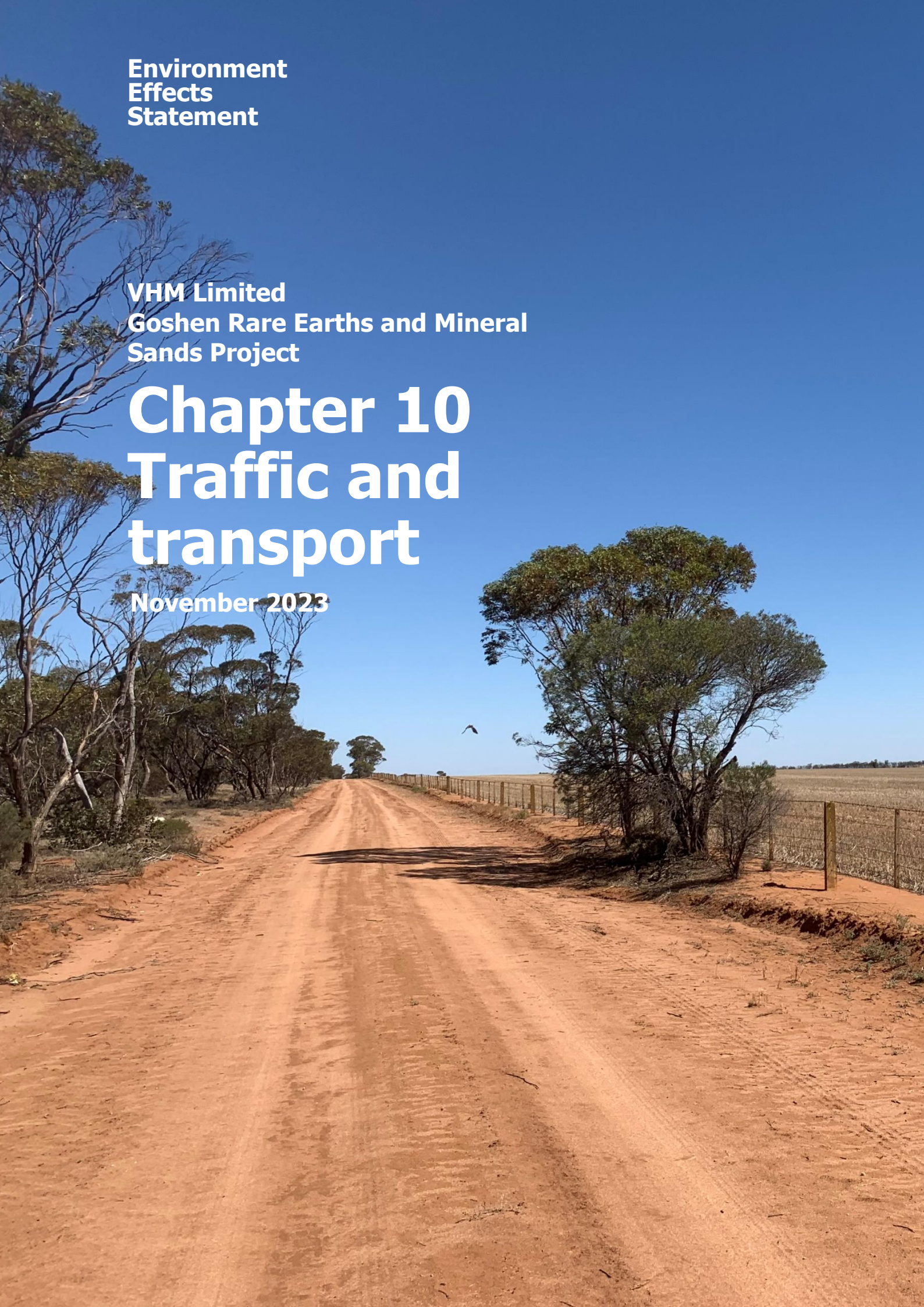
Environment
Effects
Statement

VHM Limited
Goshen Rare Earths and Mineral Sands Project

Chapter 10 Traffic and transport

November 2023



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10. Transport

This chapter provides an assessment of the transport impacts associated with the construction, operation and decommissioning of the Goshen Rare Earths and Mineral Sands Project (the Project).

This chapter summarises the outcomes of Technical Report E: Transport impact assessment prepared in support of the Environment Effects Statement (EES).

Overview

The Project would be located near Lalbert, approximately 35 km south of Swan Hill. The local land use is predominantly agricultural and the area surrounding the Project consists of highways, such as the Murray Valley Highway and Calder Highway, sealed main roads such as Donald-Swan Hill Road and local gravel roads, such as Shepherd Road. Given the rural setting of the Project, existing traffic volumes are low on local roads.

Potential impacts to both public safety and transport infrastructure have been considered. Construction activities would generate additional light and heavy traffic, requiring routes to be assessed for their safety and suitability, upgrades to the local road network and the short- and long-term closure of traffic lanes and roads. It was determined that the additional traffic generated during construction would be well within the existing capacity of the local road network, causing negligible impacts. Donald-Swan Hill Road would have a spare capacity of approximately 88% and the Murray Valley Highway having a spare capacity of 32% during construction of the Project. The traffic routes assessed for light and heavy vehicles during construction would be appropriate, however no roads along the route are over-dimensional approved and as such, approval would be required to operate this vehicle class and additional permits would need to be obtained where heavy vehicles cross infrastructure such as rail lines.

Subject to detailed design and stakeholder input, upgrades have been proposed where Donald-Swan Hill Road intersects Bennett Road and Mystic Park-Meatian Road, as well as at a number of local access roads. Measures including pavement widening and vegetation removal were also recommended at several local intersections following swept path assessment. The proposed upgrades would ensure that these roads and intersections can safely accommodate heavy and light construction vehicles. The implementation of mitigation measures such as ongoing stakeholder engagement, developing and implementing a Traffic Management Plan (TMP) and site access strategy and undertaking heavy transport route assessments would ensure that potential impacts to public safety and transport infrastructure are negligible. In fact, any road and intersection upgrades would make the current road network a safer road environment for all road users when compared to its existing conditions. The implementation of a Stakeholder Engagement Plan and TMP would also ensure potential impacts are minimised during the anticipated road closures at Bennett Road and Thompson Road. These roads would be closed during Project construction and operation, with segments of Bennett Road and Thompson Road proposed to be closed for up to approximately 21 years prior to reinstatement.

Short-term road closures resulting from road upgrade works may have a significant impact on local road users looking to travel east-west between the site and Donald-Swan Hill Road, however impacts can be mitigated by staging upgrades instead of upgrading the roads concurrently. This would maintain road access and east west connectivity with only minor diversions subject to the road management plan.

Similar to the construction phase of the Project, there would be negligible impact to the existing road capacity and public safety during its operation. Traffic routes and upgrades to the local road network would also be similar during operations, however this phase of the Project would need to consider the transport of product between the Project and the Ultima intermodal rail terminal, 47 km from the Project. Any residual impacts associated with operational traffic routes would be limited to minor delays experienced by local road users due to potential lowered speed limits. This would last for the duration of operation. The use of A-double vehicles, anticipated to transport product to the Ultima terminal, would require approval to travel along its proposed route. Necessary upgrades to local access roads would also be undertaken so that they are safe and suitable for A-double transportation. This would be managed through mitigation measures, ensuring any potential impacts to public safety, transport infrastructure and operations are low.

Heavy vehicle usage during both construction and operation of the Project would potentially impact the condition of local roads. By implementing mitigation measures, such as conducting dilapidation surveys and road condition reviews as part of a TMP and having agreements with the relevant road asset owners, it is expected that there would be no damage to the local road network following construction, operation and decommissioning of the Project.

EES evaluation objective

The scoping requirements provided by the Minister for Planning for the project set out the specific environmental matters to be investigated and documented in the project's EES. The scoping requirements inform the extent and scope of the EES technical studies. The following EES evaluation objectives are relevant to the transport impact assessment:

To minimise potential adverse social and land use effects, including on agriculture and transport infrastructure.

The potential for risks to public health and safety and diminished social wellbeing at all stages of the project due to a range of factors including but not limited to: exposure to dust, air pollution, noise, vibration, lighting, radiation, hazardous materials and transport hazards.

Technical Report E: Transport impact assessment was prepared in support of the Project EES. The technical report provides more detailed information on the investigation and impact assessment conducted in response to the EES scoping requirements.

10.1 Methodology

The following approach was adopted for the transport impact assessment:

- Establishment of the existing conditions of the transport network within and surrounding the Project area through:
  - Preliminary desktop studies.
  - Site visit and assessment of the roads within the study area undertaken on Tuesday 12 April and Wednesday 13 April 2022.
  - Review of the local road network, including key infrastructure, sustainable and public transport provisions.
  - Investigation of road safety data, bus routes and designated heavy vehicle routes and website.
  - Analysis of available traffic data sourced from Department of Transport and Planning (DTP). This included assessment and development of the peak traffic volume time periods associated with the project, traffic volume diagrams and road mid-block theoretical capacity analysis.
  - Review of any local infrastructure upgrades.
  - Review of relevant Commonwealth, state and local policies and legislation.
- Consultation with key regulatory stakeholders.
- Review of the proposed project construction and vehicle access strategy.
- Assessment of potential impacts on the transport network and traffic conditions during construction, operation and decommissioning of the Project.
- Development of mitigation measures in response to the transport impact assessment to avoid, minimise and manage potential impacts on the transport network.

10.2 Study area

The study area for the transport impact assessment comprised the transport network within and surrounding the Project area, including all the roads and intersections proposed to be used by light and heavy vehicles. The following elements were also considered:

- Access to the Project sites.
- Access for the construction of the water pipeline.
- Movement of vehicles from the mine site to key local major arterial roads and the Ultima intermodal terminal.

The study area is rural in nature and does not include any densely populated areas.

Figure 10-1 below presents the study area for the transport impact assessment.

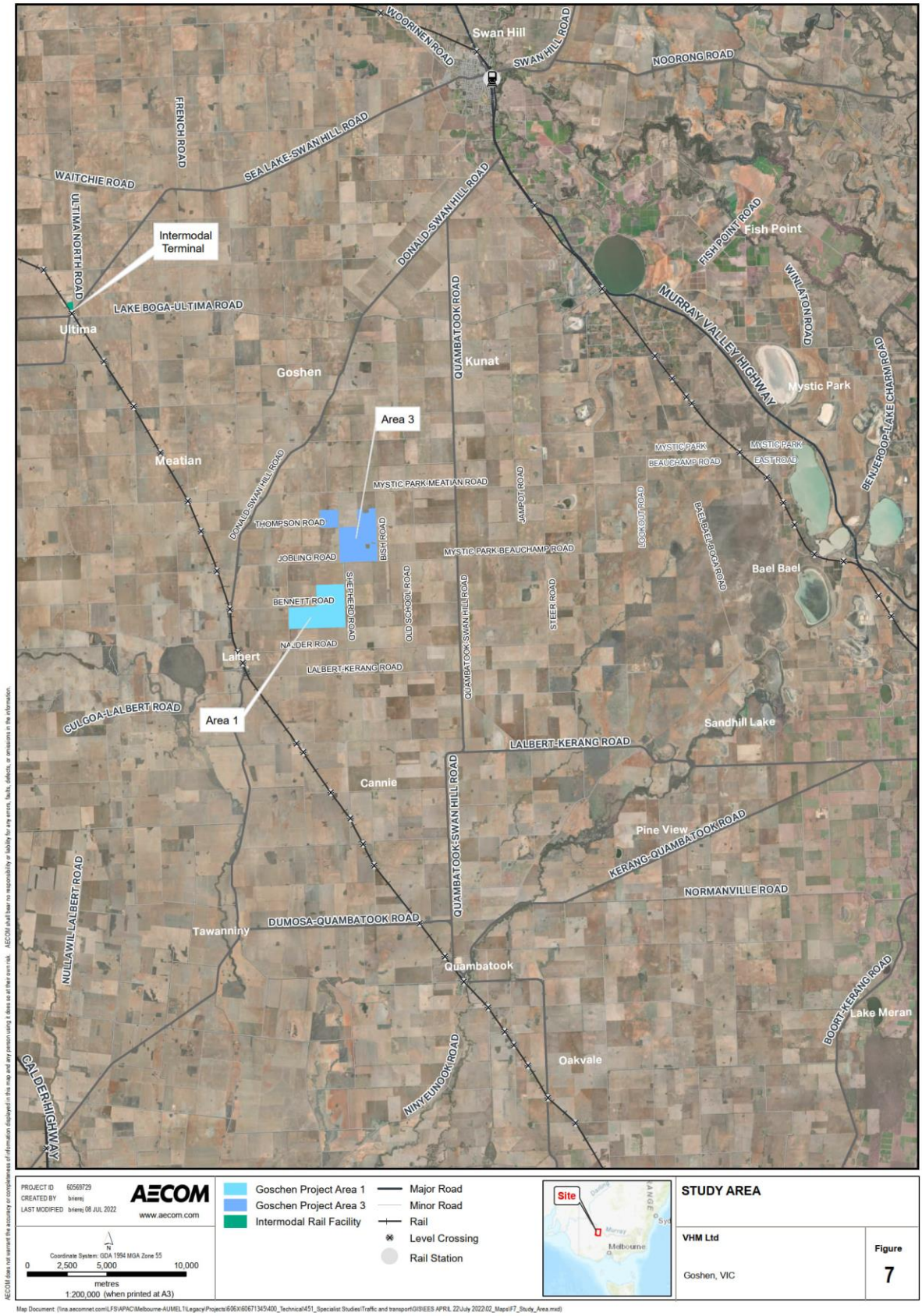

Figure 10-1 Traffic and transport study area

10.3 Existing environment

The assessment of the existing conditions included collection and analysis of traffic data within the study area, a review of the local road network, traffic conditions, existing modes of transport, the rail-freight intermodal terminal at Ultima and a review of crash history within the study area. The existing conditions data is used to inform the assessment of potential transport impacts associated with the construction, operation and decommissioning of the Project.

10.3.1 Local road network

The Project would be located near Lalbert, approximately 35 km south of Swan Hill. The local land use is predominantly agricultural. The study area comprises a number of arterial and local roads managed by the DTP, Gannawarra Shire Council and Swan Hill Rural City Council respectively, with speed limits of up to 100 km/h. The arterial roads, such as the Murray Valley Highway and Donald-Swan Hill Road, are sealed roads with a carriageway width typically greater than 7 metres. Local roads in the study area, such as Bennett Road and Lake Boga-Ultima Road, are unsealed with a carriageway width typically less than 7m. Pedestrian, bicycle and bus facilities are limited, however all of the roads to and from the Project area are B-double approved, or conditionally approved, with the exception of Bish Road and Thompson Road. This means that these roads can be used by certain heavy vehicles without requiring a permit. All of the arterial roads to and from the Project are over size and over mass (OSOM) approved, however only the Murray Valley Highway, Lake Boga-Ultima Road and Calder Highway are conditionally approved for A-Double vehicles, noting that the Murray Valley Highway is conditionally approved. None of the local roads surrounding the Project are OSOM approved, with the exception of Lake Boga-Ultima Road which is also part of the A-Double network.

Roads accessing the pipeline route, including Mystic Park – Beauchamp Road and Mystic Park East Road, are local roads managed by Gannawarra Shire Council. Mystic Park – Beauchamp Road is sealed from Wilson Street to Gorton Drive and Mystic Park East Road is gravel. Both Mystic Park – Beauchamp Road and Mystic Park East Road are only B-double approved.

Several bridges and culverts are present throughout the local road network. Bridges and culverts may present restrictions to the heavy vehicle route as they may restrict access due to height or load restrictions and have been considered in **Section 10.4** and **Section 10.5**. Restricted access vehicles only have gazetted access to certain roads. Non-gazetted routes can still be used under permit (both heavy freight and OSOM vehicles), if consented to by the road manager.

Figure 10-2 below presents the key roads surrounding the Project. Further information is provided in EES Technical Report E: Transport impact assessment.

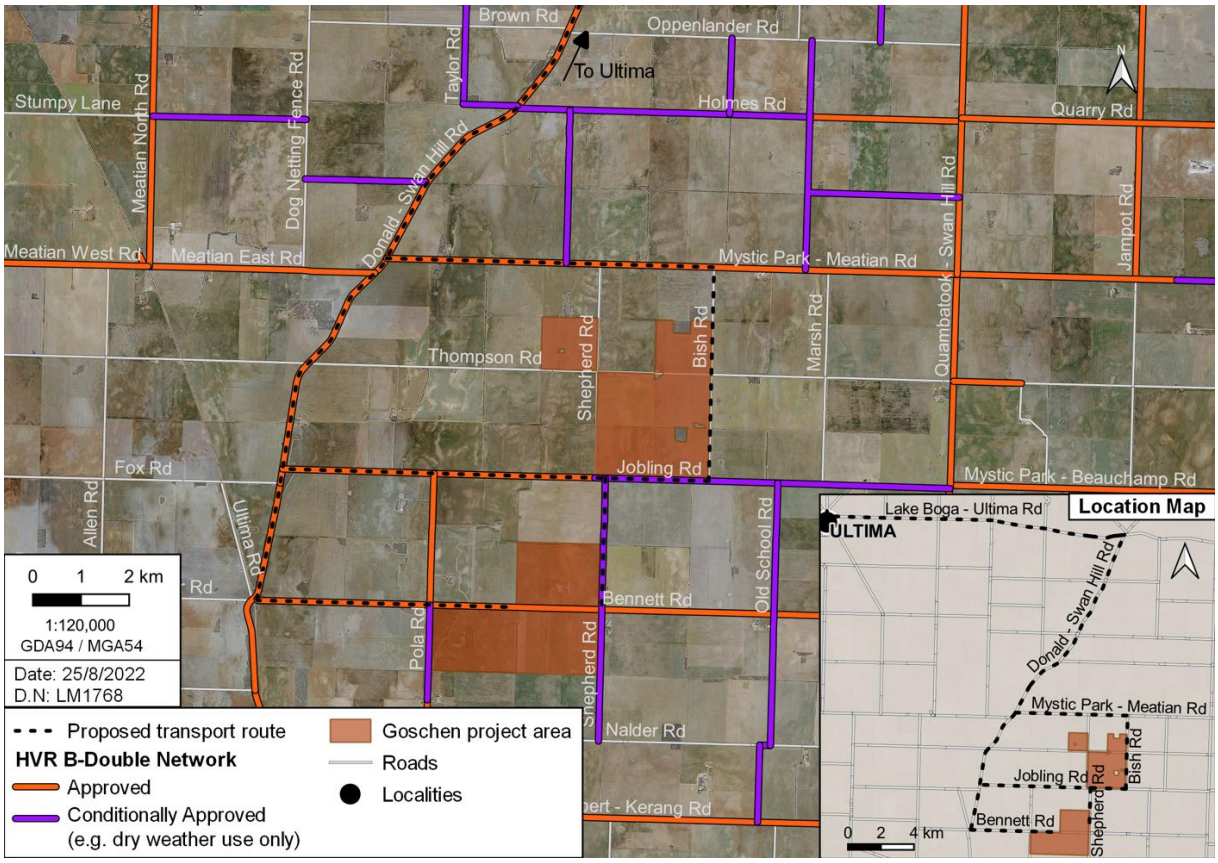

Figure 10-2 Local roads surrounding the Project

Heavy vehicle road networks

A number of heavy vehicles would be used as part of the Project. Heavy vehicles may include B-doubles, A-doubles and four and five axel all terrain mobile cranes. Each heavy vehicle can only travel along specific approved roads within Victoria's road network. B-doubles are classified as Class 2 Combinations, A-doubles are classified as Performance Based Standards (PBS) Combinations and four and five axel all terrain mobile cranes are classified as Class 1 Vehicles. Where conditional approval applies, it means that the relevant vehicles can only cross features like rail crossings and structures, while adhering to specific speed, positioning and pilot requirements. Unless otherwise signed, structures in general can support up to 30m/68.5t vehicles. Bridge assessments may be required to confirm this or where permits may be required to support vehicles greater than 68.5t.

It should be noted that other High Productivity Freight Vehicle (HPFV) combinations have been considered, as they fall under the same PBS approvals. An HPFV is any heavy vehicle combination that exceeds 26m and/or has a gross mass limit of more than 68.5t. Combinations which fall under the same PBS as 30m A-Doubles include Quad-Axle semi-trailers, B-Doubles up to 77.5 tonnes, B-Triples up to 91 tonnes and AB-Triples up to 113.5 tonnes. The B-Double network allows for B-Doubles at General Mass limits (i.e. 62.5t) and generally can be mapped for PBS level 2A and 2B (cubic) vehicles up to 68.5t.

The following key roads in the study area are approved for the transport of B-Double vehicles:

- Donald-Swan Hill Road.
- Bennett Road.
- Jobling Road.
- Mystic Park-Meatian Road.
- Quambatook-Swan Hill Road.
- Kerang-Lalbert Road.
- Pola Road.
- Shepherd Road – conditionally approved.
- Old School Road – conditionally approved.
- Lake Boga-Ultima Road.

The following roads are approved for a 30 metre A-Double vehicle operating at weights between 68.5 tonnes and 85.5 tonnes (or HPFVs up to 113.5t):

- Lake Boga-Ultima Road.
- Murray Valley Highway.
- Calder Highway.

The following roads are approved for four and five axel all terrain mobile cranes, operating at up to 48 and 60 tonnes respectively:

- Donald-Swan Hill Road.
  - Approved from between the Calder Highway and up to its intersection with Holmes Road, meaning such vehicles can travel to and from the Project site from the south.
  - From between its intersection with Holmes Road and continuing onto Lake Boga-Ultima Road, the route is conditionally approved due to the presence of a single span bridge which requires vehicles of this type to slow down to 10km/h and travel with two certified pilots.
- Lake Boga-Ultima Road – conditionally approved.
- Murray Valley Highway – approved.
- Calder Highway – approved.

The level crossings located on Donald-Swan Hill Road and near the Ultima terminal require over dimensional load (ODL) permits from the rail track manager via DTP for vehicles over any of the following 4.9 metres high, 5.0 metres wide, and 26 metres in length.

10.3.2 Traffic conditions

Traffic volume information was obtained from DTP open-source data hub for the declared roads anticipated to be utilised by the Project. **Table 10-1** below summarises the existing road traffic volumes for roads managed by DTP.

Table 10-1 DTP managed roads - road traffic volumes

Road	Location	*AADT one-way traffic volumes - 2020			**Peak period one-way traffic volumes - 2020			Growth rate
		Total AADT	Heavy vehicles AADT	% Heavy vehicles	Total	Light vehicles	Heavy vehicles	
Calder Highway	B/t Donald-Swan Hill Road and Birchip-Whycherproof Road	650	150	28%	104	89	15	650
	B/t Railway Avenue and Donald-Swan Hill Road	750	215	24%	120	99	22	750
Donald-Swan Hill Road	B/t Dumosa-Quambatook Road and Calder Hwy	105	25	23%	17	14	3	105
	B/t Murray Valley Highway and Dumosa-Quambatook Road	155	20	23%	25	23	2	155
Dumosa-Quambatook Road	B/t Donald-Swan Hill Road and Olive Street	60	20	32%	10	8	2	60
	B/t Olive Street and Lindsay Road	350	40	12%	56	52	4	350
Murray Valley Highway	B/t Jaceranda Crescent and Lalbert Road	2,900	470	15%	464	417	47	2,900
	B/t Lalbert Road and McNeill Court	2,500	600	18%	560	500	60	3,500

**note – 2020 data was used as 2019 data was unavailable. Understanding that 2020 volumes may have been influenced by COVID, 2014-2017 volume growth was reviewed and 2020 volumes were deemed to keep to the trend. As such, 2020 volumes are considered accurate.*

***note – AADT – Average annual daily traffic; peak period traffic volumes have been derived as being 16% of the AADT traffic volume, adopted highest percentage as advised from Austroads Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management*

Local Councils have no available traffic count data for local roads in the study area. With consideration to the rural setting, an average annual daily traffic (AADT) volume of 150 vehicles AADT for collector and 25 vehicles AADT for local access roads has been assumed, with 25% of these vehicles assumed to be heavy. A summary of the local roads and adopted traffic volumes is presented in **Table 10-2.**

Table 10-2 Local Council managed roads - road traffic volumes

Road authority	Road	AADT one-way traffic volumes - 2020			Peak period one-way traffic volumes - 2020		
		Total AADT	Heavy vehicles AADT	% Heavy vehicles	Total	Light vehicles	Heavy vehicles
Swan Hill	Mystic Park Meatian Road	25	6	25%	4	3	1
	Lake Boga-Ultima Road	150	25	25%	24	20	4
	David Street	150	25	25%	24	20	4
Gannawarra Shire	Bennett Road	25	6	25%	4	3	1
	Bish Road	25	6	25%	4	3	1
	Jobling Road	25	6	25%	4	3	1
	Shepherd Road	25	6	25%	4	3	1
	Mystic Park-Meatian Road	25	6	25%	4	3	1
	Mystic Park-Beauchamp Road	25	6	25%	4	3	1
	Jampot Road	25	6	25%	4	3	1
	Steer Road	25	6	25%	4	3	1
	Cummock Road	25	6	25%	4	3	1
	Jewson Road	25	6	25%	4	3	1
	Mystic Park East Road	25	6	25%	4	3	1
	Gorton Drive	25	6	25%	4	3	1
	Bael Bael Boga Road	25	6	25%	4	3	1
	Wilson Street	25	6	25%	4	3	1
	Silvester Road	25	6	25%	4	3	1

The maximum flow of vehicles that a road can accommodate can be assessed by its mid-block capacity. A mid-block capacity of a road is determined by counting the number of vehicles crossing an arbitrary line in the road some distance from an intersection.

The Austroads Guide to Traffic Management Part 3: *Traffic Studies and Analysis* outlines the typical mid-block capacities for various types of urban roads with interrupted flow. Interrupted flow is where the movement of traffic is interrupted due to the presence of intersections and crossings and can be used to describe majority of local roads surrounding the project area. This document states that the one-way mid-block capacity of an undivided road would be 900 passenger cars per hour (pc/h), with peak period mid-block traffic volumes increasing to 1200 and 1400 passenger cars per hour per lane (pc/h/ln).

Based on the characteristics of the local road network, a conservative mid-block capacity of 900 pc/h has been adopted for the study area. A review of the local road network mid-block capacities is provided in **Figure 10-3** below. Traffic volumes were taken from **Table 10-1** and **Table 10-2**.

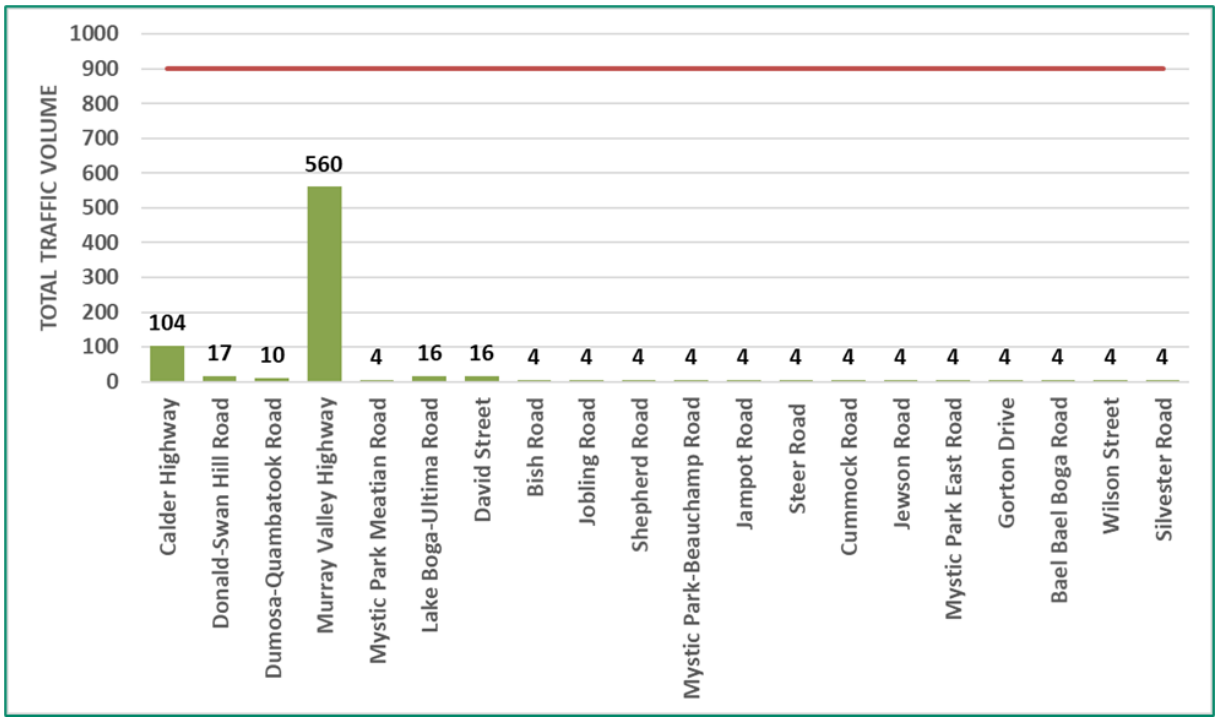

Figure 10-3 Local road network mid-block capacities

This highlights that the local road network has spare capacity to facilitate potential increases in traffic demand from the Project.

10.3.3 Existing suitable modes of transport

Pedestrians and cyclists

Given the rural nature of the area, there is no known dedicated pedestrian or bicycle infrastructure provided along any of the roads in the study area, with the exception of a pedestrian crossing sign in Mystic Park, on Mystic Park E Road.

Bus services

V/Line coach services operate east of the study area via Kerang and Mystic Park as part of the Mildura – Albury route. They currently run approximately one to three times a day on a typical weekday.

Two bus services operate within the study area as follows:

- Quambatook – Kerang bus route. Currently operates along Kerang – Quambatook Road, Dumosa – Quambatook Road and Donald-Swan Hill Road. Buses typically operate on the second, third, fourth and fifth Monday of the month and require prior booking to operate. On those days, buses typically run in one direction only from Quambatook to Kerang, with services at 8:50 am and 9:15 am.
- Wycheproof - Swan Hill via Lalbert bus route. Currently operates along Calder Highway and Donald-Swan Hill Road. Buses typically run twice a day during weekdays in both directions from 9:00 am to 10:15 am and 1:45 pm to 3:00 pm.

There are no identified school buses routes which commence, terminate or intersect either of the proposed work areas. However, there are three school bus routes within 1.5-3 kms of the proposed work area.

- Kunat – Swan Hill school bus route commences/terminates approximately 1 km south of Thompson Rd on the Quambatook-Swan Hill Rd
- Sandhill – Kerang school bus route commences/terminates at 3600 Lalbert-Kerang Road
- Meatian-Lalbert Rd – Swan Hill school bus route travels along Donald-Swan Hill Road, partially on the haulage route.

The buses would generally operate from 7:30 am to 9:00 am and 3:20 pm to 5:00 pm during school term.

There are also three Intertown public transport services that travel partially on the proposed haulage route.

- Quambatook-Kerang intertown service.
- Swan Hill-Sea Lake via Ultima service.
- Wycheproof-Swan Hill via Lalbert.

Rail

Whilst the Melbourne-Swan Hill railway line runs east of the project area, there are no train stations in proximity to the Project.

Swan Hill Railway Station located approximately 30 km northeast of the project location. Four level crossings exist within the study area. Locations and details of level crossings present within the study area are summarised in **Table 10-3**.

Table 10-3 Location of level crossings in the vicinity of the project

Level crossing	Location	Type of protection	Protection equipment
Donald Swan Hill Road	Near intersections with Bennett Road and Ultima Road	Passive	Signage and line markings
Donald Swan Hill Road	Near intersection with Calder Highway	Passive	Signage and line markings
Dumosa Quambatook Road	2 km west of Quambatook-Swan Hill Road	Passive	Signage and line markings
Mystic Park Beauchamp Road	Near intersection with Silvester Road	Active	Barrier arms, flashing lights, signage and line markings

10.3.4 Rail-freight intermodal terminal

The QUBE Ultima intermodal (rail and freight) terminal is in Ultima, approximately 47 km from the Project. The following is noted with regards to the terminal:

- The Ultima terminal opened in 2019 and is used for exporting Victorian Hay to Asia, with the facility removing the need for approximately 4,000 truck trips annually from Victoria roads.
- Rail frequencies are estimated to be two per week.
- The Ultima terminal has approved HPFV access to the site via Swan Hill-Sea Lake Road.

10.4 Construction impact assessment

The construction of the Project may result in a number of transport related impacts which could affect public safety and transport infrastructure. Construction activities would generate additional traffic throughout the various stages of Project. Traffic would usually consist of the construction workforce and the transportation of construction material travelling from metropolitan Melbourne and local towns such as Swan Hill and Kerang. Deterioration of the local road network may also occur as a result of heavy vehicle movements. Construction activities would require road and intersection upgrades to ensure safe and appropriate access to the site, road and traffic lane closures and may impact local public transport, pedestrian and cyclist movements and emergency vehicle access.

10.4.1 Traffic generation and road capacity analysis

Traffic would be generated at all stages during the construction of the Project, but is not expected to exceed the existing safe volume capacities of the local road network. Traffic generated would include light vehicles, for transporting the workforce and heavy vehicles for transporting construction equipment and materials. To estimate traffic generation during construction and assess local road capacity, the following stages of construction have been considered:

Stage 1 - pre works:

- Pre works may include, but are not limited to:
  - Buildings and works, including vegetation removal.
  - Investigating, testing and preparatory works to determine the suitability of land, and property condition surveys.
  - Creation and use of construction access points and working platforms.
  - Site establishment works including temporary site fencing and hoarding, site offices, and hardstand and laydown areas.
  - Construction, protection, modification, removal or relocation of utility services, and associated infrastructure.
  - Establishment of environment and traffic controls, including designation of 'no-go' zones.
  - Establishment of temporary car parking.
  - Demolition to the minimum extent necessary, to enable preparatory works.

Stage 2 – Area 1 construction works:

- Area 1 works would include process plant construction and would take eight to 12 months to complete.

Stage 2 – pipeline construction works:

- The underground water supply pipeline would be constructed between Kangaroo Lake and the Project area, taking approximately 8 to 12 months to complete.

Stage 3 and Stage 4 – Area 3 and Area 3 west construction works:

- Construction works would be minimal compared to works associated with Area 1, since Area 3 would be solely established for mining extraction activities, including a laydown yard and workshop.

The amount of one-way daily trips associated with each construction phase has been estimated as part of the transport impact assessment. Details of these estimates are presented in EES Technical report E: Transport impact assessment. A summary of the one-way traffic estimates is presented in **Table 10-4** below.

Table 10-4 Construction – daily one-way traffic estimates

Work stage	Daily peak one-way trips			Comments
	Light vehicles - workforce	Heavy vehicles	Total vehicles	
Stage 1 – pre works	50	2	52	Minimal movements routinely managed and dependent on-site access strategy.
Stage 2 – Area 1 works	200	39	239	Heavy vehicle estimate based on equal vehicle distribution over construction time at this stage
Stage 2 – Pipeline construction works (Area 1 access)	25	7	32	Assumed 50% of workers and plant associated with pipeline would distribute between the Area 1 access and Pump Station access
Stage 2 – Pipeline construction works (Pump station access)	25	7	32	
Stage 3 – Area 3 works	50	2	52	-
Stage 4 – Area 3 west works	50	2	52	-

Estimates for the worst-case peak hour construction traffic volumes associated with the Project's access points are presented in **Table 10-5** below.

Table 10-5 Construction – daily one-way traffic estimates, worst-case

Work stage	Daily peak one-way trips			Access point
	Workforce arrival light vehicles – AM peak 6am to 7am	Workforce depart light vehicles – PM peak 6pm to 7pm	Heavy vehicles construction midday peak*	
Stage 1 – pre works	50	50	1	Bennett Road
Stage 2 – Area 1 works	200	200	5	
Stage 2 – Pipeline works (Area 1 access)	25	25	1	
Stage 2 – Pipeline works (Pump station access)	25	25	1	Mystic Park East Road
Stage 3 – Area 3 works	50	50	1	Jobling Road
Stage 4 – Area 3 west works	50	50	1	

**construction vehicles assumed to travel to and from between 8am and 4pm, given distances from points of origin, and equally distribute through the day*

The final distribution of construction workforce trips would be verified once a construction contractor has been appointed, however the distribution of workforce light vehicle movements has been estimated based on the location and potential accommodation provisions of the surrounding regional towns. It has been estimated that 80% of light vehicle movements would originate from towns north of the Project (Swan Hill, Lake Boga, Ultima) and that 20% would originate to the south of the Project (Kerang, Quambatook, Boort).

Regarding heavy vehicles, given the location of the Project and links to the wide arterial and highway road network, it is expected that the majority of construction plant trips would originate from Melbourne. Trips from Melbourne would likely travel to the Project via the Calder Highway and via Donald-Swan Hill Road.

Table 10-6 to **Table 10-8** below presents the construction traffic generation:

- Major road mid-block traffic estimated volumes, with 2024 base and construction comparisons.
- The worst-case derived movement of construction traffic volumes at the nominated major site access points.

The year 2024 has been adopted as it is considered the worst-case year for construction traffic. As described in **Section 10.3.2**, mid-block capacities can be used to assess the maximum flow of vehicles that a road can accommodate. The existing, one-way mid-block capacities for the local road network are presented in **Figure 10-3**, **Section 10.3.2**. Construction traffic volume estimates are presented in **Table 10-6** and **Table 10-8**.

Table 10-6 Project traffic AM volume estimated increases

Access point	Minor road	Major road	Major road mid-block		2024 Project intersection volumes	
			2024 two-way	2024 and project two-way	Left in	Right in
Area 1	Bennett road	Donald Swan Hill Road	52	277 (+225)	180 (80% of 225)	45 (20% of 225)
Area 3 / 3 west	Mystic Park Meatian Road	Donald Swan Hill Road	52	102 (+50)	40 (80% of 50)	10 (20% of 50)
Pipeline pump station	Mystic Park E Road	Murray Valley Highway	1,188	1,213 (+25)	5 (20% of 25)	20 (80% of 25)

Table 10-7 Project traffic PM volume estimated increases

Access point	Minor road	Major road	Major road mid-block		2024 Project intersection volumes	
			2024 two-way	2024 and project two-way	Left in	Right in
Area 1	Bennett road	Donald Swan Hill Road	52	277 (+225)	45 (20% of 225)	180 (80% of 225)
Area 3 / 3 west	Mystic Park Meatian Road	Donald Swan Hill Road	52	102 (+50)	10 (20% of 50)	40 (80% of 50)
Pipeline pump station	Mystic Park E Road	Murray Valley Highway	1,188	1,213 (+25)	20 (80% of 25)	5 (20% of 25)

Table 10-8 Project traffic midday volume estimated increases

Access point	Minor road	Major road	Major road mid-block		2024 Project intersection volumes			
			2024 two-way	2024 and project two-way	Left out	Right in	Left in	Right out
Area 1	Bennett road	Donald Swan Hill Road	52	58 (+6)	6	6	0	0
Area 3 / 3 west	Mystic Park Meatian Road	Donald Swan Hill Road	52	54 (+2)	1	1	0	0
Pipeline pump station	Mystic Park E Road	Murray Valley Highway	1,188	1,196 (+8)	0	0	4	4

As highlighted in **Section 10.3.2**, a one-way mid-block capacity of 900 pc/h (1,800 vehicles per hour two-way) was adopted for the study area, with reference to *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis*.

Therefore, traffic impacts associated with road capacity would be considered negligible for traffic generated via major access roads to the Project. **Table 10-6** to **Table 10-8** demonstrates that there would be a spare mid-block capacity of 88% via Donald-Swan Hill Road and 32% via the Murray Valley Highway. As project construction stage traffic impact is predicted to be negligible, the associated impact to public road safety is likely to be minimal.

While traffic generated during the construction of the Project would have negligible impacts to local road capacity and public safety, the following mitigation measures would be implemented to ensure potential impacts are avoided or minimised and that the road capacity can safely accommodate Project traffic. Mitigation measures are presented in **Section 10.8**.

- Develop and implement a Stakeholder Engagement Plan (SEP) to inform the community and other stakeholders of changes in transport conditions such as the increase in traffic expected and likely peak times so traffic can be avoided if desired (MM-TP01).
- Develop and implement a Traffic Management Plan (TMP) to include measures for the management of light and heavy vehicle routes and reduction in trips, where possible (MM-TP02).
- Implement a site access strategy (MM-TP06) to develop the routes workers would use to access each Project site, the method of travel (carpooling, buses etc), accommodation for workers (if any), parking and time of arrivals and departures to reduce traffic volumes on roads and intersections during peak times.

With the implementation of the mitigation measures outlined above, the Project traffic during construction would have negligible impacts to the existing capacity of the road network. The residual impact of Project traffic volumes to the existing road network demonstrates that with respect to road capacity, that there would be a spare mid-block capacity of 88% via Donald-Swan Hill Road and 32% via the Murray Valley Highway.

10.4.2 Construction traffic route assessments

The proposed traffic routes would need to be appropriate and suitable to accommodate the safe movement of vehicles associated with the construction of the Project. The assessment of construction traffic routes considered the wider road network, for transport routes originating from Melbourne, and the local road network, for transport routes from local towns.

As described in **Section 10.3.1**, heavy vehicles can only travel along specific approved roads within Victoria's road network. Most of the initial heavy vehicle traffic associated with the delivery of construction materials and components is expected to arrive from Melbourne. A review of the National Heavy Vehicle Regulator (NHVR) route planner was conducted as part of the transport impact assessment and shows the expected transport routes for heavy vehicles from Melbourne to the Project areas. These are as follows:

- Project Area 1 and Area 3 would be accessed via the Calder Highway (Highway A79) from Melbourne before turning onto Donald Swan-Hill Road (Highway C261) and travelling onwards to Area 1 (via Bennett Road) and Area 3 (via Mystic Park-Meatian Road).
- The water supply pump station construction site would be accessed via the Calder Highway (Highway A79) from between Melbourne to Bridgewater on Loddon, before turning onto Bridgewater-Serpentine Road (Highway C274), Loddon Valley Highway (Highway B260), Bendigo Road, Wellington Street, Murray Valley Highway (Highway B400) and turning off onto Mystic Park E Road.

As noted from Victoria's Gazetted roads, the Calder Highway and Donald Swan-Hill Road are part of the approved B-Double and 4 & 5 axle All Terrain Mobile Crane road network (refer to **Section 10.3.1**). It is likely that over-dimensional vehicles would be required to travel to the site during the Project construction stage. No roads along the route are over-dimensional approved and as such, approval would be required to operate this vehicle class.

While the final distribution of light vehicle, construction workforce trips would be verified once the construction contractor has been appointed, it is considered likely that workers would reside in the local towns and travel to and from the worksite via the following routes.

To Project Area 1 and Area 3:

- Swan Hill, travelling to and from the Project area via Murray Valley Highway, Donald Swan-Hill Road and finally to the Project sites via Bennett Road or Mystic Park-Meatian Road.
- Kerang, travelling to and from the project area via Kerang – Quambatook Road, Lalbert-Kerang Road, Quambatook-Swan Hill Road, Lalbert-Kerang Road, Donald Swan-Hill Road and finally to Area 1 and Area 3 via Bennett Road or Mystic Park-Meatian Road.

To pump station construction work site:

- Swan Hill, travelling to and from site via Murray Valley Highway and turning to the worksite via Mystic Park E Road.
- Kerang, travelling to and from site via Murray Valley Highway and turning to the worksite via Mystic Park E Road.

Workers would likely travel directly to site access points and park at the respective works compound via their instructed transport route. These routes are the most direct which have the lowest impact and considered safe.

Restricted access vehicles that need to travel off the gazetted network require a permit, and vehicles over 26 m, 4.9 m high and 5 m wide require an ODL permit. Where this is deemed necessary, engagement between the proponent, the relevant road authority, and the NHVR would be undertaken to establish any necessary approvals. These approvals would be considered in more detail by the respective transportation contractors in consultation with relevant approval processes (NHVR) and stakeholder co-ordination as part of developed transportation TMPs. Factors that may be considered during these discussions include:

- Vehicle characteristics including (but not limited to) size and mass, security of couplings, distribution of mass, dynamic stability.
- Risk of rollover.
- Visibility to other road users.
- Ability to interact with surrounding traffic.
- Dimensions, accessibility and suitability of road.
- Current road and pavement conditions.
- Horizontal and vertical load limits.

Where OSOM vehicles may not satisfy all of the above conditions, the NHVR may impose road, vehicle or travel conditions, which allows the operation of the relevant heavy vehicle with special conditions that ensures there is no significant safety risk posed to the community or road infrastructure. Examples of conditions may include:

- The vehicle does not use routes with particular bridges or weight-restricted structures.
- The vehicle is limited to a particular speed.
- The vehicle's operator participates in an intelligent access program including the requirement for certain components or equipment to be installed such as on-board mass measurement devices.

To avoid or further minimise potential impacts associated with traffic routes, and to ensure the proposed traffic routes would be appropriate and suitable to accommodate the safe movement of vehicles, the following mitigation measures would be implemented.

- Develop and implement a SEP for agreement and finalisation of final construction vehicle transportation routes (MM-TP01).
- Relevant permits would be obtained from NHVR and DTP for over-dimensional travel and any significant areas of travel that may need to be traversed (e.g. rail lines) (MM-TP06).
- Route assessment for the over-dimensional and heavy vehicles planned to be used during construction would be undertaken (MM-TP06).
- Depending on route reviews, undertake bridge or culvert assessments, as required, based on final transportation routes (MM-TP06).

Anticipated residual impacts would be increased delays experienced by local road users due to lowered speed limits if required by heavy vehicle movements to and from the site. This would last for the duration of construction.

10.4.3 Site access and road section upgrades

Existing local access roads and intersections may not be able to safely accommodate Project traffic, resulting in potential impacts to public safety and the local road network in the form of delays, the potential for an increased likelihood of safety incidents occurring and the deterioration of existing roadways. Upgrades to key local site access roads and intersections would need to be undertaken. The proposed upgrades to access roads and intersections would make the local road network a safer road environment for all users when compared to its existing conditions and therefore any potential impacts are expected to be negligible.

Intersection upgrades

The proposed construction site access strategy would be established in a way that also facilitates the operational phase of the Project to ensure the safe movement of vehicles during all Project phases. Two Project access points have been proposed, as follows:

- Area 1 access point – Bennett Road via the Donald-Swan Hill Road and Bennett Road priority intersection.
- Area 3 access point – Mystic Park-Meatian Road via the Donald-Swan Hill Road and Mystic Park-Meatian Road priority intersection.
- Area 3 alternative access point – Jobling Road via the Donald-Swan Hill Road and Jobling Road priority intersection.

Potential upgrades to local intersections would consider the existing conditions of the intersection, anticipated traffic volumes and safety performance outcomes. Intersection designs should be informed by Victoria's Road Design Note 04-01 (RDN 04-01) to ensure appropriate heavy vehicle access. This is to be used in place of Austroads guide to road design where a higher standard is stipulated. More detail is available in EES Technical report E: Transport impact assessment.

The existing intersection at Donald-Swan Hill Road and Bennett Road is a 'Y' intersection as presented in the below photograph. Bennett Road is a gravel road varying between 5 metres and 6.5 metres in width and would not facilitate two-way heavy traffic movements. Donald-Swan Hill Road has a posted speed limit of 80 km/h, with traffic advisory signs in the vicinity of the Bennett Road intersection due to the road alignment and slowing down of vehicles to cross the nearby railway level crossing tracks. Bennett Road does not have a posted speed limit but is assumed to have a speed limit of 100 km/hr, the default speed limit for open rural roads.

Photograph 10-1 Existing Donald-Swan Hill Road and Bennett Road intersection

With reference to Austroads Guide to Road Design Part 6*: Intersections, Interchanges and Crossings Management* and considering the anticipated volume of traffic during construction (277 vehicles, refer to **Section 10.3.2**) and turning construction and operational stage traffic volumes via Bennett Road (estimated to be worst case 180 vehicles turning left and 45 vehicles turning right in the peak hour during construction), a channelised right (CHR) turning intersection treatment is recommended to facilitate access to the mine site.

The existing intersection at Donald-Swan Hill Road and Mystic Park-Meatian Road is a 'T' intersection as presented in the below photograph. Mystic Park-Meatian Road has a width of approximately 7 metres which can facilitate two-way vehicle movements. Donald-Swan Hill Road has a posted speed limit of 100 km/h. Mystic Park-Meatian Road does not have a posted speed limit but is assumed to have a speed limit of 100 km/hr, the default speed limit for open rural roads.

Photograph 10-2 Existing Donald-Swan Hill Road and Mystic Park-Meatian Road intersection

With reference to Austroads Guide to Road Design Part 6: *Intersections, Interchanges and Crossings Management* and considering the anticipated volume of traffic during construction (102 vehicles, refer to **Section 10.3.2**) and turning construction and operational stage traffic volumes via Mystic Park-Meatian Road (estimated to be worst case 40 vehicles turning right out and 10 vehicles turning left out in the peak hour during construction), a CHR turning intersection treatment is recommended at the Donald-Swan Hill Road and Mystic Park-Meatian Road intersection to facilitate access to the Project.

The existing intersection at Donald-Swan Hill Road and Jobling Road forms a priority 'T' intersection. Jobling Road has a width of approximately 6 – 6.5 metres which cannot facilitate two-way vehicle movements. Sight distances were observed to be adequate, though heavy roadside vegetation was observed which restrict sight distances from Jobling Road. Donald-Swan Hill Road has a posted speed limit of 100 km/h. Jobling Road does not have a posted speed limit but is assumed to have a speed limit of 100 km/hr, the default speed limit for open rural roads.

Photograph 10-3 Donald-Swan Hill Road and Jobling Road 'T' priority intersection – looking eastbound on Jobling Road

An estimated worst case of 180 vehicles turning left and 45 vehicles turning right during construction may be using Jobling Road should it be used as an alternative access road to Bennett Road. Given its current condition, an intersection upgrade would be required, thus the following would be considered:

- Widening the priority intersection to allow safe bidirectional movements notedly at the bellmouth of the intersection.
- Localised vegetation removal to enhance sight lines for vehicles.
- Reduction in the main carriageway speed on Donald-Swan Hill Road from 100 km/h to 80 km/hr at this intersection location given the increased usage.
- Intersection sight distances would need to be considered further as part of the concept design process.
- A road safety audit (RSA) may recommend additional control measures such as early warning signage, side road activation speed (RSAS) and other safety measurements.

The DTP (VicRoads) Heavy Vehicle Network Access Considerations Road Design Note 04-01, July 2019, sets out guidelines to be considered on all new road and road upgrade projects during the design phase along corridors to be utilised by heavy vehicles. The guidelines outline the minimum requirements which should be adopted to ensure the current and future performance of the network for large and heavy vehicles.

The guide states that design and check vehicle swept path analyses must be submitted with design packages to validate the vehicle requirements have been adequately addressed, that is the analysis of the space required for a vehicle to make a turn or manoeuvre at an intersection.

The purpose of the swept path assessment is to determine possible conflicts and constraints for heavy vehicles accessing the proposed site, including likely extents of native vegetation and significant tree removal, impacts to road furniture, utilities and privately-owned property.

It is expected that as site access designs progress and are verified, the associated vehicle swept paths and improvements to permit access would be undertaken for these vehicle types in consultation with the nominated transport contractor. Improvements to facilitate access for these vehicle types at a site access point level are likely to involve temporary pavement widening to safely accommodate their respective traffic movements.

Temporary pavement refers to a pavement widening constructed to a lower standard than the adjacent carriageway pavement (typically unsealed crushed rock) and used for OSOM and OD vehicles to complete turning movements.

Following swept path assessment considering design vehicles with a 500 mm body clearance, the following intersections were identified as potentially requiring upgrades.

Table 10-9 Local site access point design vehicle swept path assessment findings

Access Point	Access road intersection	Access intersection assessment		
		Movement(s)	Issue(s)	Potential mitigation measure(s) and impacts
1	Bennett Road and Donald-Swan Hill Road	A-Double left-in / right-out	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders and opposite traffic lane	Intersection to be upgraded to T-intersection and include pavement widening and upgrade Remove vegetation within swept path
2	Bennett Road and Donald-Swan Hill Road	A-Double right-in / left-out	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders and opposite traffic lane Roadside vegetation present	Intersection to be upgraded to T-intersection and include pavement widening and upgrade Remove vegetation within swept path
3	Mystic Park Meatian Road and Donald-Swan Hill Road	B-Double – all movements	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle turning radius Roadside vegetation present	Remove vegetation within swept path Pavement widening to be constructed
4	Thompson Road and Bish Road	B-Double - all movements	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders Roadside vegetation present	Remove vegetation within swept path. Pavement widening to be constructed
5	Bish Road and Jobling Road	B-Double – all movements	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders Roadside vegetation present	Remove vegetation within swept path. Pavement widening to be constructed
6	Mystic Park Meatian Road and Bish Road	B-Double – all movements	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders Roadside vegetation present	Remove vegetation within swept path. Pavement widening to be constructed
7	Donald-Swan Hill Road and Jobling Road	B-Double – all movements	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle movements and turning radius at the intersection Turning movements require vehicle to encroach onto road shoulders Roadside vegetation present	Remove vegetation within swept path. Pavement widening to be constructed

Vehicle use of the access points during construction would result in an increase in slowing and turning vehicles along the public road network at these locations. This change in traffic conditions may result in an increased risk of vehicle collisions. As such, construction access point requirements would be investigated and confirmed to ensure that each of the access point intersections provide safe access and egress for construction vehicles as part of a site access strategy (MM-TP05).

The site access strategy (MM-TP05) would also consider OSOM and OD movements, which will likely be required during construction and pre-operation phases of the project (mining fleet deliveries).

During construction, traffic management measures would be considered in the vicinity of the proposed site access points and routes, particularly during the construction peak. Traffic mitigation measures anticipated to be required include temporary speed limits, advanced warning signage or line marking and would be developed and managed as part of the TMP (MM-TP02).

It is expected that these measures would be developed during TMP development, in consultation with key stakeholders and to the satisfaction of the responsible road management authority.

Heavy vehicle transport route assessments (MM-TP06) would be carried out to assess route options and consider safety, alignment, cross section, pavement design of these roads to confirm final route options and provide all the necessary mitigation measures to ensure that construction heavy vehicle movements can be safely accommodated on the road network including at intersections.

Access road upgrades

In addition to intersections, local access roads may also need to be upgraded to facilitate vehicles movements during construction and subsequent operation.

Table 10-10 below presents the key local access roads proposed to be used by the Project during construction and subsequently operation, and the potential upgrade requirements for the safe movement of vehicles to and from the Project.

Table 10-10 Identified local access road upgrades

Access Road Ref	Access road		Road condition		Road width		Potential upgrade impacts and requirements
	Name	Length *	Existing	Proposed	Existing	Proposed	
1 – Area 1	Bennett Road	6.3km	Gravel	Sealed	5 – 6.5m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Sealed road surface Localised shoulder widening and shoulder sealing in the vicinity of the intersection with local roads including Donald Swan Hill Road to provide a wider turning lane Vegetation trimming or removal to the minimum extent necessary
2 – Area 3	Mystic Park-Meatian Road	6.8km	Gravel	Sealed	5 – 7m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised road widening to allow for bidirectional heavy vehicle movements Localised shoulder widening and shoulder sealing in the vicinity of the intersection with local roads to provide a wider turning lane Vegetation trimming or removal to the minimum extent necessary

Access Road Ref	Access road		Road condition		Road width		Potential upgrade impacts and requirements
	Name	Length *	Existing	Proposed	Existing	Proposed	
3 - Area 3	Bish Road	4.5km	Gravel / Dirt	Sealed	4 – 5m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised road widening to allow for bidirectional heavy vehicle movements Localised shoulder widening in the vicinity of the intersection with local roads to provide a wider turning lane Vegetation trimming or removal to the minimum extent necessary
4 - Area 3	Jobling Road	1.3km – 9km^	Gravel / Dirt	Sealed	5 – 6m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised road widening to allow for bidirectional heavy vehicle movements Localised shoulder widening in the vicinity of the intersection with local roads to provide a wider turning lane Vegetation trimming or removal to the minimum extent necessary
6 – Area 1	Shepherd Road	2.8km	Gravel / Dirt	Sealed	5 – 5.5m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Vegetation removal, mostly shrubs and small trees Localised road widening to allow for bidirectional heavy vehicle movements Localised shoulder widening in the vicinity of the intersection with local roads to provide a wider turning lane One culverts present along length of road

The proposed local intersection and road section upgrades would need to be developed further during the detailed design phase of the Project, considering contractor and stakeholder input and in consultation with the road authority. A review of roadside furniture and features would be undertaken to confirm the presence of culverts, signs and vegetation which may be impacted by road and intersection upgrades.

In order to minimise and avoid the potential impacts of construction vehicle access on public safety, transport infrastructure and operations, and to ensure that the proposed access locations don't exacerbate or create new road safety issues, the following mitigation measures would be implemented.

- Ongoing stakeholder consultation (MM-TP01) to obtain stakeholder input on transport management and to give the community and other stakeholders adequate notice of any anticipated changes to transport conditions associated with works.
- Develop and implement a TMP (MM-TP02) to enact measures such as temporary speed reductions, potential large vehicle delivery time restrictions and additional signage may be required to provide safe access and egress to and from the proposed construction access points.
- Conduct road safety audits (RSAs) (MM-TP03) at:
  - All access points onto both minor and major roads
  - Access roads to be used and their intersections with the public road network to confirm upgrade requirements.
- Develop a site access strategy (MM-TP05) to ensure that each of the access points provides safe access and egress for construction and subsequent operational stage vehicles.
- Heavy vehicle transport route assessments (MM-TP06) would be carried out to assess and confirm final routes and provide the necessary mitigation measures to ensure that construction heavy vehicle movements can be safely accommodated on the road network including at intersections.

With the implementation of the mitigation measures, the impact of construction vehicle access on public safety, transport infrastructure and operations is expected to be negligible, with delays only experienced during the upgrade of roads themselves which would be appropriately managed through a project works TMP. The intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to the existing conditions.

10.4.4 Proposed road section upgrades and closures

There would be short term road closures associated with local and wider intersection and road section upgrades, and long-term closures associated with the construction and operation of the Project. Temporary and extended road closures have the potential to impact the local transport network through increases delays, however impacts are expected to be minimised through the implementation of mitigation measures.

If road upgrade works are to be conducted at the same time, this may have a significant impact on local road users looking to travel east-west to access Donald-Swan Hill Road. This includes users looking to travel on the following roads:

- Mystic Park-Meatian Road (Between Bish Road and Donald-Swan Hill Road).
- Shepherd Road (Between Bennett Road and Jobling Road).
- Jobling Road (Between Bish Road and Donald-Swan Hill Road).
- Bish Road (Between Mystic Park-Meatian Road and Jobling Road).
- Bennett Road (Between Shepherd Road and Donald-Swan Hill Road).

During road upgrade works and associated temporary road closures, local road users attempting to travel to and from these roads and Donald-Swan Hill Road will experience diversions, reduced speeds or limited access, depending on the type of works at the time. This impact requires mitigation by staging upgrades instead of upgrading the roads concurrently. This would maintain road access and east west connectivity with only minor diversions subject to the road management plan.

A summary of the proposed long-term road closures is presented in **Table 10-11** below.

Table 10-11 Anticipated construction road closures

Works stage	Roads to be closed	Indicative time periods of road closure	
		Closure	Reinstatement
Stage 1 – pre-works	Bennett Road	2024	Between 2031 – 2044 pending on settlement timeframes
Stage 3 – Area 3 works	Thompson Road	Approx. 2031	Post 2044 pending on settlement timeframes

The proposed Bennett Road and Thompson Road closure extents are shown in **Figure 10-4**, along with the Gazetted Victoria local B-Double approved and conditionally approved roads.

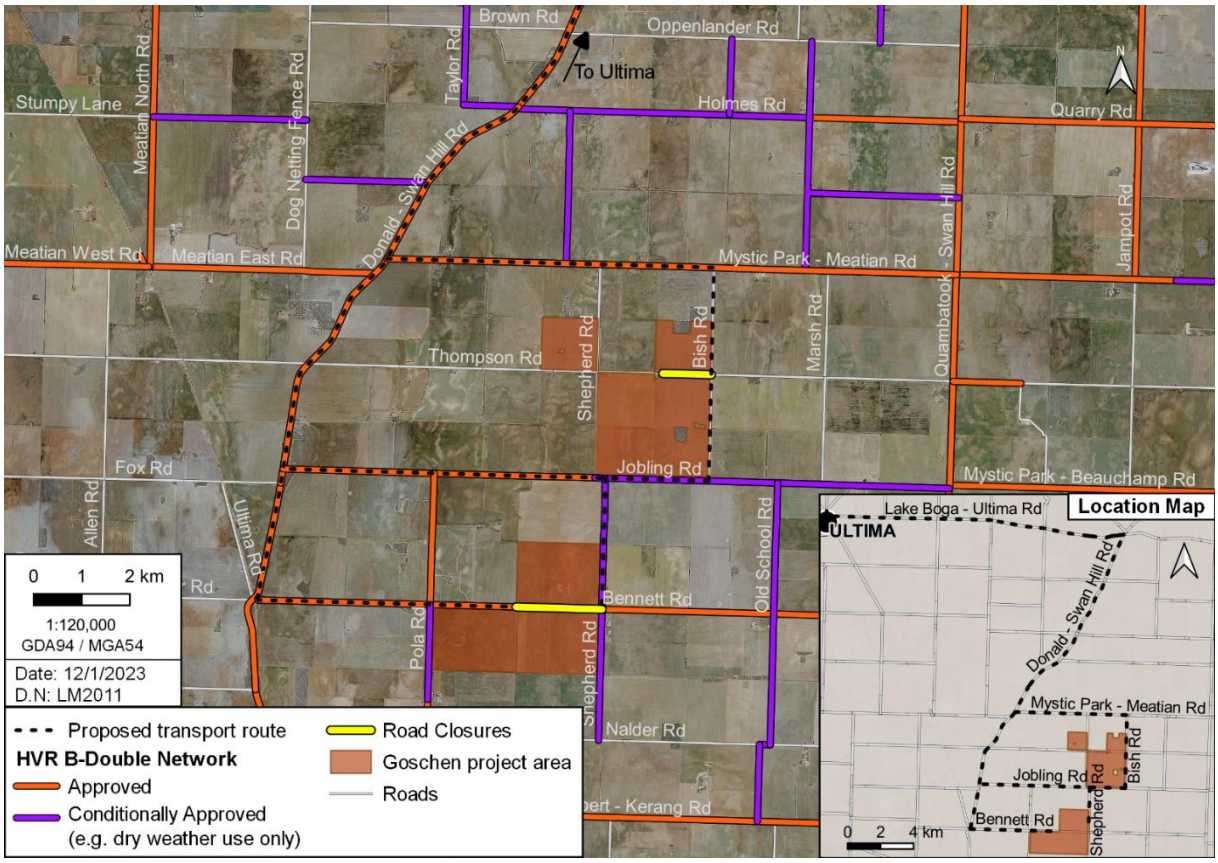

Figure 10-4 Proposed Project Road Closures and Victoria's Gazetted B-double road network

The proposed placement of the pipeline under the road reserve between Mystic Park E Road and the Project area would also require short term partial road closures. During road works and associated temporary road closures, local road users attempting to travel to and from these roads and the Murray Valley Highway may experience diversions, reduced speeds or limited access, depending on the type of works at the time. The exact roads which will require road closures include:

- Mystic Park E Road
- Mystic Park-Beauchamp Road
- Lookout Road
- Teagues Road
- Jobling Road
- Shepherd Road

As the placing of the pipeline will be staged, the impact of closure can be easily mitigated operationally by staging upgrades instead of upgrading the roads concurrently. This will maintain road access and east west connectivity with only minor diversions subject to the road management plan.

The final road and traffic lane closure strategy would be verified following further stakeholder discussions and design stages and would be outlined in the Project TMP (MM-TP02), with the following also considered:

- Specific traffic detours and associated traffic management requirements would be investigated and outlined.
- Where local access roads are affected, access to nearby properties and to permit emergency vehicle access will need to be considered and catered for.

Short- and long-term road closures would impact the accessibility and connectivity of local road users. Diversions and connectivity would be maintained through the design and delivery of a TMP. It is recommended that temporary closures to facilitate road upgrades are staged to minimise impacts on the wider network and the length of diversion routes. The following additional mitigation measures would minimise the potential impacts from road and traffic lane closures:

- The SEP (MM-TP01) would include road and lane closures notification to impacted residents and emergency services where vehicular passage may not be available or be limited. The SEP would include a details analysis

of specific landowners significantly affected by temporary and permanent road closures, with targeted engagement sessions conducted.
- A TMP (MM-TP02) would be developed in consultation with key stakeholders for temporary or partial closure of roads and/or traffic lanes to maintain existing connectivity for local access, pedestrians and cyclists in accordance with relevant road design standards and in consultation with landholders and any other relevant third parties. Road upgrade methodologies would consider maintaining one-lane controlled access for all vehicles during works if feasible.

Following the implementation of mitigation measures, residual impacts would involve localised and short travel time increases resulting from short- and long-term road closures in the vicinity of the Project area. This may result in increased travel time depending on the direction of travel and destination of the vehicle. These increased travel times would apply while diversions would be in place due to the closure of Bennet Road and Thompson Road. However, the intersection and road condition improvements would make the current road network a safer road environment when compared to its existing conditions.

10.4.5 Amenity impacts arising from the road network

Vehicle movements during construction works may generate dust deposition on roads and other surfaces. Dust and debris accumulating on surfaces may be considered a nuisance, could impact the quality of the road network and create public safety hazards.

Measures to manage dust and sedimentation impacts would be included in the TMP (MM-TP02), and sub-contractor TMP's (MM-TP07). These may include keeping vehicles to defined haul roads, minimising vehicle movements on exposed surfaces, road watering, using wheel washing facilities and enforcing vehicle speed limits.

Increased traffic during construction may also result in noise impacts on surrounding receptors. These effects could be mitigated by largely restricting construction activities to normal working hours, being 0700 to 1800 hours Monday to Friday and 0700 to 1300 hours on Saturday to minimise disruption at any nearby residences. Construction would only occur outside normal working hours where unavoidable or required by the Project (notably as the Project nears the testing and subsequent commissioning phase, following which 24/7 mining operations would take place).

Measures to manage potential noise impacts include restricting vehicle movements to and from the site during normal working hours where practicable to avoid disturbance outside of standard construction hours, and no construction vehicles would be left idle with the engine running.

The TMP (MM-TP02) would include the development of dust and debris management strategies and will include dust suppression methods such as covering vehicle loads, watering and street sweeping if deemed necessary. With the implementation of mitigation measures, the potential impact on public safety and the road network is expected to be low as dust and debris would be prevented and removed when required.

Further information on noise and air quality is presented in EES Technical report F: Noise impact assessment and EES Technical report G: Air quality impact assessment.

10.4.6 Impacts on public transport

School buses operate in the local area, notably along Calder Highway and Donald-Swan Hill Road (refer to **Section 10.3.3**), in proximity to the Project site.

Any construction or over-dimensional vehicle movements associated with the Project would either not occur during periods when public or school buses are operating, or suitable mitigation measures would be implemented to reduce potential impacts if conflicts are unable to be managed.

Ongoing consultation with relevant stakeholders would be undertaken to manage potential impacts on buses during construction. A SEP (MM-TP01) would be developed and implemented and would include consultation with local councils and bus operators during the development of the TMP. The development and implementation of a TMP (MM-TP02) would include traffic management measures to manage construction traffic movements and any implications on public transport.

With the implementation of mitigation measures, the potential impact to public transport and safety would be insignificant. Bus operators would be informed of the works and usage of roads in the area minimising potential conflicts.

10.4.7 Impacts on pedestrians and cyclists

As the Project would be located within a rural road network, there are no dedicated pedestrian or bicycle facilities located in the vicinity of the project area (refer to **Section 10.3.3**). Nevertheless, there could be ad-hoc movements of pedestrians through local land use areas and recreational cyclists using roads on the local / wider road networks used by construction and subsequent operational traffic. The construction works and mitigation must consider the safety of cyclists and pedestrians when travelling and operating on roads in the study area.

The following mitigation measures would be implemented to avoid and minimise potential impacts. A SEP (MM-TP01) would be developed and implemented to inform the local community and road users of the changes in transport conditions including details of any proposed road and traffic lane closures. A TMP (MM-TP02) would include appropriate traffic management measures to ensure safe pedestrian (including school children in vicinity of school bus stops) and cyclist passage on nominated routes during construction (and if deemed required operation stage), in accordance with relevant road design standards and in consultation with relevant road authorities.

With the implementation of the mitigation measures, it is anticipated that there would be no safety and connectivity impacts to pedestrians and cyclists.

10.4.8 Emergency vehicle access

Availability and access of emergency services can be a key issue for regional communities. At this stage, two local access roads are proposed to be closed with local access conditions to be altered for an extended period (refer to **Section 10.4.4**).

Emergency vehicle access protocols would need to be developed in consultation with emergency services stakeholders, with unrestricted access to always be maintained where possible, especially given the remote location of the project area, and potential on site hazards. The arrangements to maintain emergency vehicle access would be outlined in the TMP, as part of an Emergency Management Plan which would be developed for the Project encompassing emergency response and evacuation procedures for project work sites.

Mitigation measures to avoid or minimise potential impacts include the development and implementation of a SEP (MM-TP01) to inform stakeholders, including emergency services of changes in transport conditions, in particular the proposed road or traffic lane closures. A TMP (MM-TP02) would be developed and implemented and would include appropriate traffic management measures, in accordance with relevant road design standards, including proposed measures to maintain emergency services access in areas where roads are temporarily or permanently closed. A road safety audit (MM-TP03) would be undertaken and include consideration of emergency vehicle access and whether or not road surface upgrades would be required and an Emergency Management Plan (MM-TP04) would outline emergency response and evacuation procedures for Project work sites and local residents.

The implementation of mitigation measures would reduce any potential impacts and ensure that the road network can service emergency vehicles during construction of the Project.

10.4.9 Road condition and maintenance

Heavy vehicles, machinery and equipment movements are anticipated to occur on several local and declared roads during the construction of the Project. These roads may experience deterioration in the quality of their surfaces due to the vehicle movements.

Road conditions would be managed throughout construction works and the responsibility of each stakeholder throughout the process would be clearly identified. It is proposed to upgrade local access intersections and road sections, where agreed, in the first instance to reduce the need and frequency of local road upgrades (refer to **Section 10.4.3**).

The following mitigation measures would be implemented to avoid or minimise potential impacts:

- Pre-construction road conditions would be in a suitable state to access and perform construction activities. TMP dilapidation surveys would be undertaken to provide a baseline which informs triggers for the upgrade or remediation of road assets (MM-TP02).
- Both public and private access roads would be in a suitable condition to transport Project components and materials to the Project in a safe manner (MM-TP02).

- Agreements with road asset owners on the following would be in place (MM-TP01):
  - Agreeing extent and form of dilapidation surveys to be undertaken prior to works commencing, either by way of photographic or more detailed survey vehicle techniques. This would provide a fair and accurate baseline of pavement conditions at the commencement of construction.
  - Implement a road maintenance methodology, which would typically involve a drive-over inspection at a minimum frequency of one inspection per month. The checking procedures would need to be agreed with, along with the intervention criteria, treatments and response timeframes based on the pavement distress type identified (e.g. potholes, surface treatment, cleaning etc.).
  - Post construction review and identification and hand-back protocols would need to be agreed and documented.
- If impacts occur during the construction period, rectification would be implemented by the responsible party.

It is proposed with regard to road condition and maintenance, the mitigation measures outlined in MM-TP01 – Stakeholder consultation, MM-TP02 – Traffic Management Plan and MM-TP07 – Sub-TMPs, be undertaken.

Implementation of these measures during construction would reduce potential impacts on transport infrastructure and operations. Any road damage that may occur would be identified and rectified early through stakeholder communication and no remaining damage to the road network would exist after the construction of the Project.

10.5 Operation impact assessment

The operation of the Project has the potential to impact public safety, transport infrastructure and operations. Transportation routes and upgrades to local intersections and road sections from the construction phase of the Project would be similar during the operational phase, however operation of the Project would need to consider the transport of product to the Ultima intermodal rail terminal. Additionally, operation activities would generate traffic which may exceed existing road capacities, require road and traffic lane closures and may result in the deterioration of the existing road condition.

10.5.1 Traffic generation and road capacity analysis

For the operation of the Project, there would be vehicle movements associated with the mobilisation and demobilisation of the mining fleet, fuel and maintenance deliveries and the mining workforce. There is the potential that the additional traffic generated may exceed the existing safe volume capacities of the local road network.

The mining contractor would use road licenced heavy transport vehicles with oversize load permits to mobilise and demobilise the mining fleet. Large mobile cranes would be required to assemble and disassemble the mining fleet into modules to comply with oversize load permit regulations. The off-road mining fleet, water trucks and service vehicles are expected to require approximately 60 oversize loads, plus three mobile cranes for assembly and disassembly, as well as a small number of support service vehicles.

During mining operations, the major supply services would be fuel and maintenance consumables. Fuel requirements for the mining operation would be approximately 6.8 mega litres of diesel per annum and would be delivered to site and transferred to 3 x 55kL double bunded tanks at the contractor's on-site maintenance and fuel storage facility. Fuel delivery vehicles would typically be extended (20m) B-double fuel tankers, with capacity of 61,000 L. This would require a fuel delivery approximately every 2 to 3 days. It is estimated that the delivery of spares and lubricants, waste removal, specialist technical support, service callouts and ad-hoc requirements would require approximately 10 truck movements and 12 light vehicle movements per week (each way).

Personnel during mining activities would likely be based on a three-panel roster for trades and operator personnel, plus back-up for other staff roles and would be a continuous 365 days per year operation. Mining administration, operations and support staff would be sourced from the local community. At this stage, it is planned that staff will be bused to their workplace.

Further detail on the calculated traffic volumes during operation of the Project is found in EES Technical report E: Transport impact assessment. The final distribution of operational workforce trips would be verified once the mining contractor has been appointed. It has been assumed that Area 1 would be operational for years 1-10 before operations would switch to Area 3 for the remaining years 11-25. The distribution of workforce light vehicle movements was estimated based on the location and potential accommodation provisions of the surrounding regional towns, similar to **Section 10.4.1**. 80% of workers have been assumed to travel from north of the Project (Swan Hill, Lake Boga, Ultima) and the remaining 20% have been assumed to travel from south of the Project (Kerang, Quambatook, Boort).

Regarding heavy traffic distribution, product would be delivered from Area 1 to the Ultima intermodal rail terminal. At present, no wider road-based transportation of product is proposed. Movements related to product haulage are expected to occur over a 12 hour shift period. These movements are expected to occur outside of workforce peak hour periods.

General consumable and other deliveries would be expected to originate from Melbourne and are assumed to be occurring during the daytime. The deliveries are assumed to be equally distributed over a 12 hour period with 75% of truck movements assumed to be going to Area 1 and the remaining 25% to Area 3 where operations would take place in 2044. Similarly, these movements would be expected to occur outside of workforce peak hour periods.

With consideration to the estimated vehicle movements during operation of the Project, it was calculated that there would be a maximum two-way AM and PM peak volume of 130 vehicles per hour. Midday peak volumes would be 82 vehicles per hour. This includes 2044 projected traffic volumes, assumed to be representative of 'worst-case' conditions. Further detail is provided in EES Technical report E: transport impact assessment.

As such, the predicted operational traffic volumes are significantly less than the adopted mid-block capacity of 900 vehicles per hour (1,800 vehicles per hour two-way) for Donald Swan-Hill Road and the Murray Valley Highway (refer to **Section 10.3.2**). It is estimated that these major access roads would have a spare mid-block capacity of 85%. Therefore, impacts associated with traffic generation during mining operations are considered negligible.

While traffic generated during the operation of the Project would have negligible impacts to local road capacity and public safety, the following mitigation measures would be implemented to ensure potential impacts are avoided and minimised. Mitigation measures are presented in **Section 10.8**.

- Develop and implement a SEP to inform the community and other stakeholders of changes in transport conditions such as the increase in traffic expected and likely peak times so traffic can be avoided if desired (MM-TP01).
- Develop and implement an operations TMP to include measures for the management of light and heavy vehicle routes associated with the Project, including appropriate control measures to plan for any unexpected operational issues (MM-TP02).
- Implement a site access strategy (MM-TP05) to develop the routes workers would use to access each project site, the method of travel (carpooling, buses etc), accommodation for workers (if any), parking and time of arrivals and departures to reduce traffic volumes on roads and intersections during peak times. The strategy would verify the final operational phase traffic types and volumes required for the Project.

With the implementation of the mitigation measures outlined above, the Project traffic during operations would have negligible impacts the existing capacity of the road network. The residual impact of Project traffic volumes to the existing road network users is expected to include minor to negligible delays experienced by local road users during the operation period.

10.5.2 Preliminary operational phase traffic route assessment

A high level desktop analysis was undertaken of the transport routes to Project access points during operation. It is considered that the initial transportation routes identified as part of the construction impact assessment (**Section 10.4.2**) would be similar to transport routes during operation of the Project, with the exception of the delivery of product from Area 1 to the Ultima intermodal rail terminal.

Product is be expected to be transported via a 30+m A-double vehicle between Area 1 and the Ultima terminal. Bennett Road, Donald-Swan Hill Road, Lake-Boga-Ultima Road, David Street, Sea Leak-Swan Hill Road and Ultima North Road would be utilised. Of these roads, only Lake Boga-Ultima Road is approved for the transportation of A-double vehicles (refer to **Section 10.3.1**).

As such, approvals and road improvement infrastructure works would be required for A-double transportation of the route, as follows:

- Approval required from Gannawarra Shire Council for transportation along Bennett Road and associated access intersections.
- Approval required from Swan Hill Rural City Council for transportation along David Street and Sea Lake-Swan Hill Road, including any associated intersections.
- Approval required from DTP for transportation along Donald-Swan Hill Road and associated intersections.

Engagement between the proponent, the relevant road authority, and the NHVR would be undertaken to establish any necessary approvals. Factors that may be considered during these discussions include:

- Vehicle characteristics including (but not limited to) size and mass, security of couplings, distribution of mass, dynamic stability.
- Risk of rollover.
- Visibility to other road users.
- Ability to interact with surrounding traffic.
- Dimensions, accessibility and suitability of road.
- Current road and pavement conditions.
- Horizontal and vertical load limits.

Where A-double vehicles may not satisfy all of the above conditions, the NHVR may impose road, vehicle or travel conditions, which allows the operation of the relevant heavy vehicle with special conditions that ensures there is no significant safety risk posed to the community or road infrastructure. Examples of conditions may include:

- The vehicle does not use routes with particular bridges or weight-restricted structures.
- The vehicle is limited to a particular speed.
- The vehicle's operator participates in an intelligent access program including the requirement for certain components or equipment to be installed such as on-board mass measurement devices.

The following mitigation measures would be implemented to avoid and minimise potential impacts associated with traffic routes during operation of the Project:

- Development of a SEP (MM-TP01) for agreement and finalisation of final operation vehicle transportation routes.
- Obtain relevant permits from NHVR and DTP for travel and for any significant areas of travel that may need to be traversed to be acquired at the appropriate time after project approval prior to construction commencement (MM-TP01).
- Undertake route assessment for the heavy vehicles (MM-TP06) planned to be used during Project operation.
- Depending on the route reviews, associated bridge or culvert assessments may also be required based on final transportation routes to ensure that Project traffic would not have adverse impacts on any existing bridges or culverts (MM-TP06).

Implementation of these measures during the operational phase would reduce residual impacts on public safety and transport infrastructure and operations. Anticipated residual impacts could be minor delays experienced by local road users due to potential lowered speed limits if required by heavy vehicle movements to and from the site. This would last for the duration of operation.

10.5.3 Preliminary intersection and road section upgrades

The assessment of local access intersections at Donald-Swan Hill Road and Bennett Road and Donald-Swan Hill Road and Mystic Park-Meatian Road was undertaken in **Section 10.4.3**. As detailed in **Section 10.4.3**, the assessment also considered the operational phase of the Project. **Section 10.4.3** however, did not consider the delivery of product from Area 1 to the Ultima intermodal rail terminal during operation of the Project. The following transport route has been considered for transport to the Ultima terminal:

- Transport route intersection point 1 – Donald-Swan Hill Road and Bennett Road priority intersection – worst case 36.2 metre A-Double vehicle for all movements.
- Transport route intersection point 2 – Donald-Swan Hill Road and Lake-Boga-Ultima Road priority intersection – worst case 36.2 metre A-Double vehicle for all movements.
- Transport route intersection point 3 – Lake-Boga-Ultima Road and David Street priority intersection – worst case 36.2 metre A-Double vehicle for all movements.
- Transport route intersection point 3 – Sea Lake-Swan Hill Road, David Street and Ultima North Road priority intersection – worst case 36.2 metre A-Double vehicle for all movements.

Following swept path assessment considering design vehicles with a 500 mm body clearance, the following intersections were identified as potentially causing issue.

Table 10-12 Wider product transportation route intersection point design vehicle swept path assessment findings

Intersection Point	Intersection Roads	Intersection assessment		
		Movement(s)	Issue(s)	Potential mitigation measure(s) and impacts
1	Donald-Swan Hill Road and Lake-Boga-Ultima Road	36.2 m A-Double vehicle – Donald-Swan Hill Road left turn only, Lake-Boga Ultima Road – right-out only	Insufficient road and shoulder width to accommodate bidirectional heavy vehicle turning radius at intersection Roadside vegetation present	Remove vegetation within swept path. Pavement widening to be constructed
2	Lake-Boga-Ultima Road and David Street	36.2 m A-Double vehicle – All movements	Insufficient road width to accommodate bidirectional heavy vehicle turning radius Turning movements require vehicle to encroach onto road shoulders	Pavement widening to be constructed
3	Sea Lake-Swan Hill Road, David Street and Ultima North Road	36.2 m A-Double vehicle – all movements	Turning movement require vehicle to encroach onto road shoulders	Remove vegetation within swept path. Pavement widening to be constructed Realignment of intersection to facilitate safe movement from David Street to Ultima North Road

Vehicle usage at these intersections during the Project operation would result in an increase in slowing and turning vehicles along the public road network at these locations. This change in traffic conditions may result in an increased risk of vehicle collisions. As such, access point requirements would be further investigated and confirmed to ensure that each of the intersections provide safe access and egress for the required vehicles as part of a site access strategy (MM-TP05).

With consideration to the above transport route between Area 1 and Ultima terminal, the following upgrades to key local access roads have been proposed (refer to **Table 10-13**).

Table 10-13 Identified local access road upgrades

Access Road Ref	Access road		Road condition		Road width		Potential upgrade impacts and requirements
	Name	Length*	Existing	Proposed	Existing	Proposed	
1 – Area 1	Donald-Swan Hill Road	20.5km	Sealed	Sealed	7 – 7.5m		Road surface to be upgraded, notably due to presence of culverts and channels present along length of road to ensure road can safely accommodate A-Double movements Roadside furniture including culverts to be reviewed
2 – Area 1	Lake Boga Ultima Road	18km	Sealed	Sealed	6.2m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised shoulder and road widening and shoulder sealing including in the vicinity of local intersections with Donald-Swan Hill Road and David Street Road surface to be upgraded, notedly due to presence of culverts and channels present along length of road to ensure road can safely accommodate A-Double movements Roadside furniture including culverts to be reviewed

Access Road Ref	Access road		Road condition		Road width		Potential upgrade impacts and requirements
	Name	Length*	Existing	Proposed	Existing	Proposed	
3 – Area 1	David Street	0.3km	Sealed	Sealed	6 – 6.5m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised shoulder and road widening and shoulder sealing in the vicinity of the intersection with Lake Boga Ultima Road and Sea-Lake Swan Hill Road to provide a wider turning lane and ensure that safe bidirectional A-Double movements can be facilitated Roadside furniture including culverts to be reviewed
3 – Area 1	Ultima North Road	0.13km	Sealed	Sealed	6 - 6.2m	TBC 6.2 to 7.0m with 1.5m unsealed shoulders	Localised shoulder and road widening and shoulder sealing in the vicinity of the David St / Sea Lake-Swan Hill Road intersection with realignment of intersection to facilitate A-Double movements through the intersection

**It should be noted that the access road lengths detailed are limited to the extents required to service the Project work areas at this stage, further lengths of road may require upgrading to facilitate the safe movement of background traffic for diversion routes due to any road closures associated with the Project.*

The proposed road section upgrades presented in **Table 10-13** would need to be developed further during the detailed design phase of the project, considering contractor and stakeholder input. Consultation with DTP would be required with regard to approvals and requirements to ensure that roads anticipated to be utilised can accommodate operational traffic, notedly A-double movements. A review of roadside features would be undertaken to confirm the presence of culverts, signs and vegetation which may be impacted by road and intersection upgrades

In order to minimise and avoid the potential impacts of construction vehicle access on public safety, transport infrastructure and operations, the following mitigation measures would be implemented:

- Ongoing stakeholder consultation (MM-TP01) would be undertaken to obtain stakeholder input on transport management and to give the community and other stakeholders adequate notice of any anticipated changes to transport conditions associated with works.
- Road safety audits (RSAs) (MM-TP03) would be conducted at:
  - All access points onto both minor and major roads
  - Access roads to be used and their intersections with the public road network to confirm upgrade requirements
- A site access strategy (MM-TP05) would be developed and implemented to ensure that each of the access points provides safe access and egress for operational stage vehicles.
- Heavy vehicle transport route assessments (MM-TP06) would be undertaken to assess and confirm final routes and provide the necessary mitigation measures to ensure that operational heavy vehicle movements can be safely accommodated on the road network including at intersections.

With the implementation of the mitigation measures, the residual impact of construction and subsequent operational stage local vehicles access on public safety, transport infrastructure and operations is expected to be negligible, with delays only experienced during the upgrade of roads themselves which would be appropriately managed through a project works TMP. As described in **Section 10.4.3**, any road condition improvements would make the current road network a safer road environment for users when compared to its existing conditions.

10.5.4 Road and traffic lane closures

There would be road closures associated with the operation of the Project, in addition to those detailed in **Section 10.4.4**. Temporary and extended road closures associated with the required road upgrade works between the site and intermodal facility, as well as the ongoing operation of Area 1 and Area 3, have the potential to impact the local transport network through increases delays, however impacts are expected to be minimised through the implementation of mitigation measures.

During road section upgrades between Area 1 and the Ultima intermodal rail terminal, it is likely short-term closures to the road network will be necessary to accommodate different aspects of road works. If road upgrade works are to be conducted at the same time, this may have a significant impact on local road users, especially those who reside in the township of Ultima. This includes users looking to travel on the following roads:

- Donald-Swan Hill Road (Between Lake Boga-Ultima Road and Bennett Road).
- Lake Boga-Ultima Road (Between Donald-Swan Hill Road and David Street).
- David Street (Between Lake Boga-Ultima Road and Sea Lake-Swan Hill Road).
- Ultima North Road (Between Sea Lake-Swan Hill Road and Ultima intermodal rail terminal).

During road works and associated temporary road closures, local road users attempting to travel to and from these roads between Area 1 and Ultima intermodal rail terminal may experience diversions, reduced speeds or limited access, depending on the type of works at the time. This impact can be easily mitigated operationally by staging upgrades instead of upgrading the roads concurrently. This would maintain road access and east west connectivity with only minor diversions subject to the road management plan.

A summary of the proposed long-term road closures during Project operation is presented in **Table 10-14** below.

Table 10-14 Anticipated operation road closures

Roads to be closed	Indicative time periods of road closure		Road closure impacts
	Closure	Reinstatement	
Bennett Road	2024	Between 2031 – 2044 pending settlement timeframes	Full road closure with motorists experiencing minor to moderate delays (approx. 10-15 min of additional travel time). Potential alternative route available via Jobling Rd, Bish Rd or Mystic Park-Meatian Rd and Old School Rd.
Thompson Road	Approx. 2032 - 2044	Post 2044 pending on settlement timeframes	Full road closure with motorists experiencing minor to moderate delays (approx. 10-15 min of additional travel time). Potential alternative route available via Jobling Rd, Bish Rd or Mystic Park-Meatian Rd and Old School Rd.

The following mitigation measures would be implemented to avoid or minimise potential impacts related to road and traffic and closures:

- The SEP (MM-TP01) would include road and lane closures notification to impacted residents and emergency services where vehicular passage may not be available or be limited.
- A TMP (MM-TP02) would be developed in consultation with key stakeholders for temporary closure of roads during operation to maintain existing connectivity for local access, pedestrians and cyclists in accordance with relevant road design standards and in consultation with landholders and any other relevant third parties. This would include road rehabilitation following the closures. Diversion routes would be confirmed and managed as part of the TMP.
- Road safety audits (RSAs) (MM-TP03) would consider diversion routes to ensure they can safely accommodate local traffic to the satisfaction of the relevant road authorities. Where roads are expected to be closed either permanently or semi-permanently, appropriate discontinuance and disposal applications are to be submitted and approvals are to be obtained from the appropriate local authority.

Implementation of these measures during the project would reduce impacts on public safety, transport infrastructure and operations. Anticipated residual impacts would be localised and short travel time increases to vehicles caused by both short- and long-term road closures in the vicinity of the Project area. However, the intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to its existing conditions.

10.5.5 Road condition and maintenance

Heavy vehicles during operation of the Project have the potential to impact several local and declared roads. Road conditions would be managed throughout operation of the Project and the responsibility of each stakeholder throughout the process should be clearly identified to avoid and minimise potential impacts.

To avoid and minimise potential impacts to public safety, transport infrastructure and operations, the following mitigation measures would be implemented:

- Pre-construction road condition reviews would be undertaken at the time of TMP development (MM-TP02) to verify conditions of roads to be utilised by the project (as outlined in Section 10.4.9). TMP dilapidation surveys would be undertaken to provide a baseline which informs triggers for the upgrade or remediation of road assets (MM-TP02).
- Agreements with road asset owners on the following would be in place (see mitigation measure MM-TP01):
  - Agreeing extent and form of dilapidation surveys to be undertaken prior to works commencing, either by way of photographic or more detailed survey vehicle techniques. This would provide a fair and accurate baseline of pavement conditions at the commencement of construction.
  - Implement a road maintenance methodology, which would typically involve a drive-over inspection at a minimum frequency of one inspection per month. The checking procedures would need to be agreed with, along with the intervention criteria, treatments and response timeframes based on the pavement distress type identified (e.g. potholes, surface treatment, cleaning etc.).
  - Post operation review and identification and hand-back protocols to be agreed upon and documented.
- If impacts occur during operation, rectification would be implemented by the responsible party and could be monitored and managed as part of the sub-TMP (MM-TP07).

Implementation of these measures would reduce residual impacts on public safety, transport infrastructure and operations; as any road damage would be identified and rectified early through stakeholder communication over the operational phase of the Project, residual impacts are expected to be insignificant with the road network expected to be in similar if not better condition than prior to the commencement of the Project with no remaining damage to the road network.

10.5.6 Contingency delivery route – Port of Melbourne

In the event that the product cannot be transported to the Ultima intermodal rail terminal due to vehicle or track maintenance, product haulage would be transported by road from Project Area 1 to the Port of Melbourne.

The most direct haulage route is anticipated to be via Bennett Road and Donald-Swan Hill Road. Vehicles would then turn onto Calder Highway before continuing along Calder Alternative Highway, Calder Freeway, Tullamarine Freeway/Citylink then exiting onto the Citylink-West Gate off-ramp and Webb Dock Drive until trucks reach the Port of Melbourne. The route passes through the townships of Lalbert, Wycheproof, Charlton, Wedderburn, Inglewood, Bridgewater of Loddon, Marong, Lockwood and Kyneton (refer to **Figure 10-5**).

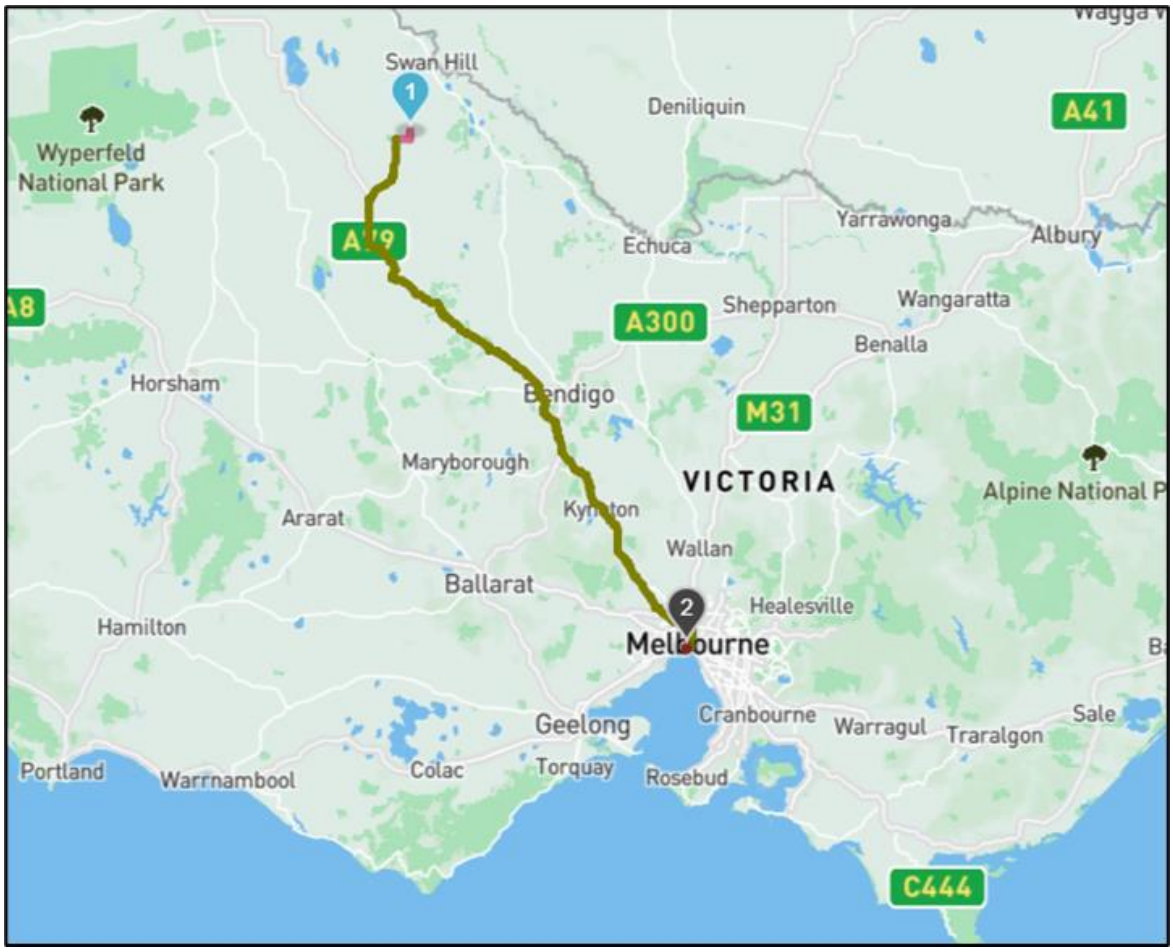

Figure 10-5 Contingency delivery route

Heavy vehicle network, road section and intersection upgrades and approvals

While it is understood that B-Doubles are the preferred delivery vehicle class, a review of the National Heavy Vehicle Regulator (NHVR) route planner was undertaken for both B-Double (up to 26 m) and A-Double (up to 36.5 m) vehicle classes along the contingency delivery route.

The entirety of the route between the site and Port of Melbourne forms part of the gazetted B-Double network and as such, can be operated on by B-Doubles without further approval or permits from the road manager. The route between the Calder Highway and the Port of Melbourne (excluding Citylink and Webb Dock Drive) is also gazetted for PBS Level 3A vehicles (A-Doubles up to 36.5 m and between 68.5 to 85.5 tonnes). However, an ODL permit is required at several level crossings for combinations in excess of 26 m there are several conditional approved bridge structures with weight limits along the contingency route.

Bennett Road, Donald Swan-Hill Road, Citylink and Webb Dock Drive are not gazetted for PBS Level 3A vehicles. As such, the relevant control measures will need to be considered and engagement between the proponent and the relevant road manager (Gannawarra Shire Council, DoT/RRV, NHVR, Transurban) should be undertaken to establish and agree on any necessary approvals and permits.

As most of the haulage route is part of the gazetted B-Double network, it is expected that these roads would adequately accommodate B-Double vehicle movements including turning movements at the relevant intersections along the route.

For A-Doubles however, and given its current condition, the Donald-Swan Hill Road / Bennett Road intersection is recommended to be upgraded to safely accommodate heavy vehicle turning movements as noted in **Section 10.4.3**.

Operational vehicle usage would result in an increase in slowing and turning vehicles along the public road network at these locations. This change in traffic conditions may result in an increased risk of vehicle collisions. As part of the heavy vehicle traffic route assessment (MM-TP06), the delivery route should be confirmed to ensure that heavy vehicles are able to safely access and navigate all roads along the route.

The final haulage route (including delivery vehicle class) would be agreed upon once a transport contractor is nominated.

Route traffic midblock capacity impact

The contingency route to the Port of Melbourne would result in an additional 12 A-Double movements or 24 B-Double movements along all roads between the project site and the Port of Melbourne. Given the existing capacity of the nominated route it is not expected that this small increase in vehicle volume would materially impact network operations.

Amenity impacts arising from use of the road network

The proposed contingency delivery route passes through a number of communities. Potential impacts on the local communities include:

- An increase in traffic related noise which may impact local road users and residents within the local communities.
- An increase in dust and debris on the road network and surrounding residential areas, which may impact the quality of the road pavement and impact the air quality in the local area.
- Increased local road and intersection safety risk associated with heavy vehicles.

Amenity related impacts for product haulage during operation to the communities living on, or in the vicinity of, the proposed contingency road route from the Project site to the Port of Melbourne is likely to be negligible. This is because of the low truck numbers generated by the contingency road option (an additional 12 A-Double movements or 24 B-Double movements per day along all roads between the Project site and the Port of Melbourne).

Nonetheless, measures to manage and minimise disruption (to the extent practicable) to affected local land uses, traffic, car parking, on-road public transport, pedestrian and bicycle movements and existing public facilities during all stages of Project would be required under MM-TP02.

After implementation of mitigation measures, the residual amenity related impacts are expected to be negligible.

10.6 Decommissioning impact assessment

Potential impacts associated with the decommissioning of the Project would be expected to be similar to those associated with the construction phase (refer to **Section 10.4**). However, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts would also be managed with the implementation of the same mitigation measures as those proposed for construction impacts (refer to **Section 10.8**).

It would be expected that a final road dilapidation survey would be undertaken to ensure that adequate remediation of the road network would be done to a standard agreed prior to the commencement of the decommissioning phase.

With recommended mitigation measures in place, the potential for impacts on the local road network within the vicinity of the Project from decommissioning of the Project would be minor.

10.7 Residual impacts

Residual impacts refer to those impacts that remain once mitigation measures have been implemented. The residual impacts to public safety, transport infrastructure and operations during construction is presented in **Table 10-15**.

Table 10-15 Construction residual impacts

Section	Impact assessment	Residual impacts
Section 10.4.1	Traffic generation and road capacity impact analysis	With the implementation of the mitigation measures the Project traffic would be low impact to the existing capacity as other routes would be chosen, or TMP measures implemented to improve traffic performance. This means that roads used by the Project would be able to safely accommodate Project traffic. The residual impact of Project traffic volumes to the existing road network users is expected to include minor to negligible delays experienced by local road users during the construction period.
Section 10.4.2	Construction traffic route assessments	Implementation of mitigation measures during construction would reduce residual impacts on transport infrastructure and operations and the proposed traffic routes would be appropriate and suitable to accommodate the safe movement of vehicles associated with the Project. Anticipated residual impacts would be increased delays experienced by local road users due to lowered speed limits if required by heavy vehicle movements to and from the site. This would last for the duration of construction and operation.
Section 10.4.3	Preliminary site access and road section upgrades	The residual impact of construction vehicles access on transport infrastructure and operations is expected to be low. Increased delays to public road users may occur in the vicinity of the proposed construction access points due to potential reduced speed limits and manoeuvring of heavy vehicles which may include OD/OSOM vehicles. The proposed intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to existing conditions.
Section 10.4.4	Potential road closures (short and long term)	Anticipated residual impacts would be localised and short travel time increases to vehicles caused by both short- and long-term road closures in the vicinity of the project area. However, the intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to its existing conditions.
Section 10.4.5	Amenity impacts on the local road network	With the implementation of the mitigation measures, amenity and public health and safety impacts would be minimised and dust and debris during construction would be similar to existing background levels.
Section 10.4.6	Impacts to public transport	With the implementation of the mitigation measures, the residual impact to public transport is expected to be insignificant as traffic management measures would be provided to minimise any potential conflicts and safety issues. The local bus services will also be informed of the works and usage of roads in the area.
Section 10.4.7	Impacts to pedestrians and cyclists	With the implementation of the mitigation measures, there are not anticipated to be residual safety and connectivity impacts to pedestrians and cyclists
Section 10.4.8	Emergency vehicle access	Implementation of these measures during construction and operations would reduce impacts on local residents by ensuring all affected properties retained suitable emergency access routes and local first responders were aware of closures. The staged or only partial closure of local roads during upgrade works would also limit the length of diversion routes and ensure continued access to all local properties. The residual impacts would be that emergency access roads to some local land users may need to be relocated for the duration of lane closure or road works.
Section 10.4.9	Road condition and maintenance	Any road damage would be identified and rectified early through appropriate surveys, routine inspections, self reporting and stakeholder communication over the construction period. No damage to the road network to remain after construction.

The residual impacts to transport infrastructure and operations during operation of the Project is presented in **Table 10-16**.

Table 10-16 Operation residual impacts

Section	Impact assessment	Residual impacts
Section 10.5.1	Traffic generation and road capacity impact analysis	The residual impact of project traffic volumes to the existing road network users is expected to be negligible. This means that roads used by the Project would be able to safely accommodate Project traffic.
Section 10.5.2	Operation traffic route assessments	Anticipated residual impacts could be minor delays experienced by local road users due to potential lowered speed limits if required by heavy vehicle movements to and from the site. This would last for the duration of construction and operation.

Section	Impact assessment	Residual impacts
Section 10.5.3	Site access and road section upgrades	The residual impact of construction and subsequent operational stage local vehicles access on transport infrastructure and operations is expected to be negligible, with delays only experienced during the upgrade of roads themselves which would be appropriately managed through a project works TMP. The intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to its existing conditions as roads would be reinstated to similar if not better conditions following project completion.
Section 10.5.4	Potential road closures	Anticipated residual impacts would be localised and short travel time increases to vehicles caused by both short- and long-term road closures in the vicinity of the project area. However, the intersection and road condition improvements would make the current road network a safer road environment for all road users when compared to its existing conditions.
Section 10.5.5	Road condition and maintenance	Any road damage would be identified and rectified early through appropriate surveys, routine inspections, self reporting and stakeholder communication prior to commencement of the project and throughout the operational period. No damage to the road network to remain after operation.
Section 10.5.6	Contingency delivery route – Port of Melbourne	The residual impact of noise, dust and debris and haulage related safety on local road users and residents is negligible.

10.8 Summary of mitigation measures

The mitigation measures to manage potential impacts to transport are presented in **Table 10-17**.

Table 10-17 Transport mitigation measures

Mitigation measure ID	Mitigation measure	Project phase
MM-TP01	Minimise adverse social effects • A community stakeholder and communications plan will be developed with regard to transport with ongoing stakeholder consultation to be undertaken during the lifecycle of the Project. Key notifications to include as a minimum: – Pre-construction stage – Construction, operation and decommission, with TMP measures and controls; Construction traffic monitoring; and road network monitoring, remediation protocols and maintenance requirements – Operation, with construction close-out meeting, infrastructure hand-back criteria • Stakeholder consultation would involve, but not be limited to: DTP, NVHR, Swan Hill Rural City Council, Gannawarra Shire Council and land owners affected by road closures.	All phases
MM-TP02	Minimise adverse social effects Prior to the commencement of construction (excluding preparatory works), a TMP must be developed and implemented to minimise disruption to the extent practicable to affected local land uses, traffic, car parking, on-road public transport, pedestrian and bicycle movements and existing public facilities during all stages of the Project. The TMP should be developed in consultation with the relevant road management authorities and be informed and supported by an appropriate level of transport analysis. The TMP should include, as a minimum those items recommended in (TIA, AECOM), including the movement of ore/product which would occur during daylight hours. The TMP would be an overarching document to inform subsequent specific work site TMPs developed by works contractors. In addition, as previously discussed there may be a need for other specific TMPs (see MM-TP07).	All phases

Mitigation measure ID	Mitigation measure	Project phase
MM-TP03	Minimise adverse land use effects from transport infrastructure Conduct Road safety audits (RSA), at various stages of project development, indicatively suggested at: • All the access points onto minor and major roads. • Functional design stage (and/or concept stage). • Detailed design stage. The audits shall include consideration of emergency vehicle access and if road surface upgrades are required.	All phases
MM-TP04	Minimise adverse social effects from transport infrastructure TMP will be developed in consideration to VHM's emergency evacuation protocols and must not conflict with any other local emergency plans in place with local businesses and emergency services.	All phases
MM-TP05	Site access strategy A site access strategy will be developed and finalised in consultation with all stakeholders, notably near landowners and relevant road authorities to verify final site access strategy, including access points. The locations and arrangements of the site access point used to access the project areas and the water supply pipeline during construction and operations should be investigated further to ensure that safe entry and egress of construction vehicles including heavy vehicles. This includes road section upgrade and provision of appropriate design for all access points intersecting with the public road network. During the design process the speed of major access roads to site access points needs to be reviewed and verified. Once designs have been completed, they should be subjected to RSAs as highlighted in MM-TP03.	All phases
MM-TP06	Heavy vehicle transport route assessments High Productivity Freight Vehicles (HPFVS) and Over Size/Over Mass (OSOM) transport route assessments should be completed by a nominated transport contractor from the nominated bulk material locations along with all necessary mitigation measures and stakeholder approvals. Following this assessment final route options would be verified, and any impacts identified along with relevant stakeholders who may need to be contacted to facilitate the safe delivery of materials to the Project sites. Potential impacts include clearance to potential obstructions, such as wires, structures (bridges and culverts), trees, and rail crossing infrastructure for HPFVS and OSOM vehicles.	All phases
MM-TP07	Sub-TMPs Sub TMPs would be completed by the relevant contractors, including for specific work activities (Worksite Traffic Management Plans). These would all need to consider and reference back to the overarching project TMP (MM-TP02).	All phases

10.8.1 Monitoring and contingency measures

Dilapidation surveys of the road network would be completed as part of the pre-construction phase and at regular intervals during the operation phase of the Project. These surveys are proposed to monitor the transport impacts associated with the Project. The dilapidation surveys would be undertaken on public roads that may be used for access and are designated for construction vehicle routes.

Consultation with road asset owners would be undertaken to agree on the extent of pre-condition dilapidation survey extents and survey requirements (specialist vehicle condition or photographic), road maintenance criteria, treatments and response timeframes, and post construction survey and asset hand-back agreements. Depending

on stakeholder requirements, other requirements may include specific traffic monitoring (maximum daily truck volumes), and specific bond payments for remedial works.

These dilapidation surveys are specified in:

- MM-TP01 Stakeholder Engagement Plan.
- MM-TP02 Traffic Management Plan.

Details of the requirements of each of these measures are outlined in **Table 10-17**.

10.9 Conclusion

The assessment has shown that the potential adverse impacts on traffic and transport during the construction, operation and decommissioning phases of the Project can, through the application of mitigation measures, be avoided or minimised and managed such that the objective of minimising adverse effects on public safety and transport infrastructure can be met.

Construction activities would generate additional light and heavy traffic, requiring routes to be assessed for their safety and suitability; upgrades to the local road network and the short-and long-term closure of traffic lanes and roads. It was determined that the additional traffic generated during construction would be well within the existing capacity of the local road network, causing negligible impacts. The traffic routes assessed for light and heavy vehicles during construction would be appropriate, however no roads along the route are over-dimensional approved and as such, approval would be required to operate this vehicle class and the relevant permits would need to be obtained where heavy vehicles cross infrastructure such as rail lines.

Road upgrades have been proposed where Donald-Swan Hill Road intersects Bennett Road and Mystic Park-Meatian Road, as well as at a number of local access roads. Measures including pavement widening and vegetation removal were also recommended at several local intersections following swept path assessment. The proposed upgrades would ensure that these roads and intersections can safely accommodate heavy and light construction vehicles. Short-term road closures resulting from road upgrade works may have a significant impact on local road users looking to travel east-west between the site and Donald-Swan Hill Road, however impacts can be easily mitigated by staging upgrades instead of upgrading the roads concurrently. This would maintain road access and east west connectivity with only minor diversions subject to the road management plan. Long term road closures during construction and operation would take place at Bennett Road and Thompson Road, with moderate delays expected for motorists.

During operation of the Project, the use of A-double vehicles, anticipated to transport product to the Ultima terminal, would require approval to travel along its proposed route. Necessary upgrades to local access roads would also be undertaken so that they are safe and suitable for A-double transportation. Conducting dilapidation surveys and road condition reviews as part of a TMP and having agreements with the relevant road asset owners would mitigate any potential damage to the local road network following heavy vehicle use during construction and operation of the Project.

In response to the EES evaluation objective described at the beginning of this chapter, impacts of the Project on public safety, traffic and transport have been assessed and mitigation measures have been identified to avoid and minimise adverse effects transport infrastructure.