Appendix M

Traffic and Transport Impact Assessment

MARINUS LINK

Marinus Link Project

Environmental Impact Statement (Tasmania)

Technical Report – Traffic & Transport

PREPARED FOR MARINUS LINK PTY LTD | November 2024

We design with community in mind

Quality Information

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Executive summary

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

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 90 km inland.

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

Method

The methodology used to assess the transport impacts of the project is aligned with the EIS guidelines. 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 its 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.
- Development of final proposed EPRs.

Baseline Characterisation

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

- The proposed converter station will be constructed in the township of Heybridge, accessible via the Bass Highway. The shore crossing will occur underneath the Bass Highway, from the converter station site.

- 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.
- Arterial roads, highways and freeways are able to accommodate the movement of large vehicles. They are regularly maintained to ensure the road surface is in adequate condition to accommodate these vehicles. As such, these roads have been assessed as being able to accommodate the project generated construction traffic volumes.
- There have been six crashes within the project area over the last five years, with only one crash resulting in injury.
- 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:

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.

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

- The capacity of the arterial road network.
- Intersection capacity assessment.
- Connectivity of the road network, and provision of alternative routes.

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 assessed:

- 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.
- Operational safety considerations.

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.
- Active transport infrastructure surrounding the site, including:
  - Dedicated cycling infrastructure.
  - Footpaths.

Environmental Performance Requirements

Through the significance assessment undertaken, which had 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 construction and operational vehicles.

Results of Significance Assessment

The outcome of the assessments undertaken found that the project will result in a number of impacts to the transport network, with varying levels of significance. Prior to the implementation of any mitigating works, there were six impacts that were deemed to be "Major", three "High", two "Moderate", nine "Low" and eight "Very Low".

Upon the implementation of the mitigating measures and EPR's, the maximum significance was determined to be "Moderate" with seven found to be "Moderate", nine "Low" and twelve "Very Low".

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 and requirements, 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 EPRS, 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.

Glossary and Abbreviations

Term	Description
converter station	installation where alternating current is converted to direct current and vice versa.
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.
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.
upgrade	(in relation to a transmission network) works to enlarge the transmission network or increase its capacity to transmit electricity, also known as augmentation.

Term	Description
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AC	Alternating Current
ATC	Automatic Traffic Count
AV	Articulated Vehicle
DC	Direct Current
DSG	Department of State Growth
DTP	Department of Transport and Planning
EDD	Extended Design Domain
EES	Environment Effects Statement
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
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
NEM	National Electricity Market
NHVR	National Heavy Vehicle Regulator
NWTD	North West Transmission Developments
TMP	Transport Management Plan
VPD	Vehicles per day

1 Introduction

The proposed 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 Electricity 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).

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).

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.

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

1.1 Purpose of this Report

This technical report presents the assessment of the terrestrial 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 2.2).

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 specialist consultants.

1.2 Project Overview

The project is a proposed 1500 megawatt (MW) HVDC electricity interconnector between Heybridge in north west Tasmania and the Latrobe Valley in Victoria (Figure 1-1, Figure 1-2). The project will 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 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 risk 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 generation 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.

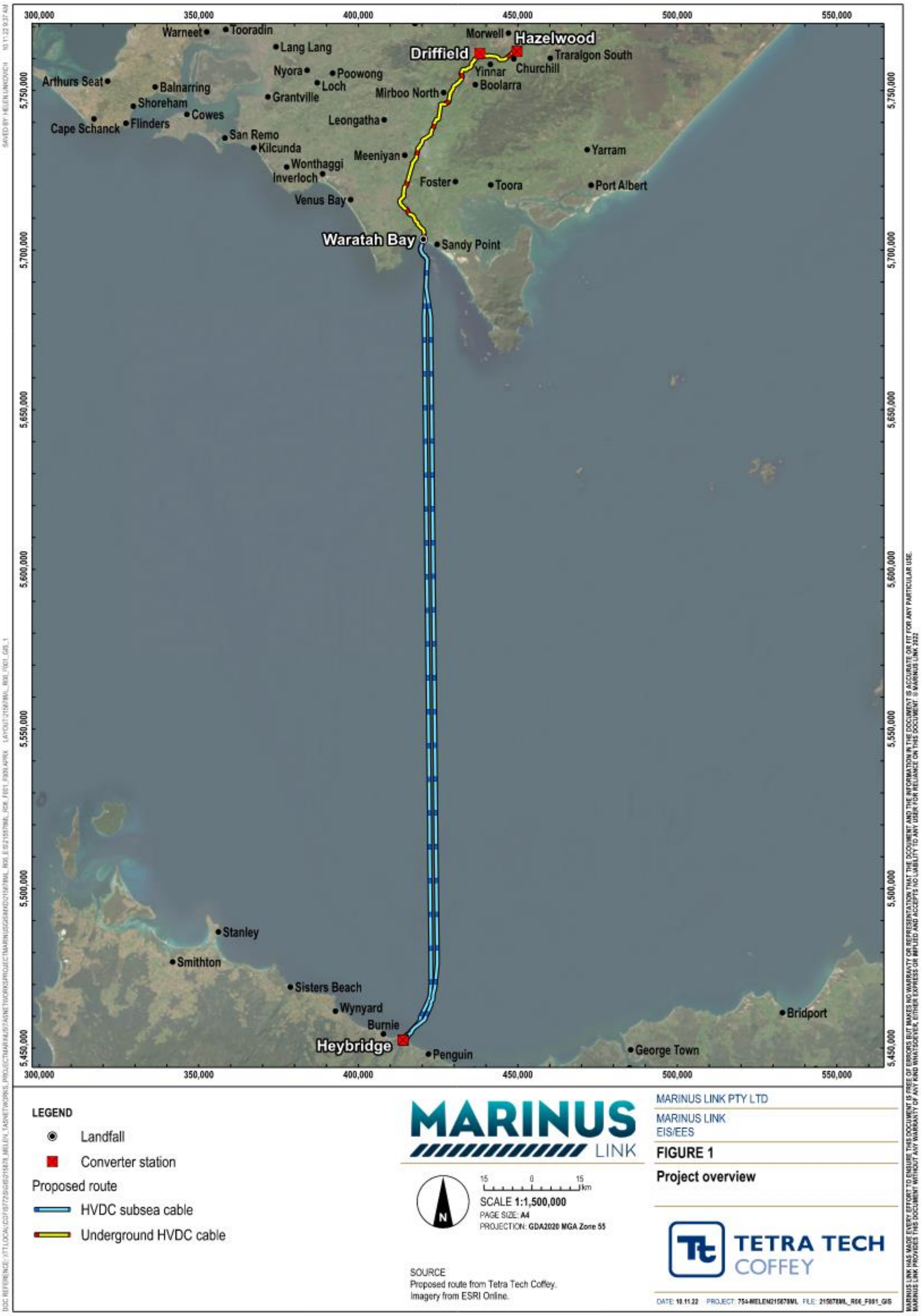


Figure 1-1: Project Overview

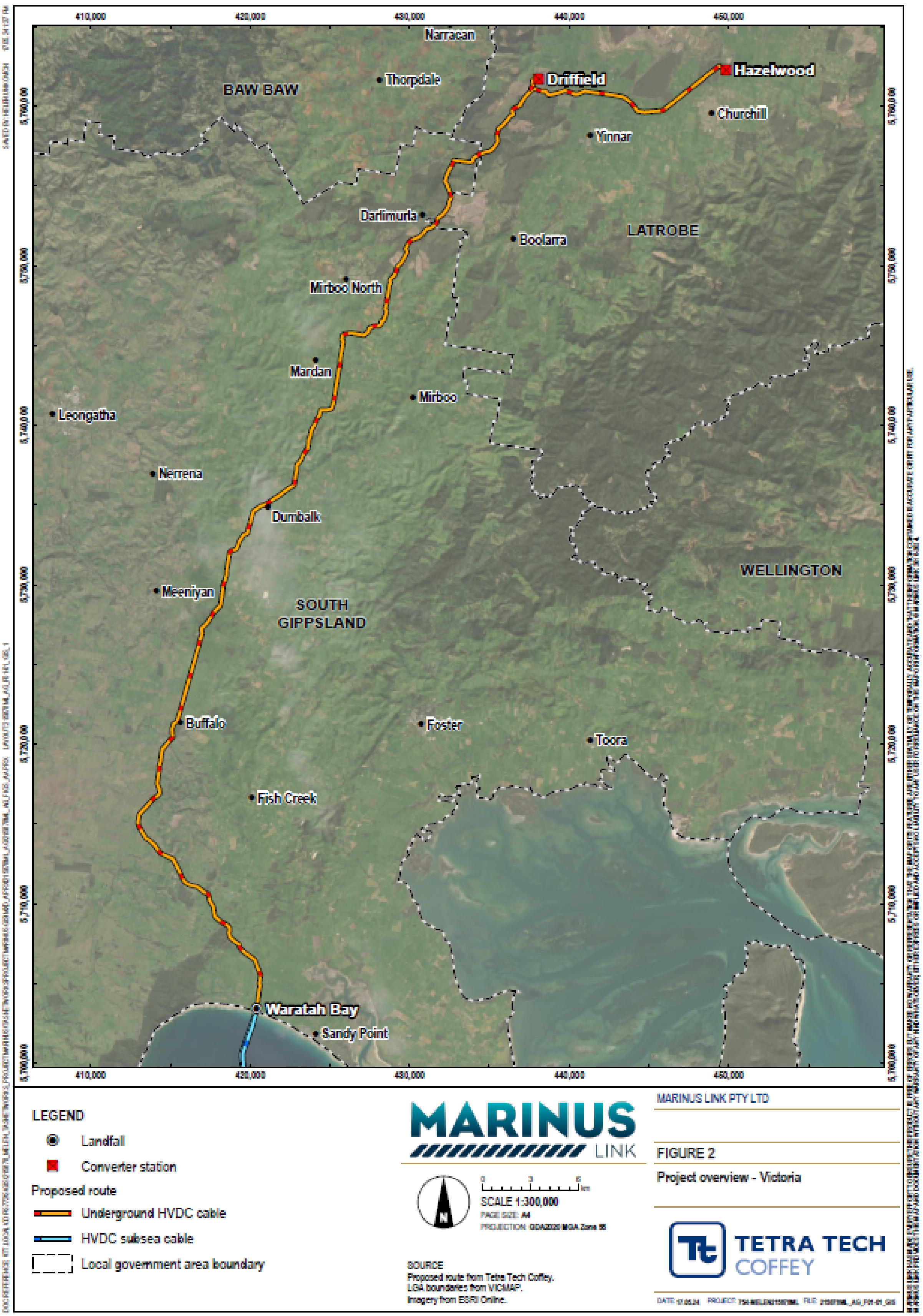


Figure 1-2: Project overview - Victoria

1.3 Assessment Context

This report has been prepared to assess the impact that the project will have on the transport network in Tasmania. 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.

This transport assessment forms a critical part of the overall EIS 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 1-3.

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 consultants 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 1-3: Structure of this Report

2 Assessment Guidelines

This section outlines the assessment guidelines relevant to traffic and transport and the linkages to other technical studies completed for the project. Two separate EISs are being prepared to address the EIS guidelines published by EPA Tasmania for the Heybridge converter station and shore crossing.

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 2.1 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
4. Description of Action	Details of all associated works/activities, including but not limited to vessel movements, maintenance activities, and transport requirements and access routes throughout different stages of development, commissioning, and operation.	Section 4.2 Section 4.3
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 Section 8.2

2.2 Tasmania

The guidelines for the EIS released by the Board of the Tasmanian EPA set out specific environmental matters to be investigated and documented in the project's EIS, and have informed the scope of the EIS technical studies. The EIS guidelines detail a series of evaluation objectives, and have been detailed in two separate guideline documents, one for the

Heybridge shore crossing, the other for the Heybridge converter station. These objectives nominate the desired outcomes sought in managing the potential impacts of constructing, operating and decommissioning the project.

The key issues and objectives relevant to traffic and transport are outlined below, which can be found in Section 6.14 of the converter station EIS scoping guidelines and Section 10.14 of the Heybridge shore crossing EIS scoping guidelines:

"Discuss potential environmental impacts of the proposal on any significant off-site or infrastructure facilities (including increased use of existing infrastructure, such as roads, ports and quarries), identify measures to avoid and mitigate any possible adverse impacts and assess the overall impacts following implementation of the proposed avoidance and mitigation measures.

Identify roads and other infrastructure to be used by vehicles for the proposal (during both construction and operation). Potential environmental impacts associated with construction and use of such infrastructure should be assessed."

These matters have been addressed throughout this report. To assist in addressing each of the key items within the above objectives, the following tables are provided for reference:

Table 2.2: Tasmanian EPA EIS Guideline Key Issues

Item	Requirement	Report Section
1	Discuss potential environmental impacts of the proposal on any significant off-site or infrastructure facilities (including increased use of existing infrastructure, such as roads, ports and quarries)	Section 7.1.1 Section 7.1.6 Section 7.1.11
2	Identify measures to avoid and mitigate any possible adverse impacts	Section 7.1.3 Section 7.1.8 Section 7.1.13
3	Assess the overall impacts following implementation of the proposed avoidance and mitigation measures.	Section 7.1.5 Section 7.1.10 Section 7.1.15

2.3 Victoria

The Victorian component is subject to the same Commonwealth assessment and will be detailed in a separate report to the Tasmanian EIS volume. The transport impacts associated with the Victorian section of the project is subject to a separate EES assessment and is detailed within a separate report.

2.4 Linkages to other reports

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 studies	Relevance to this assessment
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 terrestrial ecology 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 Act 1981 (Tas)	The *Transport Act 1981* establishes the Transport Commission and gives it statutory powers and functions including the power to regulate and control all or any means of transport by road, water or air within Tasmania	The Act is the legislative framework by which the state controls and administers the road network that will be utilised by the framework. Government authorities are engaged with throughout the lifecycle of planning through to construction.
Dangerous Goods (Road and Rail Transport) Act 2010 (Tas)	The Dangerous Goods Act 2010 provides the framework to regulate the transport of dangerous goods by road and rail in order to promote public safety and protect property and the environment	The project must comply with the Act. Strategies should be in place to ensure that project work and planning meets all Dangerous Goods Ace Regulations listed in the Act.
	State Strategic Policy	
Cradle Coast Integrated Transport Strategy, 2006	The Cradle Coast Integrated Transport Strategy was developed by the state and local councils as a guiding document for transport in the region. The objective of the document is: "A seamless, cost effective and efficient system for moving people, goods and resources operating within broader networks that: • improves interaction and physical connectivity; • enables communities and industries to meet their transport needs; and • enhances the Region's and Tasmania's economic development, and social and environmental wellbeing."	The document outlines future infrastructure requirements and strategic transport planning for the future direction of the region. The project will not impact the implementation of the strategies objectives.
Tasmanian Walking & Cycling for Active Transport Strategy (2010)	To create a safe, accessible and well connected transport system that encourages more people to walk and cycle as part of their everyday journeys. The vision supports the priority areas of the Tasmanian Urban Passenger Transport Framework to • Reduce Greenhouse emissions • Create liveable an accessible communities • Increase travel reliability\\ • Encourage healthy, active communities Integrated transport and land use planning	The project will identify any impacts to active transport paths within the study area which are impacted by the project and develop strategies to limit impacts.
North West Coastal Pathway Plan (2010)	The North West Coastal Pathway Plan provides guidance for local councils, State Government agencies and the wider community in regard to the development and operation of the shared pathway between Wynyard and Latrobe.	The project will identify any impacts to the proposed scope of this plan.
Tasmanian Integrated Freight Strategy, 2016	Strategy prepared by the Tasmanian government to address the states freight challenges. A number of objectives, principles and key actions are identified.	Much of the construction materials required for the construction activities will be delivered from outside the state, arriving at the ports. This guiding strategy will influence the freight delivered for project construction.
Bass Highway Cooee to Wynyard Planning Study, May 2019	The Department of State Growth undertook a planning study, funded by the Commonwealth Government, along the Bass Highway between Cooee and Wynyard. The results of this study is a corridor improvement plan.	The project will identify any impacts to the proposed scope of this plan.

Legislation	Key Policies and Strategies	Implication for this project
Transport Access Strategy	Sets out the Tasmanian Government's approach to providing better integrated and coordinated land-based passenger transport services for all Tasmanians. The strategy has the following priorities: Living closer, working together, connected transport system, better integration, closing transport gaps, innovative pricing, improved infrastructure.	The project will identify any impacts to the proposed scope of this plan.
Burnie City Council Strategic Policy		
Council Plan 2022-2025	To represent and make informed decisions in the best interests of the Burnie community over the long term	Strategic document. The project will identify any impacts to the proposed scope of this plan.
Road Network Strategy, 2016	Key outcome areas of the Strategy are: • Facilitating well-connected and appropriate freight routes including HPV / HML and Over Size and Over Mass Vehicles to support economic activity in the local and wider region. • Adopting and implementing a Road Network Hierarchy. • Prioritising and implementing works to address network deficiencies and supporting development opportunities. • Facilitating greater access to, and linkages within, the road network for pedestrians and cyclists.	The project construction activities will be in accordance with the recommendations of the strategy
Central Coast Council Strategic Policy		
Central Coast Strategic Plan 2014-2024	A 10-year time horizon with overarching strategic direction and priorities. It also provides the context and resources for turning strategy into action	The project will identify any impacts to the proposed scope of this plan.
Central Coast Council Cycling Strategy, 2021	A plan to support the growing culture of cycling in the municipality, with infrastructure recommendations.	The project will identify any impacts to the proposed scope of this plan.

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 750 MW 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.

In Tasmania, a converter station is proposed to be located at Heybridge near Burnie. The converter station will facilitate the connection of the project to the Tasmanian transmission network. There will be two subsea cable landfalls at Heybridge with the cables extending from the converter station across Bass Strait to Waratah Bay in Victoria. The preferred option for shore crossings is horizontal directional drilling (HDD) to about 10 m water depth where the cables will then be trenched, where geotechnical conditions permit.

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 is proposed to comprise two identical size power cables and a fibre-optic communications cable bundled together. The cable bundles for each circuit will transition from approximately 300 m apart at the HDD (offshore) exit to 2 km apart in offshore waters.

This assessment is focused on the Tasmanian terrestrial and shore crossing section of the project. This report will inform the two EISs being prepared to assess the project's potential environmental effects in accordance with the legislative requirements of the Commonwealth and Tasmanian governments (see Figure 4.1).

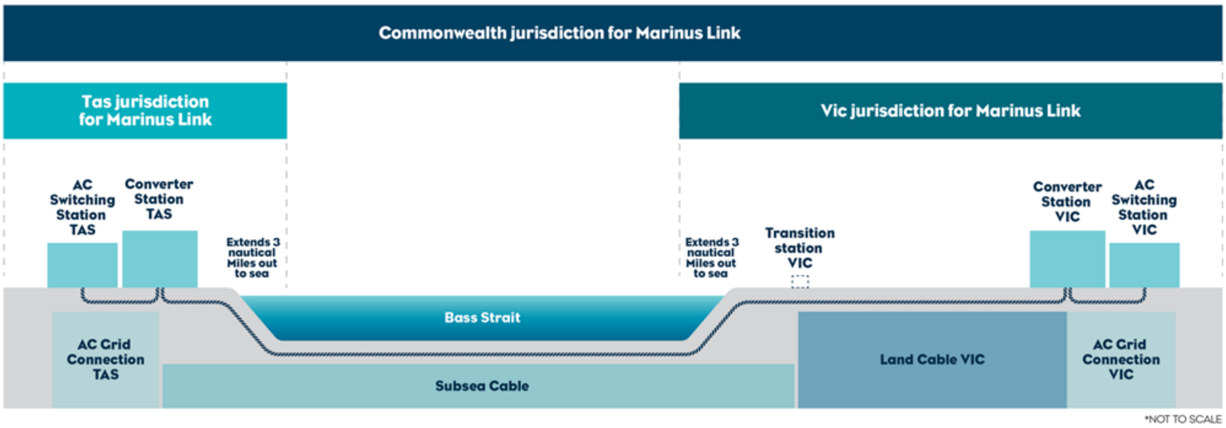


Figure 4-1: Project Components Considered Under Applicable Jurisdictions (Marinus Link Pty Ltd 2022, Consultation Plan)

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 one of the project is expected to be operational by 2030 and stage two will 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 two separate stages:

- Tasmanian Shore Crossing
  Horizontal boring methods will be utilised to cross the Tasmanian coastline to approximately 10m water depth.

- **Converter Station/(s)**
  The construction of the converter station at the end of the cable. This converter station will be located in Heybridge and will include the delivery of the transformer by an approximately 130m long vehicle.

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 Tasmanian Shore Crossing

4.2.1.1 Tasmanian Shore Crossing Description

In Tasmania, the shore crossing will be in Heybridge, approximately 6 km east of Burnie. The shore crossing will be constructed using Horizontal Directional Drill (HDD) and will extend approximately 800 m to 1200 m offshore out to 10 m water depth. The subsea cables and land cables will be connected close to the Tasmanian coast. The land-sea cable joint will be installed at the HDD drill pad location in Heybridge. The site will be accessible via Minna Road, at the same access point as the converter station.

The HDD construction process will occur over eight to 12 months. Each HDD will drilled continuously 24 hours per day, 7 day per week.

4.2.1.2 Tasmanian Shore Crossing Construction Traffic Generation

Information and assumptions in regard to the construction of the Tasmanian shore crossing and its associated traffic generation have been outlined below:

- HDD Drilling at the shore crossing will occur over six months.
- 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.
- It is expected that a maximum of six light vehicles and eight heavy vehicles will be required on-site during set up.
- It is assumed that the construction vehicles generated will arrive in the morning during site set up and remain on-site during construction
- 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: Tasmanian 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 Converter Station

4.2.2.1 Converter Station Description

The Tasmanian converter station will be located in Heybridge on Tasmania's north coast, the location of which is shown in Figure 4-2

Figure 4-2: Converter Station Location

The Heybridge converter station will connect the subsea cables to the Tasmanian 220 kV HVAC network. The overhead steel lattice gantries will terminate at the site, connect to a switching station which is connected to the converter stations.

The Heybridge converter station is accessed via the Bass Highway at Minna Road which has a seagull intersection layout. Access will be a sealed, two-lane access road . Internal roads will also be constructed within the converter station site to provide access between buildings.

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 650 tonnes. This arrangement is further discussed in Section 4.2.3.2 and shown in more details in Appendix D .

4.2.2.2 Converter Station Traffic Generation

Information and assumptions regarding 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 4.2 below.

Table 4.2: Converter Station Construction Traffic Volume Summary

Movements per quarter	2025				2026				2027	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Stage 1		353	619	267	300	367	357	264		
Stage 2			512	512	159	159	169	239	229	209
Switching Station				100	240	300	300	300	240	120
Total Movements = 4,715										

- The peak quarterly traffic volumes identified in Table 4.2 is 1,131 vehicles. Assuming this volume of traffic is evenly distributed across a three-month period 15 daily vehicle movements will result. 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 30 vehicles will arrive on a single day (30 inbound movements and 30 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 4-3 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.

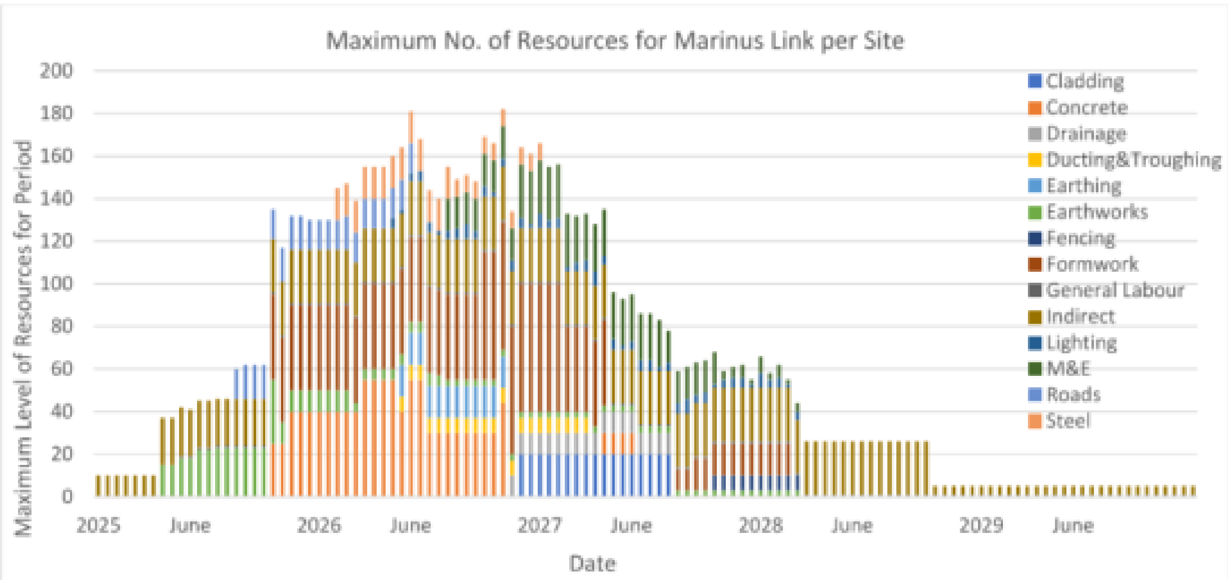


Figure 4-3: Converter Station Construction Daily Workforce

- 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 4.3 below.

Table 4.3: Converter Station Traffic Volume Summary

Time Period	Heavy Vehicles (Construction)	Light Vehicles (Employees)	Total Vehicles
Peak Hour	30 movements	180 movements	210 movements
Daily	60 movements	360 movements	420 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.

4.2.3 Vehicle Types Used for Construction

4.2.3.1 Core Construction Activities

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

- 12-18 tonne capacity tip truck
- 8m^3 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 7.1.6.2 and 7.1.8.2.

4.2.3.2 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 D in greater detail.

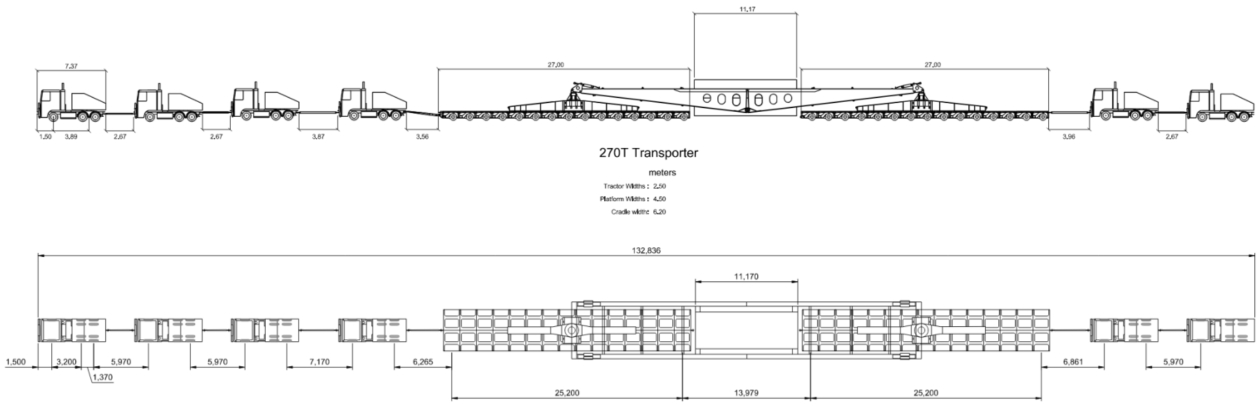


Figure 4-4: Transformer Transporter Vehicle

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 Burnie. Further detail is outlined in Section 7.1.6.2 and 7.1.8.2.

4.2.4 Construction Vehicle Travel Paths

The paths of travel to the site have been determined. These considered a number of factors, such as pre determined heavy vehicle routes as found on the Department of State Growth (DSG) transport services 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 site. It has been assumed that all construction vehicles will be arriving to the region from either Burnie or Devonport (primarily from the ports in either township)
- 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

- **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 the DSG transport services website were preferenced. These maps show the pre-approved and assessed heavy road networks as determined by DSG 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 (26m) Network:** Tasmania's arterial and municipal roads for Class 2 B-Doubles that are up to 26m in length. 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.
- **Load Carrying Vehicles Network:** Tasmania's Class 1 load carrying vehicles network is for oversize vehicles. This includes vehicles up to 5.5m in width, 5.0m in height and 30.0m in length. This road network was deemed to be the most accessible, with a greater level of accessibility than the B-Double network.
- **Height Clearance Under Overhead Structures:** The map of overhead structures on the road network, utilized to identify any roads with low hanging infrastructure that may impact the access requirements of the transformer transport vehicle.

4.2.4.1 Heavy Vehicles

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 either Burnie (west of the site), Devonport or Launceston (East of the site). These paths of travel will both primarily use the Bass Highway, turning into the site at the Minna Road intersection. It is expected that vehicles will be travelling from Burnie, where possible, given its close proximity to the site, however given Launceston and Devonport are larger townships a 50:50 east/west distribution has been assumed.

The travel paths determined are outlined in Figure 4-5

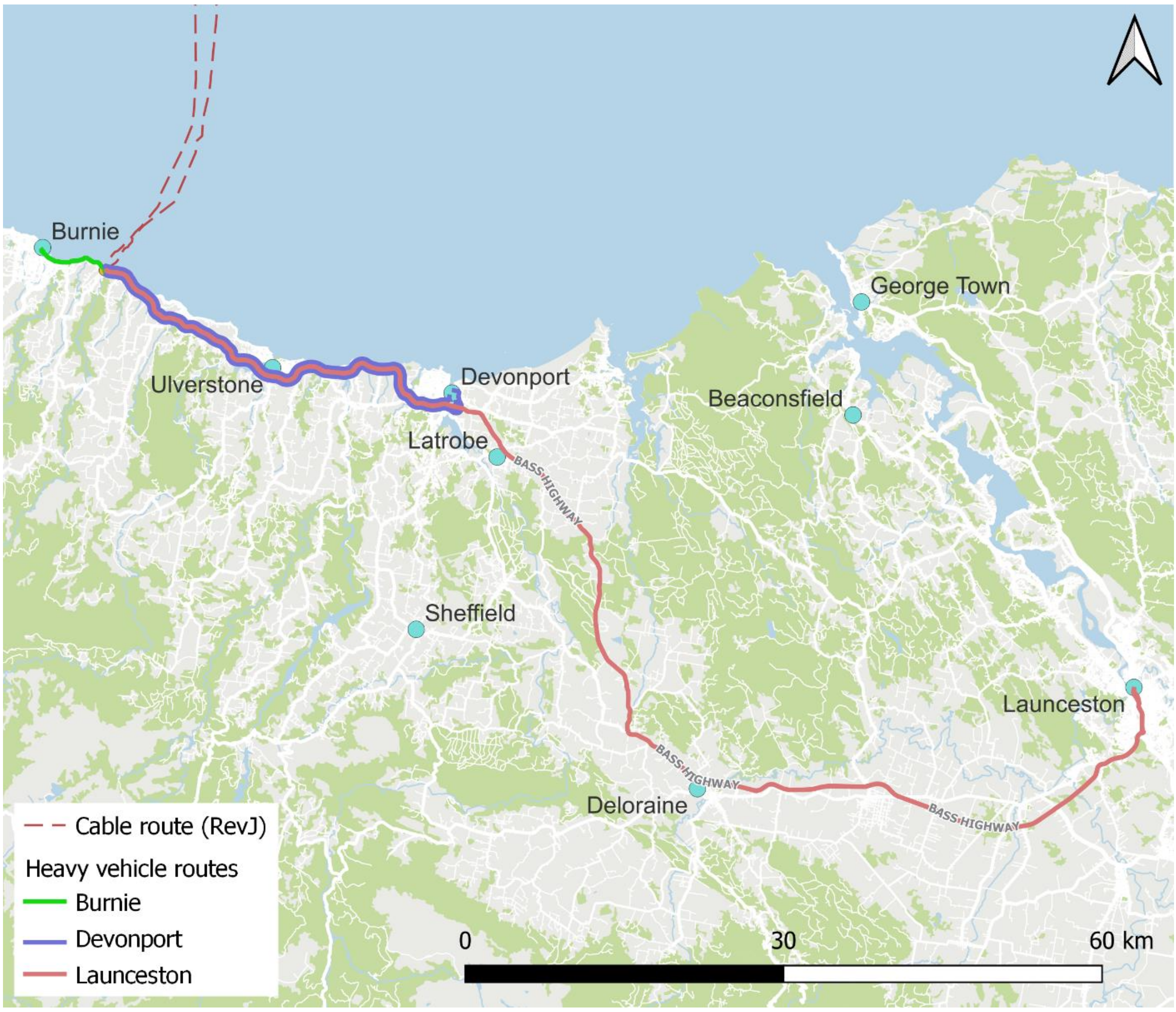


Figure 4-5: Heavy Vehicle Paths of Travel Using the Bass Highway

4.2.4.2 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.

The population of the surrounding local government areas were therefore identified using ABS data from the 2016 Census. These are outlined in Table 4.4, with their locations presented in Figure 4-6.

Table 4.4: Local Government Municipalities in the Surrounding Area

Local Government Municipality	Population
Circular Head	8,114
Waratah-Wynyard	14,164
Burnie	19,862
Central Coast	22,299
Kentish	6,713
Devonport	25,886
Latrobe	12,076
West Tamar	24,688
George Town	6,962
Launceston	70,331
Dorset	6,748
Meander Valley	20,505

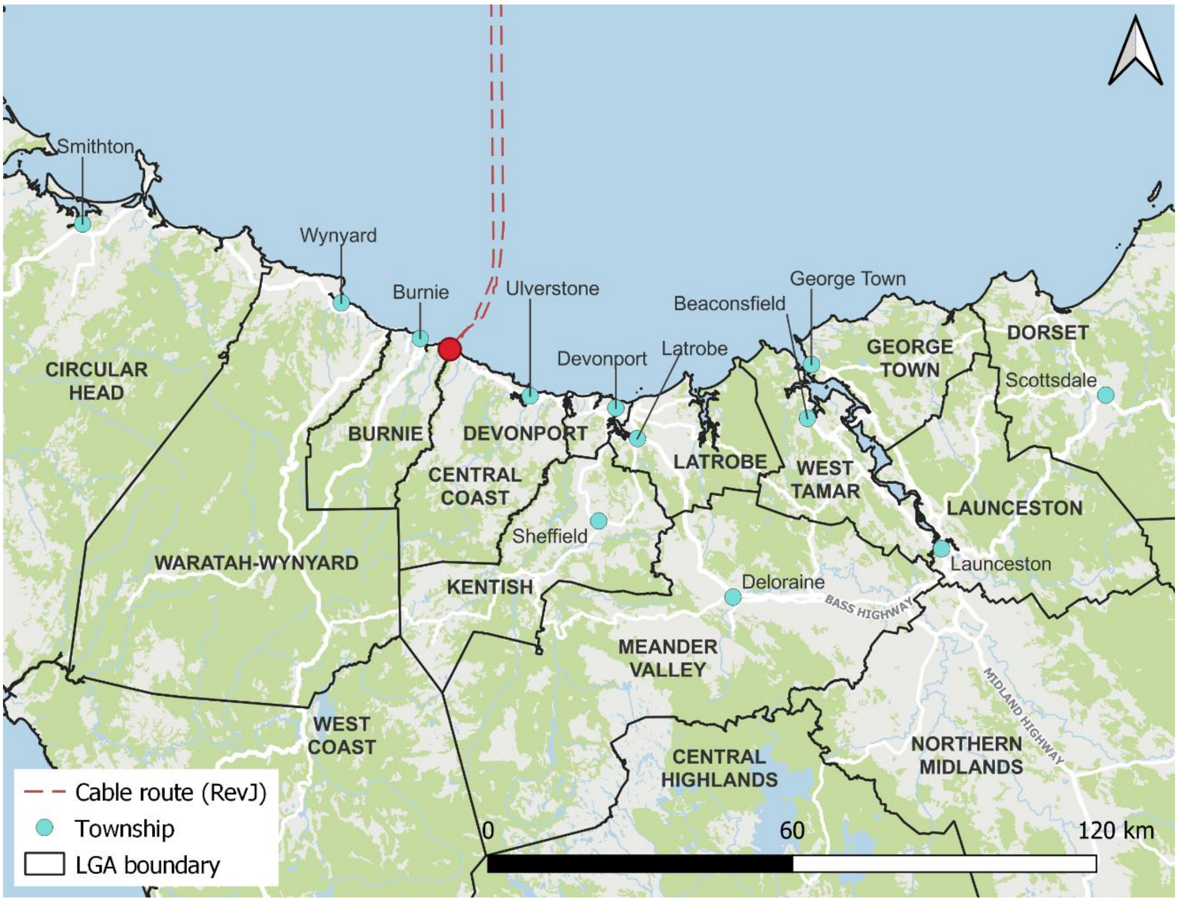


Figure 4-6: Local Government Municipalities in the Surrounding Area

The municipalities were then grouped by their location when compared to the Heybridge site, to identify the direction of travel and distribution. The percentage of total residents within the municipalities was utilised to determine the percentage split of employees to the site from that general direction.

Table 4.5: Grouping of Local Government Municipalities in the Surrounding Area

Location	List of Municipalities	Total Population	Percentage of Combined Population
West	Circular Head, Waratah-Wynard, Burnie	42,140	18%
East	Central Coast (Tas.), Kentish, Devonport, Latrobe (Tas.), West Tamar, George Town, Launceston, Dorset, Meander Valley	196,208	82%

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.

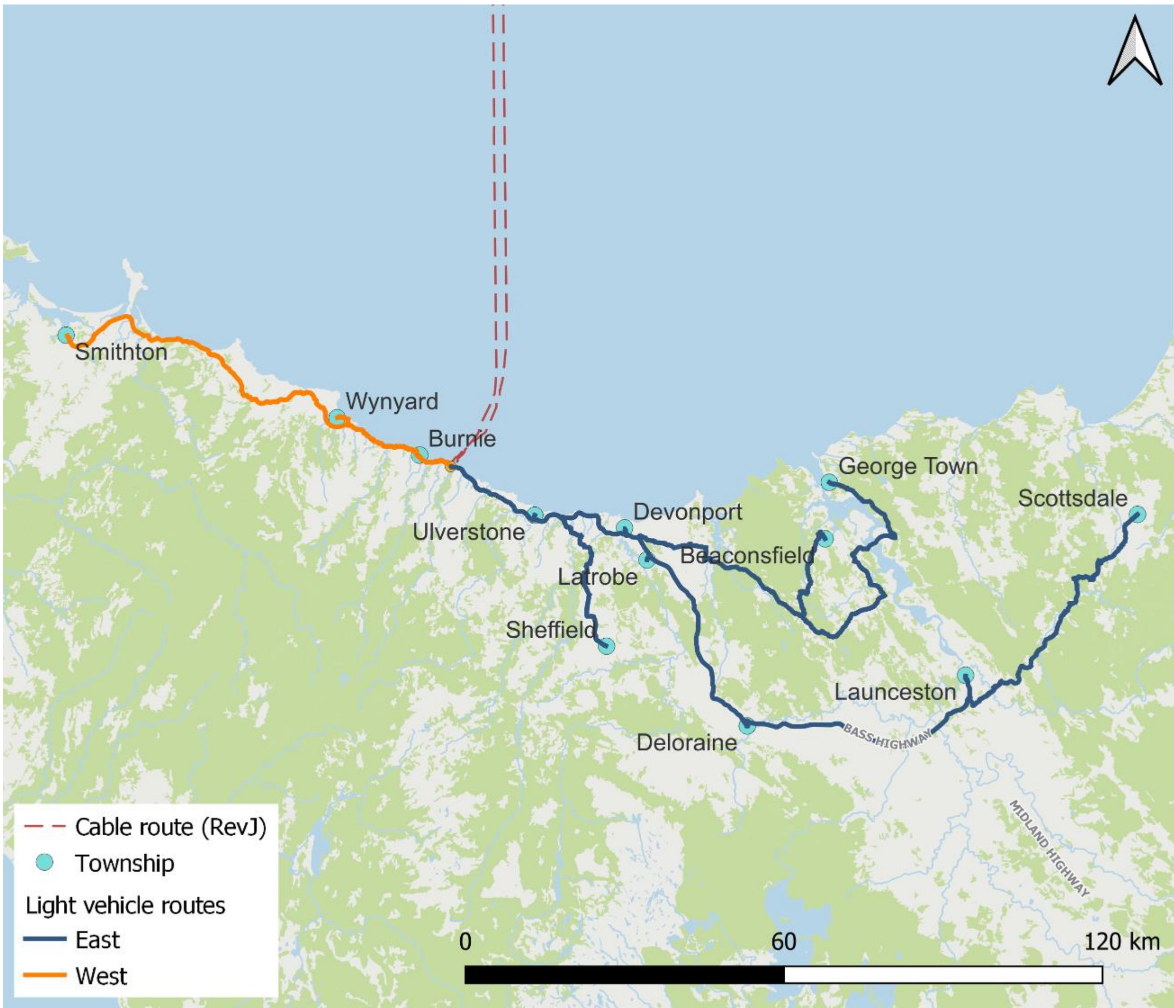


Figure 4-7: Light Vehicle Paths of Travel

4.2.4.3 Transformer Transport Path of Travel

As stated above in Section 4.2.2 the construction of the converter station entails the arrival of the transformer transport vehicle. Information provided by MLPL indicates that the transformer will arrive at either the Port of Burnie or Port of Devonport to then be delivered to the site.

The travel paths for this vehicle were determined utilising the Load Carrying Vehicles Network and the Height Clearance Under Overhead Structures maps as outlined above on the DSG website. A review of these maps, as well as an inspection of the infrastructure along the Bass Highway found that the transformer is recommended to be delivered to the Port of Burnie. This is due to the following:

- The travel distance is less between the site and the Port of Burnie. This will reduce disruption to the road network caused by the large, slow moving vehicle and decrease the labour cost
- Roundabouts exist along the Bass Highway (such as that immediately to the east of the site in Heybridge) that will need to be traversed by the large vehicle. Roundabouts do not exist between the site and Burnie
- There are a number of bridges over the Bass Highway between the site and Devonport with height clearances of 5.0m and less
- Consultation with DSG highlighted that the Port of Burnie is utilised for the delivery of wind turbine blades for wind farms in the region, indicating it is accessible to very large vehicles.
- There are a number of bridges between the site and the Port of Burnie which require further assessment as to their structural integrity and capacity to accommodate a vehicle of this size and mass (refer stakeholder feedback provided via the Department of State Growth in Section 5.7)

The path of travel utilised by the transformer transport is shown in Figure 4-8.

Figure 4-8: Paths of Travel from the Port of Burnie by the Transformer Transport

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 shore crossing 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, and converter stations equipment and infrastructure including scheduled minor and major outages.

In addition to the above, the converter station will have personnel during normal working hours, with small numbers of personnel attending each day.

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.

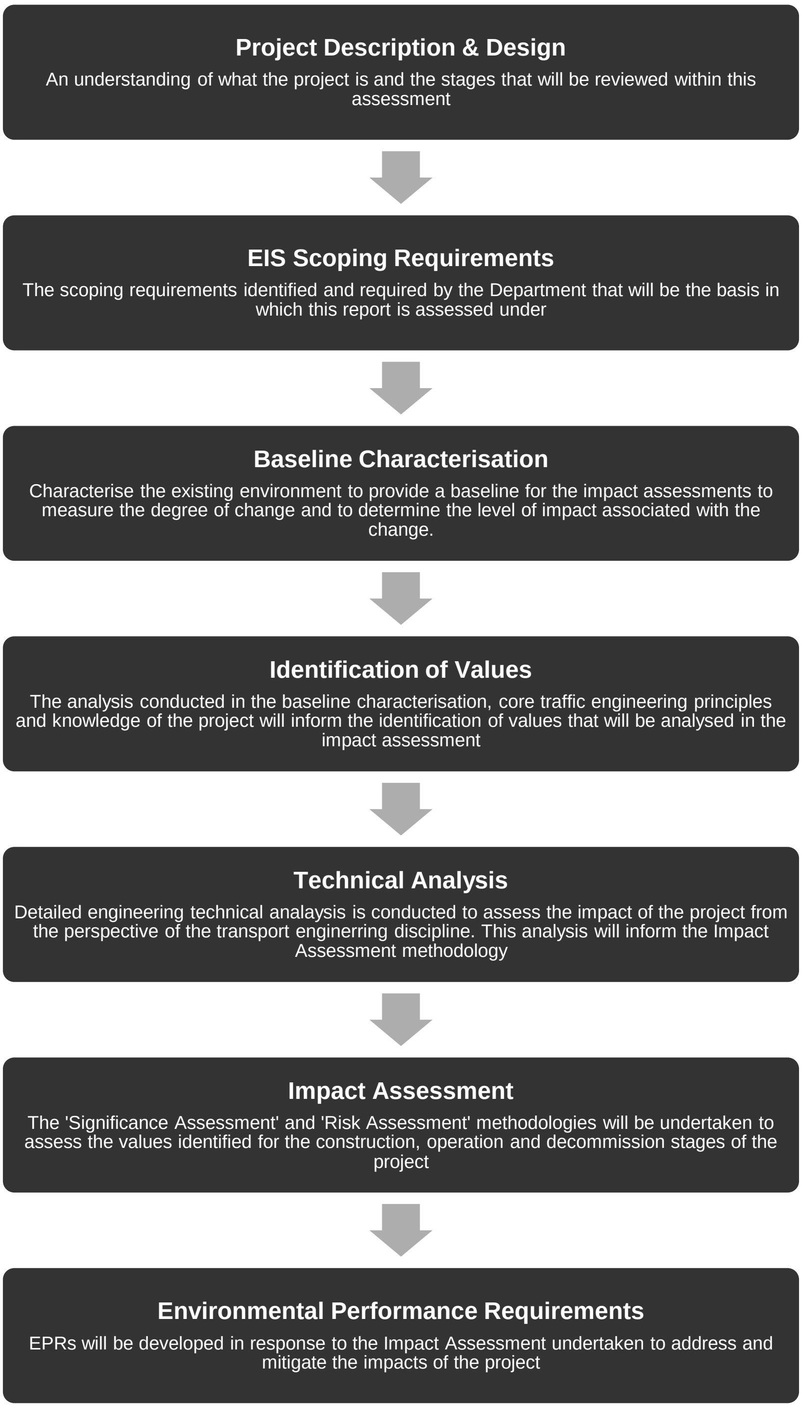


Figure 5-1: EIS Methodology

5.2 Study Area

This report assesses the road network in the immediate surrounding area of the construction site and to Burnie and Devonport. This includes Minna Road and the Bass Highway on the converter station sites frontages.

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.

The approximate extents of the study area assessed within this report are shown in Figure 5-2.

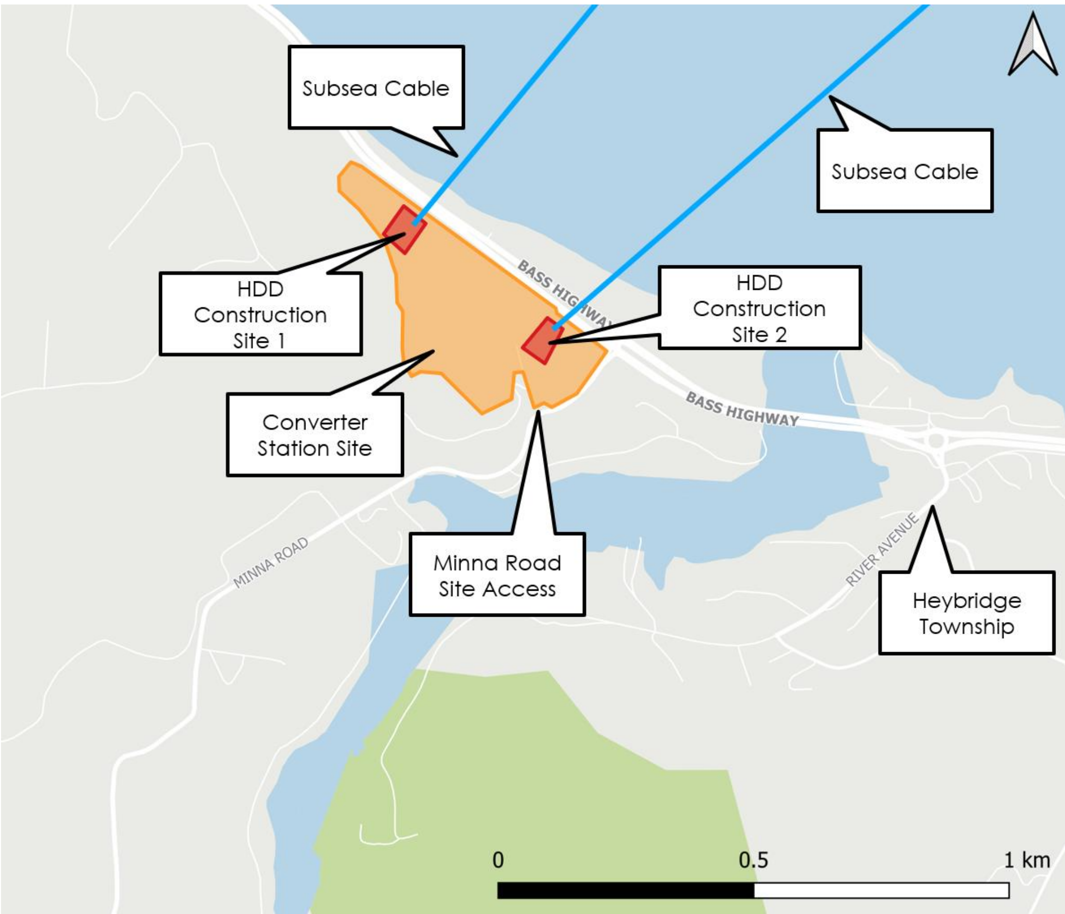


Figure 5-2: Assessment Study Area

5.3 Existing conditions

The baseline characterisation was 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 Baseline 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
	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.	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 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 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 significance impact 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.

Identify Value

Determine transport specific project values on which the project is to be assessed against

Identify Assessment Method

Two assessment methodologies were considered in the development of the Transport Impact Assessment: significance assessment and risk assessment. Each value was assessed by the methodology deemed most appropriate

Significance Assessment

Determine Sensitivity of Value

The sensitivity of a value is determined with respect to its protection status, intactness, uniqueness or rarity, resilience to change and replacement potential

Determine Magnitude of Potential Impact

The magnitude of impacts on a value is assessment of the geographical extent, duration and severity of the impact

Assessment of Significance

The ultimate significance assessment combines the sensitivity and magnitude in a matrix

Develop Environmental Performance Requirements

Environmental performance requirements set out the environmental outcomes that must be achieved during design, construction and decommissioning to reduce the impact of the identified values

Assess Residual Risk or Impacts

The Significance assessment and Risk Assessment are revaluated in the matrix after the application of the Environmental Performance Requirements

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. • 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 utilised 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. • 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 utilised 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. • 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

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
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. • Future access proposed to lightly trafficked road (<1,500 vpd)	• Non-approved B-double route with moderate increase in traffic • The road and intersection geometry is slightly constrained with some non-conforming infrastructure • Low road crash history (or potential to) • A moderately sensitive use is accessed directly from a non-approved B-double approved route	• Low frequency bus services • Recreational paths used by locals
Very Low	• Current traffic volumes are significantly below the road's design capacity • Suitable alternative routes exist for roads effected by the project. • 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

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
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
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 • Minordetours 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 significance of impacts 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 significance of impacts is determined. This approach adopts a five-by-five matrix.

Table 5.4: Assessment of Significance of Impact

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 significance of an impact derived using Table 5.4 is set out in Table 5.5.

Table 5.5: Assessment of Significance of Impact

Significance of Impact	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 significance of the impact of each value.

The assessment of the significance of the impacts is outlined in Section 7 of this report for each value. The assessment of Value 1 is shown in Table 7.6 and Table 7.8, Value 2 in Table 7.12 and Table 7.15 and Value 3 in Table 7.17 and Table 7.19.

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 EPRs. These mitigation measures will address the various impacts that the development will likely have, and result in a number of different works, which are outlined below:

- Infrastructure upgrades.
- Temporary traffic management.

5.6.3 Cumulative Impacts

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 Tasmania are:

- Remaining North West Transmission Developments
- Guilford Wind farm
- Robbins Island Renewable Energy Park
- Jim's Plain Renewable Energy Park
- Robbins Island Road to Hampshire Transmission Line
- Bass Highway upgrades between Deloraine and Devonport
- Bass Highway upgrades between Cooee and Wynard
- Hellyer Wind farm
- Table Cape Luxury Resort
- Youngmans Road Quarry
- Port Latta Wind farm
- Port of Burnie Shiploader Upgrade
- Quaylink – Devonport East Redevelopment.

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 optimising 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.

The extent to which potential impacts have been reduced is determined by undertaking an assessment of the significance of the residual impacts. 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 has been outlined in Table 5.6.

Table 5.6: Stakeholder Consultation Undertaken

Stakeholder	Engagement activity and timing	Discussion topics
Burnie City Council	Consultation meeting 18/11/2022	Initial consultation with Burnie City Council to understand initial feedback on the project methodology 1. Main concern is movement of transformer transporter 2. Recommend transformer transporter travel from Port of Burnie 3. Expect transformer transporter to occur outside peak periods 4. Large vehicles such as for wind farms have had difficulty exiting Port of Burnie 5. Semi-trailer vehicles approved to travel on Minna Road 6. Small level of residential development occurring in surrounding area
Department of State Growth	Consultation Meeting 12/12/2022	Initial consultation with Department of State Growth to understand initial feedback on the project methodology 1. DSG have been liaising with MLPL for a number of months to date 2. Recommendation to use Port of Burnie for transformer transport 3. A number of bridges on path of travel to Heybridge, review still required 4. If Port of Devonport is to be used, significant lead times will occur (approx. 4-5 year process) 5. Possible limitation of port capacity. Port of Burnie preferred 6. Minna Rd is part of the B-double road network, and assumed to be generally accessible to large vehicles 7. Ensure worker car parking does not impact road network, contain within site
National Heavy Vehicle Regulator	To be completed and timing to be confirmed	1. The path of travel for the transformer transport 2. Traffic management requirements for the transformer transport. 3. Access constraints of bridges and road infrastructure

5.8 Assumptions and Limitations

Construction Methodology

- Information in regard to the methodology of the different construction stages of the project was provided by MLPL. 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.

Travel Routes

- The travel routes for construction vehicles travelling to the site were assumed to be travelling from either Burnie or Devonport.
- Distribution of employees arriving to the site is based on the population of the surrounding local government areas.
- Heavy construction vehicles will utilise the 26m 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 Class 1 load carrying vehicles road network where possible.
- The transformer will arrive at the Port of Burnie. The transformer transporter will travel from the Port of Burnie to the site.
- The transformer transporter will utilize the vehicle identified in Appendix D .

Swept Paths

- DSG 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.

Pavement Analysis

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

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 summarised in Section 6.4.

6.2 Site Context

The Tasmanian section of the project corridor consists of a 1.5ha site located just off the north coast of Tasmania in the township of Heybridge. This site sits within the municipality of Burnie, 6km to the east of the township of Burnie and 30km to the west of Devonport.

The site is accessible via Minna Road, which is immediately accessible to / from the Bass Highway, that connects across the northern coast of Tasmania

As stated above, this report has been prepared for the Tasmanian section of the project, which includes the construction of the converter station as well as the shore crossing.

The location and surrounding context of the project alignment is outlined in Figure 6-1.

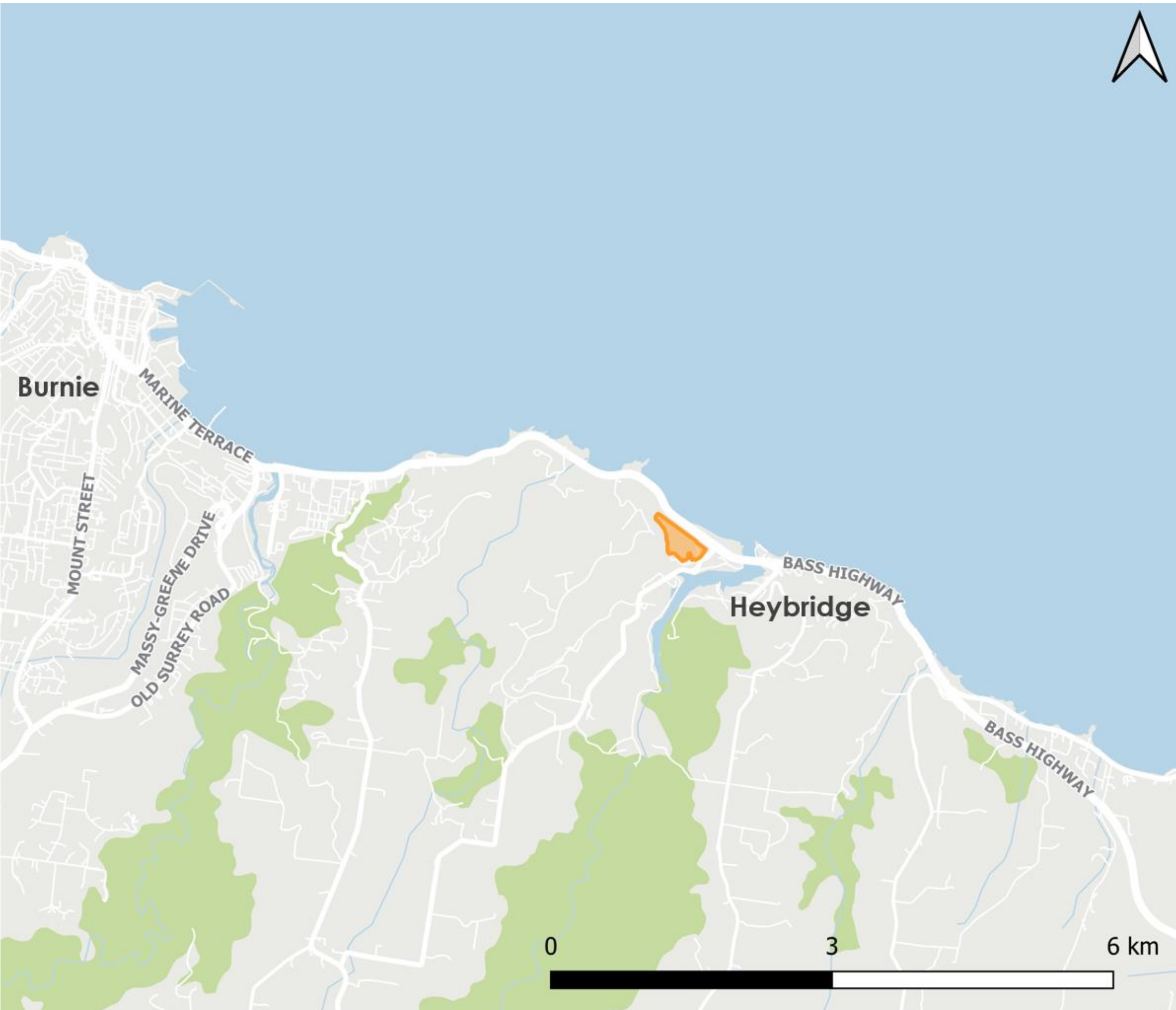


Figure 6-1: Marinus Link Tasmania Surrounding Context

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 on Wednesday 9th November 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 and video cameras over a week long period of time between 8th November 2022 to 14th November 2022. The surveys undertaken are summarised in Table 6.1, with the turning movement counts shown in Figure 6-2 to Figure 6-5

Table 6.1: Summary of Traffic Surveys Undertaken

#	Road	Location	Average 2-way Traffic Volumes		
			AM Peak Hour	PM Peak Hour	Daily
1	Bass Highway [1]	Adjacent to the proposed converter station site	460	478	19,673
2	Minna Road	Adjacent to the site access point	64	71	798
3	Tarleton Street	Between Riverview Avenue and Bass Highway	766	935	10,621
4	Wright Street	Between Anchor Drive and Torquay Road	421	467	5,275

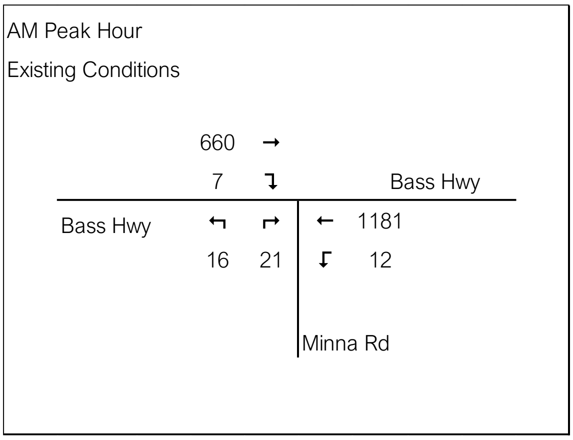


Figure 6-2: Survey Results: Bass Highway / Minna Road AM Peak

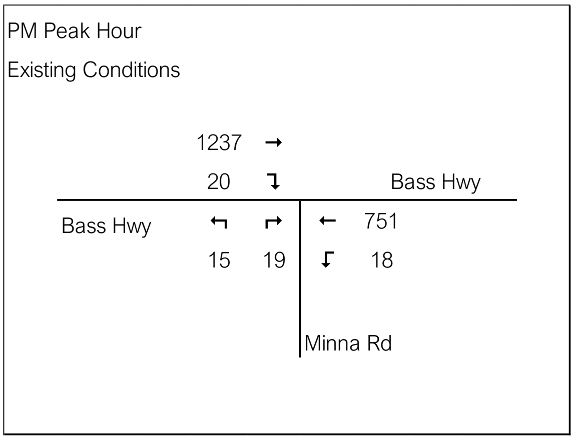


Figure 6-3: Survey Results: Bass Highway / Minna Road PM Peak

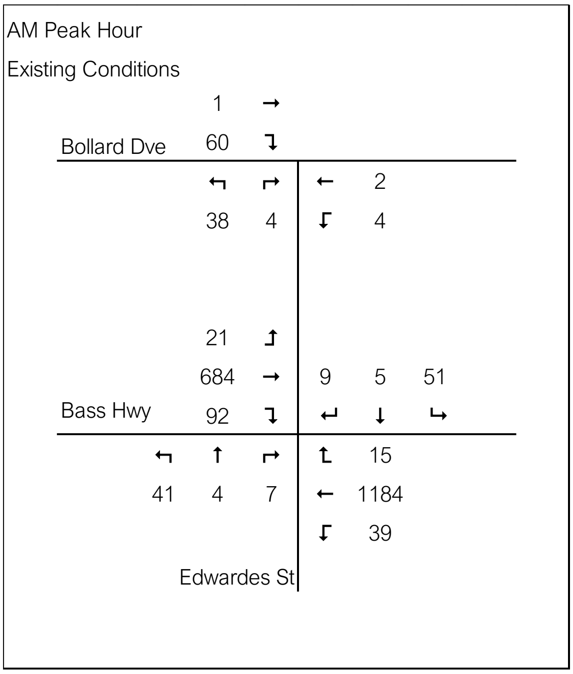


Figure 6-4: Survey Results: Bass Highway / Edwardes Street / Bollard Drive AM Peak

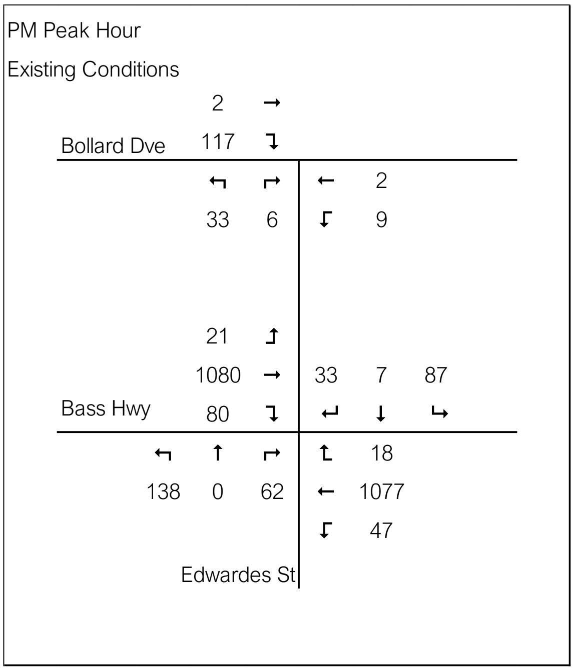


Figure 6-5: Survey Results: Bass Highway / Edwardes Street / Bollard Drive PM Peak

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 along the Bass Highway. The traffic surveys undertaken are expected to represent typical operating conditions for the roads surveyed.

6.3.1.3 Road Classifications & Capacity

All roads within the study area under review have been classified in accordance with common traffic engineering guidelines. Lower order roads have been classified using *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 route. The traffic capacities outlined in Table 6.3 have been utilized where appropriate.

In addition to the above, an approximate capacity for highways has been determined. Reference was made to *Austroads Guide to Traffic Management: Part 2, Section 8.2.1* which provides the following guidance:

"For the purpose of designing grade-separated junctions and interchanges, the maximum flow per lane for motorways must be taken as 1800 vehicles per hour (vph). These flows do not represent the maximum hourly throughputs but flows greater than these will usually be associated with decreasing levels of service and safety."

As a typical traffic engineering 'rule of thumb' a two way, two lane road with minimal side friction has a daily capacity threshold of 18,000 vehicles per day. For a four lane highway, this capacity doubles 36,000 vehicles per day.

For the purposes of this assessment, the traffic capacity as outlined above has been utilized for the highways in the study area.

6.3.1.4 DoT Heavy Vehicle Networks

The surrounding road network was reviewed against the heavy vehicle map networks on the Department of State Growth transport website. 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 (26m) Network:** Tasmania's arterial and municipal roads for Class 2 B-Doubles that are up to 26m in length. 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.
- **Load Carrying Vehicles Network:** Tasmania's Class 1 load carrying vehicles network is for oversize vehicles. This includes vehicles up to 5.5m in width, 5.0m in height and 30.0m in length. This road network was deemed to be the most accessible, with a greater level of accessibility than the B-Double network.
- **Height Clearance Under Overhead Structures:** The map of overhead structures on the road network, utilized to identify any roads with low hanging infrastructure that may impact the access requirements of the transformer transport vehicle.

Source: https://www.transport.tas.gov.au/vehicles_and_vehicle_inspections/heavy_vehicles/Heavy_vehicle_access

6.3.1.5 DSG Open Data Traffic Surveys

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

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

Source: https://geocounts.com/traffic/au/tas/

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 DSG 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.
- 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	Road Characteristics	Vehicles Per Day (VPD)	Historic Growth Rate	HV%
1	Bass Highway	National / State Highway	90	Total carriageway width = 37m Total lane width = 7m one way (2 x 3.5m) Shoulder width = 3.7m	>40,000	State significant highway with two lanes in each direction. Emergency stopping lane shoulders. No active transport infrastructure.	19,673	2%	10%
2	Minna Road	Sub Arterial Road	100	Total carriageway width = 7.8m Total lane width = 3.9m (2 x 3.9m) Shoulder width = 2m	>3,000	Sealed road with single lane in each direction. Gravel shoulder with topographic barriers. No active transport infrastructure.	798	N/A	14%
3	Edwardes Street	Arterial Road	50	Total carriageway width = 20m Total lane width = 20m (2 x 10m) Shoulder width = 0m	>3,000	Access between Bass Highway and Port of Burnie. wide lanes for truck turning movements. Pedestrian infrastructure crossing at traffic lights along Bass Highway.	1,355	N/A	25%
4	Tarleton Street	Arterial Road	60	Total carriageway width = 12m Total lane width = 12m (2 x 6m) Shoulder width = 0m	>3,000	Sealed road with single lane in each direction. Footpaths on western frontage	10,621	N/A	7%
5	Wright Street	Arterial Road	50	Total carriageway width = 8m Total lane width = 8m (2 x 4m) Shoulder width = 0m	>3,000	Sealed road with single lane in each direction. Footpaths on eastern frontage.	5,275	N/A	17%

Table 6.5: Intersections

ID	Intersection	Intersection Arrangement	Sight Distance	Intersection Characteristics
1	Minna Road / Site Access Point	T-intersection	Curves and topography limits sight distance from minor road	The intersection is sealed with fading line marking
2	Bass Highway / Minna Road	'Seagull' T-intersection. Give way from minor road	No issues with sight distance	The intersection is sealed with road markings and signage. No issues identified.
3	Bass Highway / Edwardes Street	Signalised X-intersection	No issues with sight distance	The intersection is sealed with signals and line marking

6.3.2 Bridges and Culverts

As stated earlier in this report, the transport routes of travel to be used by heavy vehicles are contained on the Bass Highway, where the infrastructure is designed for the movement of vehicles such as B-doubles or other larger trucks / vehicles. As stated in Section 4.2.4.3, it has been assumed that the transformer transporter will be travelling to the site from the Port of Burnie. One of the reasons for this decision was the number of bridges that are on the longer path of travel from Devonport.

Notwithstanding, there are four bridges between the site and the Port of Burnie which are to be crossed by the transformer transporter vehicle. It is recommended that these bridges are assessed to determine they can adequately accommodate the large vehicle.

It is noted that in the event of any road closures on the Bass Highway, a route review of the path of travel will need to be undertaken to identify whether any bridges exist along this travel path that need further assessment. This is particularly relevant for the transformer transporter, or for when any cable drums to be delivered to the site.

6.3.3 Vehicle Crashes

An analysis was undertaken of crashes on all vehicle routes for the latest five-year period available (2018 - 2022). This assessment was undertaken for the Bass Highway and Minna Road within the vicinity of the site to capture all proximate crash data along the road network proposed to be used by project generated traffic.

The location of crashes is shown in Figure 6-6.

Figure 6-6: Vehicle Crashes and Travel Routes

During this period, there were six crashes within the study area, five of which occurred on the Bass Highway and did not result in any injury. The remaining crash was on Minna Road and resulted in a minor injury

A summary of the identified crashes is outlined in the table below

Table 6.6: Summary of reported crashes – 2018 to 2022

Date	Location	Crash Type	Severity
12-01-18	Bass Highway, Heybridge, Burnie	184 - Out of control on carriageway	Property Damage Only
23-02-18	Bass Highway, Heybridge, Burnie	173 - Right off carriageway into object or parked vehicle	Property Damage Only
23-02-18	Bass Highway, Heybridge, Burnie	171 - Left off carriageway into object or parked vehicle	Property Damage Only
15-05-18	Bass Highway, Heybridge, Burnie	173 - Right off carriageway into object or parked vehicle	Property Damage Only
15-02-21	Bass Highway, Heybridge, Burnie	179 - Other straight	Property Damage Only
20-09-20	Minna Road, Heybridge, Burnie	189 - Other curve	Minor

6.3.4 Rail

The western rail line is located on the northern side of the Bass Highway in the immediate vicinity of the site. This is a single track rail line used for freight services connecting Burnie to Devonport. No passenger rail services are currently operational along the western rail line.

The arrangement of the western rail line in the vicinity of the site is shown in Figure 6-7 and Figure 6-8.

Figure 6-7: Western Rail Line Immediately Adjacent the Site Facing East

Figure 6-8: Western Rail Line Immediately Adjacent the Site Facing West

6.3.5 Buses

Public bus services are available in the Burnie, a short drive from the site in Heybridge. 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. On the Bass Highway along the frontage of the site operates the 708 bus and the 190 bus. These services operate at a low frequency. The 190 bus has a stop on the other side of Blythe River, a short walk from the site.

A map showing these bus services is shown in Figure 6-9

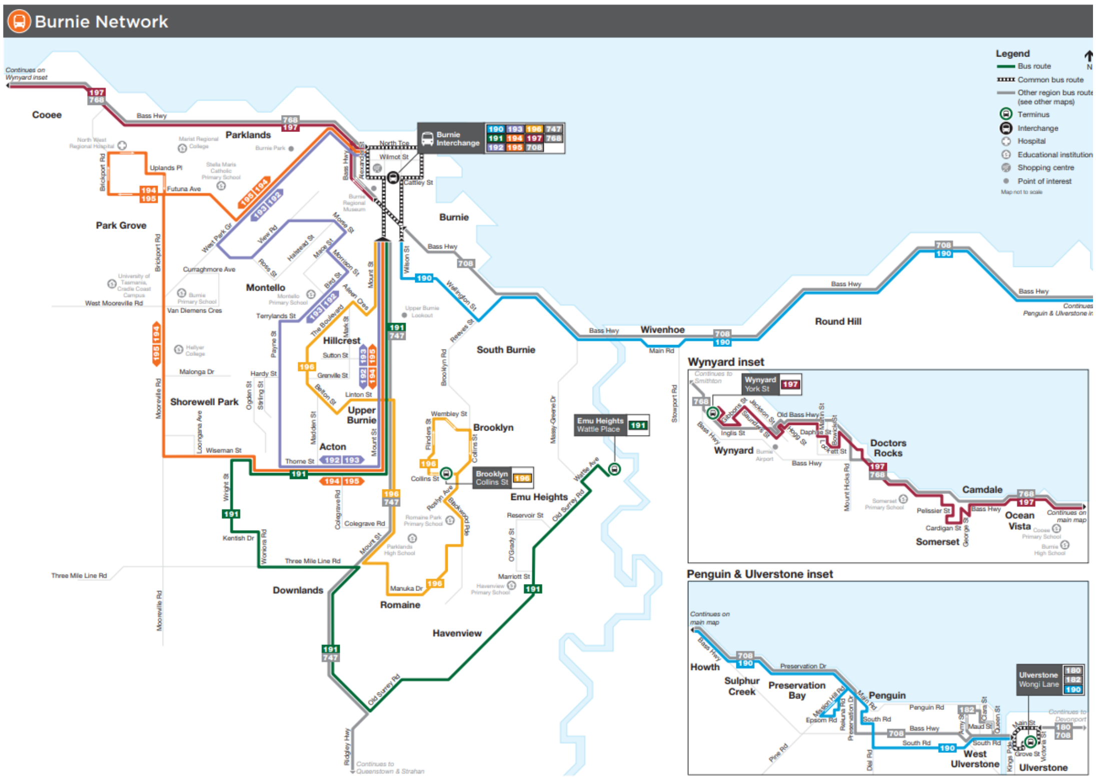


Figure 6-9: Bus Services in Burnie

It is noted that in addition to the above public bus routes that school bus services will be operating in the area. 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.

6.3.6 Public Transport Accessibility & Use

The above indicates that the site has minimal access to public transport services.

6.3.7 Active Transport

Given the location of the site and immediate surrounds, there is a lack of formal pedestrian footpaths and cycle tracks.

6.4 Summary of Relevant Values

The items outlined in the 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 regional freight trains, local bus services, school buses, recreational 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	Road Network Capacity
	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 guidance as identified in section 6.3.1.3 of this report. The theoretical capacity for the roads in the immediate surrounds of the site impacted by development traffic has been calculated using the information identified in this section. Theoretical capacity is informed by industry standard documentation and approach.

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 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 DSG open data as detailed in Table 6.4. It is noted that for Minna Road, growth rate information was not available, the same growth rate was applied as found on Bass Highway. It is noted that this is a highly conservative assumption given their different road types and expected usage.

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 will be operating above or below capacity.

The results highlighted that both Minna Road and the Bass Highway will continue to operate well below capacity with the addition of development generated traffic.

Table 7.2: Midblock Capacity Assessment Results

Road	Theoretical Capacity	Surveyed AADT Flow	Growth Factor	Maximum Daily Traffic Generation	Projected AADT Flow	Capacity Check
Bass Highway	36,000	19,673	0.02	494	20,167	Under Capacity
Minna Road	>3000	798	0.02	494	1,292	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.

7.1.1.3 Attribute 2: Intersection Capacity

To determine the operating capacity of the intersections immediately surrounding the site that will experience an uplift in traffic, SIDRA Intersection 9 has been utilised. 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 0.90 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately. This is shown in Table 7.3 below

Table 7.3: 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 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 7.4 below for the existing conditions and Table 7.5 for the during construction scenarios. The input traffic volumes are shown in Appendix E , with the full results shown in Appendix F .

Table 7.4: Existing Conditions SIDRA Intersection Modelling Results

Peak Hour	Intersection	Approach	DOS	Average Delay (Seconds)	95th Percentile Queue (Metre)
AM Peak Hour	Bass Highway / Minna Road (North)	Median Storage (South)	0.02	2 sec	0m
		Bass Highway (West)	0.21	0 sec	0m
		Intersection	0.21	0 sec	0m
	Bass Highway / Minna Road (South)	Minna Road (South)	0.30	40 sec	6m
		Bass Highway (East)	0.38	0 sec	0m
		Median Storage (North)	0.04	14 sec	1m
		Intersection	0.38	1 sec	6m
	Minna Road / Site Access Point	*Intersection not assessed in existing conditions as it is not operational*			
PM Peak Hour	Bass Highway / Minna Road (North)	Median Storage (South)	0.01	3 sec	0m
		Bass Highway (West)	0.40	0 sec	0m
		Intersection	0.40	0 sec	0m
	Bass Highway / Minna Road (South)	Minna Road (South)	0.08	16 sec	2m
		Bass Highway (East)	0.24	0 sec	0m
		Median Storage (North)	0.05	7 sec	1m
		Intersection	0.24	1 sec	2m
	Minna Road / Site Access Point	*Intersection not assessed in existing conditions as it is not operational*			

Table 7.5: During Construction SIDRA Intersection Modelling Results

Peak Hour	Intersection	Approach	DOS	Average Delay (Seconds)	95th Percentile Queue (Metre)
AM Peak Hour	Bass Highway / Minna Road (North)	Median Storage (South)	0.02	2 sec	0m
		Bass Highway (West)	0.21	1 sec	0m
		Intersection	0.21	1 sec	0m
	Bass Highway / Minna Road (South)	Minna Road (South)	0.36	49 sec	10m
		Bass Highway (East)	0.38	1 sec	0m
		Median Storage (North)	0.42	29 sec	12m
		Intersection	0.42	4 sec	12m
	Minna Road / Site Access Point	Minna Road (South)	0.03	0 sec	0m
		Minna Road (North)	0.18	6 sec	8m
		Site Access (West)	0.00	10 sec	0m
		Intersection	0.18	5 sec	8m
PM Peak Hour	Bass Highway / Minna Road (North)	Median Storage (South)	0.12	3 sec	0m
		Bass Highway (West)	0.40	0 sec	0m
		Intersection	0.40	1 sec	0m
	Bass Highway / Minna Road (South)	Minna Road (South)	0.79	35 sec	44m
		Bass Highway (East)	0.24	0 sec	0m
		Median Storage (North)	0.05	7 sec	1m
		Intersection	0.79	8 sec	44m
	Minna Road / Site Access Point	Minna Road (South)	0.02	0 sec	0m
		Minna Road (North)	0.03	0 sec	0m
		Site Access (West)	0.18	9 sec	7m
		Intersection	0.18	7 sec	7m

The results of the above assessment found the following:

- The intersection of Bass Highway / Minna Road operates well under its existing arrangements, with a maximum DOS of 0.40 found for the eastbound movements along the Bass Highway in the PM Peak.
- The Minna Road approach experiences moderate levels of delay, with an average delay of 40 seconds found in the AM peak.
- In the during construction scenarios, delay increases at the Minna Road approach, however the intersection continues to operate well under capacity.
- A maximum DOS of 0.79 was found for the Minna Road approach in the PM peak, primarily consisting of right turning vehicles from the site.
- The site access point operates well under its capacity in the AM and PM peak hours

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, construction activities are expected to arrive at 7AM, which is before the recorded road network peak hour.

7.1.1.4 Attribute 3: Road Connectivity and Provision of Alternative Routes

All vehicles accessing the site are expected to approach via Bass Highway, turning at Minna Road. In the event of any road closures along Bass Highway, detours are generally available, noting that these add sizable increases in travel time. The site can also be accessed via Minna Road to the south.

7.1.2 Value 1 - EIS Significance Impact Assessment

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

The significance assessment for value 1, prior to the implementation of any mitigating works, has been summarised in Table 7.6 below.

Table 7.6: Value 1 Initial 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	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatment existing	There are two intersections primarily impacted by site generated traffic to access the site. The intersections will operate in accordance with industry standards.	Moderate	Minor	Low
Road Network Capacity	Connectivity	Nil	Bass Highway is a primary Highway utilized by the Tasmanian north coast	Significant detours will occur to the local public if the Bass Highway were to be closed. 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 possible 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 traffic 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: Intersection Capacity

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

7.1.3.3 Attribute 3: 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

The following EPRs outlined in Table 7.7 have been informed by the possible mitigation and management measures summarised in the impact assessment. These mitigation measures are discussed to outline how the EPRs could be implemented. The EPRs have also been developed with consideration of industry standards and relevant legislation, guidelines and policies. The location of where these items are represented in the final EPRs outlined in Section 8.2 has been provided.

Table 7.7: Value 1 EPRs

#	EPR Identified	# Reference to final EPR's
1	The performance of the road network and intersections utilised by the project should be monitored to ensure they continue to operate within their capacity.	EPR T01-2
2	Public roads will not be closed during construction.	EPR T01-15
3	In the event that traffic volumes exceed those found within this report, an additional assessment should be undertaken to determine If adequate capacity exists within the road network or if additional mitigation measures are required to accommodate the change.	EPR T01-17

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 scrutinised by the contractor to ensure the performance is in line with expectations, and no unforeseen traffic capacity issues occur. Assessment should be undertaken in the event of unexpected additional traffic generated by construction activities.

Addressed in EPR T01-2

7.1.5.2 Attribute 2: Intersection Capacity

The assessment conducted above determined that no intersections within the study area will exceed their capacity during peak operational 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 T01-17

7.1.5.3 Attribute 3: Road Connectivity and Provision of Alternative Routes

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

Addressed in EPR T01-15, EPR T02

The revised significance assessment for value 1 with mitigating works has been summarised in Table 7.8 below.

Table 7.8: Value 1 Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	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	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatment existing	Moderate	Minor	Low	Nil	Inspections required to ensure intersections of Bass Highway / Minna Road and Minna Road / site access are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low
Road Network Capacity	Connectivity	Nil	Bass Highway is a primary Highway utilized by the Tasmanian north coast	Very High	Negligible	Moderate	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.	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 7.9: 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.	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: Safe Condition of Bridges and Culverts

As identified in Section 6.3.2, there are a number of bridges within the study area that have an operational mass limit. This information has been provided by MLPL, in consultation with DSG. It is expected that all bridges within the study can accommodate vehicles up to an including a 19m semi-trailer, given they are all contained within the approved B-double road network. Any reviews required are in regard to the transformer transporter.

The appropriate reviews for the capacity limits of these bridges, and any works required to them is ongoing, with reviews being undertaken by MLPL. These reviews should be undertaken by a suitably qualified engineer in order to confirm they are in an appropriate condition for the expected vehicles that will be generated by the project.

7.1.6.2 Attribute 2: 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 4.2.3.1, 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.

As a separate analysis to the above, swept paths have also been undertaken for the bespoke transformer transport at all critical locations between the Bass Highway 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 DSG 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. An assessment was therefore undertaken at the proposed site access point from Bass Highway to Minna Road, the results of which are shown in Appendix B This assessment demonstrates that no additional works are required to gain access to the site.

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 Port of Burnie to the converter station site.

The locations where swept paths were undertaken are identified with reference numbers in Figure 7-1 below.

Figure 7-1: 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 7.10 indicating whether works may be required to accommodate the turning movements of the transformer transporter.

Table 7.10: Transformer Transport Swept Path Assessment Results

#	Location	Swept Path Assessed	Outcome
1	Port of Burnie	Internal movement in the Port of Burnie, inbound and outbound	Works to the roundabout in the Port of Burnie to provide a trafficable surface through the roundabout.
2	Bass Highway / Edwardes Street / Bollard Drive	Right turn from Bollard Drive into Edwardes Drive, then a left turn into Bass Highway	Works to enable the vehicle to drive over the kerb at the slip lane turning left onto the bass highway.
		Bass Highway, right turn into Edwardes Street, left turn into Bollard Drive	Path will travel over median to right hand side of Bass Highway to travel through slip lane provided from Edwardes Street northern approach. Minor works to drive over kerbing.
3	Bass Highway / Minna Road	Right turn movement into Minna Road from the Bass Highway Left turn movement from Minna Road onto the Bass Highway	Works to drive over kerbing in median of Bass Highway, and Road island on Minna Road approach and remove signage. Minor works to drive over grass in median and verges.

#	Location	Swept Path Assessed	Outcome
4	Minna Road / Site access point	Right turn movement into the site and left turn movement from the site at Minna Road	Driving over shoulders of Minna Road. Possible land clearing and excavation works to the hill on the northern frontage of Minna Road.

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. When this movement is occurring, access to individual properties may be restricted temporarily.

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

7.1.6.3 Attribute 3: Crash Stats Review

A review of the historic crash data for the study area was conducted in Section 6.3.2 above. This background review found that there were six crashes within a five-year period in the surrounding area, five of which did not cause injury.

This review did not find an evident crash trend in the study area. 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.

7.1.6.4 Attribute 4: Sight Distance Assessment

Both an on-site and desktop assessment were undertaken for the proposed site access point to Minna Road 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 7-2 below.

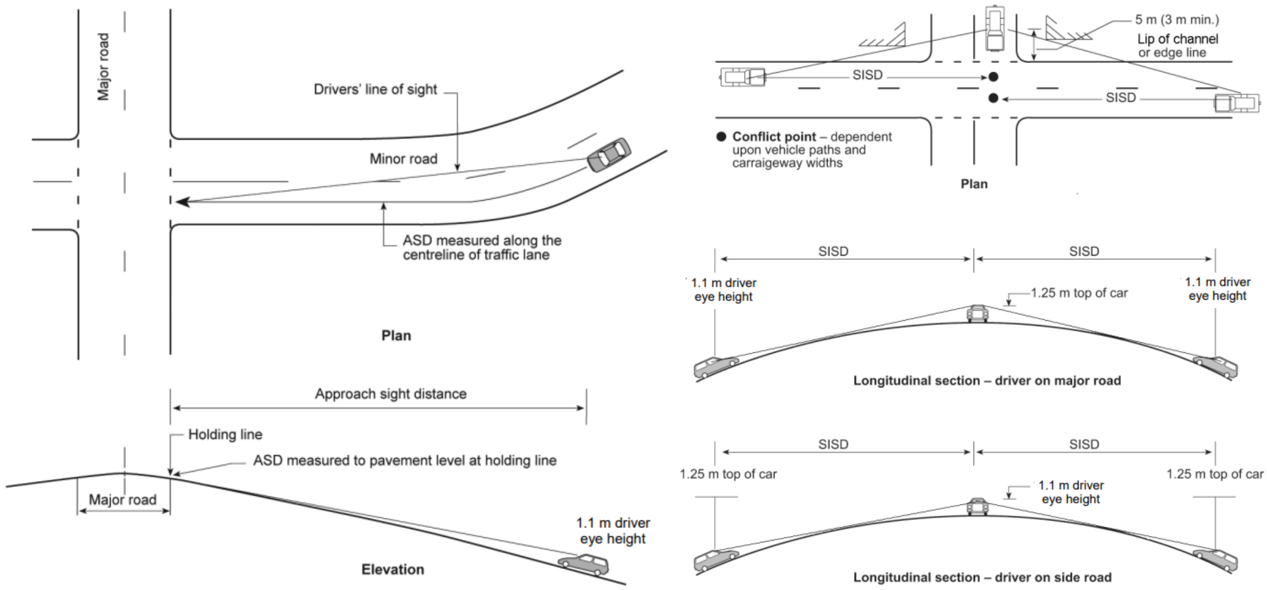


Figure 7-2: Application of Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD)

The results of this assessment is detailed in Table 7.11

Table 7.11: Sight Distance Assessment Results

ID	Intersection	Approach	Sight Distance	Existing Measures
11	Minna Road / Site Access Point	Site Access Point (minor arm)	ASD is achieved	There are curves in the road in both directions on the major carriageway which limit the available sight distance as well as vegetation and topography. The intersection currently has appropriate signage to identify the curves in the road and the location of the intersection.
		Minna Road (south)	SISD is not achieved	
		Minna Road (north)	SISD is not achieved	

7.1.6.5 Attribute 5: Height Clearance Requirements of 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. An indicative observation from the site visit identified low hanging power lines over Minna Road.

7.1.6.6 Attribute 6: Safe Operation

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. It is noted that given the majority of the path of travel to the site are contained upon the Bass Highway, many of the following operational considerations will be minimal in nature. If, however, any detours in traffic paths are required during construction due to road closures along the Bass Highway, additional consideration will be required to the matters identified below to ensure safe operational standards are implemented.

These have been outlined below.

Pavement Assessment

A pavement assessment was not conducted on the external road network. This is due to the road network that is expected to be relied upon for vehicles travelling to the site is contained on higher order arterial roads that are regularly maintained and designed to be utilized by heavy vehicles.

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 shore crossing works, which will generate heavy movements during the 24/7 operation.

Provision of Adequate Quality Intersection Treatments

Intersections utilized by the site should be provided to adequate standard, including clear signage and line marking. This is most notable at the site access point to Minna Road.

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 load carrying vehicles network, as outlined in Section 4.2.4.3. The routes utilized have been developed in conjunction with the Department of State Growth, 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 Bass Highway and are therefore operating in line with expectation and existing use.

Vehicle movements may occur through smaller townships in the event of a road closure on the Bass Highway. When construction vehicles pass through these locations there is potentially an increased risk of crashes with a more significant consequence due to the increased number of pedestrians that are present within the townships.

Safety Risk Around Schools

There are a number of schools and kindergartens within the townships that construction vehicles will be travelling through to access the site. These paths of travel, however, remain on the Bass Highway, which does not contain direct access points to schools.

If any detours are required during construction activities, a review of schools along the detour route should be conducted. When construction vehicles pass by schools 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.

7.1.7 Value 2 – EIS Significance Impact Assessment

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

The significance assessment for value 2 prior to the implementation of any mitigating works has been summarised in Table 7.12.

Table 7.12: Value 2 Initial Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Safe condition of bridges and culverts	Nil	Bridges and culverts may not be in an appropriate condition for the movement of the transformer transporter	There are a number of bridges on the path of travel between the Port of Burnie and the site. The bridges on the Bass Highway may not be designed for the transformer transporter.	Moderate	Major	High
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access via the surrounding road network	The paths of travel to the site are contained on the DSG approved B-double road network. It is assumed the DSG approved road network can accommodate the construction vehicles accessing the site.	Low	Minor	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access to the site	The existing site access point is designed to be accessible to large vehicles. 19m semi-trailers can access the site.	Very Low	Negligible	Very Low
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.	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. This will require traffic management and may restrict access to private property temporarily	High	Major	Major

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	The transformer transporter may require works and removal of minor road furniture to access the site at the following locations: • Port of Burnie • Bass Highway / Edwardes Street / Bollard Drive • Bass Highway / Minna Road • Minna Road / Site Access Point	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	Historic Crash Safety Review	Nil	Increased crash risk on the external road network surrounding the site	No noted crash trend. The traffic generated by the site is not expected to increase the safety risk.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Provision of safe sight distance at intersections	Nil	Increased safety risk at the Minna Road site access point with sight distance constraints, noting warning signage is provided.	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	Nil	Roads may require resurfacing / remediation works.	The road network on the paths of travel to the site are high capacity freight routes, designed to accommodate heavy vehicles. The traffic generated will increase wear and tear on the road network.	Low	Moderate	Low

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Safe operation	Nil	Increased crash risk due to poor road lighting for HDD at night	Provision of road lighting at the Minna Road access point . Vehicle movements generated with insufficient lighting provided.	Moderate	High	Moderate
Safe Road Performance, Condition & Design	Safe operation	Nil	Provision of adequate quality intersection treatments, notably at the Minna Road site access point.	Infrastructure treatments utilised by construction traffic should be up to an appropriate quality as required by the standards Traffic generated on intersections with poor line marking.	Low	Moderate	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	General driver safety	General driver behaviour and crash risk.	Low	Major	Moderate
Safe Road Performance, Condition & Design	Safe operation	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	Nil	Safety risk of pedestrians in townships with increased truck movements	Roads used to access the site travel past townships on the Highway. Heavy vehicle movements through townships contained on highways.	Very Low	Major	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk around Schools – identify schools / townships	Roads used to access the site are contained to the highway. Heavy vehicle movements during school pick-up.	Very low	Major	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	Unforeseen safety risk	Diverted roads should be constructed to the same or better standard than the original.	Very Low	Major	Low

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Safe Road Performance, Condition & Design	Safe operation	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	Nil	Peak Seasonal Events	Increase in the number of unfamiliar drivers onto the road network during seasonal holiday periods.	Low	Negligible	Very Low

7.1.8 Value 2 – Mitigation Works

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

7.1.8.1 Attribute 1: 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 the transformer transporter. This process should be undertaken in consultation with road authorities. These pieces of road infrastructure 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.

7.1.8.2 Attribute 2: Adequate Road Geometry

No additional road works were identified to accommodate 19m semi-trailers accessing the site. Should any unforeseen large sized vehicles required access during the construction period, separate assessment will be required to ensure access can be achieved.

Table 7.13 outlines the works required to accommodate the transformer transporter, with the results of the swept path assessments undertaken outlined in Appendix C

Table 7.13: Road Works Required to Accommodate Transformer Transport Movements

#	Location	Swept Path Assessed	Results
1	Port of Burnie	Internal movement in the Port of Burnie	Works required to the roundabout in the Port of Burnie to provide a trafficable surface through the roundabout
2	Bass Highway / Edwardes Street / Bollard Drive	Right turn from Bollard Drive into Edwardes Drive, then a left turn into Bass Highway Right turn from Bass Highway into Edwardes Drive, then a left turn into Bollard Drive.	Works required to enable the vehicle to drive over the kerb at the slip lane turning left onto the bass highway. The path of travel will cross the central median, travelling onto the to right hand side of Bass Highway. Vehicle will to travel through slip lane provided from Edwardes Street northern approach. Minor works required to drive over kerbing.
3	Bass Highway / Minna Road	Right turn movement into Minna Road from the Bass Highway	Works required to drive over the kerbing in the central median of the Bass Highway, and the road island on the Minna Road approach. Signage to be removed. Minor works to drive over grass in median and verges.
4	Minna Road / Site access point	Right turn movement into the site from Minna Road	The vehicle will drive over shoulders of Minna Road. Possible earthworks required to hill on the northern frontage of Minna Road.

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. This may also result in temporary restrictions to property access. 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 early consultation with the HVR and DSG is required to ensure all approvals are obtained prior to the proposed operation.

7.1.8.3 Attribute 3: Crash Stats Review

Inductions will be provided to workers transporting goods to and from the site of any 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.

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.

7.1.8.4 Attribute 4: Sight Distance Assessment

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

7.1.8.5 Attribute 5: Height Clearance Requirements of 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.

7.1.8.6 Attribute 6: Safe Operation

Pavement 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, as a result of project traffic, the contractor should liaise with the relevant road authority to ensure they are informed.

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.

Provision of Adequate Quality Intersection Treatments

Improve the line marking at the Minna Road site access point to be clear in directing traffic. Monitor intersections utilized by the construction activities to ensure they are up to an appropriate standard.

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 Plans (TMPs) 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 TMPs.
- 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 in the event of any road closures that cause traffic to be redistributed off the Bass Highway. This is 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

The following EPRs outlined in Table 7.14 have been informed by the mitigation and management measures summarised in the impact assessment. These mitigation measures are discussed to outline how the EPRs could be implemented. The EPRs have also been developed with consideration of industry standards and relevant legislation, guidelines and policies. The location of where these items are represented in the final EPRs outlined in Section 8.2 has been provided.

Table 7.14: Value 2 EPRs

#	EPR Identified	# Reference to final EPR's
1	Ensure the bridges that will be crossed by heavy vehicles to the site are in a suitable condition before and during construction	EPR T02-8
2	Complete road works to accommodate the turning movement requirements of the transformer transporter as outlined in the swept path assessment.	EPR T01
3	Continuous traffic management to control and supervise the movements of the transformer transporter.	EPR T01-18
4	TMPs Prepare and implement a traffic management plan that addresses and documents the approach for the following: • Provide appropriate upgrades and pavement regrading in line with the recommendations of a suitably qualified pavement engineer during construction if required. • Mitigate the risk of driver fatigue • Provide adequate height clearance for the transformer transporter path of travel • provide guidance to comply with relevant industry standards • provide guidance on driver schedules • avoid travel past schools during pick-up / drop-off • minimise 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 T01
5	Provide adequate temporary road lighting over night during HDD operations	EPR T01-12
6	Inspections of infrastructure treatments to ensure they comply with industry standards such as Austroads guide to road design, Australian Standards, DSG design guidance and relevant local government standard drawings.	EPR T02-6

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: Safe Condition of Bridges and Culverts

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

Addressed in EPR T02-8

7.1.10.2 Attribute 2: 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 EPR T01-8, EPR T02-9

7.1.10.3 Attribute 3: Crash Stats Review

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

Addresser in EPR T01-13

7.1.10.4 Attribute 4: Sight Distance Assessment

Intersections will continue to operate as per existing arrangements

7.1.10.5 Attribute 5: Height Clearance Requirements of Transformer Transporter

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

Addressed in EPR T01-8

7.1.10.6 Attribute 6: Safe Operation

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 EPR T01 ,EPR T02.

The revised significance assessment for value 2 with mitigating works has been summarised in Table 7.15 below.

Table 7.15: Value 2 Revised Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Safe condition of bridges and culverts	Nil	Bridges and culverts may not be in an appropriate condition for the movement of the transformer transporter	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 inspections.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access via the surrounding road network	Low	Minor	Low	Nil	If larger vehicles are required during construction, additional assessment required	Low	Minor	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access to the site	Very Low	Negligible	Very Low	Nil	If larger vehicles are required during construction, additional assessment required	Very Low	Negligible	Very Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significanc e
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 as well as the potential for temporary restrictions to private property	High	Negligible	Low

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significanc e
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	The transformer transporter may require works to access the site at the following locations: • Port of Burnie • Bass hwy / Edwardes St / Bollard Drv • Bass Hwy / Minna Rd • Minna Rd / Site Access Point	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	Historic Crash Safety Review	Nil	Increased crash risk on the external road network surrounding the site	Moderate	Negligible	Low	Implement TMPs 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 Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significanc e
Safe Road Performance, Condition & Design	Provision of safe sight distance at intersections	Nil	Increased safety risk at the Minna Road site access point with sight distance constraints, noting warning signage is provided:	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
Safe Road Performance, Condition & Design	Road pavement condition	Nil	Roads may require resurfacing / remediation works.	Low	Moderate	Low	Roads should be upgraded to align with the requirements of a suitably qualified pavement engineer.	Pavement will require continuous inspections.	Low	Negligible	Very Low
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	Lighting to be provided to sufficiently meet the appropriate standards	High	Minor	Moderate

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significanc e
Safe Road Performance, Condition & Design	Safe operation	Nil	Provision of adequate quality intersection treatments, notably at the Minna Road site access point.	Low	Moderate	Low	Provide updated line marking at the Minna Road site access point. Monitor the road network utilised by the site to ensure up to an adequate standard.	Linemarking will require continuous inspections.	Low	Minor	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	General driver safety	Low	Major	Moderate	Implement TMPs 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

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significance
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk of pedestrians in townships with increased truck movements	Very Low	Major	Low	Vehicle movements contained to highways and not in pedestrianised areas	Truck movements through townships as a result of detours	Very Low	Minor	Very Low
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk around Schools – identify schools / townships	Very low	Major	Low	Vehicle movements contained to highways and not directly past schools	Avoid travel past schools during pick-up / drop-off if detours occur	Very Low	Minor	Very 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	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

Value	Attribute	Standard Mitigation	Impact	Impact Assessment			Mitigating Works	Residual Impact	Residual Impact Assessment		
				Sensitivity	Magnitude	Impact Significance			Sensitivity	Magnitude	Residual Impact Significanc e
Safe Road Performance, Condition & Design	Safe operation	Nil	Peak Seasonal Events	Low	Negligible	Very Low	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.	Low	Negligible	Very 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 7.16: 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: Public Transport

Rail

As outlined above in Section 6.3.4, the proposed 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 proposed works.

Bus

The public bus routes within the surrounding area of the converter station are identified in Section 6.3.5.

The proposed paths of travel to the converter station that are expected to be 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 predominantly be confined to major arterial roads / highways and heavy vehicle routes within these townships.

It is noted that the path of travel of the transformer transporter travels along the Bass Highway, which has the 190 and 708 bus routes. Consultation is expected to occur by the construction contractor in developing the TMPs with the public transport operators to ensure the impact on these routes are minimised.

School Bus

It is expected that the construction of the converter station 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, and the current school bus movements will likely have changed when construction activities commence.

7.1.11.2 Attribute 2: Active Transport

Dedicated Cycling Infrastructure

Dedicated cycling infrastructure is minimal within the area surrounding the converter station, given that the site is primarily surrounded by major highways and high speed arterial roads.

The proposed works will not impact any cycling infrastructure.

Footpaths

Footpaths on the roads surrounding the converter station site are minimal, given that the site is primarily surrounded by major highways and high speed arterial roads.

The proposed works will not impact any footpaths.

7.1.12 Value 3 – EIS Significance Impact 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 summarised in accordance with the significance assessment methodology outlined in section 5.6 with Table 5.2 and Table 5.3 identifying the criteria that has been used to assess each impact.

The significance assessment for value 3 prior to the implementation of any mitigating works has been summarised in Table 7.17 below.

Table 7.17: Value 3 Initial Significance Assessment

Value	Attribute	Standard Mitigation	Impact	Description	Inherent Significance Assessment		
					Sensitivity	Magnitude	Significance
Public & Active Transport	Public Transport	Nil	Impact on train services.	No rail lines are in the study area. No rail lines are impacted by the project.	Very Low	Negligible	Very Low
Public & Active Transport	Public Transport	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	Public Transport	Nil	Impact on public bus services by the transformer transporter.	Low frequency bus routes are in towns along travel routes. The transformer transporter will travel at a low speed and take up multiple lanes of traffic on roads utilised by public buses.	Low	Minor	Low
Public & Active Transport	Public Transport	Nil	Impact on school bus routes.	School buses may be present on travel routes by construction vehicles. Construction vehicles may pass school buses and waiting children.	High	Moderate	High
Public & Active Transport	Active Transport	Nil	Impact on dedicated cycling infrastructure.	There is minimal cycling infrastructure present within the study area. Construction vehicles may pass some cycling infrastructure.	Very Low	Negligible	Very Low
Public & Active Transport	Active Transport	Nil	Impact on footpaths.	There are minimal footpaths present within the study area. Construction vehicles may pass some footpaths.	Very Low	Negligible	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: Public Transport

Rail

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

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 be planned in consultation with the heavy vehicle regulator, DSG and public transport operators to minimise disruption.

School Bus

Prior to the beginning of construction of the project, consultation should be undertaken with relevant councils / schools / bus operators 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, it is recommended that the project considers that the movement of these vehicles be restricted to occur outside of the typical school bus operating hours (7AM to 9AM and 2:30PM to 4:30PM).

7.1.13.2 Attribute 2: Active Transport

Dedicated Cycling Infrastructure

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

Footpaths

No footpaths will be impacted by construction activities.

7.1.14 Value 3 – Environmental Performance Requirements

The following EPRs outlined in Table 7.18 have been informed by the mitigation and management measures summarised in the impact assessment. These mitigation measures are discussed to outline how the EPRs could be implemented. The EPRs have also been developed with consideration of industry standards and relevant legislation, guidelines and policies. The location of where these items are represented in the final EPRs outlined in Section 8.2 has been provided.

Table 7.18: Value 3 EPRs

#	EPR Identified	# Reference to final EPR's
1	Identify any school bus routes along the construction routes. Movement of heavy vehicles travelling along these routes to be considered to be restricted to occur outside of the typical school bus operating hours (7AM to 9AM and 2:30PM to 4:30PM).	EPR T01-4
2	Consultation by the contractor with public transport operators in regard to the movement of the transformer transporter to mitigate the impact of this movement on public transport services. This should occur during the preparation of the TMPs.	EPR T01-19, EPR T02-2

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: Public Transport

Rail

The proposed converter station vehicle access routes do not cross any currently active train lines. There is no residual impact to the rail network.

Bus

The proposed converter station vehicle access routes are not expected to have a material residual impact on the public bus network.

The movement of the transformer transporter will be planned and conducted to minimise any disruption to public transport routes.

Addressed in EPR T01-19, EPR T02-2

School Bus

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

Addressed in EPR T01-4

7.1.15.2 Attribute 2: Active Transport

The proposed converter station vehicle access routes do not cross any cycle paths or footpaths. Active transport infrastructure is therefore not impacted.

The revised significance assessment for Value 3 with mitigating works has been summarised in Table 7.19 below.

Table 7.19: Value 3 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
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
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 public bus services by the transformer transporter.	Low	Minor	Low	The transformer transporter will travel at a time when public buses are infrequent	Transformer transporter will travel at a low speed and take up multiple lanes of traffic on roads utilised by public buses	Very Low	Negligible	Very Low
Public & Active Transport	Public Transport	Nil	Impact on school bus routes.	High	Moderate	High	Heavy 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	Active Transport	Nil	Impact on dedicated cycling infrastructure.	Very Low	Minor	Very Low	Consultation with council to determine mitigating measures.	No cycle paths in the study area	Very Low	Minor	Very Low
Public & Active Transport	Active Transport	Nil	Impact on footpaths.	Low	Minor	Very Low	Consultation with local residents.	No footpaths in the study area	Low	Minor	Very Low

7.2 Operation

The converter stations will not be manned 24/7 and only attended during normal working hours.

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.

7.3 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 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.

In the event that the project is decommissioned, all above-ground infrastructure will be removed, the site rehabilitated.

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 and subsea cables. The conduits and shore crossing ducts would be left in-situ as removal would cause significant environmental impact. Subsea cables would be recovered by water jetting or removal of rock mattresses or armouring to free the cables from the seabed.

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

The decommissioning of the converter station is expected to involve lesser levels of traffic generation than those that occur during construction, as assessed within this report.

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.

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 Figure 7-3 and Table 7.20.

Figure 7-3: Projects in the Surrounding Area

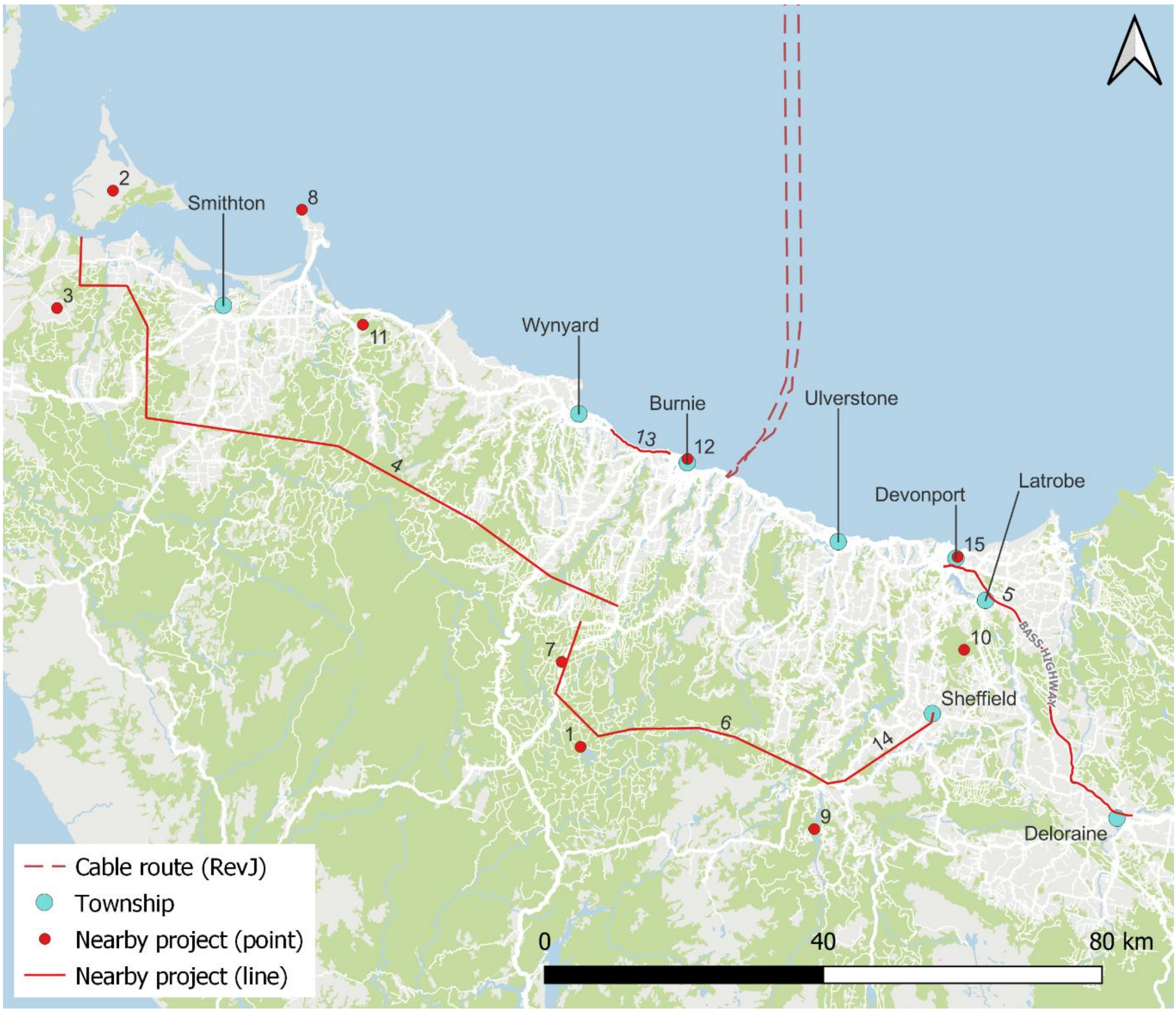


Table 7.20: Projects in the Surrounding Area

#	Proposal / proponent	Description	Location	Timing	Comment on Transport Impact
1	Guilford Wind Farm	Wind farm in Guildford with up to 80 wind turbines Generation of up to 450 megawatts (MW) of wind energy Estimated capital: $50 million	7 km northeast of Waratah and 15 km south of Hampshire	Current status: Notice of intent submitted September 2020 Deemed a controlled action by DAWE in September 2021 Construction to commence: 2024	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
2	Robbins Island Renewable Energy Park	Wind farm on Robbins Island with up to 122 wind turbines Generation of up to 900 MW of wind energy Estimated construction value: $1.2 billion Construction workforce: 250 personnel	Robbins Island, northwest coast of Tasmania	Current status: Approved by the Commonwealth Government and assessment by the EPA underway Construction to commence: 2023-2025	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.

#	Proposal / proponent	Description	Location	Timing	Comment on Transport Impact
3	Jim's Plain Renewable Energy Park	Wind farm in Jim's Plain with up to 31 wind turbines and possible solar generation Generation of up to 200 MW of wind energy and up to 40 MW of solar energy Capital investment: $350 million. Construction workforce: over 150 personnel Operations workforce: 15 personnel	23 km west of Smithton	Current status: Approved by the Council and State and Commonwealth governments in 2020 Construction to commence: 2023	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
4	Robbins Island Road to Hampshire Transmission Line	A new 220 kV overhead transmission line (OHTL) spanning 115 km, estimated to have 245 towers. Connects Jim's Plain and Robbins Island Renewable Energy Parks transmission infrastructure to Tasmanian transmission network. Construction workforce: up to 100 personnel over 24 months	Between Robbins Island Rd at West Montagu and Hampshire	Current status: Detailed planning/environmental approvals phase underway. Commonwealth Government determined the project to be a controlled action under the EPBC Act in September 2020. Construction to commence: 2023	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
5	Bass Highway, targeted upgrades between Deloraine and Devonport	Targeted highway upgrades between Deloraine and Devonport. Roads of strategic importance Estimated project cost: $50 million	Targeted areas along Bass Highway between Deloraine and Devonport	Current status: In planning Construction expected to commence: late 2023 Expected completion: 2027	Delays and road closures may impact vehicles travelling to the site from the east. Possible detours during construction.
6	Staverton to Hampshire Hills Transmission Line	A component of the North West Transmission Developments, comprising a new 60-km-long new 220 kV OHTL between a new switching station at Staverton and Hampshire Hills Supports new and existing renewable energy developments in North West Tasmania, including Marinus Link. Estimated project cost: $220 million	Between Staverton and Hampshire Hills	Current status: Planning and approvals phase in progress Construction expected to commence: 2024	Traffic volumes from the Port of Burnie will travel past the Heybridge site along the Bass Highway. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.

#	Proposal / proponent	Description	Location	Timing	Comment on Transport Impact
7	Hellyer Wind Farm	Wind farm with up to 48 wind turbines Generation of up to 300 MW of wind energy	8.5km southwest of Hampshire	Current status: Design phase. Notice of intent issued. Tasmanian EPA - EIS Guidelines issued in November 2022	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
8	Western Plains	Wind farm with up to 12 wind turbines Generation of up to 50.4 MW of wind energy	4 to 5 km northwest of Stanley	Current status: Work on the Development Proposal and Environmental Management Plan (DPEMP) is continuing. The DPEMP has been drafted in accordance with the Project Specific Guidelines issued for the project by the Environment Protection Authority (EPA Tasmania). The EPA Tasmania recently extended the timeframe for submission to enable completion of the required documentation.	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
9	Lake Cethana Pumped Hydro	Storage and underground pumped hydro power station with associated infrastructure, with up to 600 MW capacity Estimated construction cost: $900 million	19 km southwest of Sheffield	Current status: Hydro Tasmania will progress with the final feasibility stage Construction likely to commence: 2027	Traffic volumes from the Port of Burnie will travel past the Heybridge site along the Bass Highway. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
10	Youngmans Road Quarry	Limestone quarry development on old quarry site Average annual production of 72,000 tonnes of limestone	2.5km northwest of Railton	Current status: EPA approved the development in February 2021. Kentish Council is reviewing the land permit for the proposed development	Traffic volumes from the Port of Burnie will travel past the Heybridge site along the Bass Highway. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.

#	Proposal / proponent	Description	Location	Timing	Comment on Transport Impact
11	Port Latta Wind Farm	Wind farm with up to 7 wind turbines Generation of up to 25 MW of wind energy Construction workforce: 15 people over six months Estimated capital: $50 million	Mawbanna Plain, 2 km southwest of Cowrie Point	Current status: Environmental Assessment Report and EPA decision issued October 2018 Website states intent to start construction late 2020, no further updates available	Traffic volumes from Port of Burnie, likely turning west on Bass Highway to access site. Minimal cumulative traffic impacts due to distance between sites. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.
12	Port of Burnie Shiploader Upgrade	Minerals shiploader and storage expansion at TasRail's existing Bulk Minerals Export Facility Estimated cost: $64 million Design and construction workforce: 140 personnel	Port of Burnie	Current status: onsite works and detailed design (commenced in April 2022). Commissioning expected to commence: 2023	The coordination by the contractor to deliver materials for the project will avoid periods of delay for works at the Port of Burnie.
13	Bass Highway – Cooee to Wynyard	Priority works upgrade along the Bass Highway between Cooee and Wynyard to realign and upgrade approximately 3.2 km of road Estimated cost: $50 million	Bass Highway from the intersection of Brickport Road in Cooee, across the Cam River Bridge, to the intersection of the Old Bass Highway at Doctors Rocks near Wynyard	Current status: Construction (commenced late 2021) Expected completion:2025.	Bass Highway works to the west of the site, and west of Burnie. Does not impact delivery of equipment from Port of Burnie. Workers from the western region maybe delayed in travel to work with Bass Highway works.
14	Sheffield to Staverton Upgrades	A component of the North West Transmission Developments, comprising modifications to two 18.5-km-long sections of existing 220 kV OHTLs between Staverton and Sheffield. Supports new and existing renewable energy developments in North West Tasmania, including Marinus Link.	Between Staverton and Sheffield	Current status: Planning and approvals phase Construction expected to commence: 2025	Traffic volumes from the Port of Burnie will travel past the Heybridge site along the Bass Highway. Any substantive cumulative impact will occur on the Bass Highway, with a high capacity.

#	Proposal / proponent	Description	Location	Timing	Comment on Transport Impact
15	QuayLink – Devonport East Redevelop-ment	Port terminal upgrade project to support TasPorts in increasing capacity of both freight and passenger ferry services across Bass Strait. Estimated cost: $240 million Design and construction workforce: 1060 direct and indirect jobs in North West Tasmania, and a further 655 broader Tasmanian jobs during construction.	Port of Devonport	Current status: Early works/construction (commenced 2022); approvals phase ongoing. Expected completion: 2027	Some equipment may arrive to the site via the Port of Devonport during upgrade works.

Table 7.20 above identified a number of major infrastructure projects that are occurring throughout the Cradle Coast region in Tasmania. This includes road upgrades, wind farms and transmission line works. For the most part, these projects will have a minimal impact on the construction of the project, due to their location. Negligible traffic volumes will intersect on lower order roads throughout the region, with more substantive traffic volumes combining along the Bass Highway, which has a high capacity.

It is expected that a number of the projects outlined above will include the delivery of large pieces of equipment (such as wind turbine blades) from the Port of Burnie. The delivery of the transformer will need to be coordinated with the Port to avoid arriving alongside other large equipment.

8 Summary of Impacts

8.1 Significance Assessment

Table 8.1: Revised Significance Assessment

Value	Attribute	Impact	Standard Mitigation	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	Impacted Intersections	Nil	Intersections not operationally impacted with appropriate intersection treatment existing	Moderate	Minor	Low	Nil	Inspections required to ensure intersections of Bass Highway / Minna Road and Minna Road / site access are performing as expected. Further assessment to be undertaken in event of unexpected traffic volumes.	Moderate	Minor	Low

Value	Attribute	Impact	Standard Mitigation	Significance Assessment			Mitigating Works	Residual Impact	Residual Significance Assessment		
				Sensitivity	Magnitude	Significance Impact			Sensitivity	Magnitude	Residual Significance Impact
Road Network Capacity	Connectivity	Nil	Bass Highway is a primary Highway utilized by the Tasmanian north coast	Very High	Negligible	Moderate	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.	Very High	Negligible	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 movement of the transformer transporter	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 inspections.	Moderate	Negligible	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access via the surrounding road network	Low	Minor	Low	Nil	If larger vehicles are required during construction, additional assessment required	Low	Minor	Low
Safe Road Performance, Condition & Design	Adequate road geometry	Nil	Semi-trailer access to the site	Very Low	Negligible	Very Low	Nil	If larger vehicles are required during construction, additional assessment required	Very Low	Negligible	Very Low

Value	Attribute	Impact	Standard Mitigation	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 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 as well as the potential for temporary restrictions to private property.	High	Negligible	Low

Value	Attribute	Impact	Standard Mitigation	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: • Port of Burnie • Bass hwy / Edwardes St / Bollard Drv • Bass Hwy / Minna Rd Minna Rd / Site Access Point	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	Historic Crash Safety Review	• Nil	Increased crash risk on the external road network surrounding the site	Moderate	Negligible	Low	Implement TMPs to ensure safe operational standards for drivers and monitor construction activities.	Inherent residual crash risk	Moderate	Negligible	Low

Value	Attribute	Impact	Standard Mitigation	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 Minna Road site access point with sight distance constraints, noting warning signage is provided:	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
Safe Road Performance, Condition & Design	Road pavement condition	Nil	Roads may require resurfacing / remediation works.	Low	Moderate	Low	Roads should be upgraded to align with the requirements of a suitably qualified pavement engineer.	Pavement will require continuous inspections.	Low	Negligible	Very Low
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	Lighting to be provided to sufficiently meet the appropriate standards	High	Minor	Moderate

Value	Attribute	Impact	Standard Mitigation	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	Provision of adequate quality intersection treatments, notably at the Minna Road site access point.	Low	Moderate	Low	Provide updated line marking at the Minna Road site access point. Monitor the road network utilised by the site to ensure up to an adequate standard.	Linemarking will require continuous inspections	Low	Minor	Low
Safe Road Performance, Condition & Design	Safe operation	Nil	General driver safety	Low	Major	Moderate	Implement TMPs 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

Value	Attribute	Impact	Standard Mitigation	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 of pedestrians in townships with increased truck movements	Very Low	Major	Low	Vehicle movements contained to highways and not in pedestrianised areas	Truck movements through townships as a result of detours	Very Low	Minor	Very Low
Safe Road Performance, Condition & Design	Safe operation	Nil	Safety risk around Schools – identify schools / townships	Very low	Major	Low	Vehicle movements contained to highways and not directly past schools	Avoid travel past schools during pick-up / drop-off if detours occur	Very Low	Minor	Very 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	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

Value	Attribute	Impact	Standard Mitigation	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	Peak Seasonal Events	Low	Negligible	Very Low	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.	Low	Negligible	Very 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 movement of the transformer transporter	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 inspections.	Moderate	Negligible	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
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 public bus services by the transformer transporter.	Low	Minor	Low	The transformer transporter will travel at a time when public buses are infrequent	Transformer transporter will travel at a low speed and take up multiple lanes of traffic on roads utilised by public buses	Very Low	Negligible	Very Low

Value	Attribute	Impact	Standard Mitigation	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 school bus routes.	High	Moderate	High	Heavy 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	Active Transport	Nil	Impact on dedicated cycling infrastructure.	Very Low	Minor	Very Low	Consultation with council to determine mitigating measures.	No cycle paths in the study area	Very Low	Minor	Very Low
Public & Active Transport	Active Transport	Nil	Impact on footpaths.	Low	Minor	Very Low	Consultation with local residents.	No footpaths in the study area	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 are informed by relevant legislation and policy requirements as well as project-specific measures recommended to minimise impacts identified environmental values.

The following EPRs have been informed by the example mitigation measures discussed in the impact assessment. These mitigation measures are discussed to provide an example of how the EPRs could be implemented. The EPRs have also been developed with consideration of industry standards and relevant legislation, guidelines and policies.

EPR ID	Environmental Performance Requirement	Project Phase
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 method. 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, particularly at the key intersections of Bass Highway / Minna Road and Minna Road / Site Access. 3. Describe measures to manage any temporary or permanent full or partial traffic lane closures or impacts to property access. 4. 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. 5. Include requirements for the delivery or removal of oversize and over mass loads. 6. Include a construction parking management plan to provide for adequate parking at appropriate work sites, including containing all worker car parking demands within the construction sites and laydown areas where practicable. 7. Outline measures to manage impacts and coordinate activities where necessary with other relevant major projects occurring at the same time. 8. Confirm and document the proposed route of the transformer transporter, including accommodation of the height and geometric requirements, and associated impacts, necessary during the transport. This must be informed by consultation with the relevant road authorities. 9. 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 Bass Highway where possible. 10. Identify construction vehicle staging areas and/or construction methodologies to minimise potential impacts of truck movements on residents and businesses. 11. Describe methods investigated and adopted to reduce impact of project generated traffic i.e. shuttle bus for workers, stagger start / finish times. 12. Requirements for the provision of adequate temporary road lighting over night at required intersections to access the construction site during HDD operations. 13. 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. 14. Outline measures to manage the project interface with rail trails and provide for the continuous operation / access of the rail trails 15. 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, so far as reasonably practicable. 16. Outline induction requirements for all workers, identifying site specific safe practice, such as identified locations on the road network with a known safety risk.	Construction

	17. 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. 18. 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. 19. Include a consultation plan for the engagement with local authorities, impacted landowners and broader community. This consultation will include, but not be limited to: o Informing affected parties of the level of traffic generated by the project construction and any road closures. o Engaging with local road authorities such as City of Burnie and DSG to coordinate construction vehicle movements to avoid school bus routes during their time of operation. o 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 method, 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.	
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 construction and 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. 9. Meet the requirements for the provision of intersection treatments at locations used for construction.	Design & Construction

8.3 Measures to Comply with EPR's

The implementation of the EPR's outlined above will be achieved through a number of measures. These measures were identified throughout the assessment undertaken in this report, and their implementation will ensure compliance is achieved with the identified EPR's.

Ultimately, the primary outcome of the EPR's, and the tool for the implementation of the identified measures is the preparation of a Transport Management Plan (TMP). The TMP will be prepared by the construction contractor and reviewed and approved by the responsible road and transport authorities. Many of the requirements of the EPR's that the TMP will implement are management measures, such as monitoring road performance, inspecting pavement conditions, outlining requirements for driver safety and identifying travel routes for drivers.

Ultimately, the level of traffic that is expected to be generated by the construction of the site is modest from a traffic engineering perspective. The analysis undertaken in this report contains a number of conservative assumptions (such as all staff arriving within a one hour time frame and assessing the peak traffic generating event), and the traffic ultimately generated on a day to day basis will be lower, as well as being temporary in nature as the primary traffic impacts occur during construction. The site is well located next to the Bass Highway to accommodate the traffic volumes.

In terms of physical infrastructure recommendations in this report, these measures are solely expected to facilitate the movement of the transformer transporter from the port at Burnie to the site. Temporary works are expected to be required to accommodate the movement of this vehicle. The assessment undertaken in this report is indicative in nature, given the exact details of the transformer transporter are to be confirmed at a later date, upon engagement of the building contractor. It is expected that the following measures will be implemented:

- The implementation of temporary traffic management to escort the oversize vehicle. Traffic management plans will be prepared by the construction contractor in consultation with and to the satisfaction of the road and transport authorities
- Temporary road works (including reinstatement following transportation), such as the removal of street signs / road furniture, works to central medians and kerbing as well as raising the height of power lines will need to be undertaken to accommodate the transformer transporter
- Necessary road works at the Minna Road access point on the shoulders of the road, including line marking adjustments and earthworks if required
- Travel times for the transformer transporter will be identified to avoid impact to busy / peak hour times, as well as avoiding impacts to public transport services

9 Conclusion

The traffic and transport impacts associated with the construction, operation and decommission of the Heybridge converter station for the project have been assessed in accordance with the Environmental Impact Statement Guidelines, Marinus Link. 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, EPRs that incorporate some site specific 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. 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.

10 References

- Transport Act 1981, Tasmanian State Government, 1981
- Dangerous Goods (Road and Rail Transport) Act, Tasmanian State Government, 2010
- Cradle Coast Integrated Transport Strategy, Cradle Coast Authority, 2006
- Tasmanian Walking & Cycling for Active Transport Strategy, Department of Infrastructure, Energy and Resources, 2010
- North West Coastal Pathway Plan, Cradle Coast Authority, 2010
- Bass Highway Cooee to Wynyard Planning Study, Department of State Growth, 2019
- Transport Access Strategy, Department of State Growth
- Council plan 2022-2025, Burnie City Council, 2021
- Road Network Strategy, Burnie City Council, 2016
- Central Coast Strategic Plan 2014-2024, Central Coast Council, 2014
- Central Coast Council Cycling Strategy, Central Coast Council, 2021
- 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
- AS 2890.2:2018 (Australian Standards Off-Street commercial vehicle facilities)
- https://geocounts.com/traffic/au/tas/
- https://www.transport.tas.gov.au/vehicles_and_vehicle_inspections/heavy_vehicles/Heavy_vehicle_access

Appendices

We design with community in mind

Appendix A Travel Routes

Burnie
George Town
Devonport
Ulverstone
Beaconsfield
Latrobe
BASS HIGHWAY
Sheffield
Launceston
BASS HIGHWAY
Deloraine
BASS HIGHWAY
Cable route (RevJ)
Heavy vehicle routes
Burnie
Devonport
Launceston
0
30
60 km


Smithton
Wynyard
Burnie
Ulverstone
Devonport
Latrobe
Sheffield
Beaconsfield
George Town
Scottsdale
Launceston
Deloraine
BASS HIGHWAY
MIDLAND HIGHWAY
Cable route (RevJ)
Township
Light vehicle routes
East
West
0
60
120 km


Burnie
BASS HIGHWAY
MOUNT STREET
PORT ROAD
MOUNT STREET
MARINE TERRACE
BASS HIGHWAY
BASS HIGHWAY
RIVER ROAD
MASSY-GREENE DRIVE
OLD SURREY ROAD
STOWPORT ROAD
MINNA ROAD
Cable route (RevJ)
Transformer transporter route
0
2
4 km

Appendix B 19m Semi-Trailer Swept Path Assessment

4.20
14.60
1.40
9.50
0.20
1.60
5.40
AV
meters
Tractor Width : 2.50
Trailer Width : 2.50
Tractor Track : 2.50
Trailer Track : 2.50
Lock to Lock Time : 6.0
Steering Angle : 28.3
Articulating Angle : 72.0
SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BASS
HIGHWAY
MINNA
ROAD


4.20
14.60
1.40
9.50
0.20
1.60
5.40
AV
meters
Tractor Width : 2.50
Trailer Width : 2.50
Tractor Track : 2.50
Trailer Track : 2.50
Lock to Lock Time : 6.0
Steering Angle : 28.3
Articulating Angle : 72.0
SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BASS
HIGHWAY
MINNA
ROAD

Appendix C Transformer Transport Swept Path Assessment


SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
270t Transporter
Custom
BOLLARD
DRIVE


SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BOLLARD
DRIVE
BOLLARD
DRIVE
STREET
MARINE
EDWARDES
TERRACE
nearmap

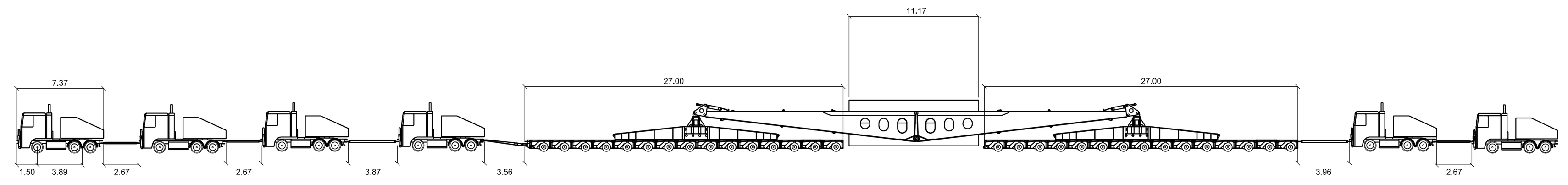

SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
270t Transporter
Custom
BOLLARD
DRIVE


SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BOLLARD
DRIVE
BOLLARD
DRIVE
STREET
EDWARDES
MARINE
TERRACE
Transporter
Custom
Transporter
Custom
nearmap
nearmap

SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BASS
HIGHWAY
MINNA
ROAD
270T Transporter
Custom

SWEPT PATH KEY
VEHICLE CENTRE LINE
VEHICLE TYRE PATH
VEHICLE BODY PATH
500mm CLEARANCE FROM VEHICLE BODY
ASSUMED SPEED 5km/h
BASS
HIGHWAY
MINNA
ROAD
270 Transporter Custom

Appendix D Transformer Transport Vehicle Profile



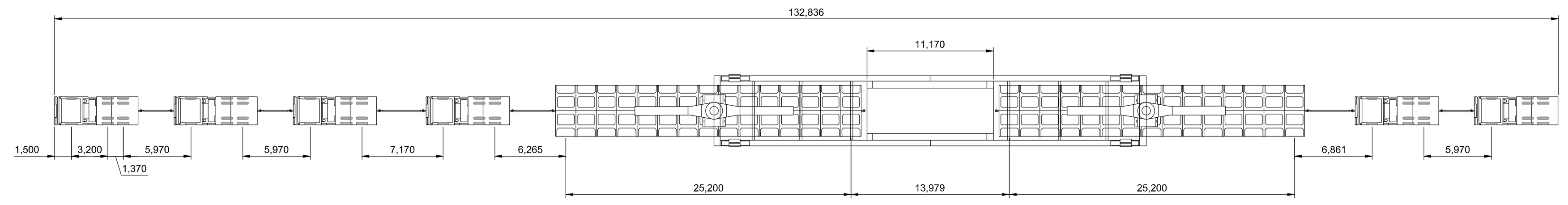
270T Transporter

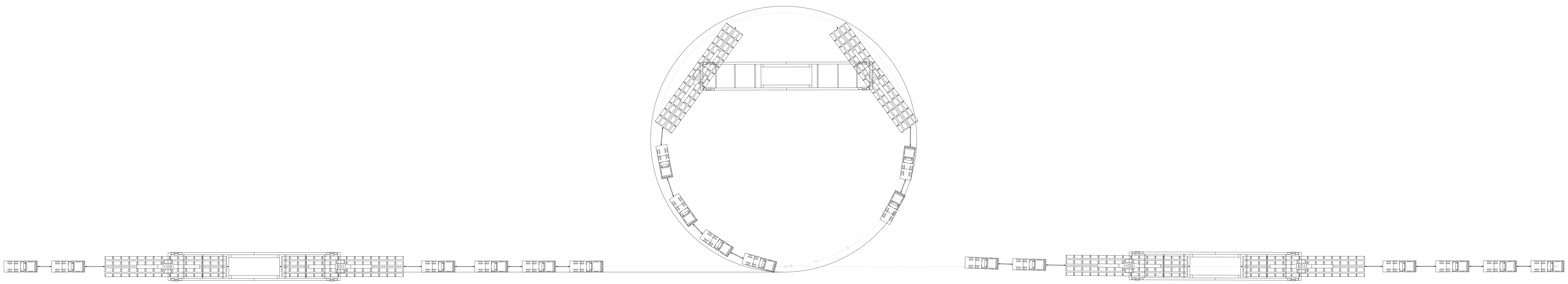
meters

Tractor Widths : 2.50

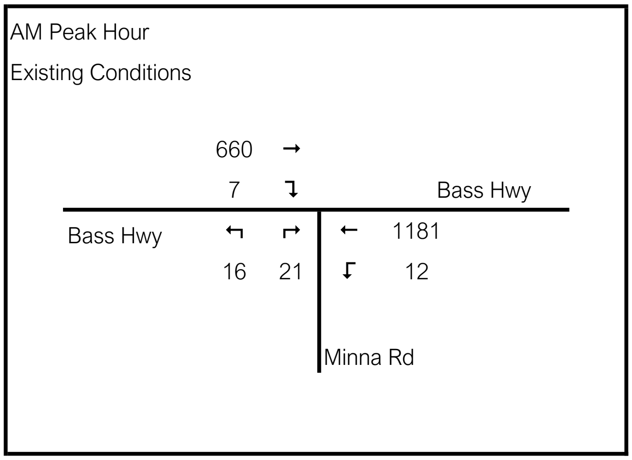
Platform Widths : 4.50

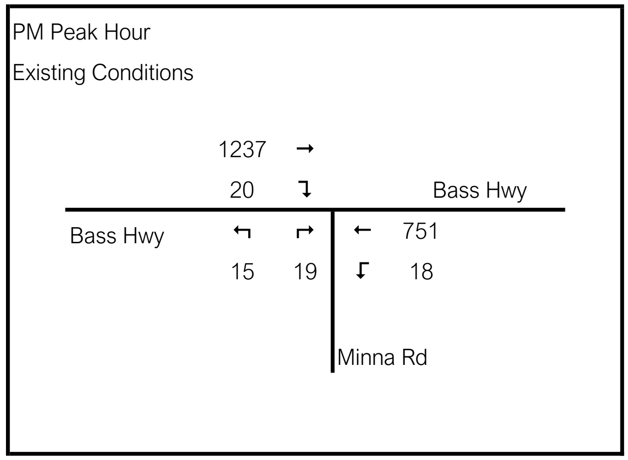
Cradle width: 6.20

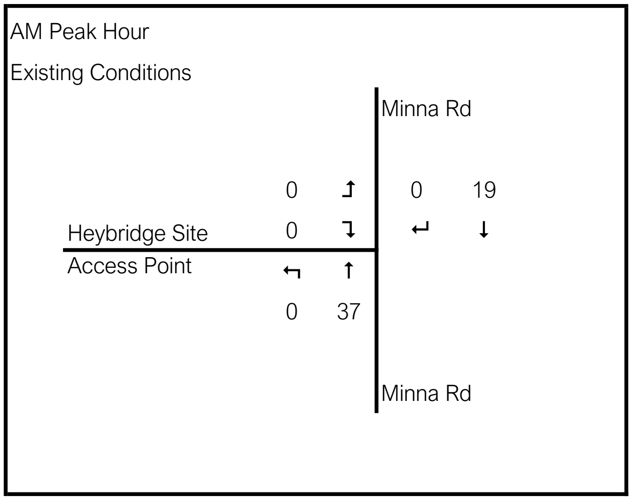


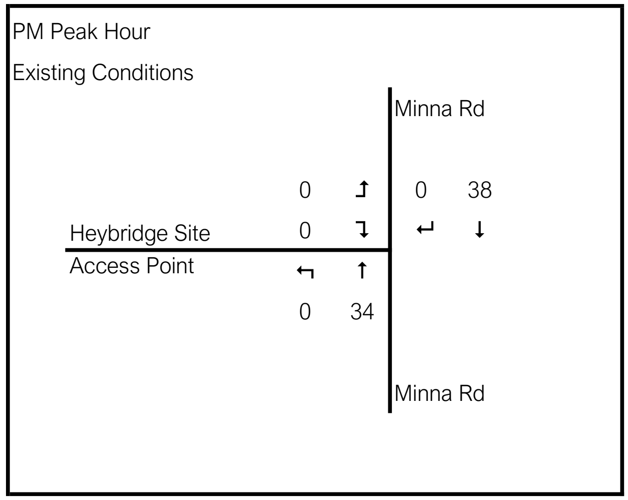


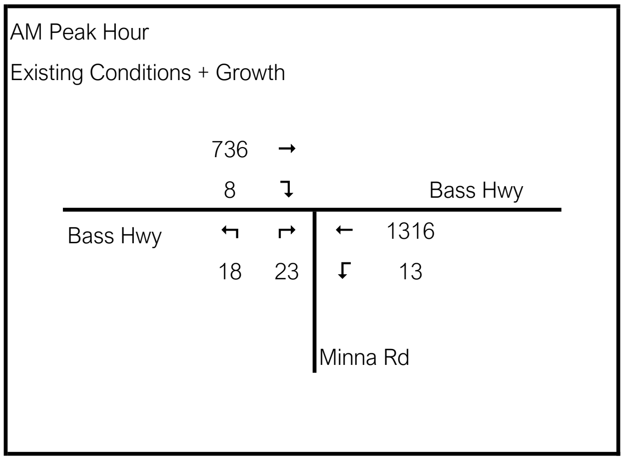
Appendix E SIDRA Input Traffic Volumes

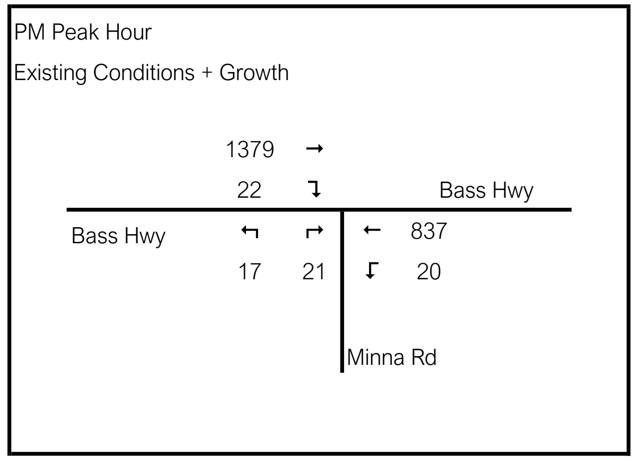

AM Peak Hour
Existing Conditions
660
7
Bass Hwy
Bass Hwy
1181
16
21
12
Minna Rd

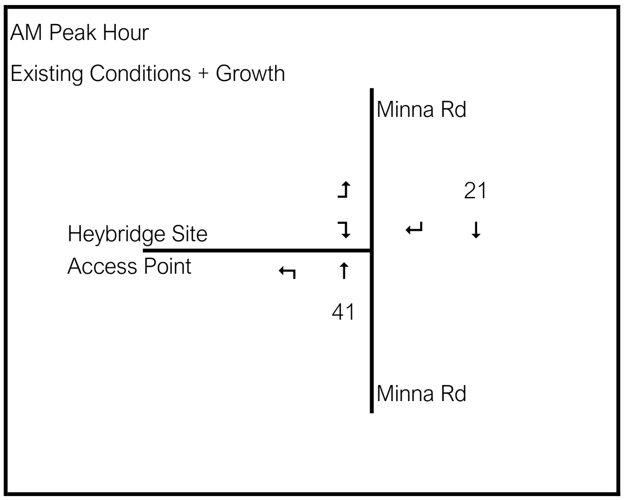

PM Peak Hour
Existing Conditions
1237
20
Bass Hwy
Bass Hwy
751
15
19
18
Minna Rd

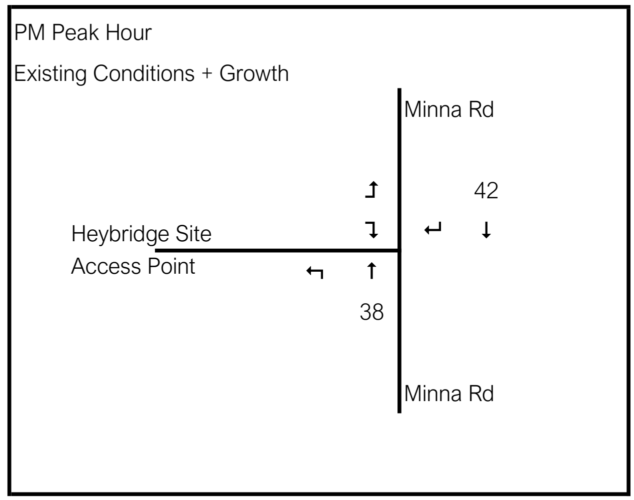

AM Peak Hour
Existing Conditions
Minna Rd
0
0
19
Heybridge Site
0
Access Point
0
37
Minna Rd

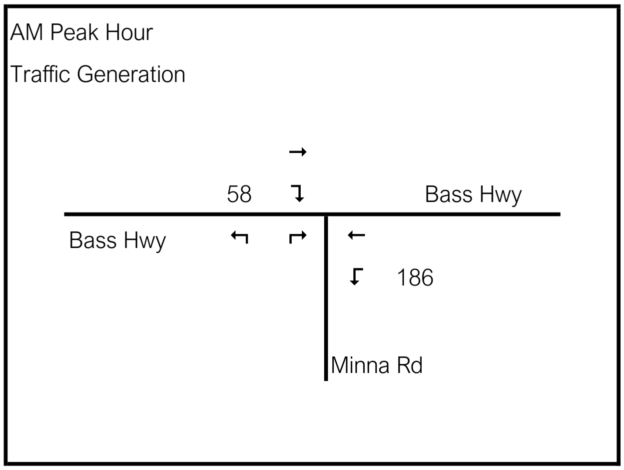

PM Peak Hour
Existing Conditions
Minna Rd
0
0
38
Heybridge Site
0
Access Point
0
34
Minna Rd

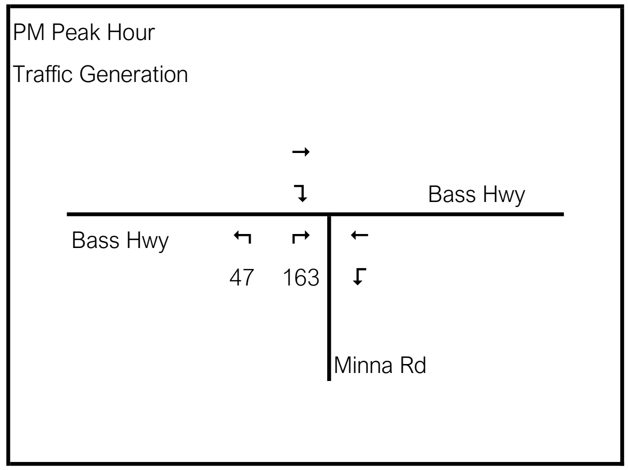

AM Peak Hour
Existing Conditions + Growth
736
8
Bass Hwy
Bass Hwy
1316
18
23
13
Minna Rd

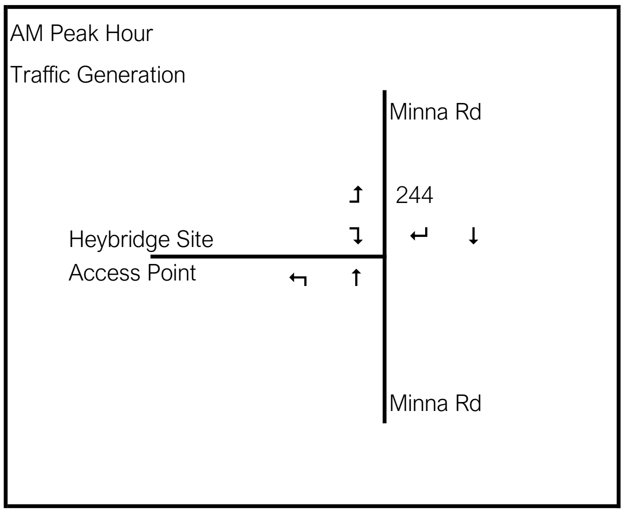

PM Peak Hour
Existing Conditions + Growth
1379
22
Bass Hwy
Bass Hwy
837
17
21
20
Minna Rd

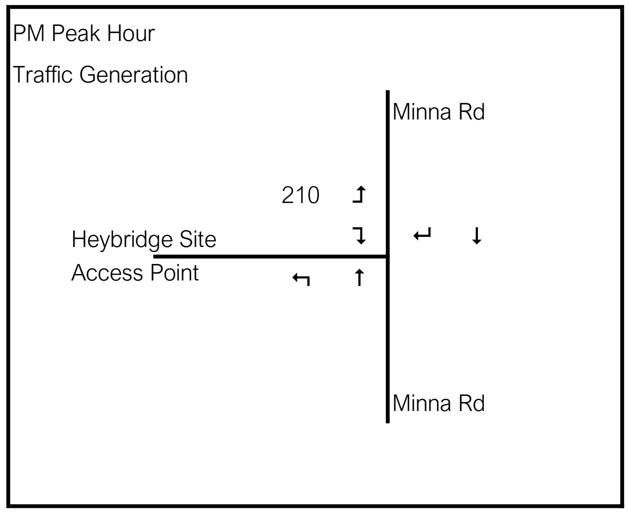

AM Peak Hour
Existing Conditions + Growth
Minna Rd
21
Heybridge Site
Access Point
41
Minna Rd

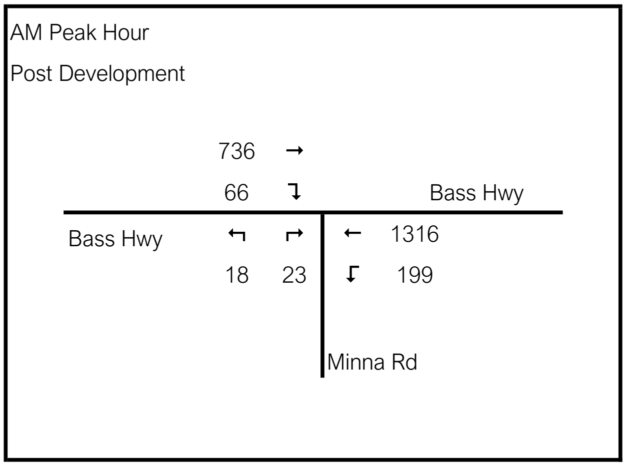

PM Peak Hour
Existing Conditions + Growth
Minna Rd
42
Heybridge Site
Access Point
38
Minna Rd

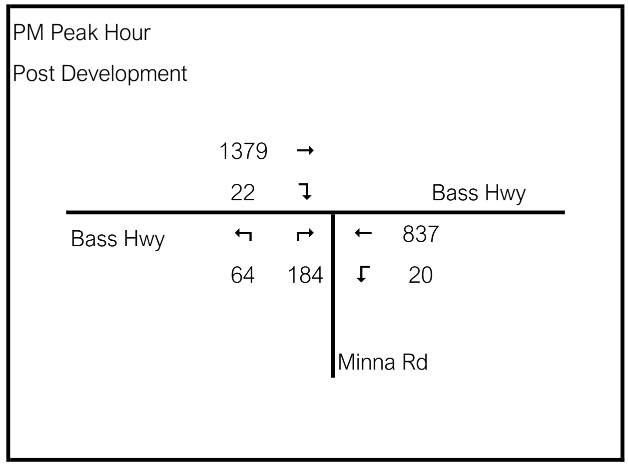

AM Peak Hour
Traffic Generation
58
Bass Hwy
Bass Hwy
186
Minna Rd

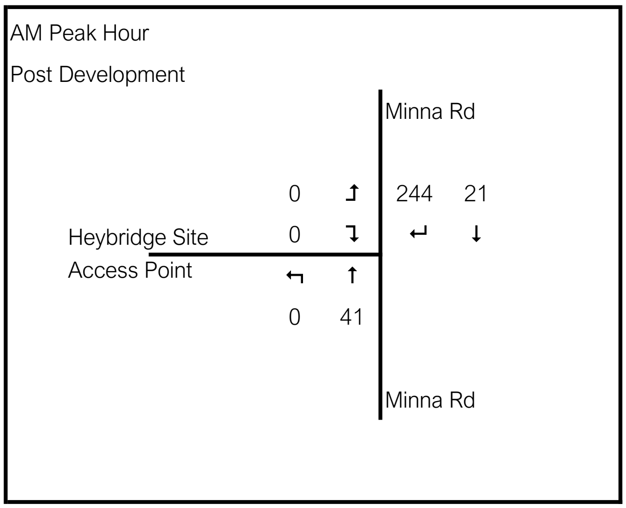

PM Peak Hour
Traffic Generation
Bass Hwy
Bass Hwy
47
163
Minna Rd

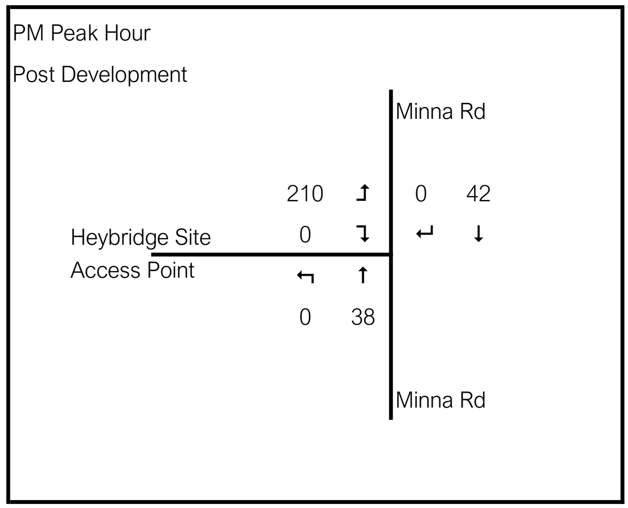

AM Peak Hour
Traffic Generation
Minna Rd
244
Heybridge Site
Access Point
Minna Rd


PM Peak Hour
Traffic Generation
Minna Rd
210
Heybridge Site
Access Point
Minna Rd


AM Peak Hour
Post Development
736
66
Bass Hwy
Bass Hwy
1316
18
23
199
Minna Rd


PM Peak Hour
Post Development
1379
22
Bass Hwy
Bass Hwy
837
64
184
20
Minna Rd


AM Peak Hour
Post Development
Minna Rd
0
244
21
Heybridge Site
Access Point
0
0
41
Minna Rd


PM Peak Hour
Post Development
Minna Rd
210
0
42
Heybridge Site
Access Point
0
0
38
Minna Rd

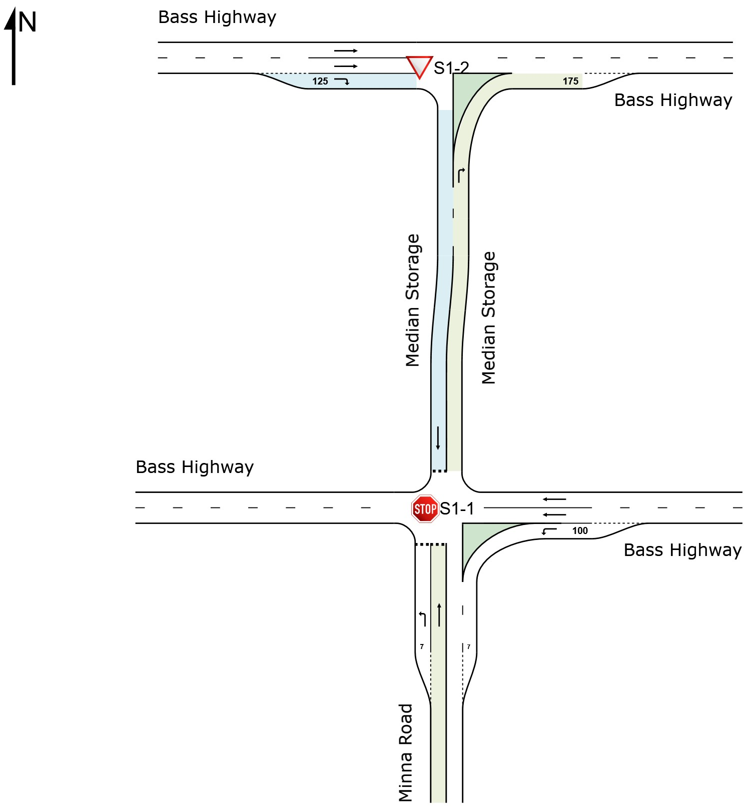
Appendix F SIDRA Results

NETWORK LAYOUT

Network: SCTI-C [Bass Highway - GF AM (Network Folder: General)]

Staged Crossing at T Intersection Type C
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



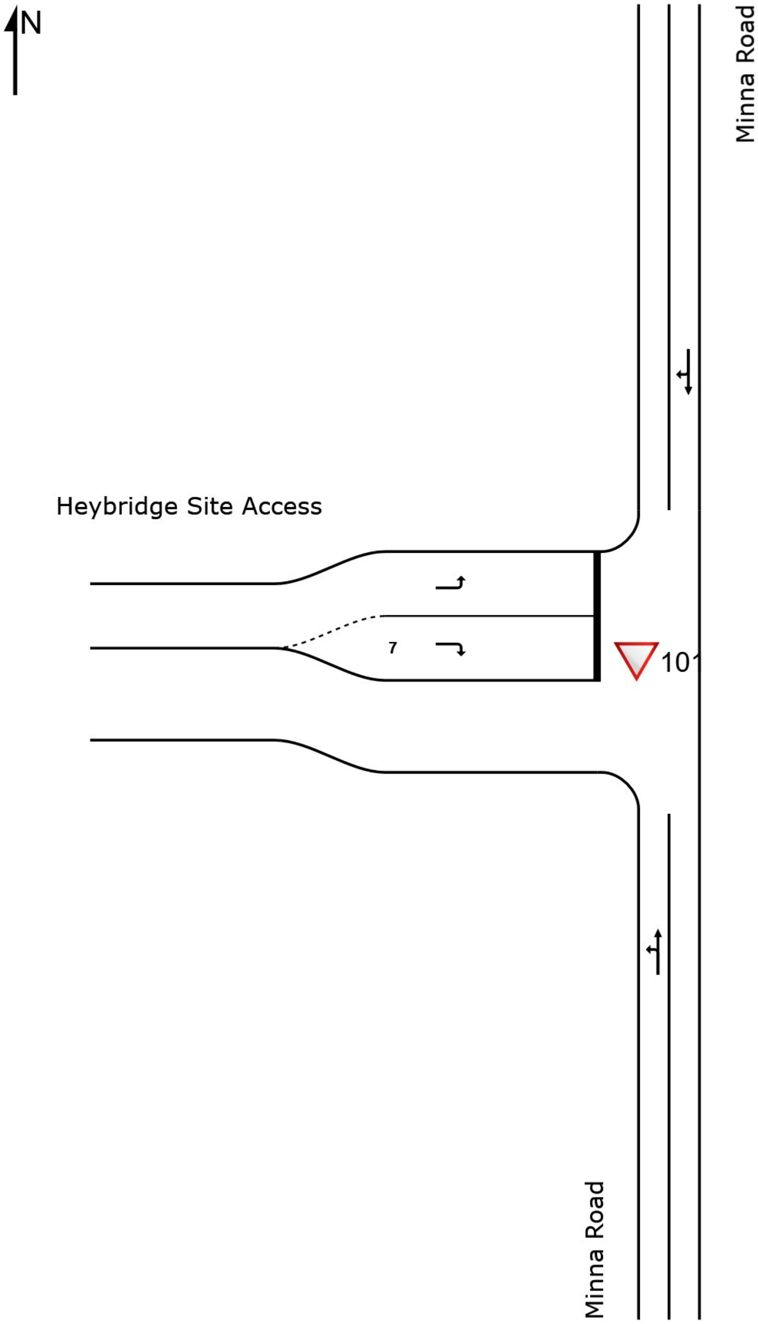
SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
S1-2	NA	Bass Highway - N GF AM
S1-1	NA	Bass Highway - S GF AM

SITE LAYOUT

Site: 101 [Minna Road - GF AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: S1-2 [Bass Highway - N GF AM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Median Storage													
Lane 1	24	20.0	1625	0.015	100	1.7	LOS A	0.0	0.0	Full	175	0.0	0.0
Approach	24	20.0		0.015		1.7	NA	0.0	0.0				
West: Bass Highway													
Lane 1	387	10.0	1831	0.212	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	387	10.0	1831	0.212	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	8	20.0	1625	0.005	100	7.7	LOS A	0.0	0.0	Short	125	0.0	NA
Approach	783	10.1		0.212		0.1	NA	0.0	0.0				
Intersection	807	10.4		0.212		0.2	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Median Storage

Mov. From S To Exit:	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	24	24	20.0	1625	0.015	100	NA	NA
Approach	24	24	20.0		0.015			

West: Bass Highway

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	387	-	387	10.0	1831	0.212	100	NA	NA
Lane 2	387	-	387	10.0	1831	0.212	100	NA	NA
Lane 3	-	8	8	20.0	1625	0.005	100	0.0	2
Approach	775	8	783	10.1		0.212			

	Total	%HV	Deg.Satn (v/c)
Intersection	807	10.4	0.212

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Bass Highway Merge Type: **Priority**												
Exit Short Lane	3	175	0.0	387	407	3.00	2.00	24	1384	0.017	0.6	0.7
Merge Lane	2	-	100.0	Merge Lane is not Opposed				387	1800	0.215	0.0	0.0

LANE SUMMARY

Site: S1-1 [Bass Highway - S GF AM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Minna Road													
Lane 1	19	20.0	621	0.030	100	12.7	LOS B	0.1	0.9	Short	7	0.0	NA
Lane 2	24	20.0	82	0.297	100	61.1	LOS F	1.0	7.8	Full	500	0.0	0.0
Approach	43	20.0		0.297		39.8	LOS E	1.0	7.8				
East: Bass Highway													
Lane 1	14	20.0	1625	0.008	100	8.6	LOS A	0.0	0.0	Short	100	0.0	NA
Lane 2	693	10.0	1831	0.378	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	693	10.0	1831	0.378	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1399	10.1		0.378		0.2	NA	0.0	0.0				
North: Median Storage													
Lane 1	8	20.0	220	0.038	100	16.4	LOS C	0.1	0.9	Full	7	0.0	0.0
Approach	8	20.0		0.038		16.4	LOS C	0.1	0.9				
Intersection	1451	10.4		0.378		1.4	NA	1.0	7.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Minna Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	-	19	20.0	621	0.030	100	0.0	2
Lane 2	-	24	24	20.0	82	0.297	100	NA	NA
Approach	19	24	43	20.0		0.297			

East: Bass Highway

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	14	-	14	20.0	1625	0.008	100	0.0	2
Lane 2	-	693	693	10.0	1831	0.378	100	NA	NA
Lane 3	-	693	693	10.0	1831	0.378	100	NA	NA
Approach	14	1385	1399	10.1		0.378			

North: Median Storage								
Mov. From N To Exit:	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	8	8	20.0	220	0.038	100	NA	NA
Approach	8	8	20.0		0.038			

	Total	%HV	Deg.Satn (v/c)
Intersection	1451	10.4	0.378

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Minna Road Merge Type: **Priority**												
Exit Short Lane	1	7	0.0	8	9	3.00	2.00	14	1791	0.008	0.0	0.0
Merge Lane	2	-	100.0	Merge Lane is not Opposed				8	1800	0.005	0.0	0.0
North Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Bass Highway Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

LANE SUMMARY

Site: S1-2 [Bass Highway - N GF PM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Median Storage													
Lane 1	22	20.0	1625	0.014	100	2.8	LOS A	0.0	0.0	Full	175	0.0	0.0
Approach	22	20.0		0.014		2.8	NA	0.0	0.0				
West: Bass Highway													
Lane 1	726	10.0	1831	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	726	10.0	1831	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	23	20.0	1625	0.014	100	7.7	LOS A	0.0	0.0	Short	125	0.0	NA
Approach	1475	10.2		0.396		0.2	NA	0.0	0.0				
Intersection	1497	10.3		0.396		0.2	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Median Storage

Mov. From S To Exit:	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	22	22	20.0	1625	0.014	100	NA	NA
Approach	22	22	20.0		0.014			

West: Bass Highway

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	726	-	726	10.0	1831	0.396	100	NA	NA
Lane 2	726	-	726	10.0	1831	0.396	100	NA	NA
Lane 3	-	23	23	20.0	1625	0.014	100	0.0	2
Approach	1452	23	1475	10.2		0.396			

	Total	%HV	Deg.Satn (v/c)
Intersection	1497	10.3	0.396

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Bass Highway Merge Type: **Priority**												
Exit Short Lane	3	175	0.0	726	762	3.00	2.00	22	1009	0.022	1.6	1.8
Merge Lane	2	-	100.0	Merge Lane is not Opposed				726	1800	0.403	0.0	0.0

LANE SUMMARY

Site: S1-1 [Bass Highway - S GF PM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: A1													
Lane 1	18	20.0	910	0.020	100	10.4	LOS B	0.1	0.6	Short	7	0.0	NA
Lane 2	22	20.0	262	0.084	100	20.8	LOS C	0.3	2.4	Full	500	0.0	0.0
Approach	40	20.0		0.084		16.2	LOS C	0.3	2.4				
East: B1-1													
Lane 1	21	20.0	1625	0.013	100	8.6	LOS A	0.0	0.0	Short	100	0.0	NA
Lane 2	441	10.0	1831	0.241	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	441	10.0	1831	0.241	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	902	10.2		0.241		0.2	NA	0.0	0.0				
North: Median Storage													
Lane 1	23	20.0	492	0.047	100	7.3	LOS A	0.2	1.3	Full	7	0.0	0.0
Approach	23	20.0		0.047		7.3	LOS A	0.2	1.3				
Intersection	965	10.9		0.241		1.1	NA	0.3	2.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: A1

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	18	-	18	20.0	910	0.020	100	0.0	2
Lane 2	-	22	22	20.0	262	0.084	100	NA	NA
Approach	18	22	40	20.0		0.084			

East: B1-1

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	-	21	20.0	1625	0.013	100	0.0	2
Lane 2	-	441	441	10.0	1831	0.241	100	NA	NA
Lane 3	-	441	441	10.0	1831	0.241	100	NA	NA
Approach	21	881	902	10.2		0.241			

North: Median Storage								
Mov. From N To Exit:	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	23	23	20.0	492	0.047	100	NA	NA
Approach	23	23	20.0		0.047			

	Total	%HV	Deg.Satn (v/c)
Intersection	965	10.9	0.241

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: A1 Merge Type: **Priority**												
Exit Short Lane	1	7	0.0	23	25	3.00	2.00	21	1774	0.012	0.0	0.0
Merge Lane	2	-	100.0	Merge Lane is not Opposed				23	1800	0.013	0.0	0.0
North Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: B2-1 Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

LANE SUMMARY

Site: S1-2 [Bass Highway - N Post Dev AM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Median Storage													
Lane 1	24	20.0	1625	0.015	100	1.7	LOS A	0.0	0.0	Full	175	0.0	0.0
Approach	24	20.0		0.015		1.7	NA	0.0	0.0				
West: Bass Highway													
Lane 1	387	10.0	1831	0.212	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	387	10.0	1831	0.212	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	69	20.0	1625	0.043	100	7.7	LOS A	0.0	0.0	Short	125	0.0	NA
Approach	844	10.8		0.212		0.7	NA	0.0	0.0				
Intersection	868	11.1		0.212		0.7	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Median Storage

Mov. From S To Exit:	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	24	24	20.0	1625	0.015	100	NA	NA
Approach	24	24	20.0		0.015			

West: Bass Highway

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	387	-	387	10.0	1831	0.212	100	NA	NA
Lane 2	387	-	387	10.0	1831	0.212	100	NA	NA
Lane 3	-	69	69	20.0	1625	0.043	100	0.0	2
Approach	775	69	844	10.8		0.212			

	Total	%HV	Deg.Satn (v/c)
Intersection	868	11.1	0.212

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Bass Highway Merge Type: **Priority**												
Exit Short Lane	3	175	0.0	387	407	3.00	2.00	24	1384	0.017	0.6	0.7
Merge Lane	2	-	100.0	Merge Lane is not Opposed				387	1800	0.215	0.0	0.0

LANE SUMMARY

Site: S1-1 [Bass Highway - S Post Dev AM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total	HV]	Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh	Dist]	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: A1													
Lane 1	19	20.0	621	0.030	100	12.7	LOS B	0.1	0.9	Short	7	0.0	NA
Lane 2	24	20.0	67	0.362	100	77.0	LOS F	1.2	9.5	Full	500	0.0	0.0
Approach	43	20.0		0.362		48.8	LOS E	1.2	9.5				
East: B1-1													
Lane 1	209	20.0	1625	0.129	100	8.7	LOS A	0.0	0.0	Short	100	0.0	NA
Lane 2	693	10.0	1831	0.378	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	693	10.0	1831	0.378	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1595	11.3		0.378		1.2	NA	0.0	0.0				
North: Median Storage													
Lane 1	69	20.0	165	0.422	100	29.4	LOS D	1.4	11.8	Full	7	0.0	23.5
Approach	69	20.0		0.422		29.4	LOS D	1.4	11.8				
Intersection	1707	11.9		0.422		3.6	NA	1.4	11.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: A1

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	-	19	20.0	621	0.030	100	0.0	2
Lane 2	-	24	24	20.0	67	0.362	100	NA	NA
Approach	19	24	43	20.0		0.362			

East: B1-1

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	209	-	209	20.0	1625	0.129	100	0.0	2
Lane 2	-	693	693	10.0	1831	0.378	100	NA	NA
Lane 3	-	693	693	10.0	1831	0.378	100	NA	NA

Mov. From N To Exit:	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Approach	209	1385	1595	11.3	0.378			
North: Median Storage								
Lane 1	69	69	20.0	165	0.422	100	NA	NA
Approach	69	69	20.0		0.422			

	Total	%HV	Deg.Satn (v/c)
Intersection	1707	11.9	0.422

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: A1 Merge Type: **Priority**												
Exit Short Lane	1	7	0.0	69	76	3.00	2.00	209	1723	0.122	0.1	0.1
Merge Lane	2	-	100.0	Merge Lane is not Opposed				69	1800	0.039	0.0	0.0
North Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: B2-1 Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

LANE SUMMARY

Site: S1-2 [Bass Highway - N Post Dev PM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Median Storage													
Lane 1	194	20.0	1625	0.119	100	3.1	LOS A	0.0	0.0	Full	175	0.0	0.0
Approach	194	20.0		0.119		3.1	NA	0.0	0.0				
West: Bass Highway													
Lane 1	726	10.0	1831	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	726	10.0	1831	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	23	20.0	1625	0.014	100	7.7	LOS A	0.0	0.0	Short	125	0.0	NA
Approach	1475	10.2		0.396		0.2	NA	0.0	0.0				
Intersection	1668	11.3		0.396		0.5	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Median Storage

Mov. From S To Exit:	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	194	194	20.0	1625	0.119	100	NA	NA
Approach	194	194	20.0		0.119			

West: Bass Highway

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	726	-	726	10.0	1831	0.396	100	NA	NA
Lane 2	726	-	726	10.0	1831	0.396	100	NA	NA
Lane 3	-	23	23	20.0	1625	0.014	100	0.0	2
Approach	1452	23	1475	10.2		0.396			

	Total	%HV	Deg.Satn (v/c)
Intersection	1668	11.3	0.396

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: Bass Highway Merge Type: **Priority**												
Exit Short Lane	3	175	0.0	726	762	3.00	2.00	194	1009	0.192	1.6	2.1
Merge Lane	2	-	100.0	Merge Lane is not Opposed				726	1800	0.403	0.0	0.0

LANE SUMMARY

Site: S1-1 [Bass Highway - S Post Dev PM (Site Folder: General)]

Staged Crossing at T Intersection Type C
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: A1													
Lane 1	67	20.0	910	0.074	100	10.5	LOS B	0.3	2.3	Short	7	0.0	NA
Lane 2	194	20.0	244 [1]	0.794	100	43.2	LOS E	5.4	44.4	Full	500	0.0	0.0
Approach	261	20.0		0.794		34.8	LOS D	5.4	44.4				
East: B1-1													
Lane 1	21	20.0	1625	0.013	100	8.6	LOS A	0.0	0.0	Short	100	0.0	NA
Lane 2	441	10.0	1831	0.241	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	441	10.0	1831	0.241	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	902	10.2		0.241		0.2	NA	0.0	0.0				
North: Median Storage													
Lane 1	23	20.0	492	0.047	100	7.3	LOS A	0.2	1.3	Full	7	0.0	0.0
Approach	23	20.0		0.047		7.3	LOS A	0.2	1.3				
Intersection	1186	12.6		0.794		8.0	NA	5.4	44.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Approach Lane Flows (veh/h)

South: A1

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	-	67	20.0	910	0.074	100	0.0	2
Lane 2	-	194	194	20.0	244 [1]	0.794	100	NA	NA
Approach	67	194	261	20.0		0.794			

East: B1-1

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	-	21	20.0	1625	0.013	100	0.0	2
Lane 2	-	441	441	10.0	1831	0.241	100	NA	NA

Lane 3	-	441	441	10.0	1831	0.241	100	NA	NA
Approach	21	881	902	10.2		0.241			

North: Median Storage

Mov. From N To Exit:	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	23	23	20.0	492	0.047	100	NA	NA
Approach	23	23	20.0		0.047			

	Total	%HV	Deg.Satn (v/c)
Intersection	1186	12.6	0.794

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: A1 Merge Type: **Priority**												
Exit Short Lane	1	7	0.0	23	25	3.00	2.00	21	1774	0.012	0.0	0.0
Merge Lane	2	-	100.0	Merge Lane is not Opposed				23	1800	0.013	0.0	0.0
North Exit: Median Storage Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: B2-1 Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

LANE SUMMARY

Site: 101 [Minna Road - GF AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Minna Road													
Lane 1	44	0.0	1948	0.023	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	44	0.0		0.023		0.1	NA	0.0	0.0				
North: Minna Road													
Lane 1	23	0.0	1935	0.012	100	0.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	23	0.0		0.012		0.3	NA	0.0	0.0				
West: Heybridge Site Access													
Lane 1	1	0.0	1384	0.001	100	8.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	1092	0.001	100	8.6	LOS A	0.0	0.0	Short	7	0.0	NA
Approach	2	0.0		0.001		8.4	LOS A	0.0	0.0				
Intersection	69	0.0		0.023		0.4	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Minna Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	43	44	0.0	1948	0.023	100	NA	NA
Approach	1	43	44	0.0		0.023			

North: Minna Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	22	1	23	0.0	1935	0.012	100	NA	NA
Approach	22	1	23	0.0		0.012			

West: Heybridge Site Access

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	-	1	0.0	1384	0.001	100	NA	NA

Lane 2	-	1	1	0.0		1092	0.001	100	0.0	1
Approach	1	1	2	0.0			0.001			

	Total	%HV	Deg.Satn (v/c)
Intersection	69	0.0	0.023

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Heybridge Site Access Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 101 [Minna Road - GF PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Minna Road													
Lane 1	41	0.0	1948	0.021	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	41	0.0		0.021		0.1	NA	0.0	0.0				
North: Minna Road													
Lane 1	45	0.0	1942	0.023	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	45	0.0		0.023		0.1	NA	0.0	0.0				
West: Heybridge Site Access													
Lane 1	1	0.0	1388	0.001	100	8.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	1073	0.001	100	8.6	LOS A	0.0	0.0	Short	7	0.0	NA
Approach	2	0.0		0.001		8.4	LOS A	0.0	0.0				
Intersection	88	0.0		0.023		0.3	NA	0.0	0.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Minna Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	40	41	0.0	1948	0.021	100	NA	NA
Approach	1	40	41	0.0		0.021			

North: Minna Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	44	1	45	0.0	1942	0.023	100	NA	NA
Approach	44	1	45	0.0		0.023			

West: Heybridge Site Access

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	-	1	0.0	1388	0.001	100	NA	NA

Lane 2	-	1	1	0.0	1073	0.001	100	0.0	1
Approach	1	1	2	0.0		0.001			

	Total	%HV	Deg.Satn (v/c)
Intersection	88	0.0	0.023

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Heybridge Site Access Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 101 [Minna Road - Post Dev AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Minna Road													
Lane 1	44	20.0	1723	0.026	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	44	20.0		0.026		0.1	NA	0.0	0.0				
North: Minna Road													
Lane 1	279	20.0	1569	0.178	100	5.6	LOS A	0.9	7.6	Full	500	0.0	0.0
Approach	279	20.0		0.178		5.6	NA	0.9	7.6				
West: Heybridge Site Access													
Lane 1	1	20.0	1248	0.001	100	9.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	20.0	704	0.001	100	11.1	LOS B	0.0	0.0	Short	7	0.0	NA
Approach	2	20.0		0.001		10.1	LOS B	0.0	0.0				
Intersection	325	20.0		0.178		4.9	NA	0.9	7.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Minna Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	43	44	20.0	1723	0.026	100	NA	NA
Approach	1	43	44	20.0		0.026			

North: Minna Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	22	257	279	20.0	1569	0.178	100	NA	NA
Approach	22	257	279	20.0		0.178			

West: Heybridge Site Access

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	-	1	20.0	1248	0.001	100	NA	NA

Lane 2	-	1	1	20.0	704	0.001	100	0.0	1
Approach	1	1	2	20.0		0.001			

	Total	%HV	Deg.Satn (v/c)
Intersection	325	20.0	0.178

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Heybridge Site Access Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 101 [Minna Road - Post Dev PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Minna Road													
Lane 1	41	20.0	1723	0.024	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	41	20.0		0.024		0.2	NA	0.0	0.0				
North: Minna Road													
Lane 1	45	20.0	1719	0.026	100	0.1	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	45	20.0		0.026		0.1	NA	0.0	0.1				
West: Heybridge Site Access													
Lane 1	221	20.0	1252	0.177	100	9.1	LOS A	0.8	6.6	Full	500	0.0	0.0
Lane 2	1	20.0	959	0.001	100	9.6	LOS A	0.0	0.0	Short	7	0.0	NA
Approach	222	20.0		0.177		9.1	LOS A	0.8	6.6				
Intersection	308	20.0		0.177		6.6	NA	0.8	6.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: Minna Road

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	40	41	20.0	1723	0.024	100	NA	NA
Approach	1	40	41	20.0		0.024			

North: Minna Road

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	44	1	45	20.0	1719	0.026	100	NA	NA
Approach	44	1	45	20.0		0.026			

West: Heybridge Site Access

Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	221	-	221	20.0	1252	0.177	100	NA	NA

Lane 2	-	1	1	20.0		959	0.001	100	0.0	1
Approach	221	1	222	20.0			0.177			

	Total	%HV	Deg.Satn (v/c)
Intersection	308	20.0	0.177

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: Minna Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Heybridge Site Access Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN.
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