Environmental Impact Statement/Environment Effects Statement

Appendix W

Traffic and transport

Part 1

MARINUS LINK

Marinus Link Project

Environment Effects Statement (Victoria)

Technical Report – Traffic & Transport

PREPARED FOR MARINUS LINK PTY LTD | May 2024

We design with community in mind

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Quality Information

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Executive summary

This traffic and transport technical report is an attachment to the Marinus Link ('the project') Environment Effects Statement (EES). It has been used to inform the EES required for the project, assess the Victorian component of the project and defines the environmental performance requirements (EPRs) necessary to meet the EES objectives.

Overview

The project is a 1500 megawatt (MW) high voltage direct current (HVDC) electricity interconnector between North West Tasmania and the Latrobe Valley in Victoria. The project will be implemented as two 750 MW circuits rather than a single 1500 MW circuit to meet transmission network operation (availability and reliability) requirements in Tasmania and Victoria. The project is proposed to be executed in two stages, each being one 750 MW HVDC circuit between Tasmania and Victoria.

The key project components for each 750 MW circuit are, from south to north are:

- HVAC switching station and HVAC-HVDC converter station at Heybridge in Tasmania. This is where the project will connect to the North West Tasmania transmission network being augmented and upgraded by the North West Transmission Developments (NWTD).
- Shore crossing in Tasmania adjacent to the converter station.
- Subsea cable across Bass Strait from Heybridge in Tasmania to Waratah Bay in Victoria.
- Shore crossing at Waratah Bay approximately 3 km west of Sandy Point.
- Transition station where the subsea cables will connect to the land cables in Victoria.
- Land cables in Victoria from the transition station to the converter station site in the Driffield or Hazelwood areas.
- HVAC-HVDC converter station and expansion of the Hazelwood Terminal Station in Victoria, where the project will connect to the existing Victorian transmission network and located approximately 90km offshore.

This report provides an assessment of the transport impacts associated with the construction, operation and decommissioning phases for the Victorian components of the project. It defines the EPRs necessary to meet the scoping requirements and evaluation objectives relating to transport and traffic management.

Method

The methodology used to assess the transport impacts of the project is aligned with the project scoping requirements and evaluation objectives. The assessment process which has been undertaken is as follows:

- Establishment of project context, including review of the design, initial EPRs and legislation, policy and strategies.
- Determining the study area to establish the baseline conditions, including collection of existing traffic data and site observations.
- Development of anticipated transport routes to access the site/s.
- Identification of potential impacts of the project for it's construction, operation and decommissioning phases.
- Identify design and mitigation measures to avoid, mitigate, limit impact of the project.
- Assess the residual impact of the project following implementation of the measures identified.
- Undertake a safety assessment of the proposed works.
- Assess cumulative impacts of other potential projects during the construction phase of the project.
- Develop the EPRs and determine residual risk.
- Completion of EPRs.

Baseline Characterisation

An assessment of the existing transport conditions was undertaken and found:

- The proposed approximately 90km project alignment will be constructed within two municipalities, crossing multiple DTP and Council managed roads.
- The roads proposed to be utilised by the project range from local residential access road through to major arterial roads.

- The road types and conditions vary greatly from existing road network which currently accommodates over size / over mass vehicle types to single width crushed rock pavement.
- With the exception of the transformer transporter, the existing B-double road network is adequate for use by all other project generated traffic
- Sight distance at all key intersections has been assessed and is generally adequate. In instances where sight distance is below minimum standards, adequate warning to drivers via signage is provided.
- The northern parts of the project area have been developed to accommodate larger vehicles, largely due to other major energy projects which have been delivered and / or operate proximate to the proposed Marinus Link converter station site.
- Heavy vehicle percentage on DTP managed roads within the project area generally ranges from between 5-20% of total vehicles, with some roads accommodating approximately 30% (based on traffic surveys undertaken for the project and DTP open data sources).
- Arterial roads, highways and freeways are able to carry heavy vehicle traffic and are regularly maintained. As such, these roads have been assessed as being able to accommodate the project generated construction traffic volumes.
- The unsealed gravel roads and dirt tracks are of very low capacity to carry heavy vehicles. It was identified that most of the unsealed roads are in poor condition with no wearing course or with soft shoulders due to poor drainage conditions, which will be further deteriorated by project traffic.
- There have been 181 crashes within the project area over the last five years, causing six fatalities, 60 serious injuries and 115 other injuries.
- Of the 181 crashes, 2% involved heavy vehicles.
- The project will have minimal interactions with public transport services, with school bus route details subject to change each year, but considered within the assessment.
- The project will have limited interactions with active transport facilities.

Impact Assessment Key Findings and Cumulative Impacts

Through the review of the baseline characteristics, a series of values were identified on which to assess the impact of the project. These are as follows:

<u>Value 1: Road Network Capacity</u>

An assessment has been completed of the performance of the road network in the surrounding area of the project during its construction. Completing this assessment entailed identifying the level of traffic generated by the various construction activities and the path of travel that vehicles will take to the site.

The following attributes of Value 1 were utilised in the assessment:

- The capacity of the arterial road network.
- The capacity of the local road network and the net change in traffic volumes.
- Intersection capacity assessment.
- Connectivity of the road network, and provision of alternative routes.

The following is a summary of noted impacts and mitigating measures for Value 1:

- No main roads were identified to be over capacity as a result of construction activities
- The local road network will not exceed its operational capacity as a result of construction activities
- Some gravel roads will exceed their capacity during construction activities, this is addressed in the pavement assessment
- Many local roads will experience a large change in traffic during construction periods due to very low existing volumes
- A number of unsignalized T-intersections will operate above capacity based on Austroads safety requirements
- Minor treatments such as traffic management speed limits will be implemented
- Only Waratah Road operates as a single point of access arterial road within the study area
- No roads are proposed to be closed as a result of the construction activities

Value 2: Safe Road Performance, Condition and Design

Analysis has been undertaken to assess the safe performance, road condition, design and operation of the road network that forms a part of the study area.

The following attributes of Value 2 were utilised in the assessment:

- The condition of the road pavement.
- Swept path analysis to assess the current road geometry.
- A review of historic crash data to identify any crash patterns or higher risk locations within the network.
- Sight distance review to identify any problem intersections.
- Height clearance requirements of the transformer transporter
- Operational safety considerations.

The following is a summary of noted impacts and mitigating measures for Value 2:

- Various road pavement improvement works will be required throughout the road network
- Localised road widening is required at site access points to accommodate semi-trailers
- Extensive road works and traffic management will be required for the movement of the transformer transporter
- Various operational safety requirements will be enforced to ensure construction activities occur in a safe manner

Value 3: Public and Active Transport

Analysis has been undertaken to assess the impact of the project on the public transport network and active transport infrastructure that forms a part of the study area.

The following attributes of Value 3 were utilised in the assessment:

- The public transport network, including the following:
  - The train network
  - The bus network
  - School buses
  - Trams
- Active transport infrastructure surrounding the site, including:
  - Recreational rail trails
  - Dedicated cycling infrastructure
  - Footpaths

The following is a summary of noted impacts and mitigating measures for Value 3:

- Consultation to ensure heavy vehicle movements will occur outside the operation of school buses in the area
- The movement of the transformer transporter will be conducted to minimize the impact to public transport services.
- There will be minimal impact to active transport infrastructure in the study area

Environmental Performance Requirements

Through the significance assessment which was undertaken having consideration for the identified values, a summary of the Environmental Performance Requirements (EPRs) are as follows:

- EPR T01 – Develop a transport management plan
  Prior to commencement of project works, develop a transport management plan/s to document how disruption to affected local land uses, traffic, car parking, public transport (rail and bus), pedestrian and cycle movements and existing public facilities will be managed during all stages of construction. The transport management plan/s may be split into locations / areas where appropriate or aligned with construction methodology.
- EPR T02 – Design transport infrastructure to maintain safety in operation
  Design all roadworks, construction staging, and site access arrangements as stipulated in the transport management plan (EPR T01) to meet relevant design standards and provide for safe movement of operational vehicles.

Conclusion

The project's transport impacts are largely limited to the construction phase. Having regard to the assessment of the impacts contained within this report, which respond to the EIS guidelines, a number of EPR's have been recommended. The implementation of these EPR's in the delivery of this project will manage the impact that the project has on the transport network and comply with the requirements of the EIS guidelines. A full assessment of the impacts which have led to the recommendations are detailed within Section 8 of this report.

Based on this assessment, and following the implementation of measures to comply with the EPR's, there are no high or major residual impacts. Through the implementation of traffic management plans, consultation with stakeholders and local community representatives / residents and some infrastructure upgrades, the projects transport impact is considered to not be detrimental to the environment. The EPRs and expected mitigation measures, that will be implemented to comply with EPRs, are standard in context with transport impacts and reduce of the overall project impact.

In summary, the traffic generated by the project is not expected to have broader impacts to the operation of the road network. Localised impacts may be experienced by road users and local residents periodically during construction when works are occurring within their immediate surrounds

Glossary and Abbreviations

Term	Description
access track	access route formed by use (e.g., wheel tracks) or a formed earthen track with or without a gravel surface. The nominal width of an access track, which may include a formation, table drains, batters and embankments, is 6 m. The width of access tracks will vary with terrain.
alignment	conceptual centreline of proposed linear infrastructure, considering design parameters and site constraints.
converter station	installation where alternating current is converted to direct current and vice versa.
easement	legal right of way registered on title that protects underground cables or overhead transmission lines. Typically, less than the construction right of way but may be the same width. Described in survey plans and legal instruments. Conditions on land use apply.
environment effects statement	report presenting the environmental, socioeconomic and cultural impacts of a proposed development.
environmental impact statement	a report presenting the environmental impacts of a proposed development (Tasmania).
environmental management plan	procedures for managing environmental, socioeconomic and cultural impacts of a proposed development.
environmental management system	the management of an organisation's environmental programs in a comprehensive and systematic manner.
environmental value	an aspect of the environment in which we live that is esteemed, desirable or useful. A quality or physical characteristic of the environment that is conducive to ecological health or public amenity and safety.
landholder	the owner, lessee or occupant of land. In relation to Crown land, the nominated land manager.
landowner	the registered proprietor of a parcel or parcels of freehold land.
land-sea joint	point at which subsea cables are joined to land cables, either in a pit or buried in-situ.
life cycle	the course of development of a project from inception to design to construction to operation to closure.
peak traffic volume	The highest amount of vehicle movements generated by the site
preferred route	transmission route incorporating landholder and community feedback taken through the environment and planning approvals process.
project area	the area potentially disturbed by construction, operation and decommissioning activities.
proposed route	transmission line route identified in route selection and released to landholders and communities for comment. The proposed route incorporating landholder and community feedback becomes the preferred route.
subsea cable	cable manufactured for laying on and burial in the seabed.
substation	electrical infrastructure designed to manage load on a transmission network. Comprises a switching station with transformers for changing the voltage of attached transmission circuits, either by stepping up or stepping down the voltage.
transition station	installation that enables HVDC land cables to be connected to a HVDC overhead transmission line via a bushing. Other infrastructure includes an isolator and control room.
upgrade	(in relation to a transmission network) works to enlarge the transmission network or increase its capacity to transmit electricity, also known as augmentation.
VicRoads	the road authority responsible for declared Victorian roads and road transport.

Term	Description
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AC	Alternating Current
ATC	Automatic Traffic Count
AV	Articulated Vehicle
AU or AUR/L	Auxiliary Right/Left Turn
BA or BAR/L	Basic Right/Left Turn
CH or CHR/L	Channelised Right/Left Turn
DC	Direct Current
DELWP	Department of Environment, Land, Water and Planning
DTP	Department of Transport & Planning
EDD	Extended Design Domain
EES	Environment Effects Statement
EIS	Environmental Impact Statement
HDD	Horizontal directional drill
HH	Heavy Haulage
HV	Heavy Vehicle
HVAC	High voltage alternating current
HVDC	High Voltage Direct Current
LOS	Level of Service
LV	Light Vehicle
MLPL	Marinus Link Pty Ltd
MW	Megawatt
NHVR	National Heavy Vehicle Regulator
NWTD	North West Transmission Developments
OD	Over Dimensional
OSOM	Oversize & Overmass
VPD	Vehicles per day

1 Introduction

Marinus Link (the project) comprises a high voltage direct current (HVDC) electricity interconnector between Tasmania and Victoria, to allow for the continued trading and distribution of electricity within the National Energy Market (NEM).

The project was referred to the Australian Minister for the Environment 5 October 2021. On 4 November 2021, a delegate of the Minister for the Environment determined that the proposed action is a controlled action as it has the potential to have a significant impact on the environment and requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) before it can proceed. The delegate determined that the appropriate level of assessment under the EPBC Act is an environmental impact statement (EIS).

On 12 December 2021, the former Victorian Minister for Planning under the *Environment Effects Act 1978* (Vic) (EE Act) determined that the project requires an environment effects statement (EES) under the EE Act, to describe the project's effects on the environment to inform statutory decision making.

In July 2022 a delegate of the Director of the Environment Protection Authority Tasmania determined that the project be subject to environmental impact assessment by the Board of the Environment Protection Authority (the Board) under the *Environmental Management and Pollution Control Act 1994* (Tas) (EMPCA).

As the project is proposed to be located within three jurisdictions, the Victorian Department of Transport and Planning (DTP), Tasmanian Environment Protection Authority (Tasmanian EPA) and Australian Department of Climate Change, Energy, Environment and Water (DCCEEW) have agreed to coordinate the administration and documentation of the three assessment processes. One EIS/EES is being prepared to address the requirements of DTP and DCCEEW. Two EISs are being prepared to address the Tasmanian EPA requirements for the Heybridge converter station and shore crossing.

This report has been prepared by Stantec for the Victorian jurisdiction as part of the EIS/EES being prepared for the project.

1.1 Purpose of this Report

This technical report presents the assessment of the traffic and transport impacts associated with the project during its construction, operation and decommission phases. It defines the Environmental Performance Requirements (EPRs) required to meet the study objectives, as outlined within the EIS guidelines (Section 2.3.2).

This report describes the existing conditions within the study area (Section 6) which informs the assessment of traffic and transport impacts (Section 7). Input was provided where required from other technical specialists.

1.2 Project Overview

The project is a proposed 1500 megawatt (MW) HVDC electricity interconnector between Heybridge in northwest Tasmania and the Latrobe Valley in Victoria (Figure 1.1). The project is proposed to provide a second link between the Tasmanian renewable energy resources and the Victorian electricity grids enabling efficient energy trade, transmission and distribution from a diverse range of generation sources to where it is most needed, and will increase energy capacity and security across the National Electricity Market (NEM).

Marinus Link Pty Ltd (MLPL) is the proponent for the project and is a wholly owned subsidiary of Tasmanian Networks Pty Ltd (TasNetworks). TasNetworks is owned by the State of Tasmania and owns, operates and maintains the electricity transmission and distribution network in Tasmania.

Tasmania has significant renewable energy resource potential, particularly hydroelectric power and wind energy. The potential size of the resource exceeds both the Tasmanian demand and the capacity of the existing Basslink interconnector between Tasmania and Victoria. The growth in renewable energy generation in mainland states and territories participating in the NEM, coupled with the retiring of baseload coal-fired generators, is reducing the availability of dispatchable generation that is available on demand.

Tasmania's existing and potential renewable resources are a valuable source of dispatchable generation that could benefit electricity supply in the NEM. The project will allow for the continued trading, transmission and distribution of electricity within the NEM. It will also manage the risks to Tasmania of a single interconnector across Bass Strait and complement existing and future interconnectors on mainland Australia. The project is expected to facilitate the reduction in greenhouse gas emissions at a state and national level.

Interconnectors are a key feature of the future energy landscape. They allow power to flow between different regions to enable the efficient transfer of electricity from renewable energy zones to where the electricity is needed. Interconnectors can increase the resilience of the NEM and make energy more secure, affordable and sustainable for customers. Interconnectors are common around the world including in Australia. They play a critical role in supporting Australia's transition to a clean energy future.

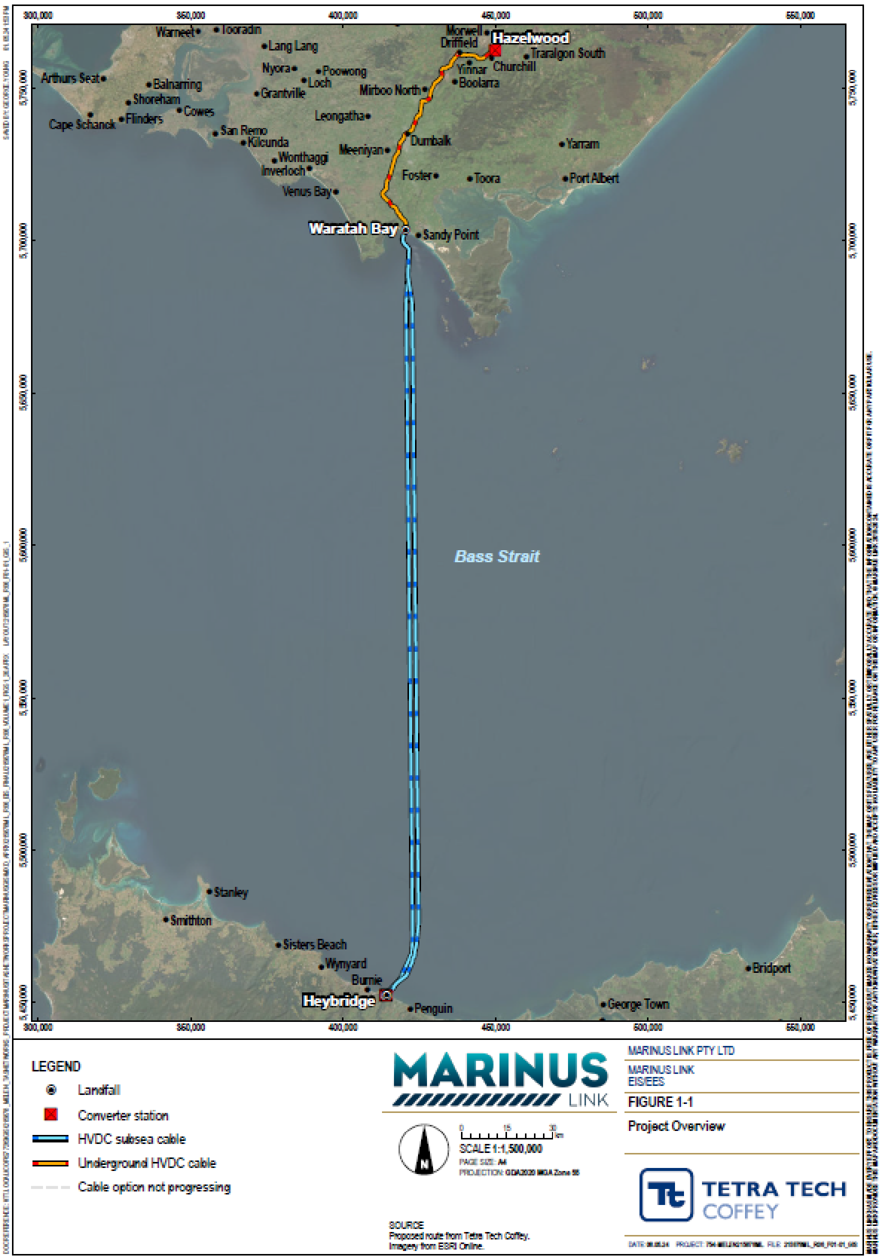


Figure 1.1: Project Overview

1.3 Assessment Context

This report has been prepared to assess the impact that the project will have on the transport network in Victoria. Typically, a transport impact assessment will assess the volume of traffic generated by the proposed project to ensure that the road network will continue to operate acceptably under capacity. It will also consider if any transport infrastructure has been suitably designed and will meet the expected needs of the use. These assessments consider all modes of transport.

The following evaluation objective is relevant to the traffic and transport assessment:

> *Avoid and, where avoidance is not possible, minimise adverse effects on community amenity, health and safety, with regard to noise, vibration, air quality including dust, the transport network, fire risk and electromagnetic fields.*

This transport assessment forms a critical part of the overall EES and has considered the construction, operation and decommissioning stages of the project. Whilst the ongoing operational nature of the completed project and its infrastructure will have minimal transport impact, the assessment largely focuses on the construction stage of the project. This is where the transport elements most prominent throughout the life of the project.

1.4 Report Structure

A summary of the structure of this report is outlined below in Figure 1.2.

Assessment Guidelines

The preparation of an EIS is subject to a number of requirements as mandated by the state and Commonwealth governments. These guidelines have been summarised to articulate the requirements that this report has been prepared to address.

Legislation, Policy and Guidelines

This section provides an overview of the key legislation, policy and guidelines that forms the framework that guides the development of the project. Some of these documents, particularly legislation, outline procedures and processes that require compliance. Other documents, particularly policy and guidelines, include quantifiable objectives that the project can be aligned with.

Project Description

The key components and details of the project that are relevant to this assessment. This section outlines the key characteristics of the project that have been utilised in the technical studies below.

Method

This section outlines the methodology for the preparation of this report. The assessments conducted within this report have been conducted to align with the EIS structure and assessment methodology.

The 'Significance Assessment' methodology has been undertaken by various technical specialists in the preparation of this EIS, and adapted to suit the discipline specific reqiurements of a traffic and transport assessment

Baseline Characterisation

An explanation of the existing conditions for the study area has been undertaken. This includes a review of the existing road network, traffic count surveys, a pavement assessment, review of historic crash data and summary of infrastructure for alternative modes of transport such as bus routes, and walking and cycling paths

Impact Assessment

A 'significance assessment' has been undertaken on the impacts that are expected to occur as a result of the project on the transport network. This section outlines the technical studies that have been undertaken to identify the expected impacts, identification of any required mitigating works inorder to address these impacts, and ultimately the final impact that the project will have on the existing environ

Summary of Impacts

A summary of the results of the significance assessment undertaken, and the resultant EPRs that were identified to address the expected impacts

Figure 1.2: Structure of this Report

2 Assessment Guidelines

This section outlines the assessment guidelines relevant to traffic and transport and the linkages to other EIS/EES technical studies. A single consolidated EIS/EES is being prepared to address the requirements of all the Commonwealth and Victorian jurisdictions including the requirement for an EES. This report will use the term EIS/EES going forward.

2.1 Commonwealth

The project was referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Minister for the Environment in October 2021. A delegate for the former Minister for the Environment determined on 4 November 2021 that the project is a controlled action requiring assessment and approval, as it is likely to have a significant impact on the following matters of national environmental significance, which are protected under Part 3 of the EPBC Act:

- listed threatened species and communities
- listed migratory species; and
- Commonwealth marine areas

The transport related items outlined within *Marinus Link underground and subsea electricity interconnector cable (EPBC 2021/9053)* are outlined in Table 2.2 below, noting only relevant sections of the document have been reproduced and presented.

Table 2.1: Commonwealth Government EPBC 2021/9053 Requirements

Aspects to be assessed	Requirement	Report Section
5 Relevant Impacts	The assessment of impacts should address impacts from activities within construction, commissioning, operational, and decommissioning stages including but not limited to vessel movement, maintenance activities, and access routes through different stages of development.	Section 7.1 (Construction) Section 7.2 (Operation) Section 7.3 (Decommissioning)
5.1 General Impacts	Likely impacts, including direct, indirect, and facilitated, to be addressed in the EIS include but should not be limited to: • discuss potential impacts which may arise through the transportation, storage and use of dangerous goods (if any), fuels and chemicals, such as accidental spills • in discussing potential impacts, consider how the interaction of extreme environmental events and any related safety response may impact on the environment.	Section 7.1.6 Section 7.1.7 Section 7.1.8 Section 7.1.9 Section 7.1.10
5.11 Cumulative Impacts	The assessment of cumulative impacts must include: • review and analysis of residual impacts of the proposed development and of other known proposals where there may be a spatial or temporal overlap.	Section 7.4
6 Proposed Avoidance and Mitigation measures	The EIS must provide information on proposed environmental performance requirements (EPRs), and any specific avoidance, management, and mitigation measures to deal with the relevant impacts of the proposed action on MNES, including those required by other Commonwealth, State, and local government approvals.	Section 7.1.3 Section 7.1.4 Section 7.1.8 Section 7.1.9 Section 7.1.12 Section 7.1.13

2.2 Tasmania

The Tasmanian component of the project is being assessed in accordance with the EIS guidelines issued by EPA Tasmania for the converter station and shore crossing (September 2022). This assessment is documented in a separate report (Stantec, 2023).

2.3 Victoria

The EES Scoping Requirements issued by the Minister for Planning (February 2023) outline the specific matters to be assessed across a number environmental and social disciplines relevant to the project, and to be documented in the EES for the project.

The EES Scoping Requirements inform the scope of the EES technical studies and define the EES evaluation objectives. The EES evaluation objectives identify the desired outcomes to be achieved and provide a framework for an integrated assessment of the environmental effects of a proposed project.

2.3.1 EES evaluation objective

The EES evaluation objective contained in Section 4.5 of the EES scoping requirements that is relevant to this traffic and transport assessment is:

> *Avoid and, where avoidance is not possible, minimise adverse effects on community amenity, health and safety, with regard to noise, vibration, air quality including dust, the transport network, greenhouse gas emissions, fire risk and electromagnetic fields.*

2.3.2 EES Scoping requirements

The relevant sections of the EES scoping requirements that this assessment has addressed are summarised in Table 2.2. These are outlined in section 4.5: Amenity, Safety and Transport of the EES scoping requirements document.

Table 2.2: EES Scoping Requirements

Aspects to be Assessed	Scoping Requirement	Report Section
Key Issues	Managing transport disruptions for residents, businesses and travellers.	Section 7.2.1
	Potential damage to local and regional road surfaces along transport routes and increased risk to road safety on transport routes.	Section 6.3.2 Section 7.1.6.1 Section 7.1.8.1 Section 7.1.10.1
Existing Environment	Describe the existing approved or planned transport network in and around the project, including proposed construction transport route options, in terms of capacity, condition, accessibility and potentially sensitive users.	Section 6
Likely effects	Assess effects of construction activities on the transport network, including on safety, amenity and accessibility.	Section 7.1.1 Section 7.1.6 Section 7.1.11
	Assess effects from road upgrades and/or connections, and infrastructure and services relocation.	Section 7.1.5 Section 7.1.6 Section 7.1.10
Mitigation	Outline any required transport infrastructure works or upgrades required to address adverse impacts of the project construction and operation, including impacts on accessibility (e.g., access road construction and upgrades).	Section 7.1.3.1 Section 7.1.3.2 Section 7.1.3.3 Section 7.1.8.1 Section 7.1.8.3
	Describe and evaluate the proposed transport management and safety principles to address changed traffic conditions.	Section 7.1.6 Section 7.1.8
Performance Criteria	Describe the framework for monitoring and evaluating the measures implemented to mitigate environmental amenity, transport and safety effects and contingencies.	Section 8.2

2.4 Linkages to other technical studies

This report is informed by or informs the technical studies outlined in Table 2.3.

Table 2.3: Other Consultant Reports Informed by this Report

Technical study	Relevance to this assessment
Air Quality Assessment	Air quality assessment has considered dust generation from construction vehicles.
Noise and Vibration (terrestrial)	This assessment provides forecast traffic volumes in the project study area which may inform the noise and vibration assessment.
Terrestrial Ecology	Road widening and intersection works may entail the removal of native vegetation and have been considered in the Ecology assessment.
Social	This assessment has considered how additional traffic from the project may reduce the road network's capacity to operate safely
Land Use & Planning	Information related to changes to local and regional access and connectivity from the project have informed the land use & planning assessment.

3 Legislation, Policy and Guidelines

The relevant legislation, policies and guidelines for traffic and transport matters that have been considered during the preparation of this report are outlined in Table 3.1.

Table 3.1: Background Policy Review

Legislation	Key Policies and Strategies	Implication for this Project
	State Legislative Documents	
Transport Integration Act 2010 (Vic)	The *Transport Integration Act 2010* establishes a framework for an integrated and sustainable transport system for Victoria and requires that all decisions affecting the transport system consider the principles and objectives set out in the Act. The Act provides the basis for assessing the consistency of a Project with transport system objectives relating to: • Social and economic inclusion • Economic prosperity • Environmental sustainability • Integration of transport and land use • Efficiency, coordination, and reliability. • Safety, health, and wellbeing.	Transport planning decisions relating to the project must have regard to current and future impact on land use and include a triple bottom line assessment including costs, benefits, and sustainability.
Road Management Act 2004 (Vic)	The *Road Management Act 2004* provides the statutory framework for VicRoads and local councils to manage the Victorian road network and the coordination of road reserves for roadways, pathways, infrastructure, and similar purposes.	The project must comply with the statutory framework. Strategies should be in place to ensure that project work and planning meets all Road Management Regulations listed in the *Road Management Act 2004*. Approvals will be required under the Road Management Act for road works. The contractor awarded for the construction of the project will be responsible for identifying and seeking these approvals
Local Government Act 1989 (Vic)	The *Local Government Act* is legislation that describes the objectives, roles and functions of local government in Victoria.	The Act outlines Councils power as the authority of the local street network within the municipality. The project will be engaging with Council, as the custodians of the road network throughout the life of planning, design construction, operation and decommissioning.
Road Safety Act 1986 (Vic)	The road safety act is enacted to provide a safe and equitable road network, outlining the obligations of road users. The Act extensively covers matters such as the issuing of licenses, demerit point system, driving under the influence of drugs / alcohol etc.	The project will abide by all laws enforced by the Victorian government. All workers travelling to the site will be instructed to abide by the road rules and this act.
Heavy Vehicle National Law 2004 (Vic)	The *National Heavy Vehicle Law* (2004) administers a set of laws for heavy vehicles over 4.5 tonnes in gross vehicle mass. This law is administered by the National Heavy Vehicle Regulator.	The National Heavy Vehicle Regulator has been contacted to be consulted with by the project team to ensure all regulatory requirements are satisfied during construction.
	Commonwealth Strategic Documents	
Australian Infrastructure Plan (2016) (Cwlth)	The Australian Infrastructure Plan provides a roadmap for government investment and reform in relation to all Infrastructure in Australia. The plan sets 78 recommendations that focus on existing gaps in Australia's infrastructure with particular focus on the following: • Productive cities, productive regions • Efficient infrastructure markets • Sustainable and equitable infrastructure • Better decisions, better delivery.	While the Australian Infrastructure Plan does not directly reference the project . relevant recommendations in the plan include but are not limited to: • Recommendation 5.3.1. Ensure Australia remains an energy export supplier of choice in decarbonised global supply chains by coordinating national development of low-emission energy sources. • Recommendation 5.3.2 Transition Australia to a high-tech, low-cost, low-emission energy system by implementing appropriate regulatory and legislative environments, identifying opportunities to transition assets, and continuing to fund new energy technology development and adoption

Legislation	Key Policies and Strategies	Implication for this Project
	State strategic policy	
State Planning Policy Framework	The State Planning Policy Framework (SPPF) is a key part of the Victorian planning system and the Victoria Planning Provisions (VPP). It sets the key policy direction for state planning issues.	Planning should focus on a design that can 'facilitate substantial growth and change in major employment, health and education precincts and activity centres beyond the central city at an appropriate scale to address the needs of Melbourne's rapidly growing population.'
Victorian Infrastructure Plan (2019)	The Victorian Infrastructure Plan outlines Infrastructure Victoria's 30-year Infrastructure Strategy. It presents priorities and future directions in nine key sectors which are: • Transport • Culture, community, and sport • Digital connectivity • Education and training • Energy • Environment • Health and human services • Justice and emergency services • Water. The Victorian Infrastructure Plan also outlines the Victorian Government's priorities over the next five years and beyond.	The project will help to achieve several recommendations and reforms in the Victorian Infrastructure Plan, including: • Victorian Renewable Energy Target • Renewable Energy Zones
Victoria's Infrastructure Strategy (2021 – 2051) (Cwlth)	The strategy takes an integrated, cross-sectoral view of infrastructure planning, making 95 draft recommendations to the Victorian Government across metropolitan Melbourne and regional Victoria. It presents a vision for a prosperous, inclusive and sustainable Victoria over the next 30 years, aiming to: • Confront long-term challenges • Manage urban change • Harness infrastructure for productivity and growth • Develop regional Victoria	The project will help achieve the following recommendations in the Infrastructure Strategy, including: • Augment electricity transmission for renewable energy and resilience • Identify and coordinate Renewable Energy Zones
Victorian Road Safety Strategy 2021–2030 *Towards Zero Victoria's Road Safety Strategy and Action Plan (2021–2025)*	The Road Safety Strategy establishes the goals to be achieved by 2030 – building on the Safe System principles, the National Road Safety Strategy and previous Victorian road safety strategies. Implementation of the Road Safety Strategy would be via action plans for key initiatives that generate immediate road safety benefits while preparing for technological advancement that would bring the next step-change in road safety. This approach allows agility in the response to road safety.	The project during its operation will generate minimal traffic demands, with appropriate access treatments provided in line with industry standards. During construction, safe practice and design will be incorporated to minimize safety risk where possible.
Victorian Freight Plan (2018)	The Victorian Freight Plan sets priorities for Victoria's freight network. Key priorities within Freight Plan include: • Manage existing and proposed freight corridors and places in conjunction with urban form changes • Reduce impact of congestion on supply chain costs and communities • Better use of our rail freight assets • Plan for Victoria's future port capacity • Stay ahead of technology curve. The Freight Plan also identifies the Principal Freight Network (PFN) and details current freight investments.	The Victorian Freight Plan is relative to the strategic freight network so there is no direct implication to the project. However, the Plan is applicable as the project will interface with the freight network during its construction and there is potential to reduce congestion on the road freight network once the rail system is operating. During the construction of the project, heavy vehicle movements will utilize the Principle Freight Network where possible
	Latrobe City Council Strategic Policy	
Latrobe Tracks, Trails & Paths Strategy (2016)	The Latrobe City Tracks, Trails and Paths Strategy is a municipal wide strategy to guide planning, development , management and promotion of tracks, trails and paths	MLPL will identify any impacts to recreational paths within this municipality which are impacted by the project and develop strategies to limit impacts.

Legislation	Key Policies and Strategies	Implication for this Project
Road Management Plan (2021	The key elements of the Road Management Plan include: • Demarcation of the road classification and hierarchy. • Inspection and maintenance standards for Councils road assets. • The management system that Council employs for the intervention, inspection, maintenance and repair of its roads.	MLPL will liaise with Council, as the road authority, to ensure the impact and management of their roads is done so in a manner which is consistent with this document.
	South Gippsland Shire Council Strategic Policy	
Road Management Plan (2022)	The key elements of the Road Management Plan include: • Definitions of Council's maintenance responsibility on various infrastructure. • The management system that Council employs for the inspection, maintenance and repair of its roads. • Inspection standards that document the nature and frequency of different types of inspections (i.e. reactive and proactive). • Maintenance standards that document intervention levels, maintenance response requirements, and maintenance response times.	MLPL will liaise with Council, as the road authority, to ensure the impact and management of their roads is done so in a manner which is consistent with this document.
Paths & Trails Strategy (2018)	To develop South Gippsland's walking, cycling, and horse riding pathway network for all abilities, and where practicable, safely connect South Gippsland's residents, businesses, and visitors to town centres, schools and main tourist attractions.	MLPL will identify any impacts to recreational paths within this municipality which are impacted by the project and develop strategies to limit

4 Project Description

4.1 Overview

The project is proposed to be implemented as two 750 MW circuits to meet transmission network operation requirements in Tasmania and Victoria. Each 750 MW circuit will comprise two power cables and a fibre-optic communications cable bundled together in Bass Strait and laid in a horizontal arrangement on land. The two 750MW circuits will be installed in two stages with the western circuit being laid first as part of stage one, and the eastern cable in stage two.

The key project components for each 750 MW circuit, from south to north, are:

- HVAC switching station and HVAC-HVDC converter station at Heybridge in Tasmania. This is where the project will connect to the North West Tasmania transmission network being augmented and upgraded by the North West Transmission Developments (NWTD).
- Shore crossing in Tasmania adjacent to the converter station.
- Subsea cable across Bass Strait from Heybridge in Tasmania to Waratah Bay in Victoria.
- Shore crossing at Waratah Bay approximately 3 km west of Sandy Point.
- Land-sea cable joint where the subsea cables will connect to the land cables in Victoria.
- Land cables in Victoria from the land-sea joint to the converter station site in the Driffield or Hazelwood areas.
- HVAC switching station and HVAC-HVDC converter station at Driffield or at Hazelwood, where the project will connect to the existing Victorian transmission network.

A Transition Station at Waratah Bay may also be required if there are different cable manufactures or substantially different cable technologies adopted for the land and subsea cables. The location of the transition station will also house the fibre optic terminal station in Victoria. However, regardless of whether a transition station is needed, a fibre optic terminal station will still be required in the same location.

Approximately 255 kilometres (km) of subsea HVDC cable will be laid across Bass Strait. The preferred technology for the project is two 750 megawatt (MW) symmetrical monopoles using ±320 kV, cross-linked polyethylene insulated cables and voltage source converter technology. Each symmetrical monopole will comprise two identical size power cables and a fibre-optic communications cable bundled together. The cable bundles for each circuit will transition from approximately 300m apart at the HDD (offshore) exit to 2km apart in offshore waters.

In Victoria, the shore crossing is proposed to be located at Waratah Bay with the route crossing at the Waratah Bay–Shallow Inlet Coastal Reserve. From the land-sea joint located behind the coastal dunes, the land cable will extend underground for approximately 90 km to the converter station. From Waratah Bay the cable will run northwest to the Tarwin River Valley and then travel to the north to the Strzelecki Ranges. The route crosses the ranges between Dumbalk and Mirboo North before descending to the Latrobe Valley where it turns northeast to Hazelwood. The Victorian converter station will be at either a site south of Driffield or Hazelwood adjacent to the existing terminal station.

The land cables will be directly laid in trenches or installed in conduits in the trenches. A construction area of 20 to 36 m wide will be required for laying the land cables and construction of joint bays. Temporary roads for accessing the construction area and temporary laydown areas will also be required to support construction. Where possible, existing roads and tracks will be used for access, for example, farm access tracks or plantation forestry tracks.

Land cables will be installed in ducts under major roads, railways, major watercourses and substantial patches of native vegetation using trenchless construction methods (e.g., HDD), where geotechnical conditions permit. A larger area than the 36m construction area will be required for the HDD crossings.

The assessment is focused on the Victorian section of the project. This report will inform the EIS/EES being prepared to assess the project's potential environmental effects in accordance with the legislative requirements of the Commonwealth and Victorian governments.(see Figure 4.1).

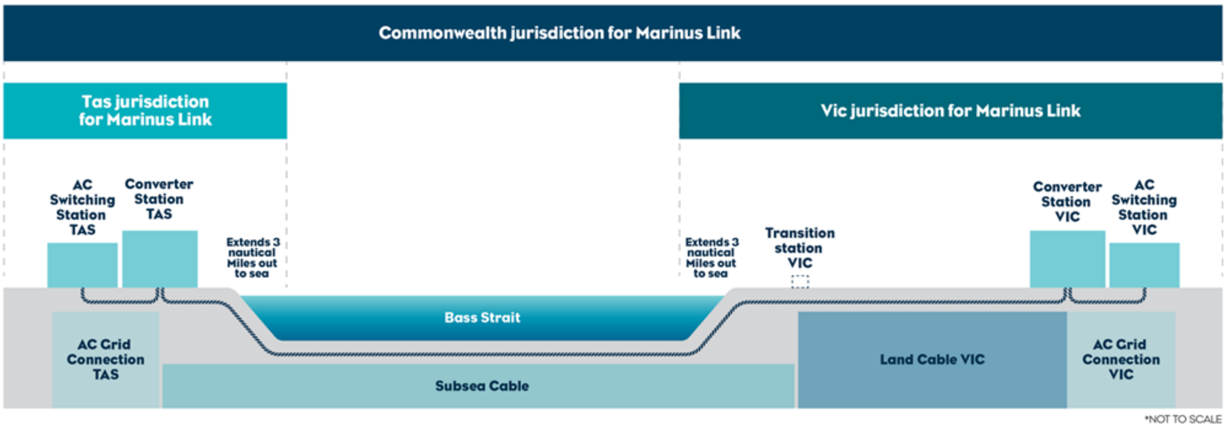


Figure 4.1: Project Components Considered Under Applicable Jurisdictions (Marinus Link Pty Ltd 2022)

The project is proposed to be constructed in two stages over approximately five years following the award of works contracts to construct the project. On this basis, stage 1 of the project is expected to be operational by 2030, with Stage 2 to follow, with final timing to be determined by market demand. The project will be designed for an operational life of at least 40 years.

4.2 Construction

For the purposes of this assessment, the construction methodology has been broken up into four separate stages:

- Victorian Shore Crossing
  Horizontal boring methods will be utilised to cross the Victorian coastline to approximately 10m water depth
- Transition Station
  The construction of the transition Station at Waratah Bay, which, may be required if a different supplier is selected for the land and subsea cables.
- Converter Station/(s)
  The construction of the converter station at the end of the cable. This station will be located at either Driffield or Hazelwood and will include the delivery of the transformer in a approximately 130m long vehicle.
- Cable Route (project alignment)
  The construction methodology of the approximately 90km long underground cable. It is noted that the land cable will be constructed in two stages, with two parallel trenches containing a separate cable each.

This construction methodology has been further outlined in the sections below, and forms the basis of the assessments conducted in this report.

4.2.1 Victorian Shore Crossing

4.2.1.1 Victorian Shore Crossing Description

In Victoria, the shore crossing will be in Waratah Bay, approximately 3 km west of Sandy Point. The shore crossing will be constructed using Horizontal Directional Drill (HDD) and will extend approximately 900 m offshore into 10m water depth. The subsea cables and land cables will be connected together close to the Victorian coast. The land-sea cable joint will be installed at the HDD drill pad location in Waratah Bay. The site will be accessible via the same track used for the transition Station, extending closer to the coastline.

The HDD construction process will be a continuous 24 hour, 7 day per week operation, occurring over approximately a 12 month period.

4.2.1.2 Victorian Shore Crossing Construction Traffic Generation

Information and assumptions in regard to the construction of the transition station and its associated traffic generation have been outlined below:

- HDD Drilling at the shore crossing will occur over a 12-month time frame.
- HDD boring will be a 24 hour / 7 day per week construction activity. Two, 12 hour employee shifts will occur each day, from 7AM to 7PM and 7PM to 7AM.
- During construction, the following vehicles will be required on-site: six light vehicles, one franna crane, three twinsteer rigid trucks 22-26 tonne, one 30-36 tonne excavator, two large drill rigs, a light truck, to be on site at all times during the works.

- It is assumed that the construction vehicles generated will arrive in the morning during site set up and depart in the evening.
- It is assumed that 10 employee vehicles will arrive and depart during each shift change over.
- It is assumed that some employees will come / go over the course of the day from the site (i.e. for deliveries, lunch etc.). Therefore it is assumed the workers will generate an average of 3 vehicle movements per day.

The above information has been summarised in Table 4.1 below.

Table 4.1: Victorian Shore Crossing Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	8 movements	6 movements	20 movements	34 movements
Daily	8 movements	6 movements	60 movements	74 movements

4.2.2 Transition Station

4.2.2.1 Transition Station Description

A transition station will be constructed proximate to the coastline at Waratah Bay and is required if there are different cable manufactures or substantially different cable technologies adopted for the land and subsea cables. It is noted this transition station may not be required, however for the purposes of this assessment it has been included.

The transition station is accessible via Waratah Road, and is located along the project alignment, immediately south of the bend in Waratah Road. An access road will be constructed along the project alignment, utilized for both the access to the transition station as well as the cable construction activities.

The location of the site is shown in Figure 4.2.

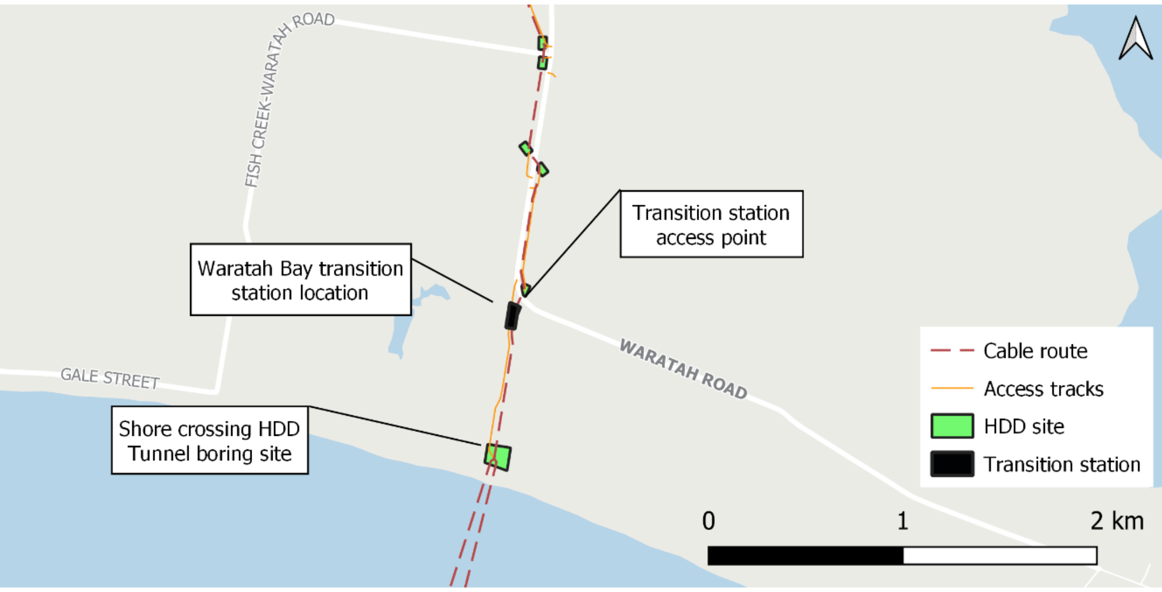


Figure 4.2: Transition Station Location

4.2.2.2 Transition Station Traffic Generation

Information and assumptions in regard to the construction of the transition station have been outlined below:

- Construction will occur over a 16-month time frame.
- Construction activities would occur six days per week, from 7:00AM to 4:00PM.
- A 16-month construction time period results in ~400 working days.
- Information on the construction methodology provided by the project team indicates that a total of 291 construction vehicles are expected to be required over the total construction period. This results in 582 vehicle movements (291 inbound movements and 291 outbound movements).

- 291 construction vehicles results in less than one vehicle per day over the construction period. However, it is noted that construction vehicles are expected to be concentrated during certain periods (such as earthworks near the beginning of construction). For the purposes of this assessment, it is assumed a maximum of 20 vehicles will arrive on a single day (20 inbound movements and 20 outbound movements). All vehicles are expected to arrive in the morning and depart in the evening.
- There are estimated to be up to 22 workers on-site per day during construction. This results 22 movements inbound at the start of the day and 22 movements outbound at the end of the day.
- It is assumed that some employees will come / go over the course of the day from the site (i.e. for deliveries, lunch etc.). Therefore, it is assumed the workers will generate an average of 3 vehicle movements per day.

The above assumptions have been summarised in Table 4.2 below

Table 4.2: Transition Station Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	20 movements	22 movements	42 movements
Daily	40 movements	66 movements	106 movements

4.2.3 Converter Station

4.2.3.1 Converter Station Description

The Victorian converter station will be located in either the Driffield or Hazelwood area of the Latrobe Valley, with the two potential sites being investigated and assessed, as shown in Figure 4.3

Figure 4.3: Converter Station Location

The Driffield converter station will connect to the Victorian transmission network by a terminal station constructed adjacent to the existing Hazelwood–Cranbourne and Hazelwood–Rowville transmission lines, which will be cut into and routed through the terminal station

The Driffield converter station is accessed via the Strzelecki Highway at Smiths Road which has protected turning lanes. Access will be a sealed, two-lane access road that is 8m wide with pathways each side. Internal roads will also be constructed within the converter station site to provide access between buildings.

The Hazelwood converter station will be connected directly into the existing Hazelwood Terminal Station. Access will be from Tramway Road. The site will have an internal two-lane access road that is 8 m wide with pathways each side. The road will be sealed.

The converter station will be constructed on only one of the sites, however for the purposes of this assessment both locations have been considered. The Hazelwood site will require approximately 12km of additional land cable compared to the Driffield site.

The construction of the converter station will also include the delivery of transformers to the site. The transport arrangements for this piece of equipment are significant in size, consisting of a vehicle approximately 130m long and 250 tonnes. This arrangement is further discussed in Section 4.2.5.2 and shown in more details in Appendix E .

4.2.3.2 Converter Station Traffic Generation

Information and assumptions in regard to the construction of the converter station have been outlined below:

- Construction will occur over a 35-month time frame.
- Construction activities will occur six days per week, from 7:00AM to 4:00PM.

Construction heavy vehicle traffic generation assumptions are outline in Table 4.3 below.

Table 4.3: Converter Station Construction Traffic Volume Summary

Movements per quarter	2025				2026				2027	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Stage 1		213	299	287	318	317	317	125		
Stage 2			172	172	159	159	159	209	209	209
Total Movements = 3,334										

- The peak quarterly traffic volumes identified in Table 4.3 is 477 vehicles. Assuming this volume of traffic is evenly distributed across a three-month period results in 7 daily vehicle movements. However, it is noted that construction vehicles are expected to be concentrated during certain periods (such as earthworks near the beginning of construction). For the purposes of this assessment, it is assumed a maximum of 20 vehicles will arrive on a single day (20 inbound movements and 20 outbound movements). All vehicles are expected to arrive in the morning and depart in the evening.
- The number of employees expected on-site each day is outlined in Figure 4.4 below. This figure indicates a peak of 180 employees on-site. This results 180 movements inbound at the start of the day and 180 movements outbound at the end of the day.

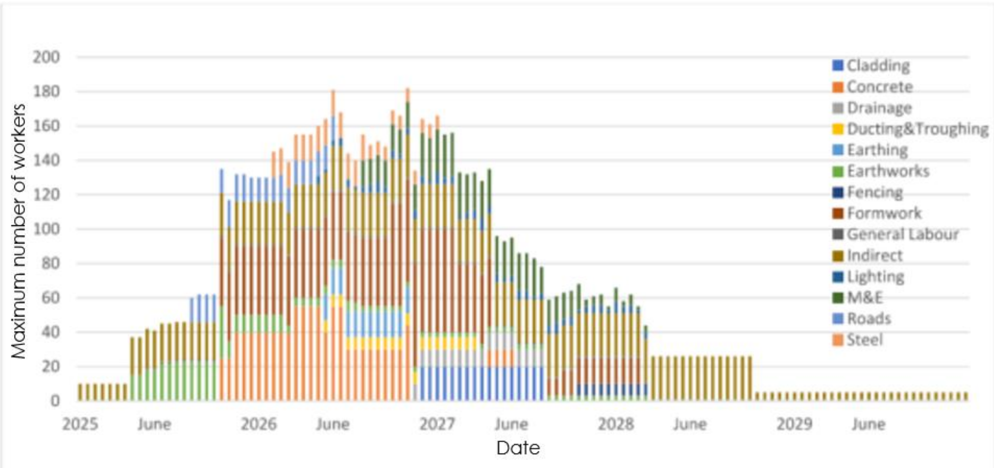


Figure 4.4: Converter Station Construction Daily Workforce

- It is assumed the workers will generate an average of 2 vehicle movements per day. Noting, maximum traffic volumes generated by staff, which gave been used in this assessment, are considered to be conservative due to the small number of times in which the peak occurs across the entirety of the program.
- The need for construction works to leave the site during their shift is considered to be low, due to the size of the construction activity, the number of workers on-site and the associated amenity which is likely to be provided for a construction activity of this scale. As such, the rate of two movements per staff member is considered reasonable.

The above assumptions have been summarised in Table 4.4 below.

Table 4.4: Converter Station Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	20 movements	180 movements	200 movements
Daily	40 movements	360 movements	400 movements

It is noted that the above assessment summarises the expected traffic generation volumes for the construction of the converter station at either Driffield or Hazelwood. Assessments will be completed considering the required treatments at either site.

4.2.4 Project alignment

4.2.4.1 Project alignment description

The remaining construction activity is the trenching and installation of the approximately 90km long cable, connecting the transition station at Waratah Bay with the converter station in either Driffield or Hazelwood. This process will be completed incrementally in 800m-1.2km long sections, to align with the size of the cable lengths that will be supplied.

Additional details on the construction methodology that is relevant to the traffic analysis has been outlined below.

Establish Laydown Areas

Laydown areas approximately 1ha in size will be utilised for the cable construction. These laydown areas are spaced out along the length of the cable for ease of accessibility. The laydown areas will primarily be utilised for the storage of equipment and materials, prestart for construction employees each day prior to accessing the project alignment, site offices and amenities. All laydown areas are positioned within close proximity to the project alignment, providing direct access to the work zone, with the exception of laydown area 6. Laydown area 6 will require vehicles to travel for a longer distance to the project alignment via the public road network. Each day all workers will arrive at the designated laydown area for prestart. After prestart, employees working on the project alignment will then travel there from the laydown area. Additionally, all construction vehicles will arrive at the laydown areas prior to arriving to the site.

The project alignment is divided into sections, that are divided up by ‘joint pits’. These joint pits divide which section is constructed at any given time, with two sections constructed concurrently (e.g. the length between joint pits 2-4 will be constructed, then the length between joint pits 4 to 6 will be constructed).

The laydown areas to be utilised are shown in Figure 4.5 and outlined in Table 4.5.

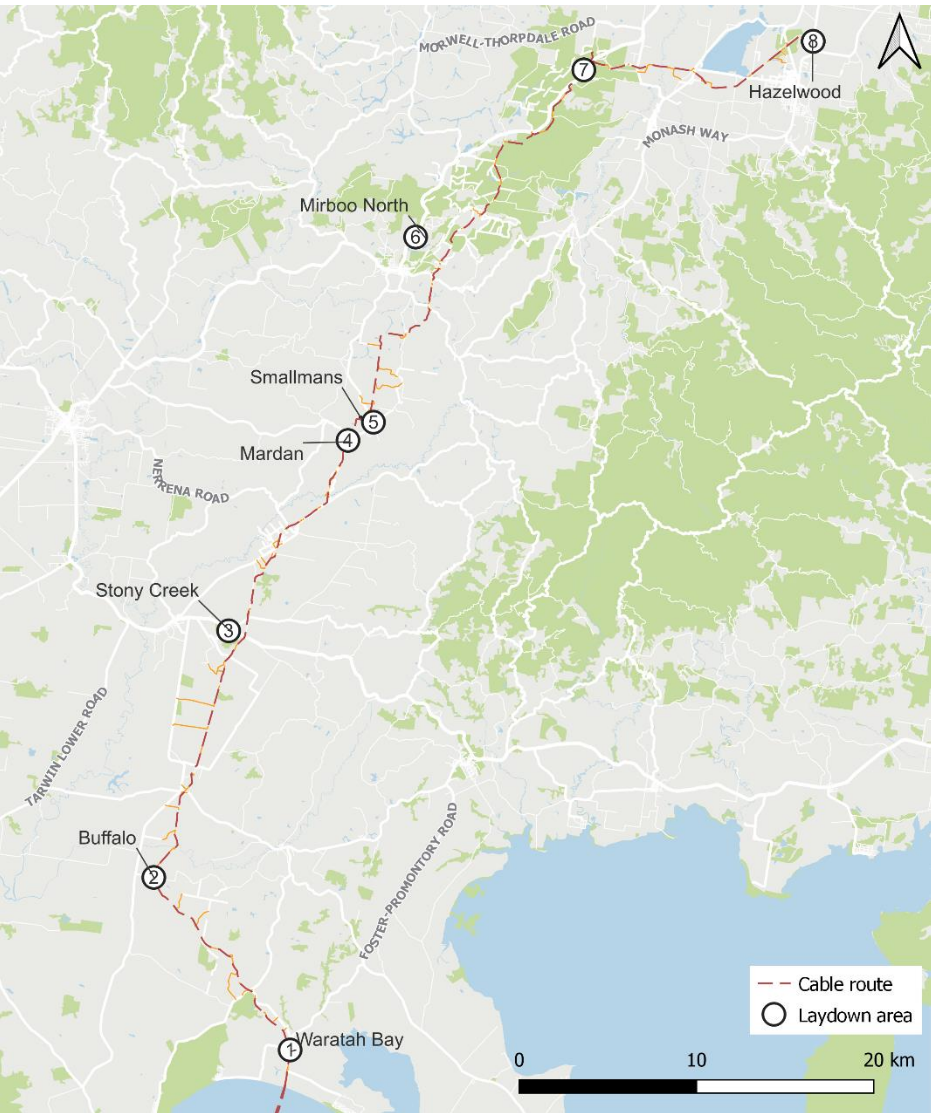


Figure 4.5: Laydown Area Locations

Table 4.5: Summary of Laydowns Areas

Laydown Area	Location	Construction Joint Pits Serviced
Laydown Area 1	Waratah Bay: adjacent to Waratah Road	Joint Pits 1-8
Laydown Area 2	Buffalo: adjacent to Harding Lawson Road	Joint Pits 8-22
Laydown Area 3	Stony Creek: adjacent to Stoney Creek–Dollar Road	Joint Pits 22-36
Laydown Area 4	Mardan: adjacent to Mardan Road	Joint Pits 36-40
Laydown Area 5	Smallmans: adjacent to Smallmans Road	Joint Pits 40-48
Laydown Area 6	Mirboo North: adjacent to Strzelecki Highway	Joint Pits 48-60
Laydown Area 7	Delburn Wind Farm / Driffield: adjacent to Strzelecki Highway	Joint Pits 60-72
Laydown Area 8	Hazelwood: adjacent to Tramway Road	Joint Pits 72-78

It is noted that these laydown area locations are indicative at this stage. If these are to be relocated, then a revised assessment should be undertaken.

Establish Access tracks and site facilities

Prior to the main construction works occurring, the site set up will occur to enable the construction activities. This will consist of:

- Constructing site entries, gates and signage.
- Constructing access roads and tracks to the project alignment.
- Erecting fencing.

Access tracks will be constructed at key locations, leading to joint pit locations, HDD drill pads, and laydown areas. During construction, vehicles will access the site using the access tracks and then travel along the project alignment. Access tracks will be required on either side of HDD locations where vehicles will not be able to travel along the project alignment.

An example section of the project alignment is shown in Figure 4.6, outlining the joint pit locations, HDD points and access tracks.

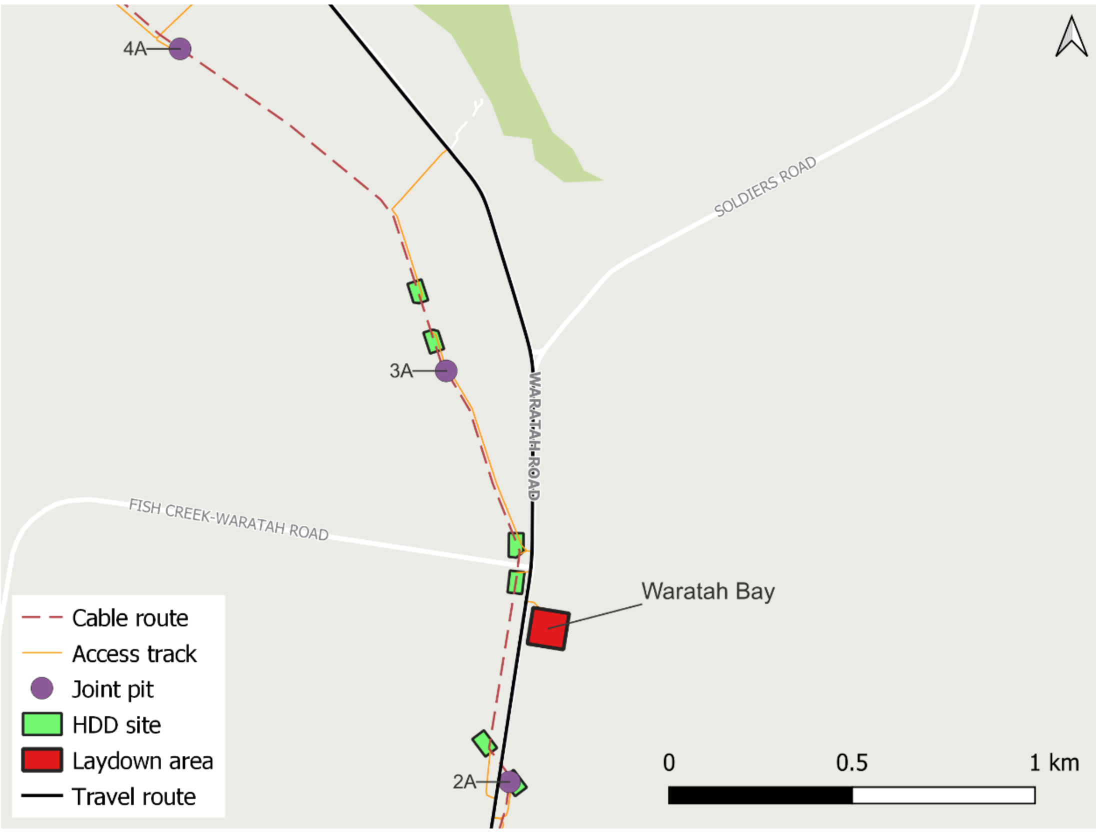


Figure 4.6: Example Section of the Project alignment

HDD Crossing Locations

HDD or other trenchless construction methods will be used at targeted crossing sites where geotechnically feasible or more practicable or cost-effective than trenching, e.g., at major watercourses, sealed roads, road reserves with native vegetation and third-party underground infrastructure, e.g., gas pipelines.

In total there are 61 HDD locations that have been assumed as a part of this assessment, the locations of which are shown in Figure 4.7

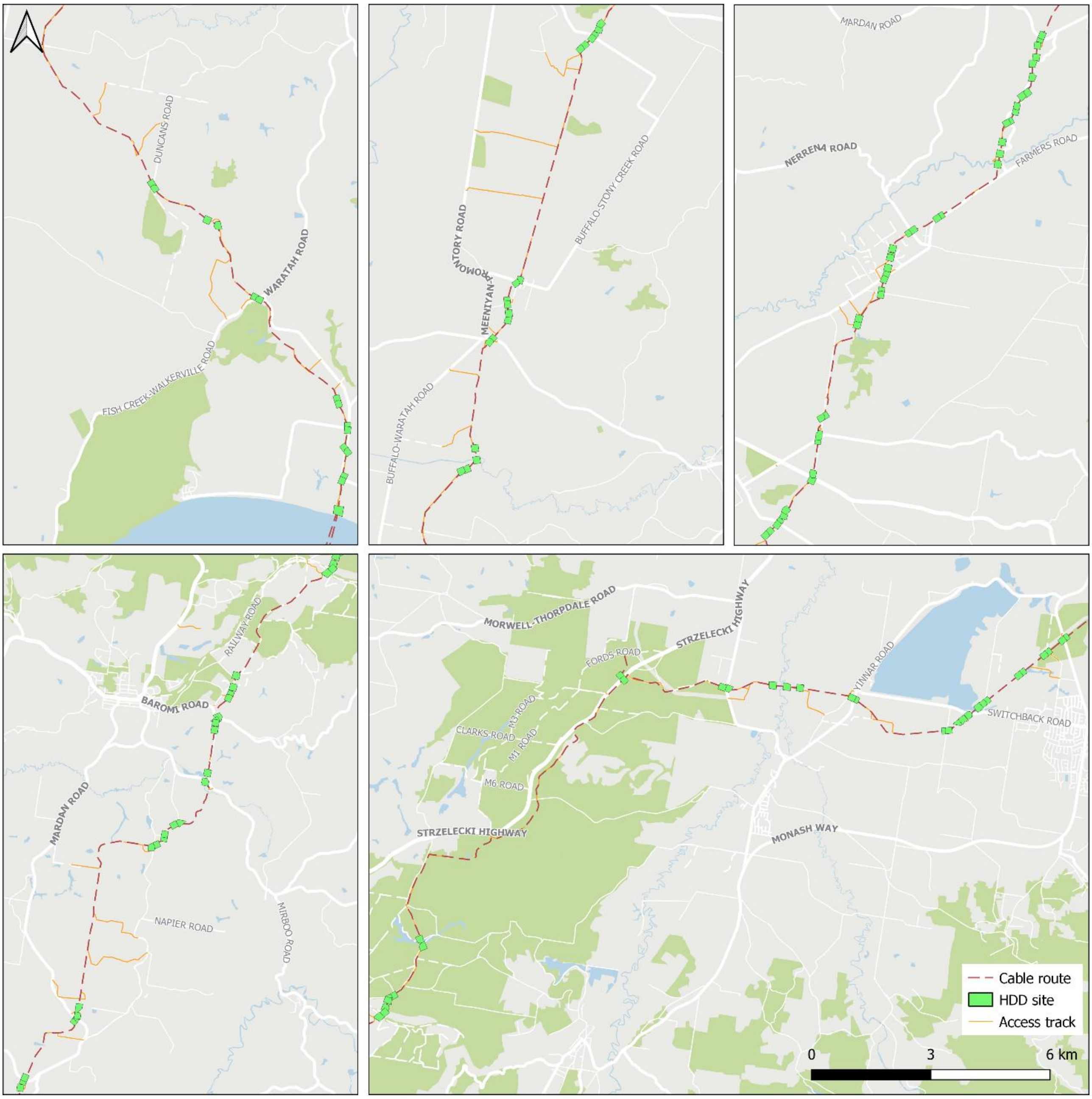


Figure 4.7: HDD Crossing Locations

The HDD construction methodology will be conducted as an independent exercise to the rest of the cable construction methodology. Each HDD is estimated to take up to two weeks plus mobilising and demobilising. HDD crossings will be a continuous 24-hour/7 day operation to ensure borehole stability.

Cable Drum Delivery

Prior to the pulling of the cable through the conduit, the cable drum must be delivered to the joint pit. For the purposes of this assessment, the cable drum delivery vehicle is assumed to be smaller in size than a 19m semi-trailer.

Summary

The construction of the cable will be completed in sections between even numbered joint pits. Each section will be completed up to and including the construction of the joint pit locations, prior to moving on to the next section. An example construction methodology for a section of the project alignment is shown in Figure 4.8. This outlines the construction stages up to and including the construction of the joint pits and the backfilling of the trench.

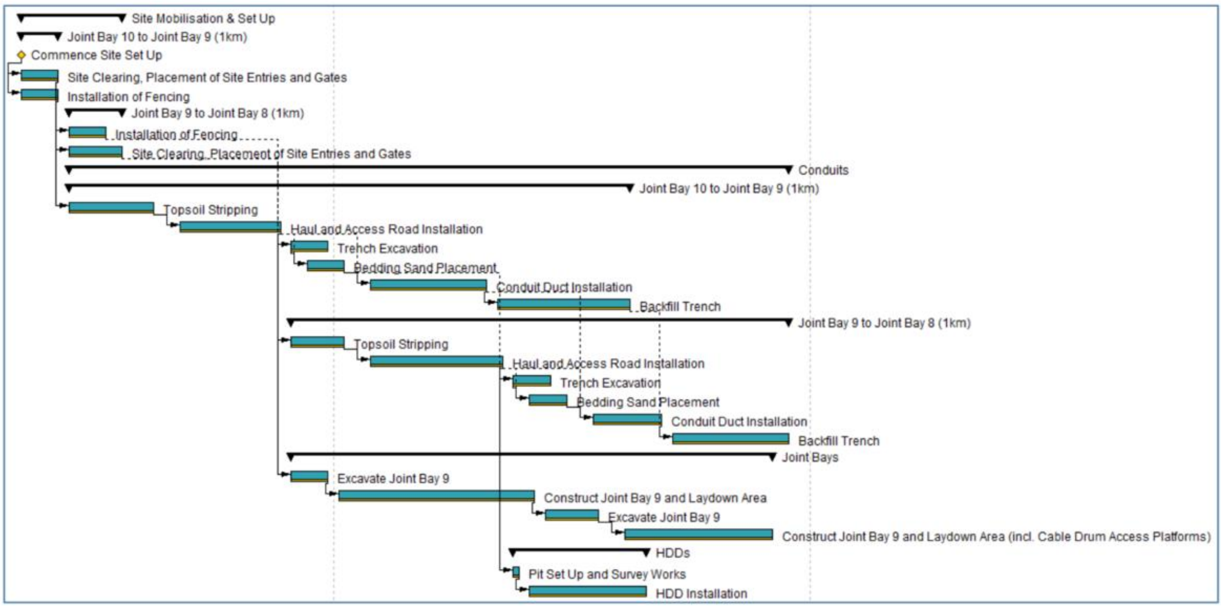


Figure 4.8: Example Timeline of Construction Between Joint Pit 8 to 10

It is noted that there will be a delay between the backfilling of the trench and the installation of the cable at the joint pits. This will occur at a time when the project alignment has been constructed to a point that the installation of the cables can occur and will not catch up to the cable trenching methodology.

The cable installation, pulling and jointing activities will be serviced by the laydown areas. No laydown area will be supporting both trenching and cable pulling activities concurrently. Outlined

4.2.4.2 Project alignment Traffic Generation

It is noted that the construction of the cable entails a number of different steps, each with different levels of construction vehicles expected to be generated, and different volumes of employees. For the purposes of this assessment a 'peak' traffic generating day has been identified for the laydown areas, as well as for the project alignment access tracks. This peak operation has been assumed to occur when the construction machinery, that will remain on site for the whole construction process is delivered or moving around joint pits. A separate rate has been determined for the access point to the laydown area and the access tracks to the project alignment.

Information and assumptions in regard to the construction of the project alignment have been outlined below:

- Construction will occur over a 36-month time frame, with Stage 1 constructed over 26 months and Stage 2 constructed over 18 months
- Construction activities will be undertaken by four separate work crews stationed at different locations along the project alignment. These work crews will not be operating out of the same laydown area at any stage during construction.
- Construction will occur working 13-day fortnights, with seven-day weeks and one rostered day off (RDO) per fortnight. Land cable construction will occur from 7am to 5pm each day.
- The following vehicles are expected to be present along the cable length for the life of the construction methodology.
  - 12 light vehicles
  - Two light duty trucks
  - Four twinsteer rigid trucks (22-26t GML)
  - Four 30-36t excavators
  - One 21 tonne excavator and one 13.8 tonne excavator.

- One of each of the following: a Franna crane and a manitou, front end loader, grader, water truck and a hydrovac excavator.

- The above vehicle list results in 12 Light Vehicles and 18 Heavy Vehicles being present on-site. For the purposes of this assessment it is assumed that all vehicles will arrive at the same time.
- Upon site set up it is assumed that all construction vehicles will arrive at the laydown area and then depart a short time later (after check-in) to travel to the project alignment.
- The construction vehicles will be left along the project alignment throughout the construction lifecycle, and will therefore not depart at the end of the day for the scenario being assessed. It is however assumed that some of the light construction vehicles will be utilized by employees to travel home (via the laydown area when departing). For the purposes of this assessment, 25% has been assumed.
- During the peak day, it has been assumed that 5 delivery vehicles will arrive over the course of the day for the construction of the cable. These will arrive outside of the peak hour, and access the project alignment via the laydown area.
- It is understood that approximately 30 employee vehicles will arrive at the laydown area for prestart each day. 20 of these employee vehicles will remain at the laydown area for employees working in the site offices and 10 will depart to work on the cable. The 10 vehicles for employees working on the cable will depart the site via the laydown area at the end of the day.
- It is assumed that some employees will come / go over the course of the day from the site (i.e. for deliveries, lunch etc.). Therefore, it is assumed the workers will generate an average of 3 vehicle movements per day.
- In addition to the above activities, the traffic generation for the HDD tunnel boring activities was also included. It has been conservatively assumed that the HDD drilling rig will be set up at the same time as the arrival of the machinery outlined above
- It is assumed that 5 vehicles will arrive (via the laydown area) for the set up of the HDD drilling rig during the morning peak. This will remain on site during the drilling process
- During the peak day, it has been assumed that 5 delivery vehicles will arrive over the course of the day for the construction of the cable. These will arrive outside of the peak hour, and access the project alignment via the laydown area.
- Arrival of 5 employee vehicles has been assumed. Employees will arrive and depart via the laydown areas, utilising the same assumptions as outlined above

The above assumptions have been summarised in Table 4.6 and Table 4.7 below

Table 4.6: Laydown Area Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	46 movements	24 movements	50 movements	120 movements
Daily	66 movements	30 movements	120 movements	216 movements

Note: The traffic movements within the Table are derived from the bullet points detailed above the table.

Table 4.7: Project alignment Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	23 movements	12 movements	15 movements	50 movements
Daily	43 movements	15 movements	45 movements	103 movements

Note: The traffic movements within the Table are derived from the bullet points detailed above the table.

4.2.5 Vehicle Types Used for Construction

4.2.5.1 Core Construction Activities

A variety of heavy vehicles are expected to be accessing the shore crossing site, transition station, converter station, laydown areas and project alignment as a part of the construction activities. This will include, but not be limited to the following:

- 12-18 tonne Capacity Tip Truck
- 8m3 capacity concrete mixer
- 100t mobile crane
- Franna Crane
- Water truck
- Hydrovac excavator
- A flat-bed truck will be used to deliver construction equipment such as a cherry picker, excavators, vibrator rollers, HDD drilling rigs and more.

For the purposes of this assessment it has been assumed that all vehicles accessing each of the construction sites will be less than or equivalent in size to a 19m articulated vehicle (AV). Where swept path assessments are required, a 19m AV has been utilised to determine the spatial requirements. Further detail is outlined in Section 7.1.6.3 and 7.1.8.3.

4.2.5.2 Transformer Transport Vehicle

The construction of the converter station will entail the delivery of a number of transformers. This activity has been specifically assessed from the other construction activities due to the use of a bespoke vehicular arrangement which will include the use of a vehicle that is approximately 130m long, 6m in height and approximately 650 tonnes. The arrangement of this vehicle is detailed in the figure below. This is also attached in Appendix E in greater detail.

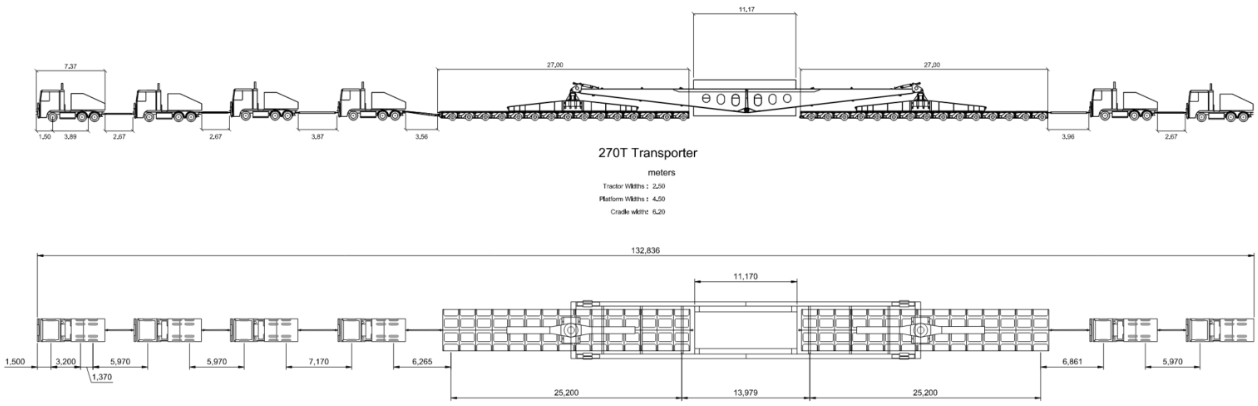


Figure 4.9: Transformer Transporter Vehicle

Separate turning movement assessments have been conducted of the path of travel that this vehicle will take to access the converter station from the Port of Melbourne. Further detail is outlined in Section 7.1.6.3 and 7.1.8.3.

4.2.6 Construction Vehicle Travel Paths

The paths of travel to the various construction locations considered as a part of this assessment have been determined. These considered a number of factors, such as pre determined heavy vehicle routes as found on the VicRoads website, a review of the existing road conditions through the site inspection as well as the most logical and short path of travel.

These have been grouped as follows:

- Construction Haulage – The path of travel of construction vehicles to the laydown areas, converter station, transition station and shore crossing. It has been assumed that all construction vehicles will be arriving to the region from the Melbourne direction (primarily from the Port of Melbourne)
- Workforce – The path of travel for the workforce of employees that is required to complete the construction activities. Employees will travel to / from the site from the townships in the surrounding area

- **Project alignment Access –** The path of travel between the laydown areas and the access tracks. As stated above, the majority of employees and construction vehicles that are accessing the project alignment will stop at the laydown area prior to travelling to the worksite.
- **Transporter Transformer –** The path of travel of the over dimensional transformer transporter from the Port of Melbourne to the converter station sites.

When determining the paths of travel for heavy vehicles, roads identified on VicRoads heavy vehicle maps were gazetted. These maps show the pre-approved and assessed heavy road networks as determined by VicRoads and can be assumed to be accessible by the large construction vehicles that are required. The following heavy vehicle maps were reviewed and utilized:

- **B-Double Network:** Victoria's gazetted arterial and municipal roads for Class 2 B-Doubles and Class 3 B-doubles operating under Victoria's Livestock Loading Scheme. For the purposes of this assessment it was assumed that all roads on the B-Double road network are accessible by vehicles up to and including a B-double in size.
- **Oversize & Overmass (OSOM):** Victoria's Class 1 gazetted Oversize & Overmass (OSOM) network is for combinations that operate up to 100.0 tonnes gross mass, 5.0 metres high, 5.0 metres wide, and 30 metres long. These vehicle routes were determined to have a greater level of accessibility than the B-Double network.
- **Over Dimensional (OD) Route Network:** Victoria's Over Dimensional (OD) shows the preferred network of arterial and municipal roads that cater for OD combinations that exceed 5.0 metres high or 5.0 metres wide or 30.0 metres long or 100.0 tonnes gross mass. These OD routes have been chosen because they have minimal height and width impediments or mass restrictions and will be the preferable route for the transport of the transformer vehicle. It is noted that this road network map outlines detours from the main freeway network, utilized to avoid certain infrastructure treatments that will inhibit access by OD vehicles.

4.2.6.1 Construction Vehicles from Melbourne

For the purposes of this assessment it has been assumed that all construction related heavy vehicle traffic volumes will be arriving to the construction sites from the Melbourne direction. Heavy Vehicle paths have been determined for all construction activities identified above, and are summarised as follows:

- **Location 1** Path of travel to the Shore Crossing, Transition Station and Laydown Area 1
- **Location 2** Path of travel to Laydown Area 2
- **Location 3** Path of travel to Laydown Area 3
- **Location 4** Path of travel to Laydown Area 4
- **Location 5** Path of travel to Laydown Area 5
- **Location 6** Path of travel to Laydown Area 6
- **Location 7** Path of travel to Laydown Area 7 and the Driffield Converter Station
- **Location 8** Path of travel to Laydown Area 8 and the Hazelwood Converter Station

The path of travel to these sites will arrive to the region either utilising the Princes Freeway or the South Gippsland Highway, with the shortest and most logical paths of travel assumed, utilising the approved road networks as outlined above. The travel paths determined are outlined in Figure 4.10 for routes utilising the South Gippsland Highway and Figure 4.11 for routes utilising the Princes Freeway.

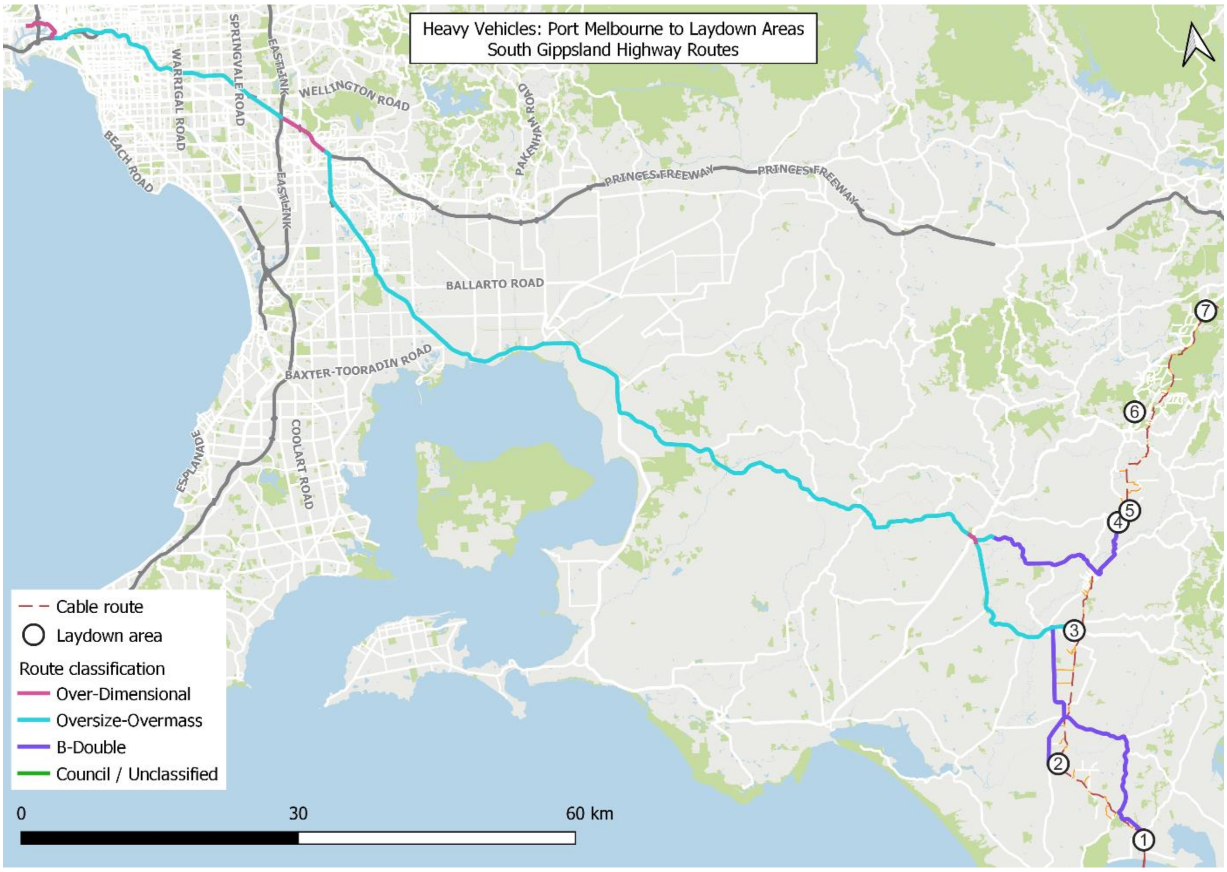


Figure 4.10: Heavy Vehicle Paths of Travel from Melbourne Utilising the South Gippsland Highway

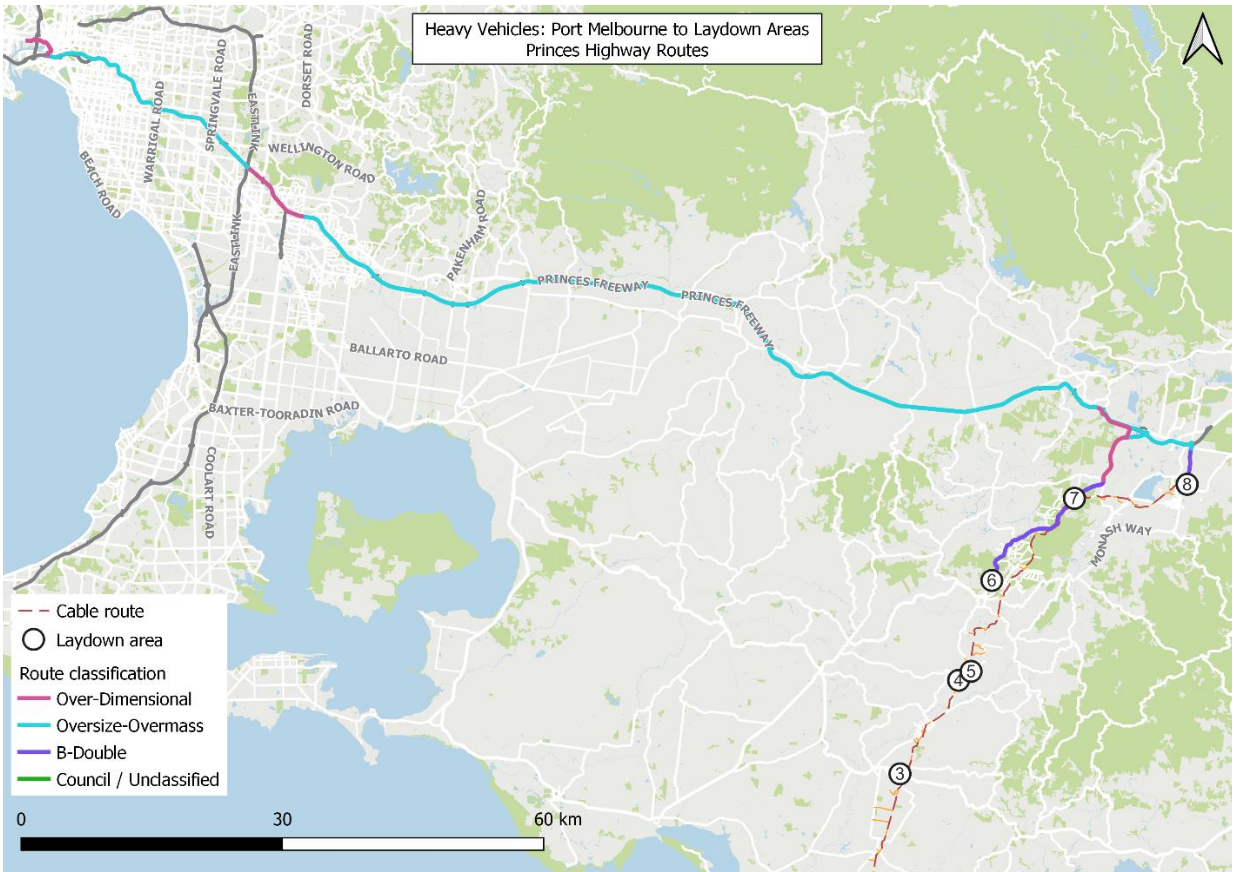


Figure 4.11: Heavy Vehicle Paths of Travel from Melbourne Utilising the Princes Freeway

A review of the above images outlines the following:

- The majority of travel paths utilised by the majority of heavy vehicle traffic are utilising roads identified by VicRoads as pre-approved or gazetted routes, some of which may be Council roads.
- The only Council road relied upon is Harding Lawson Road, utilised to access Laydown Area 2.
- The destinations on the project alignment can be grouped into two paths of travel, accessing from either the Princes Highway or South Gippsland Highway.

4.2.6.2 Personnel/ Light Vehicles from Surrounding Area

Personnel for the construction activities will be sourced from a variety of local, state, interstate and international resources. It was assumed that any employees that were not locally located will be given accommodation within the surrounding townships. Given that all employees will be residing within the local area during construction, the paths of travel for all employees to the work sites were determined based on the townships population.

All towns in the surrounding area with a population greater than 1,000 residents were therefore identified using ABS data from the 2016 Census. These are outlined in Table 4.8.

Table 4.8: Townships in the Surrounding Area with a Population Greater than 1,000 Residents

Town	Population	Town	Population
Briagolong	1,086	Neerim South	1,305
Churchill (Vic.)	4,784	Newborough	6,760
Drouin	12,348	Nyora (Vic.)	1,483
Foster	1,843	Rosedale (Vic.)	1,658
Hazelwood North	1,478	Sale	3,672
Heyfield	1,991	Stratford (Vic.)	2,621
Korumburra	4,475	Trafalgar (Vic.)	3,911
Leongatha	5,658	Traralgon	24,935
Longford (Vic.)	1,499	Traralgon East	1,728
Longwarry	1,950	Warragul	15,760
Maffra (Vic.)	5,282	Wurruk	1,109
Mirboo North	2,194	Yallourn North	1,545
Moe	8,776	Yarragon	1,650
Morwell	13,774	Yarram	2,135

The above towns were then grouped based on their location proximate to the project alignment, as shown in Table 4.9 and Figure 4.12. The percentage of total residents within the townships was utilised to determine the percentage split of employees to each of the construction sites from that general direction.

Table 4.9: Groupings of Townships in the Surrounding Area.

Location	List of Towns	Total Population	Percentage of Combined Population
West	Korumburra, Leongatha, Mirboo North, Nyora	13,810	9%
North-West	Drouin, Longwarry, Neerim South, Trafalgar, Warragul, Yarragon	36,924	25%
North	Churchill, Hazelwood North, Moe, Morwell, Newborough, Traralgon, Traralgon East, Yallourn North	63,780	43%
North-East	Briagolong, Heyfield, Longford, Maffra, Rosedale, Sale, Stratford, Wurruk	28,918	20%
East	Foster, Yarram	1,843	3%

Figure 4.12: Grouping of Surrounding Townships Based on Location

The groupings of townships identified above, as well as the percentage population that lives in each town forms the basis of the paths of travel that employees are expected to take to the locations identified above. These paths of travel have been determined and are identified below.

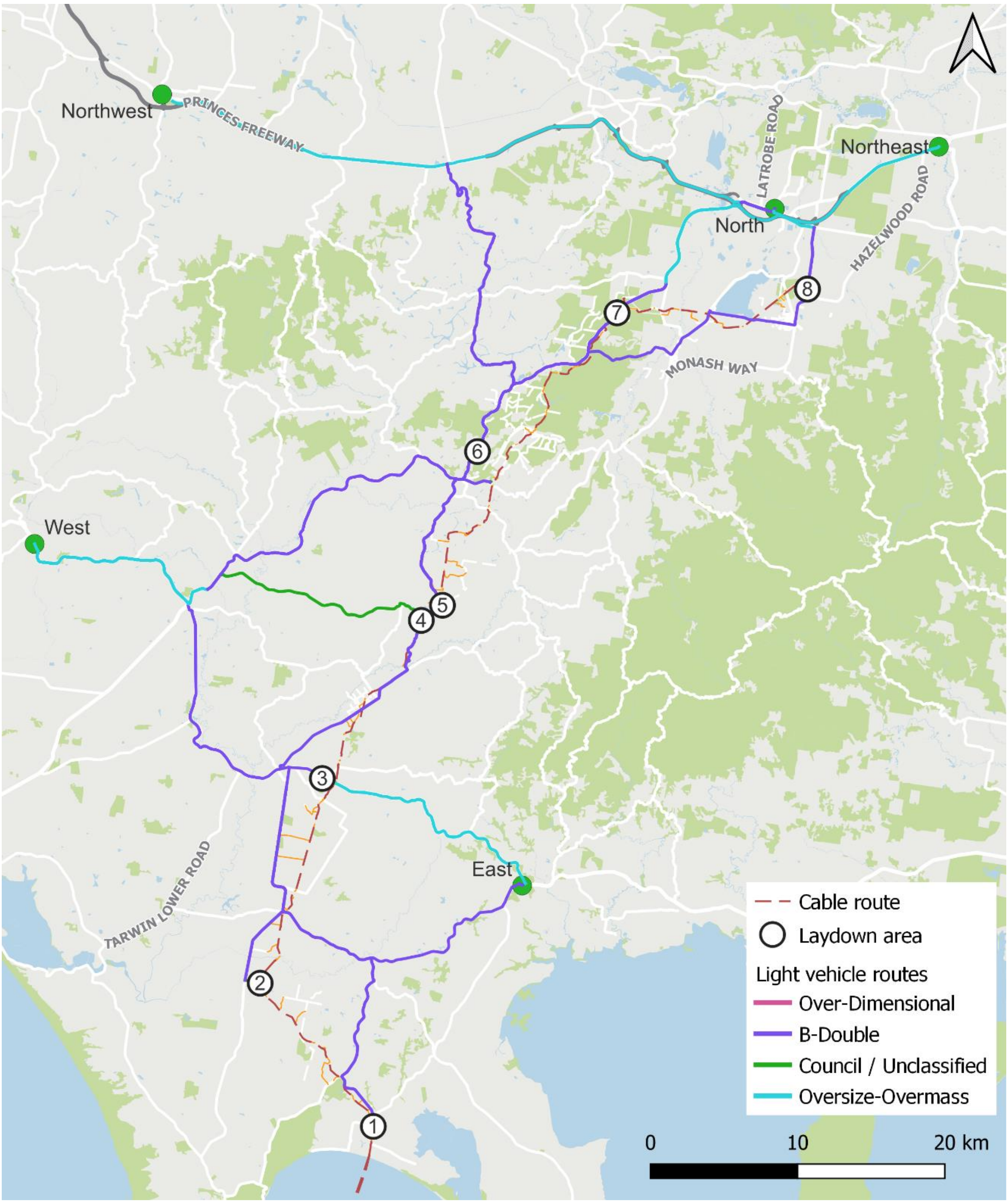


Figure 4.13: Light Vehicle Paths of Travel

A review of the above image outlines the following:

- A variety of roads will be relied upon for employees travelling to each location from townships in all directions.
- For the most part, vehicle movements will occur on higher order, DTP managed roads.
- There are a number of critical links that will be relied upon throughout the life of the construction of the cable, such as the Strzelecki Highway, Mardan Road, Meeniyan-Mirboo Road, Meeniyan-Promontory Road and Waratah Road.

It is noted, the project may consider a scenario in which a camp is set up for construction employees that will then travel to the work site on a bus, operated by the construction contractor. In this event, a revised path of travel will be utilized to access the construction site. For the purposes of this assessment, it has been assumed that construction workers will be arriving from the local townships to represent a worst case scenario approach for project generated traffic.

4.2.6.3 All Vehicles Path of Travel from Laydown Areas to the Project Alignment

All vehicles that will ultimately travel to the project alignment will arrive via the laydown area, accessing the cable via the access tracks. The paths of travel between the laydown areas and access tracks are outlined in Figure 4.14.

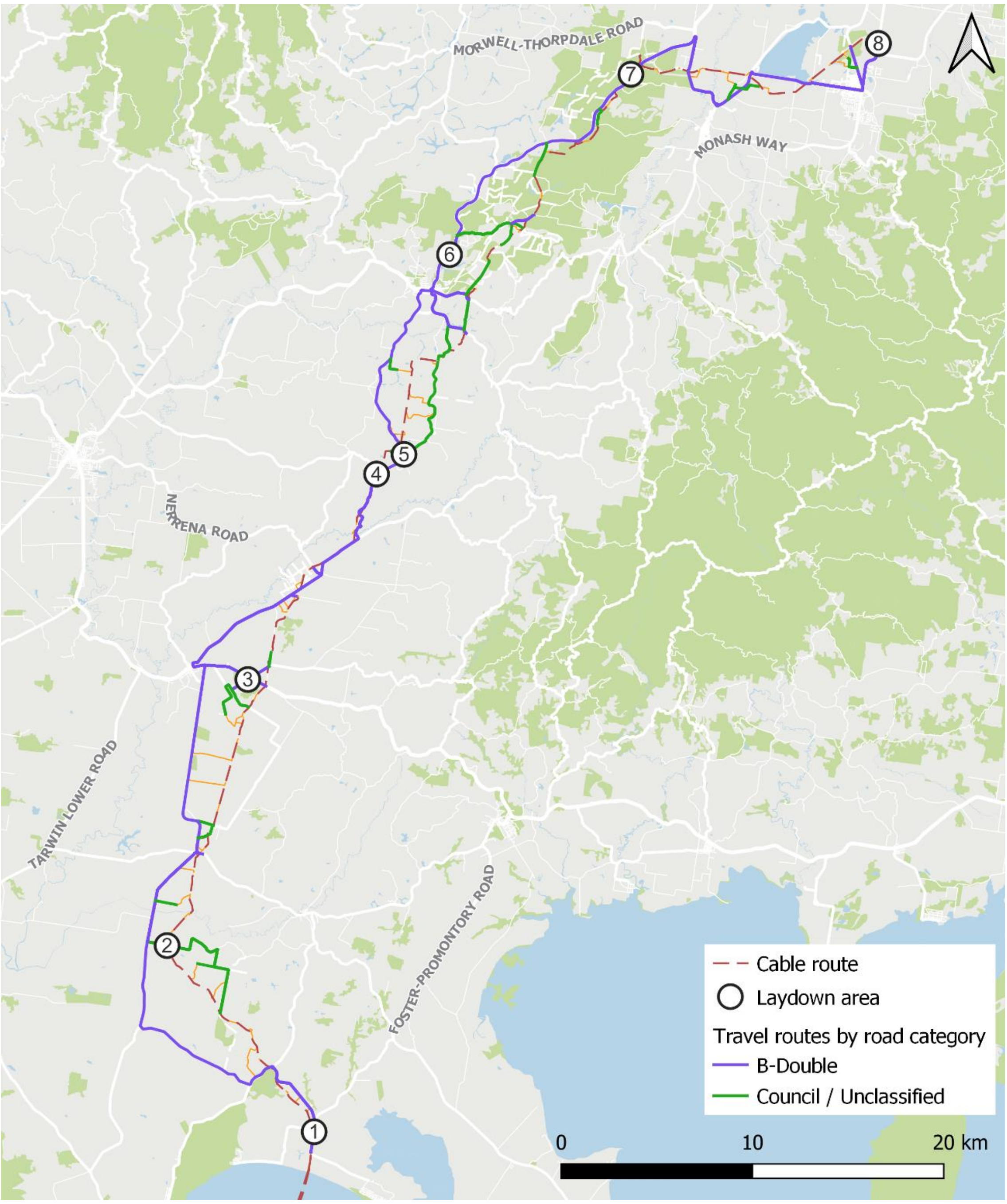


Figure 4.14: Paths of Travel from Laydown Areas to Project Alignment

A review of the above image outlines the following:

- A greater reliance on the local council road network is required to access the access tracks when compared to the paths of travel to the Laydown Areas.
- Some access tracks are immediately accessible from high speed, arterial roads.
- The laydown areas are well distributed to avoid long and circuitous paths to the access tracks.

4.2.6.4 Transformer Transport Path of Travel

As stated above in Section 4.2.3 the construction of the converter station entails the arrival of the transformer transport vehicle. This vehicle will arrive in Victoria at the Port of Melbourne and be transported utilising the bespoke 130m long vehicle.

The travel paths for this vehicle were determined to favour the DTP pre-approved over dimensional road network, which has been determined to accommodate vehicles such as this. It is noted that the path of travel through Melbourne was influenced by the vehicles 6m height. The CityLink tunnels through Melbourne have a height clearance of 4.25m.

The proposed paths of travel that can be utilised by the transformer transport is shown in Figure 4.15 and Figure 4.16.

Figure 4.15: Paths of Travel from the Port of Melbourne by the Transformer Transport

The identified paths of travel are indicative at this stage, with further investigation and consultation required. It is expected that this will be undertaken by the building contractor closer to construction.

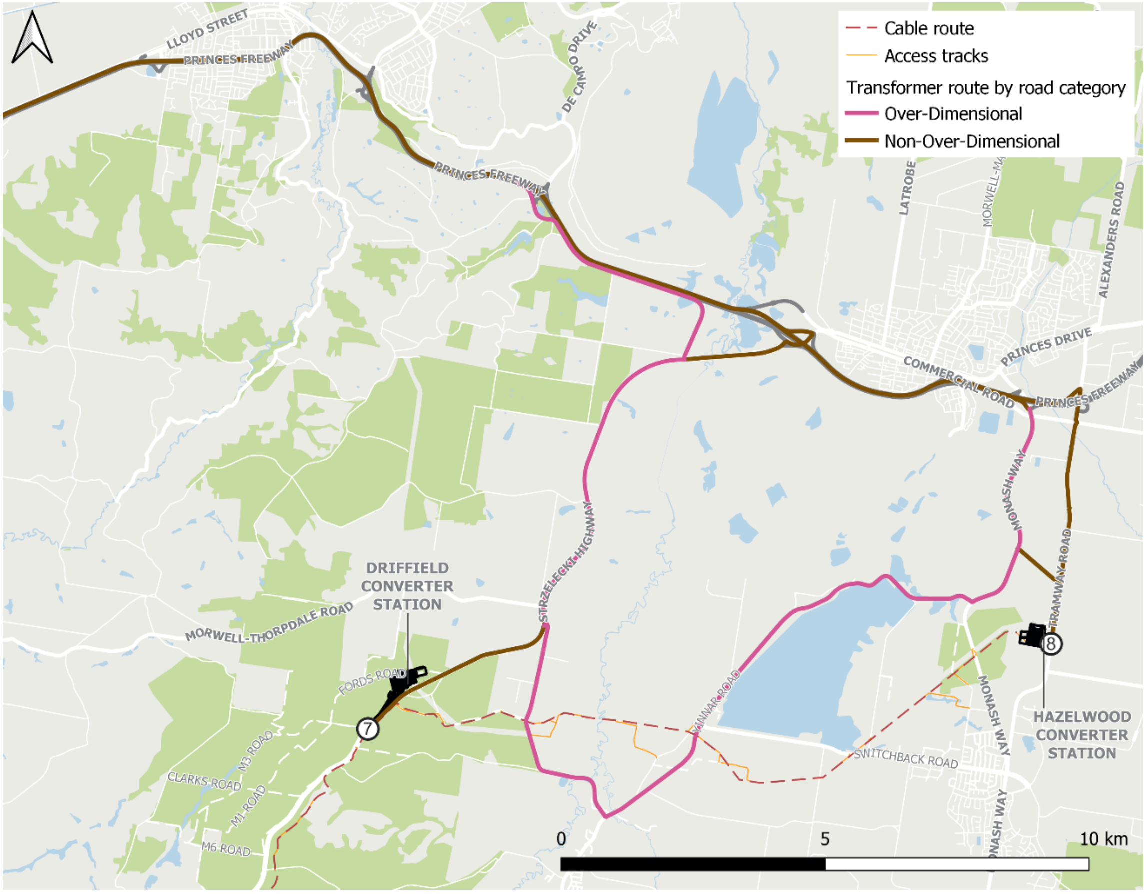


Figure 4.16: Paths of Travel to Driffield and Hazelwood Converter Stations by the Transformer Transport

A review of the above image outlines the following:

- The path of travel heavily favours DTP pre-approved over dimensional travel routes.
- The final section of road to access both Driffield and Hazelwood is not contained on the pre-approved over dimensional travel route.

It is noted, we understand the Port of Geelong and Port of Melbourne are being considered as potentially being utilised by the project for the transformer transporter. In this regard, DTP Heavy Haulage unit has provided advice associated with both routes. This is detailed within Section 5.7 of this report. In summary, the travel path from Port of Melbourne to the converter station site/s for a vehicle of this type and size is reasonably well utilised and associated requirements and pathways known and previously agreed for other similar projects. This is not necessarily the case for Port of Geelong. If Port of Geelong is to be further considered a higher level of consultation with DTP and the NHVR is recommended to occur as early as possible to ensure travel routes are agreed and other major projects are consulted.

4.2.6.5 Roads excluded from Travel Routes

Routes were excluded due to topographical issues such as sharp bends, narrow roads, local traffic volumes etc. These are outlined in Table 4.10 below.

Table 4.10: Roads Excluded from Assessment

#	Road Name	Section of Road	Reason for Exclusion
1	Mardan-Dumbalk Road	Links Nerrena Road to Mardan Road	Tight, narrow bends; local traffic
2	Mirboo North-Trafalgar Road	Shortcut to Mirboo North from Princes Freeway	Local traffic and agricultural machinery; use should be discouraged; prefer Princes Freeway and Strzelecki Highway used
3	Creamery Road	Shortcut from Yinnar to Strzelecki Highway	Local rat run and logging traffic
4	Stocks Road	Shortcut from Yinnar to Strzelecki Highway	Local rat run and logging traffic
5	Darlimurla Road	Darlimurla to Boolarra	Local road through rural residential subdivision
6	School Road	Strzelecki Highway to Darlimurla	Local road through rural residential subdivision
7	Old Mardan Road	Meeniyan-Mirboo North Road to Boolarra South-Mirboo North Road	Tight, narrow bends; local traffic

4.3 Operation

The project will operate 24 hours, 7 days a week as a continuous connection between Tasmania and the mainland. It is anticipated to have a minimum 40-year operational lifespan.

During its active lifespan, the operational and maintenance activities that are expected include the following:

- Routine inspections of the land cable easement for potential operational and maintenance issues, including:
  - Unauthorised activities and structures.
  - Land stability.
  - Rehabilitation issues.
  - Weed infestations resulting from construction activities.
  - Cover at watercourse crossings.
- Periodic inspection of the subsea cables by remotely operated vehicles.
- Remote monitoring of shipping activity near the subsea cables for potential anchoring issues.
- Servicing, testing and repair of the subsea and land cables, transition station and converter stations equipment and infrastructure including scheduled minor and major outages.
- Maintenance of access tracks

In addition to the above, the converter station will have personnel during normal working hours (Monday to Friday 07:00 to 18:00 and Saturday 07:00 to 13:00 excluding public holidays), with small numbers of personnel attending each day. The transition station will not be manned.

All aspects of the project will require periodic maintenance.

4.4 Decommissioning

The operational lifespan of the project is a minimum 40 years. At this time the project will be either decommissioned or upgraded to extend its operational lifespan.

Decommissioning will be planned and carried out in accordance with regulatory and landowner or land manager requirements at the time. A decommissioning plan in accordance with approvals conditions will be prepared prior to planned end of service and decommissioning of the project.

Requirements at the time will determine the scope of decommissioning activities and impacts. The key objective of decommissioning is to leave a safe, stable and non-polluting environment, and minimise impacts during the removal of infrastructure.

In the event that the project is decommissioned, all above-ground infrastructure will be removed, and associated land returned to the previous land use or as agreed with the landowner or land manager.

Decommissioning activities required to meet the objective will include, as a minimum, removal of above ground buildings and structures. Remediation of any contamination and reinstatement and rehabilitation of the site will be undertaken to provide a self-supporting landform suitable for the end land use.

Decommissioning and demolition of project infrastructure will implement the waste management hierarchy principles being avoid, minimise, reuse, recycle and appropriately dispose. Waste management will accord with applicable legislation at the time.

Decommissioning activities may include recovery of land cables and removal of land cable joint pits. Recovery of land cables would involve opening the cable joint pits and pulling the land cables out of the conduits, spoiling them onto cable drums and transporting them to metal recyclers for recovery of component materials. The conduits and shore crossing ducts would be left in-situ as removal would cause significant environmental impact.

The concrete cable joint pits would be broken down to at least one metre below ground level and buried in-situ or excavated and removed.

A decommissioning plan will be prepared to outline how activities will be undertaken and potential impacts managed

5 Assessment method

5.1 Overview

This section outlines the methodology for the preparation of this report. The assessments conducted within this report have been conducted to align with the EIS structure and assessment methodology.

The process undertaken to complete this assessment as it relates to traffic and transport is outlined in Figure 5.1 below.

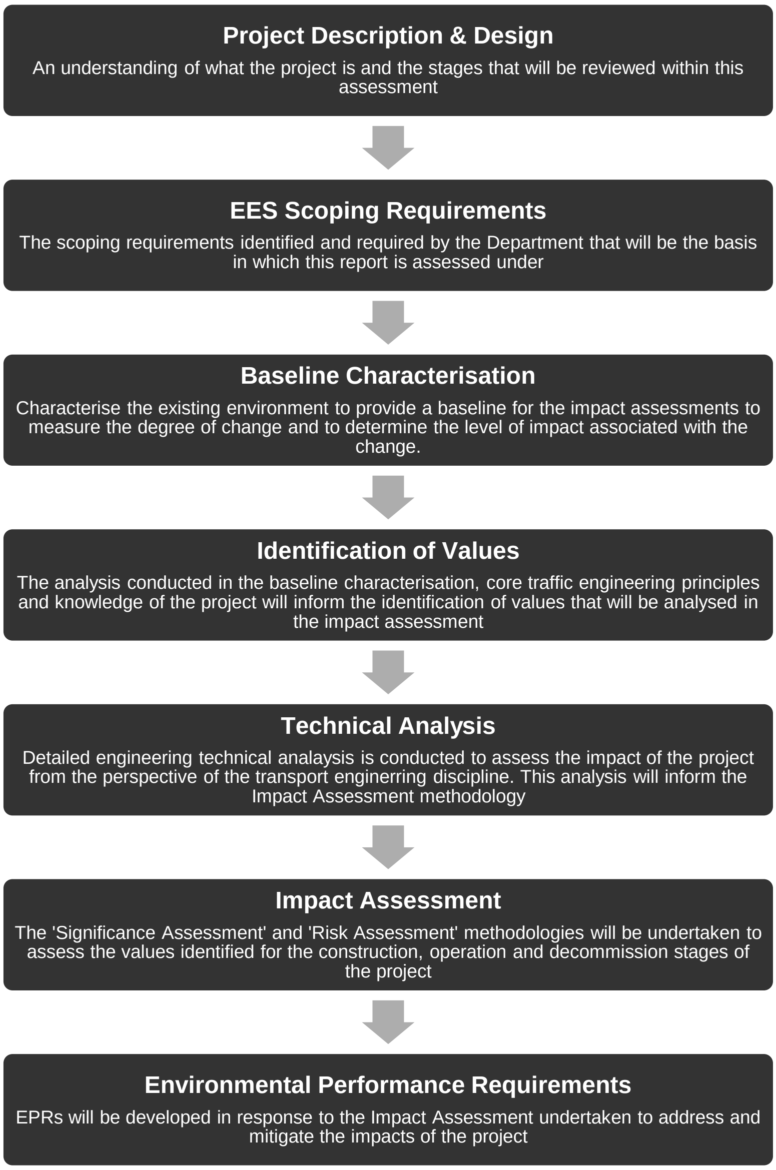


Figure 5.1: EIS Methodology

5.2 Study Area

This report assesses the road network in the immediate surrounding area to the survey area , including the paths of travel that vehicles will utilize. This includes the surrounding arterial roads within the Gippsland region that connect between the major arterial roads that service the area to the various townships, as well as minor streets and access tracks that will be relied upon to access the cable easement.

This report will assess the existing condition of the roads within the immediate surrounds, and determine any infrastructure upgrades that may be required to service the access needs of the project. This will include the path of travel to the following key locations: the Victorian shore crossing HDD site, the transition station, the converter station, the project alignment access tracks and laydown areas utilized to service the construction of the cable.

The approximate extents of the study area assessed within this report are shown in Figure 5.2.

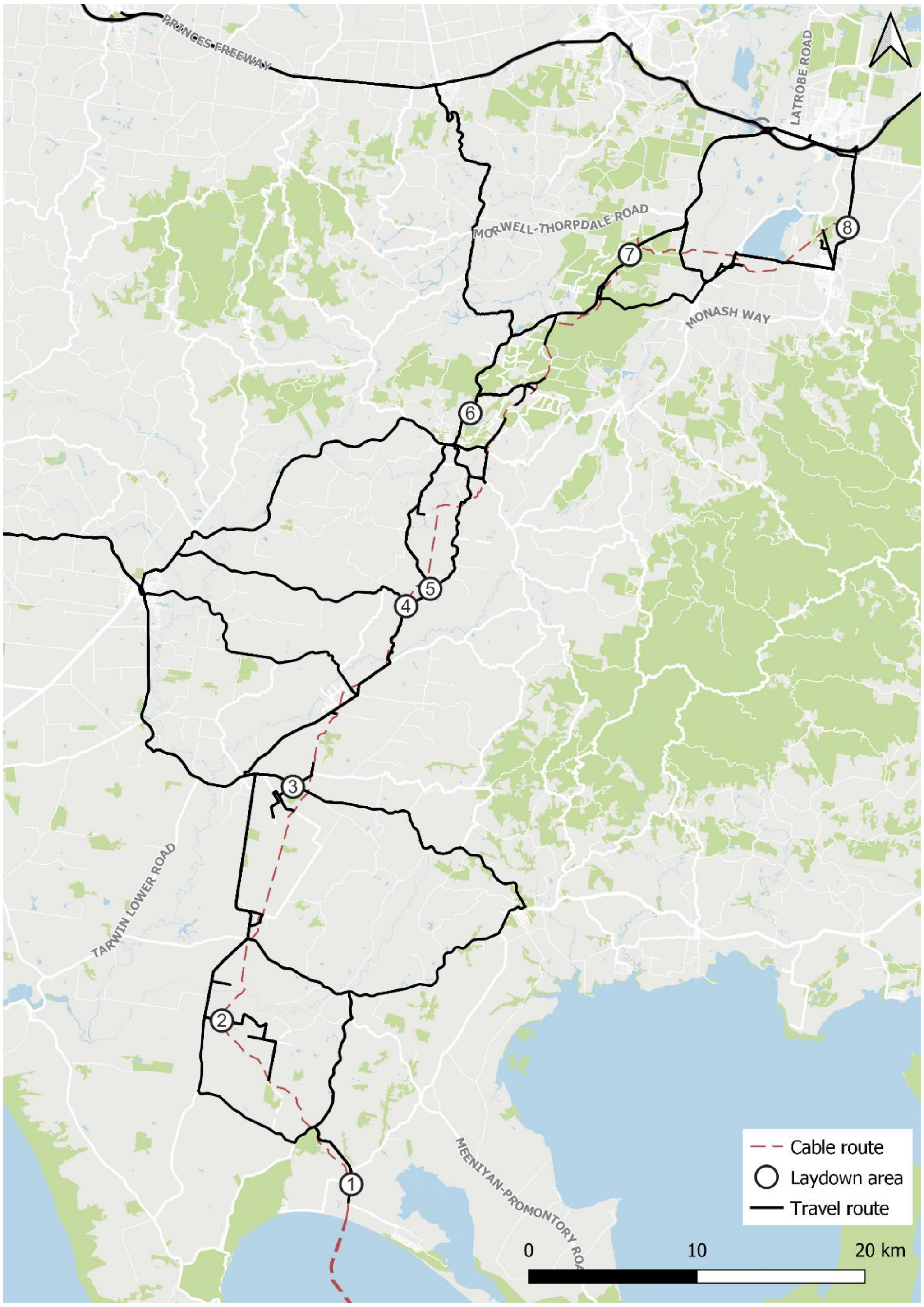


Figure 5.2: Assessment Study Area

5.3 Existing conditions

The existing conditions utililsed to gain an understanding of the existing conditions and operation of the transport network within the immediate surrounds of the project. This includes the preparation of an extensive background review, including conducting the following activities:

- a site inspection of the road network surrounding the project extents
- the collection of existing conditions traffic count data surveys
- a review of required traffic engineering literature and resources
- data collection of publicly available channels / resources
- a review of alternative modes of transport, such as the public transport network and walking and cycling tracks

The impact assessment will rely upon, in many cases, a comparison to the existing operational performance of the transport network in the area.

5.4 Identification of Existing Values & Attributes

The baseline characterization / existing conditions review as outlined above was utilized to identify the 'values' that were assessed as a part of the impact assessment. The values alongside their attributes were identified based on core transport engineering principles, as well as a knowledge and understanding of the project.

The values and attributes identified are outlined below in Table 5.1.

Table 5.1: Values and Attributes

Value	Attribute
Road Network Capacity The operational performance of the road network with regard to its theoretical capacity and existing operation. This value recognizes how the road network is performing, whether a substantial change is to occur from its existing operational performance	Arterial road network capacity
	Local road network capacity and net change
	Intersection capacity
	Road connectivity and provision of alternative routes
Safe Road Performance, Condition and Design The design and operation of the road network, ensuring that it is provided in a safe manner that is compliant with relevant industry standards and guidelines.	Road pavement condition assessment
	Safe condition of bridges and culverts
	Provision of adequate road geometry
	Review of crash history
	Intersection safe sight distance assessment
	Height clearance requirements of transformer transporter
	Safe operation and management of construction activities
Public and Active Transport The continued operation of the public transport network, as well as the active transport infrastructure in the surrounding area. This includes V/Line trains, local bus services, school buses, recreational rail trails and public footpaths.	Operation of public transport services and infrastructure
	Operation of active transport infrastructure

The values were identified based on the analysis conducted within Section 6.3.

5.5 Impact Assessment Technical Analysis

Prior to the completion of the impact assessment, detailed traffic engineering assessment was required to complete the technical analysis and identify the impacts of the project. This assessment was undertaken with consideration of the three stages of the project lifecycle; construction, operation and decommission. This analysis aligns with the values identified, with the impacts subsequently assessed utilizing the significance assessment.

The analysis undertaken includes typical traffic engineering analysis to identify the impact of the project, such as those outlined below:

- traffic generation estimates
- identification of travel routes
- road link capacity assessments
- turning lane warrant intersection assessments
- swept paths
- safe sight distance
- pavement conditions
- road safety and crash history review
- review of surrounding public transport and active transport.

The assumptions made to inform the analysis ensures a ‘worst case; scenario has been assessed for all technical analysis undertaken.

The technical analysis conducted is outlined in Section 7 of this report, completed to align with the appropriate value.

5.6 Impact Assessment

The impacts that were identified as a part of the technical analysis were assessed using the impact significance assessment methodologies: This approach considers the significance of an impact on the value by evaluating the magnitude of an impact and the sensitivity of the value to change. This is the primary method of impact assessment to be used for the project.

The key steps to the impact assessment methodologies are set out below.

Figure 5.3: Impact Assessment Methodology

5.6.1 Significance Assessment Methodology

One approach to impact assessment is to assess the significance of impacts by considering the sensitivity of the value and magnitude of the impact. This approach assumes the identified impacts will occur, as this conservative method enables a more comprehensive understanding and assessment of the likely impacts of a project. It focuses attention on the mitigation and management of potential impacts through the identification and development of effective design responses and environmental controls.

The process of undertaking this assessment is detailed in Figure 5.3 above, with the criteria that were determined to assess each value outlined below.

5.6.1.1 Sensitivity Criteria

The sensitivity criteria are outlined in Table 5.2.

Table 5.2:Sensitivity Criteria

Sensitivity Level	Value 1 – Road Network Capacity Sensitivity Criteria	Value 2 – Safe Road Performance, Condition & Design Sensitivity Criteria	Value 3 – Public & Active Transport Sensitivity Criteria
Very High	• Current traffic volumes exceed the road's design capacity • There are no viable alternatives for access and road closures will cut off access to a township, private properties, significant tourist location. • Local roads with very low volumes • Future access proposed to heavily trafficked road (>10,000 vpd)	• B-double approved route with high increase in traffic • The road and intersection geometry cannot accommodate large vehicles with major non-conforming infrastructure • Very high road crash history (or potential to) • A highly sensitive use is accessed directly from a B-double approved route	• High frequency rail services • Active transport infrastructure heavily summarised by commuters
High	• Current traffic volumes are equivalent to the road's design capacity • Alternative routes with significant detours exist and will limit access to a township, private properties, significant tourist location. • Local roads with low volumes • Future access proposed to moderately-to-highly trafficked road (<10,000 vpd)	• B-double route with moderate increase in traffic • The road and intersection geometry is highly constrained with non-conforming infrastructure • High road crash history (or potential to) • A moderately sensitive use is accessed directly from a B-double approved route	• Low frequency rail services • Active transport infrastructure moderately summarised by commuters
Medium	• Current traffic volumes are approaching the road's design capacity • Alternative routes with moderate detours exist and will partially limit access to a township, private properties, significant tourist location. • Local roads with moderate volumes • Future access proposed to moderately trafficked road (<3,000 vpd)	• Non-approved B-double route with high increase in traffic • The road and intersection geometry is moderately constrained with non-conforming infrastructure • Moderate road crash history (or potential to) • A highly sensitive use is accessed directly from a non-approved B-double approved route	• High frequency bus services • Recreational paths which are a tourism attractor
Low	• Current traffic volumes are comfortably below the road's design capacity • Alternative routes with minor detours exist and will not limit access to a township, private properties, significant tourist location.	• Non-approved B-double route with moderate increase in traffic • The road and intersection geometry is slightly constrained with some non-conforming infrastructure	• Low frequency bus services • Recreational paths used by locals

Sensitivity Level	Value 1 – Road Network Capacity Sensitivity Criteria	Value 2 – Safe Road Performance, Condition & Design Sensitivity Criteria	Value 3 – Public & Active Transport Sensitivity Criteria
	• Local roads with high volumes • Future access proposed to lightly trafficked road (<1,500 vpd)	• Low road crash history (or potential to) • A moderately sensitive use is accessed directly from a non-approved B-double approved route	
Very Low	• Current traffic volumes are significantly below the road's design capacity • Suitable alternative routes exist for roads effected by the project. • Local roads with very high volumes • No future access proposed	• Residential property access road with any increase in traffic • The road and intersection geometry is not constrained and has conforming infrastructure • Low road crash history (or potential to) • No sensitive land uses are accessed directly from the road	• Minor disruption to public transport services • Minimal active transport infrastructure

5.6.1.2 Magnitude

The following magnitude criteria outlined in Table 5.3 were determined for each value.

Table 5.3:Magnitude Criteria

Magnitude Level	Value 1 – Road Network Capacity Magnitude Criteria	Value 2 – Safe Road Performance, Condition & Design Magnitude Criteria	Value 3 – Public & Active Transport Magnitude Criteria
Severe	• Extreme delays caused • Impacts >10,000 people with severe travel time impacts • Constraints and disruption occurs permanently or longer than 1 year • significant percentage increase in traffic	• Extensive pavement damage across road network requiring major upgrades to road surfaces • Significant disruptive works required (clearing of habitat, major services, road closures, major infrastructure) • One or more fatality • There is a significant increase in safety risk as a result of the project operations	• Permanent closures to rail services • Permanent closure of active transport links used by commuters
Major	• Major delays caused • Impacts <5,000 people with major travel time impacts • Constraints and disruption occurs for 6 – 12 months • Major percentage increase in traffic	• Major pavement damage requiring upgrades to pavement surfaces • Major disruptive works required (clearing of habitat, major services, road closures, major infrastructure) • Serious injuries to multiple people • There is a major increase in safety risk as a result of the project operations	• Major delays to rail services • Major detours of active transport links used by commuters or permanent closure of active transport links which are tourist attractors or recreational paths
Moderate	• Moderate delays caused • Impacts <1,000 people with moderate travel time impacts • Constraints and disruption occurs for between 1 – 6 months • Moderate percentage increase in traffic	• Moderate pavement damage requiring remediation works and minor upgrades to pavement surfaces • Serious injuries to 1 or more people • There is a moderate increase in safety risk as a result of the project operations	• Moderate delays to bus services or major delays to bus services • Major detours of active transport links which are tourist attractors or local recreational paths

Magnitude Level	Value 1 – Road Network Capacity Magnitude Criteria	Value 2 – Safe Road Performance, Condition & Design Magnitude Criteria	Value 3 – Public & Active Transport Magnitude Criteria
Minor	• Minor delays caused • Impacts <500 people with minor travel time impacts • Constraints and disruption occurs for between 1 week – 1 month • Minor percentage increase in traffic	• Minor pavement damage requiring remediation works • Minor injuries • There is a minor increase in safety risk as a result of the project operations	• Moderate delays to bus services • Minor detours of active transport links which are tourist attractors or local recreational paths
Negligible	• Negligible delays caused • Impacts <100 people with negligible travel time impacts • Constraints and disruption occurs for less than a week • Negligible percentage increase in traffic	• Negligible pavement damage • There is no / negligible increase in safety risk as a result of the project operations	• Negligible / no impact to public transport • No / minor impacts to local active transport links

5.6.1.3 Assessment of Significance

The impacts significance on a value is determined by the sensitivity of the value itself and the magnitude of the change it experiences as outlined in the above sections. Table 5.4 shows how, using the criteria described above, the impacts significance is determined. This approach adopts a five-by-five matrix.

Table 5.4: Assessment of Impact Significance

Magnitude of Impact	Sensitivity of Value				
	Very High	High	Moderate	Low	Very Low
Severe	Major	Major	Major	High	Moderate
Major	Major	Major	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Minor	Moderate	Moderate	Low	Low	Very Low
Negligible	Moderate	Low	Low	Very Low	Very Low

A description of the impact significance derived using Table 5.4 is set out in Table 5.4.

Table 5.5: Assessment of Impact Significance

Impact Significance	Description
Major impact	Occurs when impacts will cause irreversible or permanent change to the road and / or active transport networks or creates a significant safety risk. Avoidance through appropriate design responses is the only effective mitigation.
High impact	Occurs when the proposed activities are likely to cause unmanageable transport volumes on the existing road and / or active transport networks or creates a high safety risk. While management of unavoidable impacts is possible, avoidance through appropriate design responses is preferred to preserve existing levels of capacity or safety.
Moderate impact	Occurs where, although reasonably resilient to increased transport volumes on the existing road network or impact to the active transport network would be degraded, the value would be degraded due to it's scale of impacts or susceptibility to further change. The abundance of the value ensures it is adequately represented in the region, and that replacement, if required, is achievable.
Low impact	Occurs where a value is of local importance and temporary and transient changes will not adversely affect its viability provided standard controls and management measures are implemented.
Very low impact	A degraded (very low sensitivity) value exposed to minor changes (negligible magnitude impact) will not result in any noticeable change in its intrinsic value and hence the proposed activities will have negligible or no effects on the road and / or active transport networks. This typically occurs where the activities occur in industrial or highly disturbed areas.

Upon completion of the above steps for each of the identified values, the EPRs will be developed and applied to mitigate the impact significance of each value.

The assessment of the impacts significance is outlined in Section 7 of this report for each value. The assessment of Value 1 is shown in Table 7.7 and Table 7.10, Value 2 in Table 7.18 and Table 7.22 and Value 3 in Table 7.24 and Table 7.26.

5.6.2 Mitigation Measures

In order to address the impacts of the project on the environment in the surrounding area, mitigation measures have been considered that could be implemented to comply with the EPRs. These mitigation measures would address the various impacts that the development will likely have, and result in a number of different works, which are outlined below:

- Infrastructure upgrades
- Road resurfacing / remediation
- Temporary traffic management

5.6.3 Cumulative impact assessment

The EIS guidelines and EES scoping requirements both include requirements for the assessment of cumulative impacts. Cumulative impacts result from incremental impacts caused by multiple projects occurring at similar times and within proximity to each other.

To identify possible projects that could result in cumulative impacts, the International Finance Corporation (IFC) guidelines on cumulative impacts have been adopted. The IFC guidelines (IFC, 2013) define cumulative impacts as those that 'result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones.'

The approach for identifying projects for assessment of cumulative impacts considers:

- Temporal boundary: the timing of the relative construction, operation and decommissioning of other existing developments and/or approved developments that coincides (partially or entirely) with Marinus Link.
- Spatial boundary: the location, scale and nature of the other approved or committed projects expected to occur in the same area of influence as Marinus Link. The area of influence is defined at the spatial extent of the impacts a project is expected to have.

Proposed and reasonably foreseeable projects were identified based on their potential to credibly contribute to cumulative impacts due to their temporal and spatial boundaries. Projects were identified based on publicly available information at the time of assessment. The projects considered for cumulative impact assessment in Victoria are:

- Delburn Wind farm
- Star of the South Offshore Wind farm
- Offshore wind development zone in Gippsland including Greater Gippsland Offshore Wind Project (BlueFloat Energy), Seadragon Project (Floatation Energy), Greater Eastern Offshore Wind (Corio Generation).
- Hazelwood Mine Rehabilitation Project
- Wooreen Energy Storage System
- Hazelwood North Battery Recycling Plant
- Latrobe Magnesium Plant
- Morwell Solar Farm

Any other projects occurring in the surrounding area that are not included in the above summary were excluded either due to their scale (they were considered small enough to have minimal impact) or proximity (deemed to be far enough away) to Marinus Link. It is noted that this list of projects was assembled to the best of our knowledge of the works in the surrounding area, and is not considered to be comprehensive.

The cumulative assessment entailed a review of publicly available information for each of the identified projects, including the construction time period, as well as expected traffic generation (if available). Commentary was provided regarding whether the impacts during the construction, operation and decommissioning phases of Marinus Link will accumulate with these projects, and any considerations or mitigating works that may be required.

5.6.4 Environmental Performance Requirements

Environmental Performance Requirements set out the environmental outcomes that must be achieved during design, construction, operation and decommissioning of the project without defining how the outcome is to be achieved. The objective is for contractors to determine the best way to achieve EPRs and manage impacts whilst developing and summarised their design solutions.

Compliance with the EPRs is intended to mitigate the impacts and the risk of harm to the environmental, social and cultural values to within reasonable limits having regard to contextual factors and the practical delivery of the project. The EPRs will address the impacts identified in the significance assessment presented in this report.

EPRs have been developed to respond to the results of the impact assessment and the possible mitigations that could be implemented to address the impacts.

> The development of the EPRs is outlined in Section 7 of this report for each value. The EPRs developed for Value 1 are shown in Section 7.1.4, for Value 2 are shown in Section 7.1.9 and for Value 3 are shown in Section 7.1.14. EPRs are then summarised in Section 8.2.

5.6.5 Residual Impacts

Residual impacts are the potential impacts remaining after the application of EPRs which implement the recommended mitigation measures.

The extent to which potential impacts have been reduced is determined by undertaking an assessment of the residual impacts significance. This is a measure of the effectiveness of the EPRs in reducing the magnitude of the potential impacts, as the sensitivity of the value does not change.

> The assessment of the residual application of the assessment criteria is outlined in Section 7 of this report for each value. The assessment of Value 1 is shown in Section 7.1.5, Value 2 in Section 7.1.10 and Value 3 in Section 7.1.15.

5.7 Stakeholder engagement

Stakeholder consultation has been undertaken in the preparation of this report. This consultation was conducted by Stantec in addition to the general consultation conducted by MLPL. This has been outlined in Table 5.6.

Table 5.6: Stakeholder Consultation Undertaken

Stakeholder	Engagement activity and timing	Discussion topics
South Gippsland Shire Council	Consultation meeting 19/09/2022	Initial consultation with South Gippsland Shire Council to understand initial feedback on Marinus Link methodology. 1. Geotechnical / pavement assessments as well as traffic counts undertaken are requested to be provided to Council 2. Queries as to whether the cable easement has been settled. Acknowledgement by the team that it is expected minor changes into the future 3. The initial pavement assessment will be scrutinized in detail by Council due to learnings from previous / recent projects 4. Future road projects undertaken by Council can be highly variable and are unlikely to be provided with much notice. Communication by the project team with Council should be undertaken throughout construction. 5. Many bridges / culverts in the municipality are aging 6. Recent land slips due to heavy rain 7. Recommend that consultation with local townships is started early 8. Permits will be provided to construct access tracks. If these are to be retained / kept permanently then the permit conditions will be changed.
Latrobe City Council	Consultation meeting (20/09/2022)	Initial consultation with City of Latrobe to understand initial feedback on Marinus Link methodology. 1. Council advice as to monitor DTP road closure maps as required 2. Landslips have been occurring due to heavy rain, particularly in Strzelecki Ranges 3. Many dirt tracks are currently logging access tracks 4. Awareness of traffic volumes due to harvesting seasons 5. Sensitivities in the road network in Churchill due to traffic volumes and residential areas. Consultation to occur.

Stakeholder	Engagement activity and timing	Discussion topics
Department of Transport & Planning – Gippsland Region	Consultation meeting on 15/09/2022	Initial consultation with DTP Gippsland to understand initial feedback on Marinus Link methodology. 1. DTP primary concern is at HDD (horizontal directional drill) locations (i.e. DTP managed road crossings), specific details of road crossings, construction method. 2. DTP noted they often have large vehicles requiring access to the region due to the number of energy related projects which have been delivered. 3. DTP noted the national heavy vehicle regulator and / or the heavy vehicle division within DTP will handle large vehicle detour / route. 4. DTP agreed any articulated vehicles along DTP approved B-double / over mass, over size vehicles routes do not need to be assessed using swept path analysis at major intersections. Any access tracks or smaller intersections will still be assessed. 5. DTP are aware of a number of road projects which are proposed to be delivered within the region and other development projects. 6. Korumburra is not a great area for heavy vehicle routes 7. Impact on townships to be considered 8. DTP aware of a number of other energy projects in the region but may need to liaise with Council to confirm 9. DTP request to receive indicative estimates on employees and construction vehicle volumes

<table>
<tr><th>Stakeholder</th><th>Engagement activity and timing</th><th>Discussion topics</th></tr>
<tr><td>Department of Transport & Planning Metro (Heavy Haulage Team)</td><td>Consultation meeting on 25/10/2022</td><td>Initial consultation with DTP Heavy Haulage to understand initial feedback on Marinus Link methodology.
1. DTP would like spatial route files and vehicle lists shared to enable comment
2. The layout of the transformer in the example indicates a Super load
3. DTP estimated with the layout in example -that approximately 270 tonnes of transformer, with the whole set up including prime movers would be possibly at the 650 tonnes mark
4. For super loads it is required that a minimum 12 month notice period with details of load.
5. Yarra Trams should be consulted. Will need 12 months' notice to understand the impact. Specific requirements for lifting overhead lines etc that requires a lot of notice and coordination in excess of 12 months.
6. Consider:
a. Rail
b. Mass
c. Time
d. Coordination
e. Tram (PoM)
7. Port of Melbourne, Councils allow enough time for coordination
8. Refer to the checklist on the super load website for assessment details & fees
9. They are currently in consultation with Golden Wind farms and have been since 2020 when they are not due for construction until 2023. DTP have facilitated approvals and pathways to streamline their project needs.
10. NVHR consult early to let them know of the project in their region.
11. Some fees can be up to $1 Mill
12. NVHR are administrative arm predominantly
13. DTP have good knowledge of external projects under early consultation (such as mega wind farm and refinery deliveries at Port of Geelong)
14. Regarding Ports
a. Port of Melbourne - very well used, used to the process for large deliveries, well versed in the process
b. Port of Geelong- large deliveries are new at this port, may take a long time to work out process, consider current interruptions NEL, West Gate Tunnel, Spirit of Tasmania and Commonwealth games.
15. Pavement impact
a. Semi and B double = region DTP.
b. Overmass moves and superloads= DTP Heavy haulage
16. Cranes – what sort and what works are they doing as permits often required.
17. Instead of obtaining multiple permits perhaps a "Access of Right" could be achieved with the proponent which is "gazetted for that particular project"
18. Bridge Structure Assessment for superload moves.
19. Consider height of super loads as there is 3rd party approval requires for overhead wires.
20. Transport operators can provide information to enable detours for those moves.</td></tr>
</table>

Stakeholder	Engagement activity and timing	Discussion topics
Department of Transport & Planning Regional Public Transport	Consultation meeting on 01/12/2022	Initial consultation with DTP Regional Public Transport to understand initial feedback on Marinus Link methodology. 1. Agreement on methodology to not identify school bus routes at this stage. These change with each year. 2. DTP can provide operator and school coordinator details to deal with direct at the time. Recommended to provide a few months notice. 3. A small number of key areas which will be the focus i.e. larger townships in the study area. 4. Time restrictions to avoid school pick-up / drop-off is advised. 5. Consideration for private school charters which DTP have no oversight on, may require direct contact to the individual schools. 6. The National Catholic Education Commission (Victorian arm) may be the best point of contact to undertake coordination.
Department of Transport Metro Public Transport Disruptions	Consultation meeting on 25/10/2022	Initial consultation with DTP Metro Public Transport disruptions to understand initial feedback on Marinus Link methodology. 1. Main consultation will occur closer to construction. Primarily manage disruptions to PT services as a result of 'events'. 2. Request to know dates / time of year when transformer transporter movement to occur. 3. When crossing tram lines, overhead power lines need to be raised. 4. Recommendation to travel only at night to avoid disruption to tram and train services. 5. Movement of large vehicle to occur 'before first, after last. 6. Details will need to be provided closer to construction: how long are will the movement take? Travel speed of vehicle? Are there road closures? 7. Not concerned of risk of damage to tram / train tracks. 8. Buses can use detours. Less of a concern.
National Heavy Vehicle Regulator	To be completed and timing to be confirmed	1. The path of travel for the transformer transport in Melbourne. 2. Traffic management requirements for the transformer transport. 3. The accessibility requirements of the Burnley / Domain tunnel for large vehicles.

Stakeholder	Engagement activity and timing	Discussion topics
Community Consultation	The following community consultation sessions were attended: March 2023 • Churchill 2 x sessions April 2023 • Mirboo North • Dumbalk • Meeniyan • Fish Creek	Summary of comments from Community members: 1. Concern from residents located adjacent to staging areas, with truck volumes past their residence 2. Comment about heavy truck volumes on dirt roads 3. Consultation with local fire services 4. Questions with regard to any road closures occurring in the community 5. Questions with regard to traffic volumes through townships 6. Impact of construction vehicle traffic on organic farming practices

5.8 Assumptions and Limitations

The following section outlines the assumptions made in the preparation of the assessment for this report. Each of the items outlined below has been incorporated into the technical analysis undertaken.

Construction Methodology

- Information in regard to the methodology of the different construction stages of the project was provided by the project team. Detailed assumptions for the determination of the traffic generation expected by the construction activities are outlined in the traffic generation section of this report in section 4.2.

Traffic Volumes

- The level of traffic experienced on the road network fluctuates over the course of the year. Particularly high volumes are experienced on travel routes to tourist destinations during holiday periods.

Travel Routes

- The travel routes for construction vehicles travelling to the site were assumed to be travelling from the Melbourne direction.
- Distribution of employees arriving to the site is based on the population of the surrounding townships. Townships with a population greater than 1,000 were considered.
- Heavy construction vehicles will utilise the B-Double road network where possible. This ensures vehicles associated with the project which are smaller than a B-double are able to utilise the pre-approved roads.

Transformer Transporter

- Transformer transporter will utilize the over dimensional road network where possible.
- The transformer will arrive at the Port of Melbourne. The transformer transporter will travel from the Port of Melbourne to the site.
- The transformer transporter will utilize the vehicle identified in Appendix E .

Swept Paths

- DTP approved B-double road network is assumed to be able to accommodate the physical requirements for a semi-trailer. Semi-trailer swept paths are therefore not required to be completed on these roads. Swept paths were completed for roads on the gazetted B-double road network that are managed by Council, upon the advice of Council during the stakeholder engagement and as outlined in Section 7.1.6.3.

Pavement Analysis

- Due to the higher level of pavement composition along DTP managed arterial roads, they are of an adequate standard to accommodate the project generated traffic and vehicle types.

Public Transport

- School bus routes through the area are subject to change each year, based on the different address of each years school children population.

6 Existing conditions

6.1 Overview

This section assesses the existing transport conditions in the study area, using information including traffic volumes, on-site observations and a review of network conditions for all transport modes. It also summarises any constraints which have been considered within the assessment.

This has been undertaken to identify the values that will be assessed as a part of the impact assessment. These values have been summarized in Section 6.4.

6.2 Site Context

The Victorian section of the project corridor is proposed to be constructed within the Gippsland region in Eastern Victoria. The corridor passes through the municipalities of South Gippsland Shire and the Latrobe City Council. The corridor is located approximately 100km's south-east of Melbourne

As stated above, this report has been prepared for the Victorian section of the project, stretching from the shore crossing at Waratah Bay, and ending at the construction of a converter station in either Driffield or Hazelwood at a length of approximately 90km's.

The location and surrounding context of the project alignment is outlined in Figure 6.1.

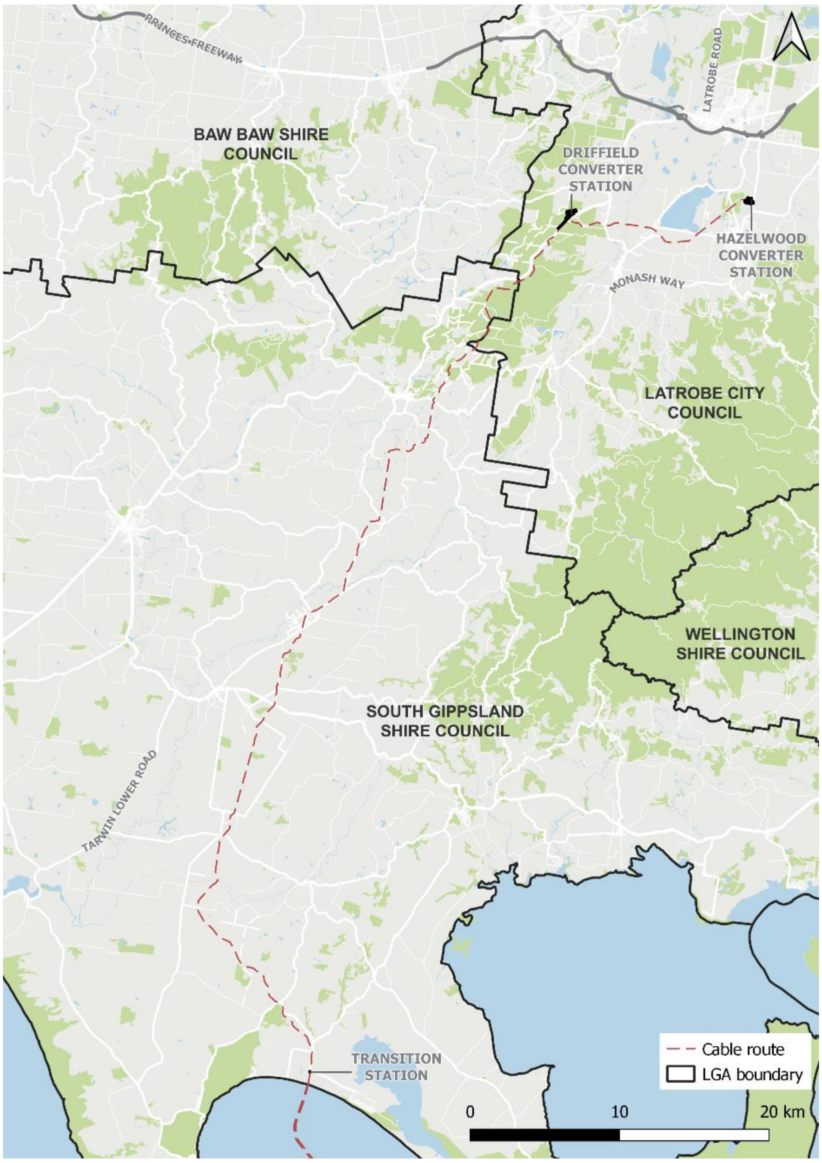


Figure 6.1: The project Victorian Cable Corridor and Surrounding Context

The two municipalities that the cable travels through are home to approximately 30,500 residents in South Gippsland Shire Council and approximately 75,000 in Latrobe City Council.

The municipality of South Gippsland Shire is approximately 3,300 square kilometers in size, primarily encompassing forestry and agriculture, including major attractions such as Wilsons Promontory, Cape Liptrap and the Strzelecki Ranges. The largest townships in the region include Leongatha and Korumburra.

The City of Latrobe is approximately 1,400 square in size. The region is well recognized as the centre of Victoria's electricity industry, with coal fired power plants and new renewable energy farms. Additionally, the region also contains tourist attractions such as Baw and Tarra-Bulga National Parks. The largest townships in the region include Traralgon, Morwell, Moe, Newborough and Churchill.

6.3 Identification and Description of Relevant Values

6.3.1 Road Network

A detailed summary of the surrounding road network and context has been provided in Table 6.4 and Table 6.5 below. These tables detail the results of the site inspection and background data review of the road network that surrounds the project corridor. This road network will be relied upon for the construction of the project, as well as maintenance during its operation and the ultimate decommission.

In the preparation of this road network review, a number of references and data sources were relied upon to compile the information required. These resources have been outlined below.

6.3.1.1 Site Inspection

A comprehensive site inspection was undertaken of the surrounding road network from Monday 22nd to Wednesday 24th August 2022. During the site inspection, the following activities were undertaken on roads and intersections throughout the surrounding road network:

- Photos and videos to record the existing conditions of the road network.
- Measurements of road cross sections
- Sight distance assessment review at key intersections.
- Observational review of traffic behaviors.
- Review of site constraints along the project travel routes / intersections.
- Recording of pavement conditions along the project travel routes to allow further assessment by specialist geotechnical / pavement engineers.

6.3.1.2 Traffic Surveys

Traffic surveys were commissioned throughout the study area to gain an understanding of the existing traffic volumes. These surveys were undertaken using Automatic Traffic Count (ATC) tube counts over a week long period of time between 3rd September 2022 to 9th September 2022 and broadly encompassed roads surrounding the project alignment that construction vehicles are expected to use.

The locations surveyed are shown below in Figure 6.2, with the results of these traffic surveys presented in Table 6.1.

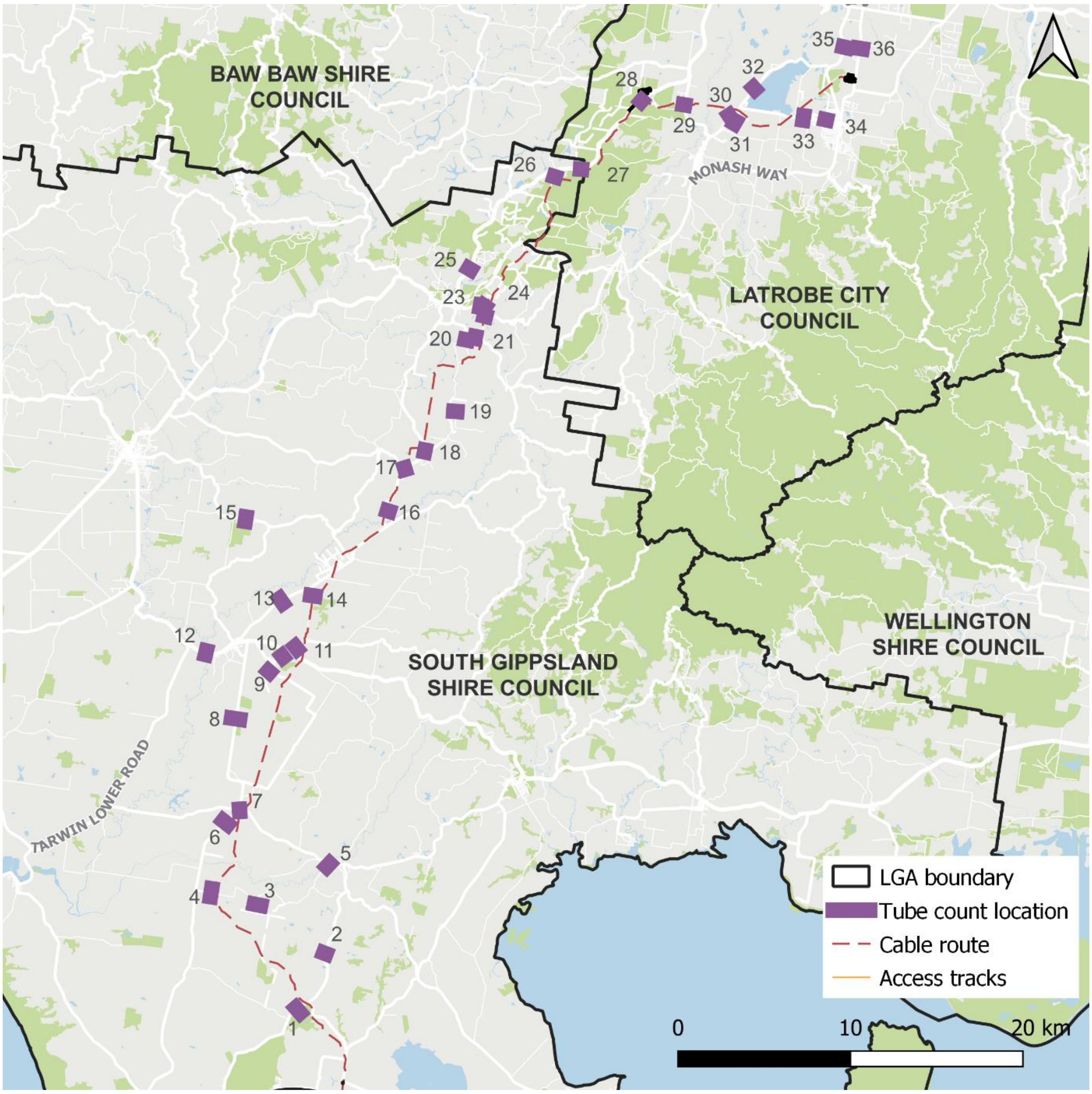


Figure 6.2: Location of ATC Tube Count Traffic Surveys Undertaken

Table 6.1: Summary of Traffic Surveys Undertaken via tube count data collection

#	Road	Location	Average 2-way Traffic Volumes		
			AM Peak Hour	PM Peak Hour	Daily
1	Fish Creek – Walkerville Road	Between Waratah Road and Kerrs Road	26	25	279
2	Waratah Road	Between Griffins Road and Glennan Road	43	53	586
3	Evans Road	Between Harding Lawson Road and Pilkington Road	4	4	37
4	Harding-Lawson Road	850m west of Buffalo-Waratah Road	2	2	15
5	Meeniyan – Promontory Road	Between Harding Lawson Road and Cornwalls Road	177	199	2,006
6	Buffalo-Waratah Road	850m southwest of Buffalo-Tarwin Lower Road	11	14	143
7	Buffalo-Tarwin Lower Road	Between Buffalo-Waratah Road and Meeniyan-Promontory Road	77	79	835
8	Meeniyan – Promontory Road	Between Pyles Road and Stevens Road	115	128	1,400
9	Jacks Road	Between Stony Creek Road and O'Connor Road	4	2	28
10	Stony Creek-Dollar Road 01	400m southwest of the South Gippsland Highway	10	10	88
11	Stony Creek – Dollar Road 02	500m northeast of the South Gippsland Highway	13	15	166
12	South Gippsland Highway	Between Morgans Road and McIlwaine Street	334	394	4,404
13	Meeniyan – Mirboo North Road 01	Between McVicars Road and Parrys Road	74	81	748
14	Dumbalk-Stony Creek Road	450m south of Meeniyan-Mirboo North Road	41	38	397
15	Nerrena Road	Between Reilly and Allans Road and Meeniyan-Nerrena Road	72	60	712
16	Meeniyan – Mirboo North Road 02	1,200m north of Farmers Road	67	62	675
17	Mardan Road	300m west of Loves Lane	17	22	236
18	Smallmans Road	150m west of Meeniyan-Mirboo North Road	0	0	2
19	Nicholls Road	200m southwest of Boolarra South-Mirboo North Road	13	14	142
20	Old Nicholls Road	300m south of Boolarra South-Mirboo North Road	2	2	24
21	Boolarra South-Mirboo North Road	450m east of Old Nicholls Road	67	56	600
22	Fullertons Road	200m south of Boolarra-Mirboo North Road	2	2	10
23	Old Darlimurla Road	100m northeast of Boolarra-Mirboo North Road	6	9	63
24	Baromi Road	150m west of Old Darlimurla Road	49	56	541
25	Strzelecki Highway	150m south of Muirhead Drive	291	317	3,330
26	Ten Mile Creek Road	350m south of Strzelecki Highway	0	2	9
27	Strzelecki Highway	1,300m east of Ten Mile Creek Road	317	339	3516
28	Kings Road	50m southeast of Strzelecki Highway	0	0	2
29	Yinnar – Driffield Road	100m north of Kings Road	139	150	1,482

#	Road	Location	Average 2-way Traffic Volumes		
			AM Peak Hour	PM Peak Hour	Daily
30	McFarlane Road	Between Welshs Road and Yinnar Road	4	4	27
31	Morrisons Road	100m east of Yinnar Road	4	3	30
32	Yinnar Road	300m northeast of Applegate Road	113	125	1,306
33	Switchback Road	Between Nadenbouschs Road and Maccas Track	79	88	812
34	Birch Drive	50m north of Switchback Road	66	89	788
35	Monash Way	100m north of Bonds Lane	697	729	7,737
36	Tramway Road	Between Bonds Lane and Church Road	306	342	3,134

It is noted, a number of the roads that have been surveyed are expected to experience fluctuations in the volume of traffic they experience at different times of the year. This is most notably expected to occur in summer during holiday periods and long weekends along roads which are used to access tourist destinations. As it relates to the project, this is particularly relevant towards Wilsons Promontory. The traffic surveys undertaken are expected to represent typical operating conditions for the roads surveyed.

Roads expected to experience seasonal fluctuations include Meeniyan-Promontory Road and Buffalo-Tarwin Lower Road as they are the primary access path to Wilsons Promontory.

6.3.1.3 Road Classifications & Capacity

All roads within the study area under review have been classified in accordance with *Austroads Guide to Road Design*: *Part 3,* Section 4.2.6 in order to determine their theoretical capacity. This resource outlines the Annual Average Daily Traffic (AADT) capacity constraints in vehicles per day (vpd) of rural roads based on the roads geometry. This is outlined in Table 6.2.

Table 6.2: Single Carriageway Rural Road Widths – *Austroads Guide to Road Design Part 3* – 4.2.6

Element	Design AADT				
	1 – 150 vpd	150-500 vpd	500-1,000 vpd	1,000-3,000 vpd	>3,000 vpd
Traffic Lanes	3.7 (1 x 3.7m)	6.2 (2 x 3.1m)	6.2-7.0 (2 x 3.1m/3.5m)	7.0 (2 x 3.5m)	7.0 (2 x 3.5m)
Total shoulder	2.5m	1.5m	1.5m	2.0m	2.5m
Minimum shoulder seal	0m	0.5m	0.5m	1.0m	1.5m
Total carriageway	8.7m	9.2m	9.2m-10.0m	11.0m	12.0m

In order to classify the capacity for all roads within the study area that traffic is expected to be generated on, the cross sections were measured during the site inspection and compared with the classifications as outlined above.

It is noted, Austroads recognizes that there are many two-lane rural roads throughout Australia that have been constructed in the past that do not strictly meet the above requirements. It is often impractical and not cost effective to conduct 'sliver' widening (i.e. minor widening to existing road pavements), and therefore minimum road width dimensions are outlined in Table 6.3, that can be applied to existing corridors.

Table 6.3: Minimum Extended Design Domain (EDD) Widths for Two-Lane, Two-Way Rural Roads – *Austroads Guide to Road Design Part 3* – A.2.2

Element	Design AADT			
	150-500 vpd	500-1,000 vpd	1,000-3,000 vpd	>3,000 vpd
Traffic Lanes	6.2 (2 x 3.1m)	6.2-7.0 (2 x 3.1m/3.5m)	7.0 (2 x 3.5m)	7.0 (2 x 3.5m)
Shoulders	0.85m (1.0m)	0.85m (1.0m)	1.25m (1.5m)	1.75m (2.0m)
Total carriageway	7.9m (8.2m)	7.9m (8.2m)-8.7m (9.0m)	9.5m (10.0m)	10.5m (11.0m)

For the purposes of this assessment, the traffic capacities as outlined in Table 6.2 have been used to classify each of the roads that are expected to be utilized during the construction of the cable. The traffic capacities outlined in Table 6.3 have been utilized where appropriate.

In addition to the above, it is noted that a number of roads that are considered in the study area are unsealed road surfaces. The quality of the road surface will impact the daily capacity. The Australian Road Research Board (ARRB) *Unsealed Roads Best Practice Guide* dated October 2020 was therefore reviewed to determine an appropriate traffic capacity for unsealed roads that will be relied upon for access to the project alignment. The document contains the following guidance regarding considerations for the sealing of unsealed roads:

"Sealing of an unsealed road is usually initiated to reduce the road agency's ongoing maintenance costs, allow all-weather access and to reduce the dust from trafficking for safety reasons. Justification for sealing an unsealed road should be grounded in an economic analysis, considering the costs and benefits of the expected outcome in terms of agency costs, vehicle operating costs and road user costs, and other costs including safety (see Section 2.5.4)."

The document outlines that the costs of upgrading an unsealed road are highly variable. In terms of traffic volume considerations for the sealing of unsealed roads, the guide identifies the following:

"Current practice with some rural councils is not to consider sealing an unsealed road where the current AADT is less than 150, while where the AADT is greater than 500 it is a potential candidate for sealing."

The document also identifies a rule of thumb approach on when to seal a road, with the nominated criteria as follows:

"The rules of thumb on when to seal an unsealed road, subject to a follow-up economic analysis, are as follows:

- *If traffic volumes are less than* 100 vpd, *it is unlikely to be able to justify sealing unless re-sheeting the existing unsealed road is extremely costly due to scarcity of suitable locally available gravels.*
- *If traffic volumes are 100 to 250 vpd, sealing the existing road will be highly dependent upon the outcome of a properly conducted economic analysis.*
- *If traffic volumes are greater than 250 vpd, sealing the existing road is highly likely to be justified based on a properly conducted economic analysis."*

Using the above-described rule of thumb guidance, and for the purposes of presenting a conservative assessment, 150 vehicles per day on an AADT basis is considered to be the appropriate threshold for all unsealed roads that are being assessed.

6.3.1.4 DTP Heavy Vehicle Networks

The surrounding road network was reviewed against the DTP heavy vehicle map networks. These network maps display the roads that have been assessed for heavy vehicle access and will inform the selection of travel routes to the site during construction. The following heavy vehicle networks were reviewed:

- **B-Double Network:** Victoria's arterial and municipal roads for Class 2 B-Doubles and Class 3 B-doubles operating under Victoria's Livestock Loading Scheme. For the purposes of this assessment it was assumed that all roads on the B-Double road network are accessible by vehicles up to and including a B-double in size.
- **Oversize & Overmass (OSOM):** Victoria's Class 1 gazetted Oversize & Overmass (OSOM) network is for combinations that operate up to 100.0 tonnes gross mass, 5.0 metres high, 5.0 metres wide, and 30 metres long. These vehicle routes were determined to have a greater level of accessibility than the B-Double network.
- **Over Dimensional (OD) Route Network:** Victoria's Over Dimensional (OD) shows the preferred network of arterial and municipal roads that cater for OD combinations that exceed 5.0 metres high or 5.0 metres wide or 30.0 metres long or 100.0 tonnes gross mass. These OD routes have been chosen because they have minimal height and width impediments or mass restrictions and will be the preferable route for the transport of the transformer vehicle. It is noted that this road network map outlines detours from the main freeway network, utilized to avoid certain infrastructure treatments that will inhibit access by OD vehicles.

Source: https://www.vicroads.vic.gov.au/business-and-industry/heavy-vehicle-industry/heavy-vehicle-map-networks-in-victoria

6.3.1.5 DTP Open Data Traffic Surveys

Additional traffic volume data was sourced from DTP publicly available database of traffic surveys. This database contains a wealth of different traffic volume counts for arterial roads throughout Victoria. The resources reviewed as a part of this assessment that were sourced from DTP publicly available data are outlined below

- Two way Annual Average Daily Traffic (AADT) volumes
- Heavy Vehicle Percentage splits
- Average yearly growth rates

Source: https://vicroadsopendata-vicroadsmaps.opendata.arcgis.com/search

6.3.1.6 Summary of Roads and Intersections

A summary of the above data collection is displayed in Table 6.4 and Table 6.5. The classification items within the table are defined as follows:

- description – The name of the road.
- road classification – The VicRoads classification of the road section.
- speed limit – The enforced speed limit on the section of road.
- road measurements
  - carriageway – The width of the carriageway and the number of lanes
  - shoulder – The width of the shoulder.
- road capacity – The theoretical capacities based upon Austroads guidelines.
- project traffic that use this road
  - W – Routes used by workers travelling to and from the laydown areas.
  - T – The routes used by the transformer vehicle delivering to the converter station .
  - H – The routes used by heavy vehicles to the laydown areas.
  - AT – Routes used by all construction traffic to and from the laydown areas and access tracks.
- road characteristics – Description of the carriageway and shoulder surfaces.
- vehicles per day – Surveyed AADT values at each section of road.
- historic growth rate – Growth rates on each road sourced from Department of Transport data.
- heavy vehicle percentage (HV%) – Percentage of heavy vehicles identified from the traffic surveys.
- sight distance – Initial observational assessment of the available site distance.

Table 6.4: Road Network

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
1	Waratah Road	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	586	0.013	14.65%
2	Fish Creek – Walkerville Road	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided	586	0.018	14.65%
3	Kerrs Road	B-Double	100	Total carriageway width = 8m Total lane width = m (2 x 4m) Shoulder width = 0m	1000 – 3000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
4	Buffalo – Waratah Road	B-Double	100	Total carriageway width = 7.2m Total lane width = m (2 x 3.6m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	143	0.018	11.70%
5	Meeniyan – Promontory Road (Fish Creek – Promontory)	B-Double	100	Total carriageway width = 7m Total lane width = 7m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	2006	0.017	12.80%
6	Meeniyan – Promontory Road (Meeniyan – Fish Creek)	B-Double	100	Total carriageway width = 7m Total lane width = 7m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	1400	0.019	19.65%
7	Foster – Promontory Road	B-Double	100	Total carriageway width = 7m Total lane width = 7m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	W	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	943[3]	0.017[3]	15.00% [3]
8	Harding Lawson Road	Council / Unclassified	100	Total carriageway width = 8.6m Total lane width = m (2 x 4.3m) Shoulder width = 0m	100-150	HV / W / AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	15	0.018	32.25%

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
9	Evans Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	37	0.018	18.40%
10	Pilkington Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
11	Duncans Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
12	Setfords Road	Council / Unclassified	100	Total carriageway width = m Total lane width = m (2 x m) Shoulder width = 0m	100 – 150	AT	Farm track with no formalized carriageway, shoulder or pedestrian facilities	N/A[2]		
13	Buffalo – Tarwin Lower Road	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	835	0.018	14.90%
14	Fish Creek – Foster Road	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	1076[3]	0.021[3]	13.00% [3]
15	South Gippsland Highway (Meeniyan – Foster)	OSOM / B-Double	100 (60 through Meeniyan)	Total carriageway width = 8.6m Total lane width = 6.6m (2 x 3.3m) Shoulder width = 2m (sealed)	>3000	HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and pavement is provided intermittently when travelling through built up areas (i.e. Leongatha & Meeniyan)	4404	0.024	13.20%
16	Moores Road	Council / Unclassified	100	Total carriageway width = 3.3m Total lane width = 3.3m (2 x 1.65m) Shoulder width = 0m	100 – 150	AT	One lane with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
17	South Gippsland Highway (Korumburra / Leongatha – Meeniyan)	OSOM / B-Double	100 (60 through Leongatha)	Total carriageway width = 8.6m Total lane width = 6.6m (2 x 3.3m) Shoulder width = 2m (sealed)	>3000	HV / W / AT	Typically, one lane in each direction with occasional overtaking lanes on a sealed carriageway. Shoulder is sealed and pavement is provided intermittently when travelling through built up areas (i.e. Leongatha & Meeniyan)	4404	0.024	13.20%
18	Neales Road	Council / Unclassified	80 / 100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	500 – 1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
19	Stony Creek-Dollar Road	B-Double	100	Total carriageway width = 6.0m Total lane width = 6.0m (2 x 3.0m) Shoulder width = 0m	500-1000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	166	0.018	17.25%
20	Buffalo-Stony Creek Road	B-Double	60 / 100	Total carriageway width = 4.6m Total lane width = 4.6m (2 x 2.3m) Shoulder width = 0m	500 -1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
21	Jacks Roads	Council / Unclassified	100	Total carriageway width = 3m Total lane width = 3m Shoulder width = 0m	100 – 150	AT	One lane with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	28	0.018	23.35%
22	McKittericks Road	Council / Unclassified	100	Total carriageway width = 6m Total lane width = 6m (2 x 3m) Shoulder width = 0m	500 – 1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
23	Meeniyan – Mirboo North Road (Meeniyan – Dumbalk)	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	748	0.018	18.90%
24	Meeniyan – Mirboo North Road (Dumbalk – Mirboo North)	B-Double	80	Total carriageway width = 5.8m Total lane width = 5.8m (2 x 2.9m) Shoulder width = 0m	1000 – 3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	675	0.018	17.45%

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
25	Gooleys Lane	B-Double	100	Total carriageway width = 4.2m Total lane width = 4.2m (2 x 2.1m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
26	Nerrena Road	B-Double	100	Total carriageway width = 7.0m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 0m	1000 – 3000	HV / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	712	0.007	13.60%
27	Ogilvy Street	OSOM	40	Total carriageway width = 18m Total lane width = 6m (2 x 3m) Side parking = 3m (2 x 1.5m) Bicycle Lane = 4m (2 x 2m)	>3000	HV	One lane in each direction with a sealed carriageway. Bicycle lanes on both sides. Street parking on both sides.	5400[3]	507[3]	6.00%[3]
28	Mardan Road	Council / Unclassified	100	Total carriageway width = 6.0m Total lane width = 7.0m (2 x 3m) Shoulder width = 0m	500-1000	W	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	236	0.018	18.05%
29	Strzelecki Highway (Mirboo North – Leongatha)	B-Double	100	Total carriageway width = 7.2m Total lane width = 5.4m (2 x 2.7m) Shoulder width = 1.8m (2 x 0.9m)	>3000	HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and no pavement or active travel infrastructure is provided.	5200[3]	0.018[3]	13.50%[3]
30	Smallmans Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m Shoulder width = 0m	100 – 150	HV / W / AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	2	0.018	0.00%
31	Strzelecki Highway (Yinnar-Driffield – Mirboo North)	B-Double	100 (50 through Mirboo North)	Total carriageway width = 10.3m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 3.3m	>3000	HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and no pavement or active travel infrastructure is provided.	3330	0.024	28.65%
32	Nicholls Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	142	0.018	19.85%

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
33	Pincinis Lane	Council / Unclassified	100	Total carriageway width = 4.2m Total lane width = 4.2m (2 x 2.1m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
34	Strzelecki Highway (Princes Freeway – Yinnar-Driffield Road)	OD	100	Total carriageway width = 10.6m Total lane width = 7.0m (2 x 3.5m) Shoulder width = 3.6m	>3000	T / HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and no pavement or active travel infrastructure is provided.	3516	0.026	16.50%
35	Old Nicholls Road	Council / Unclassified	100	Total carriageway width = 5m Total lane width = 5m (2 x 2.5m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	24	0.018	22.45%
36	Boolarra South-Mirboo North Road	B-Double	60 / 80	Total carriageway width = 9.2m Total lane width = 6.2m (2 x 3.1m) Shoulder width = 3m (2 x 1.5m)	1000 – 3000	AT	One lane in each direction with a sealed carriageway. No shoulder and no pavement or active travel infrastructure is provided.	600	0.017	12%
37	Fullertons Road	Council / Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	10	0.018	19.55%
38	Boolarra-Mirboo North Road	B-Double	100	Total carriageway width = 7m Total lane width = 5.2m (2 x 2.6m) Shoulder width = 1.8m (2 x 1.8m)	1000 – 3000	AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	541	0.010	11%
39	Baromi Road	B-Double	60 / 80	Total carriageway width = 6m Total lane width = 5.6m (2 x 2.8m) Shoulder width = 0.4m (2 x 02.m)	>3000	HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	541	0.010	11%
40	Old Darlimurla Road	Council / Unclassified becomes B-double after Darlimurla Road / Pleasant Valley Road	100	Total carriageway width = 9m Total lane width = 9m (2 x 4.5m) Shoulder width = 0m	100 – 150	HV / W / AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	63	0.019	9.70%

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
41	Giles Street	B-Double	50	Total carriageway width = 8.6m Total lane width = m (2 x 4.3m) Shoulder width = 0m	>3000	HV / W / AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[4]		
42	Darlimurla Road	Council / Unclassified	100	Total carriageway width = 6.8m Total lane width = m (2 x 3.4m) Shoulder width = 0m	500-1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[4]		
43	Pleasant Valley Road	Council / Unclassified	100	Total carriageway width = 3.3m Total lane width = 3.3m (2 x 1.65m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
44	Ten Mile Creek Road	Council / Unclassified	100	Total carriageway width = 3.6m Total lane width = 3.6m (2 x 1.8m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	9	0.018	14.85%
45	Creamery Road	Council / Unclassified	100	Total carriageway width = 7.6m Total lane width = 7.6m (2 x 3.8m) Shoulder width = 0m	100-150		One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
46	Smiths Road	Unclassified	100	Total carriageway width = 5.2m Total lane width = 5.2m Shoulder width = 0m	100 – 150	HV / W / AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided. This route is currently used by quarry vehicles.	N/A[2]		
47	Yinnar – Driffield Road	B-Double	100	Total carriageway width = 9.0m Total lane width = 7.3m (2 x 3.65m) Shoulder width = 1.7m (gravel)	1000 – 3000	T / AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	1482	0.018	16.20%
48	Yinnar Road	B-Double	100	Total carriageway width = 10.6m Total lane width = 7.4m (2 x 3.7m) Shoulder width = 3.2m (gravel)	1000 – 3000	T / AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	1306	0.018	8.00%

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
49	McFarlane Road	Council / Unclassified	100	Total carriageway width = 4.2m Total lane width = 4.2m (2 x 2.1m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	27	0.018	16.75%
50	Morrisons Road	Council / Unclassified	100	Total carriageway width = 4.2m Total lane width = 4.2m (2 x 2.1m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	30	0.018	5.25%
51	Switchback Road	B-Double	70 / 100	Total carriageway width = 8.2m Total lane width = 7m (2 x 3.5m) Shoulder width = 1.2m (2 x 0.6m)	1000 – 3000	AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and no pavement or active travel infrastructure is provided.	812	0.018	9.15%
52	Frasers Road	B-Double	100	Total carriageway width = 5.4m Total lane width = 5.4m (2 x 2.7m) Shoulder width = 0m	500-1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
53	Nadenbouschs Road	B-Double	100	Total carriageway width = 5.6m Total lane width = 5.6m (2 x 2.8m) Shoulder width = 0m	500-1000	AT	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[2]		
54	Monash Way	OD	100 (80 through Churchill)	Total carriageway width = 14.2m Total lane width = 10.8m (3 x 3.6m) Shoulder width = 3.4m (sealed)	>3000	T / HV / W / AT	One lane in each direction with a sealed carriageway. Shoulder is sealed and no pavement or active travel infrastructure is provided.	7737	0.014	16.15%
55	Tramway Road	B-Double	100	Total carriageway width = 9.3m Total lane width = 7.3m (2 x 3.65m) Shoulder width = 2m (gravel)	>3000	T / AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	3134	0.016	9.25%
56	Acacia Way	Council / Unclassified	60	Total carriageway width = 10m Total lane width = 10m (2 x 5m) Shoulder width = 0m	>3000	AT	One lane in each direction with a sealed carriageway. No shoulder or active travel infrastructure is provided. Footpath on one side of the road.	N/A[4]		
57	Silcocks Road	Council / Unclassified	100	Total carriageway width = 5m Total lane width = 5m (2 x 2.5m) Shoulder width = 0m	100 – 150	AT	One lane in each direction with a gravel carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[4]		

ID	Description	Road Classification	Speed Limit (kph)	Road Measurements	Road Capacity	Project Traffic that use this Road (W / T / H / AT [1])	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
58	Brodribb Road	OD / B-Double	80 / 100	Total carriageway width = 9.2m Total lane width = 7.3m (2 x 3.65m) Shoulder width = 1.9m (sealed)	>3000	T / AT	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	N/A[4]		
59	Bonds Lane	B-Double	100	Total carriageway width = 7.3m Total lane width = 7.3m (2 x 3.65m) Shoulder width = 0m	1000 – 3000	T	One lane in each direction with a sealed carriageway. No shoulder, pavement or active travel infrastructure is provided.	N/A[5]		
60	Marretts Road	OD	100	Total carriageway width = 11.6m Total lane width = 7.3m (2 x 3.65m) Shoulder width = 4.3m (gravel)	>3000	T / HV	One lane in each direction with a sealed carriageway. Shoulder is gravel and no pavement or active travel infrastructure is provided.	N/A[5]		

[1] W-Workers route, T-Transformer Transport, H-Heavy Vehicle Route, AT-Access Track

[2] Traffic surveys weren't undertaken at these locations however, given the road characteristics and locations the existing traffic volumes are expected to be very low

[3] Data extracted from the publicly available data source DTP Open Data Hub which details DTP statistics for roads throughout Victoria. As referenced in Section 6.3.1.5.

[4] Traffic surveys weren't undertaken at these locations however, given their locations and that they primarily give access to residential areas it is expected that the traffic volumes on these roads will be very low.

[5] Traffic surveys weren't undertaken at this location given that it is primarily an over dimensional route to be used by the transformer vehicle and will therefore have limited impact on its capacity as a result of development traffic.

Table 6.5: Intersections

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
1	Soldiers Road / Waratah Road	T-Intersection (Give way). Right turn lane on major carriageway.	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
2	Waratah Road / Fish Creek – Walkerville Road	T-Intersection (Give way). Right turn lane on major carriageway.	HV / W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
3	Kerrs Road / Fish Creek – Walkerville Road	T-Intersection (Give way). Left slip lane off Fish Creek-Walkerville Road	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
4	Kerrs Road / Buffalo – Waratah Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified.
5	Meeniyan – Promontory Road / Soldiers Road	T-Intersection (Give way). Right turn lane on major carriageway.	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
6	Foster – Promontory Road / Meeniyan – Promontory Road	T-Intersection (Give way). Separate left slip and right turn off Meeniyan-Promontory Road. Left slip lane and right turn lane on Foster-Promontory Road.	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
7	Buffalo – Waratah Road / Harding Lawson Road	T-Intersection (unsealed). No signage	HV / W / AT	No issues with sight distance.	The intersection is unsealed with limited signage. Alterations may be required to accommodate for heavy vehicle movements.
8	Evans Road / Harding Lawson Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified. Evans Road is a no through road
9	Evans Road / Pilkington Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified.
10	Evans Road / Duncans Road	T-Intersection (unsealed). Signage for No long vehicle turning area	AT	No issues with sight distance.	The intersection is gravel with no road markings. Signage for No long vehicle turning area
11	Meeniyan – Promontory Road / Waratah Road	T-Intersection (Give Way)	HV / W / AT	Bend from both directions, may be a blind spot for incoming traffic. Appropriate signage already implemented.	The intersection is sealed with road markings and signage. No issues identified.
12	Setfords Road / Buffalo – Waratah Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified. Setfords Road is a no through road
13	Buffalo – Tarwin Lower Road / Buffalo – Waratah Road	T-Intersection (Give way) with worn road markings.	HV / W / AT	No issues with sight distance.	The intersection is sealed with worn road markings and limited signage.

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
14	Meeniyan – Promontory Road / Buffalo – Tarwin Lower Road	T-Intersection (Give way) with right and left turn lanes on the major carriageway.	HV / W / AT	Curved alignment at all three approaches could impact sight distances. Appropriate signage currently exists on both major and minor carriageways.	The intersection has a small farm access located directly across from the minor arm which has give way signage on its approach. It is possible that vehicular movements from the farm could enter and exit via this access.
15	Meeniyan – Promontory Road / Fish Creek – Foster Road	Cross-Intersection with a right turn lane on the major carriageway eastbound (Stop sign). On the minor arm to the south there is a left turn lane separated by a hard island and a left slip lane from the major carriageway also separated by a hard island (Give way).	HV / W / AT	No issues with sight distance.	The turning movements at the intersection are separated to prevent interference. The intersection is clearly signed, and the road markings are clear. No operational or safety issues have been identified at the intersection.
16	Fish Creek – Foster Road / Foster – Promontory Road	T-Intersection (Give way). Left slip lane off Fish Creek-Foster Road. Right turn lane on major carriageway	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
17	Fish Creek – Foster Road / South Gippsland Highway	T-Intersection (Give way). Right turn lane on major carriageway.	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
18	Moores Road / Meeniyan – Promontory Road	T-Intersection (Give way)	AT	No issues with sight distance.	Moores Road is a gravel road. The intersection is sealed with road markings and signage. No issues identified.
19	Moores Road / Neales Road	T-Intersection (Stop sign)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
20	Neales Road / Meeniyan – Promontory Road	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
21	South Gippsland Highway / Meeniyan – Promontory Road	T-Intersection (Give way) with a right turn lane on the major carriageway. There is a centre island on the minor carriageway and a painted widened left turn area.	HV / W / AT	No issues with sight distance.	The intersection has signage on all approaches and a widened left turn area to allow for HV left turn movements from the minor arm onto the major carriageway.
22	South Gippsland Highway / Stony Creek – Dollar Road	Cross-Intersection with stop signs on the minor arm approaches.	HV / W / AT	No issues with sight distance.	Power poles and signs positioned at the minor arms which could potentially cause issues with HV*
23	Stony Creek – Dollar Road / Buffalo – Stony Creek Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
24	Jacks Road / Stony Creek – Dollar Road	T-Intersection (No signage)	AT	No issues with sight distance.	The intersection is sealed with no road markings and no signage. No issues identified. Jacks Road is a no through road
25	Stony Creek – Dollar Road / McKittericks Road	Cross-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
26	South Gippsland Highway / Meeniyan – Mirboo North Road	T-Intersection (Give way)	W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
27	Gooleys Lane / Meeniyan – Mirboo North Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
28	Nerrena Road / Meeniyan Mirboo North Road	Cross-Intersection (Give way)	HV / W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. The corner radii on the minor arm are quite tight so swept path analysis has been undertaken*.
29	Meeniyan Mirboo North Road / Farmers Road	Cross-Intersection (Give way)	HV / W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
30	South Gippsland Highway / Ogilvy Street / Blair Street	Signalised Cross-Intersection	HV / W / AT	No issues with sight distance.	Intersection is on a OSOM route and has a give way controlled left turn slip lane on the northern arm. The intersection is commonly used by heavy vehicles therefore, no issues have been identified.
31	Blair Street / Bass Highway	4- arm roundabout (Give way)	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
32	South Gippsland Highway / Roughead Street	T-Intersection (Give way)	HV / W	No issues with sight distance.	Intersection is on a OSOM route and has heavy vehicle signage on the approach. The intersection is commonly used by heavy vehicles therefore, no issues have been identified.
33	Roughead Street / South Gippsland Highway	T-intersection with a right turn lane on the major carriageway.	HV / W	No issues with sight distance.	Intersection is on a OSOM route and has heavy vehicle signage on the approach. The intersection is commonly used by heavy vehicles therefore, no issues have been identified.
34	Mardan Road / Strzelecki Highway	T-Intersection (Give way). Right turn lane on major carriageway.	W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
35	Meeniyan Mirboo North Road / Mardan Road	T-Intersection (Stop sign)	HV / W / AT	Steep incline on the minor arm approach but no issues with the sight distance identified.	The minor arm approach is on a steep incline and is controlled by a stop sign. There is notable overrun at the minor arms left shoulder from vehicles leaving the carriageway. Swept path analysis has been undertaken to assess the operation of the intersection*.

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
36	Smallmans Road / Nicholls Road / Meeniyan – Mirboo North Road	Cross-Intersection (partly unsealed). Give way intersection	HV / W / AT	No issues with sight distance.	Smallmans road is a gravel track the intersection has limited space. Swept path analysis of the intersection has been undertaken to assess its operation*.
37	Pincinis Lane / Meeniyan – Mirboo North Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Pincinis Lane is a no through road.
38	Old Nicholls Road / Nicholls Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified.
39	Old Nicholls Road / Boolarra South – Mirboo North Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
40	Fullertons Road / Boolarra South – Mirboo North Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Fullertons Road is a gravel road.
41	Fullertons Road / Boolarra – Mirboo North Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Fullertons Road is a gravel road.
42	Baromi Road / Old Darlimurla Road	T-Intersection (Give way)	HV / W / AT	Bend from both directions, may be a blind spot for incoming traffic.	Old Darlimurla Road is a gravel road. Baromi Road has road marking and signage before and at the intersection.
43	Meeniyan Mirboo North Road / Giles Street	T-Intersection (Give way)	HV / W / AT	No issues with sight distance.	The minor approach is on an incline and is controlled by a give way sign. The corner radii are quite tight which may cause difficulty for HV. Swept path analysis has been undertaken to assess the operation of the intersection*.
44	Meeniyan Mirboo North Road / Baromi Road	T-Intersection (Stop sign)	HV / W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. The minor arm is controlled by a stop sign. No issues identified.
45	Strzelecki Highway / Baromi Road	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	HV / W / AT	No issues with sight distance.	The intersection has painted islands to separate turning movements from and onto the minor arm.
46	Darlimurla Road / Strzelecki Highway	T-Intersection (Stop sign)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. The minor arm is controlled by a stop sign. No issues identified.

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
47	Darlimurla Road / Old Darlimurla Road / Pleasant Valley Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified.
48	Ten Mile Creek / Strzelecki Highway	Cross-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. One end of Ten Mile Creek is gravel with give way signage.
49	Creamery Road / Strzelecki Highway	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Creamery Road is gravel with give way signage.
50	Smiths Road / Strzelecki Highway	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	HV / W / AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
51	Yinnar – Driffield Road / Strzelecki Highway	T-Intersection (Give way) with right turn lane on the major carriageway.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Island at Yinnar-Driffield Road.
52	Yinnar – Driffield Road / Yinnar Road	T-Intersection (Give way) with left slip lane onto Yinnar-Driffield Road.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Island at Yinnar-Driffield Road.
53	McFarlane Road / Yinnar Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
54	Morrisons Road / Yinnar Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
55	McFarlane Road / Yinnar Road	T-Intersection (unsealed). No signage	AT	No issues with sight distance.	The intersection is gravel with no road markings and no signage. No issues identified. Site is currently access to a farm.
56	Switchback Road / Yinnar Road	T-Intersection (Give way) with left slip lane onto Switchback Road.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
57	Frasers Road / Switchback Road	T-Intersection. No signage	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. T-intersection sign before intersection.
58	Nadenbouschs Road / Switchback Road	T-Intersection (Give way)	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
59	Switchback Road / Monash Way	4- arm roundabout.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified. Roundabout sign before intersection.

ID	Intersection	Intersection Arrangement	Project Traffic that use this Road (W / T / H / AT)	Sight Distance	Intersection Characteristics
60	Tramway Road / Monash Way	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
61	Acacia Way / Monash Way	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
62	Acacia Way / Silcocks Road	T-Intersection. No signage	AT	No issues with sight distance.	The intersection is sealed with no road markings and no signage. No issues identified.
63	Brodribb Road / Monash Way	T-Intersection (Give way) with a left slip lane onto Brodribb Road (separated by hard island) and right turn lane on the major carriageway.	AT	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
64	Princes Freeway / Tramway Road	T-Intersection (Give way)	HV / W	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
65	Marretts Road / Strzelecki Highway	T-Intersection (Give way) with a left and right turn lane on the major carriageway.	HV	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
66	Strzelecki Highway 3-arm Roundabout	3 – arm roundabout (Give way)	HV	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.
67	Princes Freeway / Strzelecki Highway	Cross-Intersection with left slip lane and right turn lane on the major carriageway.	HV	No issues with sight distance.	The intersection is sealed with road markings and signage. No issues identified.

6.3.2 Road Pavement Assessment

A pavement conditions and impact assessment was conducted on the local road network identified above in table figure?. The scope involves undertaking a high-level visual condition assessment along the transport routes proposed for the project. Go-Pro footage of all the proposed transport routes was undertaken as part of the work. The video footage was then analyzed for existing pavement types, and existing defects to set a baseline condition.

A generic pavement impact assessment was undertaken for the routes based on the type of heavy vehicles involved in this project estimating the impact. The generic pavement impact assessment will inform the likely reduction or impact on the pavement design life due to the additional construction traffic.

6.3.2.1 Pavement Condition Assessment

The pavement condition assessment was undertaken using a Go-Pro camera mounted on a field car travelling at rated traffic speed along the proposed project travel routes. The footage was then analysed and defects and existing conditions were recorded. A detailed analysis was not undertaken and only high-level observations were recorded. *Austroads Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design (AGPT-05)* was used as a guide to identify the defects.

The assessment only focused on council roads and excluded roads under DTP jurisdiction as the arterials, highways and freeways can carry heavy vehicle traffic and are regularly maintained. However, video footage was collected for all the routes involved in haulage and will form a precondition assessment.

The assessment focused on generic conditions of the routes of certain lengths rather than identifying individual defects or conditions.

The start and end chainages were defined based on the intersecting roads or landmarks. The lengths of the roads were taken from the GoPro footage and checked against Nearmap aerial photography measurements. Road defects were then observed and recorded based on the chainage the footage travelled. The chainages are approximate only and can vary +/- 50m.

The pavement assessment is summarized in detail in Table 6.6, with the locations of where the pavement assessment has been undertaken shown in Figure 6.3.

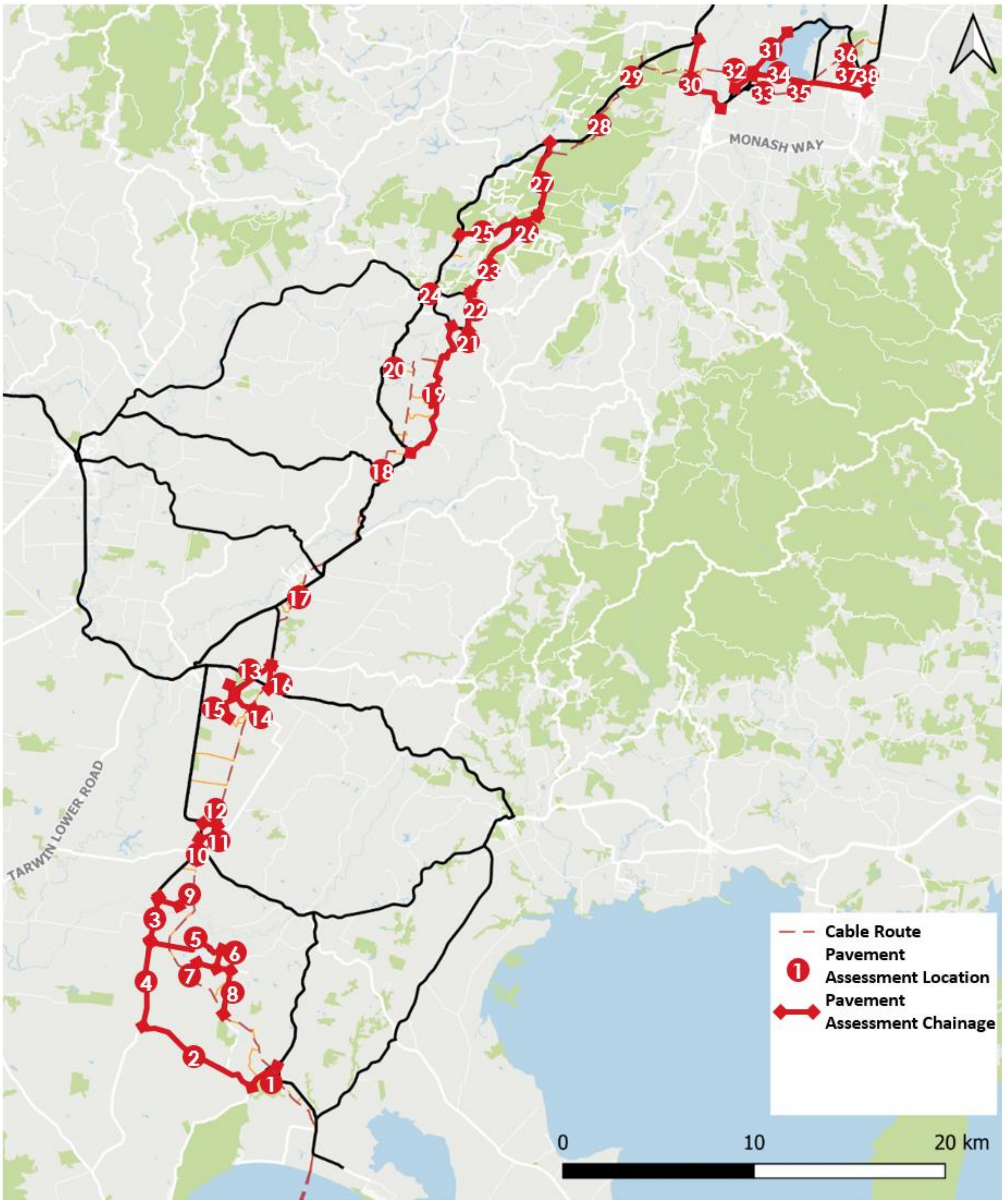


Figure 6.3: Pavement Assessment Locations

Table 6.6: Road Sections & Conditions Assessment

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
1	Fish Creek – Walkerville Road	Council / Municipal B-Double	Sealed road. One lane in each direction. Centerline marking. No kerb and channel, no table drains, natural drainage.	CH0000 – Kerrs Road	CH1600 – Waratah Road	Flushing, no potholes observed, water ponding in cut areas, no drainage system, elevated road in some areas and cut areas for the rest. Soft or weaker shoulders due to water ponding CH500 – edge breaks and repaired edge break patchings.
2	Kerrs Road	Council / Municipal B-Double	Unsealed gravel road, no centerline markings. No table drains, natural drains.	CH0000 – Buffalo – Waratah Road	CH6800 – Fish Creek – Walkerville Road	Complete loss of wearing course, the base course exposed, surface erosion due to poor drainage, water ponding in low-lying shoulder areas Shoulder erosion due to the absence of proper drainage CH700 – CH1100 potholes with water ponding CH1200 -CH1300 – severe potholing in the culvert crossing area CH1400 – CH1800 potholes with water ponding CH5400 – road erosion due to surface runoff CH6300 – Potholes and water ponding due to lower point CH6600 – Severe potholes and water ponding
3	Buffalo – Waratah Road	Council / Municipal B-Double	Spray seal CH0000 – CH4200 Unsealed gravel road CH4200-CH5600. No kerb and channel.	CH3300 – Setford Road	CH5600 – Harding Lawson Road	CH0000- CH4200 – Spray seal wearing course, no centerline markings, flushing in wheel paths, elevated road, no water ponding in the road, minor water ponding in shoulder areas possibly due to a recent rain event. CH3800- Culvert coring – undulating surface levels. CH4200 – CH CH5600 – Unsealed gravel road with isolated severe pothole zones, loss of gravel wearing course from the carriageway, poor drainage conditions, water ponding in the shoulders CH1100 – CH1750 Fewer potholes. CH1750 – CH1850 Severe potholes. CH2200 – CH2300 Severe potholes.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
4	Buffalo – Waratah Road	Council / Municipal B-Double	Unsealed gravel road, table drains present in some areas.	CH0000 – Harding Lawson Road	CH4500 – Kerrs Road	Complete loss of wearing course, the base course exposed, surface erosion due to poor drainage, water ponding in low-lying shoulder areas. CH000-CH500 – Isolated potholes. CH400-CH500 – Shoulder completely submerged, possibly due to recent rain event, potholes. CH1400- CH1500 Shoulder completely submerged, possibly due to recent rain event, potholes. CH2000-CH2100 Shoulder completely submerged, possibly due to recent rain event, potholes. CH2800 – CH CH3700 Severe pothole damage, both isolated and network of potholes with water ponding possibly due to a recent rain event. CH3800 – CH4000 – Isolated potholes with water ponding.
5	Harding Lawson Road	Council / Unclassified	Unsealed gravel road. No kerb and channel.	CH0000 -Buffalo – Waratah Road	CH4500 – Evans Road	Isolated potholes, complete loss of wearing course, water ponding in table drains. CH2700-CH2900 – Severe to low pothole-affected areas. CH2900-CH3000 – Surface erosions due to table drain overflow.
6	Evans Road	Council / Unclassified	Unsealed gravel road. No kerb and channel.	CH0000 – Harding Lawson Road	CH2300- Duncans Road	CH0000 – CH2300 Isolated potholes, complete loss of wearing course, water ponding in table drains.
7	Pilkington Road	Council / Unclassified	Unsealed road. No kerb and channel.	CH0000 – Evans Road	CH0200 dead end	Complete loss of wearing course, surface erosion due to no table drains presence. Very low-end road service with few properties.
8	Duncans Road	Council / Unclassified	Unsealed gravel road. No kerb and channel.	CH0000 – Evans Road	CH1000	CH000-CH1000 Isolated potholes, complete loss of wearing course, water ponding in table drains. CH0800-CH900 Severe pothole damage, water ponding possibly due to recent rain.
9	Setfords Road	Council / Unclassified	Unsealed gravel road. No drains, and vegetation growth in the centre	CH0000 – Setford East End / Farm Entrance	CH1200 – Buffalo – Waratah Road	Poorly maintained road with vegetation growth along the centerline of the road, wheel paths are clear of vegetation, gravel unsealed road, poor drainage. CH0000-CH1100 – Drainage and larger potholes along wheel paths, water ponding in the road wheel paths.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
10	Buffalo – Tarwin Lower Road	B-Double	Sealed, two-lane road with centerline markings, no kerb and channel.	CH0000 Meeniyan-Promontory Road	CH0180 Buffalo-Waratah Road	Some edge break, and minor delamination of the spray seal, but no major defects.
11	Moores Road	Council / Unclassified	Unsealed gravel road, table drains in some areas, missing drainage system in the majority of the alignmen.t	CH0000 Neals Road	CH1100 Meeniyan-Promontory Road	Unsealed gravel road with complete to a partial loss of gravel wearing course, water ponding in shoulder possibly due to a recent rain event. CH0000 – CH0300 – severe pothole damage, a network of potholes with water ponding. CH1100 – Shoulder damage and potholes.
12	Neales Road	Council / Unclassified	Sealed road, centerline markings. No kerb and channel. Table drain present.	CH0000 Meeniyan-Promontory Road	CH0800 Moored Road	Sealed, no major defects observed. CH0700- CH0800 repaired pothole patches.
13	Stony Creek-Dollar Road	B-Double	Sealed road with no kerb and channel, no drainages or table drains in some areas.	CH0000 – McKittricks Road	CH2300 Main St / Buffalo Stony Ck Road	Sealed road, with no centerline marking, minor delamination of spray seal. CH000-CH500 most delamination at these changes. CH 1200 – Crocodile cracking developing, edge breaks (near east approach lane to A440). CH1400-CH1500 – Severe crocodile cracking at the racecourse entrance.
14	Buffalo-Stony Creek Road	B-Double	Sealed road CH0000-CH0500, no centerline markings, no kerb and channel. Unsealed road CH0500 -CH1500.	CH0000 Jacks Road	CH1500, Property Entry (No. 860)	CH0000 – CH0500 Spray sealed, no major defects, minor stripping of spray seals. Some longitudinal cracks. CH0000- CH1500 Unsealed gravel road with no drainage. CH0500-CH0700 – Partial wearing course gravel observed, largely isolated potholes. CH0700 CH1500 complete loss of wearing course and base course exposed.
15	Jacks Roads	Council / Unclassified	Unsealed gravel road with no drainage.	CH0000 Stony Creek Road	CH1200	Gravel road with complete loss of wearing course, soft shoulder due to poor drainage. CH0000 – CH0600 – Isolated pothole damages, water ponding in shoulder areas, soft shoulders.
16	McKitthericks Road	Council / Unclassified	Sealed road, centreline marking no kerb and channel, table drains present.	CH0000 South Gippsland Hwy**	CH1000 Stony Creek Dolr Road**	The footage was not reviewed, however, based on Nearmap aerial images, possibly granular pavement with thin asphalt wearing course. No major defects.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
17	Gooleys Lane	B-Double	Unsealed gravel road, Tables drains present.	CH0000 Mirboo North – Meeniyan Road	CH3000	Unsealed gravel road, wearing course still partially remaining, table drains present, no major defects.
18	Mardan Road	Council / Unclassified	Sealed road, centreline markings, no kerb and channel.	CH0000 – Meeniyan-Mirboo Road C455	CH0400 Property Entrance (No. 1560)	Minor edge breaks, flushing, no major defects.
19	Nicholls Road	Council / Unclassified	CH000 – CH400 Sealed road. No kerb and channels, table drains present. CH0400-CH3300 Unsealed road with gravel wearing course present. CH3300 – CH3700 Sealed road with no kerb and channel, missing table drains. CH3700 – CH4600 Possibly previous sealed road and heavily worn off wearing course, table drains present. CH4100 – CH8800 Sealed road, no kerb and channel.	CH0000 Meeniyan – Mirboo North Road (C455)	CH8800 – Boolara South – Mirboo North Road	CH0000 – CH0400 Sealed road, with no major defects, minor edge damage. CH4000 – CH3300 Unsealed gravel road, wearing course present (possibly recent grading). CH1000 – CH1200 Isolated potholes, water ponding within potholes, no table drains or covered with vegetation. CH3300 – 3700 Sealed road. CH3300 – Potholes at the property entrance. CH3700 – CH4600 Appears to be a previous sealed road and wearing course damaged to an extent it looks like a gravel road, Table drains can be seen covered with vegetation. CH4600 – CH8800 Sealed road with drainage, no major defects, minor stripping and flushing of spray seal.
20	Pincinis Lane	Council / Unclassified	Unsealed gravel road, shallow drainage in cut areas, and no drainage low lying areas.	CH0000	CH0700, end of the road	Large potholes at CH0050 and CH0450 Newly graded wearing course, soft shoulder areas, deep rutting marks near shoulder areas.
21	Old Nicholls Road	Council / Unclassified	Unsealed gravel road with some spray-sealed sections but appears to be wearing course damaged to an extent it looks like a gravel road, with recently excavated table, drains.	CH000 Nicholls Road	CH2000 Boolara South-Mirboo North Road	Unsealed road with functional table drains. No major defects. CH300-CH800- Unsealed gravel road, fines pumped to the surface CH000- CH300 and CH800-CH1900 – Appear to be spray-sealed sections, spray seal and gravel could be stripping or ravellinga due to heavy traffic. CH190 0-CH2000 Appear to be granular pavement with thin asphalt wearing course, severe longitudinal cracking.
22	Fullertons Road	Council / Unclassified	Unsealed gravel road. CH1000 – CH1500 becoming dirt track with no gravel-wearing course.	CH0000 Boolarra – Mirboo North Road	CH1600 Boolara South-Mirboo North Road	CH0000-CH0600 Unsealed gravel wearing course, newly installed/ graded wearing course, Isolated deep rutting, water runoff in shoulder areas in low-lying sections.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
			CH1500- CH1600 sealed road.			Dirt track for the rest of the chainage, with shoulder erosion (water runoff).
23	Old Darlimurla Road	Council / Unclassified becomes B-double after Darlimurla Road / Pleasant Valley Road	Unsealed gravel road. Becoming dirt road from CH1000.	CH0000 Baromi Road -C456	CH2000	CH0100- CH0200 – Newly graded gravel-wearing course. CH0200 – CH2000 – Loss of wearing course gravel. CH0100 -CH0200 Isolated potholes, water ponding in potholes. CH0300- CH0400 Severe pothole network. CH1000- CH2000 Heavily damaged shoulders due to pumping fines, very soft shoulders, deep rutting marks, surface erosion and isolated potholes.
24	Giles Street	B-Double	Sealed road, local council road. No kerb between CH0000 – CH0400.	CH0000 Grand Ridge East – C457	CH0600 Brennan Street - C455	Sealed road, intermittent longitudinal cracks CH0000- CH0400.
25	Darlimurla Road	Council / Unclassified	CH0000 – CH3000 Sealed Road, centerline markings. No kerb and channel. No centerline markings from CH2800 and the road width is narrow compared to previous sections. Unsealed gravel road from CH2800 to CH4200.	CH0000 Strzelecki Hwy	CH4200 Ten Mile Creek Road	CH0000 – Wider shoulders, water ponding, no major defects, flushing and stripping of spray seal. CH1600 -CH3000 Water pooling between shoulder and pavement edge. CH3000 Severe pothole damage at the intersection. Severe potholes in the approaching sides of the bridge crossing. CH2800 onwards, changing to dirt road and severe surface erosion damage to the road. The bridge section has a wearing course. CH3900 – CH4200 Isolated potholes, fines pumped to the surface, complete loss of wearing course.
26	Pleasant Valley Road	Council / Unclassified / Plantation Access Road	Unsealed gravel road. No drainage system.	CH0000 Darlimurla Road	CH0700 End of Pleasant Valley Road	Gravel track, wearing course loss from the wheel paths, grass growth in the centre of the pavement, pumping of fines through the pavement wearing course.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
27	Ten Mile Creek Road (South of Strzelecki Hwy)	Council / Unclassified	Unsealed gravel road.	CH0000 Strzelecki Hwy	CH0700	Wearing course completely missing, soft shoulders due to poor drainage, pumping of fines to the surface.
28	Creamery Road	Council / Unclassified	Sealed road up to 50-100m and then changing into a dirt track.	CH0000 Strzelecki Hwy	CH0100	Sealed entry from the highway, complete stripping of wearing course possibly due to breaking log trucks, no other defects observed. Dirt track from CH0100 onwards.
29	Smiths Road	Unclassified	Unsealed road, possibly dirt track for plantation traffic.**	CH0000 Strzelecki Hwy**	N/A	The footage was not reviewed, however, based on Nearmap aerial images and nearby road network footage it appears to be a dirt track with similar defects (soft shoulders, no table drains, isolated potholes etc).
30	Yinnar – Driffield Road	B-Double	Sealed road, centerline markings, no kerb and channel. Table drains are present.	CH0000 Yinnar Road	CH4600 Strzelecki Hwy (460)	No major defects, minor flushing along the wheel paths and stripping of sprayed seals.
31	Yinnar Road	Council Road B-Double	Sealed, centerline markings, no kerb and channel, wider unsealed shoulder.	CH0000 Switchback Road	CH2800 Cemetery Avenue	No major defects identified, CH000 – CH1700 flushing/ bleeding in wheel paths.
32	McFarlane Road	Council / Unclassified	Unsealed, local access road, vegetation-covered table drains	CH0000 Yinnar Road	CH0900 Unknown intersection at McFarlane Road	The unsealed access road, with a recently graded gravel-wearing course. No major defects.
33	Morrisons Road	Council / Unclassified	Unsealed local access road, appears to be a dirt track to the farming property. First 20m is sealed wearing surface.	CH0000 Yinnar Road	CH0200	Unsealed dirt track and table drains present with vegetation cover
34	Switchback Road	Council Road B-Double	Likely a granular pavement with an asphalt-wearing course, kerb and channels until CH0900. Four-lane dual carriageway road with a grassed centre median. At CH1500 changes to a two-lane single carriageway road with no kerb and channel.	CH0000 Monash Way	CH5900 Yinnar Road	CH0000 – CH5900 No major defects observed, some patch repairs indicate previous edge failures at CH3700 -CH3800, minor flushing. CH4500 – Pothole patch repaired, repair appears to be failing. CH0900 – CH1400 Table drains to the verge and kerb/ channel to the centre median. CH1400- CH1500 – Kerb and channel.

ID	Road Name	Road Classification	Road Surface Type and infrastructure	Start Chainage	End Chainage	General Defects
35	Frasers Road	B-Double	Sealed Road with centerline marking, no kerbs and channel	CH0000 Switchback Road	CH0800	No major defects, minor stripping, flushing in wheel paths, wide shoulders, water ponding in table drains, minor edge breaks
36	Nadenbouschs Road	Local access road to farming property B-Double	Unsealed gravel road. No Drainage.	CH0000 – Silcocks Road	CH0500 – Farm Entrance	New gravel-wearing course grading can be seen between CH0100 – CH0300 . No drainage and water ponding at shoulders.
37	Acacia Way	Council local residential street	Possibly granular pavement with thin asphalt wearing course. Kerb and channel present. Single carriageway with no line markings.	CH0000 Monash Way	CH0600 – Birch Road	No major defects, minor flushing.
38	Silcocks Road	Local access road to farming property	Unsealed gravel road with first 10-20m with asphalt wearing surface. No drainage.	CH0000 – Acacia Road	CH0500 Nadenbouschs Road	Unsealed gravel road, wearing course layer completely missing for CH0000- CH0600. No drainage and water ponding at shoulders.

6.3.3 Bridges and Culverts

There are a number of bridges and culverts that are located along the travel routes in the study area. Those that have been identified from the VicRoads website of publicly available data have been outlined in Table 6.7.

Table 6.7: Bridges with Identified Mass Limits

#			
1	Nerrena Road	Bridge over Tarwin River West Branch	Restricted structure has a 49.5 tonne mass limit restricting access for this vehicle.
2	Mardan Road	Bridge over Tarwin River East	Restricted structure has a 49.5 tonne mass limit restricting access for this vehicle.

Further inspections and analysis should be undertaken once the travel routes have been confirmed in order to identify additional bridges within the study area that may have mass limits.

6.3.4 Vehicle Crashes

An analysis was undertaken of crashes on all vehicle routes for the latest five-year period available (July 2015 – June 2020, data published October 2021 by VicRoads). A 200m buffer was used around all travel routes in the study area to capture all proximate crash data along the road network proposed to be used by project generated traffic. It is noted, the South Gippsland Highway and Princes Freeway/Highway are not considered necessary to assess due to the negligible increase in daily traffic volumes the project contributes to these roads. The location of crashes is shown in Figure 6.4.

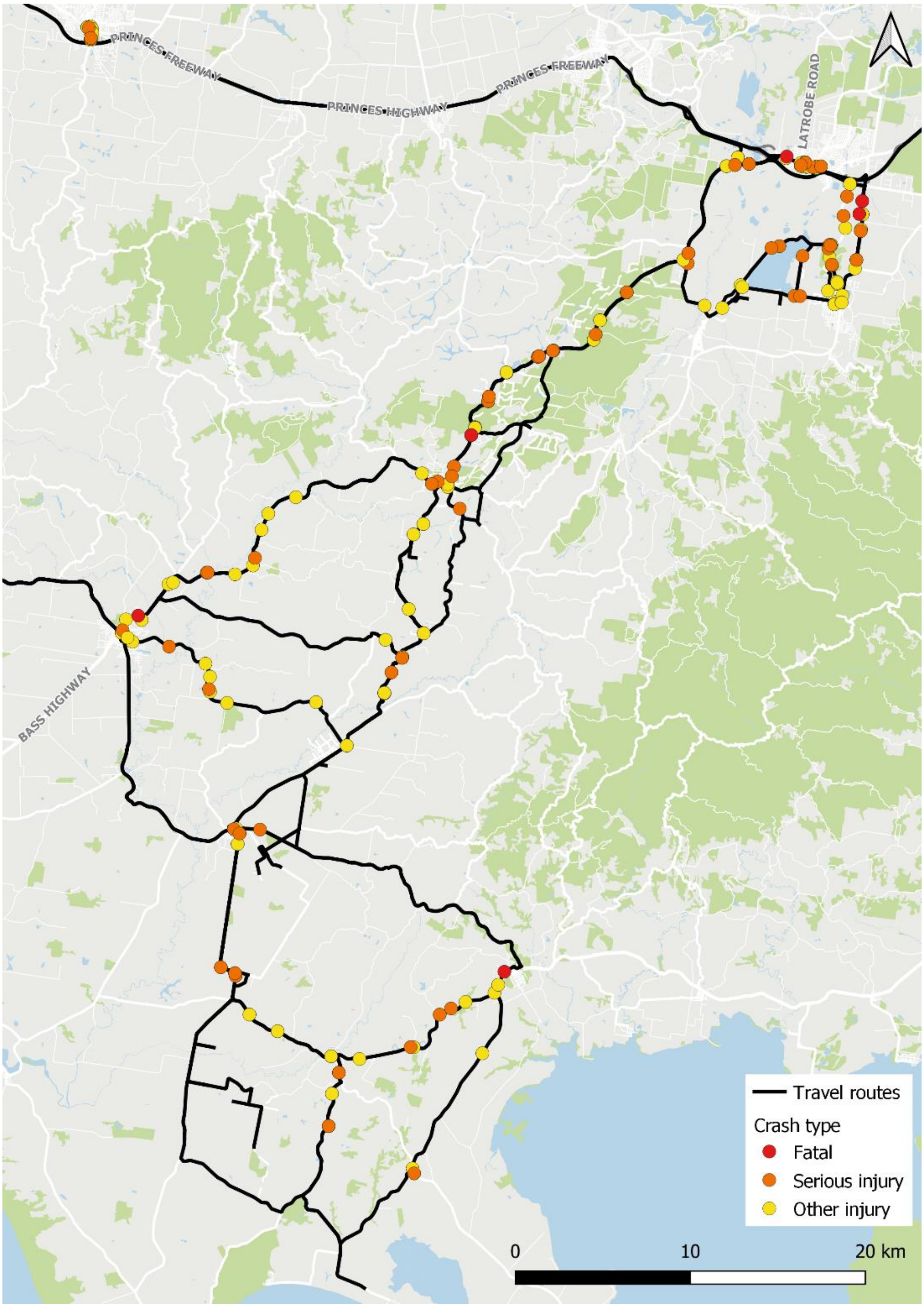


Figure 6.4: Vehicle Crashes and Travel Routes

During this period, there were 181 crashes along the travel routes in the study area. Of these, six resulted in a fatality, 60 in serious injury and 115 in other injury. Annual crashes have remained relatively consistent over the period reviewed, with minor yearly fluctuations, as shown in Table 6.8.

Table 6.8: Reported Crashes Recorded within Study Area – Mid 2015 to mid 2020

Year	Fatal	Serious injury	Other injury	Total
2015-2016	1	17	29	47
2016-2017	0	16	20	36
2017-2018	2	9	20	31
2018-2019	3	11	14	28
2019-2020	0	7	32	39
Total	6	60	115	181

The proportion of transport modes involved in crashes across the study area are presented in Table 6.9. The percentages reflect all participants involved in crashes across the study area. This data shows that passenger vehicles represent the majority of crashes in the study area, which is reflective of the high car usage of the region.

It is noted that of the six fatal crashes, two involved motorcyclists and one a pedestrian.

Table 6.9: Transport Modes involved in Crashes

Transport Mode	Proportion of Crashes
Passenger Vehicle	91%
Heavy Vehicle	2%
Motorcycle	9%
Public Vehicle (e.g. bus)	1%
Cyclist	3%
Pedestrian	9%

Most crashes occurred mid-block (129), with 31 occurring at T-intersections, 17 at cross-intersections, and three at multiple intersections (one crash had an unknown road geometry).

Crashes mostly occurred during the day (122), with six occurring at dusk or dawn and 47 at night.

The most common crash type was a collision with another vehicle (84), followed by collision with a fixed object (60), struck pedestrian (13), and vehicle overturned (9). The most common crash types are outlined in Table 6.10.

Table 6.10: Most common crash types in study area, 2015-2020

DCA code	Number of crashes
Off right bend into object/parked vehicle	23
Rear end (vehicles in same lane)	17
Left off carriageway into object/parked vehicle	14
Head on (not overtaking)	12
Right near (intersections only)	12
Off left bend into object/parked vehicle	11
Right off carriageway into object/parked vehicle	9
Right far (intersections only)	7
Cross traffic (intersections only)	8
Out of control on carriageway (on straight)	6
U-Turn	6
Right Rear	6
Off Carriageway on Right bend	6

In addition to the above, a summary of locations where a high number of crashes were identified in the above review has been summarized. The locations reviewed are displayed in Figure 6.5, with the tables presenting the data shown in Table 6.11 to Table 6.19.

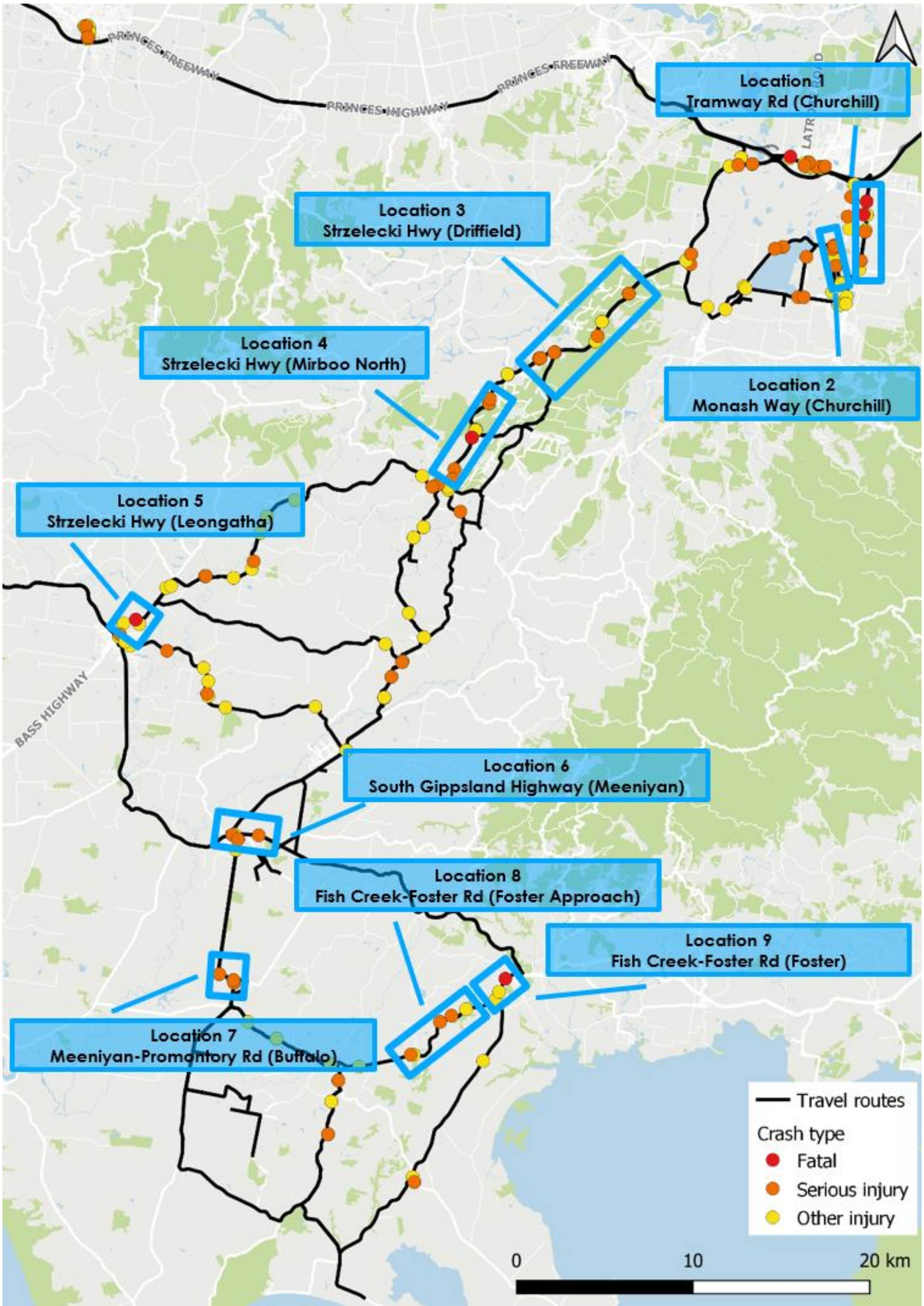


Figure 6.5: Locations with a High Number of Crashes

Table 6.11: Crash Data Summary – Location 1 Tramway Road (Churchill)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Fatal accident	Struck Pedestrian	Ped walking against traffic	Not at intersection	Passenger Vehicle , Pedestrian
2	Serious injury accident	Vehicle overturned (no collision)	Out of control on carriageway (on straight)	Not at intersection	Passenger Vehicle
3	Fatal accident	Vehicle overturned (no collision)	Out of control on carriageway (on straight)	Not at intersection	Motorcycle
4	Other injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
5	Other injury accident	Collision with vehicle	Rear end (vehicles in same lane)	T intersection	Passenger Vehicle
6	Other injury accident	No collision and no object struck	Out of control on carriageway (on straight)	T intersection	Motorcycle
7	Serious injury accident	Vehicle overturned (no collision)	Out of control on carriageway (on straight)	Not at intersection	Motorcycle

A review of the above table found:

- Three of the identified crashes involved a motorcyclist, including one fatal and one serious crash.
- The other fatal crash involved a pedestrian struck by a vehicle.
- Four of the identified crashes involved a “Out of control on carriageway (on straight)” type crash.

Table 6.12: Crash Data Summary – Location 2 Monash Way (Churchill)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Serious injury accident	Collision with vehicle	Right far (intersections only)	T intersection	Passenger Vehicle
2	Serious injury accident	Collision with vehicle	Rear end (vehicles in same lane)	Not at intersection	Motorcycle, Passenger Vehicle
3	Serious injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
4	Serious injury accident	Collision with vehicle	Right near (intersections only)	T intersection	Passenger Vehicle
5	Other injury accident	Collision with vehicle	U turn	Not at intersection	Passenger Vehicle
6	Serious injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
7	Serious injury accident	Collision with vehicle	Head on (not overtaking)	Not at intersection	Passenger Vehicle
8	Other injury accident	Collision with vehicle	Rear end (vehicles in same lane)	Not at intersection	Passenger Vehicle
9	Other injury accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced nine crashes, six of which were serious crashes.
- Two of the crashes identified occurred at the intersection of Monash Way / Brodribb Road.

Table 6.13: Crash Data Summary – Location 3 Strzelecki Highway (Driffield)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Other injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Passenger Vehicle
2	Serious injury accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
3	Serious injury accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
4	Serious injury accident	Collision with vehicle	Right rear.	T intersection	Passenger Vehicle
5	Serious injury accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Heavy Vehicle, Passenger Vehicle
6	Serious injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
7	Serious injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Cross intersection	Passenger Vehicle
8	Other injury accident	Collision with vehicle	Head on (not overtaking)	Not at intersection	Passenger Vehicle , Pedestrian

A review of the above table found:

- The identified stretch of road experienced eight crashes, six of which were serious crashes.
- Six of the identified crashes included vehicles veering off a straight into an object.
- Five of the eight crashes involved a single vehicle.

Table 6.14: Crash Data Summary – Location 4 Strzelecki Highway (Mirboo North)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Serious injury accident	No collision and no object struck	Other accidents not classifiable elsewhere	Not at intersection	Pedestrian
2	Serious injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Passenger Vehicle
3	Other injury accident	No collision and no object struck	Out of control on carriageway (on straight)	T intersection	Motorcycle, Passenger Vehicle
4	Other injury accident	Collision with vehicle	Right far (intersections only)	T intersection	Passenger Vehicle
5	Serious injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
6	Other injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	T intersection	Passenger Vehicle
7	Other injury accident	Collision with a fixed object	Off left bend into object / parked vehicle	Not at intersection	Passenger Vehicle
8	Fatal accident	Collision with vehicle	Right rear.	T intersection	Motorcycle, Passenger Vehicle
9	Other injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced nine crashes, one of which was fatal and three of which were serious crashes.
- Six of the identified crashes included vehicles veering off a straight into an object.
- Six of the eight crashes involved a single vehicle.

Table 6.15: Crash Data Summary – Location 5 Strzelecki Highway (Leongatha)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Other injury accident	Collision with vehicle	Other adjacent (intersections only)	T intersection	Passenger Vehicle, Public Vehicle
2	Other injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Motorcycle
3	Fatal accident	Collision with a fixed object	Off left bend into object / parked vehicle	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced three crashes, one of which was fatal.
- The fatal crash involved a single vehicle veering into an object.

Table 6.16: Crash Data Summary – Location 6 South Gippsland Highway (Meeniyan)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Mode
1	Serious injury accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
2	Serious injury accident	Collision with vehicle	Right rear.	Cross intersection	Passenger Vehicle
3	Serious injury accident	Collision with a fixed object	Off left bend into object/parked vehicle	Not at intersection	Passenger Vehicle
4	Other injury accident	Collision with vehicle	Rear end (vehicles in same lane)	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced four crashes, three of which were serious.
- Two of the serious crashes involved a single vehicle veering into an object.
- The other serious crash involved a 'right rear' accident at a cross intersection.

Table 6.17: Crash Data Summary – Location 7 Meeniyan-Promontory Road (Buffalo)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Modes
1	Serious injury accident	Collision with vehicle	Head on (not overtaking)	Not at intersection	Passenger Vehicle
2	Serious injury accident	Collision with a fixed object	Off left bend into object / parked vehicle	Not at intersection	Passenger Vehicle
3	Serious injury accident	Vehicle overturned (no collision)	Off carriageway on right bend	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced three crashes, three of which were serious.
- Two of the serious crashes involved a single vehicle veering into an object.
- The remaining severe crash was a head on collision.

Table 6.18: Crash Data Summary – Location 8 Fish-Creek Foster Road (Approach to Foster)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Modes
1	Serious injury accident	Collision with vehicle	Rear end (vehicles in same lane)	Not at intersection	Passenger Vehicle
2	Other injury accident	Collision with a fixed object	Off left bend into object / parked vehicle	Not at intersection	Passenger Vehicle
3	Serious injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Passenger Vehicle
4	Serious injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Passenger Vehicle
5	Other injury accident	Collision with a fixed object	Off right bend into object / parked vehicle	Not at intersection	Passenger Vehicle

A review of the above table found:

- The identified stretch of road experienced five crashes, three of which were serious.
- Four of the five crashes involved a single vehicle veering into an object.
- The remaining severe crash was a rear end.

Table 6.19: Crash Data Summary – Location 9 Fish-Creek Foster Road (Foster)

#	Severity	Crash Type	DCA Code	Road Geometry	Transport Modes
1	Other injury accident	Collision with a fixed object	Left off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
2	Fatal accident	Collision with a fixed object	Right off carriageway into object / parked vehicle	Not at intersection	Passenger Vehicle
3	Other injury accident	Vehicle overturned (no collision)	Other maneuvering	Not at intersection	Heavy Vehicle

A review of the above table found:

- The identified stretch of road experienced three crashes, one of which was fatal.
- The fatal crash involved a single vehicle veering into an object.

6.3.5 Rail

The region within the surrounds of the project are serviced by V/Line services through the Latrobe valley on the Bairnsdale train line, servicing townships such as Moe, Morwell and Traralgon. This train line has approximately 20 services operating daily, providing a public transport link to Melbourne for the region.

The proposed project alignment does not cross the active train line, as shown in Figure 6.6.

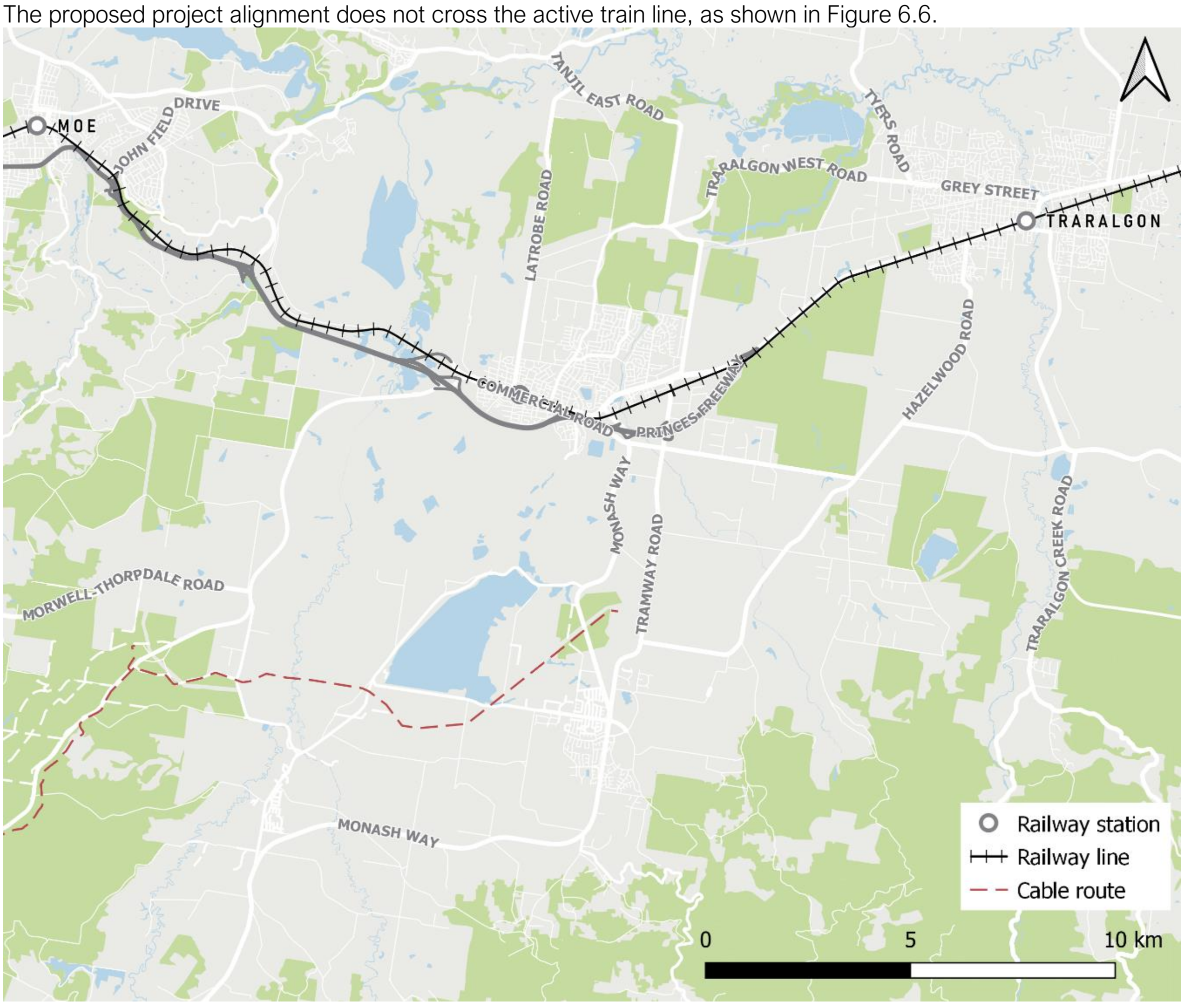


Figure 6.6: Latrobe Valley Train Stations Proximate to Cable

With regard to the movement of the transformer transport, the vehicle route from the Port to the Freeway, in Melbourne, is yet to be confirmed by the project, noting DTP has suggested the use of Port of Melbourne, as opposed to Port of Geelong, is the preferred pathway with less coordination and consideration for other major projects on the road network including West Gate Tunnel, North East Link and the Commonwealth Games planning.

It is noted, however, that based on the publicly available over-dimensional road network, there are two likely paths of travel from the Port of Melbourne, as identified in Section 4.2.6.4, both of which cross the Sandringham train line.

Further investigation and consultation is required, and it is expected that this will be undertaken by the building contractor closer to construction and following confirmation of construction methodology and proposed route.

6.3.6 Buses

Public bus services are available in the major townships surrounding the study area, including Leongatha, Moe and Morwell. These services run at a low frequency and generally either provide access to the centre of the township for the local residents, or a broader function connecting towns.

A number of these bus services are displayed in the figures below.

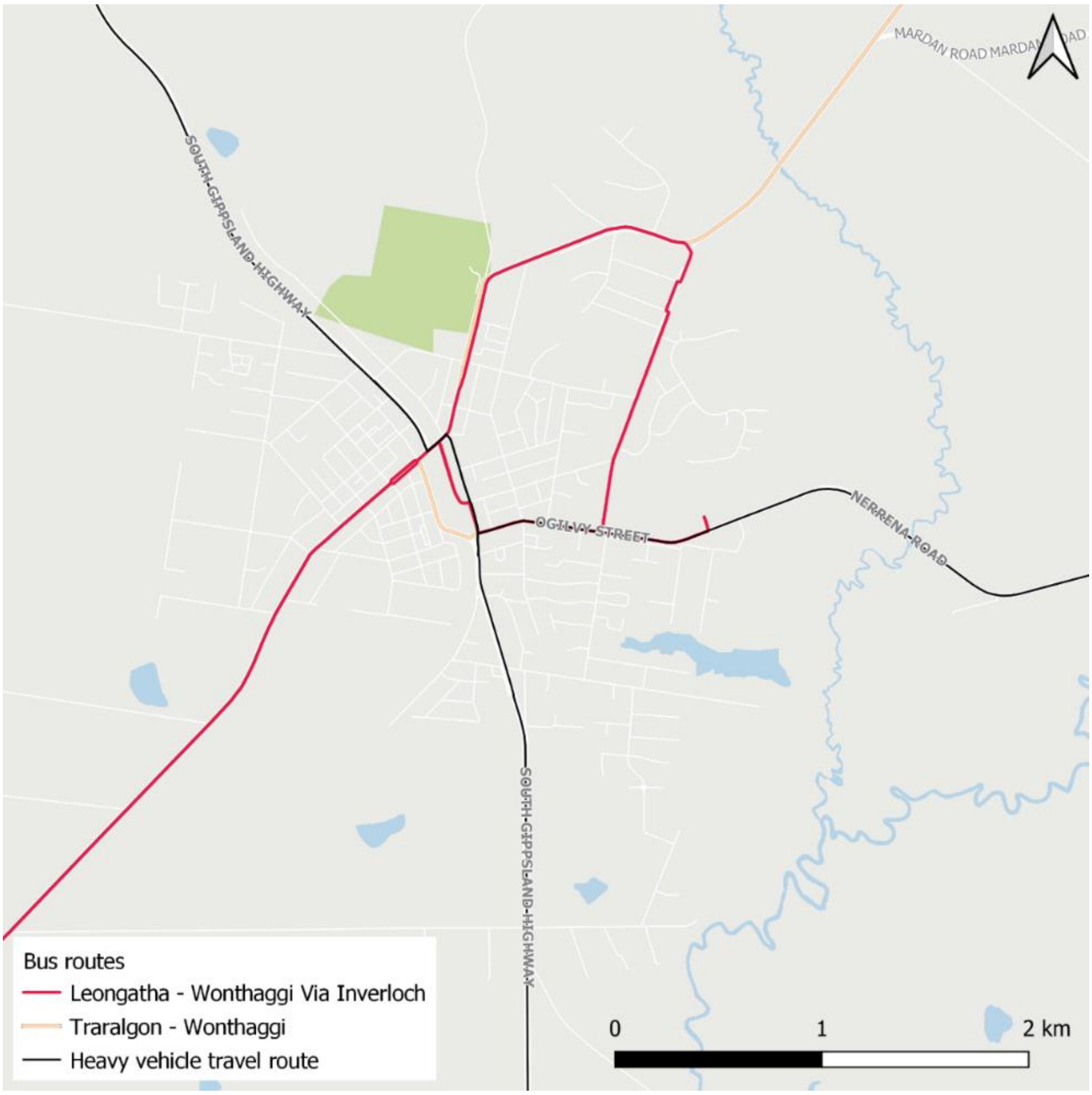


Figure 6.7: Bus Services in Leongatha

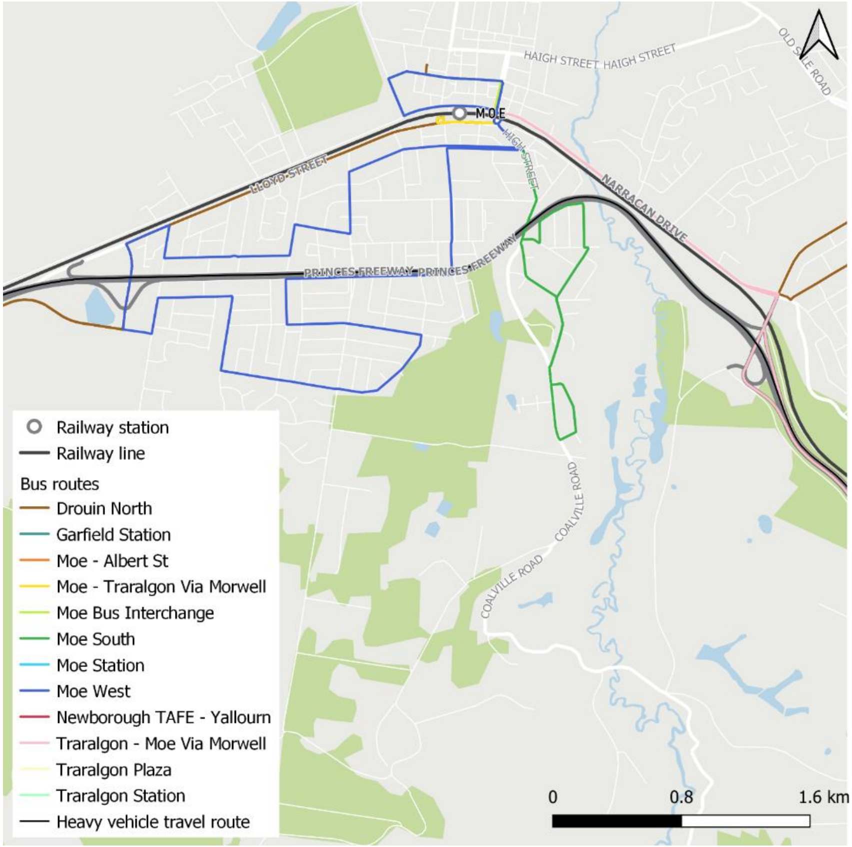


Figure 6.8: Bus Services in Moe

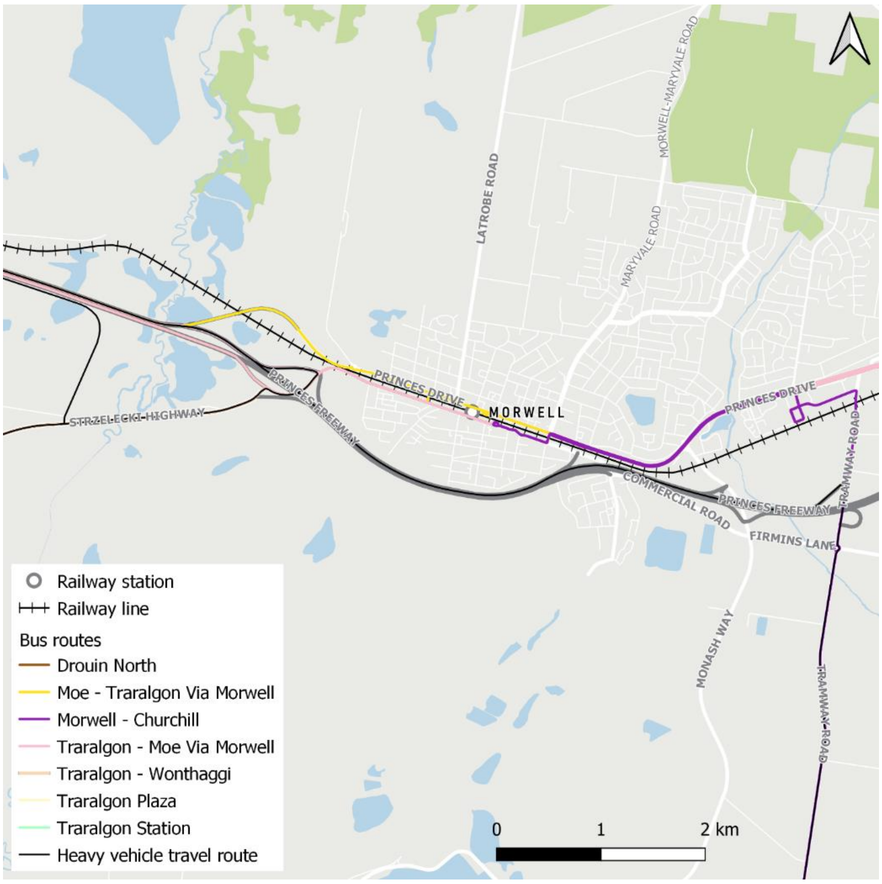


Figure 6.9: Bus Services in Morwell

It is noted that in addition to the above public bus routes that a number of school bus services will be operating throughout the townships. Further consultation will be required with Council to determine these school bus routes, noting that these are subject to change based on the residences of the children being picked up each year.

As noted above, the movement of the transformer transport from the port has not been finalized. Based on the publicly available over-dimensional road network, there are two likely paths of travel from the Port of Melbourne. These routes utilize roads that contain active bus routes. These have been identified below:

- 600 Southland Shopping Centre – St Kilda Station
- 631 Southland – Waverley Gardens via Clayton & Monash University
- 811 Dandenong – Brighton via Heatherton Road & Springvale
- 812 Dandenong – Brighton via Parkmore Shopping Centre
- 821 Southland – Clayton via Heatherton
- 824 Moorabbin – Keysborough via Clayton & Westall
- 861 Endeavour Hills – Dandenong Station via Dandenong Hospital
- 863 Endeavour Hills SC – Hampton Park SC via Hallam Station
- 893 Cranbourne Park SC – Dandenong Station
- 902 Chelsea Railway Station – Airport West Shopping Centre (SMARTBUS Service)
- 903 Altona – Mordialloc (SMARTBUS Service)
- 923 Southland SC – St Kilda Station
- 979 Clayton Station – Dandenong Station via Keysborough
- 981 Dandenong Station – Cranbourne via Berwick

Further investigation and consultation is required, and it is expected that this will be undertaken by the building contractor closer to construction.

6.3.7 Trams

The need to consult Yarra Trams was raised by Department of Transport Metro (Heavy Haulage) Team as a likely requirement. As noted above, the movement of the transformer transport from the port has not been finalized. Based on the publicly available over-dimensional road network, there are two likely paths of travel from the Port of Melbourne, as identified in Section 4.2.6.4, both of which cross the 109 tram line.

Further investigation and consultation is required, and it is expected that this will be undertaken by the building contractor closer to construction and following confirmation of construction methodology and proposed route.

6.3.8 Public Transport Accessibility & Use

The above review demonstrates that public transport services and accessibility within the region is low, with the majority of townships not serviced by public transport routes. This is further demonstrated by the Australian Bureau of Statistics (ABS) journey to work data from 2016 which indicates that 91% of residents in South Gippsland Shire and 95% in Latrobe travel to work by private vehicle.

6.3.9 Pedestrians

Given the rural nature of much of the site there is a lack of formal pedestrian footpaths throughout much of the study area. Footpaths are primarily provided alongside roads that are within townships in the central activity centre or on residential streets.

6.3.10 Cycle Lanes and Recreational Rail Trails

There are various on-road cycle facilities that are provided throughout the townships, that are variable in width, quality and connectivity. The broader region does contain a number of rail trails that span over long distances, such as the Great Southern Rail Trail and the Grand Ridge Rail Trail. A section of the project alignment which runs alongside the Great Southern Rail Trail, between Buffalo and Stony Creek. The proposed project alignment is not anticipated to impact the trail however. AT the locations where the project alignment crosses a trail, HDD digging is proposed which will avoid impact. Should impact be unavoidable, this will need to be managed by the contractor in consultation with management authorities.

These are shown in Figure 6.10 below.

Figure 6.10: Rail Trails

6.4 Summary of Relevant Values

The items outlined in the above existing conditions form the basis of the values that will be assessed as a part of the impact assessment as outlined below. Consideration of the above material was utilized to identify the values, alongside more detailed attributes.

The values identified for this assessment are outlined below

Road Network Capacity

The operational performance of the road network with regard to its theoretical capacity and existing operation. This value recognizes how the road network is performing, whether a substantial change is to occur from its existing operational performance

Safe Road Performance, Condition and Design

The design and operation of the road network, ensuring that it is provided in a safe manner that is compliant with relevant industry standards and guidelines.

Public and Active Transport

The continued operation of the public transport network, as well as the active transport infrastructure in the surrounding area. This includes V/Line trains, local bus services, school buses, recreational rail trails and public footpaths.

7 Impact Assessment

The following section outlines the impact assessment undertaken for the values identified above in Section 6.4. This process has been undertaken to align with the significance assessment, as detailed in Section 5 of this report.

To robustly assess each value, the values were divided into several attributes of the respective value.

This process has been conducted below.

7.1 Construction Impact Assessment

7.1.1 Value 1 – Road Network Capacity

An assessment has been completed of the performance of the road network in the surrounding area of the project during its construction. Completing this assessment entailed identifying the level of traffic generated by the various construction activities and the path of travel that vehicles will take to the site.

Upon completion of the above works, the following attributes were defined in the assessment of Value 1:

Table 7.1: Values and Attributes

Value	Attribute
Road Network Capacity The operational performance of the road network with regard to its theoretical capacity and existing operation. This value recognizes how the road network is performing, whether a substantial change is to occur from its existing operational performance	Arterial Road Network Capacity
	Local Road Network Capacity and Net Change
	Intersection Capacity
	Road connectivity and provision of alternative routes

7.1.1.1 Assessment of Attributes

The sections below outline capacity based assessments undertaken for all the roads impacted by the project. Using Austroads guidance alongside the development traffic generation and surveyed traffic volumes, assessments of the potential impact the project could have on the local road network during construction has been assessed and potential mitigation measures identified.

The assessment has been split based on the attributes identified above.

7.1.1.2 Attribute 1: Arterial Road Network Capacity

The capacity assessment of the arterial road network was determined by undertaking a midblock AADT assessment with reference made to the *Austroads Guide to Road Design: Part 3, Section 4.2.6* as identified in section 6.3.1.3 of this report. The theoretical capacity for each road impacted by development traffic has been calculated using the information identified in this section. Theoretical capacity is informed by industry standard documentation and approach; as it relates to this assessment we reference the Austroads Guide identified above.

Whilst the theoretical capacities identify the maximum daily traffic movement each road can support, the existing daily traffic movements are also required to assess the impact of development traffic on the road network. Therefore, reference was also made to the traffic surveys undertaken from the 3rd of September until the 9th as discussed in Section 6.3.1.2 of this report.

For the traffic data collected to be used in our assessment, 5 years of traffic growth has been applied to represent the traffic conditions at the expected year of completion. Growth factors were extracted from the VicRoads Open Data Hub which details Department of Transport statistics for roads throughout Victoria and are detailed in Table 6.4. The growth rates were extracted for each direction at each applicable road however, many of the roads in question are not identified within this resource.

To account for the roads with missing growth factors, an average was calculated in each direction for the roads which had data available, and that average was then applied to the remaining roads. Using the extracted growth rates, 5 years of traffic growth was then calculated and applied to the surveyed daily traffic flows to calculate the expected traffic movements in 2027.

The daily traffic generation on each road was then applied to the 2027 traffic volumes to calculate the expected 2027 traffic flows at each road including development generated traffic. The resulting volumes were then compared to the theoretical capacities to assess which roads would be operating above or below capacity.

The results highlighted that the majority of identified roads will operate well below capacity with the addition of development generated traffic. This was expected given the traffic volumes surveyed were typically very low. Table 7.2 below identifies the roads with the highest level of 'during construction' traffic volumes. Noting, Monash Way is the only arterial road which will have a traffic volume above 50% of its theoretical capacity.

Table 7.2: Midblock Capacity Assessment Results

Road	Theoretical Capacity	Surveyed AADT Flow	Growth Factor	Maximum Daily Traffic Generation	Projected AADT Flow	Capacity Check
Strzelecki Highway (Yinnar-Driffield – Mirboo North)	>3000	3330	0.024	103	3730	Under Capacity
Strzelecki Highway (Princes Freeway – Yinnar-Driffield Road)	>3000	3516	0.026	103	3964	Under Capacity
Meeniyan – Promontory Road (Fish Creek – Promontory)	1000 – 3000	2006	0.017	103	2171	Under Capacity
South Gippsland Highway (Korumburra / Leongatha – Meeniyan)	>3000	4404	0.024	103	4921	Under Capacity
South Gippsland Highway (Meeniyan – Foster)	>3000	4404	0.024	103	4933	Under Capacity
Monash Way	>3000	7737	0.014	103	8280	Under Capacity

An assumed maximum capacity of 10,000 vehicles per day was applied to roads with the theoretical capacity classification of >3000 vehicles per day.

None of the roads assessed were identified to operate over their theoretical capacity in 2027 with the addition of project generated traffic.

7.1.1.3 Attribute 2: Local Road Network Capacity and Net Change

Assessment was also conducted on the local road network to determine whether these roads were operating underneath their theoretical capacity. Given that the local road network in rural areas can often operate with very low volumes, assessment was also undertaken to consider the net change in traffic, with the addition of the daily construction traffic volumes.

The existing surveyed traffic volumes are summarized in Table 7.3.

Table 7.3: Surveyed Traffic Volumes for Local Roads

Surveyed Traffic Volume	Road Name	
	Travel path to Laydown Area	Travel Path to Access Track
< 50 vpd	Smallmans Road, Harding Lawson Road	Evans Road, Jacks Road, Old Nicholls Road, Fullertons Road, Ten Mile Creek Road, McFarlane Road, Morrisons Road
50 – 150 vpd	Old Darlimurla Road	Nicholls Road,
150 – 500 vpd	-	Mardan Road
500+	-	-
Not Surveyed	Smiths Road	Pilkington Road, Duncans Road, Setfords Road, Moores Road, Gooleys Lane, Neales Road, McKittericks Road, Pincinis Lane, Darlimurla Road, Pleasant Valley Road, Creamery Road, Acacia Way, Silcocks Road

Whilst the table above identifies 14 roads that will experience an increase in traffic volumes that were not surveyed, it can be concluded that the majority of these roads currently accommodate very low traffic volumes, consistent with the other local roads which were surveyed.

The roads utilized to access a laydown area will experience a maximum uplift in daily traffic volumes of 319 vehicle movements, as identified in section 4.2.4.2. The roads utilized to access the access tracks will experience a maximum uplift in daily traffic volumes of 103 vehicle movements.

The above assessment found that the local roads will not experience an uplift in traffic that will exceed their theoretical, operational capacity. Some roads will exceed their capacity due to the lower capacity of a gravel carriageway, with a capacity of 150 vehicles per day. It is noted that this capacity constraint is due to the wear and tear on gravel roads and the associated maintenance cost when compared to upgrading the roads to a paved surface (as outlined in Section 6.3.1.3), given the short term nature of the construction period, this capacity constraint is considered manageable. Notwithstanding, this has been further considered and addressed in the pavement assessment completed in Value 2.

The majority of local roads will, however, experience a substantial uplift in traffic when compared to their existing traffic volumes during peak construction activities.

7.1.1.4 Attribute 3: Intersection Capacity

Side Road Access Points

To determine the operating capacity of the proposed access points to laydown areas and access tracks, a side roads turning lane warrant assessment was conducted utilising *Austroads Guide to Traffic Management: Part 6, Section 3.3.6 Warrants for BA, AU and CH Turn Treatments*. This section details how to calculate the required level of turning treatment for an intersection, based upon the major carriageway traffic flow and the volume of turning movements onto the minor arm.

There are three levels of turning treatments which can be adopted in an urban / rural setting including basic turn treatments (BA), auxiliary turn treatments (AU) and channelised turn treatments (CH). Given the locations of the access tracks the rural BA, AU and CH treatments are applicable in this case.

Rural basic BA turn treatments are the simplest of the three treatment options and are split into left (BAL) and right (BAR) turn movements from the major carriageway which are described as follows:

- The BAR treatment features a widened shoulder on the major road that allows through vehicles, having slowed, to pass to the left of turning vehicles
- The BAL treatment on the major road has a widened shoulder, which assists turning vehicles to move further off the through carriageway, thus making it easier for through vehicles to pass

The corresponding diagrams to theses descriptions are detailed in the Austroads document and are attached below in Figure 7.1 and Figure 7.2

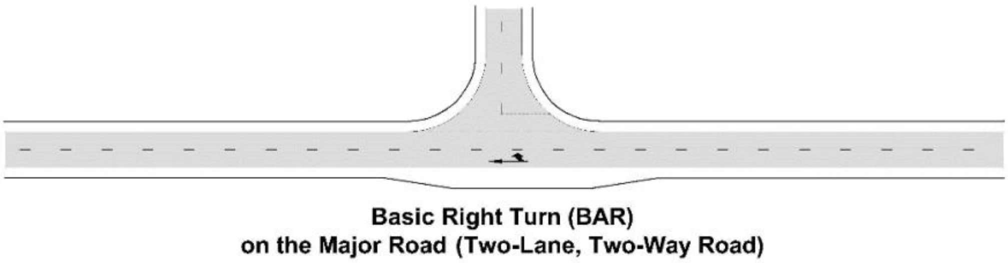


Figure 7.1: Rural Basic Right Turn Treatments (BAR)

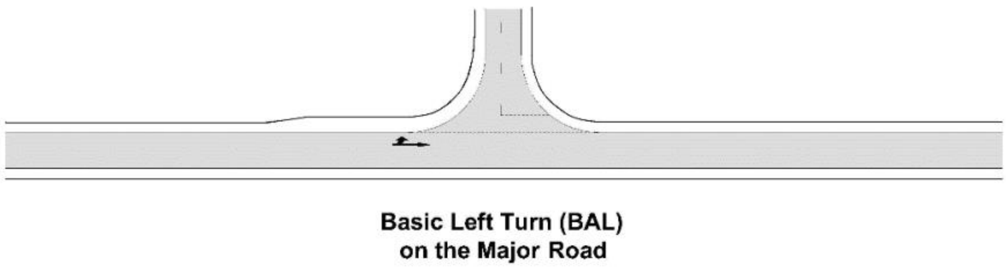


Figure 7.2: Rural Basic Left Turn Treatments (BAL)

Auxiliary (AU) turn treatments are a more extensive treatment than BA but less so than CH and are described as follows:

- An AUR turn treatment is created by the use of a short lane with standard painted stripes.
- An AUL turn treatment on a major road is a normal indented turn lane.

The corresponding diagrams are detailed in the Austroads document and are attached below in Figure 7.3 and Figure 7.4

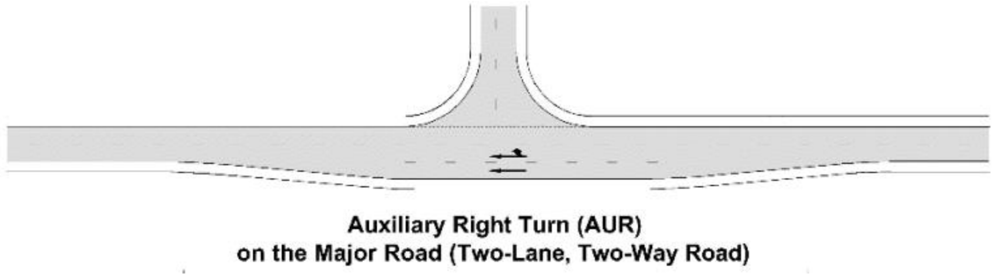


Figure 7.3: Rural Auxiliary Right Turn Treatments (AUR)

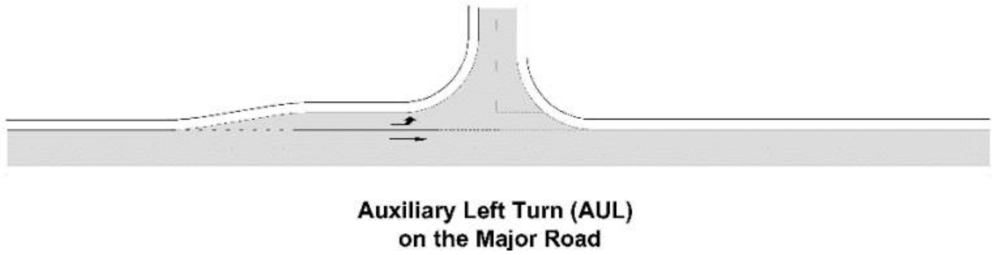


Figure 7.4: Rural Auxiliary Left Turn Treatments (AUL)

The most extensive turn treatment identified within the Austroads guide are the channelised (CH) turn treatments which has conflicting vehicle travel paths separated by raised, depressed, or painted medians and/or islands as detailed in the figures below.

Figure 7.5: Rural Channelised Right Turn Treatments (CHR)

Figure 7.6: Rural Channelised Left Turn Treatments (CHL)

To identify which of the discussed turn treatments is required to each of the access track locations, reference was made to the warrants detailed in *Austroads Guide to Traffic Management: Part 6, Section 3.3.6 Warrants for BA, AU and CH Turn Treatments*.Three separate graphs are provided for roads of different speeds including 100kph and above, between 70 and 100 kph, and below 70kph. The 100kph and above graph, which was most commonly applied in our assessment given the rural nature of the road network, is attached below as Figure 7.7.

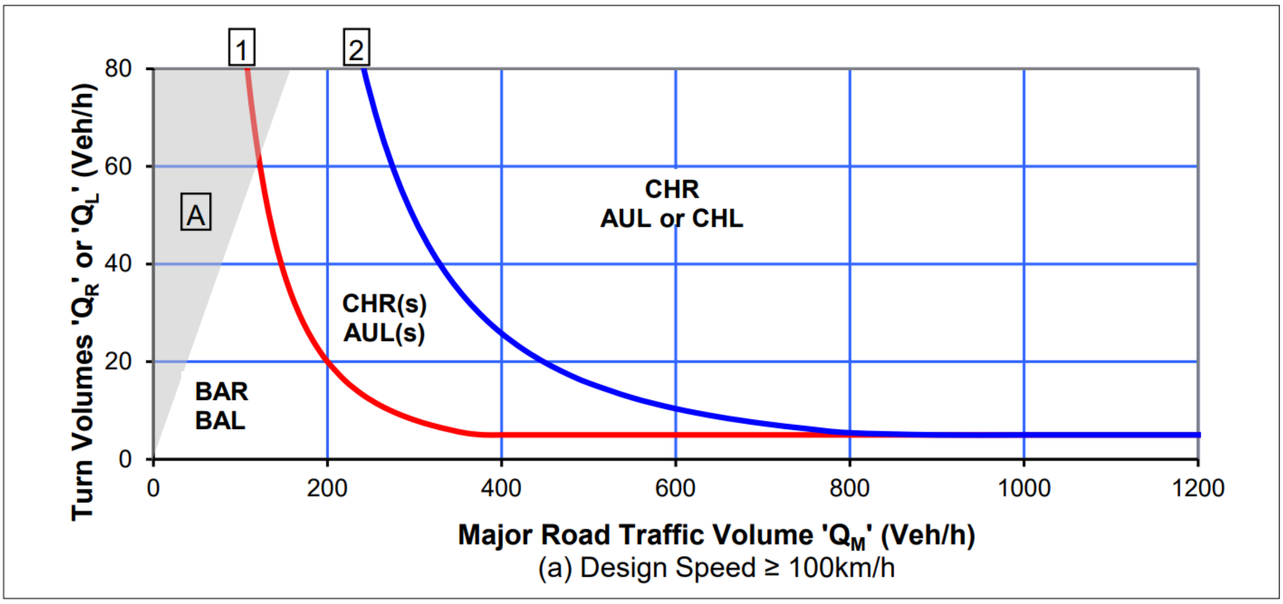
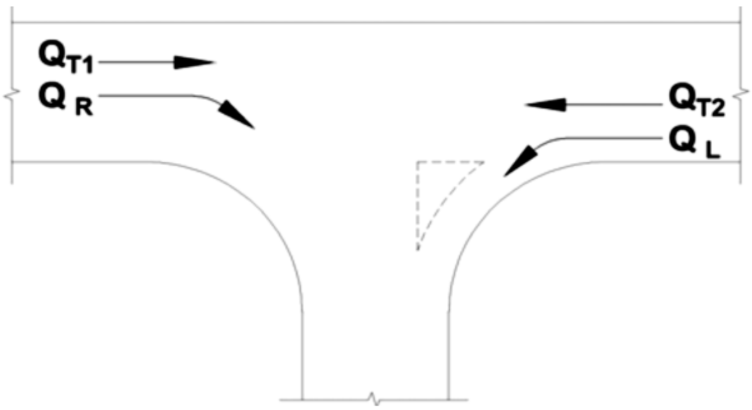


Figure 7.7: Warrants for Turn Treatments on ≥100kph Major Roads at Unsignalised Intersections

To calculate the value of the major road traffic volume parameter (Q_m) we must follow the calculations detailed in Figure 7.8 below.



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	$= Q_{T1} + Q_{T2} + Q_L$
		Yes	$= Q_{T1} + Q_{T2}$
	Left	Yes or no	$= Q_{T2}$
Four-lane two-way	Right	No	$= 50\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 50\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 50\% \times Q_{T2}$
Six-lane two-way	Right	No	$= 33\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 33\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 33\% \times Q_{T2}$

Figure 7.8: Calculation of the Major Road Traffic Volume Q_m

Using the calculations in Section 4.2 and the graph in Figure 7.7 along with the peak hour traffic generation and survey data discussed previously in the report we were able to determine which turning treatment is required at each of the access track locations. This assessment was undertaken, and the results identified that several access track locations require auxiliary (AU) and channelised (CH) treatments and they are identified in Table 7.4 below.

Table 7.4: Midblock Capacity Assessment Results

ID	Road	Speed Limit (kph)	Access Points	Turning Movement	Traffic Generation	Turn Treatment
33	South Gippsland Highway	100	HDD15b, JP27, HDD16a	Right	50	CHR AUL or CHL
85	Strzelecki Highway	100	LA06	Right	120	CHR AUL or CHL
94	Strzelecki Highway	100	JP61, JP62	Left	50	CHR(s) or AUL(s)
96	Strzelecki Highway	100	JP65	Left	50	CHR(s) or AUL(s)
97	Smiths Road	100	LA07, Driffield Station	Right	200	CHR AUL or CHL
98	Strzelecki Highway	100	JP66, HDD49a, JP67	Right	50	CHR AUL or CHL
99	Strzelecki Highway	100	HDD49b	Left	50	CHR(s) or AUL(s)
101	Yinnar-Driffield Road	100	HDD50a	Right	50	CHR(s) or AUL(s)
113	Monash Way	100	HDD59a, HDD59b	Right	50	CHR AUL or CHL
114	Tramway Road	100	JP78, LA08, Hazelwood Station	Right	200	CHR AUL or CHL

Based on the assessment completed, the above intersections may require upgrade or works as a result of the development generated traffic.

Converter Station Access Points

In addition to the above, given the volume of traffic generated by the construction of the converter stations, the access points to these sites has been further assessed using SIDRA Intersection 9. SIDRA is a computer-based modelling package which calculates intersection performance.

The commonly used measure of intersection performance is referred to as the *Degree of Saturation (DOS)*. The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection.

For unsignalised intersections, a DOS of around 0.905 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately. This is shown in Table 7.5 below

Table 7.5: SIDRA Intersection Adopts the following criteria for Level of Service Assessment

Level of Service		Intersection Degree of Saturation (DOS)		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.85
D	Acceptable	0.80-0.90	0.90-0.95	0.85-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

For the purposes of this assessment, the existing conditions and worst case construction traffic volumes scenarios have been modelled in SIDRA to gain an understanding of the change in traffic performance as a result of the development. The existing conditions assessment has been undertaken on the 5-year traffic growth volumes.

The results of this assessment are shown in Table 7.6 for the during construction scenarios. The input traffic volumes are shown in Appendix E , with the full results shown in Appendix F

Table 7.6: During Construction SIDRA Intersection Modelling Results

Peak Hour	Intersection	Approach	DOS	Average Delay (Seconds)	95th Percentile Queue (Metre)
AM Peak Hour	Tramway Road / Hazelwood Converter Station Access Point	Tramway Road (South)	0.13	0 sec	0m
		Tramway Road (North)	0.20	6 sec	7m
		Site Access (West)	0.00	12 sec	0m
		Intersection	0.20	4 sec	7m
	Strzelecki Highway / Smiths Road (Driffield Converter Station Access Point)	Strzelecki Hwy (North-East)	0.18	3 sec	6m
		Site Access (West)	0.00	8 sec	0m
		Strzelecki Hwy (South-West)	0.12	1 sec	0m
		Intersection	0.18	2 sec	6m
PM Peak Hour	Tramway Road / Hazelwood Converter Station Access Point	Tramway Road (South)	0.10	0 sec	0m
		Tramway Road (North)	0.12	0 sec	0m
		Site Access (West)	0.23	9 sec	7m
		Intersection	0.23	3 sec	7m
	Strzelecki Highway / Smiths Road (Driffield Converter Station Access Point)	Strzelecki Hwy (North-East)	0.13	0 sec	0m
		Site Access (West)	0.18	7 sec	6m
		Strzelecki Hwy (South-West)	0.10	0 sec	0m
		Intersection	0.18	2 sec	6m

The results of the above assessment found the following:

- Both of the proposed converter station site access points will operate well under capacity under the during construction scenarios
- A maximum delay of 6 seconds was found at the Hazelwood converter station in the AM Peak for vehicles entering the site and a maximum delay of 9 seconds was found in the PM peak for vehicles exiting the site
- A maximum delay of 3 seconds was found at the Driffield converter station in the AM Peak for vehicles entering the site and a maximum delay of 7 seconds was found in the PM peak for vehicles exiting the site
- The 95th percentile queue length under all scenarios is in the order of one vehicle.

It is noted that the above assessments have assumed that the peak hour traffic volumes generated by the site are occurring at the same time as the road network peak. As identified in section 4.2.3, construction activities are expected to arrive at 7am, which is before the recorded road network peak hour.

7.1.1.5 Attribute 4: Road Connectivity and Provision of Alternative Routes

The road network was also reviewed to identify any sensitive roads that are a single point of access to residential areas, with no viable alternatives. The roads identified are outlined below:

- Waratah Road
- Evans Road
- Pilkington Road
- Duncans Road
- Setfords Road
- Jacks Road
- Gooleys Lane
- Smallmans Road
- Pincinis Lane
- Pleasant Valley Road
- Morrisons Road
- Silcocks Road

It is noted that the majority of these roads operate as access points to small residential areas, with limited populations. The notable exception is Waratah Road, providing access to the township of Sandy Point.

7.1.2 Value 1 – EES Impact Significance Assessment

The analysis and commentary presented above has established the likely traffic performance impacts. The impacts outlined above have been assessed in accordance with the significance assessment methodology outlined in section 5.6 with Table 5.2 and Table 5.3 identifying the criteria that each impact has been assessed using.

The significance assessment for value 1 prior to the implementation of any mitigating works has been summarised in Table 7.7 below.

Table 7.7: Value 1: Road Network Capacity – Inherent Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Road Network Capacity	Arterial road link capacity	Nil	No arterial roads identified will exceed their capacity	No arterial roads identified will exceed or approach capacity Total traffic generation is small percentage of arterial road capacity	Low	Negligible	Very Low
Road Network Capacity	Local road link capacity	Nil	No local roads identified will exceed their capacity	No local roads identified will exceed or approach capacity Total traffic generation is small percentage of arterial road capacity	Very Low	Negligible	Very Low
Road Network Capacity	Local roads identified as vulnerable based on percentage of increased traffic	Nil	Roads over capacity	Many local roads within the study area have very low existing traffic volumes The level of traffic generated on the local road network during peak events will increase the relative traffic	High	Moderate	High
Road Network Capacity	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatments (below 'line 1' in the Austroads turning warrant assessment)	There are a number of access point intersections to moderate to heavily trafficked roads The side road intersection will operate in accordance with industry standards	Moderate	Minor	Low
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	There are a number of access point intersections to heavily trafficked roads The side road intersection will have potential safety and road performance issues	Moderate	Major	High

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	There are a number of access point intersections to heavily trafficked roads The side road intersection will have potential safety and road performance issues	Moderate	Major	High
Road Network Capacity	Connectivity	Nil	Roads where access is restricted Local roads for residential access identified	There are a number of dead end local roads that provide access to residential properties that will be used by the project No roads are proposed to be closed as a result of the project	Moderate	Negligible	Low
Road Network Capacity	Connectivity	Nil	Waratah Road	Waratah Road is the single point of access to the township of Sandy Point No roads are proposed to be closed as a result of the project	Very High	Negligible	Moderate

7.1.3 Value 1 – Mitigation Works

The attributes identified above have then been further assessed to identify mitigating works.

As stated above, it has been assumed that the construction workforce will be residing in the local townships surrounding the area and travelling to the site. It is possible that during construction, a workers camp will be set up to consolidate traffic movements, travelling workers to the site on a bus. For the purposes of this assessment, it has been assumed that this will not be occurring, however in the event that this option is pursued by the contractor, a reduced traffic volume and overall traffic impact will be experienced on the road network.

7.1.3.1 Attribute 1: Arterial Road Network Capacity

The assessment conducted above determined that no arterial roads within the study area will exceed their theoretical capacity during peak operational time periods. Therefore, no mitigation works are required to increase the road network capacity. Continuous inspections should occur during construction to ensure the road network is operating as expected.

7.1.3.2 Attribute 2: Local Road Network Capacity and Net Change

The assessment conducted above determined that local roads within the study area will not exceed their theoretical capacity during peak time periods from an operational perspective, with capacity constraints only occurring as a result of the gravel road surface (further explored in Value 2). Therefore, no mitigation works are required to increase the local road network capacity.

The assessment did however identify that there are a number of sensitive local roads within the area that currently experience very low traffic volumes. Local residents within the immediate surrounds that currently utilise these roads as access points to their properties should be appropriately consulted to ensure they are aware of and understand the level of traffic uplift on the road network, with management plans developed to detail how the increase in traffic can be managed.

The assessment undertaken to date has made a number of assumptions in regard to the level of traffic generated during construction. These traffic generation assumptions are conservative, and align with the expected peak operational day. The construction contractor should aim, where possible, to reduce the level of traffic generated on to local roads. In this regard, residents will only require consultation and forewarning during peak operational activities.

Local roads utilised to access laydown areas will experience significantly greater traffic volumes than those utilised to access the project alignment. Each of these roads should be considered on a case by case basis, with adequate consultation with land owners and residents conducted.

7.1.3.3 Attribute 3: Intersection Capacity

Side Road Access Points

The assessment conducted earlier in this report identified a number of intersections that may require works to accommodate the maximum expected traffic generation volumes.

The access track locations where turning treatments would be required are primarily on high traffic volume roads which is consistent with the turning warrant graph in Figure 7.7.

However, the Access Point column in the graph identifies which construction areas are accessible by each access track and as detailed, tracks 99, 101 and 113 access HDD locations only. Therefore, the application of a peak traffic generation of 50 vehicles is excessive as HDD locations are expected to generate a maximum of 15 total vehicles, 5 of which are heavy vehicles, during peak periods; so, these access tracks can be discounted as requiring turning treatments.

The remaining access tracks in Table 7.4 still require some form of turning treatment or traffic management measure to mitigate the safety issues that may arise from the implementation of the access tracks.

As discussed previously, the turning treatment requirements for these intersections changes depending on the speed limit enforced on the major carriageway. By introducing and enforcing a temporary reduction in the speed limit from 100kph to 70kph on the major carriageway at the proposed access track locations, a reduction in the turning treatment can be achieved. Figure 7.9 below details the warrants for turning treatments on roads a with 70kph speed limits or less taken from the Austroads guidance.

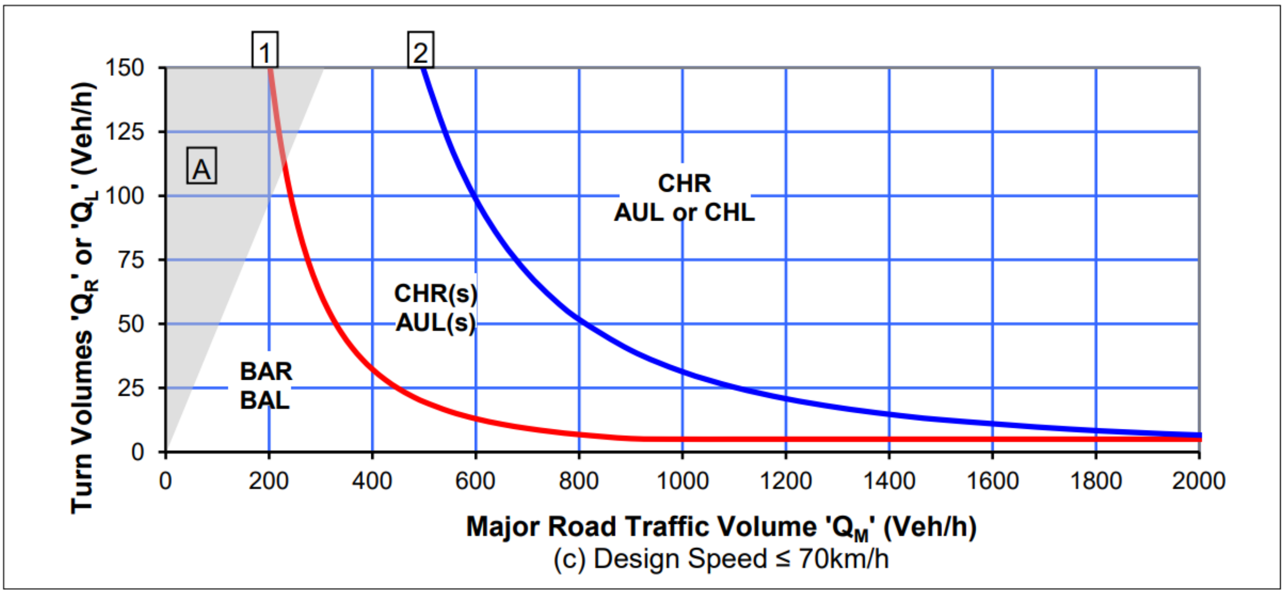


Figure 7.9: Warrants for Turn Treatments on ≤70kph Major Roads at Unsignalised Intersections

Reassessing the access tracks using the graph above results in a different turning treatment requirement as is illustrated in Table 7.8 below.

Table 7.8: Midblock Capacity Assessment Results When Adopting a 70 kph Speed Limit

ID	Road	Speed Limit (kph)	Access Points	Turning Movement	Traffic Generation	Turn Treatment
33	South Gippsland Highway	70	HDD15b, JP27, HDD16a	Right	50	CHR(s) or AUL(s)
85	Strzelecki Highway	70	LA06	Right	120	CHR(s) or AUL(s)
94	Strzelecki Highway	70	JP61, JP62	Left	50	BAR / BAL
96	Strzelecki Highway	70	JP65	Left	50	BAR / BAL
97	Smiths Road	70	LA07, Driffield Station	Right	200	CHR AUL or CHL
98	Strzelecki Highway	70	JP66, HDD49a, JP67	Right	50	BAR / BAL
114	Tramway Road	70	JP78, LA08, Hazelwood Station	Right	200	CHR AUL or CHL

By implementing a reduced speed limit of 70kph at the access tracks detailed in Table 7.8 during the construction period, tracks 94, 96 and 98 will not require any further turning treatment. It also results in the reduction of the treatments from CHR AUL or CHL to CHR(s) or AUL(s) at tracks 33 and 85.

The remaining tracks may require additional treatment in the form of further traffic management or the implementation of turning treatments. A breakdown of the individual access tracks and the potential measures to be taken is as follows.

33 – South Gippsland Highway

The sole access track which connects directly to the South Gippsland Highway is located to the east of Meeniyan and approximately 90m southeast of Laydown Area 3. The track is positioned almost onto McKittericks Road and two westbound lanes from the McKittericks Road intersection with the South Gippsland Highway which has an existing channelised right turn and two westbound

85 – Strzelecki Highway

The access track to Laydown Area 6 is located to the north of Mirboo North, positioned on the eastern edge of the Strzelecki Highway carriageway. The track provides access only to Laydown Area 6 however, the laydown areas generate significant traffic movements in the context of the project which creates conflicting traffic movements onto the Strzelecki Highway which has significant existing traffic volumes. Therefore, turning treatments and/or traffic management solutions will have to be implemented at this location to allow safe operation of the construction period with the project delivered in its current arrangement.

97 – Smiths Road

The Smiths Road access track will provide access to both the Laydown Area 7 and to the Driffield Converter Station and will therefore experience the highest expected generated traffic volumes throughout the entire construction period. Technically the track is accessed from Smiths Road however, given its proximity to the Strzelecki Highway the assessment has been undertaken using the traffic volumes surveyed on the Highway.

The results identify that a channelised right turn treatment as well as an auxiliary or channelised left turn may be required at this location to meet Austroads guidelines. As is illustrated in the images in Figure 7.10 below taken on the site visit, these turning treatment measures are already in place at the Smiths Road / Strzelecki Highway and therefore the requirement is already met at this location and no further turning treatment is necessary.

Figure 7.10: Photos taken at the Smiths Road / Strzelecki Highway Intersection on 23/08/2022

114 – Tramway Road

The access track on Tramway Road will be used to access Joint Pit 78, Laydown Area 8 and Hazelwood Converter Station which will result in this access track experiencing the highest generated traffic volumes of the entire project construction phase. Therefore, the turning treatment requirements of a channelised right turn and a channelised left turn will have to be implemented to allow for safe access to the access track throughout the construction phase.

Converter Station Access Points

The SIDRA assessments undertaken of the converter station access points found that both intersections will operate under capacity during both the AM and PM peak hours, therefore no additional mitigation works are required.

Continuous inspections should occur during construction to ensure the road network is operating as expected.

7.1.3.4 Attribute 4: Road Connectivity and Provision of Alternative Routes

No road closures are proposed as a result of the construction works. Therefore, no alternative routes expected to be required for the project.

In the event that a road closure is required due to unforeseen circumstances, other options should first be explored. If no alternative options are deemed acceptable, thorough consultation should be undertaken with affected parties and relevant authorities.

7.1.4 Value 1 – Environmental Performance Requirements

In response to the above assessment, a number of EPR's have been identified. These EPR's are the mechanism to implement the mitigation and management measures that have been found in the above assessment, and have been developed with consideration of industry standards and relevant legislation, guidelines and policies. The EPR's have been outlined in section 8.2 of this report. Table 7.9 below has been prepared to summarise the key findings of the impact assessment, with a reference to where these items are represented in the EPRs.

Table 7.9: Value 1: Road Network Capacity – EPRs

#	Mitigation Identified	# Reference to EPR's
1	The TMP should include a consultation plan for the engagement with local authorities, impacted landowners and broader community. This consultation will include, but not be limited to: • Informing affected parties of the level of traffic generated by the project construction and any road closures, • Engaging with local road authorities to coordinate construction vehicle movements to avoid school bus routes during their time of operation. • Engaging with road authorities and emergency services about any partial or full road closures.	EPR T1-21
2	Identify where traffic management is required to lower the speed limit during construction, such as at the intersections to Strzelecki Highway if they are utilised to access the following locations: JP61, JP62, JP 65, JP66, HDD49a, JP67 (and any additional locations where it may be required)[1]	EPR T1-3
3	Identify the requirements for the provision of intersection treatments at the following locations if they are used by construction vehicles: South Gippsland Highway access to HDD15b, JP27, HDD16a; Strzelecki Highway access to LA07,and any additional locations where it may be required [1]	EPR T1-4
4	Document how any road closures will be managed to ensure access is maintained, especially on roads that operate as a single point of access for private properties. These measures must be informed by engagement with affected properties, relevant road authorities and emergency services. The design and construction staging approach should aim to not close any public roads during construction or operation, to the extent reasonably practicable.	EPR T1-17
5	The TMP should be updated when there are significant changes in construction methodology, including changes in construction traffic volumes or roads closures that requires further analysis to confirm adequacy and appropriateness of management measures.	EPR T1

[1] Locations of above items outlined in Table 7.8

7.1.5 Value 1 – Residual Impacts

Upon the implementation of the mitigating works, some residual impacts will still remain. These have been outlined in the following sections

7.1.5.1 Attribute 1: Arterial Road Network Capacity

The assessment conducted above determined that no arterial roads within the study area will exceed their theoretical capacity during peak operational time periods. The level of traffic generated by the site should be monitored by the contractor, with assessment undertaken in the event of unexpected additional traffic generated by construction activities.

Addressed in EPR T1, EPR T1-2.

7.1.5.2 Attribute 2: Local Road Network Capacity and Net Change

The local road network will experience a noted uplift in traffic as a result of the construction activities, particularly on local roads used to access laydown areas. Consultation will provide local residents and landowners with prewarning that construction activities will be occurring.

Addressed in EPT T1-21.

7.1.5.3 Attribute 3: Intersection Capacity

With implementation of the recommended intersection treatments, all roads considered in the assessment will perform in accordance with the capacity constraints identified in industry standards. The level of traffic generated by the site should be monitored by the contractor, with assessment undertaken in the event of unexpected additional traffic generated by construction activities.

Addressed in EPR T1, EPR T1-2, EPR T-3, EPR T1-4.

7.1.5.4 Attribute 4: Road Connectivity and Provision of Alternative Routes

No roads are proposed to be closed as a result of construction activities.

Addressed in EPR T1, EPR T1-5.

The revised significance assessment for value 1 with mitigating works has been summarised in Table 7.10 below.

Table 7.10: Value 1: Road Network Capacity – Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Road Network Capacity	Arterial road link capacity	Nil	No arterial roads identified will exceed their capacity	Low	Negligible	Very Low	Nil	Inspections required to ensure road network performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Low	Negligible	Very Low
Road Network Capacity	Local road link capacity	Nil	No local roads identified will exceed their capacity	Very Low	Negligible	Very Low	Nil	Inspections required to ensure road network performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Very Low	Negligible	Very Low
Road Network Capacity	Local roads identified as vulnerable based on percentage of increased traffic	Nil	Roads over capacity	High	Moderate	High	Consultation with local residents Distribute peak traffic event traffic over multiple days	Consultation will provide local residents and landowners to provide prewarning that construction activities are occurring.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Road Network Capacity	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatments (below 'line 1' in the Austroads turning warrant assessment)	Moderate	Minor	Low	Nil	Inspections required to ensure intersections performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	High	Moderate	High	Provision of traffic management to lower the speed limit to 70km/h during peak events	Inspections required at identified intersections to ensure they are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	High	Major	High	Provision of a right turn lane treatment	Inspections required at identified intersections to ensure they are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Road Network Capacity	Connectivity	Nil	Roads where access is restricted Local roads for residential access identified	Moderate	Negligible	Low	Nil	No roads are proposed to be closed as a result of the project. If road closures are required due to unforeseen events, consultation with authorities should be undertaken to minimise disruption.	Moderate	Negligible	Low
Road Network Capacity	Connectivity	Nil	Waratah Road	Very High	Negligible	Moderate	EPR T01	Waratah Road is the single point of access to the township of Sandy Point and is not proposed to be closed. If road closures are required due to unforeseen events, consultation with authorities should be undertaken to minimise disruption.	Very High	Negligible	Moderate

7.1.6 Value 2 – Safe Road Performance, Condition and Design

Analysis has been undertaken to assess the safe performance, road condition, design and operation of the road network that forms a part of the study area.

Upon completion of the above works, the following attributes were defined in the assessment of Value 2:

Table 7.11: Values and Attributes

Value	Attribute
Safe Road Performance, Condition and Design The design and operation of the road network, ensuring that it is provided in a safe manner that is compliant with relevant industry standards and guidelines.	Road pavement condition assessment
	Safe condition of bridges and culverts
	Provision of adequate road geometry
	Review of Crash History
	Intersection safe sight distance assessment
	Height clearance requirements of transformer transporter
	Safe operation and management of construction activities

7.1.6.1 Attribute 1: Road Pavement Condition Assessment

The pavement impact assessment is to estimate the increased traffic on the state and local council roads that are part of the project routes. The generic impact assessment will be based on the methodology detailed by Austroads Publications. The heavy vehicles' Equivalent Standard Axle (ESA) equivalents will be compared to estimate the impact caused by the construction traffic.

Assessment Process

It is understood that there will be a range of construction vehicles in use during the construction stage, ranging from light duty trucks, excavator carriers, crane trailers and 34 tonne cable drum delivery trucks.

It is assumed that the cable construction vehicle traffic is expected in all the sealed and unsealed roads under local municipality jurisdiction.

Table 7.12: Road Damage Calculation (Example)

Item	Vehicle Usage	Class	Axle Group	ESA (Laden and Unladen)
1	Two Light Duty Trucks	2 Axle Rigid Truck	SAST x 2-	7.1
2	Four Twin steer rigid trucks	4 Axle Twinsteer Rigid Truck	TADT x 2	16.4
3	Four 36t Excavator carrier	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	41
4	Two 21 tonne excavator carrier	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	20.4
5	Manitou Crane (Delivery) x 2	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	20.4
6	Front End Loader (delivery) x 2	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	20.4
7	Grader (delivery) x 2	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	20.4
8	Water Truck x 2	3 Axle truck	SAST x 1 TADT x 1	14.3
9	Hydrovac Excavator (delivery) x 2	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	20.4
10	34 Tonne cable drum delivery x 1	Prime Mover and Low Loader with Dolly (Gooseneck)	SAST x 1 TADT x 4	10.3
TOTAL ESAs Generated for mobilization.				**191 ESAs**

The vehicular traffic assumed for a single site during the initial setup is assumed in Table 7.12 and total damage to the pavement in terms of ESA is calculated. In order to assess the 'worst case' event, the above estimation does not include daily traffic during the construction period and only includes mobilization traffic.

Generic Impact Assessment

A typical local access road serving a few rural properties with 2000 ESAs (2 heavy vehicles per week) will have a significant reduction in its design life due to the construction traffic. The example mobilization traffic estimated in Table 7.12 is 10% of its design life i.e. reducing its serviceability by two years. However, many of the local roads appear to be surpassed their design life and an upgrade is recommended based on a detailed assessment of individual local roads.

The unsealed gravel roads and dirt tracks are of very low capacity to carry heavy vehicles. The conditions assessment identified that most of the unsealed roads are in poor condition with no wearing course or with soft shoulders due to poor drainage conditions. The heavy vehicle traffic due to the construction activity will expedite the existing pavement defects i.e., bearing failures due to soft shoulders.

Having regard for the above, project generated traffic is anticipated to negatively impact the road pavement conditions. It is recommended that this assessment is reviewed and updated upon finalization of the ultimate laydown area locations and construction methodology.

7.1.6.2 Attribute 2: Safe Condition of Bridges and Culverts

As identified in Section 6.3.3, there are a number of bridges within the study area that have an operational mass limit. It is noted that this list is not comprehensive and is based on publicly available data and information. Notwithstanding, it is possible that there are additional bridges and culverts throughout the study area and along the paths of travel to the site which will likely require an inspection by a suitably qualified civil engineer in order to confirm they are in an appropriate condition for the expected vehicles that will be generated by the project.

7.1.6.3 Attribute 3: Provision of Adequate Road Geometry

Swept Path Assessment Methodology

Swept paths have been undertaken at critical locations to understand whether any works may be required to accommodate the access requirements for large vehicles. As stated above in section 4.2.5.1, it has been assumed that the largest vehicle that will access the locations that have been identified is a 19m semi-trailer (excluding the transformer transporter).

For the purposes of this assessment, it was assumed that all roads classified on the B-double road network are accessible by a 19m-semi-trailer. Therefore, the swept path assessments were triggered where a semi-trailer is required to turn from the B-double road on to a lower order road. Feedback provided by Council also indicated that many of the Council roads identified on the B-double road network may have access constraints, these locations were therefore also assessed.

It is noted that for turning movements between the external road network and the access tracks, a generic swept path profile has been provided, outlining the generalised width requirements to accommodate a 19m semi-trailer. This profile can be utilised as a template to understand the spatial requirements for access at all access track intersections.

As a separate analysis to the above, swept paths have been undertaken for the bespoke transformer transport at all critical locations between the freeway and the converter stations.

In any location where physical works may be required to be completed to modify the existing road geometry to accommodate the vehicle through an intersection, a detailed investigation of existing underground and overhead services / utilities is required to be completed. In the instances where services / utilities are impacted, authority requirements and consent must be sought prior to modifications to intersection geometry. Where possible, impacts should be identified during the design phase.

19m Semi Trailer Swept Paths at Required Intersections

As stated above, it has been assumed that all roads designated on the DTP gazetted B-double road network are capable of accommodating the turning movement requirements for a 19m semi-trailer. These intersections were therefore excluded from this assessment.

Swept paths were undertaken at key locations on the council road network and turning movements between the B-double road network and lower order roads. The locations where swept paths were undertaken are outlined in the figure below.

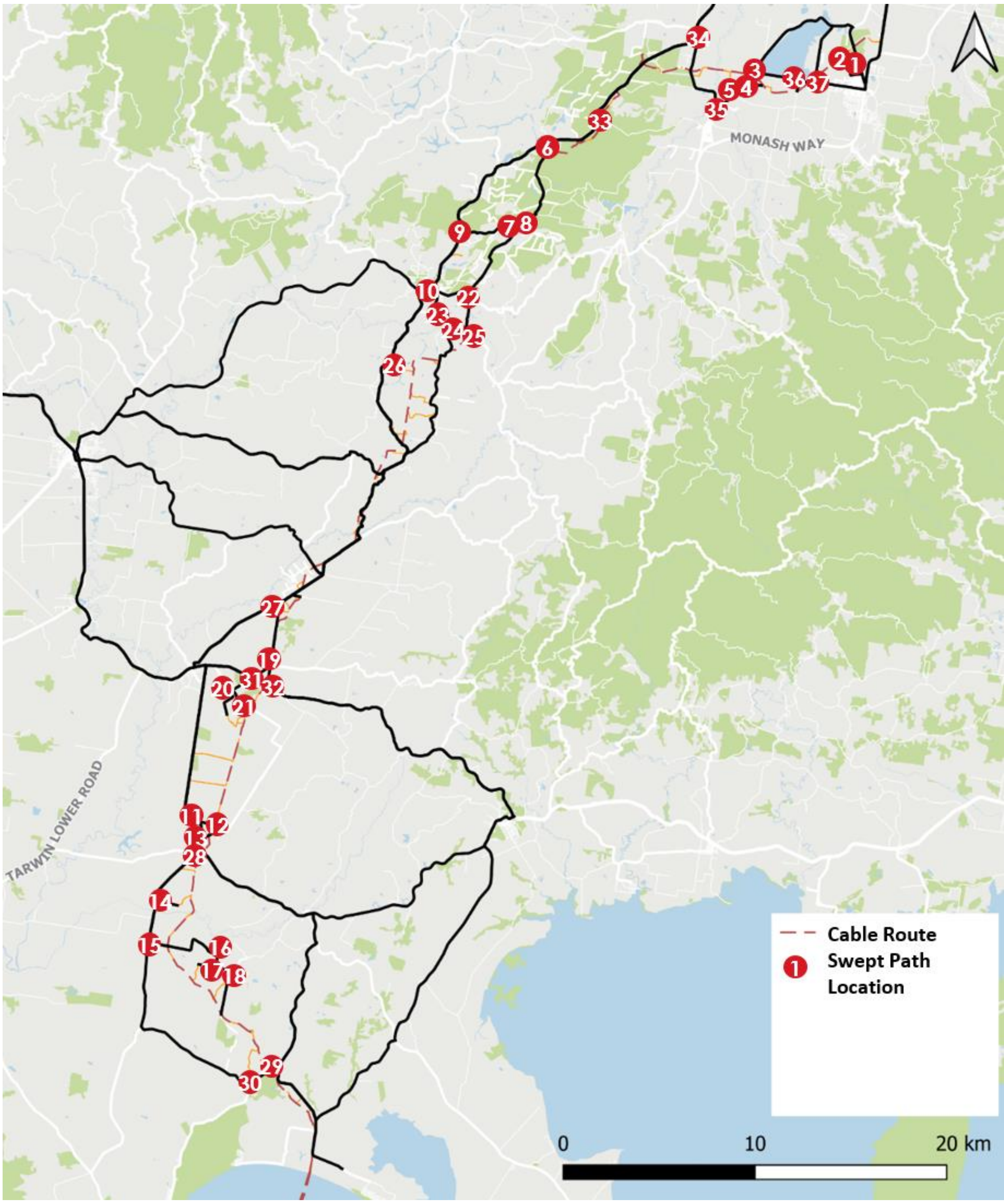


Figure 7.11: 19m Semi-Trailer Swept Path Assessment Locations

The swept paths undertaken are shown in Appendix B , with a summary of the results found shown in Table 7.13. It is noted that the above assessment outlines recommendations based on the currently known construction vehicles, laydown area locations and project alignment. This advice is subject to change based on the ultimate arrangements of the project.

Table 7.13: 19m Semi-Trailer Swept Path Assessment Results

#	Location	Swept Path Assessed	Results
1	Intersection of Monash Way / Acacia Way	Turning movements into / out of Acacia Way from Monash Way	No works identified
2	Intersection of Silcocks Road / Acacia Way	Turning movements into / out of Acacia Way from Silcocks Road	No works identified
3	Intersection of Yinnar Road / Switchback Road	Turning movements into / out of Switchback Road from Yinnar Road	No works identified
4	Intersection of Yinnar Road / Morrisons Road	Turning movements into / out of Morrisons Road from Yinnar Road	No works identified
5	Intersection of Yinnar Road / Mcfarlane Road	Turning movements into / out of Mcfarlane Road from Yinnar Road	Minor local widening may be required
6	Intersection of Strzelecki Highway / Ten Mile Creek Road	Turning movements in / out of Ten Mile Creek Road from Strzelecki Highway	Minor local widening may be required
7	Intersection of Darlimurla Road / Old Darlimurla Road	Turning movements in / out of Old Darlimurla Road from Darlimurla Road	Minor local widening may be required Clearing of trees and low hanging branches may be required
8	Intersection of Darlimurla Road / Pleasant Valley Road	Turning movements in / out of Pleasant Valley Road from Darlimurla Road	Minor local widening may be required Clearing of trees and low hanging branches may be required
9	Intersection of Strzelecki Highway / Darlimurla Road	Turning movements in / out of Darlimurla Road from Strzelecki Highway	No works identified
10	Intersection of Strzelecki Highway / Baromi Road	Turning movements in / out of Strzelecki Highway from Baromi Road	No works identified
11	Intersection of Meeniyan-Promontory Road / Neals Road	Turning movements in / out of Neales Road from Meeniyan-Promontory Road	No works identified
12	Intersection of Neales Road / Moores Road	Turning movements in / out of Moores Road from Neales Road	No works identified
13	Intersection of Meeniyan-Promontory Road / Moores Road	Turning movements in / out of Moores Road from Meeniyan-Promontory Road	No works identified
14	Intersection of Buffalo Waratah Road / Setfords Road	Turning movements in / out of Setfords Road from Buffalo Waratah Road	No works identified
15	Intersection of Buffalo Waratah Road / Harding Lawson Road	Turning movements in / out of Harding Lawson Road from Buffalo Waratah Road	Possible clearing of low hanging branches
16	Intersection of Harding Lawson Road / Evans Road	Turning movements in / out of Evans Road from Harding Lawson Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required

#	Location	Swept Path Assessed	Results
17	Intersection of Evans Road / Pilkington Road	Turning movements in / out of Pilkington Road from Evans Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required
18	Intersection of Evans Road / Duncans Road	Turning movements in / out of Duncans Road from Evans Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required
19	Intersection of McKittericks Road / Stony Creek Road	Turning movements in / out of McKittericks Road from Stony Creek Road	No works identified
20	Intersection of Stony Creek-Dollar Road / Jacks Road	Turning movements in / out of Jacks Road from Stony Creek Road	No works identified
21	Intersection of Stony Creek-Dollar Road / Buffalo-Stony Creek Road	Turning movements in / out of Stony Creek-Dollar Road from Buffalo-Stony Creek Road	No works identified
22	Intersection of Baromi Road / Old Darlimurla Road	Turning movements in / out of Old Darlimurla Road from Baromi Road	No works identified
23	Intersection of Boolarra South-Mirboo North Road / Nicholls Road	Turning movements in / out of Nicholls Road from Boolarra South-Mirboo North Road	No works identified
24	Intersection of Boolarra South-Mirboo North Road / Old Nicholls Road	Turning movements in / out of Old Nicholls Road from Boolarra South-Mirboo North Road	Possible clearing of trees and low hanging branches may be required
25	Intersection of Boolarra South-Mirboo North Road / Fullertons Road	Turning movements in / out of Fullertons Road from Boolarra South-Mirboo North Road	No works identified
26	Intersection of Mardan Road / Pincinis Lane	Turning movements in / out of Pincinis Lane from Mardan Road	No works identified
27	Intersection of Meeniyan-Mirboo North Road / Dumbalk-Stony Creek Road	Turning movements in / out of Dumbalk-Stony Creek Road from Meeniyan-Mirboo North Road	No works identified
28	Buffalo-Tarwin Lower Road / Buffalo – Waratah Road	Turning movements in / out of Buffalo-Waratah Road from Buffalo-Tarwin Lower Road	No works identified
29	Waratah Road / Fish Creek – Walkerville Road	Turning movements in / out of Fish Creek-Walkerville Road from Waratah Road	No works identified
30	Fish Creek – Walkerville Road / Kerrs Road	Turning movements in / out of Kerrs Road from Fish Creek-Walkerville Road	No works identified
31	South Gippsland Highway / Stony Creek – Dollar Road	Turning movements in / out of Stony Creek-Dollar Road from the South Gippsland Highway	No works identified
32	South Gippsland Highway / McKittericks Road	Turning movements in / out of McKittericks Road from the South Gippsland Highway	No works identified
33	Strzelecki Highway / Creamery Road	Turning movements in / out of Creamery Road from the Strzelecki Highway	No works identified

#	Location	Swept Path Assessed	Results
34	Strzelecki Highway / Yinnar-Driffield Road	Turning movements in / out of Yinnar-Driffield Road from Strzelecki Highway	No works identified
35	Yinnar-Driffield Road / Yinnar Road	Turning movements in / out of Yinnar Road from Yinnar-Driffield Road	No works identified
36	Switchback Road / Frasers Road	Turning movements in / out of Frasers Road from Switchback Road	No works identified
37	Switchback Road / Nadenbouschs Road	Turning movements in / out of Nadenbouschs Road from Switchback Road	No works identified

19m Semi Trailer Swept Path Requirements at Access Tracks

The access arrangements for turning movements onto access tracks from the external road network can be found through the requirements as outlined in *AS 2890.2:2018 (Australian Standards Off-Street commercial vehicle facilities).* The Australian Standards indicates that a 19m semi-trailer has a turning radius width requirement of 12.5m in width that is clear from obstructions. This width should be provided at the access points to the road network for all access tracks.

In addition to the above, a minimum trafficable road width of 7m should be provided for access tracks.

The turning template profiles as outlined in the Australian Standards for a 19m semi-trailer is shown in Figure 7.12.

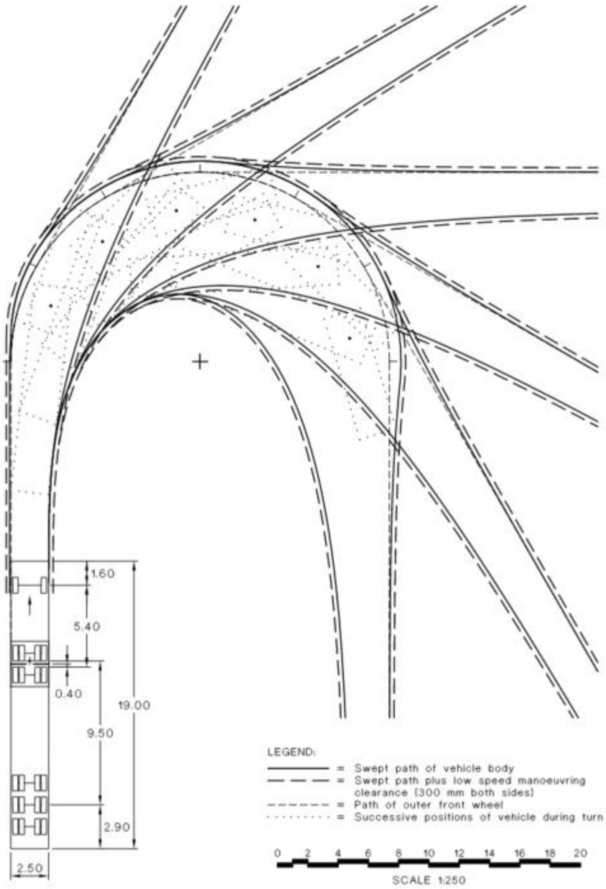


Figure 7.12: 19m Semi-Trailer Swept Path Assessment Template

Transformer Transport Swept Paths

In addition to the swept path assessments as outlined above, assessments have been undertaken for the bespoke transformer transport vehicle for its path of travel from the Princes Freeway to the Driffield and Hazelwood converter station locations.

The locations where swept paths were undertaken are outlined in Figure 7.13

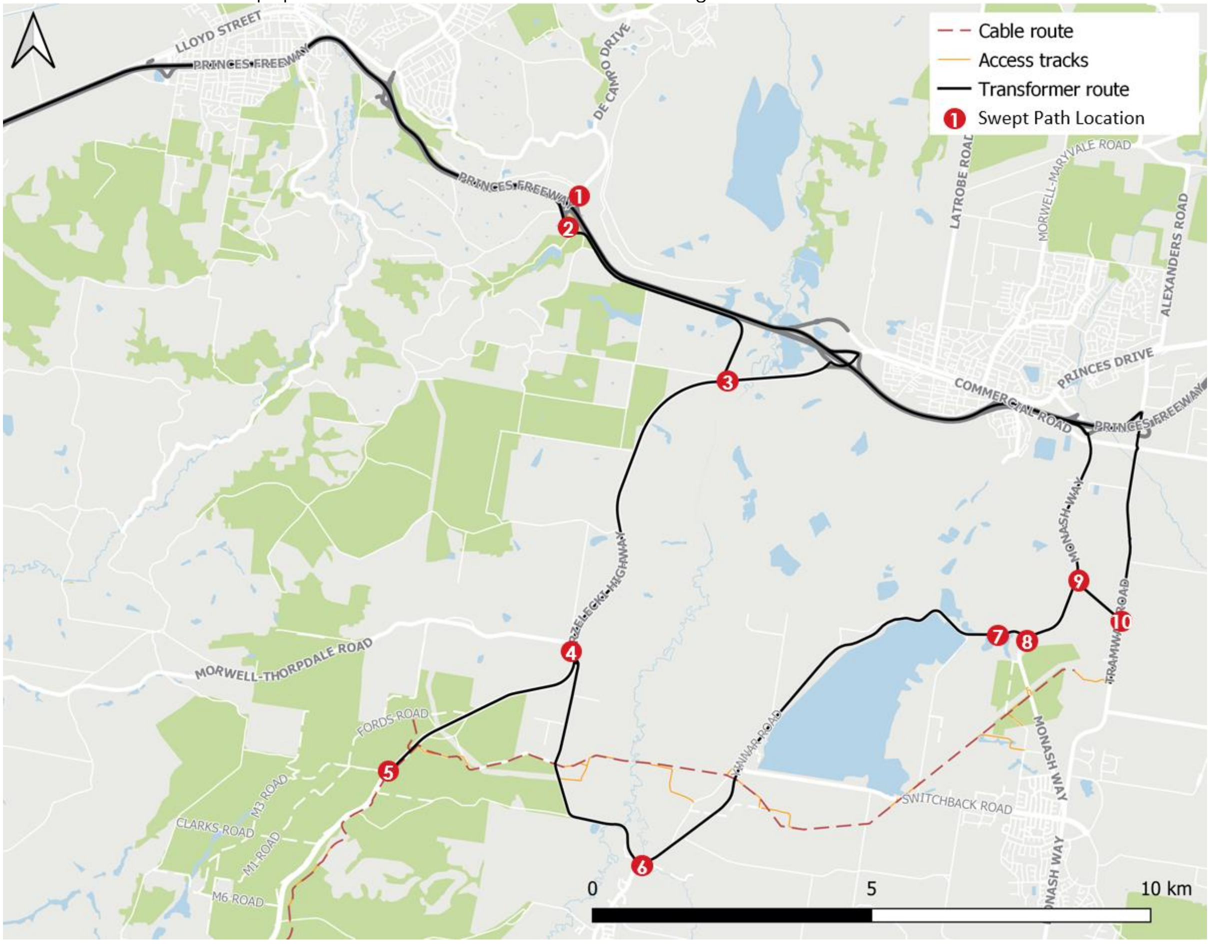


Figure 7.13: Transformer Transport Swept Path Assessment Locations

The swept paths undertaken are shown in Appendix C , with a summary of the results found shown in Table 7.14 indicating whether works may be required to accommodate the turning movements of the transformer transporter.

This assessment is yet to be completed for the path of travel from the Port of Melbourne to the Princes Freeway. Based on feedback from the Department of Transport it was determined that the specific vehicle arrangements should be identified prior to completing these works, given the constrained environment in Melbourne and volume of obstructions to be considered. The DTP heavy haulage team and heavy vehicle regulator are to be consulted with early to identify these works.

Table 7.14: Transformer Transport Swept Path Assessment Results

#	Location	Swept Path Assessed	Results
1	Princes Freeway off-ramp to Marretts Road	Right turn from Princes Freeway off-ramp on to Marretts Road.	Grading of green space to accommodate vehicle turning arc.
2	Marretts Road westbound and on-ramp to Princes Freeway	Marretts Road approach to Princes Freeway and on-ramp to Princes Freeway.	Removal of crash barriers may be required on on-ramp to freeway.
3	Intersection of Marretts Road and Strzelecki Highway	Right turn from Marretts Road on to Strzelecki Highway Left turn from Strzelecki Highway on to Marretts Road.	Removal of concrete road separator may be required on Marretts Road approach.
4	Intersection of Strzelecki Highway and Yinnar-Driffield Road	Left turn movement from Strzelecki Highway on to Yinnar-Driffield Road. Right turn from Yinnar Driffield Road on to Strzelecki Highway.	Slip lane used for both turning movements. Travelling contraflow for right turn movement from Yinnar-Driffield Road on to Strzelecki Highway. Clearing of low hanging branches may be required. Further investigation recommended.
5	Intersection of Strzelecki Highway and Smiths Road	Right turn into Smiths Road from Strzelecki Highway. Left turn out of Smiths Road to Strzelecki Highway.	Minor widening works to shoulder at intersection may be required. Clearing of low hanging branches or trees may be required. Further investigation recommended.
6	Intersection of Yinnar-Driffield Road and Yinnar Road	Left turn from Yinnar-Driffield Road to Yinnar Road utilising pre constructed detour route on private property. Right turn from Yinnar Road to Yinnar-Driffield Road utilising pre constructed detour route on private property.	Local road widening may be required at turn onto Yinnar Driffield Road, including trafficable surface of green space and removal of crash barriers.
7	Brodribb Road on Approach to Monash Way	Eastbound and westbound through movements on Brodribb Road.	No works identified
8	Intersection of Brodribb Road and Monash Way	Left turn movement from Brodribb Road on to Monash Way. Right turn movement from Monash way on to Brodribb Road.	Slip lane used for both turning movements. Travelling contraflow for right turn movement from Monash Way on to Brodribb Road. No works identified.
9	Intersection of Monash Way and Bonds Lane	Right turn movement from Monash Way on to Bonds Lane. Left turn movement from Bonds Lane on to Monash Way.	Local road widening may be required at intersection to accommodate turning arc. Removal of fencing and vegetation may be required. May require use of private property.
10	Intersection of Bonds Lane and Tramway Road	Right turn movement from Bonds Lane on to Tramway Road. Left turn movement from Tramway Road on to Bonds Lane.	Local road widening may be required at intersection to accommodate turning arc. May require removal of fencing and vegetation. May require use of private property.

It is noted that the transport of this vehicle will require constant traffic management, with many swept path movements entailing the vehicle blocking two lanes of traffic.

As outlined above in regard to the 19m semi-trailer swept paths, the above assessment outlines recommendations based on the currently known converter station locations. This assessment will change if the ultimate arrangements of the project and transformer transport vehicle are different to those assessed.

7.1.6.4 Attribute 4: Review of Crash History

A review of the historic crash data for the study area was conducted in Section 6.3.3 above. This background review found that there were 181 crashes within a five-year period in the surrounding area, six of which were fatal. Nine locations were identified to have a noted high number of crashes, which have been further explored.

The nine locations identified to have a high number of crashes over the past 5 years are detailed in Table 7.15 below along with the surveyed two-way AADT flows and the maximum daily trip generation at each location. The percentage impact the maximum daily trip generation has on the surveyed traffic volumes has also been calculated and is detailed in the table below.

Table 7.15: Crash Location Assessment

Location	Road	Crashes by type			Surveyed AADT Traffic Volume	Maximum Daily Traffic Generation	% Impact of Traffic Generation
		Fatal	Serious	Other			
1	Tramway Road (Churchill)	2	2	3	3,134	400	12.76%
2	Monash Way (Churchill)	0	6	3	7,737	103	1.33%
3	Strzelecki Highway (Driffield)	0	6	2	3,330	216	6.49%
4	Strzelecki Highway (Mirboo North)	1	3	5	3,516	216	6.14%
5	Strzelecki Highway (Leongatha)	1	0	2	3,516	216	6.14%
6	South Gippsland Highway (Meeniyan)	0	3	0	4,404	216	4.90%
7	Meeniyan-Promontory Road (Buffalo)	0	3	0	2,006	216	10.77%
8	Fish Creek-Foster Road (approach to Foster)	0	3	2	1,076*	60	5.58%
9	Fish Creek-Foster Road (Foster)	1	0	2	1,076*	60	5.58%

*Data has been sourced from DTP open data due to no survey data being available at this location

As detailed in the table above, the highest percentage impact of 12.76% occurs on Tramway Road to the north of Churchill which is due to the Hazelwood Converter Station being accessed directly from Tramway Road. The lowest impact is on Monash Way with 1.76%.

There is always an inherent risk of increasing the number of crashes by increasing the volume of traffic on any road however, given the low values of percentage impact at higher risk locations, we can conclude that there is no material increase in the likelihood of crashes during the construction phase as a result of the project.

However, at the two highest percentage impact locations of Tramway Road and Meeniyan-Promontory Road mitigation measures can be implemented to reduce the possibility of crashes and increase the safety of road users during the construction period.

7.1.6.5 Attribute 5: Intersection Safe Sight Distance Assessment

Both an on-site and desktop assessment were undertaken for each of the approaches at every intersection identified in Table 6.5 to determine whether a further, more detailed, assessment was required to identify the existing achievable sight distances and what measures could be installed to improve the safety of said intersections.

To conduct detailed assessments of intersection sight distances, reference was made *to Austroads Guide to Road Design Part 4a: Section 3.2 Sight Distance Requirements for Vehicles at Intersections*. This section of the guideline identifies the Approach Sight Distance (ASD) requirements on minor arm approaches and the Safe Intersection Sight Distance (SISD) requirements on major arm approaches; diagrams detailing both measurements taken from the Austroads guidelines are detailed in Figure 7.14 below.

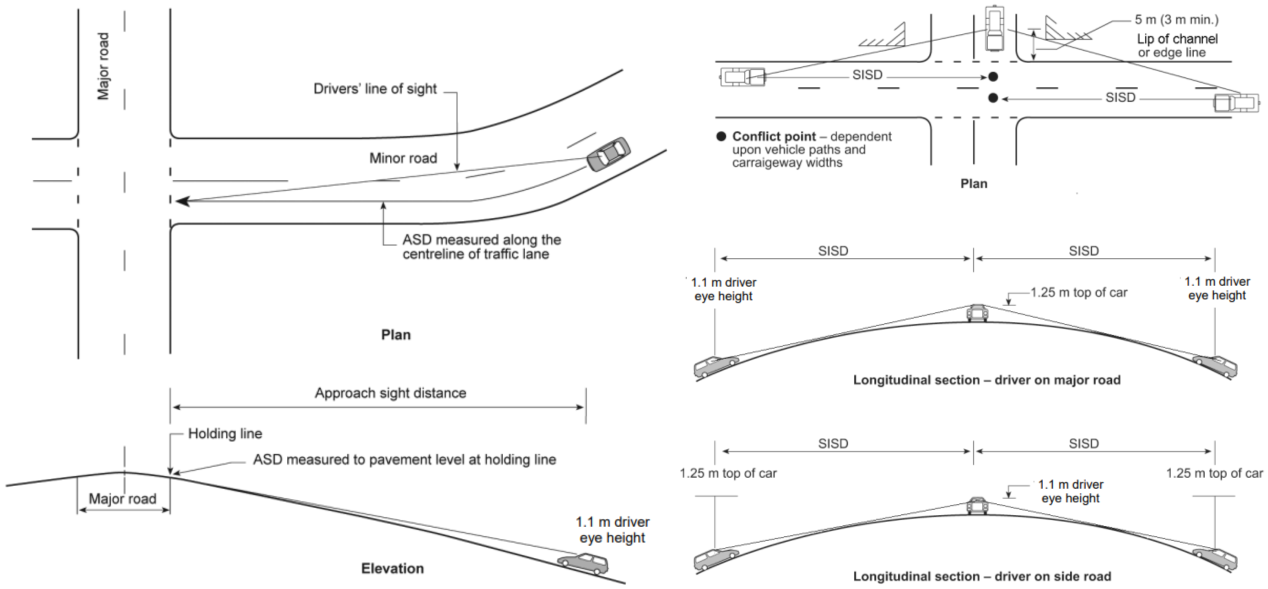


Figure 7.14: Application of Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD)

Of the intersections assessed, the vast majority were identified to have no issues achieving the required sight distances however, those that were flagged are detailed in Table 7.16 below along with a description of the existing situation, any preventative measures that currently exist and any proposed improvements.

Table 7.16: Sight Distance Assessment Results

ID	Intersection	Project Use (W/ H/AT)	Approach	Sight Distance	Existing Measures
11	Meeniyan – Promontory Road / Waratah Road	HV/W/AT	Waratah Road (minor arm)	ASD is achieved	There are curves in the road in both directions on the major carriageway which limit the available sight distance. The intersection currently has appropriate signage to identify the curves in the road and the location of the intersection.
			Meeniyan – Promontory Road (south)	SISD is not achieved	
			Meeniyan – Promontory Road (north)	SISD is not achieved	
14	Meeniyan – Promontory Road / Buffalo – Tarwin Lower Road	HV/W/AT	Buffalo – Tarwin Lowe Road (minor arm)	ASD is not achieved	Curved alignment at all three approaches prevents achievable sight distances. Appropriate signage identifying the curves in the road currently exists on both major and minor carriageways.
			Meeniyan – Promontory Road (south-east)	SISD is not achieved	
			Meeniyan – Promontory Road (north-west)	SISD is not achieved	
35	Meeniyan Mirboo North Road / Mardan Road	HV / W / AT	Loves Lane (minor arm)	ASD is not achieved	Steep incline on the minor arm approach limits the available visibility and a curved carriageway on Mardan Road limits the visibility of the intersection. Appropriate signage is provided to alert drivers of the intersection in both approaches.
			Mardan Road (west)	SISD is not achieved	
			Meeniyan – Mirboo North Road (east)	SISD is achieved	
42	Baromi Road / Old Darlimurla Road	HV / W / AT	Old Darlimurla Road (minor arm)	ASD is achieved	Curved carriageways in both directions on the major carriageway limits the available sight distance. Appropriate curve in the road signage is in place on both approaches.
			Baromi Road (north-west)	SISD is not achieved	
			Boolarra – Mirboo North Road	SISD is not achieved	

As detailed in the above table, there are multiple intersections on the road network used by construction traffic which do not meet the Austroads guidelines for sight distance requirements for vehicles at intersections. However, as observed during the site visit, each of the affected approaches have the appropriate signage required to warn road users of the approaching intersection and any adverse road conditions like a curve in the road. Therefore, no further treatment, in the form of signage or otherwise, has been identified at any of the assessed intersections.

7.1.6.6 Attribute 6: Height Clearance Requirements of the Transformer Transporter

The transformer transporter is a 6m high vehicle. A review should be undertaken of the path of travel of the transformer transporter for overhead obstructions such as power lines. Observations from the site visit identified low hanging power lines over Marretts Road, Strzelecki Highway, Yinnar-Driffield Road, Yinnar Road, Brodribb Road and Tramway Road.

It is noted that many overhead obstructions such as power lines are expected to be present along the path of travel through Melbourne.

7.1.6.7 Attribute 7: Safe Operation and Management of Construction Activities

There are a number of operational items that have had consideration to ensure the construction traffic generated by the site will operate in a safe environment. These have been outlined below.

Crash Risk Due to Poor Road Lighting at Night

Any construction related activities occurring at night will require the provision of appropriate road lighting to improve road safety. The core construction activities that occur at night is the HDD crossings of roads and at the shoreline, which will generate heavy movements during the 24/7 operation.

VicRoads technical guideline, *TCG 006 – Guidelines for Street Lighting Design (Jan 2016)* provide recommendations on where road lighting is typically provided. At unsignalized intersections a single flag light is recommended.

General Driver Safety

The construction of the project will involve an increase in the number of heavy movements on the road network, including 19m semi-trailers. This increase in traffic for the life of the construction process is an important consideration. Management and monitoring is typically enforced to address key issues such as driver fatigue, fitness for work, employee inductions, familiarization of vehicles and the road network.

Movement of Transformer Transporter

The transformer transporter is an over dimensional vehicle, and will utilize the approved over dimensional road network, as outlined in Section 4.2.6.4. The routes utilized have been developed in conjunction with the Department of Transport, Council and the Heavy Vehicle Regulator.

Safety Risk of Pedestrians in Townships within the Study Area

Pedestrian activity within the study area and along the construction traffic routes is primarily limited to the townships. The heavy movements through townships are primarily constrained to the arterial B-Double approved road network and are therefore operating in line with expectation and existing use. There are a number of townships / population centres in which vehicle movements occur off the arterial road network. These are outlined below, noting that many of these townships have very small populations:

- Buffalo
- Stony Creek
- Meeniyan
- Mirboo North
- Baromi
- Churchill

When construction vehicles pass through these locations there is potentially an increased risk of crashes with a more significant consequence. This safety risk will be particularly pronounced during any local events that may occur during construction activities that will attract higher pedestrian numbers. These events may include community events, local markets or festivals.

Safety Risk Around Schools

There are a number of schools and kindergartens that are present along the routes that will experience an uplift in traffic (including heavy vehicles) as a result of the construction of the project. These schools have been listed below:

Table 7.17: List of Schools Located along Identified Construction Travel Routes

Secondary College	Primary School	Kindergarten
South Gippsland Shire Council		
Foster Secondary School Leongatha Secondary College Mary Mackillop Catholic Regional College Mirboo North Secondary School	Fish Creek Primary School Foster Primary School Leongatha Primary School Chairo Christian School, Leongatha South Gippsland Specialist School, Leongatha St Lawrences O'Toole's, Leongatha Tarwin Valley Primary School Mirboo North Primary School	Fish Creek Kindergarten Foster Kindergarten Leongatha Community Preschool (Allora) Leongatha Community Preschool (Hassett Street) Nurture One Brown Street Childrens Centre, Leongatha Leongatha Childrens Centre Meeniyan Preschool Mirboo North Kindergarten
Latrobe City Council		
Kurnai campus	Boolarra Primary School Churchill Primary School Churchill North Primary School Hazelwood North Primary School Lumen Christi Primary School Yinnar Primary School	Churchill Preschool Federation Children's Centre Churchill Glendonald Park Preschool Yinnar Pre School

*It is noted that this is not a comprehensive list of all schools that construction vehicles will travel past. It simply represents a snapshot of those which are in the area.

When construction vehicles pass through these locations there is potentially an increased risk of crashes with a more significant consequence, particularly given the high number of children within the road network during pick-up and drop-off time periods.

Unforeseen Safety Risks

There are a number of road upgrades which are recommended throughout this report. These intersection works should be constructed to the same or better standard than existing. Any new intersections are to be designed and constructed with regard to Austroads guidelines and the requirements and standards of the responsible authority; this includes new intersections at access roads to the project alignment. Any new road works will be subject to road authority review and approval.

Transportation of Hazardous Goods

The transportation of any hazardous goods may be required as part of the construction phase of this project. This may be required to support specific construction activities throughout the completion of the projects delivery phase.

Peak Seasonal Events

A number of the roads in the study area can experience fluctuations in traffic volumes due to tourism. These volumes can typically peak during the summer months around public holidays, such as Christmas/New Year, Australia Day and Easter. These peak events will see an increase in traffic volumes on roads proposed to be used by the project in the study area, creating potential capacity constraints on roads that otherwise may not experience capacity issues, as well as cause safety risks with construction vehicles due to an increase in the volume of unfamiliar drivers in the area.

7.1.7 Value 2 – EES Impact Significance Assessment

The analysis and commentary presented above has established the likely traffic performance impacts. The impacts outlined above have been assessed in accordance with the significance assessment methodology outlined in section 5.6 with Table 5.2 and Table 5.3 identifying the criteria that each impact has been assessed using.

The significance assessment for value 2 prior to the implementation of any mitigating works has been summarised in Table 7.18

Table 7.18: Value 2: Safe Road Performance, Condition and Design – Inherent Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Road pavement condition assessment	Nil	Roads may require resurfacing / remediation works.	The road network on many local roads is in poor condition. The traffic generated will further degrade the condition of local roads.	Moderate	Moderate	Moderate
Safe Road Performance, Condition & Design	Safe condition of bridges and culverts	Nil	Bridges and culverts may not be in an appropriate condition for the expected size of vehicles generated by the site	The bridges and culverts on many local roads are in poor condition. The size of the vehicles generated may be too large for the bridges and culverts in their current condition	Moderate	Major	High
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Construction of access tracks providing access to the external road network	Semi-trailer access to proposed access tracks.	Locations with future access points to the public road network with existing trees, fencing and infrastructure. Access points provided that allow the turning movements of semi trailers.	Moderate	Moderate	Moderate
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	Semi-trailers may require local widening works to access the site at the following locations: • Yinnar Road / Mcfarlane Road • Strzelecki Highway / Ten Mile Creek Road	The road network at these locations poorly accommodates semi trailer movements. The traffic generated by the site will damage the shoulders, road reserve etc.	Moderate	Moderate	Moderate

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	Semi-trailers may require works to access the site at the following locations • Darlimurla Road / Old Darlimurla Road • Darlimurla Road / Pleasant Valley Road • Harding Lawson Road / Evans Road • Evans Road / Pilkington Road • Evans Road / Duncans Road	The road network at these locations poorly accommodates semi trailer movements. Semi trailers cannot conduct these movements .	Moderate	Major	High
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The movement of the transformer transporter generally throughout the road network will travel down the centre of the road and travel at a slow speed.	Roads are not designed for vehicles of this size in standard operation. The transformer transporter will travel down the centre of the road, heavily delaying traffic.	High	Major	Major

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The transformer transporter may require works and removal of minor road furniture to access the site at the following locations: • Princes Freeway off-ramp to Marretts Road • Marretts Road westbound and on-ramp to Princes Freeway • Marretts Road and Strzelecki Highway • Strzelecki Highway and Smiths Road • Yinnar-Driffield Road and Yinnar Road	The road network at these locations poorly accommodates the transformer transporter. The transformer transporter cannot conduct these movements.	High	Major	Major
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The transformer transporter may require works to private property to access the site at the following locations: • Monash Way and Bonds Lane • Bonds Lane and Tramway Road	Private properties adjacent the road reserve at tight corners. Transformer transporter cannot complete movement.	High	Major	Major
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 1 Tramway Road (Churchill)	Existing location with a fatal crash in the last five years. The traffic movements generated by the site do not align with the crash trend.	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 2 Monash Way (Churchill)	Existing location with a number of serious crashes in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 3 Strzelecki Highway (Driffield)	Existing location with a number of serious crashes in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 4 Strzelecki Highway (Mirboo North)	Existing location with a fatal crash in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 5 Strzelecki Highway (Leongatha)	Existing location with a fatal crash in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 6 South Gippsland Highway (Meeniyan)	Existing location with a number of serious crashes in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 7 Meeniyan-Promontory Road (Buffalo)	Existing location with a number of serious crashes in the last five years. The traffic movements generated by the site do not align with the crash trend.	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 8 Fish Creek-Foster Road (Approach to Foster)	Existing location with a number of serious crashes in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 9 Fish Creek-Foster Road (Foster)	Existing location with a fatal crash in the last five years. The traffic generated by the site is a small increase in overall daily traffic volumes.	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at various locations with a lesser traffic crash history	Existing locations with serious and 'other' crashes. The traffic generated by the site is a small increase in overall daily traffic volumes.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Intersection safe sight distance assessment	Nil	Increased safety risk at the following locations with sight distance constraints, noting warning signage is provided: • Meeniyan – Promontory Road / Waratah Road • Meeniyan – Promontory Road / Buffalo – Tarwin Lower Road • Meeniyan Mirboo North Road / Mardan Road • Baromi Road / Old Darlimurla Road	Poor sight distance, with warning signage provided. Traffic generated at intersection with warning signage.	Low	Negligible	Very Low
Safe Road Performance, Condition & Design	Height clearance requirements of transformer transporter	Nil	Low hanging power lines may present an obstruction on the path of travel of the transformer transporter	Low hanging power lines The path of travel of the transformer transporter may impact low hanging power lines	High	Major	Major
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Increased crash risk due to poor road lighting for HDD at night	Locations where future access points will be placed that do not have sufficient lighting. Vehicle movements generated with insufficient lighting provided.	High	Major	Major

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	General driver safety	General driver behaviour and crash risk.	Low	Major	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety impact of movement of transformer transporter	Roads are not designed for vehicles of this size in standard operation. The transformer transporter will travel down the centre of the road, heavily delaying traffic.	High	Major	Major
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety risk of pedestrians in townships with increased truck movements	Roads used to access the site travel past townships on local roads. Heavy vehicle movements on the local road network.	Moderate	Major	High
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety risk around Schools – identify schools / townships	Roads used to access the site travel past schools. Heavy vehicle movements during school pick-up .	High	Major	Major
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Unforeseen safety risk	Diverted roads should be constructed to the same or better standard than the original.	Very Low	Major	Low
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Transportation of Hazardous Goods	Movement of hazardous goods materials to support the construction phase.	High	Severe	Major
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Peak Seasonal Events	Increase in the number of unfamiliar drivers onto the road network during seasonal holiday periods.	Moderate	Major	High

7.1.8 Value 2 – Mitigation Works

The attributes identified above have then been further assessed to identify mitigating works.

7.1.8.1 Attribute 1: Road Pavement Condition Assessment

It is recommended that the individual construction site access / local road should be assessed by a suitably qualified pavement engineer and existing defects should be rectified to prevent further damage and delays to the project. Should any pavement fail during the construction period or gravel road be degraded to an unacceptable degree (as determined by a civil / pavement engineer), as a result of project traffic, the contractor should maintain an adequate condition of the road and / or liaise with the relevant road authority to ensure they are informed as required.

7.1.8.2 Attribute 2: Safe Condition of Bridges and Culverts

It is recommended that the ultimate travel routes are reviewed to identify bridges and culverts that will be traversed by heavy construction vehicles. This process should be undertaken in consultation with road authorities. These pieces of infrastructure road should be assessed by a suitably qualified civil engineer to confirm they are in an acceptable and appropriate state for the vehicles that will be generated by the construction activities.

7.1.8.3 Attribute 3: Provision of Adequate Road Geometry

Additional road widening works to accommodate construction vehicle movements are outlined in Table 7.19 and Table 7.20. Should any unforeseen large sized vehicles required access during the construction period, separate assessment will be required to ensure access can be achieved.

Table 7.19: Road Works Required to Accommodate 19m Semi-Trailer Movements

#	Location	Results
1	Intersection of Yinnar Road / Mcfarlane Road	Minor local widening may be required
2	Intersection of Strzelecki Highway / Ten Mile Creek Road	Minor local widening may be required
3	Intersection of Darlimurla Road / Old Darlimurla Road	Minor local widening may be required Clearing of trees and low hanging branches may be required
4	Intersection of Darlimurla Road / Pleasant Valley Road	Minor local widening may be required Clearing of trees and low hanging branches may be required
5	Intersection of Buffalo Waratah Road / Harding Lawson Road	Possible clearing of low hanging branches
6	Intersection of Harding Lawson Road / Evans Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required
7	Intersection of Evans Road / Pilkington Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required
8	Intersection of Evans Road / Duncans Road	Minor local widening may be required Possible clearing of trees and low hanging branches may be required
9	Intersection of Boolarra South-Mirboo North Road / Old Nicholls Road	Possible clearing of trees and low hanging branches may be required

Should any unforeseen large sized vehicles require access during the construction period, separate assessment will be required to ensure access can be achieved.

Table 7.20: Road Works Required to Accommodate Transformer Transport Movements

#	Location	Results
1	Princes Freeway off-ramp to Marretts Road	Grading of green space to accommodate vehicle turning arc.
2	Marretts Road westbound and on-ramp to Princes Freeway	Removal of crash barriers may be required on on-ramp to freeway.
3	Intersection of Marretts Road and Strzelecki Highway	Removal of concrete road separator may be required on Marretts Road approach.
4	Intersection of Strzelecki Highway and Yinnar-Driffield Road	Slip lane used for both turning movements. Travelling contraflow for right turn movement from Yinnar-Driffield Road on to Strzelecki Highway. Clearing of low hanging branches may be required. Further investigation recommended.
5	Intersection of Strzelecki Highway and Smiths Road	Minor widening works to shoulder at intersection may be required. Clearing of low hanging branches or trees may be required. Further investigation recommended.
6	Intersection of Yinnar-Driffield Road and Yinnar Road	Local road widening may be required at turn onto Yinnar Driffield Road, including trafficable surface of green space and removal of crash barriers.
7	Brodribb Road on Approach to Monash Way	No works identified
8	Intersection of Brodribb Road and Monash Way	Slip lane used for both turning movements. Travelling contraflow for right turn movement from Monash Way on to Brodribb Road. No works identified.
9	Intersection of Monash Way and Bonds Lane	Local road widening may be required at intersection to accommodate turning arc. Removal of fencing and vegetation may be required. May require use of private property.
10	Intersection of Bonds Lane and Tramway Road	Local road widening may be required at intersection to accommodate turning arc. May require removal of fencing and vegetation. May require use of private property.

The movement of the transformer transporter will require traffic management personnel to supervise for the entirety of the process. This will include operations to block traffic during periods of time when the transformer transporter is travelling down the centre of the carriageway, or completing turning movements. Moving warnings will be provided for approaching vehicles that a large, slow moving vehicle is on the approach. It is recommended engagement with a transport operator who can complete the movement of the transformer is consulted as early as possible to ensure all project requirements and risks, as they see it, are identified. Ongoing consultation with the HVR and DTP is required to ensure all approvals are obtained prior to the proposed operation.

7.1.8.4 Attribute 4: Review of Crash History

Inductions will be provided to workers transporting goods to and from the site of the identified locations with an existing safety risk. It is noted that the traffic generated by construction activities is not expected to increase the safety risk at these locations.

Of the crashes outlined in the above review, a high number of those identified involved a single vehicle veering and crashing into an object on the side of the road. This is a likely indication of driver fatigue, with many motorists in rural areas driving for extended durations and long distances.

In order to mitigate the risk of fatigue in the workforce when driving to/from the construction site, a number of measures can be put in place, such as:

- Implementing a plan to limit the length of personnel shifts.
- Comply with industry standards with regard to providing breaks when driving long distances.
- Provide on-site facilities to accommodate breaks for drivers.

It is recommended to continuously monitor the performance of the road network, identify any crashes that might occur on the identified road network by other vehicles and investigate the reasoning of crashes that occur by construction vehicles.

7.1.8.5 Attribute 5: Intersection Safe Sight Distance Assessment

Warning signage already provided at these intersections to warn drivers of visibility issues at intersections with restricted sight distance. No mitigating works required.

7.1.8.6 Attribute 6: Height Clearance Requirements of the Transformer Transporter

If any low hanging overhead power lines are identified that present a safety risk for the movement of the transformer transporter, management strategies should be put in place during the movement of this vehicle.

7.1.8.7 Attribute 7: Safe Operation and Management of Construction Activities

Crash Risk Due to Poor Road Lighting at Night

Temporary construction road lighting to be provided by the contractor at access intersections during HDD operations to provide adequate lighting. A review of existing lighting conditions and lighting requirements to be conducted by the contractor.

General driver safety

Management and monitoring is typically enforced to address key issues such as driver fatigue, fitness for work, employee inductions, familiarization of vehicles and the road network. The Traffic Management Plan (TMP) will address the following in regard to general driver safety:

- measures to manage shift length of personnel
- compliance with industry standards with regard to providing breaks when driving long distances.
- provision of on-site facilities to accommodate breaks for drivers.
- inspection of workplace rosters and work-time records on regular occasions.
- consultation with drivers on issues throughout construction.
- monitor and review process to ensure compliance with TMP.
- possibility to set up a workforce campsite where workers are transported to the site by bus.

Movement of Transformer Transporter

The movement of the transformer transporter will require permanent traffic management personnel to supervise. This will include operations to block traffic during periods of time when the transformer transporter is travelling down the centre of the carriageway, or completing turning movements. Moving warnings will be provided for approaching vehicles that a large, slow moving vehicle is on the approach.

Safety Risk of Pedestrians in Townships within the Study Area

The contractor should be in contact with representatives of the local townships (Council and or relevant community groups) that will experience a large increase in heavy vehicle movements to identify if any events are occurring which will attract larger-than-normal pedestrian volumes. If events are scheduled, the contractor should adjust the proposed operation to manage / limit / prevent any increased project traffic through these locations.

Unforeseen Safety Risks

Infrastructure treatments should be inspected to ensure they comply with relevant standards.

Transportation of Hazardous Goods

The transportation of any hazardous goods / materials shall be done so in adherence to any standard requirements by the road authority as it relates to that specific material.

Peak Seasonal Events

Management of construction operations should be considered during peak seasonal weekends, such as the Christmas/New Year break, Australia Day and Easter to minimise project generated traffic on roads likely to be used by tourists / unfamiliar drivers.

7.1.9 Value 2 – Environmental Performance Requirements

In response to the above assessment, a number of EPR's have been identified. These EPR's are the mechanism to implement the mitigation and management measures that have been found in the above assessment, and have been developed with consideration of industry standards and relevant legislation, guidelines and policies. The EPR's have been outlined in section 8.2 of this report. Table 7.21 below has been prepared to summarise the key findings of the impact assessment, with a reference to where these items are represented in the EPRs.

Table 7.21: Value 2: Safe Road Performance, Condition and Design – EPRs

#	Mitigation Identified	# Reference to EPR's
1	Provide for appropriate upgrades of pavement, bridges, intersections and other road infrastructure, in line with the recommendations of the road safety audit and condition inspections	EPR T2-8
2	The CTMPs must address the following: • All requirements as outlined in the TMP, including but is not limited to: • Maintain appropriate transport capacity and performance • Management of lane closures and property access • Management of heavy vehicles during peak periods and around sensitive land uses such as schools • Maintain a communication register with other major projects • the continuous management of the external road network during construction • Monitor any impacts to active transport / recreational paths and trails that are impacted by the construction works, including liaison with relevant authorities • Utilise identified vehicle routes or nominate alternatives as required • The access requirements for oversize vehicles	EPR T1
3	Complete road works to accommodate the turning movement requirements of the transformer transporter as outlined in the swept path assessment.	EPR T1-10
4	Continuous traffic management to control and supervise the movements of the transformer transporter.	EPR T1-20 EPR T2-9
5	TMP – Prepare and implement a traffic management plan that addresses and documents the approach for the following: • Mitigate the risk of driver fatigue • provide guidance to comply with relevant industry standards • provide guidance on driver schedules • prohibit travel past schools during pick-up / drop-off • prohibit travel through townships during local events • manage the safe transportation of any hazardous goods / materials • reduce construction operations during peak seasonal events such as long weekends	EPR T1
6	Provide adequate temporary road lighting over night during HDD operations	EPR T1-14
7	Monitoring of infrastructure treatments to ensure they comply with industry standards such as Austroads guide to road design, Australian Standards, DTP design guidance and relevant local government standard drawings.	EPR T2-1 EPR T2-2

		EPR T2-6

7.1.10 Value 2 – Residual Impacts

Upon the implementation of the mitigating works, some residual impacts will still remain. These have been outlined in the following sections.

7.1.10.1 Attribute 1: Road Pavement Condition Assessment

The condition of the pavement of access roads will require continuous monitoring during construction activities to ensure its continued acceptable operating condition.

Addressed in EPR T2-7, EPR T2-8

7.1.10.2 Attribute 2: Safe Condition of Bridges and Culverts

The condition of bridges and culverts along the travel routes will require continuous monitoring during construction activities to ensure its continued acceptable operating condition.

Addressed in EPR T2-8

7.1.10.3 Attribute 3: Provision of Adequate Road Geometry

The project assessment has considered vehicles up to a 19m semi-trailer or equivalent (excluding the transformer transporter). Physical requirements associated with the use of a larger vehicle have not been undertaken, with analysis required if larger vehicles will be utilised.

The dimensions of the transformer transporter should be confirmed prior to the movement occurring to ensure that the designs prepared meet the spatial requirements.

Traffic delays will occur as a result of the movement of the transformer transporter as it will move at a slow speed, under continuous traffic management.

Addressed in EPRT1-7, EPR T1-10, EPRT2-9

7.1.10.4 Attribute 4: Review of Crash History

The generation of vehicle movements will inherently carry a crash risk on the road network.

Addressed in EPR T1-15, EPRT1-18.

7.1.10.5 Attribute 5: Intersection Safe Sight Distance Assessment

Intersections will continue to operate as per existing arrangements

7.1.10.6 Attribute 6: Height Clearance Requirements of the Transformer Transporter

Works will be undertaken to ensure the transformer transporter can traverse the required path of travel.

Addressed in EPR T2-9

7.1.10.7 Attribute 7: Safe Operation and Management of Construction Activities

The proposed mitigation measures aim to reduce the safety risk associated with the construction activities for the project, however, there is always possibility for human error or other unforeseen circumstances or events. As such, an inherent safety risk will remain following the implementation of the mitigation measure associated with each element of this attribute.

Addressed in EPRT1-3, EPRT1-4, EPRT1-12, EPRT1-15, EPRT1-16, EPRT1-19, EPRT1-21, EPRT2, EPR T2-10

The revised significance assessment for value 2 with mitigating works has been summarised in Table 7.22 below.

Table 7.22: Value 2: Safe Road Performance, Condition and Design – Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Road pavement condition assessment	Nil	Roads requiring resurfacing / remediation works.	Moderate	Moderate	Moderate	Roads should be upgraded to align with the recommendations of a suitably qualified pavement engineer.	Pavement will require continuous monitoring, with upgrade works undertaken when necessary	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Safe condition of bridges and culverts	Nil	Bridges and culverts may not be in an appropriate condition for the expected size of vehicles generated by the site	Moderate	Major	High	Bridges and culverts should be upgraded to align with the recommendations of a suitably qualified civil engineer.	Bridges and culverts will require continuous monitoring.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Construction of access tracks providing access to the external road network.	Semi-trailer access to proposed access tracks.	Moderate	Moderate	Moderate	Construction of access tracks in line with swept path template.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Moderate	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	Semi-trailers may require local widening works to access the site at the following: • Yinnar Road / Mcfarlane Road • Strzelecki Highway / Ten Mile Creek Road	Moderate	Moderate	Moderate	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Minor	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	Semi-trailers may require works to access the site at the following locations • Darlimurla Road / Old Darlimurla Road • Darlimurla Road / Pleasant Valley Road • Harding Lawson Road / Evans Road • Evans Road / Pilkington Road • Evans Road / Duncans Road	Moderate	Major	High	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Moderate	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The movement of the transformer transporter generally throughout the road network will travel down the centre of the road and travel at a slow speed.	High	Major	Major	Traffic management throughout the movement of the transformer transporter	The dimensions of the transformer transporter should be confirmed prior to the movement. Traffic delays to external road network during movement of transformer transporter.	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The transformer transporter may require works to access the site at the following locations: • Princes Freeway off-ramp to Marretts Road • Marretts Road westbound and on-ramp to Princes Freeway • Marretts Road and Strzelecki Highway • Strzelecki Highway and Smiths Road • Yinnar-Driffield Road and Yinnar Road	High	Major	Major	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Provision of adequate road geometry	Nil	The transformer transporter may require works to private property to access the site at the following locations: • Monash Way and Bonds Lane • Bonds Lane and Tramway Road	High	Major	Major	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture impacting private property.	High	Minor	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 1 Tramway Road (Churchill).	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 1 Tramway Road (Churchill)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 2 Monash Way (Churchill).	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 2 Monash Way (Churchill)	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 3 Strzelecki Highway (Driffield.)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 3 Strzelecki Highway (Driffield)	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 4 Strzelecki Highway (Mirboo North)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 4 Strzelecki Highway (Mirboo North)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 5 Strzelecki Highway (Leongatha)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 5 Strzelecki Highway (Leongatha)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 6 South Gippsland Highway (Meeniyan)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 6 South Gippsland Highway (Meeniyan)	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 7 Meeniyan-Promontory Road (Buffalo)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 7 Meeniyan-Promontory Road (Buffalo)	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 8 Fish Creek-Foster Road (Approach to Foster)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 8 Fish Creek-Foster Road (Approach to Foster)	High	Negligible	Low
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at Location 9 Fish Creek-Foster Road (Foster)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 9 Fish Creek-Foster Road (Foster)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Review of crash history	Nil	Increased crash risk at various locations with a lesser traffic crash history.	Moderate	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Inherent residual crash risk	Moderate	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Intersection safe sight distance assessment	Nil	Increased safety risk at the following locations with sight distance constraints, noting warning signage is provided: • Meeniyan – Promontory Road / Waratah Road • Meeniyan – Promontory Road / Buffalo – Tarwin Lower Road • Meeniyan Mirboo North Road / Mardan Road • Baromi Road / Old Darlimurla Road	Low	Negligible	Very Low	Nil	Residual safety risk.	Low	Negligible	Very Low
Safe Road Performance, Condition & Design	Height clearance requirements of transformer transporter	Nil	Low hanging power lines may present an obstruction on the path of travel of the transformer transporter	High	Major	Major	Develop a strategy to raise the height of low hanging power lines during the movement of the transformer transporter.	Works will be undertaken to ensure the transformer transporter can traverse the required path of travel.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Increased crash risk due to poor road lighting for HDD at night	High	Major	Major	Provision of temporary construction lighting at required intersections	inspections and communication to ensure temporary lighting provides adequate and appropriate light for drivers.	High	Low	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	General driver safety	Low	Major	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities. Survey drivers on regular basis	General driver safety	Low	Major	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety impact of movement of transformer transporter	High	Major	Major	Traffic management throughout the movement of the transformer transporter	Traffic management in high speed road environments. Delays to external road network during movement of transformer transporter	High	Minor	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety risk of pedestrians in townships with increased truck movements	Moderate	Major	High	Avoid movement of construction vehicles during periods of high pedestrian activity in the townships	Pedestrians in townships with truck movements	Moderate	Low	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Measures	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Safety risk around Schools – identify schools / townships	High	Major	Major	Avoid travel past schools during pick-up / drop-off	Communication with schools and councils to be notified of changed school bus routes.	High	Negligible	Low
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Unforeseen safety risk	Very Low	Major	Low	Ensure infrastructure built to standards	Nil	Very Low	Major	Low
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Transportation of Hazardous Goods	High	Major	Major	The transportation of any hazardous goods / materials shall be done so in adherence to any standard requirements by the road authority as it relates to that specific material.	Compliance with road authority guidelines and material specific management measures results in a standardised level of risk commensurate with the activity required to be completed.	High	Minor	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Peak Seasonal Events	Moderate	Major	High	Reduced construction operations during peak seasonal event such as long weekends.	Increase in the number of unfamiliar drivers onto the road network during seasonal holiday periods.	Moderate	Low	Low

7.1.11 Value 3 – Public and Active Transport

Analysis has been undertaken to assess the impact of the project on the public transport network and active transport infrastructure that forms a part of the study area.

The following attributes were defined in the assessment of Value 3:

Table 7.23: Values and Attributes

Value	Attribute
Public and Active Transport The continued operation of the public transport network, as well as the active transport infrastructure in the surrounding area. This includes V/Line trains, local bus services, school buses, recreational rail trails and public footpaths.	Operation of public transport services and infrastructure
	Operation of active transport infrastructure

7.1.11.1 Attribute 1: Operation of Public Transport Services and Infrastructure

Rail

As outlined above in Section 6.3.5, the proposed project alignment and construction vehicle access routes do not cross any active train lines. There is therefore no impact to any rail services as a result of the main works.

The movement of the transformer transporter from Melbourne may be required to cross metro train lines in the path of travel from Melbourne. This may impact tracks and overhead power lines

Bus

The public bus routes within the surrounding area of the project alignment are identified in Section 6.3.6.

The proposed paths of travel to the project alignment that is utilised by construction vehicles will pass through a number of townships with regular public bus services. It is not expected that these services will be impacted by the movement of large vehicles, given the heavy vehicle movements will be confined to major arterial roads and heavy vehicle routes within these townships.

All roads with operational public busses such as the V/Line service to Yarram will be crossed using HDD construction methodology, and will therefore not be impacted.

The movement of the transformer transporter from Melbourne may travel along roads utilised by public buses.

School Bus

It is expected that the construction of the cable will result in heavy construction vehicles being generated on roads that are utilised by school buses to pick up children in rural areas. Given the nature of these movements being targeted at picking up from specific households, these school bus movements are subject to change over time.

Tram

The movement of the transformer transporter from Melbourne may be required to cross tram infrastructure in the path of travel from Melbourne. This may impact tracks and overhead power lines

7.1.11.2 Attribute 2: Operation of Active Transport Infrastructure

Recreational Rail Trails

Active transport infrastructure that is available in the area surrounding the project alignment is outlined in Section 6.3.10.

The project alignment passes through a number of areas containing recreational trails for walking and cycling. Main active trails such as the Grand Ridge Rail Trail and the Great Southern Rail Trail will be uninterrupted as the crossings will occur utilising HDD methods.

It is expected that other more minor recreational trails may be crossed by the cable trench. These will need to be managed on-site by the contractor when identified and as required.

Dedicated Cycling Infrastructure

Dedicated cycling infrastructure is minimal within the area surrounding the project alignment. On-road cycling infrastructure is informal, and available on the shoulders of roads with wide trafficable lanes. All public roads are crossed by the project alignment using HDD methodology, and are therefore unimpacted.

It is expected that other more informal cycling paths / lanes may be crossed by the cable trench. These will need to be managed on-site by the contractor when identified and as required.

Footpaths

The majority of roads that will be crossed as a part of the construction of the project alignment have minimal pedestrian infrastructure such as footpaths or tracks. Main roads will be crossed using HDD tunnel boring methods, which will enable the road and footpaths to continue to operate without disturbance. Any roads that are not crossed with HDD methodology are minor in nature and service local properties with low population and volumes.

7.1.12 Value 3 – EES Impact Significance Assessment

The analysis and commentary presented above has established the likely impacts to the public transport and active transport networks. The impacts outlined above have been assessed in accordance with the significance assessment methodology outlined in section 5.6 with Table 5.2 and Table 5.3 identifying the criteria that each impact has been assessed using.

The significance assessment for value 3 prior to the implementation of any mitigating works has been summarised in Table 7.24 below.

Table 7.24: Value 3: Public and Active Transport – Inherent Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on train services from general	No rail lines are in the study area. No rail lines are impacted by the project.	Very Low	Negligible	Very Low
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on public bus services.	Low frequency bus routes are in towns along travel routes. The traffic generated by the project is not expected to impact public bus routes.	Low	Negligible	Very Low
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on school bus routes.	School buses may be present on travel routes by construction vehicles. Construction vehicles may pass school buses and children waiting on the side of the road / walking home.	High	Moderate	High
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on public transport services as a result of the transformer transporter movement.	Public transport services may be on the path of travel of the transformer transporter Possible disruption to public transport services in Melbourne	High	Major	Major
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on recreational rail trails.	Major rail trails are in the vicinity of the project. Minor recreational trails may be present in the vicinity of the project. Rail trails will be unimpacted by the project, crossed using HDD methods. Construction of the cable may cross minor recreational trails.	Moderate	Minor	Low

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on dedicated cycling infrastructure.	Minor recreational cycle tracks may be present in the vicinity of the project. Construction of the cable may cross minor recreational trails.	Very Low	Minor	Very Low
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on footpaths.	Minor footpaths may be present in the vicinity of the project. Construction of the cable may cross minor footpaths.	Low	Minor	Very Low

7.1.13 Value 3 – Mitigation Works

The attributes identified above have then been further assessed to identify mitigating works.

7.1.13.1 Attribute 1: Operation of Public Transport Services and Infrastructure

Rail

The proposed project alignment and construction vehicle access routes do not cross any currently active train lines. No mitigating works are required.

The movement of the transformer transporter will occur over night when crossing any train tracks.

Bus

The construction vehicles generated by the construction of the cable are not expected to have a material impact on the public bus network. No mitigating works are required.

The movement of the transformer transporter will predominantly occur at night, minimising impacts to bus services.

School Bus

Prior to the beginning of construction of the project, consultation should be undertaken with South Gippsland Shire Council and Latrobe City Council to identify whether any school bus routes currently operate along the paths of travel to the project alignment that are being utilised by heavy construction vehicles.

If any school bus routes do align with the expected heavy vehicles paths, then the movement of these vehicles will be restricted to occur outside of the typical school bus operating hours (7AM to 9AM and 2:30PM to 4:30PM).

Tram

The movement of the transformer transporter will occur over night when crossing any tram lines.

7.1.13.2 Attribute 2: Operation of Active Transport Infrastructure

Recreational Rail Trails

The main active trails such as the Grand Ridge Rail Trail and the Great Southern Rail Trail that are being crossed by the project alignment will not be interrupted by the construction works, and therefore no mitigating works are required.

Minor recreational trails may be present along the project alignment, appropriate consultation should be conducted with Council to identify these trails and identify appropriate mitigating works.

Dedicated Cycling Infrastructure

On-road cycle lanes will be unimpacted by the construction of the cable due to roads being crossed using HDD methodology. No mitigating works are required.

Minor off-road cycle paths trails may be present along the project alignment, appropriate consultation should be conducted with Council to identify these trails and identify appropriate mitigating works.

Footpaths

Properties that are located adjacent to minor roads that will not be crossed with HDD methodology will be consulted with prior to the construction of the project due to the disruption to their transport accessibility as well as the other impacts caused by the construction (i.e. noise, land access requirements etc.).

7.1.14 Value 3 – Environmental Performance Requirements

In response to the above assessment, a number of EPR's have been identified. These EPR's are the mechanism to implement the mitigation and management measures that have been found in the above assessment, and have been developed with consideration of industry standards and relevant legislation, guidelines and policies. The EPR's have been outlined in section 8.2 of this report. Table 7.25 below has been prepared to summarise the key findings of the impact assessment, with a reference to where these items are represented in the EPRs.

Table 7.25: Value 3: Public and Active Transport – EPRs

#	Mitigation Identified	# Reference to EPR's
1	Identify any school bus routes along the construction routes. Movement of heavy vehicles travelling along these routes be restricted to occur outside of the typical school bus operating hours (7AM to 9AM and 2:30PM to 4:30PM).	EPR T1 EPR T1-6 EPR T1-21
2	Consultation by the contractor with Council as to any recreational active travel paths that may be crossed by the cable construction and identify appropriate mitigating works. This should occur during the preparation of the TMP.	EPR T1-16

7.1.15 Value 3 – Residual Impacts

Upon the implementation of the mitigating works, some residual impacts will still remain. These have been outlined in the following sections.

7.1.15.1 Attribute 1: Operation of Public Transport Services and Infrastructure

Rail

The proposed project alignment and construction vehicle access routes do not cross any currently active train lines. There is no impact to the rail network.

The movement of the transformer transporter will occur outside of the operating hours of train services.

Bus

The construction vehicles generated by the construction of the cable are not expected to have a material impact on the public bus network.

The movement of the transformer transporter will primarily occur outside of the operating hours of bus services.

Addressed in EPR T1-10

School Bus

Construction vehicles will not travel on school bus routes during pick-up / drop-off time periods, therefore there is no residual impacts.

Addressed in EPR T1, EPR T1-6, EPR T1-21

Tram

The movement of the transformer transporter will occur outside of the operating hours of tram services.

Addressed in EPR T1-10

7.1.15.2 Attribute 2: Operation of Active Transport Infrastructure

Recreational Rail Trails

The main active trails such as the Grand Ridge Rail Trail and the Great Southern Rail Trail that are being crossed by the project alignment will not be interrupted by the construction works, and therefore there are no residual impacts.

Some minor recreational tracks may be closed as a result of the construction works, with appropriate measures developed in consultation with Council.

Addressed in EPR T1-16

Dedicated Cycling Infrastructure

On-road cycle lanes will be unimpacted by the construction of the cable due to roads being crossed using HDD methodology, and therefore there are no residual impacts.

Some minor cycling paths may be closed as a result of the construction works, with appropriate measures developed in consultation with Council.

Footpaths

Localised impacts due to closure of access paths in low density areas. Residents impacted will be consulted.

The revised significance assessment for Value 3 with mitigating works has been summarised in Table 7.26 below.

Table 7.26: Value 3: Public and Active Transport – Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Measures	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on train services.	Very Low	Negligible	Very Low	Nil	No rail lines are in the study area.	Very Low	Negligible	Very Low
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on public bus services.	Low	Negligible	Very Low	Nil	The traffic generated by the project is not expected to impact public bus routes.	Low	Negligible	Very Low
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on school bus routes.	High	Moderate	High	Construction vehicles will not travel on school bus routes during pick-up / drop-off times	Continuous engagement to ensure any changes to school bus routes is known.	High	Negligible	Low
Public & Active Transport	Operation of public transport services and infrastructure	Nil	Impact on public transport services as a result of the transformer transporter movement.	High	Major	Major	The movement of the transformer transporter should occur overnight, avoiding public transport services	Transformer transporter will travel at a low speed and take up multiple lanes of traffic on roads utilised by public buses	High	Negligible	Low
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on recreational rail trails.	Moderate	Minor	Low	Consultation with council to determine mitigating measures.	No residual impact due to HDD crossing of rail trails	Moderate	Minor	Low
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on dedicated cycling infrastructure.	Very Low	Minor	Very Low	Consultation with council to determine mitigating measures.	Delays to some recreational tracks due to construction.	Very Low	Minor	Very Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Measures	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Public & Active Transport	Operation of active transport infrastructure	Nil	Impact on footpaths.	Low	Minor	Very Low	Consultation with local residents.	Delays to some footpaths due to construction.	Low	Minor	Very Low

7.2 Operation

The operational requirements for each of the sections of the project that were assessed within this report have been outlined below.

7.2.1 Transition Station and Shore Crossing

The transition station at Waratah Bay will not require personnel on site. During normal operations, the site will be monitored remotely. There will be regular inspections of buildings and maintenance. These inspections will include 1-2 personnel

7.2.2 Converter Station

The converter stations will not be manned 24/7 and only attended during normal working hours (Monday to Friday 07:00 to 18:00 and Saturday 07:00 to 13:00 excluding public holidays).

Operation and maintenance vehicles entering and exiting the converter station site per day will be a maximum of five light vehicles per day (for operational personnel). On some days it may be as low as two vehicles per day. There will also be planned outages up to twice a year which will involve 15-20 employees for up to 2 weeks

The traffic accessibility requirements are minor, and are not expected to compromise the safety, function or operation of the surrounding road network.

The intersection upgrades which are proposed to be delivered for the construction stage of the project can be retained and utilised for the ongoing operation of the site/s.

7.2.3 Land Cable

In general, land cables are typically maintenance free with routine maintenance being limited to a number of smaller activities around the jointing pits. These activities will be tested every five years involving 2 workers for 1 day at each joint bay.

7.2.4 Residual Impacts

The traffic generating requirements during operation are expected to be minor in nature, and not have a detrimental impact to the performance of the surrounding road network.

7.3 Decommissioning

7.3.1 Expected Lifespan and Decommissioning Methodology

The operational lifespan of the project is anticipated to be a minimum 40 years. At the end of its operational lifespan, the project will either be decommissioned or upgraded to extend the operational lifespan.

In the event that the project is decommissioned, all above-ground infrastructure will be removed, and associated land returned to the previous land use or as agreed with the landowner. All underground infrastructure will be decommissioned in accordance with the requirements of the time. This may include removal of infrastructure or some components remaining underground where it is safe to do so. It is generally considered less impactful to leave underground and submarine infrastructure in place rather than remove it. All metal removed will be recycled and concrete broken down for recycling or disposal.

A decommissioning plan will be prepared to outline how activities will be undertaken and potential impacts managed.

7.3.2 Residual Impact

The decommissioning methodology indicates that underground infrastructure will be left in place rather than removed, indicating that the approximately 90km project alignment will remain in place, and not require additional works.

The historic traffic growth as found in Section 6.3.1.6 indicates that the growth in traffic volumes in the future is not substantial. The decommissioning of the transition station and converter station are expected to involve lesser levels of traffic generation than those that occur during construction, as assessed within this report.

7.4 Cumulative Impacts

There are a number of projects in the immediate surrounds of the subject site that may have an impact on the construction of the project. A number of these projects are outlined below in Table 7.27, the locations of which are shown in Figure 7.15 and Figure 7.16.

Table 7.27: Projects in the Surrounding Area

#	Project	Timeframe / Status
1	Delburn Wind Farm	• Currently under construction • To be completed in approx. 2023
2	Star of the South	• Currently under planning • EIS being prepared in 2021 to 2024
3	Hazelwood Rehabilitation Project	• Currently under planning • EES being prepared in 2022/2023
4	Wooreen Energy Storage System	• Currently under planning and expected to be submitted in 2022
5	Hazelwood North Battery Recycling Plant	• Approved in January 2021 • Construction to be confirmed
6	Latrobe Magnesium Plant	• Currently under construction
7	Morwell Solar Farm	• Planning approval granted • Construction expected to begin in 2022

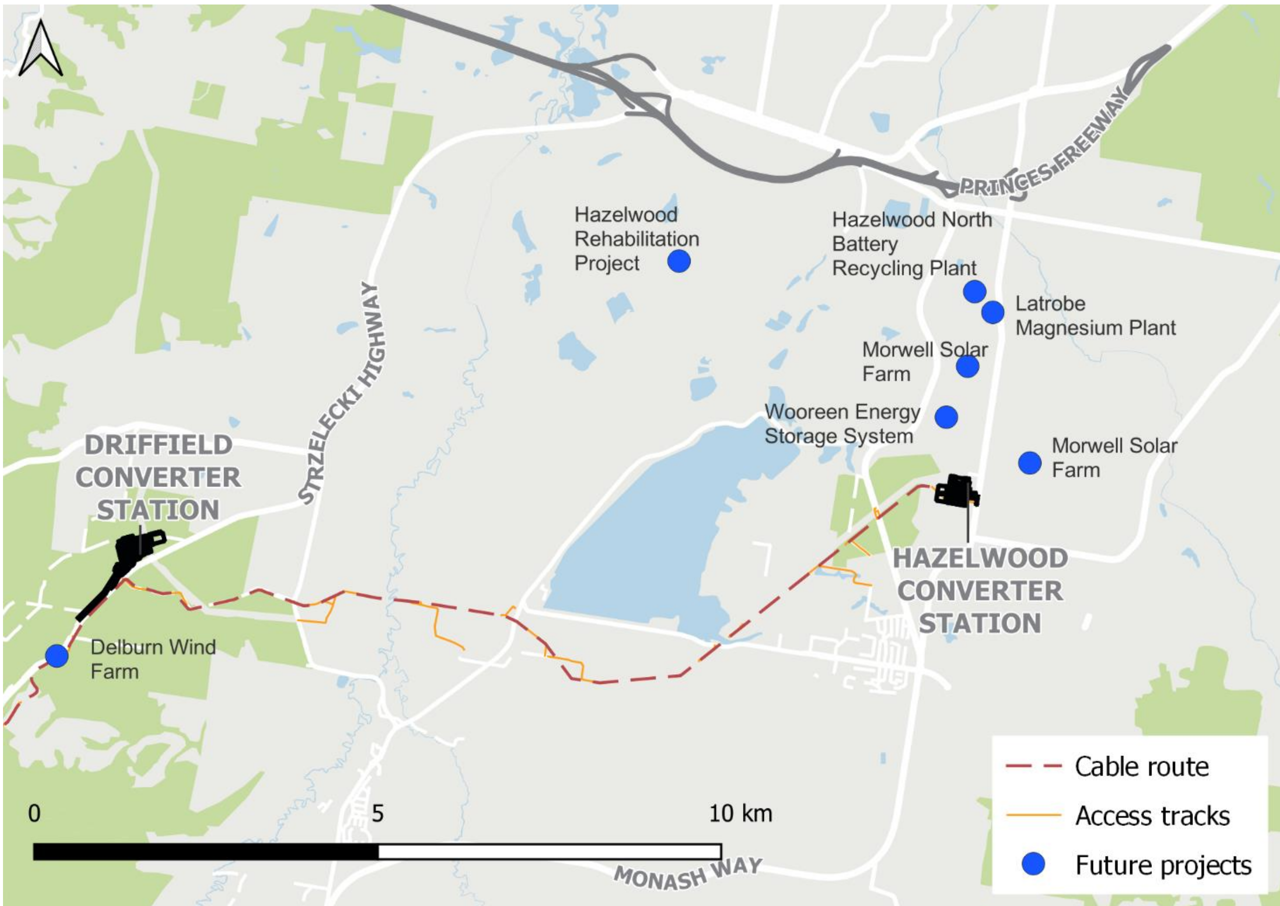


Figure 7.15: Projects in the Surrounding Area

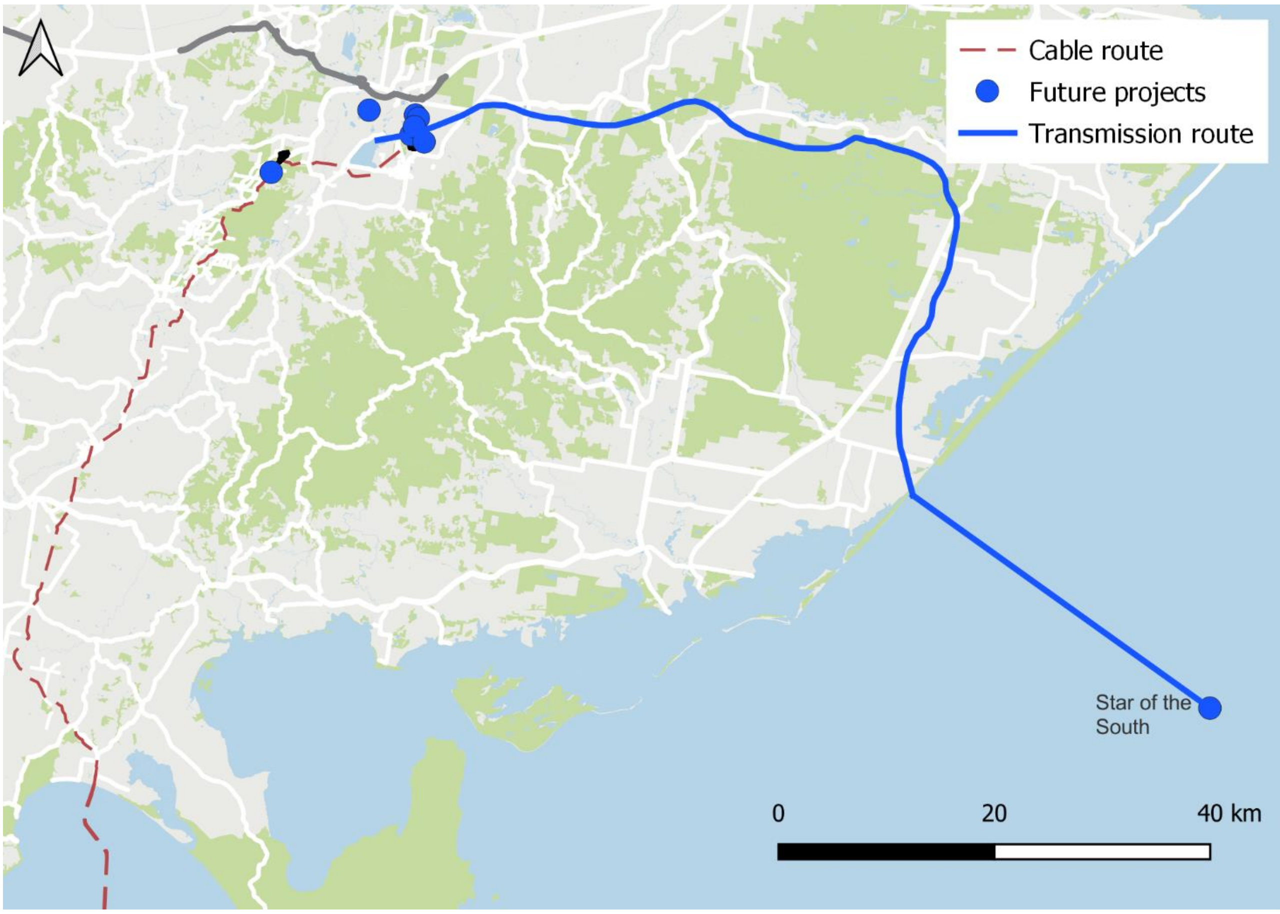


Figure 7.16: Projects in the Surrounding Area

A number of these projects are located around the township of Churchill, and are expected to generate construction traffic volumes along Tramway Road, Monash Way and others. Information is not known as to the specific traffic volumes or construction timelines for the majority of these projects, however it is expected that the level of capacity within the road network will sufficiently accommodate the construction of these projects. Notwithstanding, communication and coordination should be undertaken between building contractors to review the likelihood of major construction traffic generating activities occurring concurrently, and that the road network is continuing to operate in a safe and suitable manner, underneath its theoretical capacity.

A summary of the major projects identified above are further discussed below. Information regarding Wooreen Energy Storage System was not available at the time of writing, so has not been discussed further.

7.4.1 Delburn Wind Farm

The Delburn Wind Farm is a proposed wind energy project located in the Strzelecki Ranges (south of the Latrobe Valley). It consists of 33 wind turbines to be constructed around the Strzelecki Highway in Delburn. A review of the transport impact assessment reports for the project, alongside the planning documents suggests that the Delburn Wind Farm will be constructed in 2022 and 2023.

Given that the construction of the project is not expected to begin until 2025, with the main cable construction beginning in 2026, it is not expected that the construction of the projects will overlap, and there will not be an overlap of construction activities. It is noted however that construction of the Delburn Wind Farm may extend beyond the planned construction duration provided in the planning documents. In this instance, both projects are expected to generate traffic volumes along side roads along Strzelecki Highway around Narracan. Coordination will be required between building contractors in this regard.

7.4.2 Star of the South

The Star of the South is an offshore wind farm proposed to be constructed off the coast of Gippsland in Victoria, east of Wilsons Promontory. The developed is proposed to consist of 200 wind turbines, the location of which is shown in Figure 7.17.

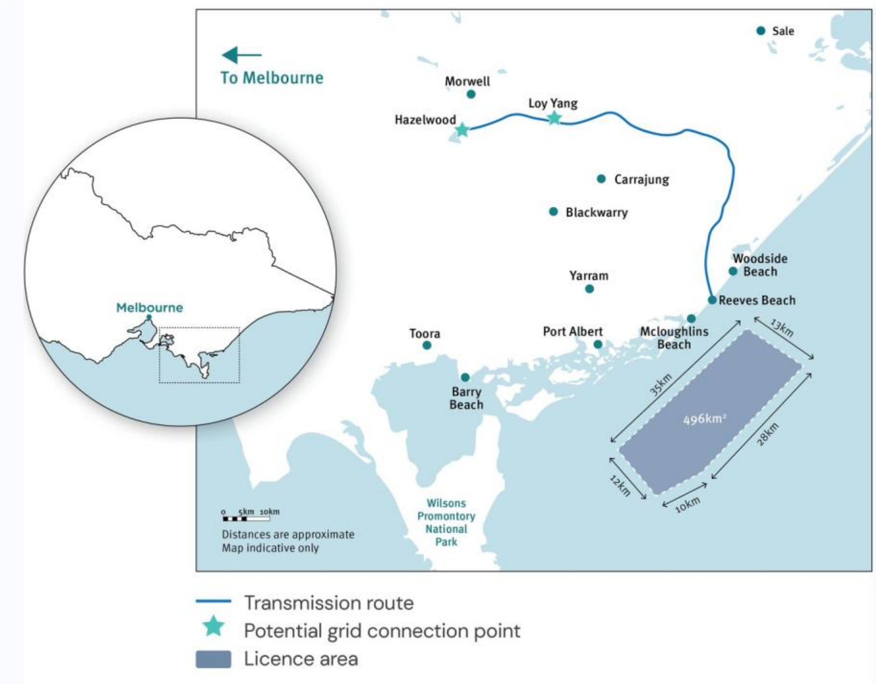


Figure 7.17: Star of the South

Source: https://www.starofthesouth.com.au/project-overview

An EIS is currently under preparation for the Star of the South, and as such the traffic impacts during construction are currently unknown. Given the location of the project and associated transmission route, the only location that could be considered to have a cumulative impact with the project is the road network around Hazelwood. This project is expected to generate traffic movements on Tramway Road. Tramway Road is a high capacity roads, with the expected level of traffic from both projects unlikely to exceed the capacity of the arterial road network.

The EES/EIS process is expected to be prepared during 2021 to 2023, with the approval decision occurring in 2024. Therefore, should the Star of the South proceed, the proponent should review and additional available information to identify any potential uses of road infrastructure which overlaps with the ML project program.

7.4.3 Hazelwood Rehabilitation Project

The purpose of the Hazelwood Rehabilitation Project is to rehabilitate the land disturbed by open cut mining operations and deliver a safe, stable, sustainable and non-polluting site. The location is shown below in Figure 7.18.

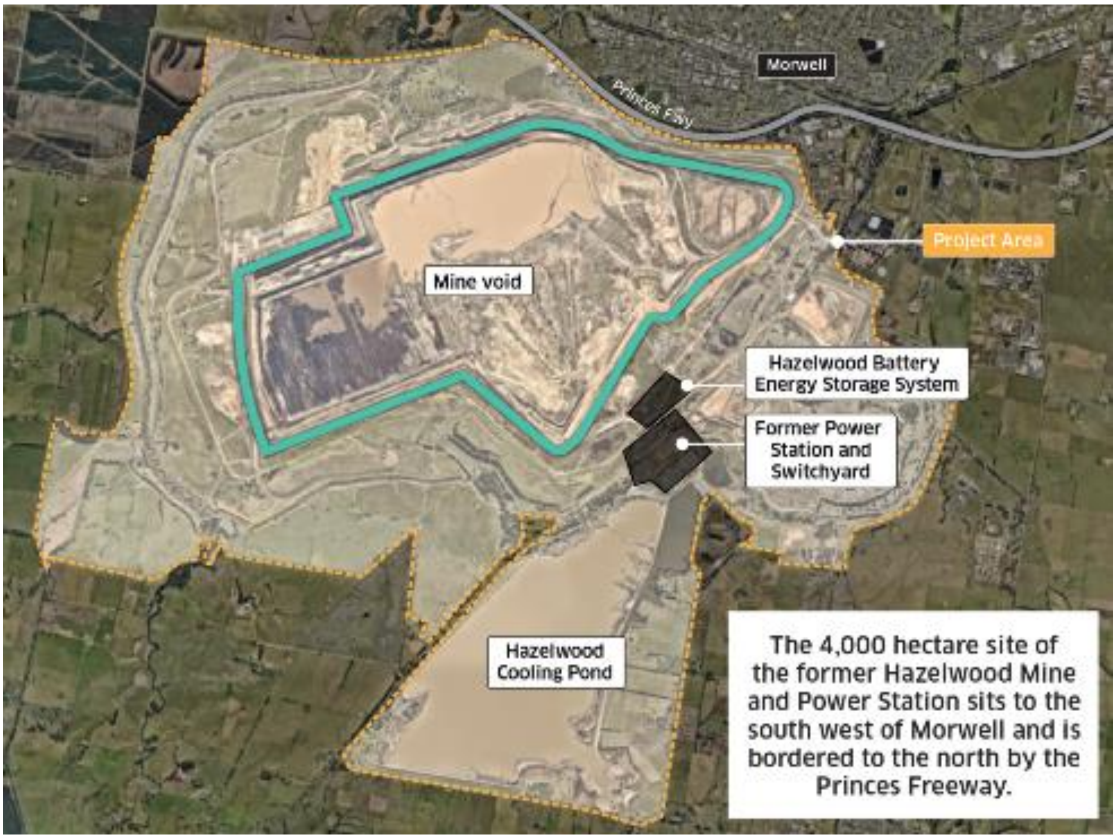


Figure 7.18: The Hazelwood Rehabilitation Project

Source: https://www.hazelwoodrehabilitation.com.au/about-the-project/

An EIS is currently under preparation for the Hazelwood Rehabilitation Project, and as such the traffic impacts during construction are currently unknown. Given the location of the project it could be considered to have a cumulative impact with the project on the road network around Hazelwood North. This project is expected to generate traffic movements on Monash Way and Brodribb Road utilising existing access points designed for large vehicles. Both roads have a high capacity, with the expected level of traffic from both projects unlikely to exceed the capacity of the arterial road network.

The EES process is expected to be prepared during 2022 and 2023. Therefore, should the Hazelwood Rehabilitation Project proceed, the proponent should review and additional available information to identify any potential uses of road infrastructure which overlaps with the ML project program.

7.4.4 Residual Impacts

Three of the projects identified above are expected to generate additional traffic movements on the road network surrounding Hazelwood North: Wooreen Energy Storage System, Star of the South and the Hazelwood Rehabilitation Project. The road network within this area contains a large number of high capacity arterial roads, with adequate capacity to accommodate these movements. Notwithstanding, it is recommended that coordination is undertaken between contractors to ensure each traffic generating events do not occur concurrently, and that monitoring of the traffic conditions is undertaken through the TMP.

8 Summary of Impacts

8.1 Significance Assessment

Table 8.1: Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Road Network Capacity	Arterial road link capacity	Nil	No arterial roads identified will exceed their capacity	Low	Negligible	Very Low	Nil	Inspections required to ensure road network performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Low	Negligible	Very Low
Road Network Capacity	Local road link capacity	Nil	No local roads identified will exceed their capacity	Very Low	Negligible	Very Low	Nil	Inspections required to ensure road network performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Very Low	Negligible	Very Low
Road Network Capacity	Local roads identified as vulnerable based on percentage of increased traffic	Nil	Roads over capacity	High	Moderate	High	Consultation with local residents Distribute peak traffic event traffic over multiple days	Consultation will provide local residents and landowners to provide prewarning that construction activities are occurring.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Road Network Capacity	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatments (below 'line 1' in the Austroads turning warrant assessment)	Moderate	Minor	Low	Nil	Inspections required to ensure intersections performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	High	Moderate	High	Provision of traffic management to lower the speed limit to 70km/h during peak events	Inspections required at identified intersections to ensure they are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low
Road Network Capacity	Impacted Intersections	Nil	Intersections without adequate intersection treatment (between 'line 1' and 'line 2' in the Austroads turning warrant assessment)	High	Major	High	Provision of a right turn lane treatment	Inspections required at identified intersections to ensure they are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Road Network Capacity	Connectivity	Nil	Roads where access is restricted Local roads for residential access identified	Moderate	Negligible	Low	Nil	No roads are proposed to be closed as a result of the project. If road closures are required due to unforeseen events, consultation with authorities should be undertaken to minimise disruption.	Moderate	Negligible	Low
Road Network Capacity	Connectivity	Nil	Waratah Road	Very High	Negligible	Moderate	EPR T01	Waratah Road is the single point of access to the township of Sandy Point and is not proposed to be closed. If road closures are required due to unforeseen events, consultation with authorities should be undertaken to minimise disruption.	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Road pavement condition	Nil	Roads requiring resurfacing / remediation works.	Moderate	Moderate	Moderate	Roads should be upgraded to align with the recommendations of a suitably qualified pavement engineer.	Pavement will require continuous monitoring, with upgrade works undertaken when necessary	Moderate	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Safe condition of bridges and culverts	Nil	Bridges and culverts may not be in an appropriate condition for the expected vehicles generated	Moderate	Major	High	Bridges and culverts should be upgraded to align with the recommendations of a suitably qualified civil engineer.	Bridges and culverts will require continuous monitoring.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Construction of access tracks providing access to the external road network.	• Semi-trailer access to proposed access tracks.	Moderate	Moderate	Moderate	Construction of access tracks in line with swept path template.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Moderate	Moderate
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailers may require local widening works to access the site at the following: • Yinnar Road / Mcfarlane Road • Strzelecki Highway / Ten Mile Creek Road	Moderate	Moderate	Moderate	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Minor	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailers may require works to access the site at the following locations • Darlimurla Road / Old Darlimurla Road • Darlimurla Road / Pleasant Valley Road • Harding Lawson Road / Evans Road • Evans Road / Pilkington Road Evans Road / Duncans Road	Moderate	Major	High	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture. If larger vehicles are required during construction, additional assessment required	Moderate	Moderate	Moderate
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	• The movement of the transformer transporter generally throughout the road network will travel down the centre of the road and travel at a slow speed.	High	Major	Major	Traffic management throughout the movement of the transformer transporter	The dimensions of the transformer transporter should be confirmed prior to the movement. Traffic delays to external road network during movement of transformer transporter.	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	The transformer transporter may require works to access the site at the following locations: • Princes Freeway off-ramp to Marretts Road • Marretts Road westbound and on-ramp to Princes Freeway • Marretts Road and Strzelecki Highway • Strzelecki Highway and Smiths Road • Yinnar-Driffield Road and Yinnar Road	High	Major	Major	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture.	High	Minor	Moderate
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	The transformer transporter may require works to private property to access the site at the following locations: • Monash Way and Bonds Lane Bonds Lane and Tramway Road	High	Major	Major	Provision of widened trafficable surface on locations identified.	Clearing of land, vegetation and furniture impacting private property.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 1 Tramway Road (Churchill).	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 1 Tramway Road (Churchill)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 2 Monash Way (Churchill).	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 2 Monash Way (Churchill)	High	Negligible	Low
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 3 Strzelecki Highway (Driffield.)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 3 Strzelecki Highway (Driffield)	High	Negligible	Low
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 4 Strzelecki Highway (Mirboo North)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 4 Strzelecki Highway (Mirboo North)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 5 Strzelecki Highway (Leongatha)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 5 Strzelecki Highway (Leongatha)	Very High	Negligible	Moderate

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 6 South Gippsland Highway (Meeniyan)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 6 South Gippsland Highway (Meeniyan)	High	Negligible	Low
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 7 Meeniyan-Promontory Road (Buffalo)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 7 Meeniyan-Promontory Road (Buffalo)	High	Negligible	Low
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 8 Fish Creek-Foster Road (Approach to Foster)	High	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 8 Fish Creek-Foster Road (Approach to Foster)	High	Negligible	Low
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	Increased crash risk at Location 9 Fish Creek-Foster Road (Foster)	Very High	Negligible	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Crash risk at Location 9 Fish Creek-Foster Road (Foster)	Very High	Negligible	Moderate
Safe Road Performance, Condition & Design	Historic Crash Safety Review	Nil	• Increased crash risk at various locations with a lesser traffic crash history.	Moderate	Negligible	Low	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities.	Inherent residual crash risk	Moderate	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Provision of safe sight distance at intersections.	Nil	Increased safety risk at the following locations with sight distance constraints, noting warning signage is provided: • Meeniyan - Promontory Road / Waratah Road • Meeniyan - Promontory Road / Buffalo - Tarwin Lower Road • Meeniyan Mirboo North Road / Mardan Road Baromi Road / Old Darlimurla Road	Low	Negligible	Very Low	Nil	Residual safety risk.	Low	Negligible	Very Low
Safe Road Performance, Condition & Design	Height clearance requirements of transformer transporter	Nil	Low hanging power lines may present an obstruction on the path of travel of the transformer transporter	High	Major	Major	Develop a strategy to raise the height of low hanging power lines during the movement of the transformer transporter.	Works will be undertaken to ensure the transformer transporter can traverse the required path of travel.	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Safe operation	Nil	Increased crash risk due to poor road lighting for HDD at night	High	Major	Major	Provision of temporary construction lighting at required intersections	inspections and communication to ensure temporary lighting provides adequate and appropriate light for drivers.	High	Low	Moderate
Safe Road Performance, Condition & Design	Safe operation	Nil	General driver safety	Low	Major	Moderate	Implement a TMP to ensure safe operational standards for drivers and monitor construction activities. Survey drivers on regular basis	General driver safety	Low	Major	Moderate
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety impact of movement of transformer transporter	High	Major	Major	Traffic management throughout the movement of the transformer transporter	Traffic management in high speed road environments. delays to external road network during movement of transformer transporter	High	Minor	Moderate
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk of pedestrians in townships with increased truck movements	Moderate	Major	High	Avoid movement of construction vehicles during periods of high pedestrian activity in the townships	Pedestrians in townships with truck movements	Moderate	Low	Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk around Schools – identify schools / townships	High	Major	Major	Avoid travel past schools during pick-up / drop-off	Communication with schools and councils to be notified of changed school bus routes.	High	Negligible	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	Unforeseen safety risk	Very Low	Major	Low	Ensure infrastructure built to standards	Nil	Very Low	Major	Low
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Transportation of Hazardous Goods	High	Major	Major	The transportation of any hazardous goods / materials shall be done so in adherence to any standard requirements by the road authority as it relates to that specific material.	Compliance with road authority guidelines and material specific management measures results in a standardised level of risk commensurate with the activity required to be completed.	High	Minor	Moderate
Safe Road Performance, Condition & Design	Safe Operation and Management of Construction Activities	Nil	Peak Seasonal Events	Moderate	Major	High	Reduced construction operations during peak seasonal event such as long weekends.	Increase in the number of unfamiliar drivers onto the road network during seasonal holiday periods.	Moderate	Low	Low
Public & Active Transport	Public Transport	Nil	Impact on train services.	Very Low	Negligible	Very Low	Nil	No rail lines are in the study area.	Very Low	Negligible	Very Low

Value	Attribute	Standard Mitigation	Impact	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Public & Active Transport	Public Transport	Nil	Impact on public bus services.	Low	Negligible	Very Low	Nil	The traffic generated by the project is not expected to impact public bus routes.	Low	Negligible	Very Low
Public & Active Transport	Public Transport	Nil	Impact on school bus routes.	High	Moderate	High	Construction vehicles will not travel on school bus routes during pick-up / drop-off times	Continuous engagement to ensure any changes to school bus routes is known.	High	Negligible	Low
Public & Active Transport	Public Transport	Nil	Impact on public transport services as a result of the transformer transporter movement.	High	Major	Major	The movement of the transformer transporter should occur overnight, avoiding public transport services	Transformer transporter will travel at a low speed and take up multiple lanes of traffic on roads utilised by public buses	High	Negligible	Low
Public & Active Transport	Active Transport	Nil	Impact on recreational rail trails.	Moderate	Minor	Low	Consultation with council to determine mitigating measures.	No residual impact due to HDD crossing of rail trails	Moderate	Minor	Low
Public & Active Transport	Active Transport	Nil	Impact on dedicated cycling infrastructure.	Very Low	Minor	Very Low	Consultation with council to determine mitigating measures.	Delays to some recreational tracks due to construction.	Very Low	Minor	Very Low
Public & Active Transport	Active Transport	Nil	Impact on footpaths.	Low	Minor	Very Low	Consultation with local residents.	Delays to some footpaths due to construction.	Low	Minor	Very Low

8.2 Environmental Performance Requirements

EPRs set out the environmental outcomes that must be achieved during design, construction, operation and decommissioning of the project.

To developed EPRs Stantec have considered industry standards and guidelines, good practice as well as the latest approaches to managing impacts. EPRs should are informed by relevant legislation and policy requirements as well as project-specific measures recommended to minimise impacts or risk of harm to identified environmental values.

EPR ID	Environmental Performance Requirement	Project Stage
T01	**Develop a transport management plan** Prior to commencement of project works, develop a transport management plan/s to document how disruption to affected local land uses, traffic, car parking, public transport (rail and bus), pedestrian and cycle movements and existing public facilities will be managed during all stages of construction. The transport management plan/s may be split into locations / areas where appropriate or aligned with construction methodology. The transport management plan/s must: 1. Be developed in consultation with relevant road authorities. 2. Include requirements for maintaining transport capacity and appropriate performance for all travel modes in the peak travel demand periods. 3. Identify where traffic management is required to lower the speed limit during construction, such as at the intersections to Strzelecki Highway if they are utilised to access the following locations: JP61, JP62, JP 65, JP66, HDD49a, JP67 (and any additional locations where it may be required). 4. Identify the requirements for the provision of intersection treatments at the following locations if they are used by construction vehicles: South Gippsland Highway access to HDD15b, JP27, HDD16a; Strzelecki Highway access to LA07, and any additional locations where it may be required. 5. Describe measures to manage any temporary or permanent full or partial traffic lane closures or impacts to property access. 6. Include requirements for limiting the amount of construction heavy vehicles and haulage during the peak traffic periods with specific regard for sensitive land uses such as schools, school bus routes and during any local public events. 7. Include requirements for the delivery or removal of oversize and over mass loads. 8. Include a construction parking management plan to provide for adequate parking at appropriate works locations, including containing all worker car parking demands within the construction sites and laydown areas where practicable. 9. Outline measures to manage impacts and coordinate activities where necessary with other relevant major projects occurring at the same time. 10. Confirm and document the proposed route of the transformer transporter, including any necessary measures and works required to accommodate the height, weight and geometric requirements, and manage any associated impacts, during the transport. This must be informed by consultation with the relevant road authorities. 11. Document construction vehicle routes including the transformer travel route and the transport of hazardous goods / materials, and prioritise the use of higher order roads, approaching the study area via the South Gippsland Highway and Princes Highway where possible. 12. Identify construction vehicle staging areas and/or construction methodologies to minimise potential impacts of truck movements on residents and businesses. 13. Describe methods investigated and adopted to reduce impact of project generated traffic i.e. shuttle bus for workers, stagger start / finish times. 14. Requirements for the provision of adequate temporary road lighting over night at required intersections to access the construction site during HDD operations. 15. Policies to ensure staff comply with relevant industry standards and guidelines with regards to safe practice, including managing driver fatigue. These policies should outline induction requirements for all workers, identifying site specific safe practice, such as identified locations on the road network with a known safety risk. 16. Outline measures to manage the project interface with rail trails and provide for the continuous operation / access of the rail trails. 17. Document how any road closures will be managed to ensure access is maintained, especially on roads that operate as a single point of access for private properties. These measures must be informed by engagement with affected properties,	Construction

EPR ID	Environmental Performance Requirement	Project Stage
	relevant road authorities and emergency services. The design and construction staging approach should aim to not close any public roads during construction, so far as reasonably practicable. 18. Outline induction requirements for all workers, identifying site specific safe practice, such as identified locations on the road network with a known safety risk. 19. Outline the inspections to be undertaken to assess the effectiveness of the transport management plans on all modes of transport. Where inspections identify adverse impacts, implement practicable and appropriate mitigation measures. 20. Outline the requirements for worksite construction traffic management that are activity and location specific to manage day-to-day activities and the requirements of the transport management plan. This includes the movement of the transformer transporter. 21. Include a consultation plan for the engagement with local authorities, impacted landholders and the broader community. This consultation will include, but not be limited to: a. Informing affected parties of the level of traffic generated by the project construction and any road closures. b. Engaging with local road authorities to coordinate construction vehicle movements to avoid school bus routes during their time of operation. c. Engaging with road authorities and emergency services about any partial or full road closures. The transport management plan/s must be updated when there are significant changes in construction methodology, including changes in construction traffic volumes or roads closures that requires further analysis to confirm adequacy and appropriateness of management measures. The transport management plan/s must be implemented throughout construction.	
T02	**Design transport infrastructure to maintain safety in operation** Design all roadworks, construction staging, and site access arrangements as stipulated in the transport management plan (EPR T01) to meet relevant design standards and provide for safe movement of operational vehicles. The project design must: 1. Be developed in consultation with the relevant road management authorities. 2. Meet all relevant road and transport authority requirements with respect to transport network user safety. 3. Be informed by appropriate transport analysis with the objective to maximise performance for all modes where necessary. 4. Address the reinstatement of vehicle and pedestrian access that is to be altered during construction, in accordance with relevant road design standards. 5. Consider any services relocations and the requirements of services authority approvals. 6. Be audited by an independent road safety auditor during the preparation of the design, at design stages to be agreed upon with the relevant road authority. In addition, the project is to agree upon authority requirements as it relates to road safety audits during construction and post construction. 7. Be informed by inspection and assessment of existing road and pavement conditions by suitably qualified engineers. 8. Provide for appropriate upgrades of pavement, bridges, intersections and other road infrastructure, in line with the recommendations of the road safety audit and condition inspections.	Operation

9 Conclusion

The traffic and transport impacts associated with the construction, operation and decommission of the project have been assessed in accordance with the Scoping Requirements, Marinus Link, Environment Effects Statement (*Environment Effects Act 1978*). The study includes a review of the existing conditions, an assessment of the project conditions which informed the transport specific 'values', leading to identification of the project impacts primarily as it relates to the construction stage of the project. These values are summarised as:

- Road network capacity.
- Safe road performance, condition and design.
- Public and active transport.

Having regard for the identified values, mitigation measures are recommended as it relates to the project impacts. The proposed measures are considered necessary to allow the project to be delivered to ensure:

- disruption to other road users is minimised
- roads operate within their capacity
- the road pavement can adequately accommodate the proposed vehicle types and volumes
- intersection upgrades are delivered at key locations
- the road network can physically accommodate the proposed vehicle fleet, including large construction vehicles and the transformer transporter
- the road network maintains safe operation
- townships and communities within the region are not unreasonably impacted by the project
- construction activities are safely managed and delivered throughout the construction period.

Based on this assessment, and following the implementation of the proposed EPRs, there are no high or major residual impacts. However, there will be some change to the road network and its operation during the construction phase of the ML project. Through the implementation of traffic management plans, consultation with stakeholders and local community representatives / residents and some infrastructure upgrades the projects transport impact are considered to not be detrimental to the environment. The EPRs and mitigation measures are standard in context with transport impacts and considered suitable to reduce the overall project impact.

In summary, the traffic generated by the project is not expected to have broader impacts to the operation of the road network. Localised impacts may be experienced by road users and local residents periodically during construction when works are occurring within their immediate surrounds

10 References

- Transport Integration Act, Victorian State Government, 2010
- Planning and Environment Act, Victorian State Government, 1987
- Road Management Act, Victorian State Government, 2004
- Environment Effects Act, Victorian State Government, 1978
- Australian Infrastructure Plan, Infrastructure Australia, 2016
- State Planning Policy Framework, Victorian State Government
- Victorian Infrastructure Plan, Department of Treasury and Finance, 2019
- Victoria's Infrastructure Strategy, Infrastructure Victoria, 2021 – 2051
- Victorian Road Safety Strategy, Department of Transport, 2021–2030
- Towards Zero Victoria's Road Safety Strategy and Action Plan, Transport Accident Commission, 2021–2025
- Victorian Freight Plan, Transport for Victoria, 2018
- Latrobe Tracks, Trails & Paths Strategy, Latrobe City Council, 2016
- Road Management Plan, South Gippsland Shire Council, 2022
- Paths & Trails Strategy, South Gippsland Shire Council, 2018
- Austroads Guide to Road Design: Part 3: Geometric Design (AGRD-03), Austroads, 2021
- Austroads Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design (AGPT-05), 2019
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management, 2020
- Austroads Guide to Road Design Part 4a: Unsignalised and Signalised Intersections (AGRD-04a), Austroads, 2021
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