections of Lindenow-Glenaladale Road but retains a seal width of approximately 6.1m which is considered acceptable. While partially obstructed, advance warning signage is provided for northbound vehicles approaching the crest to warn of entering vehicles.

As per the Assessment, Lindenow-Glenaladale Road is a B-double approved route. This indicates an assessment would have been undertaken on the risk level for B-doubles to operate along these roads based on the prevailing road conditions.

However, site measurements indicate that the existing available sight distance does not satisfy the minimum requirements outlined in Austroads and VicRoads guidelines (existing available sight distance is approximately 280m and the requirement is approximately 308m). Whilst this is predominately as a result of the vertical geometry, over grown shoulders and low level vegetation was observed to be creating a marginal impact.

The existing peak hour turning volumes along Lindenow-Glenaladale Road as documented in the Assessment would not warrant the provision of separated right turning lanes. However, given the regular movements at the golf course and that it forms part of the entry to Lindenow South, it is recommended that existing 80km/h zone on Lindenow-Glenaladale Road is extended approximately 900m south to incorporate the crest and golf course access. Shoulders and vegetation should also be regularly maintained to improve visibility of the intersection and supporting warning signage.

It is also recommended that as part of the TOMP, consultation with the South Pines Golf Club is undertaken to understand peak periods (e.g. when events are held at the club) and manage product transport movements during any key peak event times and to provide driver awareness. These treatments are recommended for the operational phases of the Pre-Avon River Bridge and Post Avon River Bridge Option 2 scenarios which include 40 return B-double trips along Lindenow-Glenaladale Road. The change in volumes along Lindenow-Glenaladale Road are expected to be much lower during construction (e.g. 5 heavy vehicle return trips per day) and therefore would not require these interventions.

4.4.1.5. Submission Number 712

Summary of comment

'No cycle routes have been considered, nor has cyclist or pedestrian safety.'

Response to comment

The existing provisions for cycling along the roads on the product transport routes are limited and volumes are generally low, however some recreational use by confident cyclists is expected.

As roads on the product transport routes are already B-double approved roads, these recreational cycling movements would already share the road with other large vehicles.

The Austroads Guide to Road Design Part 3 recommends that for new roads 1.5m and 2.0m clearances to the cyclist envelope from adjacent trucks for 80km/h and 100km/h speed limits, respectively. The traffic volumes along key routes such as Bairnsdale-Dargo Road and Lindenow-Glenaladale Road are relatively low and the road link level of service analysis outlined in Section 7.2.2 of the Assessment shows these routes operating at level of service A (best) during peak periods. On this basis, it is considered that there would be adequate opportunities for trucks to safely pass cyclists on these routes. Along the Princes Highway, there are existing sealed shoulders that provide space for cycling in accordance with VicRoads and Austroads Guidelines. For the Gippsland Highway there are either sealed shoulders provided or a combination of reduced speeds and volumes that would facilitate safe passing of cyclists.

It is recommended that the Transport Operational Management Plan (TOMP) include protocols for truck drivers when sharing the road with cyclists, ensuring safe driver behaviour around cyclists, including overtaking behaviours and maintaining certain distance required between cyclists when passing. It is noted that under the existing Victorian Road Rules, drivers are required to maintain a 'sufficient distance' when passing other vehicles (including cyclists) with VicRoads suggesting at least one metre or more than a metre if travelling above 60km/h[1]. The Victorian Government has also announced minimum passing distance laws will be introduced in 2021 that will require drivers to ensure a minimum one metre clearance when overtaking on roads with speed limits up to 60km/h, and 1.5 metres on roads with speed limits above 60km/h[2].

Recommendations identified in the Assessment include regular maintenance of road shoulders on the product transport route to remove overgrowth and improve drainage. The removal of overgrowth may also assist recreational cyclists using these routes by removing minor obstacles or hazards immediately adjacent to the pavement and provide a clearer space to ride.

It is also noted that the Assessment has recommended mitigation measures that avoid B-double movements during school pick-up and drop-off hours. Safety risks for children and parents cycling to school would be mitigated by these limits to the hours of operation.

4.4.1.6. Submission Number 837

Summary of comment (part 1)

'Simply accepting that 80 B-double movements per day will increase the accidents on local roads despite ongoing expressions of concern shown by the local residents.'

'Kalbar has identified far too many risks associated with the increase in traffic that the mine will create.'

Response to comment (part 1)

The increase in B-double movements is a key focus for the investigation, assessment and particularly the mitigations for impacts discussed throughout the Assessment in Section 7, 8 and 9, and detailed in Appendix E. The includes a number of infrastructure and operational mitigations including at intersections and the preparation of a Transport Operational Management Plan (TOMP).

[1] https://www.vicroads.vic.gov.au/safety-and-road-rules/cyclist-safety/sharing-the-road

[2] https://www.premier.vic.gov.au/safer-cycling-and-more-routes-keep-melbourne-moving

Summary of comment (part 2)

'To improve the roads will lead to an increase in traffic speed and consequently more accidents.'

Response to comment (part 2)

The Assessment has not proposed any increases to the existing speed limits along roads that are being upgraded as part of the project and in some instances is recommending reduced speeds (e.g. at the intersection of the private haul road and Fernbank-Glenaladale Road). It is not expected that the recommended mitigation measures will increase vehicle speeds.

It is considered that the recommended mitigations will provide a project legacy of a safer transport network for the community beyond the project life.

Summary of comment (part 3)

'With road deterioration expected, there will always be time delays in completing repairs. Common damage that can be expected is the collapse of road shoulders which too often leads to loss of control of front wheel drive cars.'

Response to comment (part 3)

The Assessment has recommended an Asset Protection Plan for the mitigation of road pavement impacts of B-double traffic generated by the project (refer Assessment, Section 11). This plan would be agreed between the project and relevant responsible road authority to determine timing and method of monitoring, when pavement works are required, reimbursement of costs and timing of interventions. The regular maintenance of shoulders would form part of this agreement as outlined in the Assessment.

Summary of comment (part 4)

The roundabout planned for the new Fingerboards intersection is another potential point for accidents with traffic having to negotiate a right hand turn to stay on the main road in what appears to be a 100kph zone that will be lacking in lighting and also have traffic entering and egressing the mine site.

Response to comment (part 4)

The Assessment recommends intersection lighting is provided at the planned roundabout at the Fingerboards intersection (refer 7.3.2 of the Assessment). It is expected that appropriate signage and intersection geometry would control speeds at the roundabout, reducing vehicle speeds as they approach the intersection.

Summary of comment (part 5)

'While School buses have been identified as a concern and mitigation suggested, there are many other buses that use these roads that have not been identified as a concern and no mitigation measures have been suggested to deal with them.'

Response to comment (part 5)

Both school bus routes and regional bus routes were identified as part of the Assessment (refer Figure 9 of the Assessment). It is also noted that bus routes along the product transport routes would already share the road with large trucks as these are already B-double approved roads.

Any additional measures relating to driver behaviour during the interaction with other buses or at bus stops should be considered as part of the preparation of the TOMP.

Summary of comment (part 6)

'Real and useful modelling of traffic safety would have drawn upon current road use figures combined with predicted increases in population and traffic as well as current road accident statistics for the area and come up with a prediction of the number of crashes, injury and deaths and cost to community expected over the life of the mine.'

Response to comment (part 6)

The Assessment considers reported casualty crash history and traffic volumes in determining the transport impact and safety risks from the project. The suggested modelling may be useful in understanding the broad trends for the area but is unlikely to be as relevant for the project given the specific mix of vehicles and driver types.

4.4.1.7. Submission Number 893

Summary of comment (part 1)

'The Roads, Traffic and Transport states that the project will 'increase the risk of road accidents'. Obviously essential services will be stretched. Police, Ambulance, CFA, SES. Have these agencies been made aware of the added workload associated with a mine?'

Response to comment (part 1)

As part of the assessment, mitigation measures have been identified to reduce the risk of road crashes due to project related traffic (refer Appendix E of the Assessment for the detailed risk assessment).

Summary of comment (part 2)

Concern with pedestrian safety in Lindenow South with up to 80 heavy vehicle movements per day.

'*Lindenow Primary School is located on this road along this road with many homes, all located very close the roads edge. Two hundred road movements a day do not include the vehicle road movements as of today. What will be an acceptable number of injuries or deaths due to a Mineral Sands Mine?'*

Response to comment (part 2)

Pedestrian safety during key school movement periods are recommended to be avoided as outlined in the Assessment. This is expected to form part of the TOMP, capturing limits to operating hours for product transport.

The Assessment has also recommended pedestrian surveys to be undertaken in Lindenow South to understand the patterns of demand. Mitigation measures that may be appropriate to consider in addition to limiting B-double operating hours include revision to speed limits and driver route familiarisation. Refer 7.3.7 of the Assessment.

4.4.2. Road asset management

A review of submissions found 22 submissions raising concerns associated with deterioration of the road infrastructure due to increased B-double movements. Of these submissions, 13 raised road asset concerns of a general nature.

A high-level road pavement assessment was undertaken as part of the study, detailed in sections 7.4, 8.2 and 9.4 of the Assessment. The Assessment includes recommendations that an Asset Protection Plan is developed and agreed with the relevant responsible authority to mitigate this (refer Section 11 of the Assessment). Similarly, it is recommended that monitoring forms part of the Asset Protection Plan, with a survey of existing pavement conditions undertaken prior to construction commencing so that deterioration resulting from the project can be determined. Ongoing surveys are recommended for monitoring to inspect changes in the pavement conditions (subject to agreements with the relevant responsible road authority). The asset protection plan would include timing and method of monitoring as well as the reimbursement of any costs associated with significant change in pavement life that is attributed to the project.

4.4.2.1. Responsibility for cost and repair

Summary of comments

The following is a summary of a common issue raised in submissions #77, #481, #506, #516, #632, #745, #763 and #813.

There is a concern surrounding the costs associated with road infrastructure upgrades and repair of any road damage caused by increased B-doubles on the roads and who will be responsible for these costs. In particular, there was a general concern that cost to repair damage to roads would be borne by local government and therefore ratepayers.

Response to comment

An Asset Protection Plan is recommended as part of the Assessment for mitigation of road pavement impacts of B-double traffic generated by the project (refer Section 11 of the Assessment). The timing and method of monitoring, and reimbursement of any costs associated with changes to the pavement life that is attributed to the project would be agreed between Kalbar and the responsible road authorities as part of the Asset Protection Plan.

Surveys prior to construction are recommended to understand the existing road conditions and provide a baseline for comparison with the future conditions of the asset through routine audits through the project life.

4.4.3. Traffic

The review of submissions found 28 submissions raising concerns associated with the additional traffic and congestion on the roads due to increased heavy vehicle and workforce traffic. Of these submissions, 24 submissions raised concerns of a general nature.

Traffic performance impacts are discussed in sections 7.1, 7.2, 9.1 and 9.2 of the Assessment. This indicates minimal impact during normal peak periods. It is noted that during holiday periods there would be greater impacts however these would be partially mitigated by the proposed roundabout controls at key intersections associated with product transport.

4.4.3.1. Number of trucks

Summary of comments

The following is a summary of a common issue raised in submissions #224 and #879.

How many trucks and trains would be involved each day of the week in transport operations at peak mine production, and more specifically, how many vehicles will travel up and down Lindenow-Glenaladale Road every day?

Response to comments

The traffic generated during mining operations is set out in Section 6.2 of the Assessment.

Under the preferred option (Post-Avon River Bridge – Option 1), there would be no additional product haulage trucks utilising Lindenow-Glenaladale Road as product would utilise a private haul road and rail siding in Fernbank East.

Information provided by Kalbar in January 2021 indicates that outside of haulage vehicles, there would be an additional two heavy vehicle return movements on average associated with mining inputs (e.g. diesel and flocculant) and outputs (e.g. waste), as detailed in Section 4.3.4 of this statement. These are expected to use the declared road network and B-double approved routes to the site, which may include use of Lindenow-Glenaladale Road. There would also be some minor additional movement associated with the construction of road works and these are likely to be in the order of two to three return heavy vehicle movements per day along Lindenow-Glenaladale Road (assuming 25% of the estimated heavy vehicle movements travel to the site from Sale or Melbourne further west). These movements are a minor addition to those included in the Assessment and do not change the findings or recommendations of the Assessment.

Associated with this option is the predominate movement of product via rail. Kalbar has advised that V/line, in collaboration with Metro Trains Melbourne, has designed an indicative timetable for the use of five (5) freight train cycles per week for the duration of the Fingerboards Project.

Should the preferred option not proceed, there will be 40 B-double return movements (80 one-way trips) per day along Lindenow-Glenaladale Rd for Pre-Avon River bridge option and post-Avon River bridge – Option 2. As outlined above, recent information provided by Kalbar indicates there would be a small number of additional movements associated with mining operation input and outputs as well as the construction of road diversions.

It is noted that under all product transport options, it is anticipated that light vehicles will utilise Bairnsdale-Dargo Road or Fernbank-Glenaladale Road primarily given the workforce travelling to site is most likely to be predominately located in areas such as Sale or Bairnsdale.

These additional movements are not considered to change the findings or recommendations of the Assessment.

4.4.3.2. Submission Number 224

Summary of comment

'What traffic management provisions are planned to prevent long delays for people using Fernbank-Lindenow South Road? What maximum and average delays for motorists is/will be mandated in respected of Fernbank-Lindenow South Road'

Response to comment

Mine related impacts on Fernbank-Lindenow South Road are expected to be minor, due to minimal traffic changes. At this time, advice from Kalbar indicates that the small number of staff associated with siding operations are expected to travel to the main project entrance for daily inductions and utilise the haul road to travel to the siding.

Product transport to the rail siding would use the private haul road, with the siding accessed from the north side of the rail line meaning there is no need to utilise Fernbank-Lindenow South Road.

There is expected to be some occasional level crossing movement delays associated with slow moving trains moving into the siding across the week.

Given the overall access arrangements and haul routes planned, a high level of service is expected to be maintained on Fernbank-Lindenow South Road.

4.4.3.3. Submission Number 741

Summary of comment

'Minimal consideration is given to the ability of the Fernbank-Glenaladale Road, Lindenow-Glenaladale Road and the Princes Highway to carry this traffic. This road has proven record of being unsuitable for heavy vehicles due to: width, number of blind corners, daily use by school buses to Bairnsdale and Lindenow, regular use by buses to Coonawarra Camp.'

Response to comment

Fernbank-Glenaladale Road is not proposed for product transport, so will not carry additional heavy vehicles associated with mining operations.

Lindenow-Glenaladale Road and Princes Highway are already B-double approved and are considered appropriate for use with the relevant mitigations recommended in the Assessment.

For roads carrying project related traffic, the Assessment includes recommendations for improved intersections, maintenance and operational interventions to address the identified risks.

4.4.3.4. Submission Number 840

Summary of comment

'The Princes Highway in the vicinity of Bairnsdale is already a heavily trafficked route both for tourists, agricultural and commercial transport. This highway is not built for the continuous movement of B-double trucks.'

Response to comment

The Assessment identifies 80 B-Double trips per day associated with the alternative product transport routes, or an increase of 3-4 one-way movements per hour. Princes Highway is a B-double approved, A-class route (Section 5.1). Table 18 and 19 of the Assessment include information on Princes Highway traffic levels, showing that a high level of service will be maintained.

4.4.4. Local access

Seven submissions raised concerns about impacts to local access associated with proposed road diversions and infrastructure. This includes the following submissions:

- Specific property access concerns were raised in submissions #506, #781, #837.
- Concerns with agriculture access (e.g. movement of stock between properties) were also raised in submissions #506, #711, #781, #813, #837, #875

Specific property access concerns are expected to be addressed by Kalbar through community consultation with the relevant property owners given their specific needs and issues around operation or severance off particular parcels .

From a transport perspective, the location and design of new access points should be considered as part of the preparation of the designs for the relocated roads or and changes associated with mining activities. Key considerations will include anticipated vehicle sizes, providing acceptable sight distance and localised shoulder sealing to facilitate safe access movements.

4.4.5. Road function

Twelve submissions raised concerns with the increase of heavy vehicles and proposed road upgrades along the product transport routes impacting the existing function of the road. One submission raised concerns of a general nature, noting the existing roads for their current use and changes would impact on the existing users and character of the area.

The declared road network and local road network are detailed in Section 5 of the Assessment. The majority of roads on the proposed product transport routes are on the declared road network and are already approved for use by B-doubles.

Only Racecourse Road is not part of the approved B-double network (Post-Avon River Bridge Option 2 – Bairnsdale Siding). Racecourse Road was included in this route in consideration of minimising impacts to the community by reducing exposure to school and residential areas and incorporated feedback from East Gippsland Shire Council.

Road upgrades recommended as part of the Assessment intend to mitigate the project impacts and further improve the safety of the roads for all road users.

4.4.5.1. Tourism

Summary of comments

The following is a summary of a common issue raised in submissions #222, #781, #813, #818, #849, and #881.

Road diversions and increase in heavy vehicle traffic on the roads will impact tourism in the region. This includes Bairnsdale-Dargo Road and Fernbank-Glenaladale Road used for cyclists, motorcyclists and recreational drivers. Tourism impacts specifically identified include tourism to the Dargo high country area and local tourism attractions, Mitchell River camping grounds, recreational 4WD visitors and motorcyclists.

Response to comment

Potential broader impacts to tourism activities are separately addressed in the EES, with this statement focussing on any direct road transport impacts.

The Assessment has addressed potential operational safety issues, with various mitigations identified to provide acceptable levels of residual risk. Product transport is limited to existing B-double approved routes (with the exception of Racecourse Road) and consideration of peak tourism times have been considered as part of the safety and traffic operational assessments.

Specific changes to road and travel conditions should not impact tourists using the area, with marginal impact to travel times associated with road diversions as covered in Section 7.2.2 of the Assessment.

4.4.5.2. Cycling

Summary of comments

The following is a summary of a common issue raised in submissions #12, #77, #268, #463, #781, #813, #875.

Road diversions and increase in heavy vehicles are identified as impacting popular cycling routes and events in the area. In particular, it was noted that Fernbank-Glenaladale Road and Bairnsdale-Dargo Road are popular, scenic cycling routes and often host events. The Fingerboards loop is also noted as one of the iconic bicycle rides in Gippsland and would no longer be viable due to danger of B-doubles on the road.

Response to comment

As roads on the product transport routes are already B-double approved roads, these recreational cycling movements would currently share the road with other large vehicles.

A summary of assessment of safety for cyclists on roads along product transport routes, is provided in Section 4.4.1.5 of this statement. It is considered that the road network performance will provide adequate opportunities to safely pass cyclists and recommendations relating to driver behaviour (as part of the TOMP) and shoulder maintenance would mitigate the identified safety risks that are generated by the project.

Any visual or social impacts as a result of the project which may impact on tourism are outside my area of expertise.

4.4.6. Transport route options

A total of 18 submissions raised concerns with the proposed product transport routes. The proposed routes are discussed in Section 6.3 of the Assessment.

4.4.6.1. Preference for rail siding option only

Summary of comments

The following is a summary of a common issue raised by submissions #9, #34, #113 (Wellington Shire Council) and #514 (EPA).

Only the rail option (Post-Avon River Bridge Option 1 - Fernbank East siding) should be considered for approval. It is noted that Wellington Shire Council has requested that rail transport be used exclusively, with preference for daytime movements and for regulatory controls to be established to ensure rail transport is utilised for the life of the mine. The Environment Protection Authority (EPA) have also noted their preference for this option.

Response to comment

It is understood that Kalbar's preferred option is the Post-Avon River Bridge Option 1 – Fernbank East rail siding and this would be the only product transport route used if it were adopted. Advice from Kalbar indicates that the remaining options to use the Bairnsdale rail siding or the Pre-Avon River Bridge option are alternatives only in the event that the preferred option does not procced.

However, the Assessment has considered all three product transport routes (including Pre-Avon River Bridge Option and the Post-Avon River Bridge Option 2 – Bairnsdale Siding) under the assumption the alternative options are still valid and may be adopted in the event the preferred option is not approved.

4.4.6.2. Timing of options

Summary of comments

The following is a summary of a common issue raised by submissions #95, #632 (DoT), #663, #840 and #875.

Clarification is sought on the factors impacting the final product transport route choice, interim measures and the timing of options as it is still unclear how ore would be moved from mine to port.

In particular, the Department of Transport (DoT) has noted that '*Limited detail has been provided in the EES regarding timing, approvals and required works for the railway siding and associated road network. Where road cartage might be required for a short period of time, the EES does not adequately address how this will be managed or mitigated until the rail siding is operational.'*

Response to comment

It is understood that Kalbar's preferred option is to use the Post-Avon River Bridge Option 1 – Fernbank East rail siding only for product transport. Advice from Kalbar has indicated their intent to use this as the sole product transport route, and other alternative options will not be pursued if the Fernbank East siding option were to proceed. This would avoid the need for infrastructure upgrades (e.g. intersection improvements, level crossing improvements) that seek to mitigate the impact of B-Double movements on the public road network.

4.4.6.3. Road suitability

Summary of comments

The following is a summary of a common issue raised by submissions #180, #516, #565, #839, #840 and #881.

There is a concern that road conditions along the specified product transport routes are not suited for B-double trucks. Particular locations mentioned include the Princes Highway in the vicinity of Bairnsdale, and roads to access Port Anthony (for the Pre-Avon River Bridge Option), noting that '*local roads are not designed for B-double trucks and the damage they would cause'.*

Response to comment

All declared roads on the product transport route options, including Princes Highway and Barry Road (leading to Port Anthony), are already approved for B-double use by the Department of Transport. Princes Highway is an 'A' class arterial, considered to be of high standard and designed to facilitate movement of heavy vehicles. Barry Road is a 'C' class arterial, providing existing access to the port.

Given that Barry Road is a C class arterial and given the existing traffic volumes and site observations, the road would be included as part of the Asset Protection Plan recommended by the Assessment. This would cover management of the road condition, including monitoring, repair and reimbursement arrangements to be agreed between Kalbar and the responsible road authority.

Similarly, local roads used by B-doubles as part of the Post-Avon River Bridge Option 2 – Bairnsdale Siding would also be covered under the Asset Protection Plan should this option be adopted.

4.4.6.4. Rail track capacity

Summary of comments

The following is a summary of a common issue raised by submissions #712, #840 and #875.

The rail option will require capacity upgrades to the rail tracks before freight trains can use the tracks. It is unclear when this upgrade will occur and may be longer until the rail option becomes feasible.

Response to comment

Track capacity can be considered from two perspectives including the engineering capacity of the track formation and structures to accommodate freight loads and also the capacity of the rail network to accept additional trains without adverse delay to other trains or general transport network congestion.

In terms of engineering capacity, information provided by Kalbar indicates that up to five trains would be required per week to move the estimated volume of product and comply with the axle load capacity of the Gippsland Line. These estimates are based on consultation with V/line, Metro Trains and the Department of Transport as well as feedback from Kalbar's competitive tender process to select a Preferred Logistics Operator. The preferred rail option and rail siding in Fernbank East will utilise the recently completed the Avon River bridge and continuing upgrade works to the Gippsland Line.

In relation to rail operations, Kalbar has been progressing discussions in relation to rail access with the Department of Transport since 2019 as noted in Section 5.6 of the Assessment. This has included DoT incorporating Kalbar's requirements into regular timetable development cycles. An outline of the anticipated timing for movement of trains as well as the key considerations relating to rail operations capacity in Melbourne and movements east of Rosedale are summarised in Section 4.3.3 of this statement. It is understood the confirmation of these train paths are in the final stages of consideration by V/line, Metro Trains and the Department of Transport.

Based on the information provided by Kalbar, appropriate engagement is occurring with key approvers and stakeholders in relation the access to the rail corridor. It is my opinion that it is a low risk that engineering track capacity or rail operations congestion will limit the feasibility of the siding in Fernbank East and the use of rail more generally.

4.4.7. Alternative route suggestion

Three submissions included suggestions of alternative routes to the proposed product transport routes. These are discussed below – it is noted that alternatives were investigated as part of the study and detailed in Section 6.4 of the Assessment.

4.4.7.1. Submission Number 1

Summary of comment

'one of the straightest most direct roads (bordering far fewer properties) from the mining area at Fernbank to the A1 has never been considered in the plan. Instead there is a circular route that takes in both Walpa and Lindenow housing settlements.'

Response to comment

It is assumed that the comment refers to Fernbank-Glenaladale Road. This alternative was reviewed as detailed in Section 6.4.1 of the Assessment.

The review noted Fernbank-Glenaladale Road being a local road, not approved for use by B-doubles. It has insufficient road width to accommodate B-doubles passing safely at the southern extent and would require major modification to the road cross section. Further safety concerns were noted at its intersection with Princes Highway, conflict at the Fernbank-Glenaladale level crossing and pedestrian safety in Fernbank.

4.4.7.2. Submission Number 268

Summary of comment

'Why doesn't the proponent utilise the unused road from the bore field that extends onto the Bairnsdale-Dargo Road from Cowells Lane then continue the haul road up through the mined out area on the south side of Bairnsdale-Dargo Road to the processing plant – this route would have less impact on the public road users, not require the removal of a large number of mature trees, not require a planning scheme amendment or an acquisition overlay.

Response to comment

While the specific location and concept proposed would require clarification, it appears that the alternative route suggested would require use of private land or impact the proposed project activities. As such, I am unable to comment on the suitability of this alternative and this would require Kalbar to investigate separately. From a transport perspective, key issues that would require consideration would include avoiding the interaction with public roads, available sight distances, providing adequate carriageway width and meeting both vertical and horizontal road design standards.

4.4.7.3. Submission Number 568

Summary of comment

'There is no reason why they cannot build a decent roundabout near the Fingerboards intersection making the road much safety as the mine trucks will have their own haul roads and underpasses for safety, and time saving routes.'

Response to comment

The proposal includes the construction of a roundabout at the intersection of Bairnsdale-Dargo Road and Fernbank-Glenaladale Road ('Fingerboards intersection'). An appropriately designed roundabout that equally distributes the angle of each leg of the intersection is considered an appropriate treatment for the safety of road users.

The proposed new roundabout at the relocated Bairnsdale-Dargo Road / Fernbank-Glenaladale Road intersection manages the conflict of vehicles from different approaches by reducing vehicle speeds as they approach the intersection.

A mining vehicle underpass is also proposed at the northwest corner of the mine for mining vehicles only. This improves safety as mine vehicles can cross Bairnsdale-Dargo Road for mining activities without any conflict with vehicles along Bairnsdale-Dargo Road.

4.4.8. Submission number 9

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment (part 1)

'The need to construct a private haul road to Fernbank East is indicated to avoid vegetation clearance along Kettles Road / Cowells Lane. This implies that the company is envisaging the use of over-size trucks or road trains between the mine and the rail siding. If this is so, then an at grade crossing of the Fernbank-Glenaladale Road (with or without flashing lights) is not adequate and the construction of an over/underpass over that road needs to be a condition of approval of the project.'

Response to comment (part 1)

B-double vehicles are proposed for product transport (as per information received from Kalbar). These are standard vehicles that are used for heavy haulage across a number of industries throughout Victoria and Australia. Other than being required to use specific routes these vehicles mostly have regular access to the public road network.

In terms of the intersection treatment for crossing Fernbank-Glenaladale Road, the proposed upgrade to a signalised intersection with advanced warning signs and a reduced speed limit of 80km/h is considered appropriate. This is on the basis of the low traffic volumes, the need to only accommodate crossing movements rather than turning movements, as well as the close proximity of other intersections.

It is noted that a heavy vehicle underpass is proposed at the north west of the site for internal mining movements (under Bairnsdale-Dargo Road).

Summary of comment (part 2)

'There has been no consideration given to the possible designation of the proposed haul road as a public road which would allow for the permanent closure of Chettles Road and Cowells Lane and the revegetation of these as a native forest offset.'

Response to comment (part 2)

It has been assumed during operations that the private haulage road would be used for the mine product transport vehicles only. This mitigates risks associated with B-doubles sharing the road with the general public, as identified in other product transport route options. As such, it would be preferred during the mine's operation for the road to be a private road.

The designation of the road once the mine ceases operation would then be dependent on decisions by the relevant road authorities.

4.4.9. Submission number 268

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment (part 1)

'Traffic counters have not been utilised to record the volume of traffic currently – why not?'

Response to comment (part 1)

Publicly available information was used for the majority of assessments. This was supplemented with spot counts of traffic turning movement volumes at select locations during site visits in 2018. This level of data collection is considered appropriate for the level of investigations required at this stage of the project.

Recent traffic counts were also conducted in November 2020 at two locations around Walpa and Lindenow South. These are discussed in Section 4.3.1 of this statement.

Summary of comment (part 2)

'The thought of putting 80 returning B-double trucks on the Princes Highway with the narrowed road width because of centre road barriers and the current regularity of accidents involving large trucks will only increase the potential hazards to other road users. When there is an accident on the Princes Highway the traffic is regularly diverted through Fernbank and onto the Bairnsdale-Dargo Road to go through to Bairnsdale. These road users are unfamiliar with this country road, its inferior road surface, less sign posting, narrower widths, no lighting at night, interacting and sharing the road with other wider agricultural machinery, and encounters with animals including native animals.'

'Roads and traffic risk assessments did not consider impact from animals both native and domestic.'

'The risk assessment of transport safety shows mostly high to major inherent risks are associated with changes to roads envisaged with road sections at Princes Highway / Racecourse Road, Princes Highway / Lindenow-Glenaladale Road, Bosworth Road / Bairnsdale rail siding access, Racecourse Road and Forge Creek Road – with so many major hazard sites the danger to other road users is paramount and should not be considered.'

Response to comment (part 2)

The ability of emergency services to divert traffic to roads forming part of the proposed product transport route is not expected to be impacted by the project. The mitigating measures that are identified utilised conventional traffic treatments and consider the requirements of both familiar and non-familiar drivers. In addition, regular monitoring and reporting of issues during product transport haulage is recommended as part of the TOMP. This includes:

- Consultation with drivers on route conditions and any issues or concerns they have identified.
- Conducting regular meetings with all parties in the Chain of Responsibility to discuss and manage any issues (e.g. identified through monitoring and review or incidents or 'near misses' that have occurred).
- Conducting regular meetings with key stakeholders including the Department of Transport and local councils to discuss issues and concerns.

The TOMP is also expected to include provisions as to how to respond to specific road conditions, such as reducing travel speeds for a certain period and/or delaying product movement in more significant cases.

Summary of comment (part 3)

'Inspections monitoring for efficiency, transport safety, asset performance, further monitoring does not include consideration for landowners' inconvenience and impacts'

Response to comment (part 3)

The Assessment has considered the inconvenience of the road diversions on local road users with increased travel times identified. This is discussed in Section 7.2.1 of the assessment and is applicable for all product transport route options.

The Assessment has considered the impacts to road users of the transport network and maintaining access on the transport network. Impacts for specific landowners and their properties is expected to be addressed by Kalbar through ongoing consultation.

4.4.10. Submission number 632

This submission raised multiple concerns in relation to the land acquisition and approvals process for the relocation of declared roads, the status of road infrastructure assets in the event the mine defaults, the timing and issues that may impact the preferred rail option and required conditions for the further development of road network changes. Some of these issues have been responded to in the above themes and the specific land or approvals requirements should be considered by Kalbar and its statutory planning specialists. Responses to additional issues are provided below.

Summary of comment

Amendments to the Incorporated Document under the Planning Scheme Amendment have been identified by DoT including requirements for preparing Traffic Management Plans including design and construction activities, Road Safety Audits and bond payments.

Response to comment

I note that the preparation of a traffic management plan, road designs, roads safety audits and approvals of designs are a typical requirements for works of this nature. I would support the inclusion of these requirements as part of the design approvals process for the selected product transport option. The information contained in the Assessment will inform ongoing design and approvals processes.

4.4.11. Submission number 712

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment

'There is no analysis undertaken that considers any impacts from the transport of the mined material through all of the locales from the project site to its destination,'

Response to comment

The Assessment focused on roads connecting to the Princes Highway. Once on Princes Highway and South Gippsland Highway (or other roads connecting to major intermodal facilities) it is considered that the road infrastructure is appropriate to use and is not a major change in characteristics for the locales for which the vehicles will travel through. It is my opinion that the scale of demand will not lead to adverse impacts on these locales and that the roads are appropriate for the intended use.

4.4.12. Submission number 713

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment

'Why has the Lindenow and District Community Plan been ignored?'

Response to comment

The Lindenow & District Community Plan (2009-2012) is referenced in the safety assessment (Section 7.3.1 of the Assessment) in review of the existing Fernbank-Glenaladale Road / Bairnsdale-Dargo Road intersection. It is understood there is now a more recent version of the plan, being the Lindenow & District Community Plan (2013-2018).

Specific to transport, the plan identified a number of safety objectives that were initiated from the previous plan (2009-2012) including providing a pedestrian crossing over the railway line in Lindenow South, provision of shared paths between Lindenow and Lindenow South townships, the review of the Fernbank-Glenaladale Road / Bairnsdale-Dargo Road intersection and improving safety around Lindenow South Primary school with signage and school zone speed limits.

Further transport objectives identified for the 2013-2018 community plan include finalising footpath connections and lighting throughout Lindenow and Lindenow South and widening road entrances to Lindenow to improve pedestrian and cyclist safety due to trucks and large farm machinery. These were also identified as key priorities for the community.

The Assessment undertaken for the product transport routes has identified the Lindenow South area as a key focus for pedestrian safety, and the intended mitigation measures do not conflict with the transport objectives in the current Lindenow & District Community Plan. This includes a number of mitigation measures recommended to ensure pedestrian safety is prioritised in the area, including understanding pedestrian demand patterns and avoiding school pick-up drop-off hours.

Upgrades to the level crossing to improve safety is also recommended as part of the Assessment for the Pre-Avon River Bridge Option and Post-Avon River Bridge Option 2 – Bairnsdale siding. Based on this plan and subject to agreement with the responsible road authorities, it would be appropriate that this rail crossing improvement include the consideration of future shared path linkages between the townships.

4.4.13. Submission number 875

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment (part 1)

'In the EES it is proposed that the B-double haul trucks will avoid morning and afternoon school drop off and pick up times. This would mean that no haul trucks would pass the school between 8:30 – 9:30am and between 2:30 – 3:30pm. Kalbar also states in the EES that it will avoid peak traffic times, so no passing trucks between 7:30 – 8:30am or 5 – 6pm. This reduces the permissible times for the trucks to be on the road for a total of 4 hours. But the EES also claims that truck movements will be avoided during the night because of noise. Consequently there will be a greater volume of the 80 return truck movements in the remaining hours not restricted which will create more concentrated noise, disturbance and safety issues for people alongside the road and other users of the road.'

Response to comment (part 1)

The Assessment has assumed product transport haulage will operate across a 24-hour period for all product transport routes. It is understood that the EES has specified for the preferred route (Post-Avon Bridge Option 1 – Fernbank East Siding) that haulage road and rail loading activities at the Fernbank East rail siding will be restricted to day and evening periods as part of noise mitigations (NV36).

For other product transport options that will use the public road network, product transport will occur over the 24-hour period and therefore will not be restricted to daytime movements only.

To clarify, the Assessment recommends that B-double movement for product transport avoid school pick-up and drop-off hours. In addition, it is noted that product transport should avoid key busy periods on particular days of the year where increased traffic may be observed on the Princes Highway (e.g. long weekends and school holidays). Movement of oversize and overmass (OSOM) loads were recommended to also avoid daily peak hours.

Given the low frequency of B-double movements across the day, the impact of applying some time restrictions (i.e. 21 hours per day rather than 24 hours per day) to B-double movements along the alternative product transport routes would have a negligible impact on safety or traffic efficiency.

Summary of comment (part 2)

'There is also the safety issue of drivers being tired as well as drivers being behind schedule and in a hurry.'

Response to comment (part 2)

These issues are expected to be addressed through the TOMP, recommended in the Assessment.

The preparation of the TOMP will be guided by the requirements of the National Heavy Vehicle Regulator (NHVR). As part of the Heavy Vehicle National Law (HVNL), minimum rest times and maximum work times are required by heavy vehicle drivers to mitigate driver fatigue and depend on the operator's fatigue management accreditation. This also requires drivers to log their work and rest hours as evidence of compliance and fatigue management. It is expected that a Fatigue Management Plan would be implemented as part of the TOMP, outlining responsibilities, requirements, and monitoring and review procedures to ensure the safety of drivers.

The requirements of the HVNL require consideration of scheduling of movements to ensure drivers are not directly or indirectly pressured to speed. Trips are required to be planned with appropriate time allowed for the required route (including rest stops), taking into account speed limits, adverse weather, road conditions and road works. Vehicle speed data may also be monitored and checked for compliance to posted and recommended speed limits for specific road environments.

These requirements would apply for both Kalbar and any heavy haulage contractor as defined under the Chain of Responsibility discussed earlier in Section 4.3.2 of this statement.

4.4.14. Submission number 893

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below.

Summary of comment

'Kalbar says many of the roads within the project area and surrounding region have low traffic volumes. What is the surrounding region they refer to? Where these studies done pre Covid? Were these studies done during Christmas, Easter, long weekends? Why were studies not done for a 12 month period? After all we are talking of 20 + years of mining.'

Response to comment

The existing conditions traffic volume assessment is provided in Section 5.3 of the Assessment, representing volumes prior to Covid-19. Whilst the volumes assessed were based on typical weekday volumes, analysis into seasonality (i.e. across a 12 month period) was carried out for the Princes Highway where increases in traffic were notable during weekends, long weekends and school holiday periods (Section 5.3.2 of the Assessment). The increase in traffic demands during these periods has informed key recommendations relating to the intersection treatments and factors to consider as part of the TOMP, the timing of over-dimensional load movements and proposed road upgrades.

More recent traffic data was obtained at Lindenow South during November 2020 (during Covid-19) and is discussed in Section 4.3.1 of this statement.

The level of assessment carried out is considered appropriate for the purposes of this study.

4.4.15. Submission number 813

This submission raised multiple concerns, some of which have been responded to in the above themes, including these topics:

- Safety for other road users;
- Responsibility for cost and repair;
- Tourism; and
- Cycling.

Responses to additional issues are provided below.

It is recognised that the Appendix to Chapter 15 of the submission raised community concerns on items identified in the risk report completed by Kalbar as part of the EES. Given the referenced items are based on commitments by Kalbar that may have some misalignment from the Traffic and Transport Impact Assessment forming an Appendix to the EES, Kalbar is best placed to clarify the questions that are raised.

Summary of comment

The submission makes various references to aspects which the respondent believes the traffic and transport '*study does not comment on, or analyse to an adequate standard'.* The submission identifies various key impacts on the local community. These are listed below in the response section.

Response to comment

'Loss or relocation of existing roads which are of cultural, financial and social significance'

'Roads in their existing layout play a vital role in relation to the social structure of community'

'The existing network of roads is obliterated with destruction of significant cultural and historic sites'

The Assessment has not attempted to consider these cultural or social impacts as these are the subject of investigations of separate specialists. These have been separately addressed in the assessments by relevant specialists (refer EES Appendix A017 – Cultural Heritage Impact Assessment and Appendix A018 – Socioeconomic Impact Assessment). However, I note that in relation to numerous statements made, in my opinion and based on the Assessment the traffic impacts associated with the road proposals would not prevent the safe continuation of the social activities identified. It is my view that the proposals to modify or reinstate road infrastructure in the vicinity of the mine (including the Fingerboards intersection) would have a negligible impact or would either maintain or improve the overall safety and functionality of the transport network.

'Lack of local knowledge results in unrealistic mitigation measures'

This comment is regarding the use of buses for workforce travel. The recommended measure for workforce to travel to the mine site by bus is intended to be a privately-operated bus (operated by the mine), rather than public transport bus routes.

'"Impact on overall travel times is minor" is just an unfounded statement'

The Assessment has included identification of traffic generated and has assessed the likely impact on travel times. My conclusion that impacts on overall travel times is minor is based on an appropriate analysis.

'Traffic volumes noted in the EES claim to identify 'peak traffic generation' for volumes which is incorrect: There is no calculation for the peak school holidays/public holidays when traffic is dense and persistent.'

Traffic volumes during holiday periods is discussed in Section 5.3.2 of the Assessment and has informed the recommended mitigation measures.

'Existing emergency management infrastructure is not detailed'

The design of changes to the road network is being undertaken by Kalbar and a separate specialist. Consideration of emergency management infrastructure will need to be part of the detailed design of any changes to the road network. Consultation with the Country Fire Authority (CFA) will also be required to ensure their access requirements are catered for.

Emergency services access during any road works will also need to be considered with an Emergency Management Plan produced. This is discussed in Section 7.5 of the assessment.

'The risk assessment omits to include reference to what happens in the case of an emergency and one of their trucks is on the road, or overturns and there's spill.'

'The EES document provides no indication for how driver risks such as drug and alcohol testing, driver fatigue will be tested in the proposed Transport Operational Management Plan (3) so how can the community be assured that mine drivers will be using local roads safely?'

The TOMP and separate procedures for materials handling are expected to cover procedures in the case of emergency and interventions in the event of crashes. It will also include critical issues such as driver fitness for work (drug and alcohol testing), speed, vehicle management and driver fatigue in accordance with the Heavy Vehicle National Law.

Existing conditions involved desktop review and site visits in May 2017 and October 2018 (p. 1). There have been marked changes in the road structure since then. Especially to the Princes Highway which is considerably degraded.

The Assessment recommends that an Asset Protection Plan be prepared and agreed with the Responsible Road Authority prior to construction of the project and would apply to Lindenow-Glenaladale Road, Bairnsdale-Dargo Road, Barry Road and local roads required for product transport. The purpose of this plan is to agree the determine timing and method of monitoring as well as the reimbursement of any costs associated with significant change in pavement life that is attributed to the project. While some areas of additional progression of pavement distress were observed as part of the January 2021 site inspection (e.g. patching, localised sealing, edge degradation), the deterioration is not considered to be significant and it is my opinion that recommendations that were developed based on the 2017 and 2018 site inspections remain appropriate.

The Princes Highway is an A-Class road and it is considered that these roads should be designed and maintained to facilitate the strategic movement of freight rather than requiring inclusion in an asset protection plan or agreement.

4.4.16. Submission number 716B

This submission raised multiple concerns, some of which have been responded to in the above themes. Responses to additional issues are provided below. Council's submission includes a report prepared by SLR Consulting Australia Pty Ltd (SLR) and my response focuses on relevant issues raised in the SLR report dated 13 November 2020.

Summary of comment (part 1)

'The proposed use of Racecourse Road under the Post-Avon River Bridge - Option 2 routing scenario is inconsistent with EGSC's planning intent for the road network. The Bairnsdale Growth Strategy identifies that a heavy vehicle bypass of Main Street (Princess Highway) might be facilitated by either Racecourse Road or Bosworth Road however EGSC's subsequent planning (i.e. Bairnsdale Southern Alternative Freight Route) establishes that the intent is for freight movement to be facilitated by Collins Street/Bosworth Road, not Racecourse Road.'

Response to comment (part 1)

The product transport route to the Bairnsdale Siding was discussed in a meeting with EGSC in November 2018. This included discussion around various alternatives between the mine site to the Bairnsdale Siding, using Racecourse Road, Collins Street or Forge Creek Road. Summary of the assessment of alternatives that was discussed with Council is provided in Section 6.4.2 of the Assessment.

The proposed product transport route to Bairnsdale was then developed for Racecourse Road incorporating the stakeholder feedback received. The proposal for Racecourse Road was also presented to the Technical Reference Group (TRG) in December 2018. The Racecourse Road option is preferred as it avoids interaction with the schools precinct, level crossing on Bosworth Road and pedestrian activity in west Bairnsdale.

Ultimately, however, Racecourse Road is not a B-double approved route and would require approval of EGSC as outlined in the Assessment should this be the confirmed position and this alternative product transport option be pursued.

Summary of comment (part 2)

'Whilst intersection performance analysis is presented for the Pre-Avon River Bridge routing option, no detailed intersection performance analysis is presented for the two Post-Avon River bridge routing options. It is therefore not possible to confirm for instance if the proposed conversion of the existing Princes Highway / Racecourse Road intersection to a roundabout would afford an appropriate level of service.'

Response to comment (part 2)

As per commentary in Section 9.2 of the Assessment, the Project impacts at the intersection of Princes Highway / Racecourse Road are minimal given that trips are limited to B-double movements only. For completeness, intersection volumes and performance are provided below, using the Cap-X assessment methodology and based on observed turning movement observations from October 2018. This shows the intersection is expected to operate well within capacity with a LOS A. A roundabout is likely to improve performance of critical side roads, particularly during holiday periods. Given the higher volumes and proximity to Bairnsdale, these findings have also been verified using SIDRA which shows the intersection operating LOS A with V/C ratio of 0.31 in the AM peak period.

Table 23: Princes Highway / Racecourse Road – Mine operation peak hour performance

Peak hour	Approach volume (rounded to nearest 10)				TOTAL	V/C	LOS
	North	East	South	West			
AM	N/A	500	50	400	950	0.53	A
PM	N/A	500	20	450	980	0.54	A

Note: V/C is volume/capacity ratio

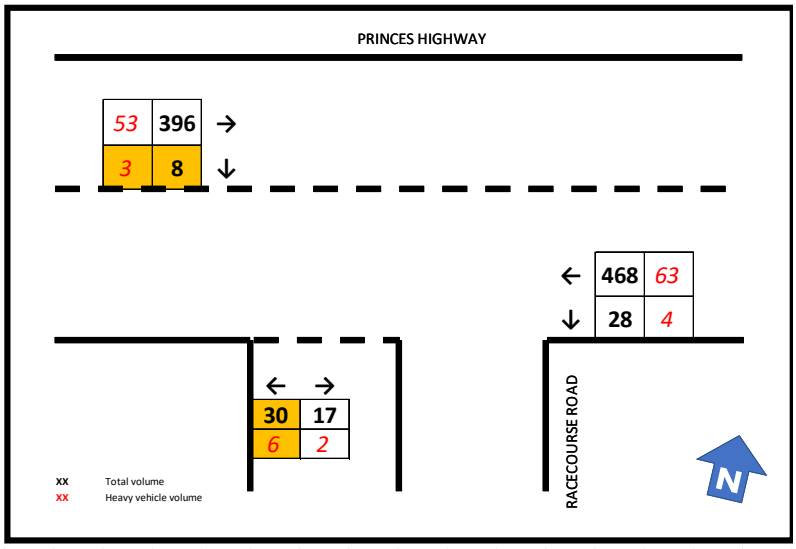


Figure 8: Princes Highway / Racecourse Road – AM peak hour volumes

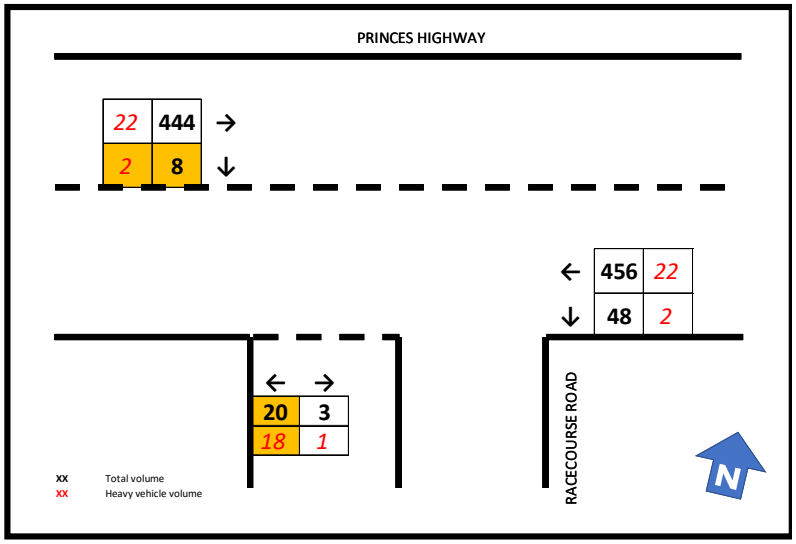


Figure 9: Princes Highway / Racecourse Road – PM peak hour volumes

Intersection turning movement assumptions:

- 15-minute turning movement traffic surveys were taken on 24 and 25 October 2018 during the AM and PM peaks. These were factored up by 4 to reflect an hourly flow.
- A peak hour factor was applied to align the surveyed volume with the peak hour identified by VicRoads Typical Hourly Volumes.
- 2.5% compound growth p.a. for 12 years was applied to reflect volumes ten years after opening in alignment with Austroads guidelines.

Summary of comment (part 3)

'It is unclear from the reviewed material the mechanism, if any, proposed to ensure that the Post-Avon River Bridge - Option 2 routing scenario would only be relied upon as an interim measure until such time that the Post- Avon River Bridge - Option 1 routing scenario is available.'

Response to comment (part 3)

It is understood that Kalbar's preference is for the Post-Avon River Bridge Option 1 – Fernbank East Siding route to be used for product transport only. If the preferred option is possible, then this would be the only option that is implemented, and alternative routes would not be used at all. Advice from Kalbar indicates that the remaining options to use the Bairnsdale rail siding or the Pre-Avon River Bridge option are alternatives only in the event that the preferred option does not procced.

Summary of comment (part 4)

'Limited information has been provided to validate the likely representativeness of the heavy vehicle demands forecast to be associated with the project's construction phase. It is unclear for instance if appropriate allowance has been made for the material requirements associated with the significant construction activity associated with the proposed road realignments as a breakdown of the heavy vehicle forecast by material type (i.e. beyond what would appear to be a nominal 20 vehicles) is not provided within the technical report.'

Response to comment (part 4)

Refer Section 4.3.4. for a summary of information provided by Kalbar in January 2021 regarding additional construction traffic associated with road construction works during the mining operation phase. Additional movements are expected to be low with an average of up to 10 return trips per day including four to six additional heavy vehicle and light vehicle return trips (noting it is conservatively assumed this may be up to 20 return trips per day for the purpose of this assessment). These additional movements were not included in the Assessment as the information was unavailable at the time.

It is my opinion that these additional traffic movements would not create any notable traffic efficiency impacts given the proposed upgrades and capacity of the surrounding road network, and are not considered to have a significant impact from a safety or road asset perspective when considered in isolation (i.e. under the preferred Post Avon River Bridge – Option 1 which proposes the use of a rail siding in Fernbank East).

Summary of comment (part 5)

'The heavy vehicle forecasts for the projects operational phase only includes allowance for the haulage of product. No allowance appears to have been made for movements associated with ongoing operational inputs such as diesel and operational outputs such as site waste. Furthermore, no allowance has been made within the operational forecasts for the material that might be required to facilitate the road realignments that are proposed to occur in the years following commencement of the project.'

Response to comment (part 5)

These movements were not included in the Assessment as the information was unavailable at the time. As outlined in 4.3.4, updated information provided by Kalbar indicates that it is expected these movements would be low with two return trips per day on average associated with transport of waste, diesel and flocculants.

It is recommended that heavy vehicle movements be required to utilise declared roads and approved product transport routes for access to site.

Based on this recommendation and the findings of the Assessment, it is my opinion that these additional traffic movements would not create any notable traffic efficiency impacts given the proposed upgrades and capacity of the surrounding road network.

Similarly, the proposed additional vehicle types and volumes are not considered to have a significant impact from a safety or road asset perspective when considered in isolation (e.g. under Post Avon River Bridge – Option 1). These additional movements also do not change my opinion of the recommended mitigation treatments when considered alongside either the Pre-Avon River Bridge Option or Post Avon-River Bridge Upgrade – Option 2.

Summary of comment (part 6)

'It is also noted that the intersection analysis (with the exception of that completed for the Princes Highway / Bairnsdale–Dargo Road intersection) has been undertaken utilising the Cap-X method that is a simplistic American methodology which is not widely utilised to inform development assessment in Australia. SLR acknowledges that we are not experts in the use of the Cap-X analysis methodology given that the tool is not commonly utilised in the Australian market. Nevertheless, SLR has some familiarity with the methodology through international work previously undertaken. Based on this previous exposure it would appear that ARUP have utilised an incorrect capacity value for the reported analysis. The assessment adopts a capacity value of 1,800 vehicles per lane which SLR understands is reflective of a two-phase signalised intersection arrangement and is not a representative value for the priority-controlled junctions assessed. Notwithstanding this apparent error SLR considers that it would be appropriate for any updates to the modelling to be completed utilising SIDRA Intersection instead of updating the previous Cap-X modelling as the Cap-X methodology is not widely utilised to inform development assessment in Australia and hence it is unclear if the results are representative for the Australian context.'

Response to comment (part 6)

The simplified method adopted for the intersection assessment is considered reasonable given the low peak hour volumes at intersections. At intersections where higher volumes were observed, SIDRA intersection modelling was conducted to check the intersection performance.

Commentary is provided in Section 7.2.1 of the Assessment outlining the assessment methodology and validation exercise. The validation process undertaken (i.e. assessing the same intersection and same volumes using Cap-X and SIDRA) showed the Cap-X method was conservative and overstated the likely impacts where volumes are low. It is acknowledged that the approach used adopted an assumption of 1,800 veh/h as a capacity measure, but this is the total intersection capacity (not a per lane capacity as suggested in the submission). This does correspond to a basic capacity used in Cap-X for a signalised intersection where capacity is assumed to be shared across approaches and does not necessarily directly correspond to the capacity of unsignalised junctions. This was a simplifying assumption adopted and is considered to be a conservative approach as explained further in the following.

The simplified Cap-X approach effectively assumes and even distribution of traffic. Therefore, variations from this even distribution of traffic would change what the outcome of the assessment would be. For example, in the unlikely and unusual situation where a right turn from a minor road was the dominant movement at the intersection (rather than the major road through movements) then the Cap-X approach may underestimate delays and over-estimate the available capacity. However, in the more usual situation where demands are lower on the minor approach then the Cap-X method is more likely to over-estimate the delays and under-estimate the available capacity.

In addition, as per Section 7.2.1 of the Assessment it is noted that the traffic analysis outside major activity centres has added the peak for project traffic (5:00am to 7:00am and 5:00pm to 7:00pm) to the commonly observed peak hour volumes (8:00am and 3:00pm). It has also been assumed that trips travelling both to and from the site occur in the same hour (i.e. rather being separated to the half hour prior to shift start and the half hour post shift end). This is a conservative assessment meaning that the traffic efficiency impacts that are documented in the Assessment are likely to be much lower in reality.

For intersections closer to activity centres (e.g. Bairnsdale) the Assessment recognised that the intersections may be more sensitive to change in demands. On this basis, the assessment is based on the time in which project vehicles are expected to travel through the intersection as outlined in Section 7.2.1 of the Assessment.

Based on the above, given the low volumes, very low delays, high available capacity and validation carried out using SIDRA, it is unlikely the outcomes of the assessment would change with wider use of SIDRA for the assessment of intersections. It is most likely that the assessed intersection performance would improve over what is documented in the Assessment.

For further context in considering this issue, it is noted that the potential capacity of rural roads is substantially higher than the assumed intersection capacity of 1,800 veh/h. The Austroads *Guide to Traffic Management Part 3: Transport Study and Analysis Methods* identifies various capacity measures as follow:

- For two lane, two-way roads with uninterrupted flow Austroads (section 5.2) relies on the approach used in the US Highway Capacity Manual. This indicates that the capacity of a two-lane highway is 1700 pc/h for each direction of travel and is nearly independent of the directional

distribution of traffic. This is indicative of the capacity of major road legs which have right of way.

- A lower estimate of capacity is derived if roads are considered as urban arterial roads with interrupted flow (Section 6.2 of the Austroads document). Here the per lane capacity of an undivided road, with unflared major intersections and interruptions from cross and turning traffic at minor intersections, is identified as 900 pc/h. This capacity may increase to up 1200 – 1400 pc/h/lane where other features such as intersection flaring are included.

Summary of comment (part 7)

Whilst Section 7.3.1 of the technical assessment describes common treatments provided at intersections to manage safety risks limited information is provided to validate the turn warrants assessment presented for the Pre-Avon River Bridge Option routing scenario. Furthermore, no turn warrants assessment has been completed for the two Post-Avon River bridge routing scenarios. The potential need for turn lanes at the Bosworth Road / Bairnsdale Rail Siding Access should for instance be confirmed. Alternatively, if such treatments are not required as the rail siding would continue operating within existing approved capacity limits and hence not trigger a mechanism for requiring upgrades (irrespective of the safety merits) than this "entitlement" should be established by reference to relevant existing statutory approvals.

Response to comment (part 7)

As part of the Assessment, investigations were undertaken to determine the need for upgraded turning treatments (e.g. channelised or auxiliary turning treatments).

A channelised right turn lane treatment is recommended for the new Fernbank-Glenaladale Road (north) / Bairnsdale-Dargo Road intersection given the proximity to the site and the potential need for vehicles to come to a stop condition on the bend of Bairnsdale-Dargo Road.

A number of intersections are recommended to be upgraded to roundabout control including Bairnsdale-Dargo Road and Fernbank-Glenaladale Road, Princes Highway and Lindenow-Glenaladale Road as well as Princes Highway and Racecourse Road. These intersection types do not require consideration of the turn lane warrants.

The intersection of Fernbank-Glenaladale Road and Princes Highway and the intersection of Bairnsdale-Dargo Road and Princes Highway both have existing channelised and auxiliary lane treatments for left and right turns. The proposed change in traffic volumes as a result of the project and background growth are not of a level to trigger additional improvements based on Austroads guidelines and the existing intersection turn lane configurations remain appropriate.

Similarly, the existing basic turn treatments at the intersection of Lindenow-Glenaladale Road and Bairnsdale-Dargo Road remain appropriate for the anticipated traffic volumes and no further improvement is required under Austroads Guidelines as documented in Section 4.3.1 of this statement.

The entrance to the rail siding from Bosworth Road is not expected to warrant the introduction of turning lanes given the low volumes and 50km/h speed limit. While the function of Bosworth Road may change in the future, based on existing volumes and assuming 2.5% growth for 10 years after opening, peak hour traffic is likely to be in the order of 120 vehicles per hour in each direction. There would need to be additional movements of approximately the same magnitude turning into the siding to warrant turning lanes. The project is generating in the order of 2 movements turning into the rail siding each hour. Accordingly, turn lane treatments would not be warranted for the access to the rail siding.

Summary of comment (part 8)

Insufficient geometric details have been provided to substantiate that the proposed road realignments would afford an appropriate level of safety. Whilst, basic cross-sectional details are provided for Fernbank-Glenaladale Road, Chettles Road and Careys Road the practicality of the proposed alignments should be confirmed through the provision of more advanced engineering drawings including for instance long-sections. The proposed re- alignment of Fernbank-Glenaladale Road results in the need to negotiate challenging topography which may in turn limit the ability to meet various design requirements such as sight distance.

Response to comment (part 8)

The requested designs are being developed by Kalbar and I note updated road diversion plans were provided to the Inquiry and Advisory Committee on the 18 January 2021. While still in an early stage of development, my preliminary review of these plans is outlined in Section 4.3.5 of this statement.

It is expected the designs of any proposed road or intersection changes would be further developed and assessed should the project proceed. Subsequent planning and approvals would include agreement from the relevant responsible road authorities (VicRoads and Council) which would include further design development and engineering assessment, design compliance reviews, road safety audits and extensive stakeholder consultation.

Summary of comment (part 9)

The ability to achieve suitable intersection spacing between the proposed Fernbank-Glenaladale Road / Private Haulage Road intersection and the proposed roundabout on Bairnsdale-Dargo Road should be confirmed with consideration also given to the ability to safely introduce the proposed signalised intersection control in a rural road environment.

Response to comment (part 9)

The Assessment (Section 8.1.1) recommends the design of the Fernbank-Glenaladale Road / Private Haulage Road intersection and the proposed roundabout on Bairnsdale-Dargo Road should be coordinated to ensure safe spacing between the intersections.

General commentary is provided within the Austroads and VicRoads guidelines on the spacing of intersection with some of the key considerations including the traffic volumes, classification of the road, number of turning movements and speed limit. The Assessment notes that given the characteristics of Fernbank-Glenaladale Road, the intersection spacing should be in the order of 150m to

200m and that and stakeholder input will be required in finalising the requirements. The proposed road diversion plan provided by Kalbar shown in Figure 10 of the Assessment indicates that the spacing of the intersections will be in the order of 200m to 250m.

The assessment also recommends dynamic warning signs (i.e. signs with flashing lights that activate in advance of traffic signal changes) to improve driver awareness of the signalised intersection controls at the haul road crossing and a reduction of the speed limit to 80km/h.

My comments from a preliminary review of the updated road diversion plans that were provided to the Inquiry and Advisory Committee on 18 January 2021 are provided in Section 4.3.5 of this statement.

Summary of comment (part 10)

Only a basic scoping assessment has been completed to quantify the pavement service life impacts associated with the proposed use of EGSC's controlled road network. The technical assessment for instance identifies that pavement loadings on Racecourse Road would triple under the Post-Avon River bridge - Option 2 routing scenario. No firm indication of the specific mechanism to manage these impacts is however identified beyond broadly describing a "make-good" type mechanism. Such a mechanism is not considered overly practical in this instance given the potential long-term use of the roads and the inability to readily attribute the cause of pavement deterioration to haulage activity that occurs remote from the project.

Response to comment (part 10)

Should this alternative proceed, the Asset Protection Plan will be developed in consultation and require agreement with EGSC. This will include agreed levels of service, asset maintenance requirements, intervention levels, agreed remediation repairs for routine and programmed maintenance. The responsibility for maintenance and method of reimbursement would also be agreed between Kalbar and EGSC.

The plan will outline how roads along the product transport routes will be monitored and steps required if surveys indicate interventions are required. For example, it is recommended an initial structural pavement evaluation using Falling Weight Deflectometer (FWD) measurements is undertaken prior to construction to determine the useful design life of each road, to understand the current condition of the road network and future expected performance.

The increase in B-double traffic may reduce the remaining life (determined through routine testing in the future), and therefore require earlier remedial intervention. The intervention levels and remediation requirements would be agreed between all relevant road authorities at time of assessment as part of apportioning the accountability for impact.

Summary of comment (part 11)

Whilst the conversion of two existing intersections on the Princes Highway to roundabout control has been proposed based on safety considerations it would appear that limited consideration has been given to the appropriateness of this outcome from a road hierarchy perspective. Whilst this outcome ultimately relates to a Designated Road outside EGSC's jurisdiction the outcome would result in lower order roads being afforded priority over traffic travelling along the Princes Highway.

Response to comment (part 11)

The proposed treatment prioritises safety, with minimal traffic impacts to Princes Highway traffic given the lower volumes expected on the side roads.

Given the increase in B-double vehicles operating across the 24-hour period, the roundabout is proposed to manage vehicle speeds at the conflict point as B-doubles turn to and from Princes Highway to reduce the risk of crashes. As discussed in Section 7.3.1 of the Assessment, alternative arrangements (such as acceleration/deceleration lanes) would not sufficiently reduce speeds of vehicles on Princes Highway and turning B-doubles at the point of conflict.

4.5. Summary of Review of Submissions

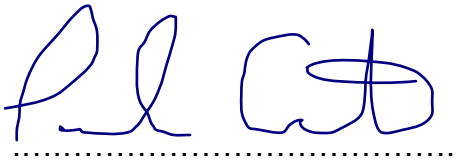
The submissions have been reviewed and considered in combination with the additional information provided by Kalbar and the work undertaken since the Assessment was prepared. I note that the submissions have raised concerns relating to three potential product transport routes that are the subject of the EES. Kalbar's preferred product transport route that utilises a rail siding in Fernbank East would mitigate a significant number of the identified impacts in the Assessment and concerns raised in submissions due to the reduced requirement to use public roads.

Notwithstanding, it is considered that the issues raised in submissions have been addressed in the Assessment and the subsequent work as summarised in this statement, or are most appropriately addressed through further planning and design, approval and compliance processes. This includes preparation of a Traffic Management Plan for the proposed road network changes as required by Department of Transport, relevant V/line and Department of Transport access approvals processes for rail infrastructure, preparation of monitoring and asset protection plans to the satisfaction of the Responsible Authority and preparation of a Transport Operational Management Plan with reference to the requirements of the National Heavy Vehicle Regulator.

On the basis of the above, it is my opinion that the assessment that has been undertaken is appropriate and that there are no road, traffic or transport reasons to refuse the proposed development.

Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.



02 February 2021

Annexure A – Qualifications and Experience

Paul has 18 years of experience as a transport engineer and transport planner and has worked in the consulting environment as well as in state and local government. He leads Arup's Transport Planning business in Victoria. His broad experience includes transport strategy, master plans, business case development as well as the design of station interchanges, airport landside infrastructure and strategic road corridors. He has been involved in various traffic impact and traffic management studies for urban and rural development and infrastructure planning projects across a variety of industry sectors. This includes assessment of the construction and operation implications of a number of large mining, energy and infrastructure projects in Victoria, Northern Territory, Western Australia and South Australia.

Qualifications

- Bachelor Engineering (Civil), First Class Honours, Monash University, Melbourne.
- Masters of Traffic, Monash University, Melbourne.
- Certified Transport Planner, Chartered Institute of Logistics and Transport Australia.

Major Projects

Calder Corridor Upgrade, VIC

Paul was the Project Director responsible for the development of a major infrastructure improvement to the Calder Corridor. This has included establishing the investment management products, undertaking site investigations, options development, options appraisal, concept design, traffic analysis, risk assessment and financial assessment of the developed options. As part of this project, Paul provided direction in the interaction with key internal and external stakeholders as well as facilitating a number of key workshops focusing on technical design as well as project risk. Paul was a key advisor to VicRoads in navigating and coordinating the various project development technical disciplines and importantly, worked closely with VicRoads to develop a series of targeted strategies for further investigating key issues in order to de-risk the project prior to finalisation of the business case interim findings report.

Hall Road and Western Port Highway Upgrade, VIC

Paul was the Project Director for this State significant business case which forms part of Arup's role as Technical Advisors to Major Road Projects Victoria. The project development and business case included investigation and assessment of a number of engineering, transport planning, land planning and environmental challenges along the road corridors. These challenges related to developing design options that respond to the sensitive environmental values for the corridors and planning for transport improvements for all modes in one of the fastest growing municipalities in Australia. Paul provided strategic direction across planning, engineering, cost, economics and risk during the project and facilitated key workshops with the client and key stakeholders.

Narre Warren North Road Upgrade, VIC

Paul was the Project Director for this State significant business case which forms part of Arup's role as Technical Advisors to Major Road Projects Victoria. The project development and business case included investigation and assessment of a series of interventions and alternative intersection arrangements options along the corridor that would best respond to the engineering and environmental constraints. Paul provided strategic direction during the project in order to meet the compressed business case and facilitated key workshops with the client and key stakeholders.

East West Link Tender Design, VIC

Paul was the transport planning and modelling technical lead for the Arup and SMEC Joint Venture (SAJV) tender design for the Ferrovial Samsung Ghella Construction JV (FSGJV) for the East West Link Project. These design and construction joint ventures form part of as part of the Inner Link Group (ILG) Consortia PPP bid to Linking Melbourne Authority. Stage 1 of the East West Link comprises a 6 kilometre freeway standard road link between Eastern Freeway Clifton Hill and CityLink in Parkville. The project includes:

- Twin 4.4 kilometre three lane tunnels;
- Reconfigured Hoddle Street / Eastern Freeway interchange;
- A tunnel interchange at Elliott Avenue;
- A CityLink interchange;
- Access ramps to Ormond Road; and
- Additional traffic lanes to the Eastern Freeway.

This five month tender design involved extensive option testing and an iterative refinement of the two separate design schemes to minimise the project cost and maximise the performance of the proposed transport network. The design development included extensive assessment of the freeway network performance, intersection performance as well as the design of new pedestrian and cycling and public transport linkages.

In this role, Paul also presented on behalf of the Inner Link Group consortium to the executive team of the Linking Melbourne Authority at the positive guidance interactive workshops.

Package 1 Business Case (Confidential), VIC

The Package 1 project involved the preparation of a full business case that met the requirements of both VicRoads and the Department of Treasury and Finance. The project included a road duplication over a length of approximately 1km as well as reconstruction and widening of an existing road/rail grade separation to increase the capacity for all road users crossing the existing rail corridor. The project was identified as a High Value, High Risk project with a capital value in excess of $150 million.

Paul was the primary author of the business case. The role included working within the VicRoads team for 6 months, steering the business case development through the stages of problem and benefits identification, strategic options testing, triple bottom line project options appraisal and the development of a recommended solution. As part of the role, Paul provided oversight in the development of the demand forecasting, local area transport modelling, engineering design, environmental assessments, economic, risk, cost, program and constructability assessments. Paul also led discussions with key stakeholders and consultants throughout the business case development.

Punt Road Transport Investigation, VIC

Paul was the Project Manager for the Punt Road Transport Investigation and provided critical input into the review of the Punt Road Public Acquisition Overlay – both high profile studies for Melbourne. The Hoddle Street-Punt Road corridor is arguably the most important arterial road in inner Melbourne and has a number of challenges in balancing competing priorities for pedestrians, cyclists, buses, trams, commercial and private vehicles. This project also provided input into the Streamlining Hoddle Street initiative.

Through a process of appraisal relative to social, environmental and economic criteria, Paul with the support of the team identified the suitability of the concept options informing the planning for this critical sub-region of Melbourne in the short, medium and long term.

Successfully delivering under compressed timeframes, the study was publicly exhibited from October 2015 to February 2016. This report formed part of the panel hearing for the review of the Public Acquisition Overlay. Paul presented as an Expert Witness to the advisory committee completing the ‘end to end’ service for this study.

WIM150 Mineral Sands Project, VIC

Paul was the project manager for the Traffic and Transport Impact Assessment that was prepared as part of the EES for the WIM150 Mineral Sands Project located approximately 20km southeast of Horsham. This assessment included a review of the existing conditions, review of two alternative scenarios for the movement of products (via road, or a mix of road and rail), an assessment of the complex intersection arrangements for access to the site, highway performance and the implications for closing local roads. In addition to the technical assessments, Paul was central to developing the Significance Assessment Method for the study which was used to identify the environmental values to be protected as part of the assessment and allowed a categorisation of the technical findings into five rating categories from Extreme to Minimal. Paul also presented the findings of the study to the Technical Reference Group.

Shaw River Power Station, VIC

Paul was the project manager for the delivery of the Roads, Traffic and Infrastructure Impact Assessment Study for the EES being prepared for the Shaw River Power Station in south western Victoria. This assessment included a review of the existing road network, assessment of intersection operation, intersection concept design, traffic flow assessments and identification of required road improvements. This role also included presentation to the Technical Reference Group which included a number of government stakeholders.

Paul also prepared and performed the role of Expert Witness at the Panel Hearing for the project there in providing a continual “end to end” service through the required stages of the EES.

Iluka Mining Murray Basin EES, VIC

Paul prepared the Traffic Impact Assessment specialist study as part of the Environmental Effects Statement of the proposed mine sites near Ouyen. This included an assessment of the impact of traffic generated by the mine both along the highway network and at the new mine access intersection.

In addition, Paul has prepared a traffic impact assessment for Iluka’s expansion of the Douglas mine site, including traffic management options to facilitate the safe movement of over-size mining equipment across Wombelano Road (a declared road), as well as a traffic impact assessment for the proposed Echo mine site between the Douglas site and Horsham.

Northern Gas Pipeline Project, NT

Paul was the Project Director for the Traffic Impact Assessment prepared as a part of the Environment Impact Statement for the proposed Northern Gas Pipeline Project. The proposed pipeline runs from Warrego in the Northern Territory to Mt Isa in Queensland. This study investigated the transport impacts of the proposed pipeline within Northern Territory and associated infrastructure requirements during the construction and operation phases of the project.

BHP Billiton Olympic Dam Expansion, SA

Paul was the project manager for the delivery of the traffic impact assessment, which forms part of the Environmental Impact Assessment undertaken for the Olympic Dam Expansion. Olympic Dam is the world's fourth-largest remaining copper deposit and the largest uranium deposit. The traffic impact assessment included a review of road links, key intersections, road safety, over-dimensional load movements and the development of mitigating options. This assessment was undertaken between Adelaide and Olympic Dam and included a review of the construction and operation stages of the expansion.

BHP Billiton Non-divisible Loads Study, SA

Paul assisted in leading the development of this traffic management strategy, which aims to facilitate the safe and efficient movement of numerous large over-dimensional loads on the public roads of South Australia. This study included the development of conceptual traffic management plans, a review of intelligent transport systems options, assessment of possible traffic and community impacts and the development of recommendations and mitigating measures.

Professional associations

Engineers Australia (Member)

Australian Institute of Traffic Planning and Management (Member)

Employment history

2019 to present	Arup	Associate Principal
2015 to 2019	Arup	Associate
2009 to 2015	Arup	Senior Transport Engineer
		(6 months seconded to VicRoads)
2007 to 2009	Arup	Transport Engineer
2006 to 2007	City of Whitehorse	Senior Transport Engineer
2004 to 2006	City of Whitehorse	Traffic Engineer
2003 to 2004	Traffix Group	Traffic Engineer

Achievements

AITPM Excellence Award for Traffic Engineering/Management, Streamlining Hoddle Street, 2016

Monash University, VicRoads Prize, 2009

Annexure B – Project Team Experience

Bruce Johnson

Profession
Strategic Transport Planning

Current Position
Principal

Joined Arup
1987

Years of Experience
35

Nationality
Australian

Qualifications
MEngSc, Transport & Traffic Engineering, Monash University, Australia, 1993

BEng (Hons) Civil, University of Melbourne, Australia, 1984

Professional Associations
Guest lecturer, 3rd and 4th year Transport Engineering, Monash University, RMIT University, University of Melbourne

Publications
Johnson, B & Pike, L - Learnings from Modelling of Technological Options for Improving Melbourne's Transport System. AITPM National Conference, 2017

Caplan, M, et al Using Electronic Ticket Machine data to develop public transport matrices in Wellington, New Zealand, AITPM National Conference, 2012

Dunn PD and Johnson BA Assignment Techniques for Networks with Junction Modelling, First Asian EMME/2 Users Conference, 1999

Johnson BA Freight and Logistics Applications for Intelligent Transport Systems, Proceedings from the International Conference on Application of New Technology to Transport Systems, Melbourne, 1995

Johnson BA and Akcelik R Review of Analytical Software for Applicability to Paired

Bruce is a Principal in Arup's Advisory Planning & Design Group and has regional responsibility for the group's strategic transport planning activities. He has extensive experience across the transport planning and transport infrastructure sectors throughout Australia and internationally.

Bruce has provided key input to numerous freight and intermodal related projects across Australia. His experience covers policy, strategic planning, demand assessment, operations and traffic engineering aspects for freight. Bruce has undertaken numerous strategic transport planning and demand forecasting projects that have included consideration of freight issues as part of their overall scope. His work on toll roads in Brisbane, Melbourne, Sydney and other cities internationally has considered demand forecasting in relation to freight movements. This work has also included specification of data collection for freight studies.

Bruce's project experience includes periods working in all states of Australia and in New Zealand, China, Hong Kong, Papua New Guinea, Thailand, United Arab Emirates, United Kingdom and the United States.

Bruce draws on his extensive experience across many facets of the transport sector to deliver insight, innovation and sound advice to clients.

SELECTED PROJECTS

Review of Second Container Port Advice, Victoria

For Transport for Victoria undertook a review of specific technical elements associated with Infrastructure Victoria's Second Container Port Advice, including timing of second container port, rail access to Hastings, assessment of the Multi Criteria Analysis outcomes, and land use assessment for affected sites. Bruce led the landside transport and logistics elements of the review.

Port of Melbourne Transaction Advice, Victoria

Led the landside logistics review as part of overall due diligence technical advice provided by Arup to support the successful bid by the Lonsdale Consortium to acquire the 50-year lease of the Port of Melbourne.

Port Botany and Port Kembla Transaction Advice, NSW

Led the landside logistics review as part of overall due diligence technical advice provided by Arup to support the successful bid led by Industry Funds Management and Global Infrastructure Partners to acquire the long term lease of Port Botany and Port Kembla in New South Wales.

Building on the above work Bruce subsequently led Arup's work in providing further transport planning advice to NSW Ports in

Intersections, Proceedings 16th ARRB Conference, Perth, 1992

Johnson BA and Singleton DJ Economic Assessment of Urban Road Projects, National Transport Conference, Institution of Engineers, Australia, Brisbane, 1991

relation to landside transport aspects of port masterplans for both ports.

Olympic Dam Mine Expansion Prefeasibility Study and EIS, South Australia

BHP Billiton appointed Arup to undertake infrastructure and environmental planning for this major mine expansion project. Included in this work was a freight and logistics study investigating whole of life logistics costs for the project. The work included various stages of investigation of a new 80km rail link as a logistics option. Bruce contributed to the feasibility analysis of transport infrastructure for the project. Bruce also contributed to work addressing issues related to Fly-in Fly-out operations and development of options for dealing with overdimensional loads on highways. Bruce led the preparation of the traffic impact assessment undertaken for the EIS.

Alice Springs – Darwin Railway Freight Review, Australia

Arup was commissioned by the senior debt financiers for the project to undertake an independent review of project freight forecasts. The BOOT concession project involved the extension of the existing Alice Springs to Tarcoola line (820 km) through to the Port of Darwin (an additional 1420 km) as an integrated rail and port operation. Bruce provided the major input for Arup's work, which involved an assessment of existing and future freight demand for the corridor, pricing, mode share and other transport issues that may influence demand forecasts. Following financial closure the role included review of Asia Pacific Transports' business plan.

Portland Access Economic Assessment, Victoria

For the Port of Portland undertook economic assessment of proposals to upgrade the Portland rail line to cater for 23 and 25 tonne axle loads.

Evaluation of Portland Access Options Study

For the Department of Infrastructure reviewed commodity flows for the Port of Portland and undertook economic evaluation of local and regional investment proposals to improve access by road and rail.

Freight Rail Track Upgrade, Victoria

Undertook economic and financial evaluation of proposals to increase axle load limits on Victorian Rail Lines for the Department of Infrastructure.

Shepparton Bypass Planning Study, Victoria

Responsible for transport planning and economic evaluation components of the EES. Developed a demand model for the study area and undertook economic evaluation to assess options for major freeway bypass of the city. Consulted extensively with local freight operators to establish freight demand and operations characteristics in the study area. Provided evidence at the EES panel hearing.

Echuca – Moama Traffic Study, Victoria and NSW

Developed an EMME model for assessment of needs and options for a new Murray River Crossing. Undertook economic evaluation of options and presented evidence at a panel hearing.

Melbourne Airport Surface Access Study, Victoria

Planned and analysed surveys of freight movements at Melbourne Airport as part of a comprehensive study of landside transport at the airport.

Automated and Zero Emission Vehicles Transport Engineering Advice, Victoria

Infrastructure Victoria appointed Arup to help inform the development of advice for the Victorian Government around the capabilities and potential impacts of AVs and ZEVs on Victoria's road users and network from a transport engineering perspective. The work highlighted opportunities and challenges for the possible wide-scale use of AVs and ZEVs in Victoria. This included consideration of freight vehicles. Bruce was Project Director for the study.

Potential Benefits for Freight Operations from Intelligent Transport Systems, Australia

Undertaken for ITS Australia this study involved an international review of the context of ITS applications in the overall transport and logistics scene and the extent of benefits from these applications. Estimates of benefit levels were made and issues affecting the development and deployment of the technology were identified. Recommendations for strategic actions and specific demonstration projects were developed. Bruce managed the study, was responsible for co-ordinating the inputs of a sub-consultant team and provided technical input to the report.

Highway Corridor Strategy Studies, Victoria

Bruce was project director for the Princes Highway West (364 km), Mallee Highway (230 km), Murray Valley Highway (630 km) and Docklands Highway (12 km) strategy studies for VicRoads. Each of these studies produced a strategy providing a statement of management plans and actions required to achieve the intended long term function and performance of the highway. The strategies involved assessment of regional economics and freight generators.

Principal Traffic Route Studies, Victoria

For VicRoads led Principal Traffic Route studies which focussed on shorter term improvement strategies for these arterial routes:

- Shepparton
- Docklands Highway
- Springvale Road, Mitcham Road, Maroondah Highway
- Springvale Road

Regional Road Project Assessment and Evaluation

Bruce's experience includes key inputs to significant road projects throughout Australia and overseas, covering many aspects of project development, operations and strategic

assessment. This has included significant studies in regional corridors, involving consideration of freight demands and road safety issues:

- Pacific Highway at Karuah EIS, NSW
- Beyond Nerriga Transport Corridor Study, NSW
- Albury - Wodonga Bypass Evaluation Review, NSW & Victoria
- Goulburn Valley Highway, Murchison, Victoria
- Federal Highway ACT to Sutton EIS, NSW & ACT
- Calder Highway Kyneton to Ravenswood Section, Victoria
- Calder Highway Black Forest Section EES, Victoria
- Rosedale Planning Study, Victoria

Peninsula Link, Victoria

Provided operations and maintenance advice as part of Arup's Independent Technical Advisor role on behalf of the sponsors and financiers associated with the Connect11 consortium's bid. The project is a new 25km freeway facility delivered under a PPP availability framework.

National Highway System Strategy Study, Australia

This study for the Australian Department of Transport involved a detailed assessment of the 16,000 km National Highway System. Bruce's input to the study included development of analytical procedures within a database environment to undertake identification of deficiencies under current and future traffic conditions, generation of treatment projects including maintenance programmes, and economic evaluation of capital and maintenance projects. The evaluation routines included pavement deterioration and rehabilitation models for a range of pavement and environmental conditions.

Investment Decision Framework for Civil Infrastructure Asset Management, Australia

This research project was undertaken as part of the Cooperative Research Centre for Construction Innovation for which Arup was a founding partner. Bruce had an expert reviewer role for the project which included investigation of optimisation of data sampling for pavement strength and a methodology for a risk adjusted maintenance budget taking into account variability in pavement strength.

Lily Xia

Profession
Transport Planning

Current Position
Transport Engineer

Joined Arup
2018

Years of Experience
4

Nationality
Australian

Qualifications
MEng (Civil)(Dist), University of Melbourne
BCom, University of Melbourne

Professional Associations
Engineers Australia (Member)

Lily is a transport engineer in Arup's Transport Planning team. She has experience working in both the public and private sector, providing transport engineering expertise across a variety of projects.

Lily has a strong foundation of transport engineering and planning skills from experience in projects involving traffic impact assessments, major road projects in Victoria, design surrounding station precincts and complex traffic signal design. She is familiar with traffic engineering and road design guidelines, which she applies in all her work. Her skills are complemented with experience in microsimulation and intersection modelling.

Prior to joining Arup, Lily worked in local government which allowed her to work closely with the community to understand and resolve local transport issues surrounding traffic management, parking, accessibility and safety.

Lily values design that provides a safe and accessible transport network for all users. She brings a range of transport engineering skills to projects, with a desire to create functional and sustainable design solutions.

Major Roads Projects Victoria (MRPV)

Arup has been appointed the technical advisor to MRPV, who are responsible for planning and delivering major road projects for Victoria.

Lily has been involved in providing traffic and transport advice for business cases for a number of proposed road projects in Victoria in outer regional suburbs including:

- Dorset Road Extension
- Napoleon Road Upgrade
- Dorset Road Upgrade
- Wellington Road Upgrade

Lily's role involved undertaking assessments of the existing and future road network for each project, including understanding existing areas of crash risk, existing traffic network and associated traffic demand and review of public transport and active transport networks surrounding the project areas.

As part of this, she was also involved in the option testing of future year options, including traffic demand forecasting and extensive intersection modelling to understand the performance of the future network.

Bendigo GovHub, VIC

Arup was engaged by Development Victoria to provide multidisciplinary services for the Bendigo GovHub development.

As part of this engagement, Lily prepared a traffic impact assessment for the Bendigo GovHub development. This involved assessing existing travel patterns using ABS Census data, traffic conditions surrounding the site (including SIDRA intersection modelling) and review of the loading dock and carpark adequacy, and development of a Sustainable Travel plan for the building's future tenants.

Inkerman Road Safe Cycling Corridor, VIC

Lily providing transport planning and design advice to Glen Eira City Council for the development of a safe cycling corridor plan for Inkerman Road.

Lily analysed various road design scenarios along the proposed cycling corridor as part of a multicriteria assessments for the corridor. She assessed different cycling facilities and how they would operate at intersections, side roads and driveway crossovers. Lily also undertook high level review of modifications to intersection operation and phasing required for different design scenarios.

Melbourne Metro Tunnels & Stations Project, VIC

(Arup / Cross Yarra Partnership)

The Metro Tunnel project consists of twin nine-kilometre rail tunnels from South Kensington to South Yarra and five new underground stations. Arup is part of the Cross Yarra Partnership (CYP) Design Joint Venture (DJV).

As part of her work, Lily was involved in the development of the proposed road design surrounding the station precincts, providing advice with a focus on ensuring road safety and accessibility for all users surrounding the road design for vehicles, cyclists and pedestrians. She was responsible for development of the Traffic Signal Plans for modified and new intersections across the station precincts, requiring coordination with multiple disciplines including road and tram design, lighting design, and signage and linemarking.