Prepared for
VHM Ltd
Co No.: 601 004 102

AECOM

Technical report E: Transport

Goschen Rare Earths and Mineral Sands Project

28-Jun-2023

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Client: VHM Ltd

Co No.: 601 004 102

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Executive Summary

Overview

This technical report is an attachment to VHM Limited's Goschen Rare Earth and Mineral Sands Project (the Project) Environment Effects Statement (EES).

The purpose of this report is to assess the potential transport impacts associated with the Goschen Project to inform the preparation of the EES required for the project. A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of transport impacts and recommended mitigation measures are summarised below.

Methodology

The methodology for this Transport Impact Assessment (TIA) comprised a systematic, risk-based screening and impact assessment approach. This has been designed to provide an understanding of the existing conditions and an assessment of the potential project impacts, and to propose mitigation measures to avoid, minimise and manage potential adverse impacts.

The existing conditions assessment included an initial desktop study, on-site road assessment including traffic surveys, data investigation and review of relevant policies and legislation. The nature of the expected traffic generating activities was reviewed to approximate the number of vehicle trips potentially associated with the project during both the construction and operational phases. This assessment was undertaken to consider network capacity, intersection and road safety, public transport impacts, pedestrian and cyclist impacts and residual impact. On completion of the impact assessment, various mitigation measures were recommended to avoid, mitigate and manage the potential impacts

Existing environment

The road network within the study area is comprised of declared and local roads. The major highway and arterial roads were observed within the study area to be relatively lightly trafficked and generally in good condition with adequate sealed road surface. Local roads in the vicinity of the project areas and the water pipeline were found to be generally unsealed, narrower and with little to no traffic. Based on the predominant agricultural land use of the study area, traffic volumes may, depending on the crop, increase during harvesting periods of the year.

An existing transport conditions review was undertaken, which was informed via a combination of desktop reviews, site visit, crash/traffic data analysis and review of relevant policies and legislation.

Traffic volume data was collected from DoT for the declared road network while Average Annual Daily Traffic (AADTs) volumes were inferred based on the rural setting and undertaking similar Projects as local Councils have no available traffic count data for local roads. Peak period traffic volumes for 2020 were derived based on the AADT by adopting highest percentage as advised from Austroads Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management. Analysis of the local road network mid-block capacities shows that the local road network has spare capacity to facilitate increases in traffic demand.

Given the rural area there are no dedicated pedestrian or bicycle infrastructure provided near the proposed site access roads to the Project areas. While dwellings are located sparsely within the immediate vicinity of the Project area, pedestrian and cycling activity may occur, notably in Mystic Park in the vicinity of Kangaroo Lake where some sections of the water pipeline are expected to be built.

Two bus services operate within the study area along Donald-Swan Hill Road running approximately once to twice a day. School buses may be operating along the local road network and generally would operate from 7:30 am to 9:00 am and 3:20 pm to 5:00 pm during school terms

While there are no stations near the project areas, four level crossings are located within the study area including two along Donald Swan Hill Road and one along Dumosa-Quambatook Road are anticipated to be utilised to access the worksites for the Project.

Analysis of crashes recorded by DoT between 2015 to 2020 shows that overall, there are no evident crash patterns. No crashes were recorded near any of the local roads in the immediate vicinity of the proposed Goschen Project areas and their anticipated access points.

Construction impact assessment findings

During construction, potential impacts on the transport network include temporary road closures, increased traffic delays, damage to road surface due to heavy vehicles and impeded access. These would be managed through the implementation of standard traffic management measures typically applied for projects of this scale and nature and incorporated into a Traffic Management Plan (TMP). The key findings of the construction phase impact assessment for the project are as follows:

- Mid-block and intersection capacity: the analysis included anticipated traffic generated by the project construction daily and across the morning peak and afternoon peak. Flow diagrams were established considering major road mid-block traffic estimated volumes, with 2024 base construction comparisons and worst-case derived movement of construction volumes at the nominated major site access points. The capacity analysis shows that Donald-Swan Hill Road and Murray Valley Highway have a respective spare mid-block theoretical capacity of 88% and 32%.
- Preliminary routes assessment: B-Doubles vehicles routes have been established based on the restrictions of the study area roads. Traffic management would be required and should be investigated as part of a TMP. Heavy vehicle transport route assessments are to be undertaken to determine the final vehicle routes for each vehicle type.
- Preliminary site access and road upgrades: a review was undertaken of the access points and roads to be used by the project during construction. Access road sections which will require upgrades or alterations have been identified. A site access strategy is to be completed to ensure that each of the access point intersections provide safe access and egress for construction vehicles. This includes considerations for intersection and road section upgrades to ensure that safe vehicle movements can be facilitated, notedly Donald-Swan Hill Road and Bennett Road priority intersection and Bennett Road.
- Road closures: all road closures are anticipated to be managed as part of a TMP. This includes traffic detours and traffic management measures such as traffic controllers and signage. No delays to public transport services are expected to occur and local property access is expected to be maintained during the closures.

Overall, impacts to the transport network during site and water pipeline construction are expected to be relatively minor given the limited population and extent of existing network to provide suitable diversion routes, and can be suitably managed through measures outlined in a TMP for the project, with the road network found to be sufficient to accommodate anticipated traffic volumes.

Operation impact assessment

Transport impacts identified in the operational phase of the project include the following:

- The road capacity assessment shows that the additional traffic movements generated by the Project operation which include product haulage and delivery truck movements would result in negligible impacts on key local/arterial roads within the study area with Donald Swan Hill Road found to have spare mid-block theoretical capacity of 85%.
- Preliminary routes assessment: a review was undertaken to determine what route would be taken by A-Double vehicles expected to be utilised for product haulage from Area 1 to Ultima intermodal train terminal. Approvals and road improvements will be required to ensure that these movements can be safely accommodated on the proposed route which is not yet designated an approved A-Double route (subject to vehicle type confirmation). Approval to operate A-Double vehicles on the local road network must be sought from either the Department of Transport or local council, depending on the asset owner. Intersection and road upgrades are also expected to be required to ensure that bidirectional movements of large vehicles can be safely facilitated on the public road network.
- Road closures: parts of Thompson Road and Bennett Road are expected to be closed for up to 12 years. Traffic controls and detour of local traffic which would be managed by the TMP would be required with motorists expected to experience moderate delays. 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.

Overall, operational impacts are considered minor for the road network and intersection capacity due to the relatively low traffic volumes anticipated to be generated during this phase. Impacts are expected to be managed through measures outlined in a TMP for the project.

Decommissioning impact assessment

Potential impacts associated with decommissioning works for the project are expected to be the same or similar to those associated with the construction phase. However, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts. The roads anticipated to be utilised by the Project, including the road closures of Thompson Road and Bennett Road during the operational phase, are expected to be fully reinstated.

Mitigation and contingency measures

Potential impacts on transport due to the project would be avoided, minimised or managed to required standards through the recommended mitigation measures:

- *MM-TP01 – Stakeholder Engagement Plan*
- *MM-TP02 – Traffic Management Plan (TMP)*
- *MM-TP03 – Road Safety Audit(s)*
- *MM-TP04 – Emergency access and evacuation plan*
- *MM-TP05 – Site access strategy*
- *MM-TP06 – Heavy vehicle transport route assessments*
- *MM-TP07 – Sub-TMPs*

Abbreviations

Abbreviation	Term
AADT	Average Annual Daily Traffic
AECOM	AECOM Australia Pty Ltd
AWDT	Average Weekday Daily Traffic
DOS	Degree of saturation
DoT/DTP	Department of Transport / Department of Transport and Planning
EES	Environment Effects Statement
EMF	Environmental Management Framework
IDM	Infrastructure Design Manual
Km	Kilometre
Km/hr	Kilometres per hour
LOM	Life of Mine
LOS	Level of service
MSP	Mineral Separation Plant
NHVR	National Heavy Vehicle Regulator
OD	Over-dimensional vehicle
OSOM	Oversize Overmass
RRV	Regional Roads Victoria
TMP	Traffic Management Plan
TIA	Transport Impact Assessment
WCP	Wet Concentrator Plant

Glossary

Term	Description
AADT	This measurement provides the total volume of vehicle traffic of a road for a year divided by 365 days.
Access track	Tracks that are built by the project to facilitate construction, operation and maintenance.
Average delay	This is the average amount of time it takes a vehicle to negotiate an intersection, including the time to negotiate corners and the time stopped in queues or waiting for a green signal.
DOS	Ratio of demand to capacity. A DOS of 1.0 or more in theory represents saturated conditions where the demand exceeds the capacity. For a signalised intersection, a DOS of 0.9 is usually adopted as the capacity threshold.
Land	Any land, whether publicly or privately owned, and includes groundwater.
Landholder	A general term used to refer to the legal owner or manager of a parcel of land. It may be private landholder, Government or private utility, or a Government Agency responsible for management of a particular parcel of Crown land (e.g., National Parks or Forestry areas).
LOS	This is an alpha-numeric rating of the overall performance of an intersection, ranging from LOS A (very good) to LOS F (very poor).
Mid-block	A location around the mid-point between two intersections.
National Heavy Vehicle Regulator (NHVR)	The NHVR are Australia's regulator for all heavy vehicles.
OD vehicle	Over-dimensional (OD) vehicles are those that exceed 5.0 metres wide/high or 30.0 metres long or 100.0 tonnes gross mass. OD vehicles should be reviewed for transportation with the NHVR permit process to permit travel. Other additional permits/conditions are required for access, such as escorts, travel times, etc.
OSOM vehicle	Victoria has a class 1 gazetted Oversize and Overmass (OSOM) vehicle network. The VicRoads website details the areas of operation, exemption and prohibited routes and structures that are up to 3.5 metres wide, 4.6 metres high, 25.0 metres long and 49.5 tonnes.
Other injury	Injury sustained in a road crash for which a person did not require hospitalisation.
Serious injury	Injury sustained in a road crash for which the person was admitted to hospital.
Trenchless crossing	A trenchless technology by which an underground transmission alignment tunnel is drilled at a shallow angle under a crossing (e.g., a waterway, wetland, road or railway) through which the pipe is then threaded.
Trenching	Excavation of a trench for burial of a cable or pipeline system.
pc/h	Passenger car per hour
pc/h/ln	Passenger car per hour per lane

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned by VHM Limited (VHM) to provide a traffic and transport assessment for the proposed Goschen Mineral Sands and Rare Earths Project (the Project).

The purpose of this Transport Impact Assessment (TIA) report is to assess the potential transport impacts associated with the Project to inform the preparation of the EES.

1.1 Requirement for an EES

The Project was referred to the Minister for Planning to seek advice on the need for an EES under the Environment Effects Act 1978 (Vic) (EE Act).

On 10 October 2018, the Minister for Planning decided that an EES was required on the basis that the Project has the potential for a range of significant environmental effects.

On 19 December 2018 under delegated authority from the Minister for the Environment, the Department of the Environment and Energy (now referred to as the Department of Climate Change, Energy, the Environment and Water (DCCEEW) made a decision that the Project is a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and would require assessment and a decision about whether approval should be given under the EPBC Act. DCCEEW also confirmed the Victorian Government's advice that the Project will be assessed under a bilateral agreement under the EE Act.

The EES allows stakeholders to understand the likely environmental impacts of the Project and how they are proposed to be managed. The Minister's assessment of the EES will also inform statutory decisions that need to be made on the Project.

The EES was developed in consultation with the community and stakeholders.

2.0 Project description

2.1 Project overview

The Goschen Project is a rare earth and mineral sands mine and processing facility anticipated to operate for approximately 20-25 years. VHM has been developing the Project in the context of a rapidly growing global demand for rare earth minerals. One of the world's largest, highest grade zircon, rutile and rare earth mineral deposits is in the Loddon Mallee region of Victoria in Australia. VHM intends to establish the Project to mine these deposits and process to produce and market a range of products to national and international consumers.

The mine footprint has been restricted to avoid intersection with groundwater and significant areas of remnant native vegetation. VHM will implement a staged development approach. Phase 1 will consist of a mining unit plant (MUP), wet concentrator plant (WCP), rare earth mineral concentrate (REMC) flotation plant and a hydrometallurgical plant (AREM) that will further refine the REMC that is produced at Goschen. The product suite for phase 1 consists of a zircon/titania heavy mineral concentrate (HMC) and mixed rare earth carbonate (MREC).

Phase 2 will commence approximately two years post-production and consist of an additional mineral separation plant (MSP) and, subject to prevailing market circumstances at that time, hot acid leach (HAL) and chrome removal circuit, that will produce additional products such as premium zircon, zircon concentrate, HiTi rutile, HiTi leucoxene, LoTi leucoxene, low chromium ilmenite.

The Goschen Project is located approximately four hours' drive (275 kilometres) northwest of Melbourne and 30 minutes (235 km) south of Swan Hill within Gannawarra Shire (Figure 1).

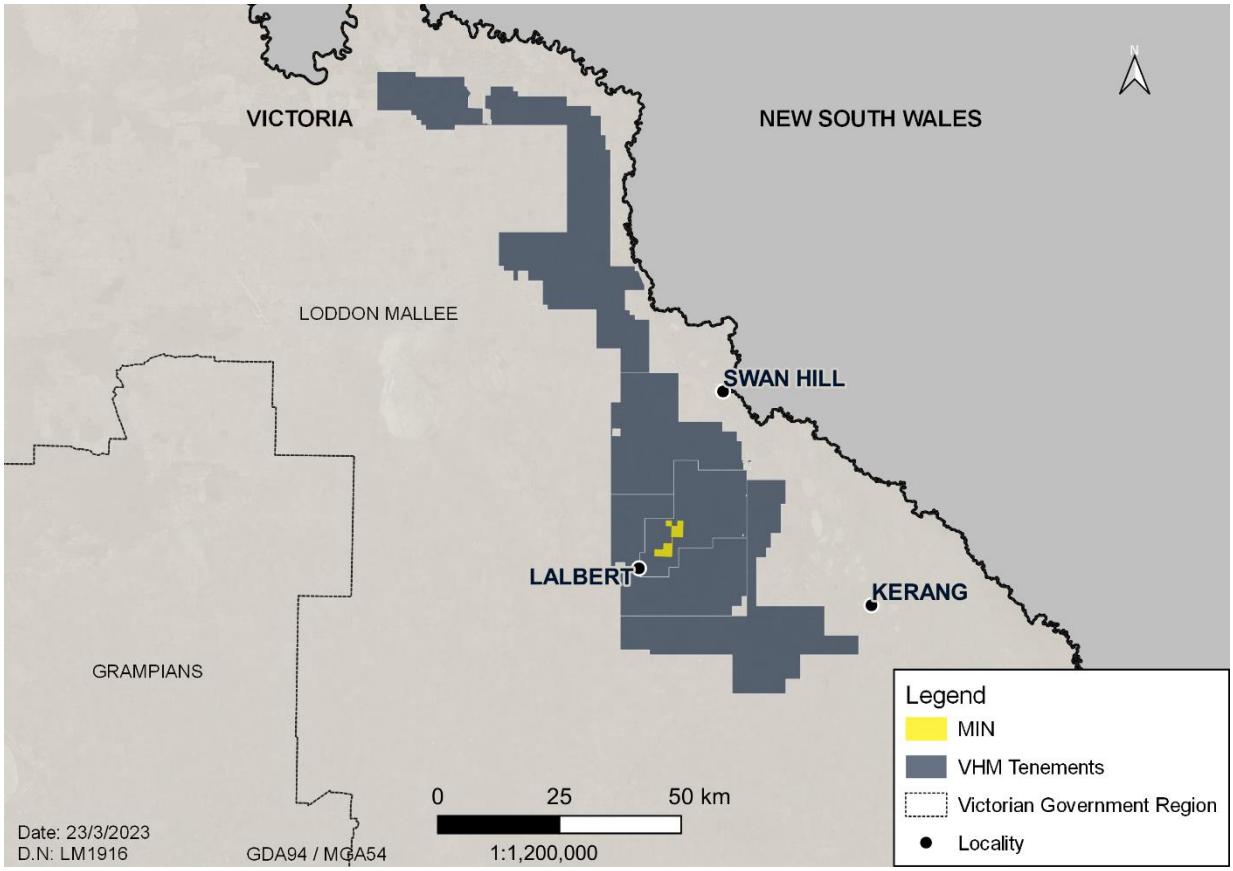


Figure 1 Goschen project location

2.2 Project development

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development. During project inception and early design development stages of the project, decisions on the location of the project, its design and construction techniques have enabled impacts to be significantly avoided and minimised in accordance with the hierarchy presented in Figure 2.

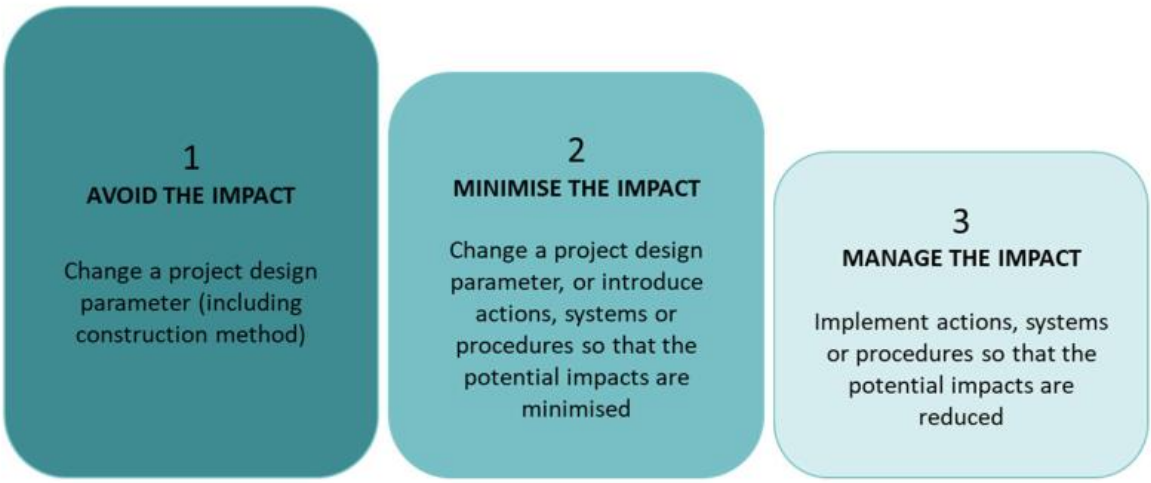


Figure 2 Mitigation hierarchy

Avoidance and minimisation of social and environmental impacts is central to the project's decision making and as such, the project will continue to be refined in response to technical requirements and potential environmental and social impacts identified during the development phase.

This was considered in the preparation of a project description which is found at Chapter 4: Project description. A description of how avoidance of impact has informed the design in relation to Transport can be found in Section 5.4.

Examples of this include the decision to utilise existing roads for construction site access wherever possible and adopting construction techniques which avoid impacts on sensitive receptors.

After opportunities to avoid impact were incorporated into the project, minimisation and rehabilitation measures were developed. These are described in the construction and operation impact assessment sections below.

2.3 Key project components

The Project site consists of a heavy mineral sand mining and processing operation that will produce several heavy mineral concentrates (HMC) and a range of critical rare earth minerals across two defined mining areas known as Area 1 and Area 3 (Figure 3 and Figure 4).

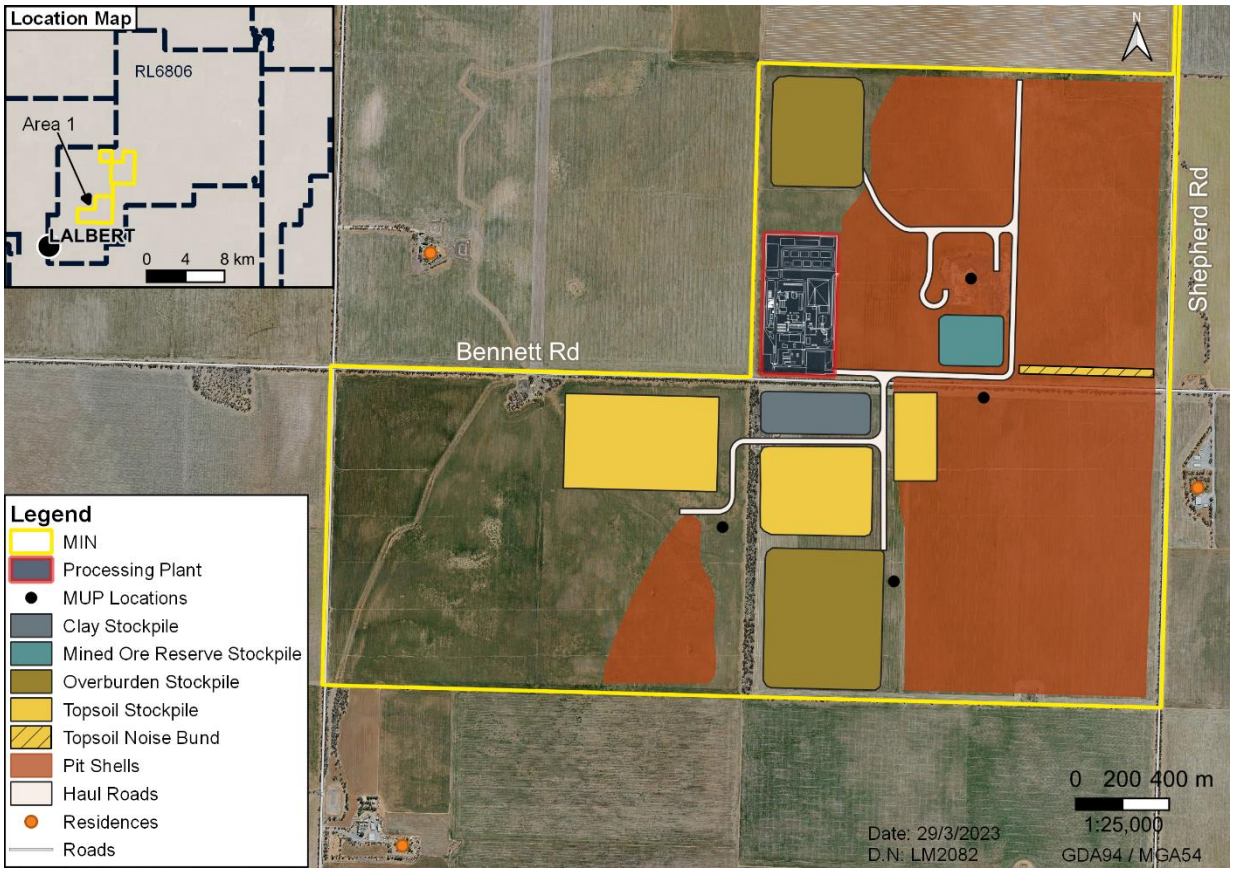


Figure 3 Area 1 Goschen project

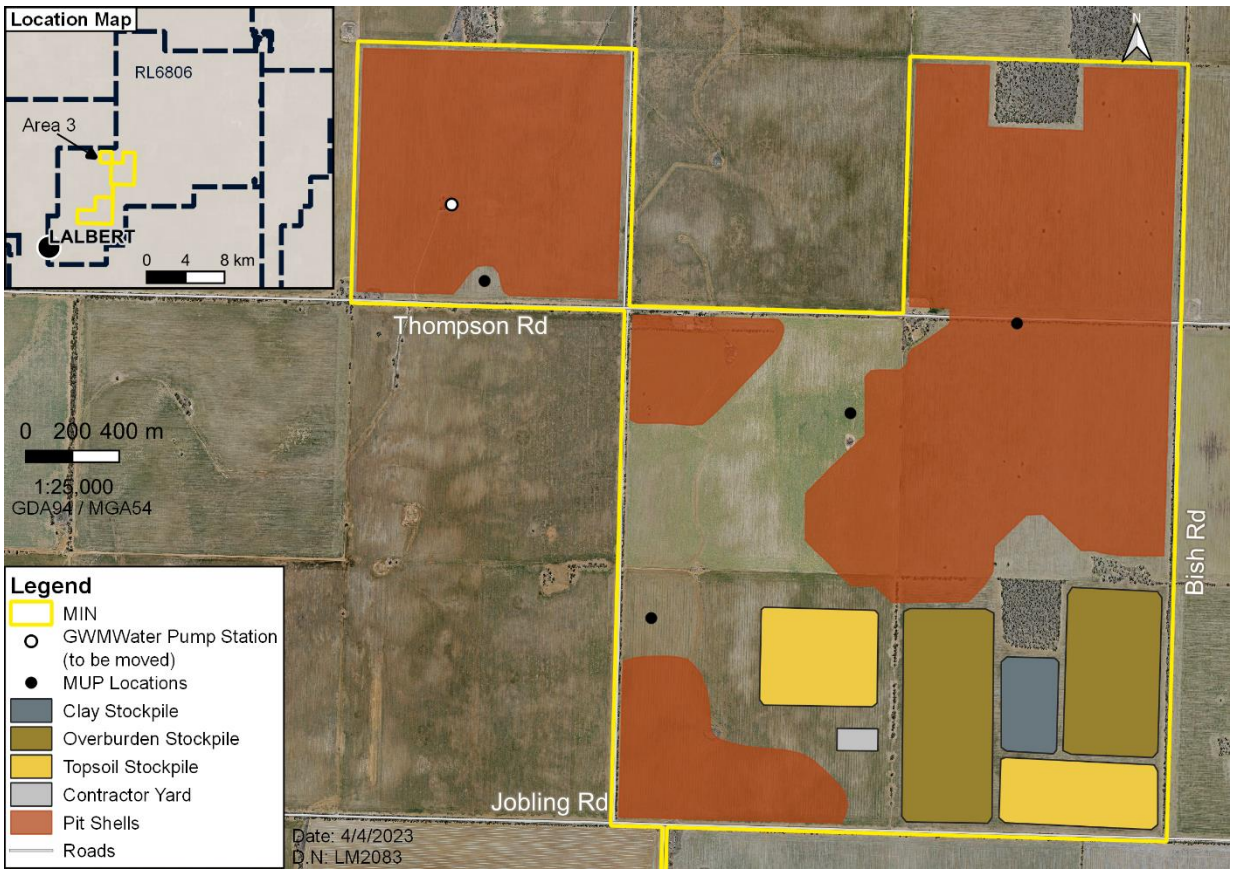


Figure 4 Area 3 Goschen project

The key components that make up the project are described below.

Mining – Mining will take approximately 20-25 years at 5M tonnes of ore produced per year and will occur only above groundwater (no dewatering) across approximately 1,479 hectares of farmland using conventional open cut mining methods of excavation, load, and haul.

Processing – Heavy mineral sands and rare earths ore will be separated via an on-site WCP and MSP to generate a Rare Earth Mineral Concentrate (REMC). Refining of the REMC on-site is limited to hydrometallurgical extraction to produce a mixed rare earth carbonate. Tailings from the various mineral processes will be homogenised and placed back into the ore zone earlier mined.

Rehabilitation – The mined areas will be progressively backfilled in a staged manner, with tailings dewatered in-pit to allow overburden and topsoil placement in a profile that reinstates the background soil structure. This will result in the ability for a return to the current agricultural land uses within 3 years.

Power – Electrical power needed for mining and processing will be produced on-site from dual fuel diesel/LNG fired power generators, with a gradual evolution over the life of mine to renewables, hydrogen and/or battery as technologies and commercial viability increase. Heat energy for the on-site gas fired appliances shall be provided from an extension of the distribution network from the main LNG storage and regasification system.

Transport – At this time it is proposed that all final products shall be containerised in 20ft sealed sea containers on site, transported via truck to the Ultima intermodal rail terminal, and exported internationally via the Port of Melbourne.

Water – Water will be required for construction earthworks, processing, dust suppression and rehabilitation. Up to 4.5 GL a year will be needed for the start-up of the Project. Water will be sourced from Kangaroo Lake. The water supply pipeline is shown in Figure 5 with the pipeline being placed

either centrally along the nominated local roads, along the road verge. The section of the pipeline annotated as 'alternative route' shown in Figure 5 is not proposed to be constructed.

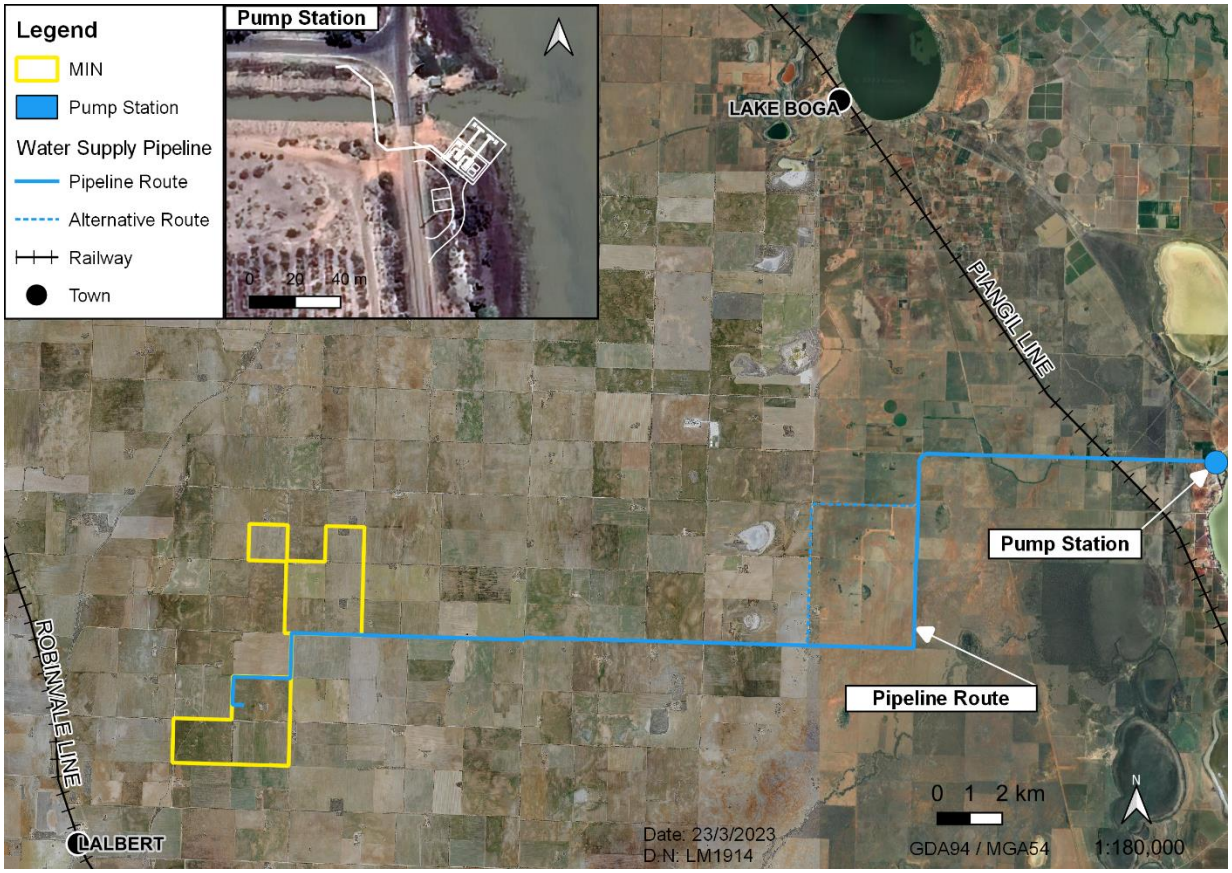


Figure 5 Water pipeline alignment

2.4 EES evaluation objectives and scoping requirements

The scoping requirements for the Goschen Project EES ('scoping requirements') by the Minister for Planning, set out the specific environmental matters the project must address to satisfy the Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the EE Act.

The following evaluation objective is relevant to the Transport Impact Assessment:

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

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 1 as well as the location where these items have been addressed in this report.

Table 1 Scoping requirements relevant to transport

Aspect	Scoping Requirement	Section addressed
Key issues	The potential for reduced access to farmland, businesses, social networks, and community facilities.	Construction impact assessment 9.0 Operation impact assessment 10.0
	The potential for changes to and interruption to the existing infrastructure in the project area and in its vicinity, including	Construction impact assessment 9.0

Aspect	Scoping Requirement	Section addressed
	water supply infrastructure, power transmission lines and local and regional roads or rail.	Operation impact assessment 10.0
	Potential damage to local and regional road surfaces along transport routes and increased risk to road safety on transport routes.	Construction impact assessment 9.0 Operation impact assessment 10.0
Existing environment	Characterise the current traffic conditions (including site access) and road infrastructure (including arterial and municipal roads) and road users in terms of capacity, condition and structural integrity, travel times, safety and accessibility.	Existing conditions 6.0 Proposed development 8.0
	Describe proposed transport routes and infrastructure, its ability to accommodate traffic generated by the project, as well as other predicted future demands.	
Assessment of likely effects	Assess the potential effects of the project on the structural condition of potentially affected public roads, having regard to relevant design standards in the context of historical and proposed future usage.	Construction impact assessment 9.0 Operation impact assessment 10.0
	Evaluate the consistency of the project with the policies and provisions of the Gannawarra and Swan Hill planning schemes and other relevant land use planning strategies.	
Design and mitigation measures	Identify the proposed transport routes impacts on road safety and operational performance of the existing road infrastructure, considering all project vehicle types, traffic volumes and movements and need for installation of any proposed mine infrastructure along or across the public road network during the project construction and operation and decommissioning.	Construction impact assessment 9.0 Operation impact assessment 10.0
	Outline the required transport infrastructure upgrades and additional road maintenance regime to address adverse impacts of the project construction, operation, and decommissioning (e.g., road, rail and port).	
	Describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions during construction, operation and decommissioning of the project, covering (where appropriate) road safety, temporary or permanent road diversions, different traffic routes, hours of use, vehicle operating speeds, types of vehicles and emergency services provisions.	Construction impact assessment 9.0 Operation impact assessment 10.0 Decommissioning impact assessment 11.0
	Outline measures to minimise potential adverse effects on local communities and infrastructure	
Approach to manage performance	Describe monitoring programs to measure social, land use, economic and infrastructure outcomes for communities living within or in the vicinity of the project area including a framework for identifying and responding to any emerging issues.	Summary of mitigation, monitoring and contingency measures 13.0

3.0 Evaluation framework

The assessment will consider legislation, policy and standards relevant to transport along with specific assessment criteria that have been derived for the purposes of the study.

3.1 Legislation, policy, guidelines and standards

The legislation, policy, guidelines and standards relevant to this assessment are summarised in Table 2.

Table 2 Legislation, policy, guidelines and standards relevant to the assessment

Document title	Summary	Relevance to the project
Commonwealth government		
None		
Victorian government		
Road Management Act 2004 (Victoria)	Road Management Act (General) Regulations 2016. Road Management Act (Works and Infrastructure) Regulations 2015. Code of Practice – Work site Safety Traffic Management.	This Act and associated Regulations must be complied with for all public roads of the Victorian road network. The Act sets out general principles and obligations for which the road authority is responsible for administering. The Road Management Act requires approval for any construction project that may impact or change access of a controlled access road.
Department of Transport (VicRoads) – Road Management Plan	The VicRoads Road Management Plan details the management and maintenance of roads registered under the VicRoads register of public roads. VicRoads manages its infrastructure in five phases: development of standards and guidelines, development of a maintenance program, implementation of the management program, auditing and review. The VicRoads road management plan also details maintenance inspection and response schedules.	Ensuring site access and maintenance of the road network is to the satisfaction of the Department of Transport (VicRoads) in terms of its own road assets impacted by the project.
Transport Integration Act 2010	The Act provides a legislative framework for transport in Victoria. The Act seeks to integrate land use and transport planning and decision-making by applying the framework to land use agencies whose decisions can significantly impact on transport. The Act requires agencies, including the Department of Transport and Planning Authorities, to consider the potential impact of land use planning proposals on transport.	This Act sets out six transport system objectives and eight decision-making principles. These objectives include triple bottom line assessment: economic prosperity, social and economic inclusion and environmental sustainability. Other objectives include: • Integration of transport and land use • Efficiency, coordination and reliability • Safety and health and wellbeing These objectives and principles need to be considered in the evaluation of this project.
Road Safety Act 1986	Road Safety Road Rules, 2017.	These Rules provide road rules that are substantially consistent across Australia. They also specify behaviour for all road users. This framework is used in this assessment as the

Document title	Summary	Relevance to the project
		basis to assess safe and efficient traffic movements on roads.
	Road Safety (Traffic Management) Regulations, 2009.	These Regulations set out requirements for authorisation for implementing traffic control devices on roads (including for traffic management for work sites) This assessment uses this framework as a reference to prescribe traffic management requirements.
Victorian Road Safety Strategy – 2021-2030 Action Plan	This strategy aims to reduce fatalities by 50 per cent and reduce serious injuries progressively by 2030.	This strategy references making local and busy places safer and using roads more safely. Safety considerations represent a critical focus of this assessment.
AS1742.3 2009 – Traffic control for works on road		This standard sets out all matters to be considered as being essential to a TMP such as traffic demand, traffic routing, traffic control, special vehicle requirements and over-dimensional vehicles which will be developed at later stage of the project following this TIA.
Austroads – Guide to Road Design Part 3: Geometric Design	The Guide to Road Design is one of a set of comprehensive Austroads Guides developed to provide a primary national reference for the development of safe, economical and efficient road design solutions.	AGRD Part 3 provides guidance on geometric requirements for Australian Roads. This guide shall be used to determine likely impacts of changes to road profiles and characteristics resulting from the project and its associated traffic.
Austroads – Guide to Road Design Part 4: Intersections and Crossings		AGRD Part 4 provides guidance on intersection design such as design considerations, design process, choice of design vehicle, pedestrian and cyclist crossing treatments, provision for public transport and property access. This is particularly relevant to the project as it is anticipated to potentially impact road access.
Austroads – Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments	Guides planners and engineers with design, develop and manage a variety of land use developments in identifying and managed the impacts on road system arising from these developments. Part 12 presents the land use and transport planning context for the TIA, including travel demand, safety, parking and access management issues. It provides guidance on the need and criteria for impact assessments, and a detailed procedure for identifying, assessing and mitigating traffic impacts. It also covers assessment of safety, infrastructure, and environmental effects, and gives	Standard guide for the completion of TIAs for projects, ensuring consistency of assessment and treatment of traffic impacts, whilst also considering all road users, road safety and effects on the broader community.

Document title	Summary	Relevance to the project
	examples of checklists, report structures, traffic generation rates and projects.	
VicTrack Rail Development Interface Guidelines	Provides guidance on how to establish an appropriate development interface with railway land. Will aim to ensure development respects the strategic importance of the railway land and does not adversely affect existing and future operations	Guides construction control measures for pipeline upgrade works near local railway lines and railway crossings.
Local Government		
Gannawarra Shire Council – planning scheme	Notable planning clauses relating to traffic and transport, include: • 18.01-1S land use and transport planning • 18.01-2S transport systems • 18.02-4S car parking • 18.05-1S freight links	Ensuring project meets required planning application standards with regards to traffic and transport. This includes: • Maintaining a safe and efficient road network Ensuring adequate supply of car parking during both construction and operational phases of the project
Gannawarra Shire Council - Road Management Plan 2021	The document establishes a management system to assist the Shire to meet its Road Management Act duties based on its policy and operational objectives having regard to available resources. Council is responsible road authority for only those roads set out in section 37 of the Road Management Act.	Ensuring site access and maintenance of the road network is to the satisfaction of Gannawarra Shire Council in terms of its own road assets impacted by the Project.
Gannawarra Shire Council – Asset Disposal and Rationalisation Policy	This policy outlines the direction for disposal and rationalisation of council assets deemed no longer necessary or no longer suiting Council purpose. This policy provides direction for identifying, assessing and making decisions that will inform the Asset Manager of their responsibilities during the disposal process.	Where roads are proposed to be either permanently or semi-permanently closed to enable Project operations.
Swan Hill Rural City Council – Road Management Plan 2021	This RMP applies to the municipal roads and road infrastructure for which Council is responsible for. Compliance with the RMP is evidence that the Council has discharged its statutory duty to inspect, repair, and maintain public	Ensuring access and maintenance of the road network is to the satisfaction of Swan Hill Rural City Council in terms of its own road assets impacted by the Project.

Document title	Summary	Relevance to the project
	roads and any commons law duty of care owed to road users.	
Swan Hill Rural City Council – Discontinuance and Disposal of Roads	The Local Government Act 1989 enables councils to discontinue and sell a road under its control. The SHRCC discontinuance and disposal of roads procedure involves submission and approval of a written road discontinuance request from the proponent. The approval of this request involves the consideration by service authorities and the public before an offer to sell the land can be reached.	Where roads are proposed to be either permanently or semi-permanently closed to enable Project operations.
Infrastructure Design Manual (2020)	The Infrastructure Design Manual (IDM) is a standardised set of requirements for the design and development of infrastructure – required by a set of participating Victorian rural and regional councils	The IDM is the standard document used by Gannawarra Shire Council and Swan Hill Rural City Council.

3.2 Assessment criteria

The assessment criteria relevant to this TIA are outlined below.

TIAs include an evaluation against relevant State and industry guidelines (as summarised in Table 2) whilst also addressing specific local government planning clauses where applicable.

Ultimately the findings and proposed mitigation measures detailed in the TIA need to be agreed with the relevant road authorities. Once planning approval has been obtained for the project, those stakeholders will be consulted regarding the development of a Traffic Management Plan (TMP). Additionally, where secondary approvals are required under transport legislation, these approvals would be sought from the relevant road authorities.

4.0 Consultation and engagement

Development of the project and preparation of the EES have been informed by consultation with key stakeholders. Feedback from DoT (RRV), local councils and other statutory parties is summarised in Table 3.

Table 3 Feedback from other stakeholders in relation to transport

Community and stakeholder feedback	Consideration in project design or impact assessment
Department of Transport (RRV) and Gannawarra Shire Council	
A meeting was held on Thursday 21 April 2022, with both DoT (RRV) and Gannawarra Shire Council in attendance, with the following feedback received on the proposed Project: • DoT noted the following: - Usage of A-Double vehicles is likely to trigger upgrades.	The items outlined have been considered as reasonably possible at this planning stage of the Project in this TIA report. Most of the items raised would be subject to agreement with these key stakeholders, notably as part of the development of the Projects Traffic Management Plan (TMP), which will be required as a

Community and stakeholder feedback	Consideration in project design or impact assessment
- Thorough route assessment should be undertaken including swept paths from the site to the Ultima intermodal terminal. - Issues with Bennett Road and its existing intersection configuration with Donald-Swan Hill road, also its proximity with the level crossing could be problematic in case of traffic queuing and impacts to the local community. - That single HV movements for mobilisation and demobilisation stages need to be considered. - Donald-Swan Hill Road and Lake Boga-Ultima Road intersection requires consideration for A-Double manoeuvrability & safety matters. • GSC noted: - Local roads are likely to require upgrades to accommodate Project generated traffic. - Rehabilitation measures need to be agreed and put in place to reinstate roads following Project usage. - Queried if alternative consideration for placement of water supply pipeline on roadside or within private landholding has been considered to reduce impacts. - Easier to upgrade / strengthen road pavement on local roads (noted to be mostly gravel / dirt), widening of roads would not be sufficient. - Traffic management measures such as speed reductions to be considered. - Consider how to reduce worker movements where possible to/from site.	condition of any future permissions.
Swan Hill Rural City Council	
Comments were received from Swan Hill Rural City Council on the 25th of August 2022, post TRG. Amongst other minor changes, the following key points were raised by council**:** - **To ensure that there are no significant risks to public safety arising from heavy vehicle use that is incompatible with road infrastructure or traffic conditions, there will be a need to upgrade some of the roads as identified with the report.** - Detailed road designs would need to be approved by Council prior to construction with consideration given to the number of heavy vehicle movements anticipated on the local road network for the period on the mine's construction and operational stages. - Upon satisfactory completion of the identified roadworks and agreement with regards to the ongoing road condition, inspections and maintenance	The items outlined have been considered as reasonably possible at this planning stage of the Project in this TIA report. Most of the items raised would be subject to agreement with these key stakeholders, notably as part of the development of the Projects Traffic Management Plan (TMP), which will be required as a condition of any future permissions.

Community and stakeholder feedback	Consideration in project design or impact assessment
Council will gazette the roads for appropriate heavy vehicle access.	
Community	
Issues raised at community information sessions include the ability to access paddocks which adjoin the mine site, including traffic control and speed control near Pola Road. Landowners have asked how they will be able to use Bennett Road and Jobling Road during the mining operation.	The items raised have been considered as much as reasonably possible at this stage of the Project in this TIA report. Most of the items raised would be subject to agreement with these key stakeholders, notably as part of the development of the Project's Traffic Management Plan (TMP), which will be required as a condition of any future permissions. A workable traffic diversion strategy will be required in consultation with the landowners and Council.

5.0 Methodology

5.1 Overview of method

This section describes the method that was used to assess the potential impacts of the project. Figure 6 shows an overview of the assessment method. A risk-based approach was applied to prioritise the key issues for assessment and inform measures to avoid, minimise and offset potential effects.

The approach used in the assessment has been guided by the evaluation framework that applies to the project comprising the regulatory framework (that is, applicable legislation and policy) as well as the scoping requirements set by the Victorian Minister for Planning.

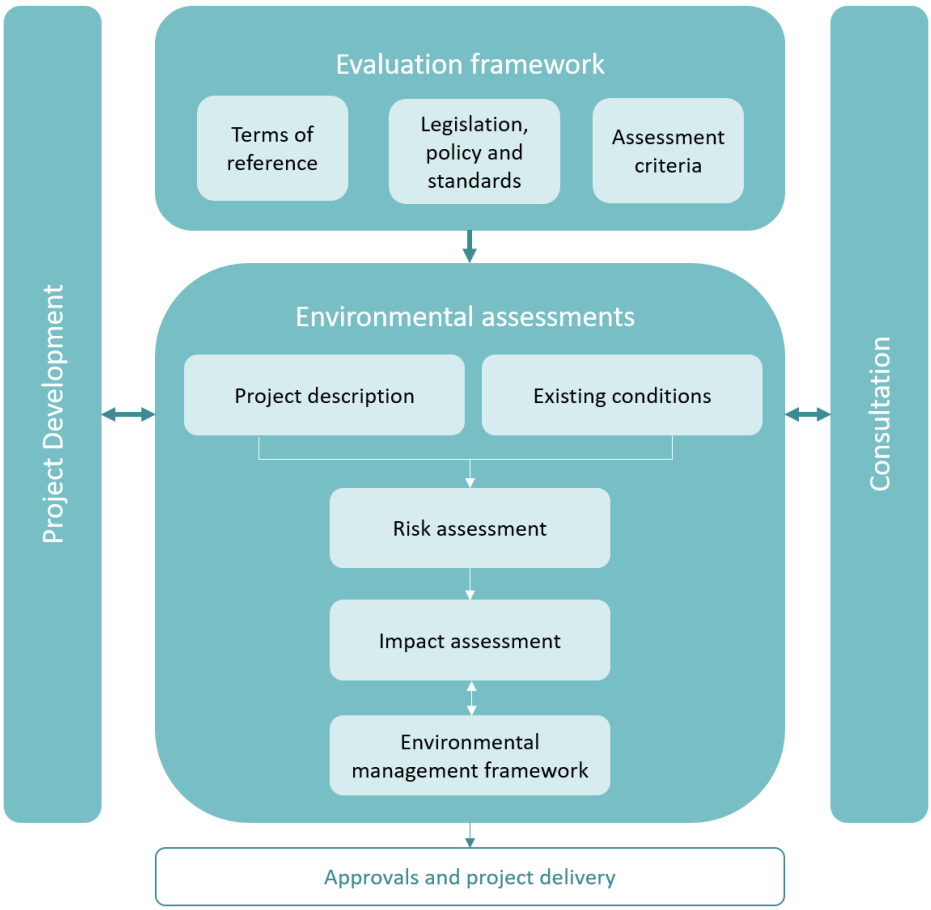


Figure 6 Overview of assessment framework

The environmental assessments were undertaken according to the following steps:

- Establishment of a study area and characterisation of existing environment.
- Review of the project description, comprising the key project components (including locations and form), proposed construction and operation activities (in the context of existing environment) and decommissioning activities to determine the location, type, timing, intensity, duration and spatial distribution of potential project interactions with sensitive receptors.
- An initial risk based analysis to evaluate the potential effects of proposed project activities and their likelihood of occurring (considering initial mitigation measures) to determine the relative importance of environmental impacts associated with the project and therefore prioritise issues for attention in the subsequent assessment of impacts. Initial mitigation measures would include measures that are common industry practice or required to meet legislation.

- An assessment of impacts that examines the severity, extent, and duration of the potential impacts and considers the sensitivity and significance of the affected receptors.
- Evaluation of predicted outcomes against benchmarks and criteria such as those described in applicable legislation, policy and standards.
- Evaluation of the potential for cumulative impacts (where relevant) caused by impacts of the project in combination with impacts of other existing and proposed projects that may have an overall significant impact on the same environmental asset.
- Identification of additional mitigation measures where necessary to address potentially significant environmental impacts.
- Evaluation and reporting of the residual environmental impacts including magnitude, duration and extent, taking into account the proposed mitigation measures and their likely effectiveness.

Based on the findings of the environmental assessments, an Environmental Management Framework (EMF) has been prepared to monitor and control environmental performance during project implementation. The EMF has specified the committed mitigation measures to avoid, minimise and manage impacts, proposed contingency measures and offset commitments, and describe the roles and responsibilities for implementation throughout project construction, operation and decommissioning.

The specific methods adopted during the key steps are described in the sections below.

5.2 Study area

The study area Figure 7 considered as part of the TIA is focused on the local road network impacts associated with the following project elements considered during construction, operation and decommissioning phases of the project:

- Access to the project sites.
- Access to 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.

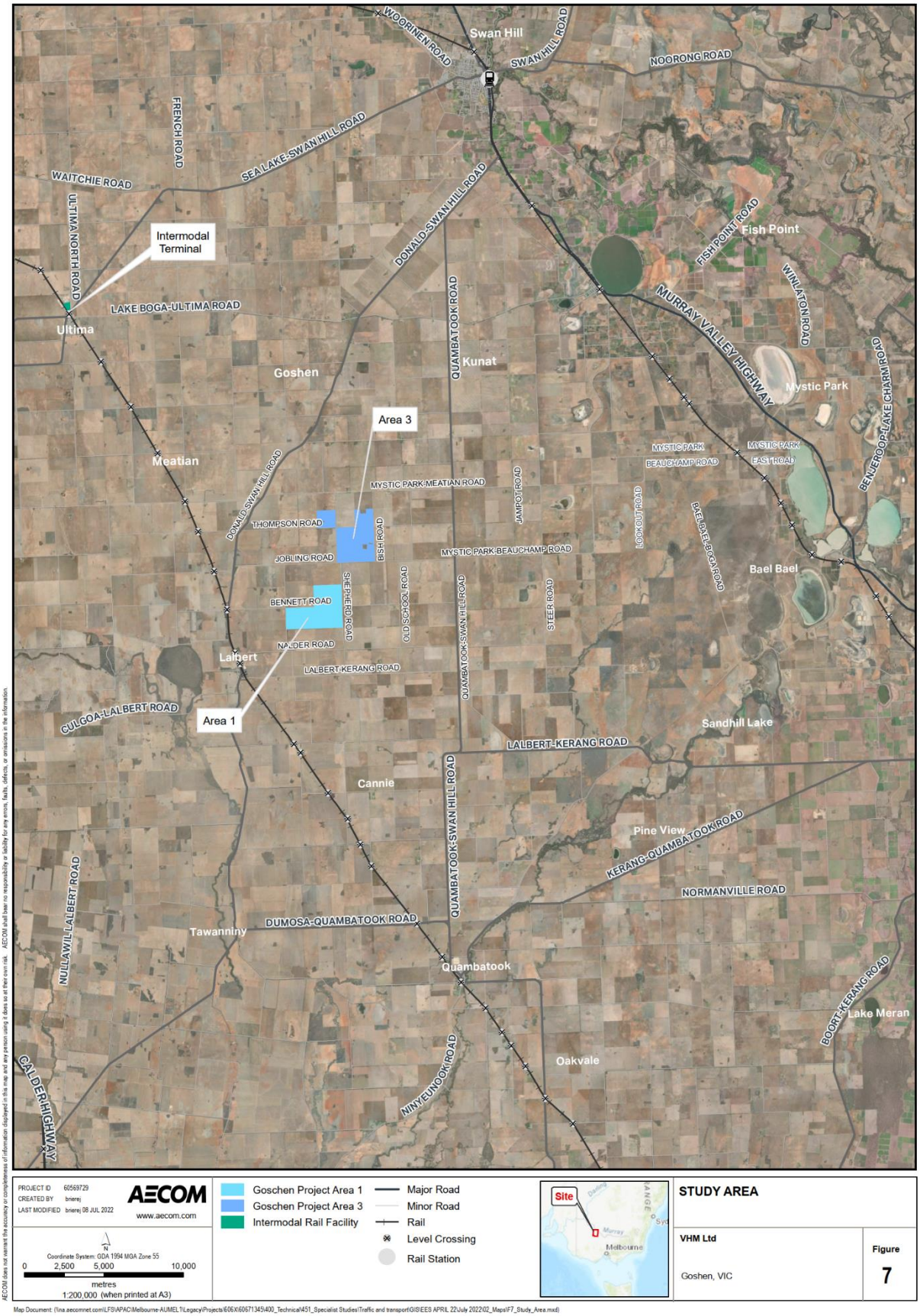


Figure 7 Study Area

5.3 Existing environment

A comprehensive assessment was undertaken to understand the existing environment of the study area to inform the subsequent project impacts. The existing conditions assessment methodology included:

- An initial desktop study of the study area and publicly available information.
- Site visit and assessment of the roads within the study area undertaken by AECOM 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 (sourced from DoT CrashStats), bus routes (sourced from DoT (PTV)) and designated heavy vehicle routes and restrictions (sourced from DoT (VicRoads) website).
- Analysis of available traffic data sourced from DoT and local Councils. This included assessment and developed 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.
- Preliminary consultation with RRV (DoT) and Gannawarra Shire Council.

5.4 Avoidance and minimisation

Relevant to this topic, the following measures have been adopted in relation to the design, construction and operation of the project to avoid and minimise impacts:

- Use of existing roads to access the project area to the extent possible, subsequently avoiding or limiting access to heavily vegetated areas to prevent vegetation removal.
- Installing the pipeline in GSC roads will minimise removal of native vegetation.
- Construction of the mine to be during normal working hours. Construction would only occur outside normal working hours where unavoidable or for safety reasons.
- Consideration during TMP development of traffic movements during local school bus movements if required.
- Use of arterial roads such as the Murray Valley Highway, Donald-Swan Hill Road, Calder Highway and Lake Boga-Ultima Road to the extent possible to minimise impacts to local roads. Local roads to be nominated to be used during all stages of the project to avoid using unsafe local roads.

5.5 Risk assessment

A risk assessment of project activities was performed to prioritise the focus of the impact assessments and development of mitigation measures. The risk pathways link project activities (causes) to their potential effects on the environmental assets, values or uses that are considered in more detail in the impact assessment. Risks were assessed for the construction, operation and decommissioning phases of the Project.

The likelihood and consequence ratings determined during the risk assessment process and the adopted mitigation measures are presented in Sections 7.0 and 13.0 and outlined in Appendix A. The risk assessment has been undertaken in line with the Preparation of Work Plans and Work Plan Variations Guideline for Mining Projects December 2021 (version 1.3).

5.6 Impact assessment

A change to baseline conditions (or the no-project case) caused by project activities in any of the project phases (construction, operation or decommissioning) may give rise to impacts.

The impact assessment involved identifying the severity, extent and duration of any impacts, positive or negative, that the project may have on the existing environment.

The significance of the impacts has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the government terms of reference established to guide the assessments.

This study has assessed the impacts of construction, operation and decommissioning of the project on the local transport network.

An overview of the TIA methodology is provided below:

- Proposed project construction and vehicle access strategy informed by VHM project requirements, including details on the following:
  - Vehicle types requiring site access.
  - The DoT heavy vehicle road network (HVRN) providing connection to/from the wider precinct and within the specific site area.
  - Indicative vehicle origin and destination requirements.
  - Primarily and alternative routes to and from the site access points.
  - The proposed project stages.
  - Potential points of restrictions (restricted height clearance structures, load limited bridges etc) as identified based on publicly available DoT HVRN data within the road network.
  - Proposed road network connections and access arrangements to the site and operation stage destination.
  - Indicative arterial road network traffic volumes based on available DoT data.
  - Vehicle volumes to/from site access points.
- AECOM utilised the above information to inform the following assessments with regards to the construction and operational phases of the project:
  - Access strategy review.
  - Traffic estimates and distributions.
  - Transport impacts - following identification of the magnitude of impacts on the site access and traffic routes to and from the work sites that would be impacted by the project, an assessment was undertaken that considered:
    - Road link capacity
    - Intersection safety.
    - Network infrastructure.
    - Public transport impacts, including school bus routes
    - Pedestrian and cyclist impacts.
    - Over-dimensional loads.
    - Residual impact and legacy.
- Upon completion of the impact assessment various treatments were considered to avoid, mitigate and manage the potential impacts.
  - Construction traffic route assessments:
    - Workers.
    - General construction traffic.
    - Over dimensional (OD).
  - Site access and road section upgrades

- Temporary or permanent road and lane closures due to the project.

5.6.1 Mitigation measures

Following the project impact analysis undertaken as detailed above, mitigation measures have been identified, these have been informed with consideration to the following:

- The construction, operation, and decommissioning phases of the Project.
- Likely modifications to the road network and associated consequences were assessed against relevant design guidelines, road safety data and stakeholder inputs.
- Potential mitigation measures were identified with reference to relevant design guidelines including: AustRoads Guides to Road design, VicRoads design supplements and the Infrastructure Design Manual, as well as reference to measures undertaken on similar projects.

5.7 Limitations, uncertainties and assumptions

5.7.1 TIA limitations and uncertainties

This TIA has been based on the data available from VHM for construction and operation activities for the project.

This assessment adopts a conservative approach to evaluate and manage the uncertainty inherent to impact assessments at the planning stage.

This TIA will form an input into a subsequent TMP, to be developed based on the final proposed design and construction methodology once a contractor has been selected to undertake the works.

5.7.2 TIA assumptions

Several assumptions have been made in the undertaking of this TIA as summarised in Table 4.

Table 4 TIA assumptions

Assumption		Assumption source
No.	**Overall**	
1.	A growth factor of 1.5% per annum has been applied to base year traffic volumes to consider growth between the base survey year (2020 - AADT) and end construction year (2024) and worst-case operational year (2044). This value was derived as the average of 1-2% average growth rate for public roads typically adopted by TIA studies in the absence of informed datasets and/or strategic model inputs. When calculating peak period volumes from AADT datasets, the Austroads Guide to Traffic Management Part 6 – Intersections, interchanges and Crossings Management has been reviewed, it nominated for rural roads that 11 to 16% of the AADT traffic volumes equates to the peak traffic volume period, to ensure a robust assessment 16% has been adopted.	AECOM
2.	Local Council defined rural collector and local access roads have had their respective existing AADT one-way traffic volumes estimated according to other similar projects and site observations. The rural collector roads are assumed to have 150 trips AADT and the local access roads 25 trips AADT.	AECOM

Assumption		Assumption source
	Construction phase assessment	
3.	Construction vehicle access routes are expected to be as per those that will eventually be utilised during the operation stage of the Project, given the road upgrades required in the local area. Vehicle access routes considered the following: • Route directness between construction worker / material sources and access points. • DoT heavy vehicle approved networks. • Location of potential height or weight restricted structures.	VHM
4.	Heavy vehicle movements are to follow the most direct route where practicable, via roads designated as part of the defined VicRoads heavy vehicle road network.	AECOM
5.	Light vehicle movements which will be generated by the workforce are expected to be travelling from the surrounding regional towns, Swan Hill (approx. 45km to Area 1 and 32km to Mystic Park) and Kerang (approx. 80km to Area 1 and 26km to Mystic Park). Drivers will be expected to utilise the most direct transport routes via the major roads to the proposed site access points and expected to park at this stage of project planning at defined project laydown areas. The distribution of light vehicle movements was estimated based on the location and potential accommodation provisions of the surrounding regional towns, • Swan Hill - 80% • Kerang - 20%	VHM & AECOM
6.	To develop the workforce traffic volumes for the project the following was proposed: • A worker laydown area is to be provided via each site access point, with sufficient car parking capacity for all workers. • All the site management and technicians are on site at once. • Each worker would travel to site via their own respective light vehicle to and from the respective work site per day. The works contractor may organise for construction workers to be transferred via bus to reduce vehicle volumes due to the project. • Workers would travel directly to the site access point and park at the respective works compound for toolbox talks before departing to work on site. With all workers to arrive in the morning between 6am-7am and depart in the evening between 6pm-7pm. • During project inductions, drivers would be instructed on the roads they can and cannot use to ensure impacts are reduced and that safe routes are used.	AECOM
7.	To estimate the peak hour traffic impacts expected at each of the proposed site access points the following has been proposed: • Construction sites operate seven days a week, with exceptions to be sought from EPA outside normal working hours guidelines. • Trips for OSOM and B-Double heavy vehicles to be distributed equally throughout the day between 7:00am and 5:00pm.	AECOM
8.	It is expected that prior to construction commencing that Bennett Road (for the extents of the Area 1 boundary) would be truncated, and traffic diversions implemented. When works move to Area 3 (year 8-12), Thompson Road would be truncated for mining activities and traffic diversion implemented.	AECOM

Assumption		Assumption source
Operation phase assessment		
9.	Workforce and material movement traffic projections during the Project operational phase have been provided by VHM. The processing plant is expected to operate 24/7, 365 days a year, with truck movements limited to daylight hours, with heavy vehicles expected to distribute over the daytime working day. Workforces arrive in the morning peak period between 5:00am – 6:00am and depart site in the evening peak period between 6:00pm – 7:00pm. Workforce shifts are anticipated to occur over a 12h period.	VHM
10.	OD mobilisation and demobilisation vehicles from/to Melbourne expected to travel to site via Calder Highway before travelling into the sites from Donald-Swan Hill Road south approach. However as these are not anticipated to be recurring daily movements, these have been excluded from the road capacity assessment.	AECOM
11.	Movements related to product haulage are expected to occur over a 12h shift period. These movements are expected to occur outside of workforce peak hour periods	VHM & AECOM
12.	General consumable and other deliveries are expected to originate from Melbourne and are expected to be occurring during the daytime. The deliveries are expected to be distributed over a 12h period with 25% of truck movements assumed to be going to Area 1 and the remaining 75% to Area 3W where operations would take place in 2044. These movements are expected to occur outside of workforce peak hour periods.	VHM & AECOM
Decommissioning phase assessment		
13.	Potential impacts associated with decommissioning works for the project are expected to be the same or similar to those associated with the construction phase, however, the overall level of impact is expected to be lower due to the nature of decommissioning activities. Any impacts would be managed with the implementation of the same mitigation measures as those proposed for construction phase.	VHM & AECOM

6.0 Existing environment

6.1 Local land use

The Goschen Project is located near Lalbert, in the Murray Basin, Victoria, approximately 35 kilometres south of Swan Hill. The local land use is mainly agriculture with local farmland, with one of the farms having around 800 sheep, which are subsequently sold to markets and exported. There are no cattle in the immediate setting. The local receptors near the Project area are shown in Figure 8.

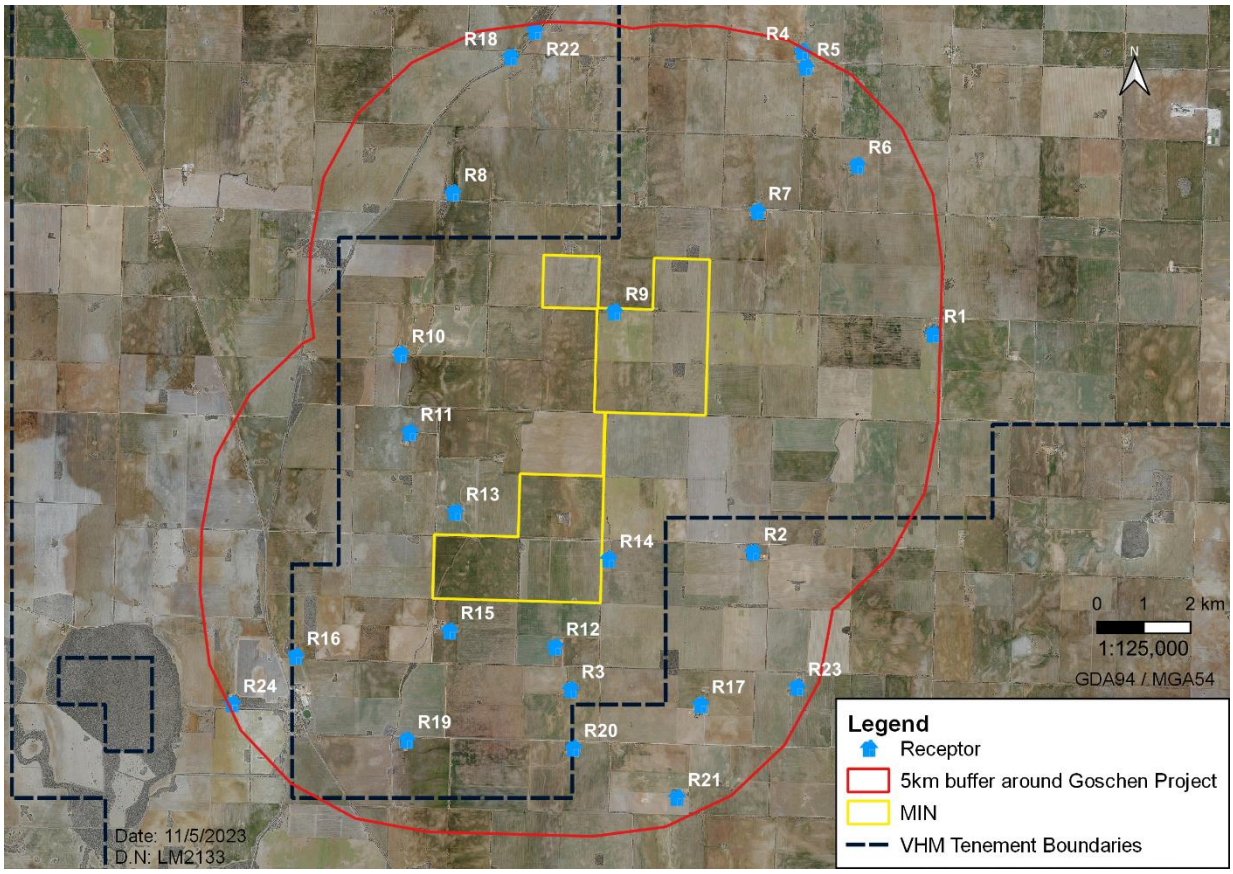


Figure 8 Local land use receptors

6.2 Local road network

6.2.1 Overview

The local road network is shown in Figure 9, with a summary review of the key transport elements of the existing local road network providing connections to the project are outlined in the following tables:

- Table 5 for the considered local roads to and from the Goschen Project areas, and onwards to the Ultima intermodal terminal.
- Table 6 for the considered local roads for access to the proposed water pipeline for the Goschen Project.

6.2.2 Site observations

A site visit was undertaken by AECOM on Tuesday 12 April and Wednesday 13 April 2022 to help understand current road network conditions, with Appendix B providing photos and more details on local roads from the site visit observations.

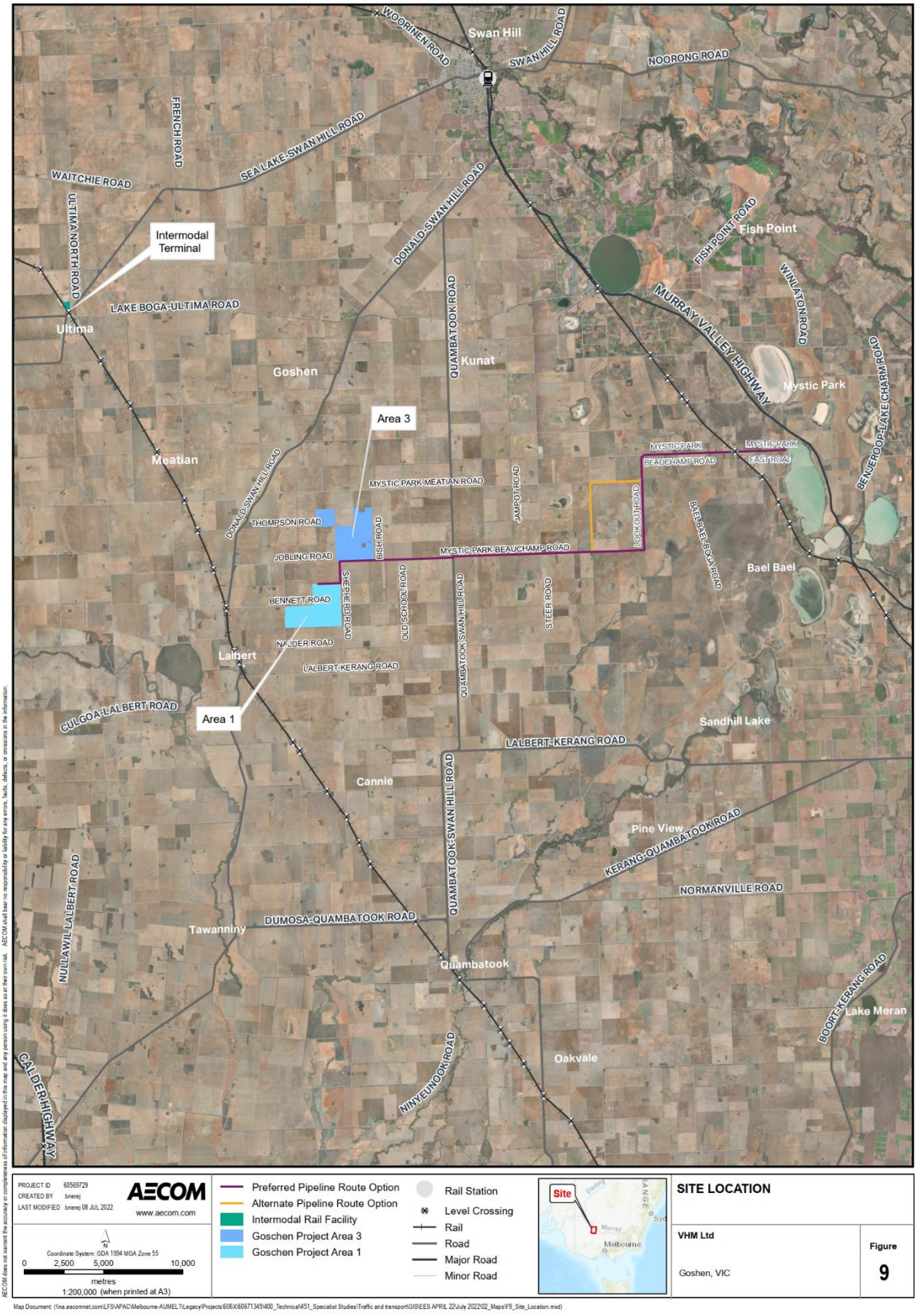


Figure 9 Site location

Table 5 Existing road conditions – roads to and from Goschen Project areas

Transport element	Murray Valley Highway	Calder Highway	Donald-Swan Hill Road	Dumosa-Quambatook Road	Sea Lake Swan Hill Road	Mystic Park-Meatian Road	Lake Boga-Ultima Road	Quambatook Road	David Street	Bish Road	Jobling Road	Shepherd Road	Quambatook-Swan Hill Road	Bennett Road	Thompson Road
Speed Limit (kph)	50 - 100	50 - 100	80 - 100			100	100	100	60	100					
Classification	Arterial – C class	Arterial – A class	Arterial – C class			Local				Local					
Managed by	DoT					Swan Hill Rural City Council				Gannawarra Shire Council					
Carriage way Width (m)	7 – 7.5	7	7 – 7.5	6 - 7	7.2	6.5 – 7.5	6.2	4.7	6.1	4.7 – 5.5	5 - 6	5.5 – 6.4	6-6.2	6-6.2	7.7-9.4
Shoulders	Gravel shoulders	Gravel shoulders	Gravel shoulders	Gravel shoulders	Gravel shoulders	None	Gravel shoulders	Gravel shoulders	Gravel shoulders	None	None	None	None	None	None
Road surface	Sealed	Sealed	Sealed	Sealed	Sealed	Gravel	Sealed	Sealed	Sealed	Gravel	Gravel	Gravel	Sealed	Gravel	Gravel
Total number of lanes	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two
Traffic Control	Give way intersections at local roads. Service roads with give way	Give way intersections at local roads. Level crossings along length of	Give way intersections at local roads. Level crossings at intersections with	Give way intersections at local roads. Level crossing near Barnes Road	Give way intersections at local roads. Level crossing near David St	Give way intersections at local roads.	Give way intersections at local roads.	Give way intersections at local roads.	Give way intersections at local roads.	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads

Transport element	Murray Valley Highway	Calder Highway	Donald-Swan Hill Road	Dumosa-Quambatook Road	Sea Lake Swan Hill Road	Mystic Park-Meatian Road	Lake Boga-Ultima Road	Quambatook Road	David Street	Bish Road	Jobling Road	Shepherd Road	Quambatook-Swan Hill Road	Bennett Road	Thompson Road
	entry/exits in townships.	highway including at intersection with Donald-Swan Hill Road	Bennett Road, Power Road, and Calder Highway												
On the Principal Bicycle Network?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
On a Strategic Cycling Corridor?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Bicycle facilities	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian facilities		Pedestrian crossing points in urbanised areas/townships	No	No	No	No	No	No	No	No	No	No	No	No	No
Bus facilities	Quambatook –	Wycheproof - Swan Hill	Wycheproof - Swan Hill	Quambatook –	Quambatook –	No	Swan Hill - Sea Lake via	No	Swan Hill - Sea Lake via	No	No	No	No	No	No

Transport element	Murray Valley Highway	Calder Highway	Donald-Swan Hill Road	Dumosa-Quambatook Road	Sea Lake Swan Hill Road	Mystic Park-Meatian Road	Lake Boga-Ultima Road	Quambatook Road	David Street	Bish Road	Jobling Road	Shepherd Road	Quambatook-Swan Hill Road	Bennett Road	Thompson Road
	Kerang bus route	via Lalbert bus route	via Lalbert bus route	Kerang bus route	Kerang bus route		Ultima bus route		Ultima bus route						
B-Double Approved Route?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes but only conditionally approved from Shepherd Road to Quambatook-Swan Hill Road (accessible in dry weather only)	Conditionally approved from Jobling Road to Nalder Road (accessible in dry weather only)	Yes	Yes	No
Truck Over-Dimensional Route?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Over size and over mass (OSOM) route	Yes	Yes	Yes	Yes	Yes. ODL Permits required at level crossing	No	Yes	No	Yes	No	No	No	Only from Quambatook to Mystic Park	No	No

Transport element	Murray Valley Highway	Calder Highway	Donald-Swan Hill Road	Dumosa-Quambatook Road	Sea Lake Swan Hill Road	Mystic Park-Meatian Road	Lake Boga-Ultima Road	Quambatook Road	David Street	Bish Road	Jobling Road	Shepherd Road	Quambatook-Swan Hill Road	Bennett Road	Thompson Road
					near David Street								Meatian Road		
HPFV A-Double 30m Network	Yes – conditionally approved in some sections	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No
On-street parking facilities	In townships only	In townships only	No	No	No	No	No	No	No	No	No	No	No	No	No

Table 6 Existing conditions – roads accessing Goschen Project water pipeline

Transport element	Jampot Road	Mystic Park – Beauchamp Road	Steer Road	Cumnock Road	Jewson Road	Mystic Park East Road	Gorton Drive	Bael Bael – Boga Road	Wilson Street	Silvester Road
Speed Limit (kph)	100	100	100	100	100	100	100	100	60 - 100	100
Classification	Local	Local	Local	Local	Local	Local	Local	Local	Local	Local
Managed by	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council	Gannawarra Shire Council
Carriageway Width (m)	5.4 - 6	6.5 – 7.5	5 - 6	4.5 - 6	6.3	6.3 – 6.5	5.5 – 6	6 - 7	8	6

Transport element	Jampot Road	Mystic Park – Beauchamp Road	Steer Road	Cumnock Road	Jewson Road	Mystic Park East Road	Gorton Drive	Bael Bael – Boga Road	Wilson Street	Silvester Road
Shoulders	None	None	None	None	None	Gravel shoulders	Gravel shoulders	None	None	None
Road surface	Gravel	Sealed from Wilson Street to Gorton Drive	Dirt	Gravel	Dirt	Gravel	Sealed	Gravel	Gravel	Gravel
Total number of lanes	Two	Two	Two	Two	Two	Two	Two	Two	Two	Two
Traffic Control	Give way intersections at local roads	Give way intersections at local roads Level crossing near intersection with Silvester Road	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads	Give way intersections at local roads
On the Principal Bicycle Network?	No	No	No	No	No	No	No	No	No	No
On a Strategic Cycling Corridor?	No	No	No	No	No	No	No	No	No	No
Bicycle facilities	No	No	No	No	No	No	No	No	No	No

Transport element	Jampot Road	Mystic Park – Beauchamp Road	Steer Road	Cumnock Road	Jewson Road	Mystic Park East Road	Gorton Drive	Bael Bael – Boga Road	Wilson Street	Silvester Road
Pedestrian facilities	No	No	No	No	No	Pedestrian crossing sign in Mystic Park	No	No	No	No
Bus facilities	No	No	No	No	No	School bus stop in Mystic Park	No	No	No	No
B-Double Approved Route?	No	Yes	No	No	No	Yes	No	No	No	No
Truck Over-Dimensional Route?	No	No	No	No	No	No	No	No	No	No
Over size and over mass (OSOM) route	No	No	No	No	No	No	No	No	No	No
HPFV A-Double 30m Network *	No	No	No	No	No	No	No	No	No	No
On-street parking facilities	No	No	No	No	No	No	No	No	No	No

It is noted that several culverts and bridges are present along some of the roads within the study area. Their locations are shown in Figure 10. Bridges and culverts may present restrictions to the heavy vehicle route as they may restrict access due to height or load restrictions. The locations of these should be noted when considering heavy vehicle routes and the impact that these vehicles may have on bridge and culvert structures. These impacts are further discussed in Sections 9.2 and 10.2.

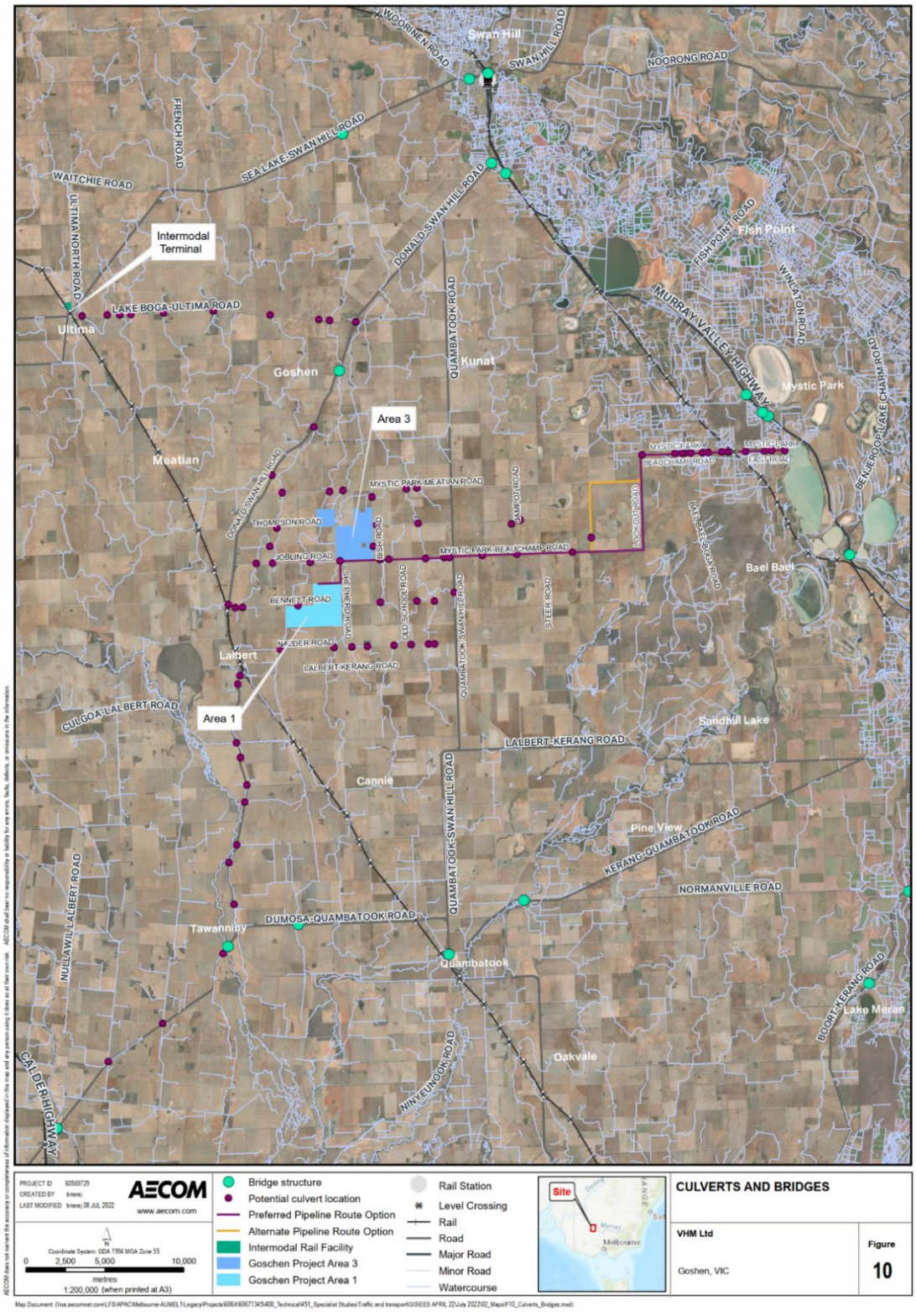


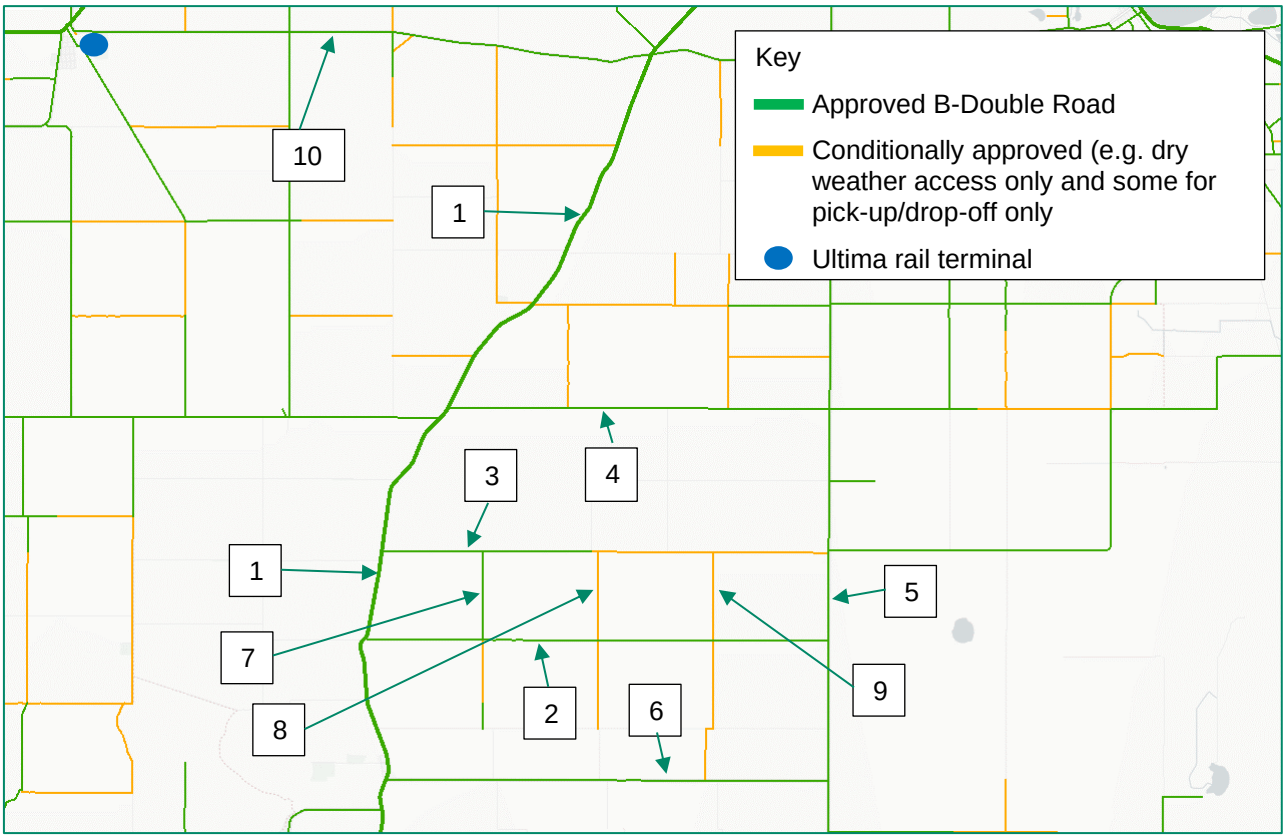
Figure 10 Culverts and bridges present within the study area

6.2.3 Heavy vehicle road networks

6.2.3.1 B-double road network

Victoria's Gazetted roads for B-Doubles is provided in Figure 11. As shown, the following key roads are approved for transport of B-Double vehicles:

1. Donald-Swan Hill Road
2. Bennett Road
3. Jobling Road
4. Mystic Park-Meatian Road
5. Quambatook-Swan Hill Road
6. Kerang-Lalbert Road
7. Pola Road
8. Shepherd Road – conditionally approved
9. Old School Road – conditionally approved
10. Lake Boga-Ultima Road



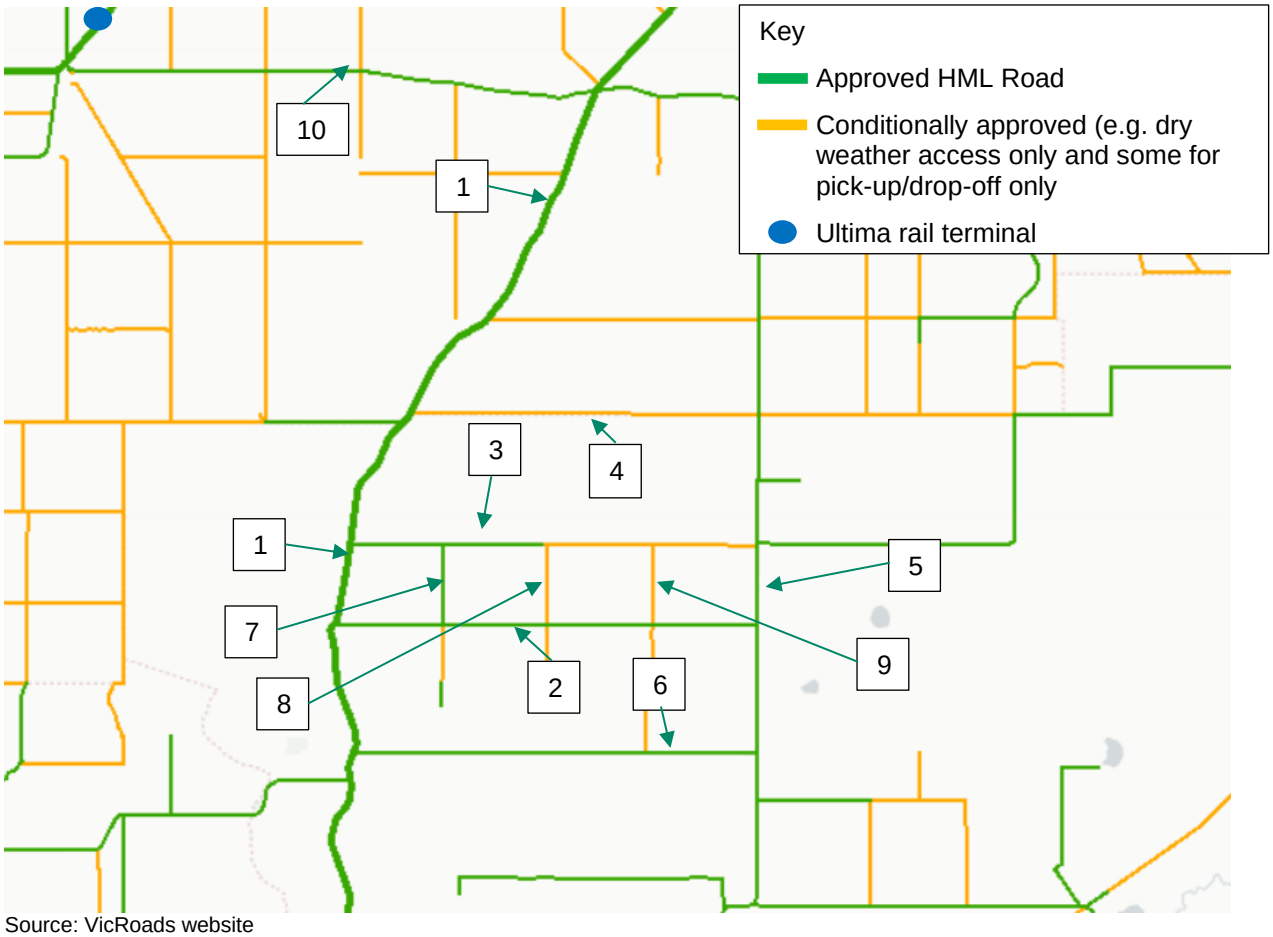
Source: VicRoads website

Figure 11 Victoria's Gazetted B-double road network

6.2.3.2 Higher Mass Limits (HML) road network

Victoria's Gazetted roads for Class 2 and 3 HML vehicles is provided in Figure 12. As shown, the following key roads are approved for transport of HML vehicles:

1. Donald-Swan Hill Road
2. Bennett Road
3. Jobling Road – partially conditionally approved
4. Mystic Park-Meatian Road – conditionally approved
5. Quambatook-Swan Hill Road
6. Kerang-Lalbert Road
7. Pola Road – partially conditionally approved
8. Shepherd Road – conditionally approved
9. Old School Road – conditionally approved
10. Lake Boga-Ultima Road



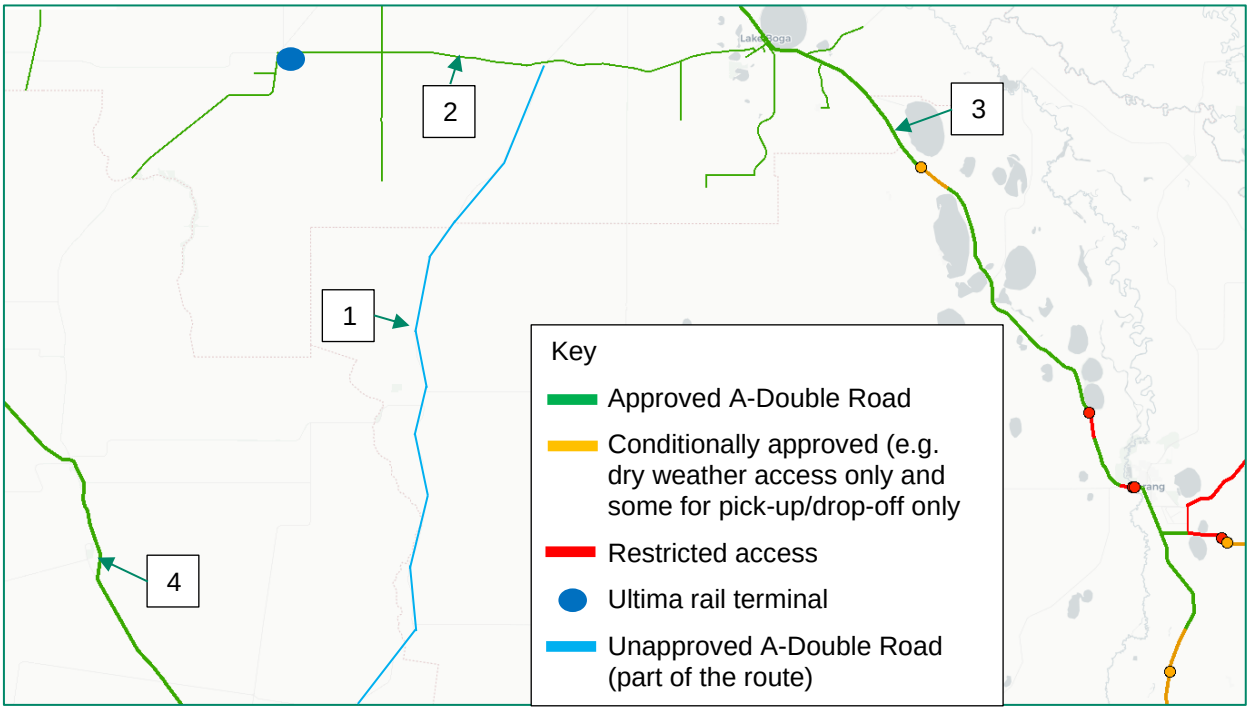
Source: VicRoads website

Figure 12 Victoria's Gazetted HML road network

6.2.3.3 30m A-double road network

Victoria's Gazetted Class 2 PBS Level 2B Mass – General Freight roads are provided in Figure 13. These allow for a 30 metre A-Double vehicle operating at weights between 68.5 tonnes and 85.5 tonnes. As shown, the following key roads are not approved / approved for transport of 30 metre A-Double vehicles:

1. Donald-Swan Hill Road – notably not approved including all local access roads in project area
2. Lake Boga-Ultima Road – approved
3. Murray Valley Highway – approved
4. Calder Highway - approved



Source: VicRoads website

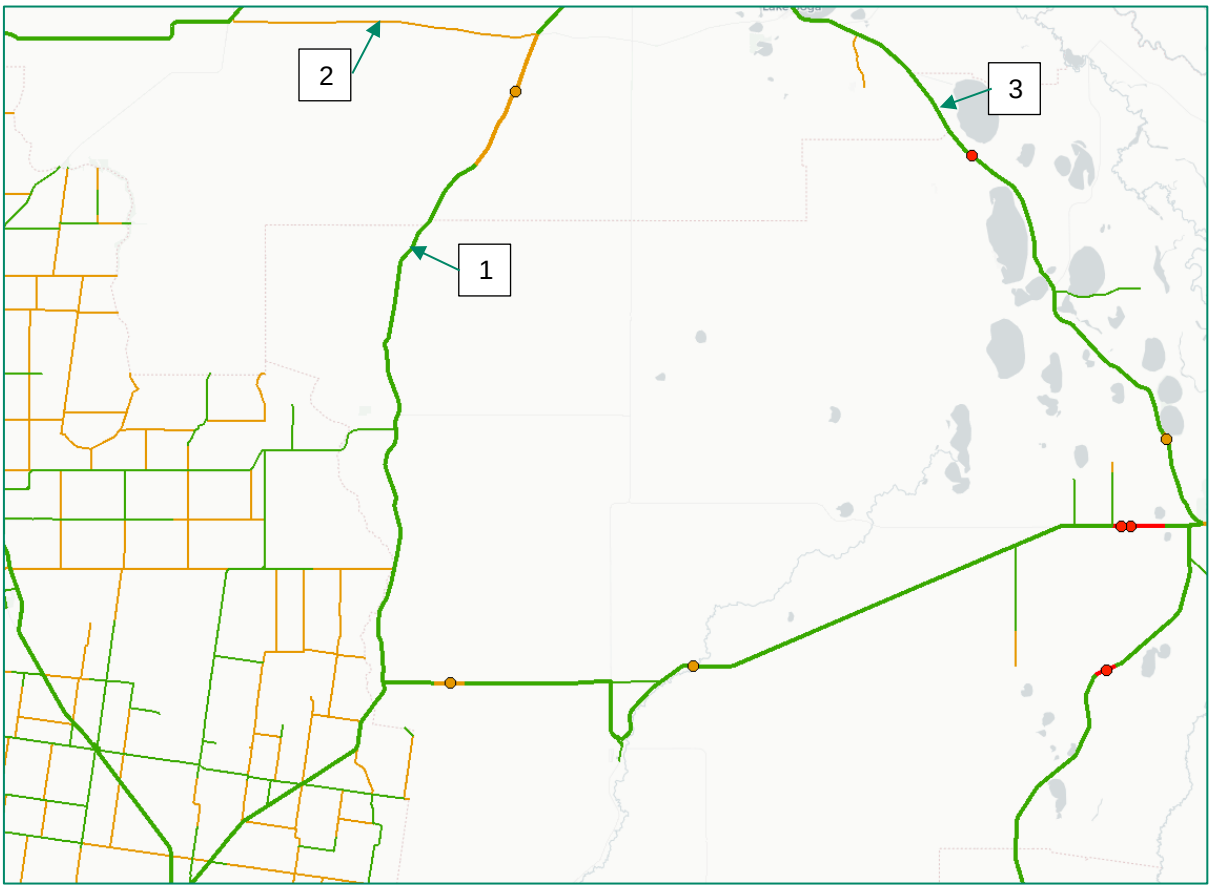
Figure 13 Victoria's Gazetted 30m A-double road network

It should be noted that the above approved A-Double road network also applies to several other HPFV combinations, such as 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. It should also be noted that different reference vehicles are subject to different mass allowances on mass limited structures.

6.2.3.4 Four & Five axle All Terrain Mobile Cranes

Victoria's Gazetted roads for four & five axle All Terrain Mobile Cranes, operating at up to 48 and 60 tonnes respectively are provided in Figure 14. As shown, the following key roads are approved for transport:

1. Donald-Swan Hill Road
    a. 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.
    b. From between its intersection with Holmes Road and continuing onto Lake Boga-Ultima Road the route is conditionally approved due to the structure shown (SN4622), which is a road over irrigation channel. The bridge is single span with an overall length of 4.6 metres, and 10 metres in width (9.4 metres available for traffic use). The structure requires vehicles of this type to slow down to 10km/h and travel with two certified pilots.
2. Lake Boga-Ultima Road – conditionally approved
3. Murray Valley Highway – approved
4. Calder Highway - approved



Source: VicRoads website

Figure 14 Victoria's Gazetted roads for 4 & 5 axle All Terrain Mobile Cranes

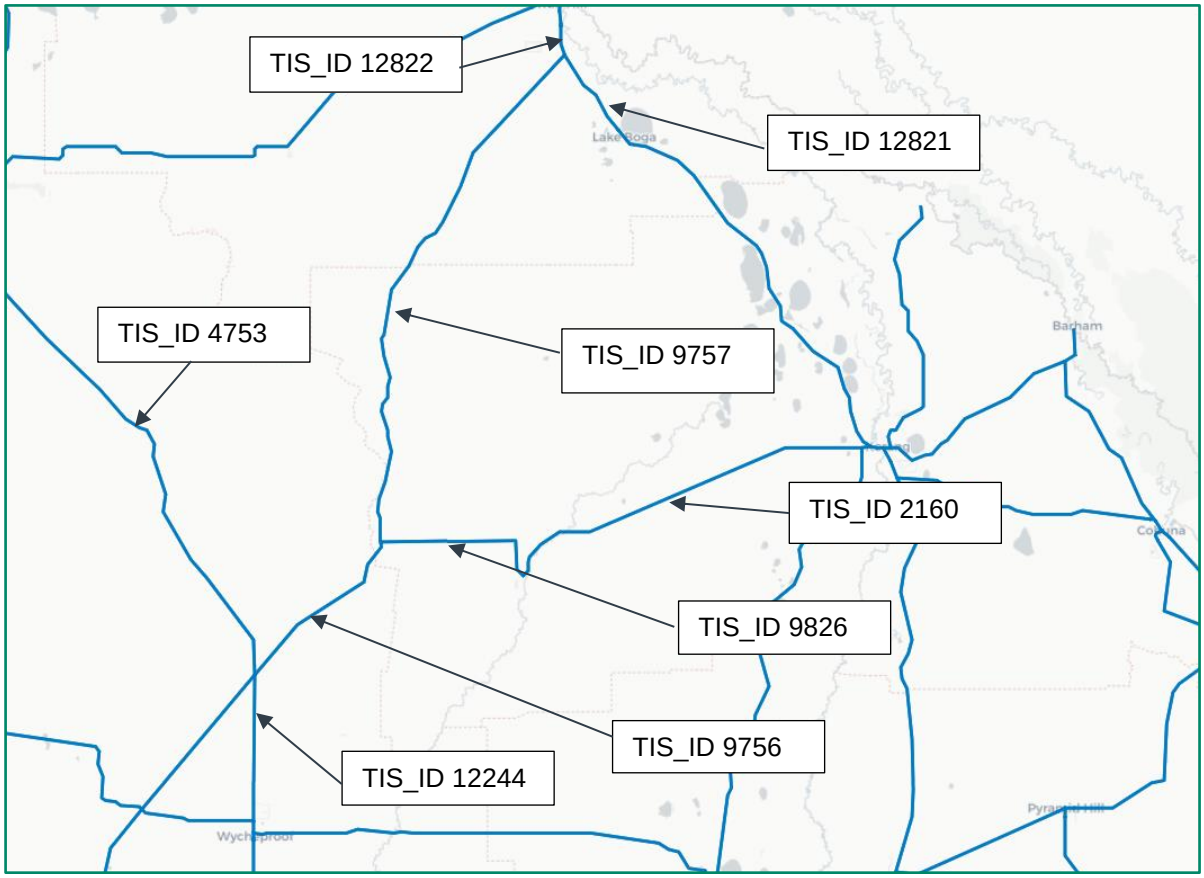
6.2.3.5 Other publicly known restrictions

The level crossings located on both Donald-Swan Hill Road and near the Ultima terminal are noted to require conditional approval to cross for combinations in excess of 26m long, 4.9m high and 5m wide, permission is required to traverse all rail crossings. Applications must be made to ODL Permits at DoT Heavy Vehicle Consent – Structural Engineering.

6.3 Traffic conditions

6.3.1 DoT managed road network traffic volumes

Traffic volume information was obtained from DoT open-source data hub for the declared roads anticipated to be utilised by the project. As shown in Figure 15, these roads are identified in the Traffic Information System (TIS) used to record data for the declared road network. Traffic volumes and percentage of heavy vehicle use for declared roads in the study area are summarised in Table 7.



Source: DoT open source

Figure 15 DoT managed road network – identification numbers

Table 7 DoT managed roads - road traffic volumes

TIS ID	Road	Location	*AADT one-way traffic volumes - 2020			**Peak period one-way traffic volumes - 2020			Growth rate
			Total AADT	Heavy vehs AADT	% Heavy Vehs	Total	Light vehs	Heavy vehs	
4753	Calder Highway	B/t Donald-Swan Hill Road and Birchip-Wycheproof Road	650	150	28%	104	89	15	650
11654		B/t Railway Avenue and Donald-Swan Hill Road	750	215	24%	120	99	22	750
9756	Donald-Swan Hill Road	B/t Dumosa-Quambatook Road and Calder Hwy	105	25	23%	17	14	3	105
9757		B/t Murray Valley Highway and Dumosa-Quambatook Road	155	20	23%	25	23	2	155
9826	Dumosa-Quambatook Road	B/t Donald-Swan Hill Road and Olive Street	60	20	32%	10	8	2	60
2160		B/t Olive Street and Lindsay Road	350	40	12%	56	52	4	350
12821	Murray Valley Highway	B/t Jaceranda Crescent and Lalbert Road	2,900	470	15%	464	417	47	2,900
12822		B/t Lalbert Road and McNeill Court	3,500	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 – 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.

6.3.2 Council managed road network traffic volumes

The local Councils have no available traffic count data for the local roads in the area. Accordingly, based on the rural setting and undertaking similar Projects, a rural local access AADT traffic volume of 150 vehicles AADT for collector and 25 vehicles AADT for local access roads have been assumed with 25% of these being heavy vehicles.

A summary of the local roads and adopted traffic volumes is provided in Table 8.

Table 8 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 vehs AADT	% Heavy Vehs	Total	Light vehs	Heavy vehs
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

*Note – 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

6.3.3 Traffic data analysis

6.3.3.1 Mid-block capacity analysis

Austroads mid-block capacity metric

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. Table 5.1 of this document states that the one-way mid-block capacity of an undivided road to be 900 pc/h, with peak period mid-block traffic volumes increasing to 1200 to 1400 pc/h/ln on any approach road when the following conditions exist or can be implemented:

- Adequate flaring at major upstream intersections.
- Uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity.
- Control or absence of crossing or entering traffic a minor intersection by major road priority controls.
- Control or absence of parking.
- Control of absence of right turns by banning turning at difficult intersections.

- High volume flows of traffic from upstream intersections during more than one phase of a signal cycle.
- Good co-ordination of traffic signals along the route.

Accordingly, based on the characteristics of the local road network a conservative mid-block capacity of 900 vehicles per hour has been adopted.

Local road network mid-block capacity

A review of the local road network mid-block capacities is provided in Figure 16. As shown the local road network has spare capacity to facilitate increases in traffic demand.

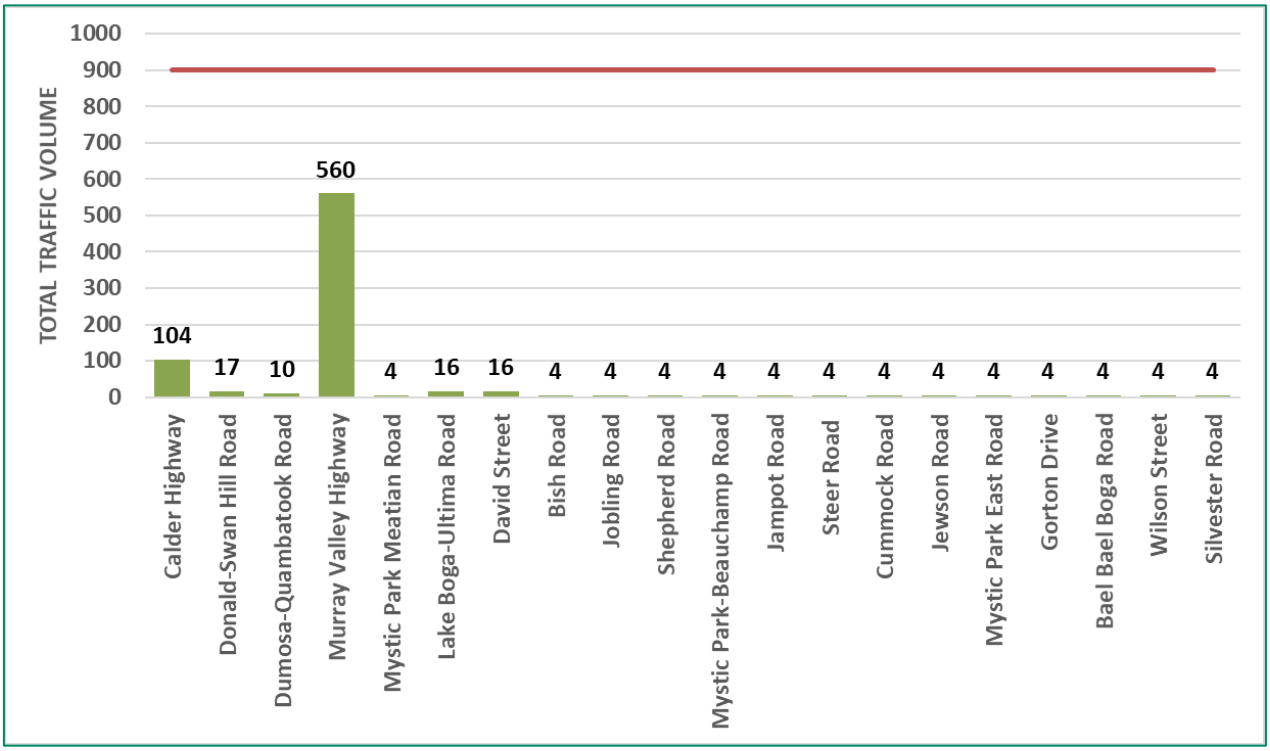


Figure 16 Local road network mid-block capacities

6.3.3.2 Peak period volumes

In the absence of traffic surveys, the peak period traffic volumes for the morning and evening peaks are assumed to be the same, with traffic flow diagrams attached in Appendix C. For simplicity any local road traffic volumes are estimated to distribute out equally onto arterial roads, with the same inverse demand assumed to enter these local roads during peak periods.

6.4 Existing sustainable modes of transport

6.4.1 Pedestrians and cyclists

Given the rural nature of the area, there are no known dedicated pedestrian or bicycle infrastructure provided along any of study area roads.

6.4.2 Public transport (Bus)

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 areas as outlined below:

- Quambatook – Kerang bus route currently operates along Kerang – Quambatook Road, Dumosa – Quambatook Road and Donald-Swan Hill Road. Buses typically operates 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 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 1.5-3kms of the proposed work area.

- Kunat – Swan Hill school bus route commences/terminates approximately 1km 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.

They generally would operate from 7:30 am to 9:00 am and 3:20 pm to 5:00 pm during school terms.

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.

DoT (PTV) regional bus routes operating within the vicinity of the proposed project area are shown in Figure 17.

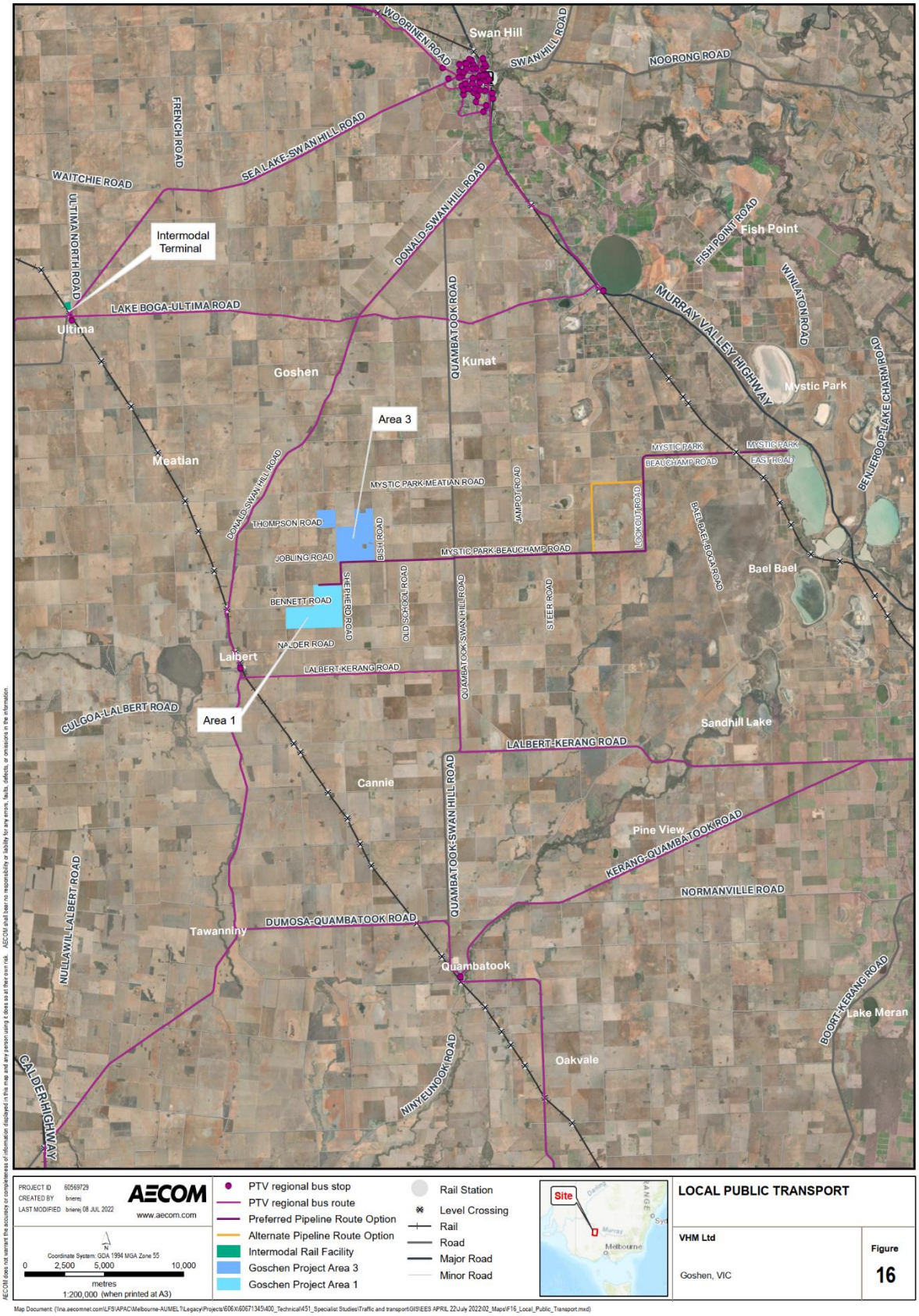


Figure 17 Local public transport

6.4.3 Rail

Whilst the Melbourne-Swan Hill railway line runs east of the Goschen Project area, there are no train stations in proximity to the site. The nearest station is the Swan Hill Railway Station located approximately 30km northeast of the project location. In addition, it is noted that that four level crossings exist within the study area. Locations and details of level crossings present within the study area are summarised in Table 9, with their respective locations shown on Figure 18.

Table 9 Location of level crossing in the vicinity of the project

Ref No.	Level Crossing	Location	Type of Protection	Protection Equipment
LX1	Donald Swan Hill Road	Near intersections with Bennett Road and Ultima Road	Passive	Signage and line markings
LX2	Donald Swan Hill Road	Near intersection with Calder Highway	Passive	Signage and line markings
LX3	Dumosa-Quambatook Road	2km west of Quambatook-Swan Hill Road	Passive	Signage and line markings
LX4	Mystic Park Beauchamp Road	Near intersection with Silvester Road	Active	Barrier arms, flashing lights, signage and line markings

6.5 Rail-freight intermodal terminal

The QUBE Ultima intermodal (rail and freight) terminal is in Ultima which is approximately 47km from the Goschen Project site entrance via Bennett Road. 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 expected to be 2 per week.
- The Ultima terminal has approved HPFV access for A Doubles to the site via Swan Hill-Sea Lake Road.

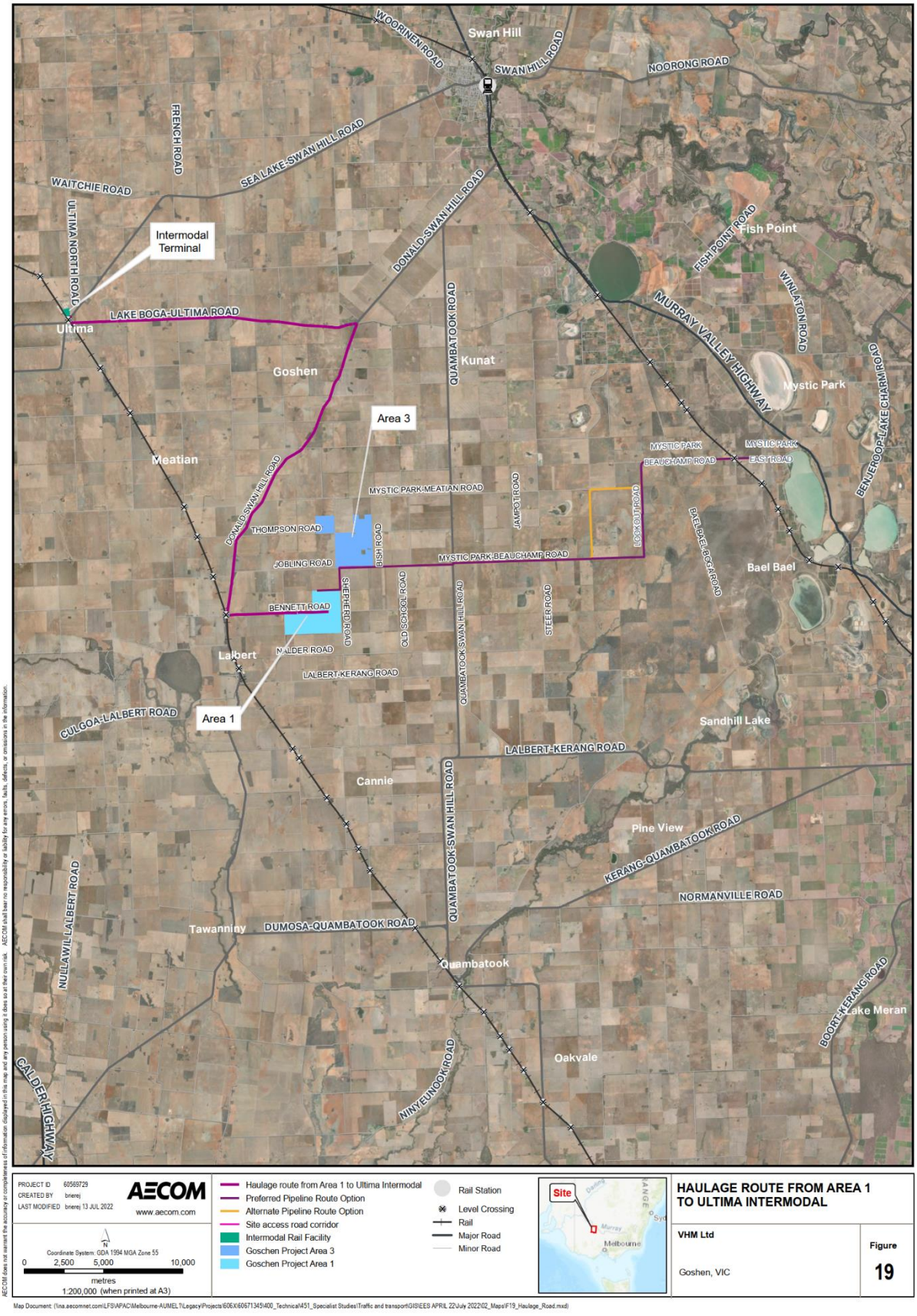


Figure 18 Haulage route to intermodal facility

6.6 Crash history

6.6.1 DoT CrashStats

DoT CrashStats was interrogated for the last five years of crash data for Donald-Swan Hill Road between the Calder Freeway and Murray Valley Highway. Donald-Swan Hill Road is anticipated to be the main haulage route used by the project traffic to access the Goschen Project areas. A summary of the reported crashes is provided in Table 10 and shown in Figure 19. In summary, the following was found:

- A total of 10 crashes were found to have occurred along Donald-Swan Hill Road, with two serious and eight other injury crashes recorded in terms of severity.
- No fatal crashes have been recorded.
- Serious crashes recorded were both classified as a collision with a fixed object or parked vehicle.
- No recorded crashes involved a pedestrian or cyclist.
- A total of eight crashes involved light vehicles, with a single crash involving a heavy vehicle and motorcyclist.
- Three of these crashes occur along Donald-Swan Hill Road which form part of the delivery route during operations. Of these three crashes, two occur at notable access points to the site, namely Donald Swan-Hill Road/Bennett Road and near Donald Swan-Hill Road/Jobling Road

Table 10 Summary of recorded crashes in the last five years (2015 - 2020)

Crash no.	Weekday	Time	Vehicles involved	Crash type	Speed limit	Severity
1	Friday	Day	1 LV	Other accident (off straight not included in DCAs 170-175)	100 km/hr	Other injury accident
2	Monday	Dark No streetlights	1 LV	Left off carriageway into object/parked vehicle	100 km/hr	Other injury accident
3	Saturday	Dusk/Dawn	1 LV	Other accidents on curve (not included in DCAs 180-184)	100 km/hr	Other injury accident
4	Friday	Dark No streetlights	1 LV	Left off carriageway into object/parked vehicle	100 km/hr	Serious injury accident
5	Saturday	Day	1 HV	Off carriageway on right bend	80 km/hr	Other injury accident
6	Thursday	Dark No streetlights	1 LV	Left off carriageway into object/parked vehicle	100 km/hr	Serious injury accident
7	Monday	Day	1 LV	Right off carriageway into object/parked vehicle	100 km/hr	Other injury accident
8	Saturday	Day	1 motorcycle	Out of control on carriageway (on straight)	100 km/hr	Other injury accident
9	Monday	Dark Street lights on	2 LV	Rear end (vehicles in same lane)	100 km/hr	Other injury accident
10	Saturday	Dark No streetlights	1 LV	Off end of road/t-intersection.	100 km/hr	Other injury accident

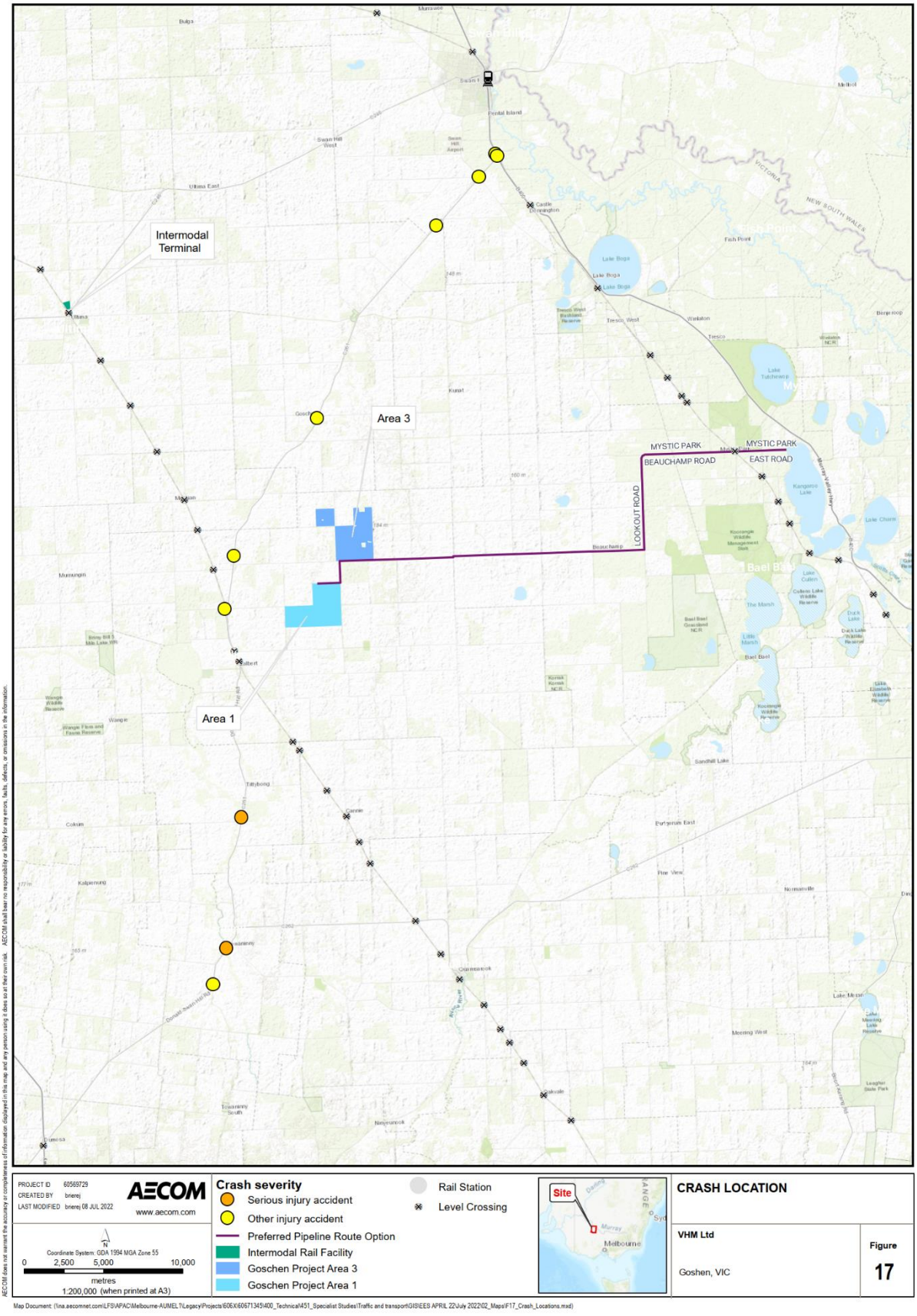


Figure 19 Crash locations

6.6.2 Swan Hill Rural City Council

Swan Hill Rural City Council has identified a fatality recorded at the Lake Boga Ultima Road and David Street intersection in 2021. This fatality has not been identified in DoT CrashStats as it has not yet been updated. As such, there is no description of the crash available. Nonetheless, the realignment and widening of David Street and Lake Boga Ultima Road intersection should be considered.

7.0 Risk assessment

The identified risks and associated residual risk ratings are listed in Table 11. The likelihood and consequence ratings determined during the risk assessment process and the mitigation measures to be achieved are presented in Appendix A.

Table 11 Transport risks

Risk ID	Potential threat and effects on the environment	Residual risk rating
Construction		
TR01	Additional traffic during construction may result in increased congestion, compromising road operation and safety within the vicinity of the project area.	Low
TR02	Insufficient road network infrastructure to accommodate safe movement of over-dimensional and over-mass loads	Low
TR03	Proposed access locations exacerbate or create new road safety issues. Risk of crash at intersection of access points and public road due to non-complying sight lines, stopping distance and lack of lighting.	Low
TR04	Road/lane closures or disruptions result in impacts on local access or business operations and emergency accessibility	Medium
TR05	Plant and spoil trucks deposit construction debris on public roads leading to dust and noise generation and loss of amenity and public health and safety issues.	Low
TR06	Movement of construction vehicles, as well as potential road closures/diversions and safety impacts on public transport and access for school buses.	Low
TR07	Additional project generated traffic and construction works impact other vulnerable road or site users resulting in a reduction in public safety and amenity.	Low
TR08	No emergency accesses provided to accommodate fire risks given the rural location and construction site locations.	Low
TR09	Public roads experience damage or deterioration due to the movement of heavy vehicles, machinery and plant.	Low
Operation		
TR10	Capacity of road network to accommodate workforce and heavy vehicle movements during operation	Low
TR11	Insufficient road network infrastructure to accommodate safe movement of over-dimensional and over-mass loads	Low
TR12	Proposed project area access locations exacerbate or create new road safety issues. Risk of crash at intersection of access points and public road due to recurring heavy vehicle movements, inadequate road width, non-complying sight lines, stopping distance and lack of lighting.	Medium
TR13	Road closures or disruptions result in impacts on local access or business operations and emergency accessibility	Medium
TR14	Public roads experience damage or deterioration due to the movement of operation traffic including heavy vehicles movements	Low

8.0 Proposed development

8.1 Construction stage

8.1.1 Staging and timeframes

An overview of the construction stage timelines is shown in Table 12, the specific construction works to be completed at each of the indicative work stages are summarised in the subsequent subsections.

Table 12 Goschen Project - Construction Program

Works stage	General works	Indicative Time period
Stage 1 – pre-works	Site investigations, general on-site pre-works and local access roads constructed and/or improved	2023 (Q3 / Q4) – 2-3months
Stage 2 – Area 1 works (including pipeline)	Site construction and establishment and water pipeline construction	2023 (Q4) – 6-12 months for Area 1 works and pipeline approx. 8 months.
Stage 3 – Area 3 works	Site construction and establishment	2031 – duration unknown
Stage 4 – Area 3W works	Site construction and establishment	2039 – duration unknown

8.1.2 Stage 1 – pre-works

The scope and detail of any project pre-works is still to be determined at this project planning stage. Typically, on such projects this would involve site investigations, general on-site pre-works (e.g. contractor facilities, site fencing and topsoil removal), improved access tracks and roads (including any necessary drainage).

The scope of any required pre-works before construction commences in terms of newly constructed roads or upgrades would be agreed with key stakeholders during the preparation of the project TMP. It is noted that if the tasks required in the pre-works take place prior to regulatory approvals that limitations will apply to these works until the relevant approvals are sought.

The timing of the closure of Bennett Road (extending from its intersection with Shepherd Road to an approximate mid-block location west towards Pola Road) would likely be part of the pre-works stage to ensure the safety of the surrounding community during construction.

8.1.3 Stage 2 – Area 1 works and pipeline construction

8.1.3.1 Area 1

Construction is proposed to commence after the relevant regulatory approvals are obtained, and will include:

- Process plant construction will occur in a staged approach, starting at the Wet Concentrator Plant (WCP) and progressing to the Mineral Separation Plant (MSP) which is a dry plant. This allows for ore commission of individual upstream process units and the availability for sale of respective products while downstream process units are yet to be completed.
- Adequate on-site footprint is available within the disturbance area for temporary construction offices, miscellaneous laydown areas, laydown for large equipment, modularised units and site assembly requirements, including using the tails stockpile area and the product container storage areas.
- On-site construction is estimated to take approximately six months to first availability of the WCP, through to 12 months for completion of the MSP (dry plant), predicated by early procurement of long lead delivery equipment and off-site pre-assembly and modularisation to decrease the site construction component.

- Construction equipment as per typical industry usage, and may include three 90t cranes on site at any one time, with an average boom extension of 30m, plus mobile lifting plant, service vehicles, welding plant, lighting towers, assembly workers, etc.
- Construction contractor is to provide all temporary construction power, administration and services buildings, ablutions, water management and site security.
- Construction activities are expected to take place during the day as default, lower risk activities not requiring working at height, or lifting equipment, or large teams of personnel, may occur at night if required to make up schedule delays.
- Commissioning activities will commence during the daytime only and progress to 24-hour activities when construction activities are significantly completed in the respective areas.
- A construction accommodation camp at this stage is not proposed as construction personnel are proposed to be housed within the local area.

8.1.3.2 Pipeline construction

The water supply pipeline will be constructed as shown in Figure 5. The pipeline will be placed either along the centre line of the nominated local roads or within the road reserve . In summary the following is predicted during construction of the water pipeline for the project:

- 38.30km of 450mm Ductile Iron Pipe (DICL) pipeline and associated fittings to be constructed over an approximate eight month period.
- A pipe crew would commence construction from each end, one from the mine and one from the pump station.
- Each crew will lay approximately 70m pipe per day.
- Crossing under rail by directional drilling. VicTrack approval to be sought and control measures to be followed.
- Irrigation channel crossings either on a pipe bridge or directional drilling, depends on approvals.
- Main road crossing by directional drilling.
- Pump station consisting of two pump/generator sets plus building and control system.

As the pipeline is proposed to be placed within the road reserve, short term road closures and temporary traffic diversions will be necessary. Furthermore, the relevant permits and approvals will be sought from council. These impacts and mitigation measures are documented in Section 9.4.3.

8.1.4 Stage 3 and 4 – Area 3 and 3W works

Early works will consist of establishment of contractor facilities and topsoil stripping in a sequence and to the required timing for all surface disturbances.

As part of the Area 3 works, Thompson Road will need to be closed as part of mining operations, the closure would commence from its intersection with Bish Road and extend west for the extents of the worksite.

The project incoming point for power and water supply will be from the Area 3 MSP, from which these utilities will be distributed to other users within Area 3, and across to Area 1 via an interconnecting services corridor, which would be established over the Shepherd Road easement connecting Area 1 and 3.

The interconnecting services corridor includes the Shepherd Road formation, an overhead powerline, water piping and potential future slurry piping.

Shepherd Road will remain a public road, with project vehicles and mobile plant utilising this road. Shepherd Road will require short road closures during construction and maintenance time periods.

8.1.5 Construction site access strategy

The site access strategy during construction is proposed to be established in a way that facilitates the operational phase of the project and to consequently ensure the safe movement of vehicles during all project phases.

Two site access points are proposed as outlined below:

- Site access point 1 – Area 1 Bennett's Road site entrance, wider access via:
  - Bennett Road and then via the Donald-Swan Hill Road and Bennett Road priority intersection.
- Site access point 2 – Area 3 – Jobling Road site entrance, wider access via:
  - Jobling Road, Bish Road, Mystic Park-Meatian Road and then the Donald-Swan Hill Road and Mystic Park-Meatian Road priority intersection.

8.1.6 Construction vehicle types

The likely construction vehicle types have been determined by firstly identifying the key materials and equipment needed for construction as outlined in Table 13. The construction vehicle types associated with these needs have been grouped to aid with vehicle route assessments taking into account their anticipated size, see Table 14.

Table 13 Materials and equipment needs and associated vehicle types

Key materials and equipment	Description	Likely vehicle types to be used
Bulk material handling	Bulk hauling of imported materials to the works sites and removal/relocation of site generated materials such as soil and vegetation and waste disposal trucks. Stockpiling of materials would occur at designate areas with the project boundary. Local material sources have yet to be verified, notably material from a local quarry will be required for mine (e.g. internal / external access roads) and pipeline works (bedding material)	Truck and dog Large concrete truck Water truck Truck and dog (water)
Oversize / heavy goods vehicles	Heavy transport and machinery logistics relate to material delivery, equipment and asset supply.	OD prime mover configuration
Equipment haulage	Handling of heavy earthmoving equipment, cranes and associated maintenance support services in and out of the work zone.	All terrain crane Small crane
Consumable deliveries	General consumable project deliveries.	Heavy Rigid Vehicle (HRV)
Pipeline deliveries	The project would facilitate the delivery, storage and handling of around 6,660 lengths of pipe plus fitting to be delivered to the sites via Melbourne, with 50% of material stored at the Area 1 mine site and 50% of material stored near the pump station.	B-Double Low Loader OSOM
Workforce access	The project would have daily crew movements to and from site with traffic peaks at start / end of working shifts	Passenger light vehicle

Table 14 Construction vehicle classification and sizes

Over-arching Vehicle Type	Sub-Vehicle Type	Vehicle Classification	Vehicle Length (based upon classification in metres, m)	Vehicle width (based upon classification in metres, m)	Transport Vehicles Gross Vehicle Mass (tonnes, t)
Light vehicles	Private car	99th percentile passenger vehicle	5.2	2.5	-
	Utes			2.5	-
Truck	Concrete truck	Heavy Rigid Vehicle (HRV)	8.8 to 12.5	2.5	22.4
	Rigid truck			2.5	13.5
	Water truck			2.5	TBC
	Large concrete truck			2.5	TBC
	Small crane			2.5	TBC
	Semi-trailers	B-Double	26.0	2.5	TBC
	Truck and dog			2.5	TBC
	Truck and dog (water)			2.5	TBC
	Low loader			2.5	TBC
	OSOM	Articulated Vehicle (AV)	19.0	2.5	TBC
SPV	Large mobile crane	All Terrain Mobile Crane (4 or 5 axle)	16.5	2.5	60.0
OD*	Heavy vehicles	Over-Dimensional	TBC	3.5	TBC

**OD vehicle specified for facilities component delivery. OD vehicle specifics are subject to confirmation.*

8.2 Operation stage

8.2.1 Staging and timeframes

An overview of the operational stage timelines is shown in Table 15, the specific construction works to be completed at each of the indicative work stages are summarised in the subsequent subsections.

Table 15 Goschen Project - Operational Program

Operational stage	Indicative Time period
Stage 1 – Area 1	2024 to 2032
Stage 2 – Area 3	2032 to 2039
Stage 3 – Area 3W	2039 to 2044

8.2.2 Area 1 operations

Year 1 disturbances and works would include:

- All disturbed areas will be firstly cleared of topsoil into temporary stockpiles for later reclamation for surface rehabilitation of disturbed areas back to original land use.
- All disturbed areas, including the mining blocks, which have disturbances to distinct clay layers will have these clay layers removed and placed into temporary clay stockpiles for later reclamation for rehabilitation.
- Commence mining on the eastern side of the orebody, over the high-grade Gemini Strandline.
- Commencement of mining with a commensurate distance from the nearest residence for the half of Life Of Mine (LOM), including the retention of the eastern end of Bennett Road and associated tree line as a visual and noise buffer for that time.
- Minimal disturbance of roads and trees, and avoidance of high priority exclusion zones.
- Adequate room for surface infrastructure for the LOM.
- Proximity of the temporary surface stockpiles of topsoil, clay and overburden to both the initial mining void and the final void for backfill.
- In-field located dewatering screens for sands tailings, with recovered water transferred for MUP use.

Year 4 disturbances (approximately 'mid-term') would include:

- The mining face has advanced.
- The fines waste evaporation ponds area re-established behind the mining pit void path.
- Topsoil removal, overburden removal and mining occurring in blocks 20 to 27.
- A mining void is retained just to the north of the eastern end of Bennett Road to facilitate future mining of blocks 29 and 30.
- The temporary overburden stockpile includes all the overburden of the initial mining void, rather than just the displaced year 1 volume.

8.2.3 Area 3 and 3W operations

Year 1 disturbances and works would include:

- All disturbed areas will be firstly cleared of topsoil into temporary stockpiles for later reclamation for surface rehabilitation to original land use.
- Sub-topsoil clay layers will be removed and placed into temporary clay stockpiles for later reclamation for rehabilitation to the original land use profile.
- Mining on two fronts at 5Mtpa ROM rate, commencing after completion of Area 1 simultaneously at the respective mining block 'number 1' found in each of the western and eastern orebodies.
- Minimal disturbance of roads and trees, and avoidance of high priority exclusion zones.
- Adequate room for surface infrastructure for the LOM.
- Proximity of the temporary surface stockpiles of topsoil and overburden to both the initial mining void and the final void for backfill. Noting that all stockpiles resulting from mining either side of Shepherd Road will remain in their respective areas to avoid requirement for mining fleet to cross over at the corner of Shepherd Road and Thompson Road.
- In-field located dewatering screens for sands tailings, with recovered water transferred for MUP use.
- Surface temporary stockpiles for management of minerals processing fines waste.
- Safe separation of off-road bulk earthmoving equipment and road licensed trucks and light vehicles.

- Off-road bulk earthmoving equipment used for mining and haulage of overburden to temporary stockpiles, ore to MUP, dewatered sand and fines waste filter-cake to temporary stockpiles, and relocation of all temporary surface stockpiles into the finals void.
- Road licensed trucks and light vehicles for general services, import of reagents, spares and goods, and export of all products.
- MUP processing infrastructure to be constructed, commissioned, and operated.
- Pumpstations and piping / power services corridors for the ROM slurry and return water transfer between the eastern and western MUP's to the WCP, plus a similar services corridor for the transfer of concentrate and return water between the WCP and MSP.
- End point facilities for the services corridor connection between Areas 1 and 3.

8.2.4 Operations site access strategy

8.2.4.1 External

Access points and routes as per the project construction stage would be utilised for both Areas 1 and 3, see Section 9.3.

All on-site material would be transferred from the site via industry standard, 20-foot sea containers (or referred to as twenty-foot equivalent units, TEU). Each TEU shall have a product carrying capacity of 27 tonnes, and a total tare mass of 29.2 tonnes when including the TEU's self-mass of 2.2 tonnes.

On-site product transfer into the TEU's as well as sealing and securing of the container shall be complete using the required shipping standards and quality checked and assessed as part of meeting regulatory requirements.

The loading of the TEU's shall be completed by the process plant site operations as part of preparation for the subsequent trucking services receipt and transfer to the Ultima intermodal rail terminal. Product loading into TEU's shall be completed in both day and night-time operations in line with the process plants 24-hour operating schedule.

An overview of the external transport strategy for the movement of material from the site is outlined in Table 16.

Table 16 Goschen - operational - material transport strategy

Material transportation mode	Details
Road transfer to Ultima Intermodal Rail Terminal	It has been nominated that all product container (empty and full) delivery movements shall be during daylight hours only in line with a responsible approach to minimising local community disturbances. The first leg of the product transfer is via road haul to the Ultima intermodal rail terminal which is within 40km North West of the project site. Based on the sites production rate, 18 TEUs will be filled each day, or 126 TEUs per week. Road transport fleet has been nominated as A-double trailer configuration enabling four empty TEU to site and two loaded TEU from the mine site per truck delivery cycle. Each truck movement to and from site shall carry either empty or full containers respectively. Truck driver shifts 12 hours per day, however, can be 14 hours with advanced fatigue management in place. QUBE can implement as required whilst adhering to regulatory requirements, will increase operational cost due to training, reporting and management to suit 14 hours transport philosophy if deemed required.
Rail transfer to Port	The Ultima intermodal rail terminal is the nominated railyard for the rail component of the transfer. It is a broad gauge rail enabling up to 80-100 wagons per train. The Ultima railyard has a 900m siding, with a rail face hardstand of 500m length by 30m width. The 500m hardstand length effectively allows the placement of circa 80 TEUs alongside the rail loading area. QUBE has a long-term lease of the intermodal terminal which will enable the optimal placement

Material transportation mode	Details
	of the TEUs alongside the siding for cargo consolidation and ease of transfer onto rail wagons. Where empty containers are to be railside they may be stacked 3 containers high. QUBE currently estimates sufficient room to cater for up to 630 containers (nominally 315 empty and 315 full) which may be required in the unlikely event of rail disruptions or to deal with any surges in the delivery chain from site to port. The projects loaded 20' containers can be loaded two per 40ft wagons. QUBE currently estimate they have capacity on all 3 standard rail service days to accommodate the 126 TEUs per week. When divided over the 3 rail pass available days, the 126 TEUs divide to nominally 42 TEUs being transferred per rail movement. Where seasonal factors for QUBE's other customers drops the regional rail demand, there may likely be a drop in Standard Rail Pass days from 3 to 2, in which event QUBE will transfer the 126 weekly TEUs over 2 days at nominally 63 TEUs per rail movement. QUBE's current TEU transfer per week is circa 160-180, which is currently requiring only 2 standard rail services. In the event an entire train would be commissioned to only transfer the project product using 40ft wagons, a maximum of circa 80 TEUs could be moved.
Port transfer to ship	With the Ultima intermodal terminal utilised as the product cargo consolidation area, the port area shall only be utilised as a transfer point in the days leading up to a ship's planned departure to the product purchaser's destination. Container line carriers are in vessel/space sharing arrangements with usually 3 or 4 other container line carriers, equating to 4-5 different ships sailing to China weekly. The 3 container stevedoring terminals (Patrick / DP World / VICT) allow 5 free days of receivals to be placed at the terminal for each arriving ship, generally cutting off day before vessel arrives in port Trucks local to the port train railyard shall take receipt of the unloaded TEUs of the wagon and move them to the stevedoring terminals for subsequent container crane transfer onto the ship.

In the event that the rail lines at Ultima Intermodal Rail Terminal become temporarily available for vehicle or track maintenance for extended durations of time, product may be temporarily transported to the Port of Melbourne using B-Double or A-Double vehicles.

8.2.4.2 Internal

An overview of the internal transport strategy for the movement of vehicles within the project sites is outlined in Table 17.

Table 17 Goschen - operational – internal project site transport movement strategy

Project area	Details
Overall layout	The administration building and associated non-process infrastructure are predominately located at the entrance to the site to ensure minimal civilian traffic is on the product haulage routes. Plant access road for road licenced vehicles will be one-way only around the process plant equipment. A separate mine access road is provided for off-road vehicles for haulage to the waste stockpiles, or back to the mining void. The water buffer pond, power station and fuel storage are proposed to be located across the road from the plant to separate it from high traffic areas, such as deliveries of reagents and product collection which need to be closer to the operating plant footprint. The plant workshop and warehouse will be split in two:

Project area	Details
	▪ Small workshop located near the plant entrance and administration facilities for small scale works and storage of components for the WCP. ▪ Larger workshop and warehouse located near the MSP which will allow for larger vehicle deliveries (e.g. equipment, bulk reagents, etc.), to be handled without interfering with other site traffic.
Interconnection corridor – Area 1 and Area 3	The project incoming point for power and water supply will be from the Area 3 MSP, from which these utilities will be distributed to other users within Area 3, and across to Area 1 via an interconnecting services corridor, which would be established over the Shepherd Road easement connecting Area 1 and 3. The interconnecting services corridor includes the Shepherd Road formation, an overhead powerline, water piping and potential future slurry piping. Shepherd Road will remain a public road, with project vehicles and mobile plant utilising this road. Shepherd Road will require short road closures during construction and maintenance time periods.
Stockpiles and storage for product and tails	All dewatered tailings stockpiles to be returned to the mining void are in a covered common area away from product storage and plant road access. These grouped stockpiles are accessed via a dedicated road for off-road heavy earthmoving equipment and trucks for collection and blending of the various tail's streams and transport back to the void with minimal potential interaction with human and light vehicle movements.

8.2.5 Operational stage vehicle types

The likely operational stage vehicle types are outlined in Table 18. The operational stage vehicle types associated with these needs have been grouped to aid with vehicle route assessments, taking into account their anticipated size, see Table 19.

While it has been noted that the likely product logistic vehicle is a 30m A-Double, 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 68.5m. 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.

Table 18 Operational stage vehicle types

Operational tasks	Description	Likely vehicle types to be used
Mining fleet mobilisation and demobilisation	The mining contractor will use road licenced heavy transport vehicles with oversize load permits to mobilise and demobilise the mining fleet at commencement and at end of LOM. Large mobile cranes will be required to assemble and disassemble the mining fleet into modules to comply with oversize load permit regulations. The assembly and disassembly operations, and the oversize load movements will all occur during day-light hours only.	OSOM / OD vehicles
Workforce access Including operations staff, external consultants, mining contractors and other miscellaneous staff	The project would have daily crew movements to and from site with traffic peaks at start / end of working shifts	Passenger light vehicle
Operational consumables	General stores and consumables	Rigid truck

Operational tasks	Description	Likely vehicle types to be used
Fuel deliveries	For on-site works and equipment	B-Double Semi-trailer Rigid trucks
Maintenance tasks	General maintenance vehicle movements, e.g. plant parts	Semi-trailer Rigid trucks
Product logistics	Movement of TEUs from site to the Ultima intermodal rail terminal	30m A-Double

Table 19 Operational stage vehicle classification and sizes

Over-arching Vehicle Type	Sub-Vehicle Type	Vehicle Classification	Vehicle Length (based upon classification in metres, m)	Vehicle width (based upon classification in metres, m)	Transport Vehicles Gross Vehicle Mass (tonnes, t)
Light vehicles	Private car	99th percentile passenger vehicle	5.2	2.5	-
	Utes			2.5	-
Truck	Concrete truck	Heavy Rigid Vehicle (HRV)	8.8 to 12.5	2.5	22.4
	Rigid truck			2.5	13.5
	Water truck			2.5	TBC
	Large concrete truck			2.5	TBC
	Small crane			2.5	TBC
	Semi-trailers	B-Double	26.0	2.5	TBC
	Truck and dog			2.5	TBC
	Truck and dog (water)			2.5	TBC
	Low loader			2.5	TBC
	OSOM	Articulated Vehicle (AV)	19.0	2.5	TBC
	Heavy vehicle	A-Double	30.0	2.5	61.0
SPV	Large mobile crane	All Terrain Mobile Crane (4 or 5 axle)	16.5	3.5	60.0
OD*	Heavy vehicle	Over-Dimensional	TBC	Range from 2.5 to 4.0	TBC

**OD vehicle specified for mining fleet mobilisation and demobilisation. OD vehicle specifics are subject to confirmation.*

9.0 Construction impact assessment

This section of the report discusses the potential impacts of the project due to construction activities with the following considered after the overview of the construction stage:

- Section 9.1 – Traffic generation and road capacity impact analysis.
- Section 9.2 – Preliminary construction traffic route assessments.
- Section 9.3 – Preliminary site access and road section upgrades.
- Section 9.4 – Potential road and traffic lane closures.
- Section 9.5 – Amenity impacts on the local road network.
- Section 9.6 – Impacts to public transport.
- Section 9.7 – Impacts to pedestrians and cyclists.
- Section 9.8 – Emergency vehicle access.
- Section 9.9 – Road condition and maintenance.
- Section 9.10 – Summary of residual impacts.

Following assessment of the above, associated mitigation measures have been identified which are summarised in Section 13.0 of this report.

9.1 Traffic generation and road capacity impact analysis (TR01)

9.1.1 Traffic generation

9.1.1.1 Stage 1 – pre-works (2-3 months)

The estimated traffic generation of any pre-works before main construction activities commence would be subject to further refinement of the project's site access strategy and identification of required upgrades to facilitate the safe movement of project related traffic to/from site. This will include the movement of local community traffic due to proposed project road closures. The initial pre-work stage traffic generation will be routinely managed. Notwithstanding, the preparation of a Traffic Management Plan will adequately address the Stage 1 – pre-works traffic, as appropriate.

9.1.1.2 Stage 2 – Area 1 and pipeline works (6-12 months)

Area 1

Table 20 provides a preliminary list of commodities required to construct the processing facilities, including the approximate number of truck loads to the construction site. It also includes a preliminary list of the equipment items, by type, to be delivered by truck to the construction site. This is an aggregate number of estimated heavy vehicle deliveries over the Area 1 construction period. There are also expected to be approximately 200 daily light vehicle trips associated with the transport of workers.

Table 20 Construction commodities and transport

Commodity	Quantity	Estimated truck deliveries – one-way
Road base / aggregate	10,600m^3	795
Bitumen	583m^3	30
Concrete	3,750m^3	419
Structural / cladding steel	3,000t	600
Piping	17,300m	115
Cabling	80,000m	21
Buildings – office, control room, lab, etc.	7	7
Equipment items		
Conveyors, buck elevators, and feeders	58	50
Pumps	112	32
Bins and hoppers	53	20
Chutes and minor platework items	100	75
Thickeners and tanks	18	18
Belt / press filters	14	12
Magnetic / Electrostatic separators	37	12
Rotating scrubbers / trommels	2	6
Gravity spiral concentrators	24	12
Other process equipment	95	27
Other mechanical equipment	44	17
Power station	12	12
MCC 1,2 and 3	6	6
Wastewater treatment plant	1	4
Fuel storage facility	6	6

Commodity	Quantity	Estimated truck deliveries – one-way
Weighbridge	1	2
Reagent storage facility	8	8
	Total truck loads to site	**2,350** (rounded up to next 50)

Water pipeline

The likely total traffic generated by the construction of the water supply pipeline has been based on the following assumptions:

- Pipeline construction period of approximately eight months, with the pipeline extending over 38.3km of 450mm DICL pipeline and associated fittings.
- Construction assumptions:
  - Trenching 1.0m wide by nominal 1.2m deep.
  - Each crew will lay approximately 70m of pipe per day.
  - A pipe crew would start works at the same time from both ends of the pipeline, i.e., one from the Area 1 mine end and one from the pump station.
  - Backfill from excavated materials, waste disposed of locally (where required).
  - Crossing under rail by directional drilling.
  - Irrigation channel crossings either on a pipe bridge or directional drilling, depends on approvals.
  - Main road crossing by directional drilling.
  - Pump station requiring two pump/generator sets plus building and control system, with concrete pad.
- Total traffic generation assumptions:
  - Around 6,660 lengths of pipe plus fittings to be delivered to site via Melbourne, stored on site, 50% at the Area 1 mine site and 50% near the pump station – consisting of:
    - Total of 238 B-Double trucks for the pipe.
    - Total of 50 trucks for fittings.
  - Pipelaying will be 2 crews plus another crew for the pump station, around 10 people per crew.
  - Imported bedding material 0.5m^3/m, 19,000 m^3 SG around 2, 38,000t in 20t trucks, total of 1,900 trucks spread over the 8 months. Prioritised sourcing of bedding material from a local (or regional) quarry.

9.1.1.3 Stage 3 and 4 – Area 3 works (duration tbc)

No detailed construction traffic estimates have been derived for the project works move to Area 3. However, it is envisaged that any works would be minimal when compared to works associated with Area 1, since these areas will be established for mining extraction activities, including a laydown yard and workshop, and accordingly works would mainly be associated with site establishment.

The total construction traffic associated with these works would be approximately 5% of the total heavy vehicle traffic required to construct Area 1, equating to a total of 118 one-way trips. In addition, it is estimated that 50 construction workers (daily total) may be required to travel to site during initial site set-up.

9.1.1.4 Construction stage – traffic generation summary

A summary of the construction stage daily one-way trips estimated from the above prediction is provided in Table 21 for the project work stages.

Table 21 Construction stage – daily one-way traffic estimates

Works 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 works – Area 1 access	25	7	32	Assumed 50% of workers and plant associated with pipeline will distribute between the Area 1 and Pump Station end
Stage 2 – Pipeline works – Pump Station access	25	7	32	
Stage 3 – Area 3 works	50	2	52	
Stage 4 – Area 3W works	50	2	52	

The worst-case peak hour construction traffic volumes associated with the projects access points are summarised in Table 22.

Table 22 Construction stage – daily one-way traffic estimates

Works stage	Access point	Daily peak one-way trips		
		Workforce arrival light vehicles – AM peak 6am to 7am	Workforce depart light vehicles – PM peak 6pm to 7pm	Heavy veh const. midday peak*
Stage 1 – pre-works	Bennett Road	50	50	1
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	Mystic Park E Road	25	25	1
Stage 3 – Area 3 works	Jobling Road	50	50	1
Stage 4 – Area 3W works		50	50	1

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

9.1.2 Traffic distribution

Workforce traffic distribution

The final distribution of construction workforce trips would be verified once the contractor has been appointed.

The distribution of workforce light vehicle movements was estimated based on the location and potential accommodation provisions of the surrounding regional towns:

- North (Swan Hill, Lake Boga, Ultima) - 80%

- South (Kerang, Quambatook, Boort) - 20%

Note that the regional towns listed above do not represent the extent of workforce origins and other regional towns may also be sourced. Given the driving distances and lack of local accommodation options, on-site accommodation could be considered by the works contractor.

Construction heavy traffic distribution

Given the site location and links to the wide arterial and highway road network, it is expected that the majority if not all construction plant trips would originate from Melbourne, and therefore travel to site via the Calder Highway and travel into the sites from Donald-Swan Hill Road south approach.

The exception to this could be where quarry materials or spoil removal trucks may travel, however the expectation is that such traffic volumes can be accommodated from a network capacity perspective given the rural road network volumes.

9.1.3 Project construction stage traffic impact analysis

Table 23 shows the following with regards to the project construction stage traffic impacts:

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

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. Table 5.1 of this document states that the one-way mid-block capacity of an undivided road to be 900 pc/h, with peak period mid-block traffic volumes increasing to 1200 to 1400 pc/h/ln on any approach road when certain conditions are met.

Accordingly, based on the characteristics of Donald Swan-Hill Road and the Murray Valley Highway a mid-block capacity of 900 vehicles per hour (1,800 vehicles per hour two-way) has been adopted. The traffic impacts during the construction stage are predicted to be negligible via these major access roads to the project's areas, with a spare mid-block theoretical 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.

9.1.4 Proposed mitigation measures

The findings of the Project construction stage traffic generation analysis suggest that there is negligible impact on the capacity of the local road network. As such, there are no significant intervention measures required to manage these negligible impacts. However, the following mitigation measures may be implemented:

- Stakeholder Engagement Plan (SEP) (MM-TP01) 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.
- Traffic Management Plan (TMP) (MM-TP02) to include measures for the management of light and heavy vehicle routes and reduction in trips where possible.
- Site Access Strategy (MM-TP06) to develop the routes workers will use to access each site, the method of travel (carpooling, buses etc), accommodation for workers (if any), parking and time of arrivals and departures to reduce the traffic volumes on roads and intersection during peak times.

With the implementation of the mitigation measures outlined above the project traffic during construction will not significantly impact 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 construction period.

Mitigation measures are detailed further in Section 13.0.

Table 23 Project traffic volume increases at mid-block and intersections within the study area – 2024 construction stage (worst case year adopted)

Access Point	Minor road	Major road	Speed (km/hr)	AM peak volumes				PM peak volumes				Midday peak volumes					
				Major road mid-block		2024 Project Intersection volumes		Major road mid-block		2024 Project Intersection volumes		Major road mid-block		2024 Project Intersection volumes			
				2024 two-way	2024 & project two-way	Left In^	Right In^	2024 two-way	2024 & project two-way	Left out^	Right out^	2024 two-way	2024 & project two-way	Left out	Right In	Left in	Right out
Area 1	Bennett Road	Donald Swan-Hill Road	80	52	277	180	45	52	277	45	180	52	58	6	6	0	0
Area 3 / 3W	Mystic Park-Meatian Road	Donald Swan-Hill Road	100	52	102	40	10	52	102	10	40	52	54	1	1	0	0
Pipeline Pump Station	Mystic Park E Road	Murray Valley Highway	100	1,188	1,213	5	20	1,188	1,213	20	5	1,188	1,196	0	0	4	4

^ Project peak hour traffic 80/20 split.

9.2 Construction traffic route assessments (TR02)

The source locations for materials and components required for the project have not been confirmed, however most of the materials delivery traffic is assumed to originate south of the project from the Melbourne area.

A desktop analysis was undertaken of the transportation routes to the site access points for the project. Further analysis is required during the detailed design phase to verify material and component source locations.

This desktop assessment considered the following vehicle transportation requirements for construction:

- Wider road network:
  - Limited to the wider road network transport route from Melbourne to the project area.
- Local road network:
  - Workforce (light vehicle) movements from local towns to the work site access points.
  - 26m B-double vehicle transport movements to deliver and remove associated materials.
  - OD vehicle transport for delivery of large components required for construction of the procession facility

9.2.1 Wider road network transport routes – construction material transport route

Most of the initial traffic associated with the delivery of materials and components is expected to originate south of the project area from Melbourne. Once works sites are established and construction has commenced, the vehicle trips could be more locally concentrated.

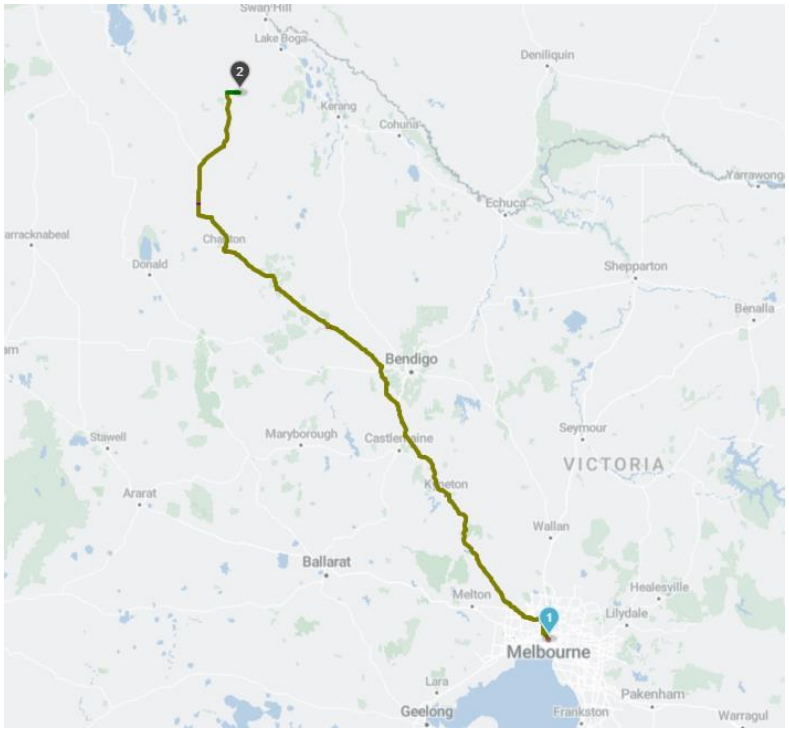
A review of the National Heavy Vehicle Regulator (NHVR) route planner has been conducted which shows the expected transport routes for heavy vehicles from Melbourne to the project areas which are outlined below:

- Project Area 1 and 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 the main project sites at Area 1 (via Bennett Road) and Area 3 (via Mystic Park-Meatian Road), see Figure 20.
- The water pump station worksite 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, see Figure 21.

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.

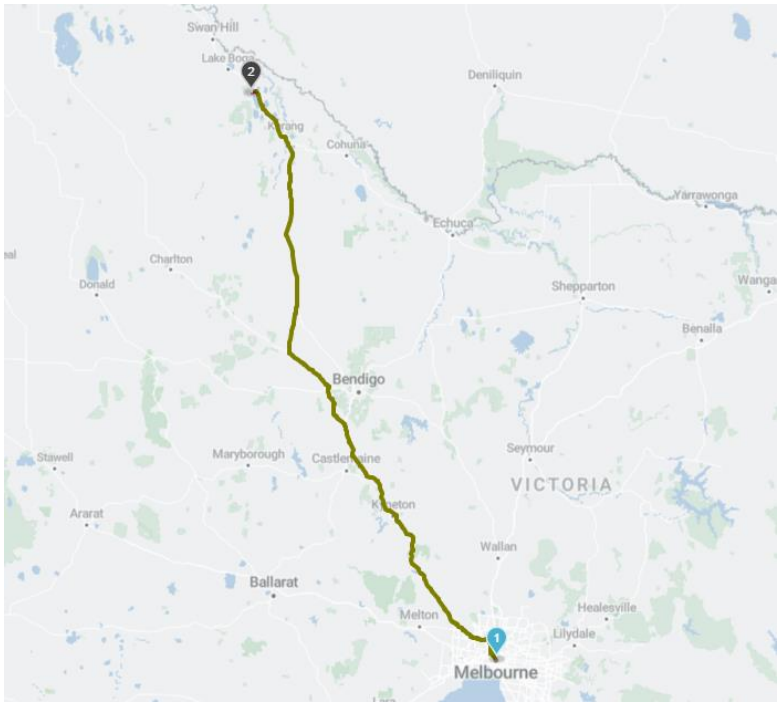
It is likely that an OD vehicle type will be required to travel to the site during the project construction stage. OD vehicles have preferred routes but are only able to operate under a permit. As such, approval will be required to operate this vehicle class.

Any route decisions made by respective transportation contractors contrary to the route assessment outlined in this report will be subject to additional detailed route assessments to ensure NHVR and DoT approval is gained.



Source: NHVR Route Planner

Figure 20 Transport route between Melbourne and Goschen Project Area 1 and 3



Source: NHVR Route Planner

Figure 21 Transport route between Melbourne and Goschen Project water pump station worksite

9.2.2 Local road network

Workforce – light vehicles

As discussed in Section 9.1.2, the final distribution of construction workforce trips would be verified once the 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 the Goschen Project Areas 1 and 3:
  - Swan Hill (see Figure 22), travelling to and from site via Murray Valley Highway, Donald Swan-Hill Road and finally to the project sites via Bennett Road or Mystic Park-Meatian Road.
  - Kerang (see Figure 23), travelling to and from site via Kerang – Quambatook Road, Lalbert-Kerang Road, Quambatook-Swan Hill Road, Lalbert-Kerang Road, Donald Swan-Hill Road and finally to the project sites via Bennett Road or Mystic Park-Meatian Road.
- To the Goschen Project Water Pump Station Worksite:
  - Swan Hill (see Figure 24), travelling to and from site via Murray Valley Highway and turning to the worksite via Mystic Park E Road.
  - Kerang (see Figure 25), travelling to and from site via Murray Valley Highway and turning to the worksite via Mystic Park E Road.

Workers will 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 consider safety.

Workers may travel in single-occupancy vehicles to and from the site. If bus transfers are deemed to be required, due to safety of works and/or lack of parking, bus transfers might be adopted from the above towns. It is expected that the transport routes identified would also be reasonable for bus movements.

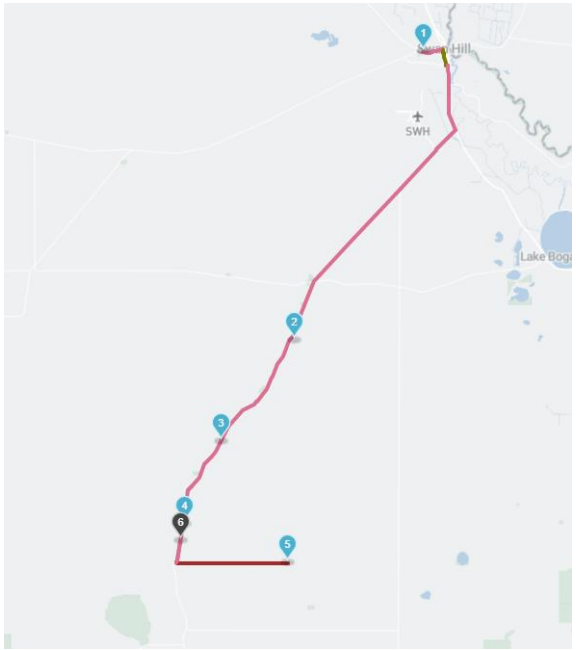


Figure 22 Worker traffic route from Swan Hill to Goschen Project Area 1 (note Area 3 would turn via Mystic Park-Meatian Road)

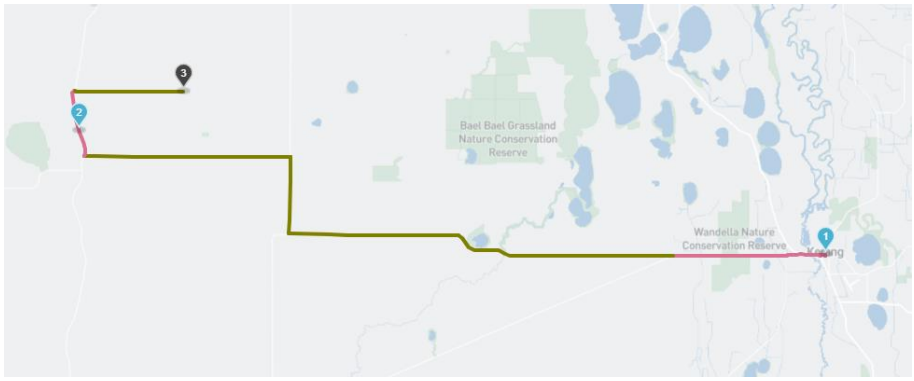


Figure 23 Worker traffic route from Kerang to Goschen Project Area 1 (note Area 3 would turn via Mystic Park-Meatian Road)

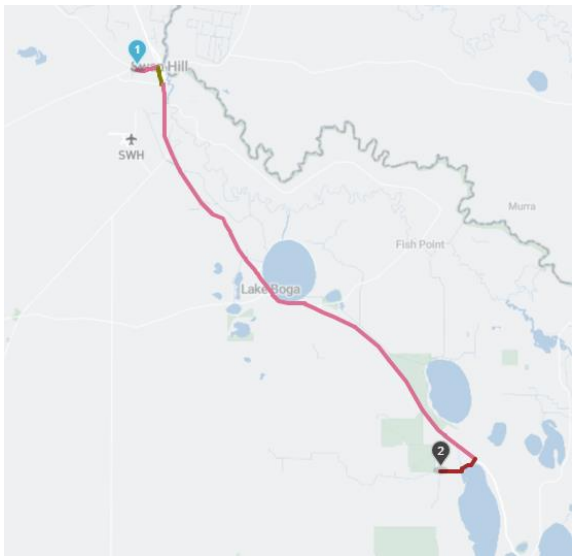


Figure 24 Worker traffic route from Swan Hill to Goschen Project Water Pump Station Worksite

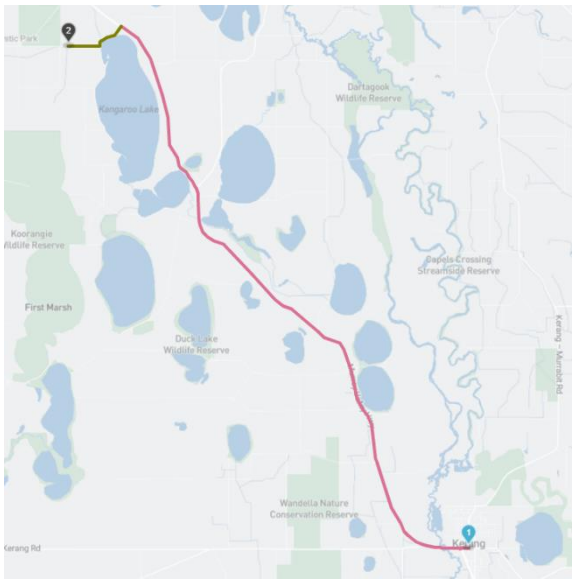


Figure 25 Worker traffic route from Kerang to Goschen Project Water Pump Station Worksite

Construction – quarry materials

The exact source location of materials is yet to be determined, however there are a few quarries located in the region which could be utilised by the project and can be accessed via approved transport routes, these are shown on Figure 26.

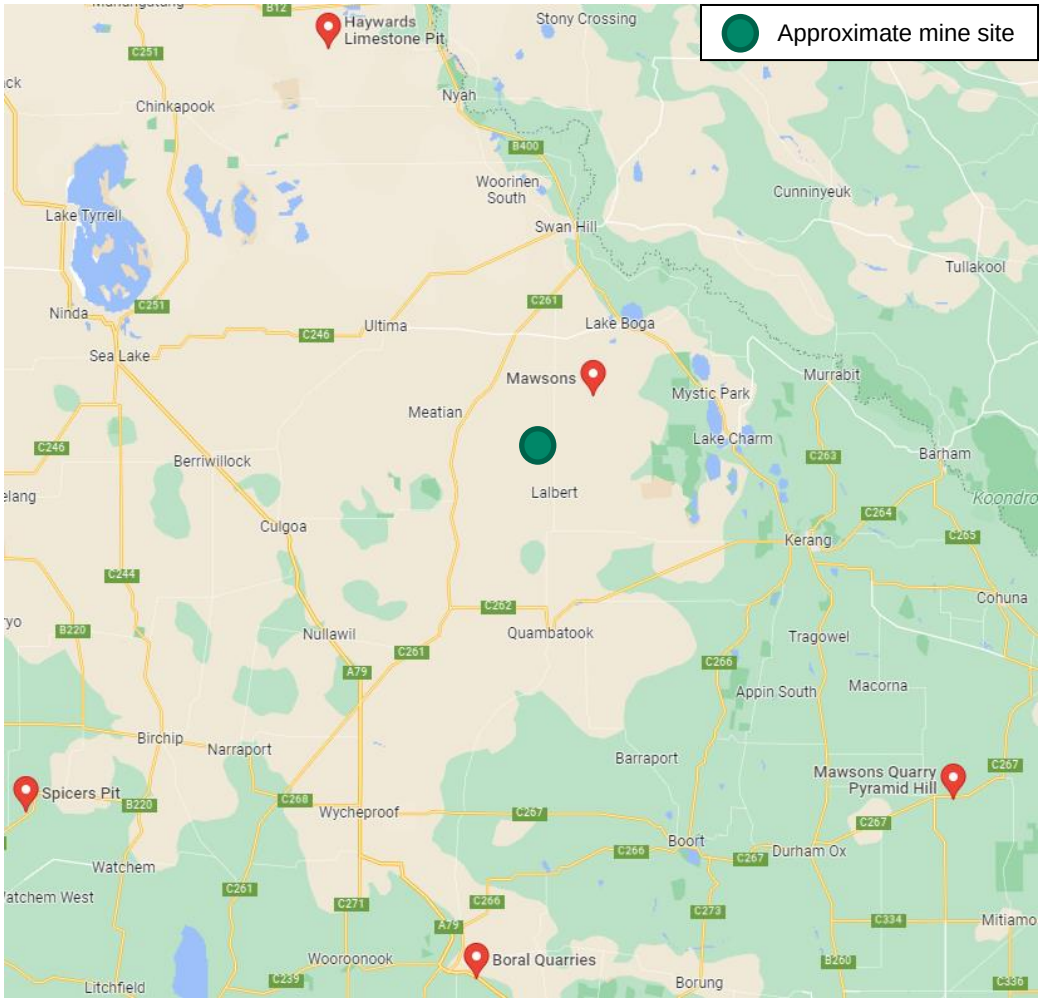


Figure 26 Local quarries

9.2.3 Approvals and control measures

Additional approvals and control measures need to be considered with regards to construction transportation routes to the proposed Project work sites, especially in relation to the expected use of OD vehicles on non-permitted roads. Where this is deemed necessary, engagement between the proponent, the relevant road authority, and the NHVR should be undertaken to establish any necessary approvals. The NHVR will manage the consent process and the relevant road managers will determine if the permit will be granted. It is understood that there are existing restrictions for vehicles greater than 26m in length and 4.9m in height (see Section 6.2.3.5). However, the following other factors may be considered:

- Vehicle characteristics including size and mass, security of couplings, distribution of mass, dynamic stability etc
- 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 OD 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 exact nature of these conditions should be discussed and agreed upon with the NHVR and the relevant road authority, and may be standalone or used in conjunction with other conditions.

These approvals will 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.

Approvals required are outlined in Appendix E.

9.2.4 Proposed mitigation measures

- Stakeholder Engagement Plan (MM-TP01) for agreement and finalisation of final construction vehicle transportation routes.
- Relevant permits from NHVR and Department of Transport for OD vehicle travel and any significant areas of travel that may need to be traversed (e.g. rail lines) (MM-TP01).
- Route assessment for the OD and heavy vehicles (MM-TP05) planned to be used during construction.
- Depending on the route reviews, associated bridge or culvert assessments may also be required based on final transportation routes (MM-TP05). If the findings deem that the bridge or culverts identified present an issue, then consideration must be placed in mitigating the consequence. This may involve localised structural upgrades to the bridge/culvert or deferring to a different route.

Implementation of these measures during construction would reduce impacts on transport infrastructure and operations. 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.

Mitigation measures are detailed further in Section 13.0.

9.3 Site access and road section investigation (TR03)

This section considers the main Area 1 and Area 3 access requirements.

In terms of site access methodology for the project, it is proposed that any site access intersection or road section upgrades would be undertaken prior to construction commencing and be of suitable standard to both facilitate the construction and operation phases of the project.

9.3.1 Local site access intersections

9.3.1.1 Austroads turning treatment warrants

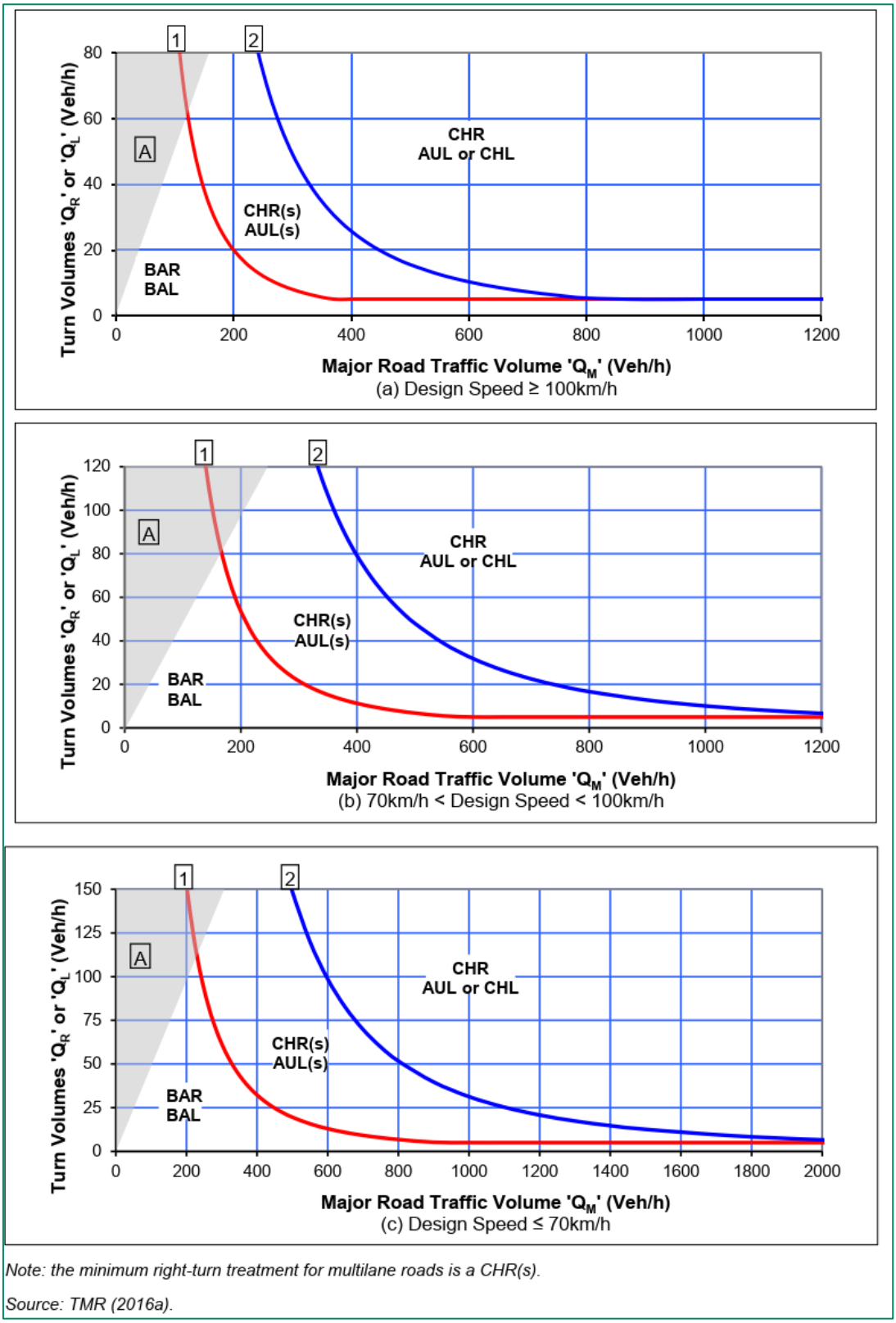
Austroads Guide to Road Design Part 6: Intersections, Interchanges and Crossings Management details the warrants for turning treatments on major roads at unsignalised intersections. Section 3.3.6 outlines the warrants for Basic (BA), Auxiliary Lane (AU) and Channelised (CH) turning treatments.

Figure 27 shows three graphs for the selection of turn treatments on roads with the following design speed:

- A - >100 km/h, is appropriate for high-speed rural roads.
- B - Between 70 and 100 km/h is appropriate for higher-speed urban roads, including those on the urban fringe and lower speed rural roads.
- C - < 70 km/h is appropriate for urban roads.

In reviewing the required turning treatment the following should be reviewed:

- The above warrants focus in the first instance on safety performance outcomes. Evaluation of operational performance may warrant that a higher level of treatment or alternative intersection control is required than those recommended.
- Where practicable a CH treatment should be used in preference to a non-channelised turning treatment.
- Adding auxiliary turning lanes will reduce the risk of rear end crashes, the risk of other high severity crash types may increase (such as right-angle crashes).
- Other safety considerations should be considered for example:
    - If the warrants indicate that a BA (right) (BAR) turn treatment is acceptable for the relevant traffic volumes, but limited visibility to the right-turning vehicle is available, then consideration should be given to the adoption of a CHR (south) or CHR turn treatment instead.
    - If a major road on a short steep downgrade has numerous heavy vehicles travelling down the grade, it may not be appropriate to adopt a BAL turn treatment, a CHL would be a preferred treatment.



Note: the minimum right-turn treatment for multilane roads is a CHR(s).

Source: TMR (2016a).

Source: Austroads Guide to Road Design Part 6 – Figure 3.25 – who sourced the graphs from TMR (2016a) as noted

Figure 27 Warrants for turn treatments on major roads at unsignalised intersections

9.3.1.2 Site access point 1 - Area 1 - Donald-Swan Hill Road and Bennett Road

Existing intersection

An overview of the existing intersection is outlined below:

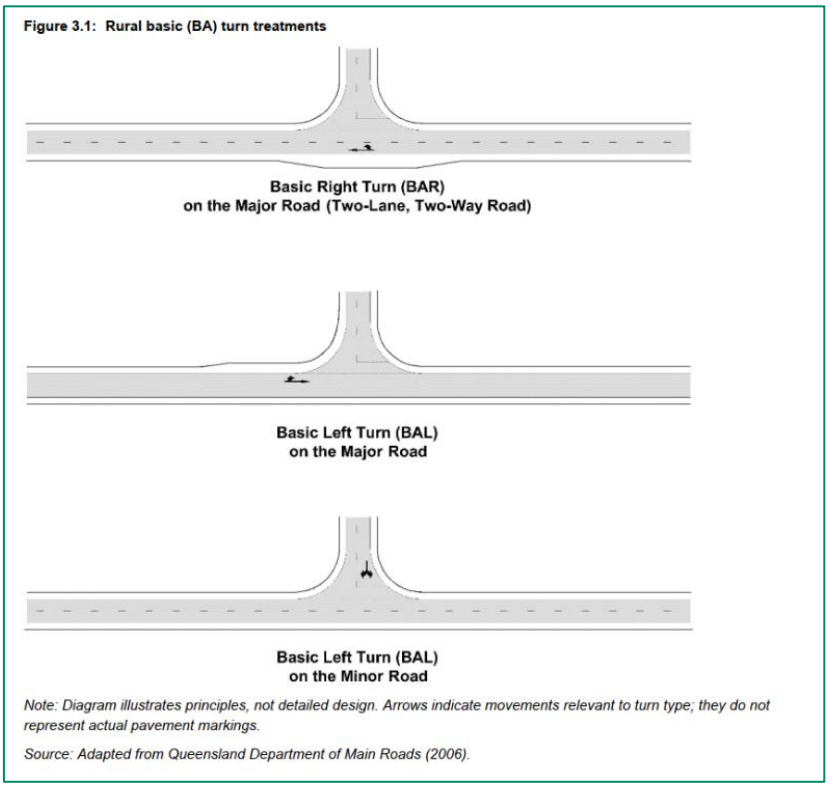
- Donald-Swan Hill Road forms a priority 'Y' intersection with Bennett Road (gravel) (see Figure 28). These types of intersections should be avoided if possible due to poor safety outcomes as the 'Y' intersection form notably has poor wayfinding, delineation, and accessibility issues for larger vehicles.
- The width of Bennett Road varies between approximately 5m and 6.5m thus would not facilitate two-way heavy vehicle movements.
- The intersection is near a railway level crossing (which has passive give-way controls), located approximately 37 metres south of southern Bennett Road entry.
- Sight distances were observed to be adequate despite the curve of the road at the intersection.
- Donald-Swan Hill Road has a posted speed limit of 80km/h, likely to be lower in vicinity of the Bennett Road intersection due to the road alignment and slowing down of vehicles to cross the railway level crossing tracks. Bennett Road does not have a posted speed limit based on street view imagery but is assumed to have a speed limit of 100km/hr, the default speed limit for open rural roads.

Source – AECOM site visit 13 April 2022

Figure 28 Donald-Swan Hill Road and Bennett Road 'Y' priority intersection – looking southbound on Donald-Swan Hill Road towards Bennett Road (N) entry/exit

Intersection review with development

With reference to Figure 27, given the major road traffic volume via Donald-Swan Hill Road (277 vehicles in the peak hour during construction) and turning construction / 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 CHR turning intersection treatment is recommended. The relevant document for design is the Austroads Guide to Road Design, Part 4A Unsignalised and Signalised Intersections, with Figure 29 demonstrating the intersection form. It is noted that the intersection upgrade layout would be subject to functional and detailed designs, turning radii verification and approval from relevant road authorities.



Source: Austroads Guide to Road Design Part 6 – Figure 3.1 – adapted from Queensland Department of Main Roads (2006)

Figure 29 BAR/BAL 'T' priority intersection rural basic (BA) turn treatments

As part of any intersection upgrade the following should also be considered:

- Formalising the priority intersection as a formal 'T' and thus removing its 'Y' intersection form which are advised to be avoided as they lead to poor safety outcomes. Upgrading the intersection will have the following safety benefits:
  - Control the turning speed of vehicles through the intersection
  - Reinforce vehicle priority
  - Enhance sight lines for vehicles
  - Reduce area of conflict and conflict points.
- Reduction in the main carriageway speed on Donald-Swan Hill Road from 80km/h to 60km/hr from prior to the level crossing, south of Bennett Road, to an appropriate location north of Bennett Road, this will ensure a safe movement of vehicles into and out of the road during the project.
- Intersection sight distances would need to be considered further as part of the concept design process, notably any realignment of Bennett Road, however given the access would be located on the outside bend this should not pose an issue.
- Offset distances to the existing level crossing of Bennett Road would need to be considered, based on the traffic generation estimates and future traffic volumes no traffic queuing from Donald-Swan Hill Road (S) to enter Bennett Road is envisaged, notably given the rural nature of traffic volumes at this location. Notwithstanding this, it may be prudent to ensure that any improved priority intersection has enough queue storage for at least two A-Double vehicle lengths for right turning vehicles.
- A road safety audit (RSA) may recommend additional control measures such as early warning signage, side road activation speed (RSAS) and other safety measurements.

9.3.1.3 Site access point 2 - Area 3 - Donald-Swan Hill Road and Mystic Park-Meatian Road.

Existing intersection

An overview of the existing intersection is outlined below:

- Donald-Swan Hill Road forms a priority 'T' intersection with Mystic Park-Meatian Road (see Figure 30).
- Mystic Park-Meatian Road has a width of approximately 7m which can facilitate two-way vehicle movements with the bellmouth intersection width which was found to be approximately 22m wide. Sight distance was observed to be restricted when looking southbound onto Donald-Swan Hill Road due to the curve of the road near the intersection.
- Donald-Swan Hill Road has a posted speed limit of 100km/h. Mystic Park-Meatian Road does not have a posted speed limit but is assumed to have a speed limit of 100km/hr, the default speed limit for open rural roads.

Source – AECOM site visit 13 April 2022

Figure 30 Donald-Swan Hill Road and Mystic Park-Meatian Road 'T' priority intersection – looking eastbound on Mystic Park-Meatian Road

Intersection review with development

With reference to Figure 27, given the major road traffic volume via Donald-Swan Hill Road (102 vehicles in the peak hour during construction) and turning construction / 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. The relevant document for design is the Austroads Guide to Road Design, Part 4A Unsignalised and Signalised Intersections, with Figure 29 demonstrating the intersection form.

As part of any intersection upgrade the following should also be considered:

- Reduction in the main carriageway speed on Donald-Swan Hill Road from 100km/h to 80km/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.

9.3.1.4 Alternative site access

Site access to Area 3 could be achieved via Jobling Road as an alternative to Bennett Road.

Existing intersection

An overview of the existing intersection is outlined below:

- Donald-Swan Hill Road forms a priority 'T' intersection with Jobling Road (see Figure 31).
- Jobling Road has a width of approximately 6 – 6.5m which cannot facilitate two-way vehicle movements with the bellmouth intersection width which was appears to be approximately 20m.
- 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 100km/h. Jobling Road does not have a posted speed limit but is assumed to have a speed limit of 100km/hr, the default speed limit for open rural roads.

Figure 31 Donald-Swan Hill Road and Jobling Road 'T' priority intersection – looking eastbound on Jobling Road

Intersection review with development

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 should be considered:

- Widening the priority intersection to allow safe bidirectional movements notedly at the bellmouth of the intersection. It is recommended that the bellmouth of Jobling Road is sealed early in the project to remove the risk of construction vehicles dragging loose material onto the arterial road.
- Localised vegetation removal to enhance sight lines for vehicles
- Reduction in the main carriageway speed on Donald-Swan Hill Road from 100km/h to 80km/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.

9.3.2 Local site access point intersection swept path review

9.3.2.1 Design and check vehicles

The DoT (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.

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.

As a starting point for assessment the design vehicle for the project access points have been considered based on worst case vehicle numbers anticipated for the project. These would be as follows:

- Site access point 1 – Area 1 - Donald-Swan Hill Road and Bennett Road priority intersection – worst case 36.2m A-Double vehicle for all movements
- Site access point 2 – Area 3 – Donald-Swan Hill Road and Mystic Park-Meatian Road priority intersection – 26m B-Double vehicle for all movements
- Internal local road network intersection turn points to Area 3 – Thompson Road and Bish Road priority intersection - worst case 26m B-Double vehicle for all movements
- Internal local road network intersection turn points to Area 3 – Bish Road and Jobling Road priority intersection - worst case 26m B-Double vehicle for all movements
- Internal local road network intersection turn points to Area 3 – Mystic Park Meatian Road and Bish Road priority intersection - worst case 26m B-Double vehicle for all movements

OSOM and OD size vehicles will also be required for deliveries throughout the project to the work site locations. Based on inputs provided by VHM, it is understood that 30m A-Double trucks would be used during operation. However, it is noted 36m A-Double vehicles were considered for the swept paths. It is expected that as site access designs progress that once verified the associated vehicle swept paths and improvements to permit access would be undertaken for these vehicle types in consultant 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. The temporary pavement is typically protected by removeable bollards or flexible barriers during times when these project vehicles do not require access.

Vehicle swept path analysis

The swept path assessments for the nominated design vehicles with a 500mm body clearance was undertaken using AutoTURN 11.0 software and is provided in Appendix D.

A summary of the swept path intersection assessments for the local site access roads, key findings and preliminary mitigation measures are provided in Table 24.

Table 24 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 should 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) should also consider OSOM and OD movements, which will likely be required during construction and pre-operation phases of the project (mining fleet deliveries). It is likely that a PBS level 2 design vehicle and a PBS level 3 check vehicle would be required. Intersection features such as removable signage, mountable kerbs etc would assist in OSOM/OD movements.

During construction, traffic management measures should 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 will be developed during TMP development, in consultation with key stakeholders and to the satisfaction of the responsible road management authority.

9.3.3 Wider site access intersections

At this project planning stage, during the construction phase of the project no known wider site access intersections have yet to be identified to require improvements to facilitate the movement of B-Double vehicles.

It is noted that OD and OSOM vehicles will be required during construction and are anticipated to be utilising the same routes as B-Doubles. Heavy vehicle transport route assessments (MM-TP06) should 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.

During construction, temporary traffic management measures such as temporary pavement widening, controllers, line markings and signage can also be implemented as part of a TMP (MM-TP02).

9.3.4 Site access roads and access points

During construction (and subsequent operational phase), project traffic is expected to access the project worksites at Area 1 and Area 3 via nominated site access points and roads. Many of these access roads may require upgrades to accommodate project vehicles. The proposed site access roads to each access points are summarised in Table 25.

Table 25 Proposed existing site access road details

Access Road Ref.	Site access road via:			Road authority	Existing road access type	Existing road width	Road verge/ shoulders present	Bridge or Culverts present
	Major road	Access road	Access Road length*					
1 – Area 1	Donald-Swan Hill Road	Bennett Road	6.3km	Gannawarra Council	Gravel	5 – 6.5m	Yes	1 decommissioned channel crossing the road between Donald Swan Hill Rd and Shepherd Rd
2 – Area 3	Donald-Swan Hill Road	Mystic Park-Meatian Road	6.8km	Swan Hill Shire Council	Gravel	5 – 7m	No	6 decommissioned channels crossing the road between Donald Swan Hill Rd and Area 3
3 – Area 3	Mystic Park-Meatian Road	Bish Road	4.5km	Gannawarra Council	Gravel / Dirt	4 – 5m	No	1 decommissioned channel crossing the road between Jobling Rd and Shepherd Rd
4 – Area 3	Bish Road	Jobling Road	1.3km	Gannawarra Council	Gravel / Dirt	5 – 6m	No	3 decommissioned channels crossing the road between Donald Swan Hill Rd and Bish Rd
5 – Areas 1 & 3		Shepherd Road	2.8km	Gannawarra Council	Gravel / Dirt	5 – 5.5m	No	1 decommissioned channel crossing the

Access Road Ref.	Site access road via:			Road authority	Existing road access type	Existing road width	Road verge/ shoulders present	Bridge or Culverts present
	Major road	Access road	Access Road length*					
								road between Jobling Rd and Bennett Rd

*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.

9.3.5 Road cross-section configuration

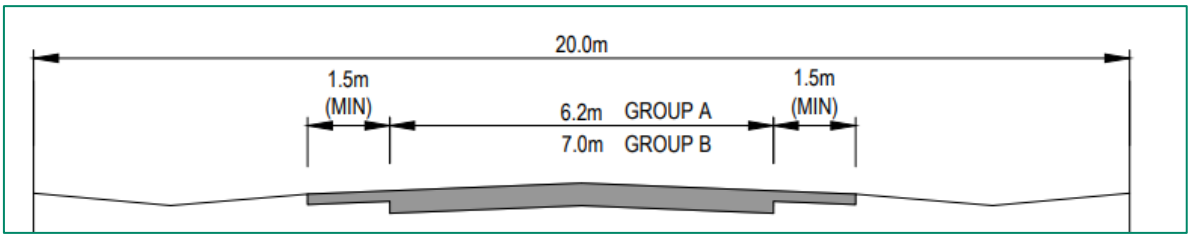
A meeting was held on Thursday 21 April 2022 with Gannawarra Shire Council to discuss the Project, with regards to any local road upgrades the Council noted the following:

- It is more appropriate to upgrade / strengthen road pavement on local roads (noted to be mostly gravel / dirt), widening of roads alone would not be sufficient.
- 300mm of class 2 crushed rock sub-base and two coats of bitumen seal on upgrading roads considered to be adequate.

Gannawarra Council and Swan Hill Shire Council utilise the IDM manual (reference to appropriate Austroads guides also outlined and referenced need to be considered in conjunction with this manual). The IDM manual in section 12.3.9 outlines the cross-section profile considerations that should be nominated during the design process, these include:

- Type of kerb and channel.
- Pavement construction including material type and depth.
- Surface details.
- Subsoil drainage, if required.
- Typical footpath offsets (not required).
- Typical service corridors.
- Typical landscaping corridors.
- Cross-falls.

Also noted in the IDM, Council expect that road reserve widths are sufficient to accommodate the specified carriageway, the required services with the necessary clearances and provisions for other road users if required, parking, drainage etc. Table 6 of the IDM guide outlines rural road characteristics based on the road type. Subject to further design stages and stakeholder discussions, given the large vehicle types to be travelling on these roads they could be rural access and collector roads, the indicative road cross section is shown in Figure 32.



Source: IDM standard drawings, SD 610

Figure 32 Typical road profile for a collector / rural access road

The local access roads are owned and managed by local Councils and upgrades and hand-back agreements would be required and need be considered during subsequent design phases.

Whilst rural single lane access roads are expected to have very low traffic demands there are two concerns with regards to safety risk and reliability of the local road network:

1. The number of vehicles travelling along a road of an inadequate width increases the likelihood of a fatal or serious injury crash.
2. The increased number of heavy vehicles poses a potential durability and reliability issue to the performance of the existing pavement, which is unlikely to have been designed for the proposed construction vehicles. This risk is further increased during and following a wet weather period.

There are many options that may be employed to mitigate the above factors, including:

- Widening of the road along key routes.
- Providing passing bays at key locations.
- Traffic management measures.
- Reduced speed limits.
- Upgrade of road pavements.
- Regular inspections and maintenance operations.
- Installation of advanced warning signs.
- Driver's code of conduct.

In addition to the advice from the relevant road authority, the adoption of an independent road safety audit (pre-qualified by the Department of Transport) could assist with determining the appropriate treatments.

It is proposed that the mitigation measures adopted be determined on a case-by-case basis considering local constraints and subsequent construction and operational activities. This would be considered during the development of the TMP (MM-TP02) as part of the site access strategy (MM-TP05) which would be developed to investigate and manage each of the access point intersections to provide safe access and egress for construction.

Operation controls such as temporary speed reductions, potential vehicle delivery time restrictions and additional signage may be required in addition to the physical measures outlined above. It is expected that these measures would be developed by the commissioned transport contractor during TMP development (MM-TP02), reviewed by the NHVR in consultation with key stakeholders including DoT and local Councils.

9.3.6 Proposed site access road section upgrade requirements

A number of key local access roads proposed be used for construction and the subsequent operational stages of the Project may require upgrades to facilitate the safe movement of vehicles to and from the site as outlined in Table 26 and shown in Figure 33.

Table 26 Identified road section 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	• Vegetation removal, mostly shrubs and small trees • 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 • One culvert present along length of road

Access Road Ref	Access road		Road condition		Road width		Potential upgrade impacts and requirements
	Name	Length*	Existing	Proposed	Existing	Proposed	
2 – Area 3	Mystic Park-Meatian Road	6.8km	Gravel	Sealed	5 – 7m	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 and shoulder sealing in the vicinity of the intersection with local roads to provide a wider turning lane • Three culverts present along length of road
3 - Area 3	Bish Road	4.5km	Gravel / Dirt	Sealed	4 – 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 culvert present along length of road
4 - Area 3	Jobling Road	9km	Gravel / Dirt	Sealed	5 – 6m	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 • Three culverts present along length of road
5 – Area 3	Thompson Road	3.5km	Gravel / Dirt	Sealed	3.5 – 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 • Three - four culverts present along length of road
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

*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.

9.3.7 Local intersection and road section upgrades summary

The proposed local intersection and road section upgrades shown on Figure 33, will need to be developed further in the subsequent detailed design phase of the project considering contractor and stakeholder input, including once specific vehicles sizes and dimensions are confirmed for construction, operational and local land uses. A review of roadside furniture and features should be undertaken to confirm the presence of culverts, signs and vegetation which may be impacted by road and intersection upgrades.

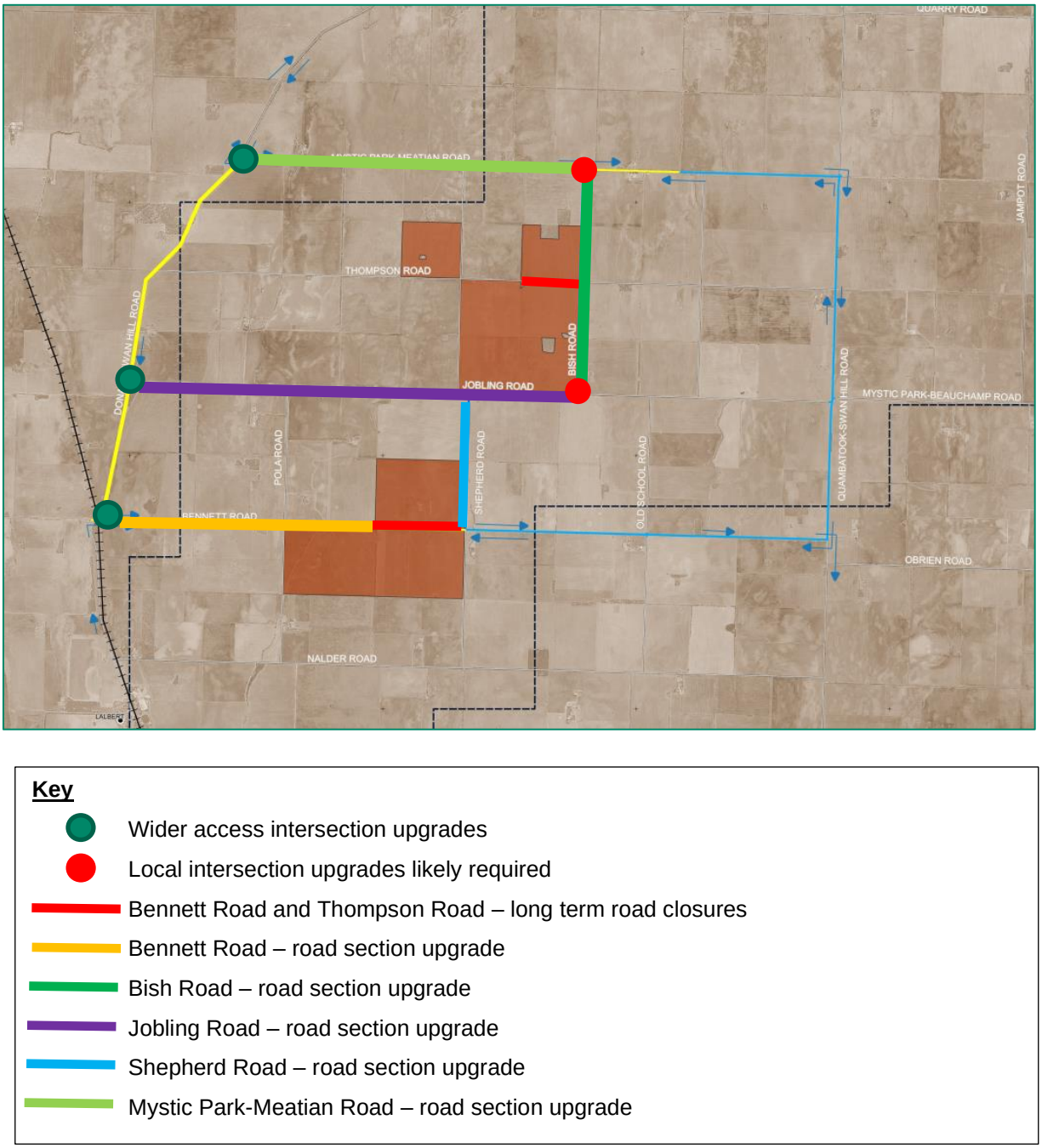


Figure 33 Summary of local intersection road section upgrades

9.3.8 Proposed mitigation measures

The following mitigation measures are proposed to be implemented with regards to the management of site access points and road section upgrades:

- 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.
- Traffic Management Plan (MM-TP02) to implement 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
- 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
- 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) 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 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.

Mitigation measures are detailed further in Section 13.0.

9.4 Proposed road section upgrades and closures (TR04)

9.4.1 Short term road closure impacts

During both local and wider site access intersection upgrades and road section upgrades, it is likely short term closures to the road network will be necessary to accommodate different aspects of road works as outlined in Section 9.3.6. 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 between the site and 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)

The extent of these road works can be visualised in Figure 33.

During road works and associated temporary road closures, local road users attempting to travel to and from these roads and Donald-Swan Hill Road 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 will maintain road access and east west connectivity with only minor diversions subject to the road management plan.

Long term road closures at Bennett Road and Thompson Road due to ongoing construction and operations are considered below in 9.4.2 and 10.4.2.

9.4.2 Long term road and traffic lane closures during construction and operations

An overview of the proposed timelines for road closures associated with the Project is shown in Table 27.

Table 27 Goschen Project – Road closure timeframes

Works stage	Roads to be closed	Indicative time periods of road closure		Closure length
		Closure	Reinstatement	
Stage 1 – pre-works	Bennett Road	2023 (Q4 TBC)	Between 2031 – 2044 pending on settlement timeframes	8-21 years
Stage 3 – Area 3 works	Thompson Road	Approx. 2031	Post 2044 pending on settlement timeframes	13+ years

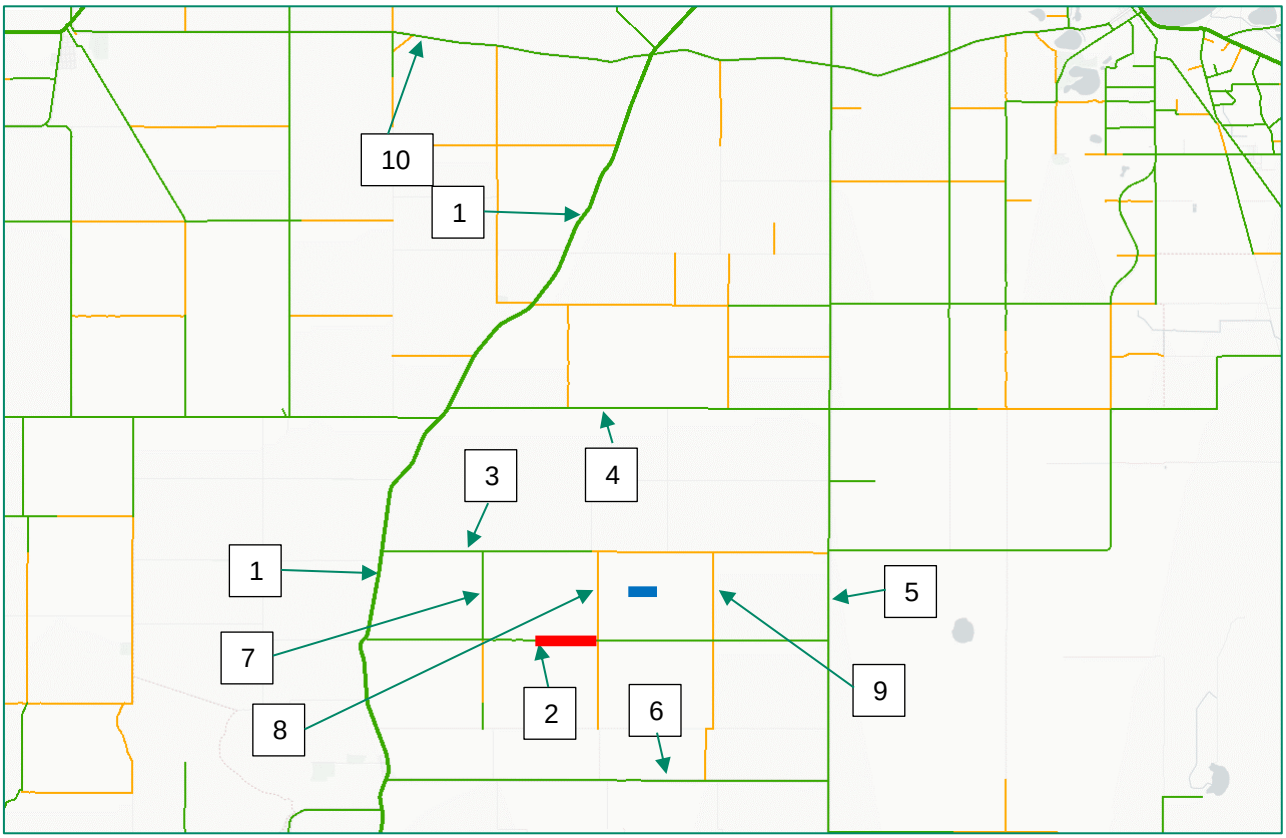
9.4.2.1 Road closures – Bennett Road and Thompson Road

The proposed Bennett Road and Thompson Road closure extents are shown on Figure 34, along with the Gazetted Victoria local B-Double approved and conditionally approved roads.

The final road and traffic lane closure methodologies would be verified following further stakeholder discussions and design stages and outlined in the project TMP, 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.
- It is likely that a PBS level 2 design vehicle and a PBS level 3 check vehicle would be required. Intersection features such as removable signage, mountable kerbs etc would assist in OSOM/OD movements.

The proposed TMP will reduced the likelihood of residents being unaware of road closures and thus reducing vehicles travelling during the closure periods.



Source: Vicroads website

1. **Donald-Swan Hill Road**
2. **Bennett Road**
3. **Jobling Road**
4. **Mystic Park-Meatian Road**
5. **Quambatook-Swan Hill Road**
6. **Kerang-Lalbert Road**
7. **Pola Road**
8. **Shepherd Road – conditionally approved**
9. **Old School Road – conditionally approved**
10. **Lake Boga-Ultima Road**

Key

- **Approved B-Double Road**
- **Conditionally approved (e.g. dry weather access only and some for pick-up/drop-off only**
- **Bennett Road Closure**
- **Thompson Road Closure**

Figure 34 Proposed Project Road Closures and Victoria's Gazetted B-Double road network

9.4.3 Road closures associated with pipeline construction

The proposed placement of the pipeline under the road reserve between Mystic Park E Road and the site will 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.

9.4.4 Proposed mitigation measures

Short and long term road closures will impact the accessibility and connectivity of local road users. Diversions and connectivity will 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 Stakeholder Engagement Plan (MM-TP01) is to include road and lane closures notification to impacted residents and emergency services where vehicular passage may not be available or be limited. The SEP should include a details analysis of specific landowners significantly affected by temporary and permanent road closures, with targeted engagement sessions conducted.

A TMP (MM-TP02) will 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 should consider maintaining one-lane controlled access for all vehicles during works if feasible.

Implementation of these measures during the project would reduce impacts on 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.

9.5 Amenity impacts arising from use of the road network (TR05)

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 and could impact the quality of the road network or create safety hazards.

Measures to manage dust and sedimentation impacts should be included in the TMP, and sub-contractor TMP’s. 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 should be left idle with the engine running.

Potential noise and vibration effects associated with construction traffic activities are further examined in Technical report F: Noise.

Potential changes to air quality due to construction traffic activities are further examined in Technical report G: Air quality.

9.5.1 Proposed mitigation measures

The Traffic Management Plan (MM-TP02) will 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.

Monitoring and engagement with local road users and residents directly affected by dust and debris during construction should also be considered to ensure mitigation measures are appropriately addressing concerns.

Implementation of these measures during the project would ultimately result in a similar environment experienced today as there is no current mitigation measures to minimise dust and debris from existing road network users. With increased traffic volumes, mitigation measures should adequately offset the impact of these vehicles and as such, it is expected that the residual impact would not be significantly worse than the existing condition. With the implementation of mitigation measures, local road users and residents should experience a similar level of dust and debris as current conditions. The residual safety impact of the dust and debris generated by project traffic should therefore be negligible.

Mitigation measures to counter potential noise and vibration effects associated with construction traffic activities are further examined in Technical report F: Noise.

Mitigation measures are detailed further in Section 13.0.

9.6 Impacts on public transport (TR06)

School buses operate in the local area, notably along Calder Highway and Donald-Swan Hill Road 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 measures would be implemented to reduce potential impacts if conflicts are unable be suitably managed.

Ongoing consultation with relevant stakeholders would be undertaken to manage potential impacts on buses during construction. DoT will require any school bus stop pull off areas found along haulage routes to be upgraded to provide safer location for students to wait / buses to fully pull off road.

9.6.1 Proposed mitigation measures

- Stakeholder Engagement Plan (MM-TP01) will include consultation with local councils and bus operators during the development of the TMP to ensure any affected school routes have appropriate diversions in place that still service necessary stakeholders and deliver acceptable travel time changes.
- Traffic Management Plan (MM-TP02) will include traffic management measures to manage construction traffic movements and any implications on 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. The local bus services will also be informed of the works and usage of roads in the area. The residual safety impact that the project traffic has on public transport should therefore be negligible.

Mitigation measures are detailed further in Section 13.0.

9.7 Impacts on pedestrians and cyclists (TR07)

As the project is located within the rural road network, there are no dedicated pedestrian or bicycle facilities located in the vicinity of the project area. 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.

9.7.1 Proposed mitigation measures

- Stakeholder Engagement Plan (MM-TP01) to inform the local community and road users of the changes in transport conditions including details of any proposed road and traffic lane closures.
- Traffic Management Plan (MM-TP02) to 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, there are not anticipated to be residual safety and connectivity impacts to pedestrians and cyclists.

Mitigation measures are detailed further in Section 13.0.

9.8 Emergency vehicle access (TR08)

Availability 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.

Emergency vehicle access protocols will need to be developed in consultation with emergency services stakeholders, with unrestricted access to be always maintained where possible, especially given the location of the project work sites, 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

would be developed for the project encompassing emergency response and evacuation procedures for project work sites.

9.8.1 Proposed mitigation measures

- Stakeholder Engagement Plan (MM-TP01) to inform stakeholders, including emergency services of changes in transport conditions, in particular the proposed road or traffic lane closures.
- Traffic Management Plan (MM-TP02) to 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.
- Road Safety Audit (MM-TP03) to include consideration of emergency vehicle access and if road surface upgrades are required.
- Emergency management plan (MM-TP04) to outline procedures for emergency response and evacuation procedures for project work sites and local residents following changed traffic access provisions.

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 to some local land users may need to be relocated for the duration of lane closure or road works.

Mitigation measures are detailed further in Section 13.0.

9.9 Road condition and maintenance (TR09)

Heavy vehicles, machinery and equipment movements are anticipated to occur on several local and declared roads during the construction phase. These roads may experience deterioration in the quality of their surfaces due to the movements of heavy vehicles during construction period. Road conditions should be managed throughout construction works and the responsibility of each stakeholder throughout the process should be clearly identified.

It is proposed to upgrade local access intersections and road sections as agreed in the first instance to reduce the need and frequency of local road upgrades.

9.9.1 Proposed mitigation measures

- Pre-construction road conditions should be in a suitable state to access and perform construction activities. As part of the TMP dilapidation surveys to be undertaken to provide a baseline for any triggers for immediate and future impacts for the upgrade or remediation of road assets (MM-TP02).
- Both public and private access roads to be in a suitable condition to transport project components and materials to the site in a safe manner (MM-TP02).
- Agreements with road asset owners on the following should 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.
- 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.
- It is understood that council will not provide HV permits until agreements are reached to Council’s satisfaction.

- If impacts occur during the construction period, rectification should be implemented by the responsible party.

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

Any road damage would be identified and rectified early through stakeholder communication over the construction period and no remaining damage to the road network after construction. As such, there are no expected residual impacts due to road maintenance.

Mitigation measures are detailed further in Section 13.0.

9.10 Construction stage – summary of residual impacts

Residual impacts are those that remain once mitigation and management measures have been implemented. Table 28 summarises potential residual impacts during the construction phase of the project once mitigation and management measures have been applied.

Table 28 Summary of residual impacts during construction

Section	Impact assessment	Residual impacts
Section 9.1	Traffic generation and road capacity impact analysis	With the implementation of the mitigation measures above the project traffic will be low impact to the existing capacity as other routes will be chosen or TMP measures implemented to improve traffic performance. 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 9.2	Construction traffic route assessments	Implementation of mitigation measures during construction would reduce residual impacts on transport infrastructure and operations. 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 9.3	Preliminary site access and road section investigation	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.
Section 9.4	Proposed road and 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 9.5	Amenity impacts on the local road network	With the implementation of the mitigation measures, anticipated residual impacts would be continued but reduced levels of dust and debris during construction similar to current background levels.
Section 9.6	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. The local bus services will also be informed of the works and usage of roads in the area.
Section 9.7	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 9.8	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

Section	Impact assessment	Residual impacts
		would also limit the length of diversion routes and ensure continued access to all local properties. The residual impacts would be that emergency access to some local land users may need to be relocated for the duration of lane closure or road works.
Section 9.9	Road condition and maintenance	Any road damage would be identified and rectified early through stakeholder communication over the construction period and no remaining damage to the road network after construction.

10.0 Operation impact assessment

This section discusses the potential impacts of the project as a result of operation of the project and the associated mitigation measures that aim to reduce impacts to as low a level as possible. Mitigation measures referred to are defined in Chapter 13.0.

This section of the report discusses the potential impacts of the project during the operational phase with the following considered:

- Section 10.1 – Traffic generation and road capacity impact analysis
- Section 10.2 – Preliminary operation traffic route assessments
- Section 10.3 – Preliminary site access and road section upgrades
- Section 10.4 – Road and traffic lane closures
- Section 10.5 – Road condition and maintenance
- Section 10.7 – Summary of residual impacts

Following assessment of the above, associated mitigation measures have been identified which are summarised in Section 13.0 of this report.

10.1 Traffic generation and road capacity analysis (TR10)

10.1.1 Area 1 and Area 3 mobilisation and demobilisation stages

The mining contractor will use road licenced heavy transport vehicles with oversize load permits to mobilise and demobilise the mining fleet at commencement and at end of LOM. Large mobile cranes will be required to assemble and disassemble the mining fleet into modules to comply with oversize load permit regulations. The assembly and disassembly operations, and the oversize load movements will all occur during day-light hours only.

The off-road mining fleet, water trucks and services 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. The smaller site vehicles will be road registered and predominantly 4WD.

Table 29 give a summary of the nominal on-site mining fleet for a 24/7 operation that will need to be mobilised and demobilised during the operations phase of the Project.

Typical internal operations utilising the on-site mining fleet include:

- Mine excavation.
- Ore and in-it works.
- Haulage activities, temporary stockpiling Run Of Mine (plant feed ore) and Mining Unit Plant (MUP).
- Dust management.

Table 29 Mining fleet

Fleet type	Quantity
Excavator – 200t class (e.g. Komatsu PC2000)	1
Excavator – 110t class (e.g. Komatsu PC1250)	1
Rigid Haul Truck – 130t (e.g. Caterpillar 785) – 4 duty, 1 stand-by / maintenance	9
Bulldozer (e.g. Caterpillar D8N)	1
Wheel loader (e.g. Caterpillar 988K)	1
Tractor Scraper (e.g. Caterpillar 623K)	2
Motor Grader (e.g. Caterpillar 150)	1
Water tanker trucks, off-road, articulated (e.g. Caterpillar 725/730 chassis based (30,000lt capacity each)	2
Maintenance / service truck, off-road, articulated (e.g. Caterpillar 725/730 chassis based)	1
Refuelling truck, off-road, articulated (e.g. Caterpillar 725/730 chassis based)	1
Light vehicles, 4WD dual cabs and similar	5
8WD tray back mounted air core drill rig	1
Diesel powered lighting towers	15

Source – VHM Limited Project Site Emissions and Traffic – Goschen Report, 1 October 2021

10.1.2 Fuel, workshop consumables and support services

During mining operations, the major supply services will be fuel and maintenance consumables.

Fuel requirements for the 5 Mtpa ROM mining operation will be approximately 6ktpa (approx. 6.8M litres) of diesel and will 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 vehicle will typically be extended (20m) B-Double fuel tankers with capacity of 61,000L (approx. 55t), requiring a fuel delivery approximately every 2 to 3 days.

Delivery of spares and lubricants, waste removal, specialist technical support, service callouts and ad-hoc requirements will require approximately 10 truck movements and 12 light vehicle movements per week (each way).

10.1.3 Personnel – mining

Personnel during mining activities will likely be based on a 3-panel roster for trades and operator personnel plus back-up for other staff roles, as this will be a continuous 365 days per year operation.

Mining administration, operations and support staff will be sourced from the local community. At this stage, it is planned that staff will be bused to their workplaces.

10.1.4 Operations stage traffic generation summary

Table 30 provides a summary of the traffic movement frequencies during the operational phase of the project over a per annum, per month, per week and per day frequency.

Table 30 Goschen Project – operational stage traffic movement frequencies

Purpose	Vehicle Configuration	Movement Frequency			
		per annum	per month	per week	per day
Staff Movements					
Operations Staff	Bus	1,825	152	35	5
Operations Staff	LV Passenger	10,950	913	210	30
VHM Corporate/Exec Movements & Visits	LV Passenger	24	2	0.5	0.07
External Consultants and Specialists	LV Passenger	1,825	152	35	5
Mining Contractors	LV Passenger	1,825	152	35	5
Other Contractors/Consultants	LV Passenger	1,825	152	35	5
External Groups					
Farm/Crop maintenance by local farmer(s)	Rigid Truck	24	2	0	0.1
Government related (DMIRS, Union, EPA, etc)	LV Passenger	8	1	0	0.0
Telstra Technicians	LV Passenger	2	0	0	0.0
Qubes Representatives	LV Passenger	4	0	0	0.0
NMI measurement certifications	LV Passenger	2	0	0	0.0
Consumables					
General Stores and Consumables	Rigid Truck	364	30	7	1.0
General Admin/Lab/Workshop/HSE consumeables	Rigid Truck	364	30	7	1.0
Diesel Fuel	B-Double	778	65	15	2.1
LNG Fuel	B-Double	92	8	2	0.252
Flocculant	Semi Trailer	44	4	1	0.121
Reagent - HN03	Semi Trailer	14	1	0.27	0.038
Reagent - Starch	Rigid Truck	2	0.2	0.04	0.005
Reagent - H2SiF6	Rigid Truck	2	0.2	0.04	0.005
Reagent - NaF	Rigid Truck	2	0.2	0.04	0.005
Reagent - S4600	Rigid Truck	2	0.2	0.04	0.005
Reagent - Aristonate-H	Rigid Truck	2	0.2	0.04	0.005
Reagent - C07	Rigid Truck	1	0.1	0.02	0.003
Flocculant (type TBA)	Rigid Truck	0.5	0.04	0.01	0.001
Reagent - Sulphuric Acid	B-Double	276	22.96	5	0.755
Reagent - Magnesium Oxide	Rigid Truck	46	3.80	1	0.125
Reagent - Ferric Sulphate	B-Double	323	26.92	6	0.885
Reagent - Hydrogen Peroxide	Rigid Truck	2	0.14	0	0.005
Reagent - Sodium Carbonate	B-Double	235	19.62	5	0.645
Reagent - Calcium Hydroxide	B-Double	377	31.41	7	1.033
Maintenance					
Mining Contractor Parts/Maintenance	Semi Trailer	208	17	4	0.57
OEM/Equipment Rep Parts/Maintenance	Semi Trailer	52	4	1	0.14
Process Plant Parts/Maintenance	Semi Trailer	1,092	91	21	3.00
Settling Pond Dredging	Semi Trailer	1	0.1	0.0	0.003

Purpose	Vehicle Configuration	Movement Frequency			
		per annum	per month	per week	per day
NPI Plant Parts/Maintenance	Semi Trailer	364	30	7	1.00
Tailings Pipeline Move/Maintenance Contractor	Rigid Truck	52	4	1	0.1
Hydraulic Maintenance Truck	Rigid Truck	24	2	0.5	0.07
Powerstation Maintenance Works	Rigid Truck	12	1	0.2	0.033
LNG Storage Maintenance Works	Rigid Truck	4	0.3	0.1	0.011
Diesel Storage Maintenance Works	Rigid Truck	4	0.3	0.1	0.011
Misc. Maintenance Works	Rigid Truck	12	1.0	0.2	0.033
Site Services					
Laboratory Samples to external lab	Rigid Truck	52	4	1	0.1
Waste Removal - Sewage	Rigid Truck	208	17	4	0.6
Waste Removal - General Rubbish	Rigid Truck	208	17	4	0.6
Waste Removal - Oily Water	Rigid Truck	208	17	4	0.6
Waste Removal - Materials	Semi Trailer	208	17	4	0.6
General Cleaner for Admin/Ablutions	LV Passenger	1,460	122	28	4
Pumpstation Operator Movements	LV Passenger	1,460	122	28	4
Powerstation Operator Movements	LV Passenger	1,460	122	28	4
Logistics					
Product Transport - All Products	A-Double	3,862	322	74	12
Shutdown					
Mobile Crane 200t	Rigid Truck	4	0.3	0.1	0.01
Mobile Crane 80t	Rigid Truck	8	0.7	0.2	0.02
Mobile Crane 25t	Rigid Truck	8	0.7	0.2	0.02
EWP Boom Lift	Rigid Truck	8	0.7	0.2	0.02
EWP Scissor Lift	Rigid Truck	8	0.7	0.2	0.02
Shutdown Contractors Personnel	LV Passenger	75	6	1.4	0.21
	Total (Passenger LV's)	20,920	1,743	401	57
	Total (Trucks)	11,382	2,446	219	31
	Total (All)	32,302	2,692	620	89

Table 31 below outlines the typical service vehicle traffic movements expected around the process plant area and the local road network during the operational phase of the project.

Table 31 Process plant traffic movements summary

Traffic source	Frequency of traffic movements
Staff	~50 trips per day.
Consumable deliveries (reagents, fuels etc)	~10 truck deliveries per day
Workshop deliveries and waste removal	~14 truck deliveries estimated per day
Maintenance	~5 truck deliveries estimated per day
Product haulage	271 loads per month, approximately 12 loads per day (A-double vehicle from site to Ultima internodal rail terminal)
Other services	Allow additional 4 access per day

10.1.5 Traffic distribution

Workforce traffic distribution

The final distribution of operational workforce trips would be verified once the contractor has been appointed. It has been assumed that Area 1 will be operational for years 1-8 before operations will switch to Area 3 for the remaining years 9-20.

The distribution of workforce light vehicle movements was estimated based on the location and potential accommodation provisions of the surrounding regional towns:

- North (Swan Hill, Lake Boga, Ultima) - 80%
- South (Kerang, Quambatook, Boort) - 20%

Note that the regional towns listed above do not represent the extent of workforce origins and other regional towns may also be sourced.

The following distributions are estimated:

- Product will be delivered from the Area 1 site to the Ultima intermodal rail terminal. At this stage no wider road-based transportation of product is proposed. Movements related to product haulage are expected to occur over a 12h shift period. These movements are expected to occur outside of workforce peak hour periods.
- General consumable and other deliveries are also expected to originate from Melbourne and are assumed to be occurring during the daytime. The deliveries are assumed to be equally distributed over a 12h period, with 75% of truck movements assumed to be going to Area 1 and the remaining 25% to Area 3W where operations would take place in 2044 (outlined in Section 8.2.1). Similarly, these movements are expected to occur outside of workforce peak hour periods.

10.1.6 Project operational stage traffic impact analysis

Table 32 shows the following with regards to the project operational stage traffic impacts:

- Major road mid-block traffic estimated volumes, with 2044 base and with 2044 base with operational traffic (worst case year adopted) comparisons.
- The worst-case derived movement of operational stage volumes at the nominated major site access points.

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. Table 5.1 of this document states that the one-way mid-block capacity of an undivided road to be 900 pc/h, with peak period mid-block traffic volumes increasing to 1200 to 1400 pc/h/ln on any approach road when certain conditions are met.

Accordingly, based on the characteristics of Donald Swan-Hill Road and the Murray Valley Highway a mid-block capacity of 900 vehicles per hour (1,800 vehicles per hour two-way) has been adopted. The traffic impacts during the construction stage are predicted to be negligible via these major access roads

to the project's areas for the duration of operations, with a spare mid-block theoretical capacity of 85% via Donald-Swan Hill Road.

Table 32 Project traffic volume increases at mid-block and intersections within the study area – 2044 operational stage (worst case year adopted)

Access Point	Minor road	Major road	Speed (km/hr)	AM peak volumes				PM peak volumes				Midday peak volumes			
				Major road mid-block		2044 Project Intersection volumes		Major road mid-block		2044 Project Intersection volumes		Major road mid-block		2044 Project Intersection volumes	
				2044 two-way	2044 & project two-way	Left In^	Right In^	2044 two-way	2044 & project two-way	Left out^	Right out^	2044 two-way	2044 & project two-way	Left In^&out	Right In^&out
Area 1	Bennett Road	Donald Swan-Hill Road	80	80	130	40	10	80	130	40	10	80	82	2	2
Area 3	Mystic Park-Meatian Road	Donald Swan-Hill Road	100	80	130	40	10	80	130	40	10	80	81	1	1

^ Project peak hour traffic 80/20 split.

10.1.7 Proposed mitigation measures

The findings of the Project operation stage traffic impact analysis suggest that there is negligible impact on the capacity of the local road network given the small numbers of additional vehicles added. As such, there are no significant intervention measures required to manage these negligible impacts. However, the following mitigation measures may be implemented:

- Stakeholder Engagement Plan (SEP) (MM-TP01) 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.
- Operations Traffic Management Plan (TMP) (MM-TP02) to include measures for the management of light and heavy vehicle routes associate with the Project, including appropriate control measures to plan for any unexpected operational issues.
- Site Access Strategy (MM-TP05). Verification of final operational phase traffic types and volumes required for the Project. Develop the routes workers will use to access each site, the method of travel (carpooling, buses etc), accommodation for workers (if any), parking and time of arrivals and departures to reduce the traffic volumes on roads and intersection during peak times.

With the implementation of the mitigation measures outlined above the project traffic during construction will not significantly impact 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 construction period.

Mitigation measures are detailed further in Section 13.0.

10.2 Preliminary operational phase traffic route assessments (TR11)

Based on the source locations, a high-level desktop analysis was undertaken of the transportation routes to the site access points for the project. Further analysis is required during the detailed design phase to verify traffic source locations.

It is considered that the initial transportation routes identified for the movement of vehicles assumed during the construction phase will be similar to the operations phase as detailed in the construction phase route assessments detailed in section 9.2.1 and 9.2.2 of this TIA report.

The additional route assessment that has been undertaken during the operational phase is the delivery of product from the Area 1 site to the Ultima intermodal rail terminal via a 30+m A-double vehicle. The REMC and HMC product is to be transported from the mine in Goschen, placed directly in containers on a truck and transported to the Ultima intermodal trail terminal (potentially a A-Double Skel see Figure 35). The A-double is expected to be 30m in length with an expected gross weight to be around 61 tonnes.

Source: Figure 14 of Qube Logistics Study report (2021)

Figure 35 A-Double Skel (illustrative only)

The following sources have been reviewed to derive the preliminary transportation routes which are subject to transport contractor review and associated road authorities' approvals:

- Qube Logistics Study, January 2021.
- Victoria's Class 2 A-Double PBS/HPFV network maps show the approved roads for 30+ metre A-Doubles operating at weights between 68.5 tonne and 85.5 tonne.
- NHVR Route Planner.

The following is noted with regards to the 30+m A-double transport route from Area 1 to the Ultima intermodal rail terminal:

- Approvals and road improvement infrastructure works will be required to approve the transportation of the route, noted as follows:
  - Bennett Road and associated access intersection with Gannawarra Shire Council
  - David Street including any associated intersections with Swan Hill Rural City Council.
  - Sea Lake-Swan Hill Road and any associated intersections with Swan Hill Rural City Council.
  - Donald-Swan Hill Road and associated intersections with DoT (RRV).
- Gazetted access may be possible in consultation with DoT heavy vehicles team and local council.

Haulage routes to intermodal terminal are presented in Figure 18.

10.2.1 Approvals and control measures

Additional approvals and control measures need to be considered with regards to operation transportation routes to the proposed Project work sites, especially in relation to the expected use of A-double vehicles on non-permitted roads. Where this is deemed necessary, engagement between the proponent, the relevant road authority, and the NHVR should be undertaken to establish any necessary approvals. It is understood that there are existing restrictions against vehicles greater than 26m in length and 4.9m in height (see Section 6.2.3.5). However, the following other factors may be considered during these discussions:

- Vehicle characteristics including size and mass, security of couplings, distribution of mass, dynamic stability etc.
- 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 exact nature of these conditions should be discussed and agreed upon with the NHVR and the relevant road authority, and may be standalone or used in conjunction with other conditions.

These approvals will 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.

Approvals required are outlined in Appendix E.

10.2.2 Proposed mitigation measures

- Stakeholder Engagement Plan (MM-TP01) for agreement and finalisation of final construction vehicle transportation routes

- Relevant permits from NHVR and Department of Transport for travel and 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).
- Route assessment for the heavy vehicles (MM-TP06) planned to be used during the operational phase.
- Depending on the route reviews, associated bridge or culvert assessments may also be required based on final transportation routes (MM-TP06). If the findings deem that the bridge or culverts identified present an issue, then consideration must be placed in mitigating the consequence. This may involve localised structural upgrades to the bridge/culvert or deferring to a different route.

Implementation of these measures during the operational phase would reduce residual impacts on 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. As project operation stage traffic impact is predicted to be negligible, the associated impact to public road safety is likely to be minimal.

This would last for the duration of construction and operation.

10.3 Preliminary intersection and road section upgrades (TR12)

As noted in Section 9.3 of this TIA, in terms of site access methodology for the project, it is proposed that any site access intersection or road section upgrades would be undertaken prior to construction commencing and be of suitable standard to both facilitate the construction and operation phases of the project.

10.3.1 Local site access intersections

The local site access intersections via Donald-Swan Hill Road priority intersections with Bennett Road and Mystic Park-Meatian Road were considered in Section 9.3 of this TIA, this included mitigating the operational phase of the project vehicle movement requirements, with swept paths assessment and local site and road upgrades considered.

10.3.2 Wider site access intersections

As noted during the project operational phase it is proposed to transport material from the project site (Area 1) to the Ultima intermodal rail terminal. A review of the route has been undertaken to understand the relative impacts and necessary improvements to permit the safe travel of A-double vehicles.

It is understood that vehicles cannot cross structures with mass limits in place under any circumstance. The NHVR will facilitate the process but the road manager will impose conditions of access.

10.3.2.1 Swept path review - design and check vehicles

The 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.

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 noted that swept paths were undertaken with 36m A-Double vehicles; however, it is understood that 30m A-Double trucks are likely to be used for product haulage. As site access designs progress, the associated vehicle swept paths and improvements to permit access would be undertaken and verified once vehicle types are confirmed in consultant with the nominated transport contractor.

For the transport of product, the following transport route was considered:

- Transport route intersection point 1 – Donald-Swan Hill Road and Bennett Road priority intersection – worst case 36.2m A-Double vehicle for all movements
- Transport route intersection point 2 – Donald-Swan Hill Road and Lake-Boga-Ultima Road priority intersection – worst case 36.2m A-Double vehicle for all movements
- Transport route intersection point 3 – Lake-Boga-Ultima Road and David Street priority intersection – worst case 36.2m A-Double vehicle for all movements
- Transport route intersection point 4 – Sea Lake-Swan Hill Road, David Street and Ultima North Road priority intersection – worst case 36.2m A-Double vehicle for all movements

Vehicle swept path analysis

The swept path assessments for the nominated design vehicles with a 500mm body clearance was undertaken using AutoTURN 11.0 software and is provided in Appendix D.

As previously noted, the local site access via Donald-Swan Hill Road / Bennett Road priority intersection Road was considered in Section 9.3 of this TIA, this included mitigating the operational phase of the project vehicle movement requirements, with upgrades, swept paths and local site upgrades considered and outlined at this project planning stage.

A summary of the swept path intersection assessments for the local site access roads, key findings and preliminary mitigation measures are provided in Table 33.

Table 33 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	36.2m 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	36.2m 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	36.2m 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

Operational vehicle usage at these intersections during the project operational stage 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 should 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). At this stage either improved aerial imagery or commissioned features should be used to develop formal conceptual designs from which the extent of issues and mitigation measures can be verified.

10.3.2.2 Site access road section upgrades

The proposed site access roads from the project site (Area 1) to the Ultima intermodal rail terminal are summarised in Table 34. Some culverts and bridges are noted to be present along the length of some the roads as shown in Figure 10.

Table 34 Proposed existing project operational stage – product transport road route details

Access Road Ref.	Site access road via:		Road authority	Existing road access type	Existing road width	Road verge/shoulders present	Bridge or Culverts present
	Access Road	Access Road length					
1	Bennett Road	6.3km	Gannawarra Council	Gravel	5 – 6.5m	Yes	3 decommissioned channel crossings between Donald Swan Hill Rd and Lake Shepherd Rd
2	Donald-Swan Hill Road	20.6km	DoT	Sealed	6.5 – 7m	Yes	3 decommissioned channel crossings between Nalder Rd and Lake Boga-Ultima Road
3	Lake-Boga-Ultima Road	18km	Swan Hill Rural Council	Sealed	6.2 – 6.5m	Yes	10 channel crossings between Ultima North Rd and Donald Swan Hill Road
4	David Street	320m		Sealed	6 – 6.5m	Yes	No channel crossing

Access Road Ref.	Site access road via:		Road authority	Existing road access type	Existing road width	Road verge/shoulders present	Bridge or Culverts present
	Access Road	Access Road length					
5	Sea-Lake Swan Hill Road	47m		Sealed	7 – 7.5m	Yes	No channel crossing
6	Ultima North Road	130m		Sealed	6.4m	Yes	No channel crossing

Road cross-section configuration

Whilst rural single lane access roads are expected to have very low traffic demands there are two concerns with regards to safety risk and reliability of the local road network:

1. The number of vehicles travelling along a road of an inadequate width increases the likelihood of a fatal or serious injury crash.
2. The increased number of heavy vehicles poses a potential durability and reliability issue to the performance of the existing pavement, which is unlikely to have been designed for the proposed operational vehicles. This risk is further increased during and following a wet weather period.

There are many options that may be employed to mitigate the above factors, including:

- Widening of the road along key routes.
- Providing passing bays at key locations.
- Traffic management measures.
- Reduced speed limits.
- Upgrade of road pavements.
- Regular inspections and maintenance operations.
- Installation of advanced warning signs.
- Driver's code of conduct.

In addition to the advice from the relevant road authority, the adoption of an independent road safety audit (pre-qualified by the Department of Transport) could assist with determining the appropriate treatments.

It is proposed that the mitigation measures adopted be determined on a case-by-case basis considering local constraints and subsequent construction and operational activities. This would be considered further during the development of the TMP (MM-TP02) as part of the site access strategy (MM-TP05) which would be developed to investigate and manage each of the access point intersections to provide safe access and egress for the operational phase of the project to the satisfaction of the responsible road management authority. Subsequently, DoT, Gannawarra Shire Council and Swan Hill Rural City Council should be consulted during the development of the strategy to ensure that final transportation routes are agreed upon and adequate upgrades are implemented.

Site access road section upgrades

The local site access intersections via Donald-Swan Hill Road priority intersections with Bennett Road and Mystic Park-Meatian Road and other key local access roads in the vicinity of the proposed project areas were discussed in Section 9.3, this included mitigating the operational phase of the project vehicle movement requirements, with upgrades, swept paths and local site upgrades considered and outlined at this project planning stage. Upgrades for other key local access roads are outlined in Table 35.

Table 35 Identified road section 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 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
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.

Intersection and road section upgrades summary

The proposed intersection and road section upgrades shown on Figure 36, will need to be developed further in the subsequent detailed design phase of the project considering contractor and stakeholder input, including once specific vehicles sizes and dimensions are confirmed for construction, operational and local land uses. This includes consultation with DoT with regards to approvals and requirements to ensure that roads anticipated to be utilised can accommodate operational traffic, notably A-double movements. A review of roadside features should be undertaken to confirm the presence of culverts, signs and vegetation which may be impacted by road and intersection upgrades.

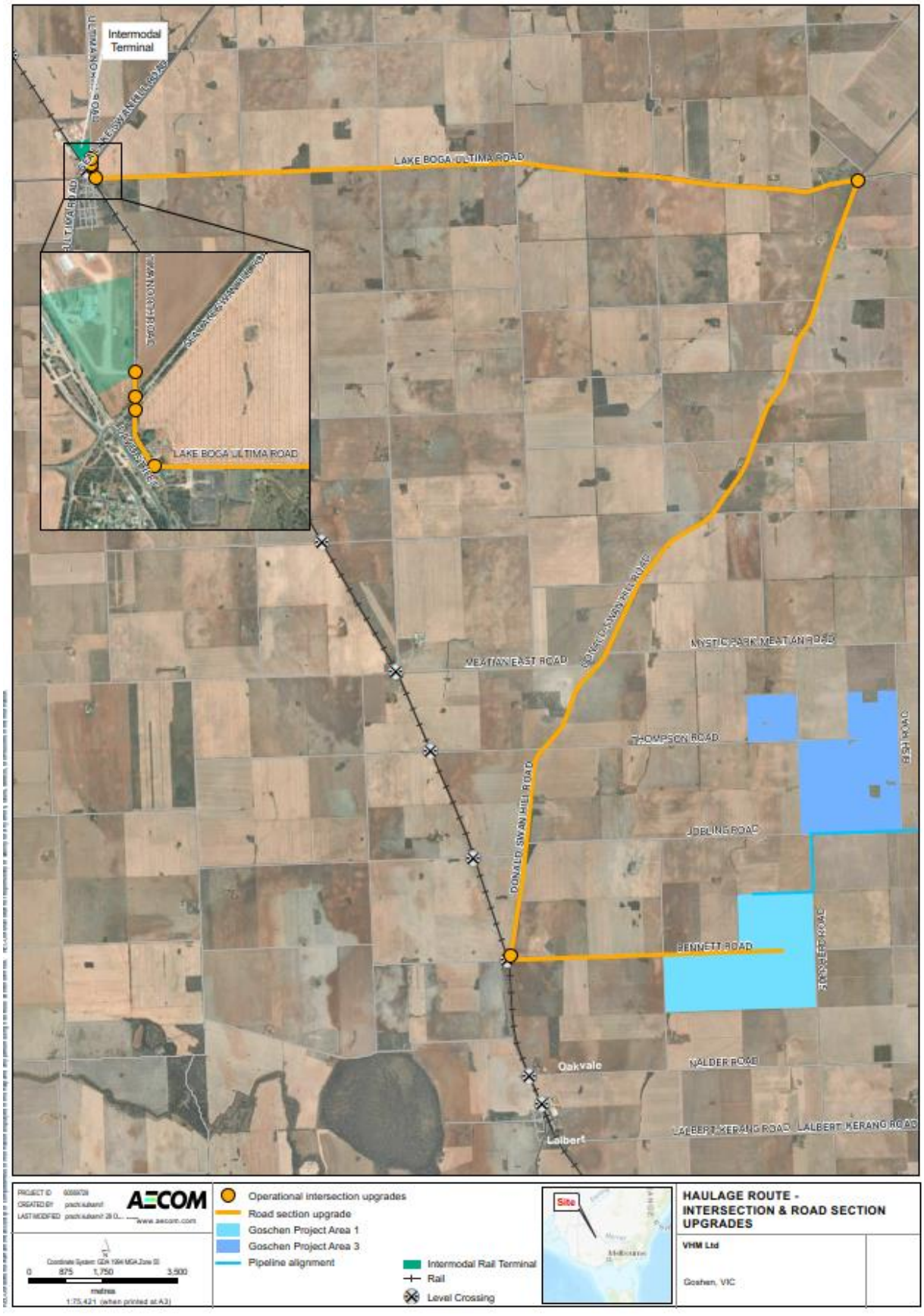


Figure 36 Summary of intersection road section upgrades

10.3.3 Proposed mitigation measures

The following mitigation measures are proposed to be implemented with regards to the development of site access and road section upgrades:

- 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.
- 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.
- 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) 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 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.

Mitigation measures are detailed further in Section 13.0.

10.4 Road and traffic lane closures (TR13)

Short and long term road closures relevant to local site access intersections and road section upgrades in the vicinity of the proposed project areas were discussed in Section 9.4. This section details the likely short and long term road and traffic lane closures relevant to the required road upgrade works between the site and intermodal facility, as well as ongoing Area 1 and Area 3 operations.

10.4.1 Short term road closure impact

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).

The extent of these road works can be visualised in Figure 36.

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 will maintain road access and east west connectivity with only minor diversions subject to the road management plan.

Long term road closures at Bennett Road and Thompson Road due to ongoing operations is considered below.

10.4.2 Long term road and traffic lane closures during operations

An overview of road closures expected to occur during the operational phase of the project is shown in Table 36.

Table 36 Goschen Project - Road closures anticipated for operations

Roads to be closed	Indicative time periods of road closure		Road closure impacts
	Closure	Reinstatement	
Bennett Road	2023 (Q3 / Q4)	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 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 final road closure methodologies would be verified following further stakeholder discussions and design stages and outlined in the project TMP, 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.
- It is likely that a PBS level 2 design vehicle and a PBS level 3 check vehicle would be required. Intersection features such as removable signage, mountable kerbs etc would assist in OSOM/OD movements.

All directly affected landowners need to be engaged directly as part of road closure and alternative route development planning discussions (MM-TP01).

Diversion routes which would be confirmed and managed as part of the TMP (MM-TP02) should also be considered as part of the Road safety audits (RSAs) (MM-TP03) 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. It is expected that roads would be reinstated to the satisfaction of road authorities following the closures.

10.4.3 Proposed mitigation measures

Short and long term road closures will likely impact the accessibility and connectivity of local road users. Diversions and connectivity will be maintained through the design and delivery of a TMP. It is recommended road upgrades are staged to minimise need for diversions. TMP will consider suitability of detour routes for all vehicle types. Road upgrades are not expected to be required based on background vehicle volumes.

The Stakeholder Engagement Plan (MM-TP01) to 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) will 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 will include road rehabilitation following the closures.

Implementation of these measures during the project would reduce impacts on 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 Road condition and maintenance (TR14)

As heavy operation vehicles have the potential to impact on several local and declared roads, road conditions should be managed throughout operation and the responsibility of each stakeholder throughout the process should be clearly identified.

10.5.1 Recommended mitigation measures

- Pre-construction road conditions review undertaken at the time of TMP development (MM-TP02) to verify conditions of roads to be utilised by the project (as outlined in Section 9.9). As part of the TMP dilapidation surveys to be undertaken to provide a baseline for any triggers for immediate and future impacts for the upgrade or remediation of road assets (MM-TP02).
- Agreements with road asset owners, includes RRV, DoT, Swan Hill Rural City Council and Gannawarra Shire Council, on the following should 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.
- 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 should be implemented by the responsible party and could be monitored and managed as part of the sub-TMP (MM-TP07).

It is understood that council will not provide HV permits until agreements are reached to Council's satisfaction.

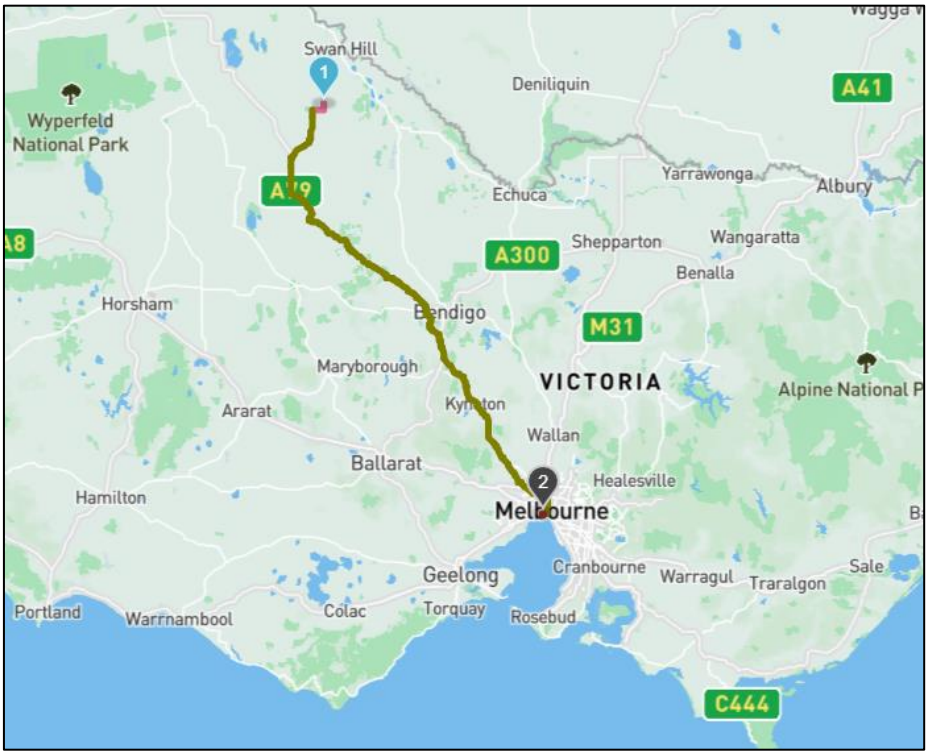
Implementation of these measures would reduce residual impacts on transport infrastructure and operations; as any road damage would be identified and rectified early through stakeholder communication over the operational phase of the project, residual impacts are expected to be insignificant with the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

10.6 Contingency Delivery Route – Port of Melbourne

In the event that the product cannot be transported to the Ultima intermodal rail terminal due to extended 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. The route is illustrated below in Figure 37Figure 37.



Source: NHVR Route Planner

Figure 37 Transport route between Goschen Project Area and Port of Melbourne

10.6.1 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 has been undertaken for both B-Double (up to 26m) and A-Double (up to 36.5m) vehicle classes along the expected transport route from the project site to Melbourne.

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. Due to the gazetted nature of the route, it can be assumed that B-Doubles currently frequent the route and no further road or intersection upgrades are required to accommodate B-Double movements.

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 36.5m and between 68.5 to 85.5 tonnes). However, the following conditions apply at a number of key points along the route:

- For combinations in excess of 26m long permission is required to traverse all rail crossings. Application for an ODL permit is required at DoT Heavy Vehicle Consent – Structural Engineering. This condition occurs at level crossings located at:
    - Calder Highway, Wycheproof within the township
    - Calder Highway, approximately 50m south-east of Back Teddwaddy Road
    - Calder Highway, near Dews Lane within Charlton township
    - Calder Highway, approximately 50m west of Glenalbyn-Mt Korong Road
    - Calder Highway, near Nixon Street within Inglewood Township
    - Calder Highway, approximately 300m east of Station Street

  - Calder Highway, approximately 150m south-east of Harrison Road
  - Calder Alternative Highway, near McKimmie Road within Marong township
- Conditionally approved bridge structures with weight limits. This condition occurs at bridge structures located at:
  - Calder Highway, near Davies Street within Charlton township – SN0375 limited to 82 tonnes
  - Calder Highway, near Park Street within Bridge on Loddon township – SN0245 limited to 75 tonnes
  - Calder Freeway, over Station road within Gisborne township – SN6685 limited to 83 tonnes
  - Calder Freeway, over Green Gully Road within Keilor – SN0426 limited to 74 tonnes
  - Calder Freeway, over Flora Street within Keilor – SN0425 limited to 69.5 tonnes
  - Calder Freeway, over Western Ring Road within Keilor Park – SN8972 limited to 74 tonnes

The remaining roads on the route including 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. Furthermore, the Port of Melbourne should be consulted regarding any approvals and control measures required for internal port movements after traversing Webb Dock Drive.

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 9.3 of the TIA report. A swept path assessment using AutoTURN 11.0 software has also been undertaken for:

- Transport route intersection point 1 – Donald-Swan Hill Road and Calder Highway On ramp – worst case 36.2m A-Double vehicle for all movements
- Transport route intersection point 2 – Kooringa Way and Webb Dock Drive signalised intersection – worst case 36.2m A-Double vehicle for all movements

No issues were noted in the swept path assessment for movements at these intersections.

Operational vehicle usage at these intersections during the project operational stage 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) will be agreed upon once a transport contractor is nominated.

10.6.2 Route traffic midblock capacity impact

The contingency route to the Port of Melbourne will 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. Furthermore, as the Port of Melbourne delivery route is required only as a contingency during unforeseen events or due to the unavailability of the railway line, the likely duration of these movements will be infrequent.

10.6.3 Amenity impacts arising from use of the road network

The proposed route to the Port of Melbourne passes through a number of communities noted above in Section 10.6. 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 will be required under MM-T02. These measures may include minimising vehicle movements on exposed surfaces, road watering, using wheel washing facilities and enforcing vehicle speed limits.

To minimise the likelihood of road safety incidents, it is recommended that a truck driver code of behaviour (or code of conduct) be developed and implemented for drivers. This is commonly developed for logging and rock haulage operations and includes typical guidance on load security, use of engine brakes in towns, fatigue management, travelling through school zones and other safety related items.

With (minor) increased local traffic volumes resulting from the project, mitigation measures should adequately offset the impact of these vehicles and as such, it is expected that the residual impact would not be significantly worse than the existing condition. With the implementation of mitigation measures, local road users and residents should experience a similar level of safety and amenity impact. Monitoring and engagement with local road users and residents directly affected by the contingency haulage route should be considered to ensure mitigation measures are appropriately addressing concerns.

After implementation of these mitigation measures, the residual impact of noise, dust and debris and haulage related safety is expected to be negligible.

10.7 Summary of residual impacts

Residual impacts are those that remain once mitigation and management measures have been implemented. Table 37 summarises potential residual impacts during the construction phase of the project once mitigation and management measures have been applied.

Table 37 Summary of residual impacts during operation

Section	Impact assessment	Residual impacts
Section 10.1	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.
Section 10.2	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 10.3	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	Impact assessment	Residual impacts
Section 10.4	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	Road condition and maintenance	Any road damage would be identified and rectified early through stakeholder communication prior to commencement of the project and throughout the operational period, no remaining damage to the road network after operation.
Section 10.6	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.

11.0 Decommissioning impact assessment

Decommissioning impacts are expected to be similar to the construction stage of the project. Potential impacts associated with decommissioning works of the project are expected to be the same or similar to those associated with the construction phase. However, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts. 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.

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.

12.0 Cumulative impacts with other projects

Construction and operation of the project is not expected to coincide with the construction and/or operation of other projects within the study area.

13.0 Summary of mitigation, monitoring and contingency measures

13.1 Mitigation measures

The mitigation measures that are proposed to avoid, mitigate or manage Transport impacts associated with the project are summarised in Table 38.

Table 38 Mitigation measures relevant to Transport

Measure ID	Mitigation measure	Phase
MM-TP01	**Stakeholder Engagement Plan** A community, business and relevant authority stakeholder and communications plan will be developed with regards to transport with ongoing stakeholder consultation to be undertaken during the lifecycle of the Project. This would consider findings from this TIA and subsequently a project development Traffic Management Plan. Stakeholder consultation, involving but not limited to: DoT, NVHR, Swan Hill Rural City Council, Gannawarra Shire Council and land owners affected by road closures will be undertaken. Key aspects include: • Pre-construction stage: - TMP agreement - Dilapidation surveys - Agreement and finalisation of B-Double, A-Double, OSOM and OD transportation routes • Construction, operation and decommission stages - TMP measures and controls - Construction traffic monitoring - Road and lane closures - Construction timing and avoidance of seasonal traffic - Road network monitoring, remediation protocols and maintenance requirements. • Post operation • Close-out meeting, infrastructure hand-back criteria	Pre-construction Construction Operation Decommissioning
MM-TP02	**Traffic Management Plan (TMP)** Prior to the commencement of construction (excluding preparatory works), TMP(s) should 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 construction. 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.	Pre-construction Construction Operation Decommissioning

Measure ID	Mitigation measure	Phase

	The TMP should include:
	• TMP is usually developed against a set of required planning permit conditions and in association with key stakeholders for endorsement, subsequently evidence of this should be provided as part of the TMP.
	• A review of relevant policy, regulatory and protocol requirements which have informed the TMP.
	• Existing conditions review undertaken at the time of TMP development to verify conditions. Those provided as part of this TIA can be used as a baseline.
	• Approved Project scope including finalised details on construction extents, staging, vehicle types, final material (e.g. bulk material sources and disposal of spoil) sources, and peak construction impacts verified (usually at this stage of the Project process given unknowns are verified via multi-disciplinary assessments and nominated works / transport contractors are onboarded.
	• Consideration of cumulative impacts of other major projects operating concurrently in the local area.
	• Verification of final site access strategy, including access points and crossovers to the site (see MM-TP05).
	• Mitigation measures outlined, including site access point requirements (e.g., vehicle size movements facilitated and AustRoads intersection type requirements according to traffic demand warrants) and any requirements for OD delivery along derived transport routes.
	  ○ This would also consider road section upgrades.
	  ○ Design drawings would need to be prepared of the above and sent for review and agreement with the relevant road authority at concept, functional and detailed design stages.
	• The following road condition and maintenance requirements considered:
	  ○ Pre-condition (dilapidation survey) to provide an existing survey of public roads that may be used for access and designated for construction vehicle routes.
	  ○ Consultation with road asset owners to agree on the extent of pre-condition (dilapidation survey) 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.
	• TMP control measures outlined, covering the following aspects:	

Measure ID	Mitigation measure	Phase
	○ Roles and responsibilities, including project management, co-ordination, public consultation, advertising and complaint procedures. ○ Road authority notification requirements. ○ Training and site induction requirements. ○ Contractor liaison protocol. ○ Roadside native vegetation requirements, including identification protocols and approvals (if required). ○ Vehicle access measures. • Access requirements by vehicle type, including any regulator or stakeholder permits. • Road closure requirements. Management of any temporary or partial closure of roads and 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. Traffic counts may be conducted to investigate suitable times for temporary road and lane closures. Road closures to occur in off-peak periods where possible when demands are low where possible. Minimise the number and duration of road closures. • Development of suitable measures to ensure emergency service access (notably fire) is not inhibited due to Project construction activities in consultation with emergency services, especially regarding any road closures on the public road network (see MM-TP04). • Construction staging and car parking requirements to ensure no car parking occurs outside of the Project boundary and affects local land use or accessibility. If required car share or shuttle bus provisions should be considered to reduce the need for single vehicle worker occupancy. Bus and car parking provision to be provided within site boundaries where required. • Signage requirements with reference to Australian Standard AS 1742. Notably for this Project this would include notification of: ○ Movement of trucks from site access points to/from major road connections. ○ No-truck access signage to ensure vehicles do not access restricted areas and to aid with wayfinding. • Speed limits set for construction stage. A temporary reduced speed limit in the vicinity of site access points to 70km/hr is recommended. This should be investigated further as part of the TMP in consultation with relevant stakeholders. • Verify operating and working hours during construction. These will need to be agreed with key stakeholders with a remit for the construction contractor to verify local bus routes/timings to ensure no conflicts occur. • Consideration will be given to avoiding temporary road closures during peak agricultural demand time where possible. Suitable detour routes to be provided as part of the TMP where required.	

Measure ID	Mitigation measure	Phase

	• The development of dust and debris management strategies and would include dust suppression methods such as covering vehicle loads, watering and street sweeping if required necessary.
	• Monitoring, inspection and auditing requirements detailed with regards to the TMP, including:
	  ○ Monitoring and inspection protocols outlined to ensure the integrity of the TMP given it should be viewed as a live document for the duration of the Project's construction period. Reviews are typically undertaken on monthly basis with relevant stakeholders informed of any significant changes.
	  ○ Auditing can include compliance and road safety audits.
	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).	

MM-TP03	**Road safety audits** 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 Will include consideration of emergency vehicle access and if road surface upgrades are required. RSA's must be completed by a pre-qualified DoT (VicRoads) RSA auditor and be independent to the project and notably the design team.	Pre-construction Construction Operation Decommissioning
MM-TP04	**Emergency access and evacuation plan** An emergency evacuation plan would likely be developed outside the TMP report but reference to its production be made. It is likely that this would be produced in tandem between the developer, works contractor, local business and CFA.	Pre-construction Construction Operation Decommissioning
MM-TP05	**Site access strategy** A site access strategy should be developed and finalised in consultation with all stakeholders, notably 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 pipeline during construction and operations should be investigated further to ensure that safe entry and egress of construction vehicles including heavy vehicles. This includes considerations for potential 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.	Pre-construction Construction Operation Decommissioning

Measure ID	Mitigation measure	Phase
	Once designs have been completed, they should be subjected to RSAs as highlighted in MM-TP03. It is expected that stormwater drainage management systems including swale drains and pipe culverts may also be required to be installed as part of any proposed intersection upgrade works, if there is currently nothing in place to divert runoff near the access intersections. This will need to be reviewed as part of the functional design process.	
MM-TP06	**Heavy vehicle transport route assessments** Formal B-Double, A-Double, OSOM and OD 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 routes 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 A-Double and OD vehicles.	Pre-construction Construction Operation Decommissioning
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 outlined previously. The sub TMPs will also outlined more specific protocols and works contacts, for example: • Roles and responsibilities • Training • Incident and emergency procedures • Documentation and communication procedures	Pre-construction Construction Operational Decommissioning

13.2 Monitoring and contingency measures

Dilapidation surveys of the road network to be completed as part of the Pre-construction phase and at regular intervals during the Operation phase are proposed to monitor the transport impacts associated with the project. These surveys are specified in:

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

Details of the requirements of each of these measures are outlined in Table 38.

14.0 Summary of implications under relevant legislation

This study has assessed the impacts of construction, operation and decommissioning of the project on Transport assets and affected road users.

The significance of the impacts has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the government terms of reference established to guide the assessments.

The following sections summarise these identified impacts under the relevant Commonwealth and Victorian legislation.

14.1 Commonwealth

No specific commonwealth legislation or policy with regards to transport is relevant to the project.

14.2 Victorian

This section assesses the Project against relevant state and local planning polices, considering the Project's consistency with strategic planning policy and an assessment of strategic land use impacts.

Road Management Act 2004 (Victoria)

This Project will require compliance with the Road Management Act 2004 and address all obligations and principles and seek all required approvals and permits outlined in the act. These include understanding and following the relevant powers and duties of road authorities, safety duties related to works on or near rail, inclusions into road management plans, and other work on roads considerations.

Department of Transport (VicRoads), Gannawarra Shire Council, Swan Hill Rural City Council – Road Management Plan

As part of the TMP, road access and maintenance will be considered via dilapidation survey to understand the triggers for any immediate or future upgrades or remediation of road assets. Agreements with road owners regarding the extent of dilapidation survey undertaken and road maintenance methodology will be sought before construction. If any impacts occur during the construction period, rectification works will be implemented by the responsible party.

Austroads and AS Guide to road design and traffic management standards

All relevant Austroads and other Australian standards for road design and traffic management have been considered during the impacts and mitigation measures assessment.

As such, in relation to the evaluation objectives set out in the EES Scoping Requirements, the project would not have significant impacts on traffic and transport resulting from the Project for the following reasons:

- The project is not expected to disrupt existing or proposed traffic and transport assets on a long-term basis; where impacts may occur on a temporary basis or related to amenity, it is considered that mitigation measures would negate or minimise this impact.
- The project is consistent with State and local policies and planning scheme provisions (refer to Section 3.1).

15.0 Conclusion

The purpose of this report is to assess the potential transport impacts associated with the Goschen Project to inform the preparation of the EES required for the project. A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of transport impacts and recommended mitigation measures, are summarised below.

Existing environment

An existing transport conditions review was undertaken, which was informed via a combination of desktop reviews, site visit, crash/traffic data analysis and review of relevant policies and legislation. The key existing condition findings are summarised below:

- Generally, the major highway and arterial roads were observed to be lightly trafficked within the study area. The roads were found to be generally in good condition, with sealed surface, adequate delineation provided and no apparent pavement defects for the declared network.
- The following observations have been made of local roads initially proposed to provide access to the Project areas considered:
    - Site access roads form a priority intersection with their respective major road connection i.e. Donald Swan Hill Road. Generally sight distances were found to be good.
    - Local site access roads are unsealed and were observed to have very little to no traffic volumes (less than one vehicle per hour).
- Traffic volume data was collected from DoT. Peak period traffic volumes for 2020 were derived based on the AADT by adopting highest percentage as advised from Austroads Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management.
- As local Councils have no available traffic count data for the local roads, AADTs were inferred based on the rural setting and undertaking similar Projects.
- A review of the local road network mid-block capacities was undertaken and shows that the local road network has spare capacity to facilitate increases in traffic demand.
- Given the rural area there are no dedicated pedestrian or bicycle infrastructure provided near the proposed site access roads to the Project areas. While there are generally no dwellings located within the immediate vicinity of the three project areas, it is noted that pedestrian and cycling activity may occur in Mystic Park where some sections of the water pipeline are expected to be built.
- Two bus services operate within the study area along Donald-Swan Hill Road running approximately once to twice a day. School buses may be operating along the local road network and generally would operate from 7:30 am to 9:00 am and 3:20 pm to 5:00 pm during school terms
- While there are no stations near the project areas, four level crossings are located within the study area. Of these, two along Donald Swan Hill Road and one along Dumosa-Quambatook Road are anticipated to be utilised to access the worksites for the Project.
- DoT CrashStats was interrogated for the last five years of crash, between 2015 to 2020. Overall, while accident density and types varied across the study area, the crash analysis shows that there are no evident crash patterns. No crashes were recorded near any of the local roads in the immediate vicinity of the proposed Goschen Project areas and their anticipated access points.

Construction impact assessment findings

During construction, potential impacts on the transport network include temporary road closures, increased traffic delays, damage to road surface due to heavy vehicles and impeded access. These would be managed through the implementation of standard traffic management measures typically applied for projects of this scale and nature and incorporated into a Traffic Management Plan (TMP). The key findings of the construction phase impact assessment for the project were as follows:

- Mid-block and intersection capacity: the analysis included anticipated traffic generated by the project construction across daily, morning peak and afternoon peak. Flow diagrams were established considering major road mid-block traffic estimated volumes, with 2024 base and with 2024 base with construction comparisons and worst-case derived movement of construction volumes at the nominated major site access points. The capacity analysis shows that Donald-Swan Hill Road and Murray Valley Highway have a respective spare mid-block theoretical capacity of 88% and 32%.
- Preliminary routes assessment: B-Doubles vehicles routes have been established based on the restrictions of the study area roads. Traffic management would be required and should be investigated as part of a TMP. Heavy vehicle transport route assessments are to be to be undertaken to determine the final vehicle routes for each vehicle type.
- Preliminary site access and road upgrades: review was undertaken of the access points and roads to be used by the project during construction. Access road sections which will require upgrades or alterations have been identified. A site access strategy is to be completed to ensure that each of the access point intersections provide safe access and egress for construction vehicles. This includes considerations for intersection and road section upgrades to ensure that safe vehicle movements can be facilitated, notedly Donald-Swan Hill Road and Bennett Road priority intersection and Bennett Road.
- Road closures: all road closures are anticipated to be managed as part of a TMP. This includes traffic detours and traffic management measures such as traffic controllers and signage. No delays to public transport services are expected to occur and local property access is expected to be maintained during the closures.

Overall, impacts to the transport network during construction are expected to be relatively minor and can be managed through measures outlined in a TMP for the project, with the road network found to be sufficient to accommodate anticipated traffic volumes.

Operation impact assessment

Transport impacts identified in the operational phase of the project include the following:

- The road capacity assessment shows that the additional traffic movements generated by the Project operation which include product haulage and delivery truck movements would result in negligible impacts on key local/arterial roads within the study area with Donald Swan Hill Road found to have spare mid-block theoretical capacity of 85%.
- Preliminary routes assessment: review was undertaken to determine what route would be taken by A-double vehicles expected to be utilised for product haulage from Area 1 to Ultima intermodal train terminal. Approvals and road improvements will be required to ensure that these movements can be safely accommodated on the proposed route which is not designed to accommodate A-Double vehicles (subject to vehicle type confirmation). As such, intersection and road upgrades are expected to be required to ensure that safe bidirectional movements can be safely facilitated on the public road network.
- Road closures: Thompson Road and parts of Bennett Road are expected to be fully closed for up to 12 years. Shepherd Road will also potentially be closed for a short amount of time. Traffic controls and detour of local traffic which would be managed by TMP would be required with motorists expected to experience moderate delays. 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.

Overall operational impacts are considered negligible for the road network and intersection capacity due to the relatively low traffic volumes anticipated to be generated during this phase.

Decommissioning impact assessment

Potential impacts associated with decommissioning works for the project are expected to be the same or similar to those associated with the construction phase. However, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts. The roads anticipated to be utilised by the Project are expected to be fully reinstated.

Mitigation and contingency measures

Potential impacts on transport assets due to the project would be avoided, minimised or managed to required standards through the recommended mitigation measures:

- *MM-TP01 – Stakeholder Engagement Plan*
- *MM-TP02 – Traffic Management Plan (TMP)*
- *MM-TP03 – Road Safety Audit (s)*
- *MM-TP04 – Emergency access and evacuation plan*
- *MM-TP05 – Site access strategy*
- *MM-TP06 – Heavy vehicle transport route assessments*
- *MM-TP07 – Sub-TMPs*

16.0 References

The following reports and / or parties have been referenced or consulted in the preparation of this report:

- VHM Limited – Qube Logistics Study, January 2021
- VHM Limited – Goschen Mineral Sands Project DFS Logistics Study, September 2019
- VHM Limited – Goschen 5Mtpa Project Description, August 2021
- Local Government Infrastructure Design Association - Infrastructure Design Manual (IDM) – version 5.30, 2019
- Local Government Infrastructure Design Association - Infrastructure Design Manual (IDM) – Appendix G, version 5.30, 2019
- Victoria Government Gazette – Road Management Act 2004, Code of Practice, Worksite Safety, Traffic Management 2010.
- Road Management Act 2004.
- Department of Transport (VicRoads) – General Guidance.
- Department of Transport (VicRoads) Heavy Vehicle Network Maps in Victoria.
- Department of Transport (VicRoads) Road Management Plan
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis
- Austroads Guide to Road Design Part 6: Intersections, Interchanges and Crossings Management
- Austroads Guide to Road Design Part 4 (AGRD4): Intersections and Crossings
- Austroads Guide to Road Design Part 4a (AGRD4a): Unsignalised Intersections.
- DoT CrashStats
- National Heavy Vehicle Regulator (NHVR) website / journey planner.
- Victorian Planning Provisions, clause 52.32 – Wind Energy Facility
- Gannawarra Shire Council Road Management Plan 2021
- Gannawarra Shire Council Asset Disposal and Rationalisation
- Swan Hill Rural City Council Road Management Plan 2021
- Swan Hill Rural City Council Discontinuance and Disposal of Roads
- Representatives from DoT/ RRV Council and Gannawarra Shire Council

Appendix A

Risk Register

Appendix A Risk Register

Refer to Section 7.0 for summarised Risk Register table

Risk ID	Risk name	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
				L	C	R		L	C	R
Construction										
TR01	**Intersection and road capacity to accommodate construction traffic**	Additional traffic during construction may result in increased congestion, compromising road operation and safety within the vicinity of the Project area.	MM-TP02 Traffic Management Plan	Possible	Moderate	Medium	MM-TP01 Stakeholder Engagement PLan MM-TP02 Traffic Management Plan	Unlikely	Minor	Low
TR02	**Heavy vehicle accessibility**	Insufficient road network infrastructure to accommodate safe movement of over-dimensional and over-mass loads	MM-TP02 Traffic Management Plan	Possible	Moderate	Medium	MM-TP02 Traffic Management Plan MM-TP05 Heavy Vehicle Transport Route Assessment	Unlikely	Moderate	Low
TR03	**Public road network and intersection accessibility**	Proposed access locations exacerbate or create new road safety issues. Risk of crash at intersection of access track and public road due to non-complying sight lines, stopping distance and lack of lighting. Risk of crash at intersection of public roads due to non-complying sight lines, stopping distance, lack of lighting and space restrictions.	MM-TP02 Traffic Management Plan	Possible	Moderate	Medium	MM-TP02 Traffic Management Plan MM-TP03 Road Safety Audits MM-TP07 Site Access Strategy	Unlikely	Moderate	Low
TR04	**Road and lane closures**	Road/lane closures or disruptions result in impacts on local access or business operations	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan	Likely	Moderate	Medium	MM-TP01 Ongoing stakeholder consultation MM-TP02 Traffic Management Plan	Likely	Minor	Medium
TR05	**Amenity impacts due to construction vehicles**	Plant and spoil trucks deposit construction debris on public roads leading to dust generation and perceived loss of amenity and public health and safety issues.	MM T01 Stakeholder Engagement Plan MM-T02 Traffic Management Plan Includes dust and debris management strategies	Almost certain	Moderate	High	MM TP01 Ongoing stakeholder consultation MM-TP02 Traffic Management Plan Monitor condition of roads. Dust suppression methods such as covering vehicle loads and street sweeping	Possible	Minor	Low
TR06	**Impacts on public transport**	Movement of construction vehicles, as well as potential road closures/diversions and safety impacts on public transport and access for school buses.	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan	Unlikley	Moderate	Low	No additional mitigation measures identified	Unlikley	Moderate	Low
TR07	**Active transport impacts**	Additional project generated traffic and construction works impact other vulnerable road or site users resulting in a reduction in public safety and amenity.	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan	Unlikley	Moderate	Low	No additional mitigation measures identified	Unlikley	Moderate	Low
TR08	**Emergency vehicle access**	Given the rural location and construction site locations emergency access will need to be considered / maintained (notable fire risks)	MM-TP01 Stakeholder Engagement Plan MM-TP01 Emergency access and evacuation plan	Possible	Minor	Low	No additional mitigation measures identified	Possible	Minor	Low
TR09	**Road condition and maintenance**	Public roads experience damage or deterioration due to the movement of heavy vehicles, machinery and plant.	MM-T01 Stakeholder Engagement Plan Agreeing with road asseet owners dilapidation surveys, road maintenance methodology and post construction review whom should ratification requirements be undertaken MM T02 Traffic Management Plan Pre-construction roads are checked to ensure they are suitable to access and perform construction activities	Possible	Moderate	Medium	MM-T01 Ongoing stakeholder consultation MM-T02 Traffic Management Plan MM-T05 Sub-TMPs	Unlikely	Moderate	Low
Operations										
TR10	**Intersection and road capacity to accommodate operational traffic**	Capacity of road network to accommodate workforce and heavy vehicle movements during operation	MM TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan MM-TP05 Site Access Strategy	Rare	Negligable	Low	No additional mitigation measures identified	Rare	Negligable	Low
TR11	**Heavy vehicle accessibility**	Insufficient road network infrastructure to accommodate safe movement of A-Doubles	MM-TP01 - Stakeholder Engagement Plan MM-TP06 - Route assessment for the heavy vehicles	Almost certain	High	Very High	MM-TP01 - Stakeholder Engagement Plan MM-TP06 - Route assessment for the heavy vehicles MM-TP02 TMP	Unlikely	Minor	LOw
TR12	**Public road network and intersection accessibility**	Proposed project area access locations exacerbate or create new road safety issues. Risk of crash at intersection of access points and public road due to recurring heavy vehicle movements, inadequate road width, non complying sight lines, stopping distance and lack of lighting. Risk of crash at intersection of public roads due to recurring heavy vehicle movements, inadequate road width, non-complying sight lines, stopping distance and lack of lighting.	MM-TP01 - Stakeholder Engagement Plan MM-TP05 - Site access strategy	Possible	Major	High	MM-TP03 - Road safety audits (RSAs) MM-TP05 - Site access strategy MM-TP06 - Route assessment for the heavy vehicles	Unlikely	Moderate	Medium
TR13	**Road closures**	Road closures or disruptions result in impacts on local access or business operations and emergency accessibility	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan	Likely	Minor	Medium	MM-TP03 - Road safety audits (RSAs)	Likely	Minor	Medium
TR14	**Public roads damage or deterioration**	Public roads experience damage or deterioration due to the movement of operation traffic including heavy vehicles movements. Road conditions assessments to be done before, during and after.	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan	Almost certain	Moderate	Very High	MM-TP01 Stakeholder Engagement Plan MM-TP02 Traffic Management Plan MM-TP07 Sub-TMPs	Likely	Low	Low

MM-T01	Ongoing stakeholder consultation
MM-T02	Traffic Management Plan (TMP)
MM-T03	Road safety audits
MM-T04	Emergency access and evacuation plan
MM-T05	Site access strategy
MM-T06	Heavy vehicle transport route assessments
MM-T07	Sub-TMPs

Figure A1: ERR Risk Matrix

Likelihood	Insignificant	Minor	Moderate	Major	Critical
Almost Certain	Medium	High	Very High	Very High	Very High
Likely	Medium	Medium	High	Very High	Very High
Possible	Low	Medium	Medium	High	Very High
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Medium	Medium	High

Consequence

Table A2: ERR likelihood descriptions

Severity	Description	Probability of event occurring
Almost certain	The risk event is expected to occur in most circumstances.	90–100%
Likely	The risk event will probably occur in most circumstances.	70–90%
Possible	The risk event might occur at some time.	30–70%
Unlikely	The risk event could occur at some time.	5–30%
Rare	Highly unlikely, but the risk event may occur in exceptional circumstances.	0–5%

Table A3: Risk Rating Acceptability

Risk level	Description
Very High	Totally unacceptable level of risk. Controls must be put in place to reduce the risk to lower levels.
High	Generally unacceptable level of risk. Controls must be put in place to reduce the risk to lower levels or seek specific guidance from ERR.
Medium	May be acceptable provided the risk has been minimised as far as reasonably practicable.
Low	Acceptable level of risk provided the risk cannot be eliminated.

Appendix B

Existing local road network review

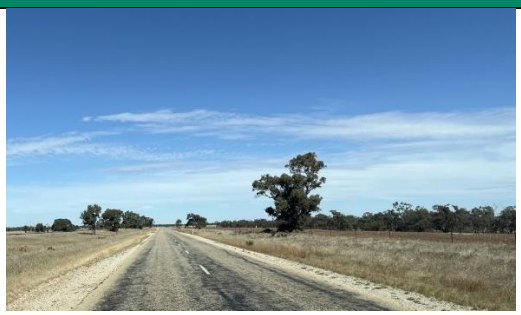
Appendix B Existing local road network review

Arterial road network

A detailed overview of the existing declared road network anticipated to be utilised by the project traffic is provided in the following tables. Observations from the site inspection were conducted by AECOM on Tuesday 12 April and Wednesday 13 April 2022.

Donald Swan-Hill Road

Donald Swan-Hill Road – looking northbound



Donald Swan-Hill Road – looking southbound

Existing conditions

Responsible Authority: DoT

Classification: Arterial

Traffic Volumes – AADT (one-way): 155 (between Murray Valley Highway and Dumosa-Quambatook Road)

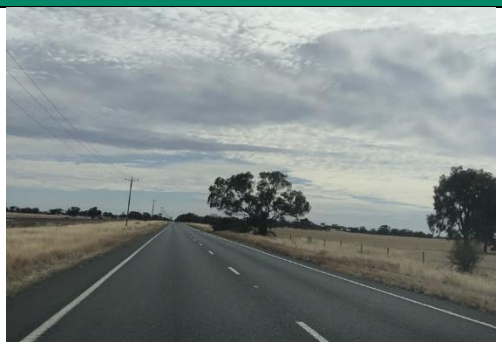
Location: Lalbert/Goschen

Existing conditions overview: Donald Swan-Hill Road serves as a major route connecting Donald, southwest of the study area with Swan Hill, northwest of the study area that intersects with key roads in the study area, including Calder Highway, Jobling Road and Bennett Road. The road was observed to be generally lightly trafficked. The carriageway has an approximate width of 7-7.5m and some gravel shoulders of approximately 0.5-1m in width are generally present along the length of the road. Appropriate signage and line marking are generally present along the length of the road though markings were observed to have faded at places. Good road surface was observed at several locations along the road length, with the pavement appearing to have been recently upgraded from Bennett Road to Mystic Park-Meatian Road and Brown Road to Lake Boga-Ultima Road. However, the road surface appears to be poor at some locations. The posted speed limit decreases to 80km/hr in the vicinity of the intersection of Bennett Road and the level crossing.

Project usage

Donald Swan Hill Road is expected to be utilised by the project traffic as it provides a key connection with key roads in the study area notably Bennett Road.

Calder Freeway



Calder Freeway – looking northbound

Calder Freeway – looking southbound

Existing conditions

Responsible Authority: DoT

Classification: Arterial

Traffic Volume – AADT (one-way): >750

Location: Wycheproof - Dumosa

Existing conditions overview: Calder Freeway runs along the southwest side of the study area and connects Melbourne to Mildura. The carriageway width is approximately 7m and small shoulders of 0.5 – 1m in width are generally present along the length of the road. Appropriate signage and line marking are present along the length of the road. Good road surface was observed at several locations along the road length. Sight distances are generally good. Several B-Doubles and semi-trailers were observed along this road.

Project usage

This major route, located southwest of the study area, intersects with Donald Swan Hill Road and is expected to be used by the Project traffic to reach the study area.

Murray Valley Highway

Murray Valley Highway – looking southbound

Murray Valley Highway – looking southbound

Existing conditions

Responsible Authority: DoT

Classification: Arterial

Traffic Volume – AADT (one-way): 2,900 – 3,500

Location: near Lake Boga/Swan Hill

Existing conditions overview: Murray Valley Freeway connects from New South Wales to Victoria and has a traffic flow of approximately 6,000 - 7,000 vehicles per day. The carriageway varies in width ranging between 8m to 11m. Appropriate signage and line marking are present along the length of the road. Road surface was overall to be observed in good condition, Several B-Doubles and semi-trailers were observed along this road. Speed limit decreases from 100km/hr to 50-80km/hr in the vicinity of the urban areas.

Project usage

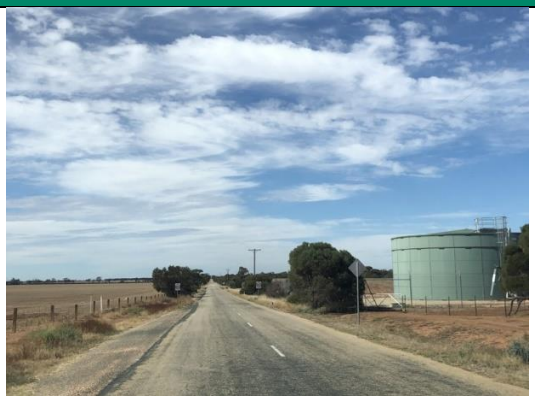
It is expected that construction traffic originating from Melbourne may be utilising the Highway to reach the study area.

Local road network

A detailed overview of the existing local road network anticipated to be utilised by the project traffic is provided in the following tables. This includes observations from the site inspection conducted on Tuesday 12th and Wednesday 13th April 2022.

Lake Boga-Ultima Road

Lake Boga Ultima Road – looking westbound



Lake Boga Ultima Road – looking eastbound

Existing conditions

Responsible Authority: Rural City of Swan Hill

Classification: Local

Traffic Volume AADT (one-way): 25 trips

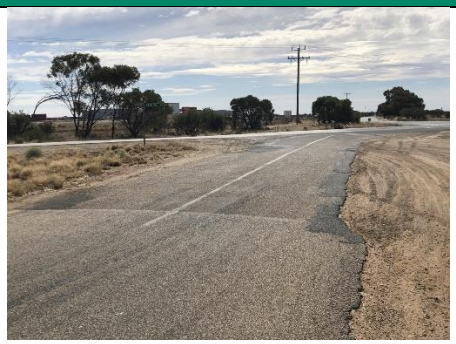
Location: Ultima/Goschen

Existing conditions overview: This is a sealed road connecting Ultima and Goschen. The road width is approximately 6.2m and gravel shoulders of approximately 0.5-1m are generally present along the length of the road. The road surface is generally good especially on the eastern section of the road near Goschen where the road surface looks like it was recently repaved. Line markings and signs are present along the length of the road. Sight distances at the intersection of Lake Boga-Ultima Road and Donald-Swan Hill Road were found to be restricted when looking northbound due to the curve of the road at this location.

Project usage

Processed material from the project areas is anticipated to be transported to the existing Ultima intermodal located off Ultima North Road.

Ultima North Road



Ultima North Road – looking southbound at its intersection with Sea Lake-Swan Hill Road

Existing conditions

Responsible Authority: Rural City of Swan Hill

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Ultima

Existing conditions overview: This road with gravel shoulders had a width of approximately 6.5m. The road surface was observed to be in relatively good condition. Heavy vehicles were observed on the road, Sight distances are good.

Project usage

Processed material from the project areas is anticipated to be transported to the existing Ultima intermodal located off Ultima North Road.

Bennett Road

Bennett Road – looking eastbound

Bennett Road at intersection with Donald Swan Hill Road

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Lalbert

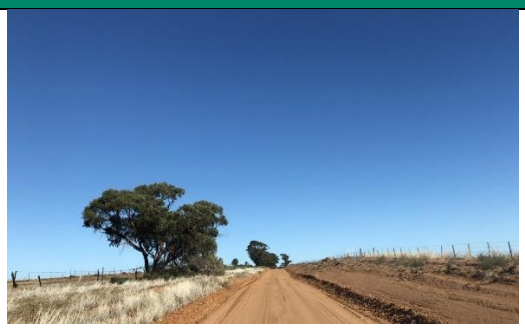
Existing conditions overview: This gravel road extends from Donald Swan-Hill Road to the west to Quambatook Swan Hill Road to the east. The road width varies from 5 to 6.5m with some gravel shoulders present along the majority of the road. A heavy vehicle was observed on this road during the site inspection. There is also a level crossing with active controls approximately 40m southwest of the Donald Swan Hill Road and Bennett Road intersection. The intersection of Bennett Road and Donald Swan Hill Road is a three-way junction located approximately 40m northeast from a level crossing with active controls. Sight distances were generally good though overgrown vegetation was observed along the road, especially in the vicinity of intersections. A crest was observed when driving eastbound near the intersection of Bennett Road and Quambatook-Swan Hill Road.

Project usage

Bennett Road is expected to be utilised by the project traffic to access project areas 1 and 3.

Mystic Park Meatian Road

Mystic Park Meatian Road – looking eastbound



Mystic Park Meatian Road – looking eastbound

Existing conditions

Responsible Authority: Swan Hill Council/ Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

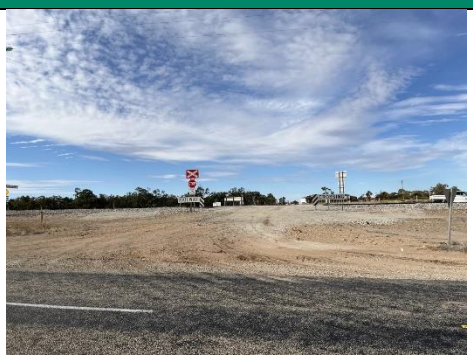
Location: Lalbert/Beauchamp

Existing conditions overview: this unsealed road provides access to paddocks and farmland. The road width varies from 5 to 7m and no shoulders are present along the length of the road. The road is generally in good condition and the road surface varies from gravel to dirt along the road length. While a couple of crests were observed, sight distances are generally adequate. Two light vehicles were observed during the site visit.

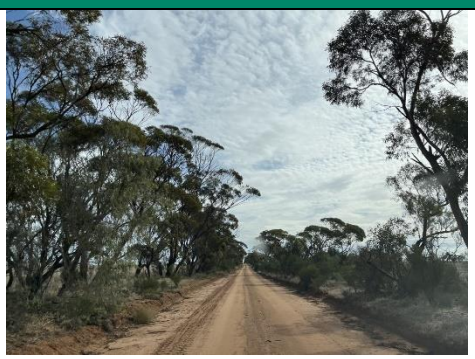
Project usage

Mystic Park Meatian Road is expected to be utilised by the project traffic notably to access project areas 1 and 3.

Nalder Road



Nalder Road at intersection with Donald Swan Hill Rd



Nalder Road – looking westbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

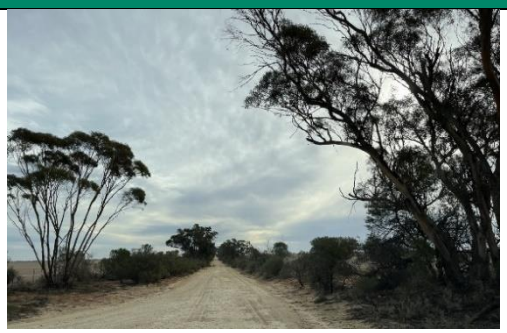
Location: Lalbert

Existing conditions overview: this earthen road provides access to paddocks and farmland. Road width varies from 5.5 to 7m and no shoulders are present along the length of the road. The road is only accessible in dry weather only as indicated by a warning sign at the Nalder Road/Donald Swan Hill Road intersection. Road surface is generally good though some sections were found to be rougher notably at the intersections of Nalder Road/Donald Swan Hill Road and Nalder Road/Quambatook Swan Hill Road. The road access is restricted to dry weather only between Pola Road and Donald Swan Hill Road. The road becomes very dusty when other vehicles use it, decreasing drastically road visibility and sight distances. A level crossing with passive controls is present near the intersection of Nalder Road/Donald Swan Hill Road. Sight distances are restricted when approaching the Nalder Road/Donald Swan-Hill Road intersection due to the level crossing.

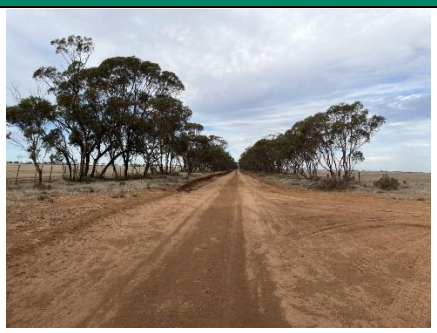
Project usage

This road is expected to be utilised as a diversion route during the road closure of Bennett Road.

Jobling Road



Jobling Road – looking westbound



Jobling Road – looking eastbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Lalbert

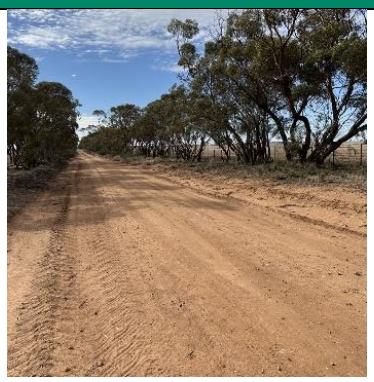
Existing conditions overview: this gravel road mainly provides local access to farmland. Road surface is earthen/sandier east of Pola Road. The road width varies between approximately 5 to 6m. Generally sight distances were observed to be good though there was some overgrown vegetation observed especially at intersections to be impacting sight distances. Some crests were observed notably near Pola Road and east of Marsh Road, restricting sight distances.

Project usage

Access to project area 3 is expected to be provided off Jobling Road. Additionally, the project traffic is expected to utilise Jobling Road to travel between Project areas 1 and 3.

Shepherd Road

Shepherd Road – looking southbound



Shepherd Road – looking northbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Lalbert

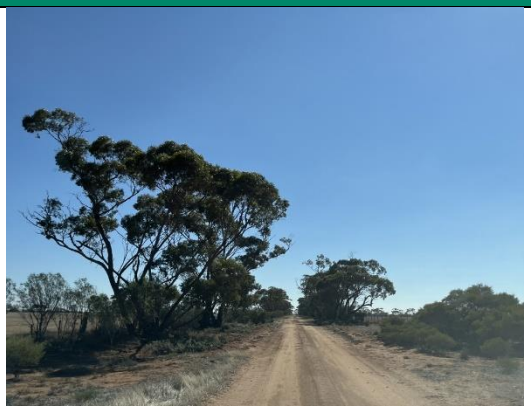
Existing conditions overview: This is an earthen road with an approximate width of 5.1-6m. Road surface is generally good with generally adequate sight distances, though some sections were observed to be sandier notably north of Bennett Road. The road may become very dusty when other vehicles use it, decreasing drastically road visibility and sight distances. Vegetation was seen encroaching onto the road at certain locations along the road length and may be restricting sight distances at intersections. Services were observed to be present along the roadside between Jobling Road and Bennett Road.

Project usage

The project traffic is expected to utilise Shepherd Road to travel between Project areas 1 and 3 which will also be closed to the public during the construction phase of the project.

Bish Road

Bish Road – looking southbound



Bish Road – looking northbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Lalbert

Existing conditions overview: This dirt road provides access to farmland and has a road width of approximately 4-5m. Road surface was observed to be more uneven at the intersection with Thompson Road. Sight distances are generally good but were found to be restricted at the intersections with Thompson Road and Mystic Park-Meatian Road due to overgrown roadside vegetation. A crest was observed approximately 600m south of Mystic Park-Meatian Road.

Project usage

The project traffic may utilise Bish Road to travel between Project areas 1 and 3.

Thompson Road

Thompson Road – looking westbound (near Bish Rd)

Thompson Road – looking eastbound (near Shepherd Rd)

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

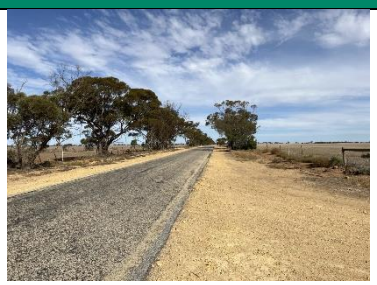
Location: Lalbert

Existing conditions overview: This is a dirt road with an approximate width ranging from 3.5 to 5.5m. The road was observed to be narrower and uneven particularly west of Shepherd Road and west of Steer Road. The road surface was observed to be sandier at the intersection with Bish Road. Sight distances were found to be restricted at the Thompson Road/Shepherd Road intersection and Thompson Road/Steer Road due to overgrown vegetation, the Thompson Road/Quambatook Swan Hill Road intersection due to the curve of the road (northbound) and overgrown vegetation (southbound).

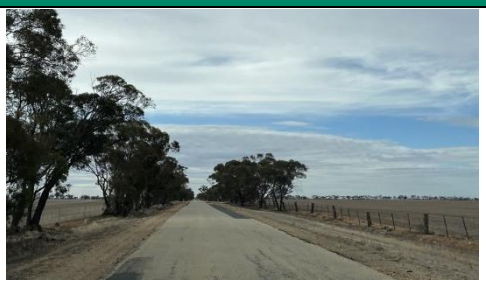
Project usage

Thompson Road is expected to require full closure during the operational phase of the project (year 8 to 20), requiring local traffic route diversions. Additionally, Thompson Road (east of Jampot Road) is expected to be utilised by the project traffic during the construction of the water pipeline which will run under this road.

Quambatook Swan Hill Road



Quambatook Swan Hill Road – looking southbound



Quambatook Swan Hill Road – northbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Beauchamp/Lalbert

Existing conditions overview: this sealed road mainly provides a connection with local access roads in the Beauchamp/Lalbert area. Road surface was found to be in fair condition. The road surface seems to have been recently upgraded north of Jobling Road. Gravel shoulders of approximately 0.5 to 1m in width are generally present along the length of the road. Sight distances are found to be generally good though overgrown roadside vegetation was observed in the vicinity of the intersecting local roads. The road was observed to be lightly trafficked.

Project usage

Quambatook Swan Hill Road is expected to be used as a diversion route during the closure of Bennett Road.

Jampot Road

Jampot Road – looking northbound

Jampot Road – looking southbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Beauchamp

Existing conditions overview: This earthen road has a width of approximately 3.5-4m. No shoulders are present along the length of the road. The road surface is generally good. Sight distances are restricted at the intersection of Jampot Road and Thompson due to a crest when looking eastbound and overgrown roadside vegetation when looking westbound. Similarly, sight distances were found to be restricted at the intersection with Mystic Park-Beauchamp Road due to overgrown vegetation.

Project usage

Jampot Road is expected to be utilised by the project traffic during the construction of the water pipeline which will run under this road.

Steer Road

Steer Road – looking southbound

Steer Road at intersection with Mystic Park-Meatian Rd

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Mystic Park

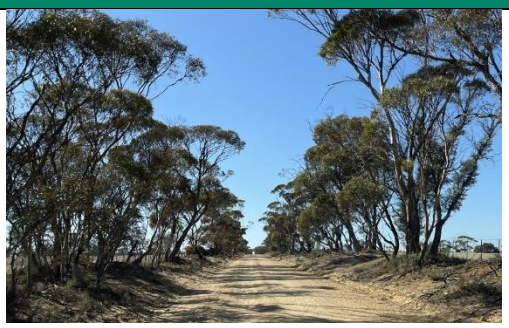
Existing conditions overview: The road width varies from 3.8 – 4.8m, no shoulders are provided along the length of the road. The road is unsealed and generally in good conditions with some sections found to be sandier which could decrease drastically road visibility and sight distance if multiple vehicles use the road. Sight distances from the road intersection with Mystic Park-Meatian Road are slightly restricted by overgrown roadside vegetation.

Project usage

The water pipeline is expected to be running along this road between Mystic Park-Meatian Road and Thompson Road.

Mystic Park-Beauchamp Road

Mystic Park-Beauchamp Road – looking southbound



Mystic Park-Beauchamp Road – looking westbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

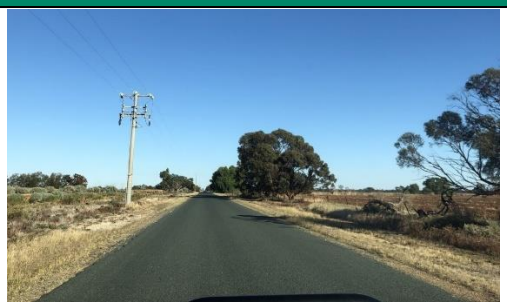
Location: Beauchamp

Existing conditions overview: The road is sealed between Mystic Park East Road and Bael Bael Boga Road before becoming unsealed with the road surface varying from gravel to dirt along its length. The road width varies from 6 – 8m, no shoulders are provided along the length of the road. The road is unsealed and generally in good conditions with some sections found to be sandier which could decrease drastically road visibility and sight distance if multiple vehicles use the road. The road is restricted to dry weather only west of Cummock Road. Multiple irrigation channels and culverts were observed on along the length of the road. A sign for protected vegetation was present near Mesley Road.There are three Y-junctions along the road at its intersection with Teagues Road, Mystic Park-Meatian Road and Jewson Road. Sight distances are generally adequate though, a couple of crests were observed along the length of the road. It is also noted that sight distances from the road intersection with Steer Road are slightly restricted by overgrown roadside vegetation.

Project usage

The water pipeline is expected to be running along this road between Mystic Park-Meatian Road and Thompson Road as part of the one of the two alternative alignment options.

Mystic Park East Road



Mystic Park East Road – looking westbound

Mystic Park East Road at the Avoca Outfall Channel

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

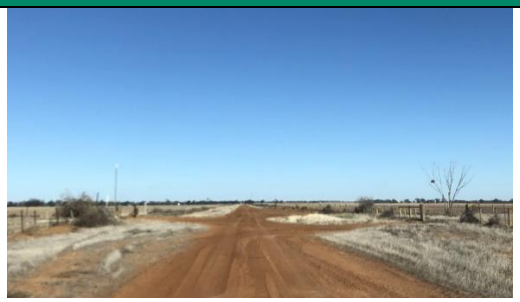
Location: Mystic Park

Existing conditions overview: This sealed road runs along the east side of the study area. The road has a width of approximately 6.3m. Gravel shoulders of 0.5-1.2m in width are present along the majority of the road length. The road is in good conditions with the road surface appearing to have recently been repaved. There are no line markings along those recently paved sections. Swale drains are present on the roadside as well as drainage culverts. The road crosses the Avoca Outfall channel. A level crossing with active controls is present west of Silvester Road. A bus stop is present on this road east of the level crossing with appropriate sign provided to indicate the presence of school buses.

Project usage

The water pipeline is expected to be running along this road between Mystic Park-Meatian Road and Thompson Road.

Teagues Road



Teagues Road – looking westbound

Teagues Road at intersection with Mystic Park-Beauchamp Road

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

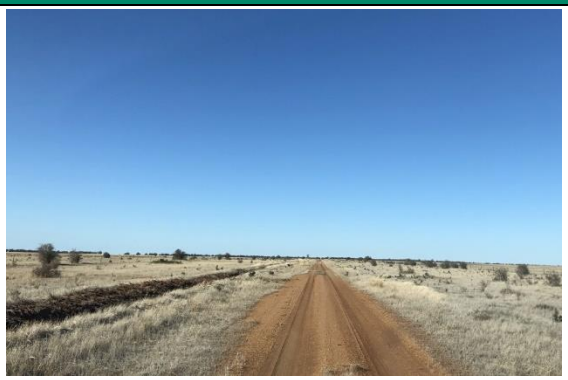
Location: Beauchamp

Existing conditions overview: this dirt road provides access to farmland. Road width varies from 3 to 4m and no shoulders are present along the length of the road. Road surface is uneven in some sections. The road becomes very dusty when other vehicles use it, decreasing drastically road visibility and sight distances.

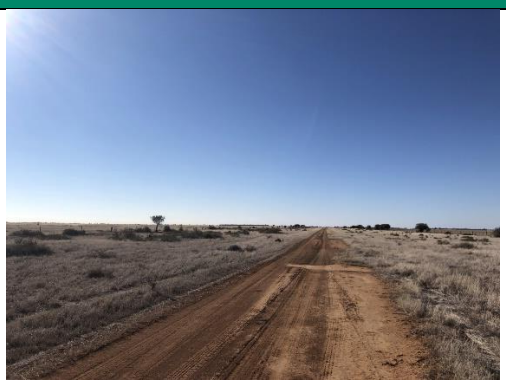
Project usage

The water pipeline is expected to be running along this road between Mystic Park-Meatian Road and Thompson Road as part of the one of the two alternative alignment options.

Lookout Road



Lookout Road – looking southbound



Lookout Road – looking northbound

Existing conditions

Responsible Authority: Gannawarra Shire Council

Classification: Local

Traffic Volume AADT (one-way): 25 trips

Location: Beauchamp

Existing conditions overview: This is an unsealed dirt road providing access to farmland. Some sections observed to be sandier which could decrease drastically road visibility and sight distance if multiple vehicles use the road. Roadside swale drains are present along the length of the road. The road is narrow with an approximate width of 3-3.5m.

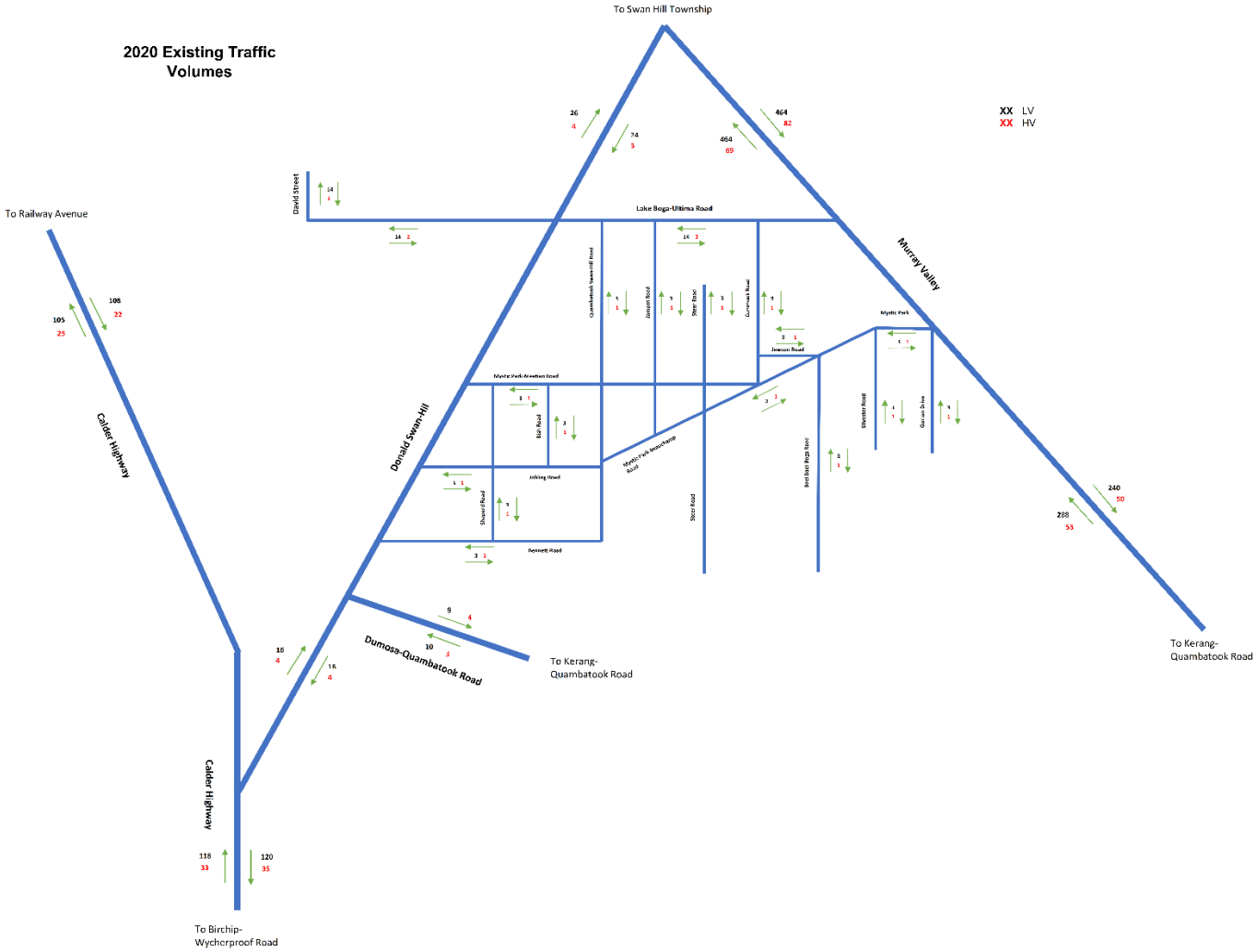
Project usage

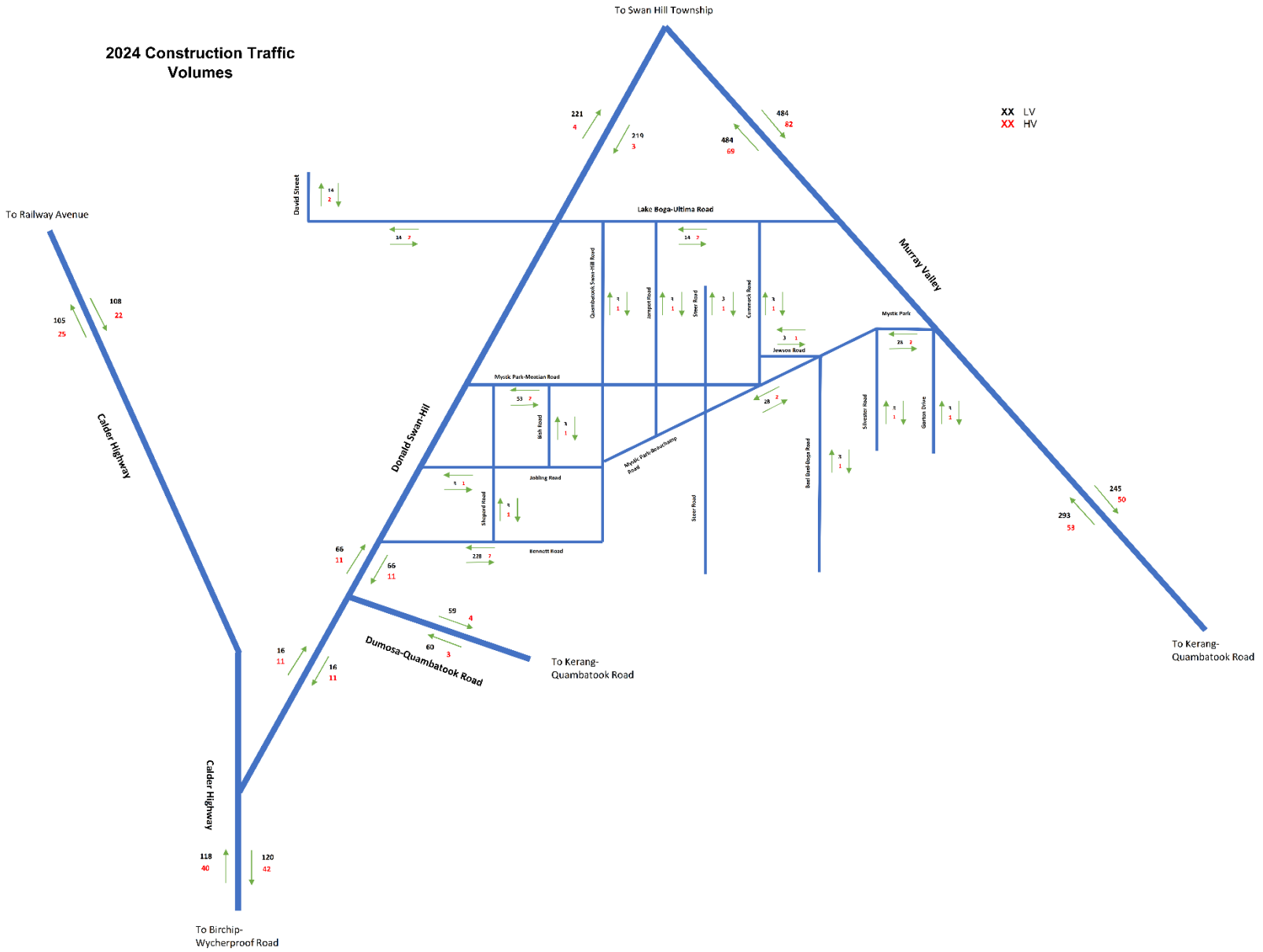
The water pipeline may be running along this road between Mystic Park-Meatian Road and Teagues Road as part of the one of the two alternative alignment options to the preferred alignment.

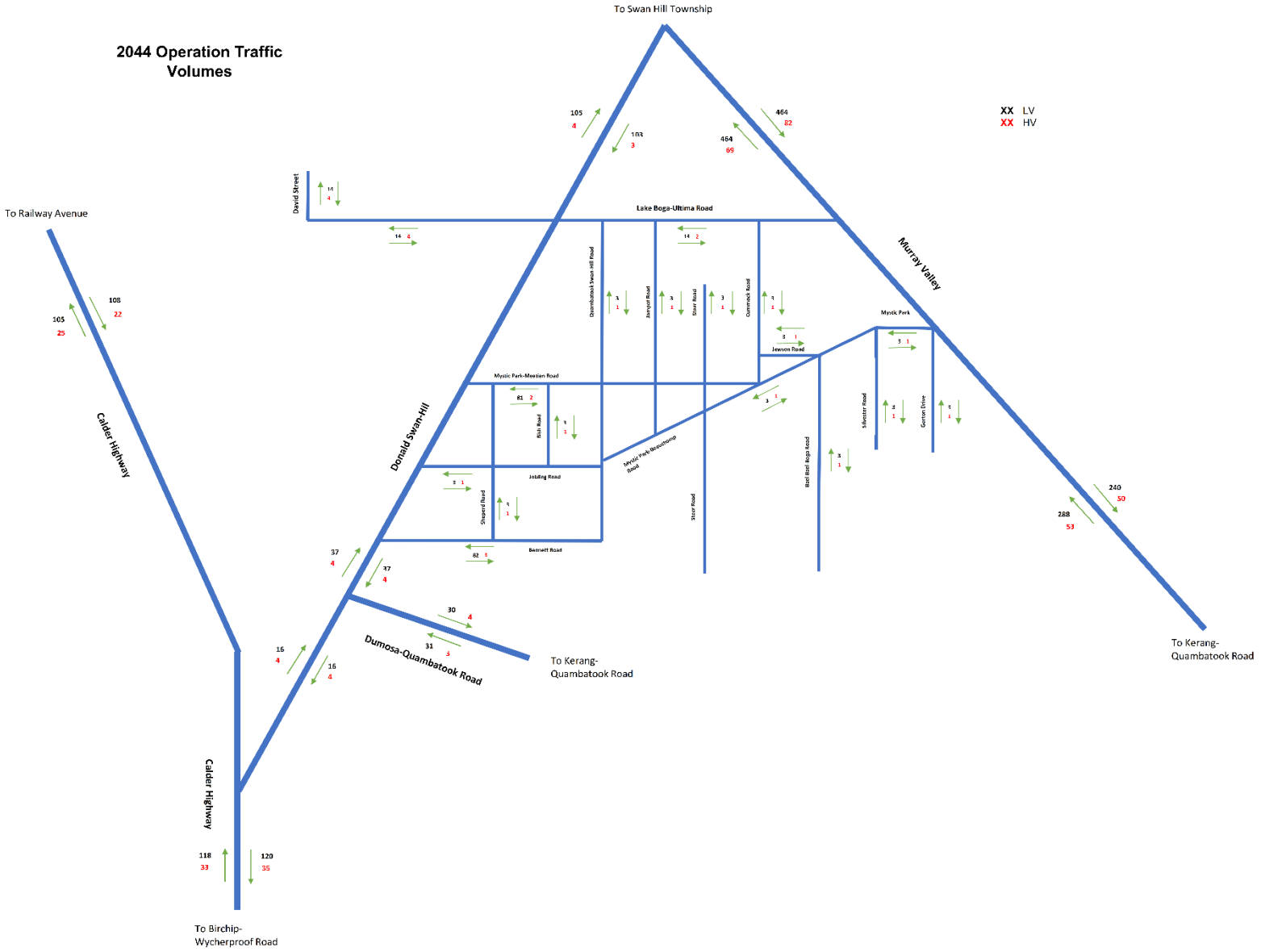
Appendix C

Traffic flow diagrams

Appendix C Traffic flow diagrams




2024 Construction Traffic Volumes
XX LV
XX HV
To Swan Hill Township
To Railway Avenue
Calder Highway
Donald Swan-Hill
Murray Valley
Lake Boga-Ultima Road
David Street
Quambatook-Swan Hill Road
Jumpet Road
Steer Road
Cummock Road
Mystic Park
Jewsons Road
Mystic Park-Meatian Road
Mystic Park-Beaufamy Road
Irish Road
Jobbing Road
Shepard Road
Bennett Road
Beel Beel-Rose Road
Silvester Road
Gamos Drive
Dumosa-Quambatook Road
To Kerang-Quambatook Road
To Kerang-Quambatook Road
Calder Highway
To Birchip-Wycherproof Road


2044 Operation Traffic Volumes
XX LV
XX HV
To Swan Hill Township
To Railway Avenue
Calder Highway
Donald Swan-Hill
Murray Valley
Lake Boga-Ultima Road
David Street
Quambatook Swan Hill Road
Jenyon Road
Steer Road
Cummock Road
Jewson Road
Mystic Park
Mystic Park-Meatian Road
Rish Road
Jobbing Road
Shepard Road
Bennett Road
Mystic Park-Nicestamp Road
Steer Road
Red Red Rags Road
Silvester Road
Gorton Drive
Dumosa-Quambatook Road
To Kerang-Quambatook Road
To Kerang-Quambatook Road
To Birchip-Wycherproof Road

Appendix D

Swept paths

Appendix D Swept Paths

B-Double and A-Double swept paths are illustrated below and are listed in 9.3.2 and 10.3.2 respectively.

B Double Swept Paths

1. Bish Road – Thompson Road

Entry from the West

Entry from the East

Egress Westbound

Egress Eastbound

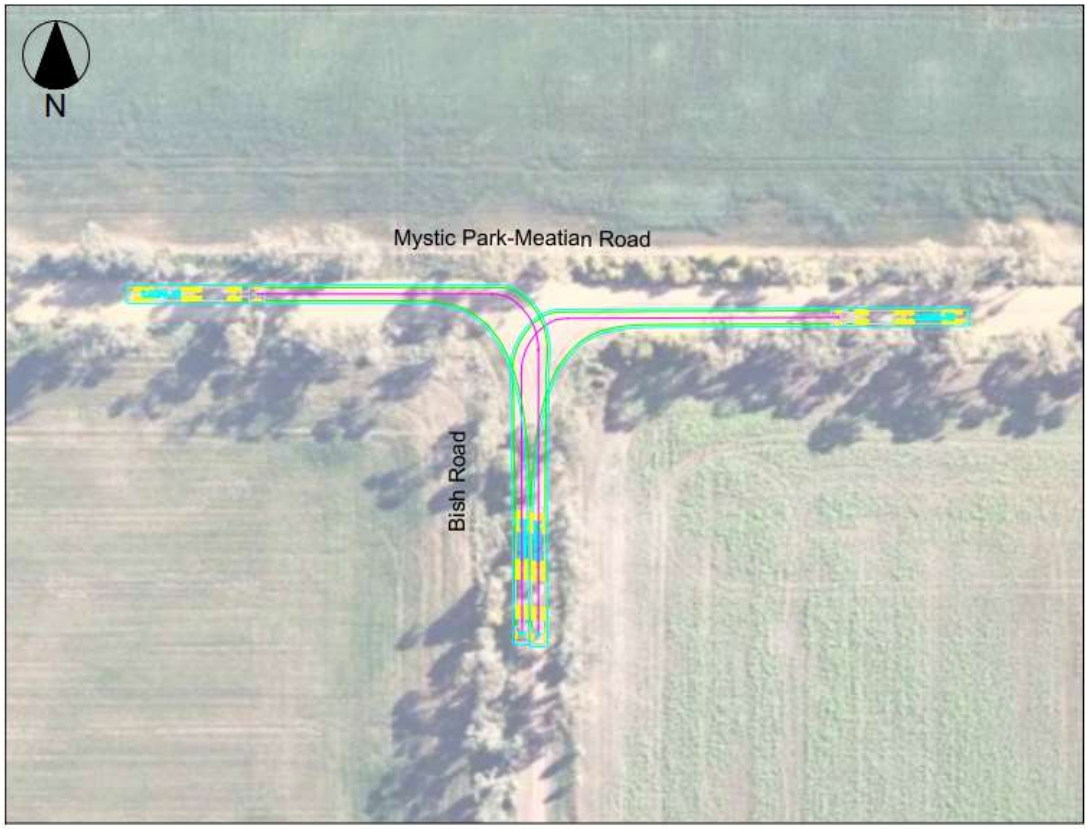
2. Jobling Road – Bish Road

Entry

Egress

3. Mystic Park-Meatian Road – Bish Road

Entry



Egress

4. Donald Swan-Hill Road – Mystic Park-Meatian Road

Entry

Egress

5. Donald-Swan Hill Road – Jobling Road

Entry

Egress

A Double Swept Paths

1. Donald Swan-Hill Road – Bennett Road

Entry

Egress

2. Donald-Swan Hill Road – Lake Boga-Ultima Road

Westbound

Southbound

3. Lake Boga-Ultima Road – David Street

Northbound

Southbound

4. Sea Lake-Swan Hill Road – Ultima North Road – David Street

Northbound

Southbound

Appendix E

Approvals

Appendix E Approvals

Approvals and control measures should be considered with regards to construction transportation routes to the project work sites. These should be considered in more detail with relevant stakeholder co-ordination as part of a subsequent TMP for the project. The following approvals and control measures may be necessary depending on the outcome of the TMP.

Transport

TMP and transport approvals

When any works are planned on a road, lane, street or footpath, a TMP should be submitted to the relevant road authority (Department of Transport and local councils) for review. This requirement is in accordance with the *Road Management Act 2004*, the *Road Safety Act 1986* and the Australian Standard AS 1742.3 2009 Traffic control devices for works on roads.

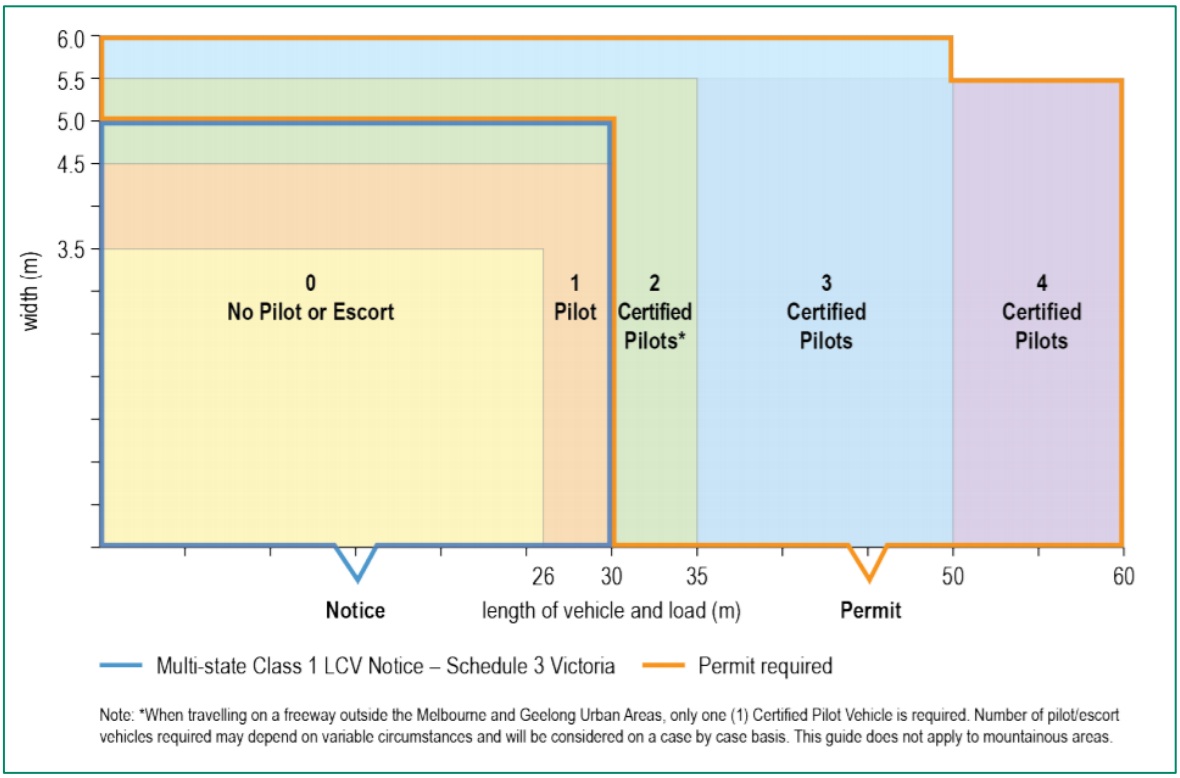
During the development of the TMP and associated sub-plans (worksite TMPs), consultation with key stakeholders should be undertaken to meet subsequent planning condition obligations. At this stage, the necessary approvals should be discussed and agreed, including:

- **Road works permits:** Typically, functional and detailed design plans would be submitted to the road authority for approval prior to the commencement of any upgrade. A 'works within the road reserves permit', 'road opening permits' and 'vehicle crossing permits' should be sought as required.
- **Memorandum of Authorisation (MoA):** DoT, Gannawarra Shire Council and Swan Hill Rural City Council would require MoAs to be completed for implementation of traffic management measures.
- **Overhead constraints:** The total ground clearance should be confirmed of the component required to be delivered during the construction phase of the project. Overheads that must have sufficient clearance include wires, structures and trees, this also applies to ground clearance at rail level crossings. A request for raising overhead cables is to be made with the relevant asset owner who would perform these works for a fee should there be insufficient clearance for passage of the OD vehicles.
- **Over-size vehicle permits:** The NHVR issues permits for oversized vehicles. DoT (Regional Roads Victoria (RRV)), on behalf of NHVR, would require at least 28 days to assess any route. Local councils will also be consulted, and agreements sought during this process.

  The NHVR outlines requirements for the movement of oversize loads and provides dimensional limits depending on vehicle types. Where the dimensions or mass limits exceed those outlined on NHVR guidelines, a specific permit must be requested from the road authority. DoT (RRV), on behalf of NHVR, will require at least 28 days to assess any route
- **Bridge and culvert condition / weight bearing assessments:** These may be required to ensure any construction vehicles do not have any adverse impacts to any bridges or culverts on route to the project sites. Co-ordination with the local authority would be required to understand any historical data on such assets and need for any additional assessments.
- **Rail track crossings:** DoT would need to give permission (provide necessary staff on site) for any such over-dimensional vehicles crossing or travelling across train tracks. A permit is required when an over-dimensional vehicle crossing the railway line is greater than 4.9 metres in height, three metres wide or 26.0 metres in length. Several rail track crossings exist within the proximity of the project sites and should be avoided if possible.

All relevant stakeholders should be involved at the outset of obtaining necessary permits to ensure that no delays to the project are experienced, and the above information should be used as a guide only in relation to those discussions.

In addition to the above, pilot and escort vehicles ensure the safe movement of OD vehicles on the road. Pilot vehicles, certified pilot vehicles and escort vehicles typical requirements are shown in Figure 0-1.



Source: NHVR, 2017

Figure 0-1 Pilot and escort graph guide

The above typical requirements are dependent on several parameters to ensure safe and efficient movement of oversize loads:

- vehicle and load width and length
- location of movement
- traffic volumes and variations
- other associated risks such as road congestion or crash risk.

Driver induction training

Prior to commencing construction activities, regular and returning drivers of semi-trailers, rigid vehicles and/or B-Double and OD vehicles who would access and egress the site for pick-up and delivery of material should be required to undertake a driver induction. The induction course should be developed early to ensure it is ready prior to construction activity (including any site preparation works) commencing. Irregular and one-off drivers of pick-ups and deliveries would be considered exempt to this induction requirement.

The induction course should intend to cover:

- Suitable routes to and from the site.
- Suitable times of travel (i.e. outside of school bus times as outlined in TMP).
- Applicable traffic management procedures that will need to be in place prior to approaching or departing the site (if required).
- Communications and notification procedures.
- Speed restrictions (on the road network and the site).
- Safety procedures (during transportation and in the evident of an accident / emergency).

Construction staging and parking

It is proposed to provide all car parking within the confines of the site and would therefore not encroach on the local road network.

It is considered that there would be sufficient area within the site during differing phases of construction to accommodate vehicle parking, including construction traffic deliveries and on-site maneuvering as and when required.

The site manager should continually monitor parking provisions within the site boundary, as well as the staging of construction vehicles into and out of the site, to ensure no impact on the local road network occurs. If required, the day-to-day vehicle parking demands can be reduced via the promotion and consideration of car sharing of workers to/from the site and mini-bus service transporting workers to/from the site.

Signage and speed limits

Signage

The safety of traffic (both construction and general background) should be managed at the access points through the installation of appropriate construction vehicle signage. Australian Standard AS 1742 defines the signage layout required for entering or crossing construction vehicles. The signage requirements at all intersections should involve similar signage, an example of such signage includes:

- 'Give Way' (R1-2)
- 'Trucks (crossing or entering)' (T2-25)
- Depending upon the vehicle access wayfinding strategy additional signage may be required for the following:
    - Informing visitors / local users of any works / delays (VMS or other static signage provisions).
    - No truck entry signs to inform drivers of access locations where access is not permitted, as agreed with local stakeholders.

Speed limits

Given the existing local traffic types/volumes and nominated speed limits no adjustments to posted speed limits would seem to be required at this stage for general worker/ construction vehicle access.

It is suggested that this is reviewed during TMP development for the project with consideration to the safe system principles. Other areas for the project to consider in terms of speed should be at site access locations and internal accesses if any pedestrian or cyclists' interactions may occur (side impact).

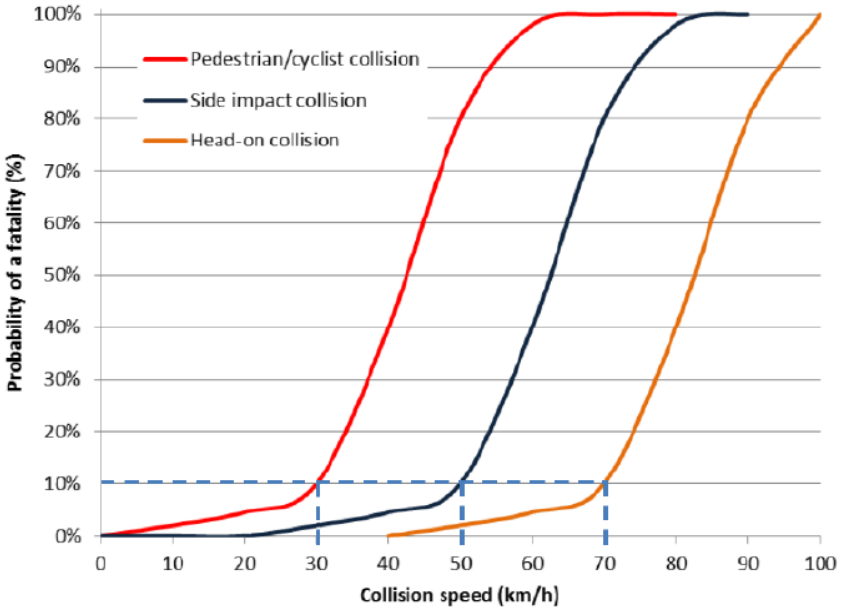


Figure 0-2 Relationship between collision speed and probability of a fatality – Source: Austroads (2018b)

The speed at which OD vehicles would be able to operate would be contingent upon the vehicle configuration, size of the load and any restrictions imposed (whether by the delivery operator or any authority). As such, it is expected that OD vehicles should travel significantly slower than the posted speed limit, with the escort arrangement being configured as to remain near the OD vehicle.

There would be occasions where intersections would need to be shutdown to allow for safe passage and maneuverability of OD vehicles (if required following contractor route assessment). During these times the appropriate warning signage, along with temporary reductions in speed limits, should be in place for all affected intersection approaches. The temporary reductions in speed limits are to only be in place while the OD movements are taking place and must not be visible to traffic at all other times (Worksite TMPs may be required for these specific circumstances).

Operating and working hours

The normal standard working hours for the proposed construction of the project are as follows:

- 12-hour (6am to 7pm) working weekday and 365 working days a year (noting final working hours for the project will be determined when a contractor has been commissioned, it is likely that in additional to the working weekday, that specific construction or transport delivery tasks would also occur on a weekend when impacts to local community and business can be reduced)
- Activities within the site compounds and other site facilities are expected outside the normal working hours to facilitate pre-starts, safety inductions and toolbox talks.
- In addition, certain circumstances, such as the delivery of works plant or construction material along with certain work activities which require completion that day may be conducted outside the normal standard hours of operations.

  This may occur even when work is scheduled for completion during normal standard hours of operations, due to the continuous nature or requirements of the work. Safety reasons may also dictate that the delivery of works plant or construction material is required to travel outside of normal hours of operation to reduce road network impacts. In this situation, local authorities should be notified as appropriate.

Nonetheless, the timings indicated should be adhered to wherever possible to minimise the impact to the local road network, users and local residents. Typical vehicle access times are provided in Table 0-1.

Table 0-1 Typical vehicle access times to/from site (final working hours to be confirmed)

Vehicle Type	Typical Travel Times	Vehicle Speeds	Comment
General workers vehicles / Medium Rigid Vehicle's and below	5:00am-7:00pm Monday to Saturday	As posted on local road network.	
Heavy Rigid and Articulated Vehicles	6:30am- 7:00pm and in consultation with school bus operators.	As posted on local road network. Speed on site will be dictated by nominated contractors HSMP.	Occur only outside of typical local road network peak operational times in order to minimise disruption.
Over-Dimensional Vehicles	TBC by NHVR permit approval (in consultation with DoT-RRV, Council and DEDJTR).	Usually undertaken with convoy at controlled speeds of 20kph and lower.	Subject to transport contractor review.

School bus routes operate throughout the area and OD and construction vehicles must not interfere with their operation. Any school bus routes should not be used by construction and OD vehicles during bus operating times.

General

Public consultation, advertising and complaints

Public communication should be undertaken by a nominated project team member with regards to any traffic matters causing disruption to local business or residents in accordance with a developed Community Engagement Plan. This plan sets out relevant stakeholders and means of communication with local residents, property owners and road users in relation to traffic deliveries, timeframes, and any traffic related activities with potential to disturb or disrupt local traffic. An underlying principle of the plan is that early and frequent communication with local stakeholders would reduce potential for complaints.

Complaints should be managed in accordance with a Complaints Investigation and Response Plan developed for the project. The plan applies on a whole of project basis and outlines how complaints will be received, administered, investigated, and managed.

In the event of unexpected impacts, the relevant Site Manager should be contacted and reference to the Complaints Investigation and Response Plan be undertaken to resolve such impacts in a timely and safe manner.

Road authority notifications

DoT, Gannawarra Shire Council and Swan Hill Rural City Council would have specific road authority notifications for what would need to be conducted and adhered to. Such measures might typically include:

- VMS or additional signage erection as part of road works to be put in place to inform local road users of works or closures to be informed 2 weeks prior to the construction works and/or closure occurring.
- Directly affected business / residents to be notified (letter drop or other means), also see above subsection.
- 24-hour public complaints hotline or website that allows public to raise concerns and issues directly with the nominated contractor.

Wider impacts

Expected to be limited to any OD vehicle access requirements. During these times the appropriate warning signage, along with temporary reductions in speed limits, should be in place for all affected intersection approaches. The temporary reductions in speed limits are to only be in place while the OD movements are taking place and must not be visible to traffic at all other times (Worksite TMPs may be required for these specific circumstances).

OD vehicles should travel under convoy at speeds typically around 20km/hr. To reduce road closures on two-way road sections, vehicles can traverse road shoulders or be stopped in designated zones to allow for safe passage of the OD vehicle before proceeding on their respective journey.

As advised in this section an accumulation of the control measures would be required during OD transportation and reduce impacts to the wider road network and its users. This would be considered further once the nominated transport contractor is hired and assessments completed as part of the associated TMP which would be reviewed and verified by NHVR (in consultation with relevant road authorities).