APPENDIX U

INLAND RAIL

Traffic and Transport Impact Assessment Technical Report

PART 1 OF 3

Main Report and Appendices A to J

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT

IR_1381

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

Inland Rail Calvert to Kagaru EIS

Appendix U – Traffic Impact Assessment

Australian Rail Track Corporation

Reference: 3400

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2-0001-340-EAP-10-RP-0221

Contents

Appendices

Appendix M

Roads and Maritime Services Traffic Growth Rates

Appendix N

Detailed Road Link Analyses

Appendix O

Detailed Pavement Impact Analysis

Appendix P

Public Transport and Principle Cycle Network Plan Maps

Figures

Tables

Glossary

Abbreviation	Definition
AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
ALCAM	Australian Level Crossing Assessment Model
ARTC	Australian Rail Track Corporation
AUL	Auxiliary left turn
BAL	Basic left turn
C2K	Calvert to Kagaru
CEMP	Construction Environmental Management Plan
CHR	Channelised right turn
COAG	Council of Australian Governments
CVC	Clarence Valley Council
DCA	Definition for Coding Accidents
DTMR	Queensland Department of Transport Main Roads
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
FAMLIT	Freight Axle Mass Limits Investigation Tool
FTE	Full Time Equivalent
GTIA	Guidelines to Traffic Impact Assessment
H2C	Helidon to Calvert
HV	Heavy vehicle
ICC	Ipswich City Council
K2ARB	Kagaru to Acacia Ridge and Bromelton
kN	Kilo-Newtons
Land Act	*Land Act 1994* (Qld)
LCC	Logan City Council
LGA	Local Government Area
LGR	Local Government Roads
LOS	Level of Service
LRDS	Local road deterioration study
LWR	Long welded rail
MUTCD	Manual of Uniform Traffic Control Devices
NHVR	National Heavy Vehicle Regulator
NRLCS	National Railway Level Crossing Safety Strategy
NSW	New South Wales
ONRSR	Office of the National Rail Safety Regulator
OSOM	Oversize, over-mass vehicles
PCNP	Principal Cycle Network Plans
PDA	Priority Development Area
QLCSS	Queensland Level Crossing Safety Strategy
QAS	Queensland Ambulance Services

Abbreviation	Definition
QFES	Queensland Fire and Emergency Services
QLD	Queensland
QPS	Queensland Police Services
QR	Queensland Rail
RACQ	Royal Automobile Club of Queensland Limited
RAMR	Rail Maintenance Access Road
RAV	Restricted Access Vehicles
RFI	Request for Information
RMS	Roads and Maritime Services
RSNL Act	*Rail Safety National Law (Queensland) Act 2017*
RTA	Roads and Traffic Authority
RUMP	Road Use Management Plan
SAR	Standard Axle Repetitions
SAR/HV	Standard Axle Repetition per Heavy Vehicle
SCR	State controlled roads
SDA	State Development Area
SDAP	State development assessment provisions
SEIS	Supplementary EIS
SEQ	South-east Queensland
SFRC	Southern Freight Rail Corridor
SRRC	Scenic Rim Regional Council
TAL	Tonne Axle Load
TCP	Traffic Control Plans
TDM	Travel Demand Management
TI Act	*Transport Infrastructure Act 1994* (Qld)
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
ToR	Terms of Reference
TP&C	*Transport Planning and Coordination Act 1994* (Qld)
VMS	Variable Message Signs
WIM	Weigh-in-motion
XPT	Express Passenger Train

1 Introduction and approach

1.1 Project overview

Australian Rail Track Corporation (ARTC) proposes to construct and operate the Calvert to Kagaru (C2K) (the Project) section of Inland Rail Program. The Project is located in South-east Queensland (SEQ) and consists of approximately 53 kilometre (km) of new track within a greenfield corridor. Because of its greenfield nature, the Project is a key 'missing link' in the wider Inland Rail alignment between Melbourne and Brisbane.

1.2 Scope and context of report

This report assesses the traffic and transport impacts of the construction and operation of the Project on the surrounding transport infrastructure. The report also summarises the potential road impacts and surrounding road network/s from the movement of materials, workforce and equipment during the construction and operational phases of the Project. The assessments were undertaken for Queensland (QLD) State-controlled Roads and public New South Wales (NSW) State-controlled roads (together referred to as SCRs) and Local Government Roads (LGRs).

This assessment follows the construction methodology adopted for the Project constructability assessment whereby a supplier has been assumed for all key materials. Generally, suppliers local to the Project within QLD have been assumed. However, due to specific Project requirements, the dual-gauge sleepers were assumed to be provided from a facility in Grafton, NSW, resulting in the inclusion of NSW impacts within this traffic impact assessment (TIA).

The transport of materials, workforce and equipment during construction is expected to primarily utilise the existing road transport networks. Some materials may be transported via rail. The expected impact of the Project on ports and airports is not considered to be significant during either the construction or operational phases. Impacts from the Project on the operation and throughputs at ports (containers) have not been assessed in this report as they are considered to be out of scope.

The construction routes assumed as a part of this assessment are routes which the construction contractor may use to transport materials from the assumed suppliers to the Project laydown areas. However, the determination of the final construction and heavy vehicle (HV) routes will be subject to consultation between Department of Transport and Main Roads (DTMR), the local government authority and the construction contractor. This is consistent with Section 7.5 of DTMR's Guidelines to Traffic Impact Assessment (GTIA) which states that the TIA "may be finalised when project contractors are appointed and final traffic generation is clearer".

The traffic and transport assessment focuses on the Project's impact on the existing road and rail transport infrastructure and users and includes the following:

- An overview of existing transport network conditions, including existing road, active transport and rail traffic
- A description of the Project
- An overview of baseline operations associated with intersections, road links, pavements (SCRs only), existing road/rail interface locations and existing road safety
- A summary of construction tasks, routes and resulting traffic generated by the Project
- A summary of rail operational traffic and maintenance processes, as an input to the impact assessment
- A TIA associated with intersections, road links, road/rail interface locations, pavements (SCRs only), road safety and access and frontage based on the Project construction routes

- Potential impacts associated with the Project and assumed construction routes, and identifies measures to be undertaken to mitigate the identified impacts for the Project and any future design development
- A summary of potential traffic impact risks identified along the route
- A consideration of the cumulative impacts of the Project alongside other proximate committed major projects.

1.3 Relevant legislation, policy, standards and guidelines

This section identifies the relevance of any legislative or policy level objectives and standards that exist to protect or manage the transport infrastructures in the context of the Project.

Table 1.1 Summary of legislation, standards, policies and guidelines

Legislation, policy/ standard or guideline	Relevance to the Project
Legislation	
Transport Planning and Coordination Act 1994 (Qld) (TP&C Act)	The *Transport Planning and Coordination Act 1994* (Qld) is the primary law relating to transport in QLD. The overall objective of the *Transport Planning and Coordination Act 1994* is to improve the economic, trade and regional development performance of QLD and the quality of life of Queenslanders. This is achieved through the Transport Coordination Plan for Queensland 2017-2027 (Transport Coordination Plan). The objectives of the Transport Coordination Plan focus on five key areas: ■ Customer experience and affordability ■ Community connectivity ■ Efficiency and productivity ■ Safety and security ■ Environment and sustainability. The following objectives are of particular relevance to the Project: ■ Transport connects communities to employment and vital services ■ Transport facilitates the efficient movement of people and freight to grow QLD's economy ■ Transport is safe and secure for customers and goods.
Transport Infrastructure Act 1994 (Qld) (TI Act)	The overall objective of the *Transport Infrastructure Act 1994* (Qld) is to provide a regime that allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure. This is consistent with the objectives of the TP&C Act. Any crossings of existing rail lines or works within existing rail corridor will trigger Section 255-*Interfering with railway* and will require the approval of the railway manager. Any works within SCRs or access to SCRs (during construction) will trigger Section 50-Ancillary works and encroachments & Section 33-Prohibition on roadworks etc. on SCRs & Section 62-Management of access between individual properties and SCRs section 66-Road access works within SCRs.
Land Act 1994 (Qld) (Land Act)	The Land Act prescribes the framework for the allocation of non-freehold land tenure and its subsequent management. Under Chapter 4, Part 4 of the Land Act, permits are required for the occupation of unallocated state land, a reserve or a road. A permit to occupy will also be required for any underground infrastructure that is proposed beneath land governed by State held tenure. Chapter 3, Part 2, Division 2 of the Land Act contains the provisions relating to the temporary or permanent closure of a road, including SCRs and LGRs, and declared stock routes.
Rail Safety National Law (Queensland) Act 2017 (Qld) (RSNL Act)	The purpose of the RSNL Act is to provide for safe railway operations in Australia. One objective of the RSNL Act is to establish the Office of the National Rail Safety Regulator (ONRSR) as the rail safety regulator in QLD. The RSNL Act was created following an agreement of the Council of Australian Governments (COAG) to deliver a consistent approach to rail safety policy and regulations (and to remove the inconsistencies) between the previous state and territory rail safety regimes.

Legislation, policy/ standard or guideline	Relevance to the Project
	The RSNL Act governs the safe operation of the rail system in QLD. The ongoing operation of the Project will need to comply with all areas of the RSNL Act, covering rail industry work practices and protocols for safe working in rail corridors and associated accreditation, signalling and control, the ongoing management of structures and civil works, interfaces with public roads and highways and other activities impacting on rail safety.
Local Government Act 2009 (Qld) (Local Government Act)	The Local Government Act sets out the responsibilities of local government authorities with regard to the construction, improvement, control and management of traffic on local roads (excluding SCRs). A local government authority may temporarily or permanently close a local road to traffic in accordance with the Local Government Act. An adjoining landowner must apply under the Land Act to temporarily or permanently close a local road.
Stock Route Management Act 2002 (Qld)	The *Stock Route Management Act 2002* (Qld) provides for the stock route network management. Under the Act, a stock route means a road or route ordinarily used for travelling stock or declared under regulation to be a stock route. A stock route has no separate title or tenure from the underlying road reserve, and the same roads are used for walking and agisting stock and vehicular transport. The Land Act and the TI Act also include relevant provisions for stock routes and associated grazing access. The Project does not traverse any known or mapped stock routes.
Transport Administration Act 1988 (NSW)	The objectives of the *Transport Administration Act 1988* (NSW) relate to administering the transport services provided to the people of NSW and include: ▪ Providing an efficient and accountable framework for the governance of the delivery of transport services ▪ Promoting the integration of the transport system ▪ Enabling effective planning and delivery of transport infrastructure and services ▪ Facilitating the mobilisation and prioritisation of key resources across the transport sector ▪ Coordinating the activities of those engaged in the delivery of transport services ▪ Maintaining independent regulatory arrangements for securing the safety of transport services. This Act is relevant to the movement of construction materials on NSW roads within the Project.
Road Transport Act of 2013 (NSW)	The elements of the *Road Transport Act of 2013* (NSW) relevant to the Project are to govern the application of traffic control devices, electrical equipment or other facilities on roads or road shoulders, footpaths, structures under or over the Project and control of vehicles (other than vehicles used on the railway itself) and animals along construction routes within NSW.
Local government plans/strategies	
Logan Planning Scheme 2015	The Logan Planning Scheme is a framework for managing development in a way that advances the purpose of the *Planning Act 2016* (Qld). The scheme sets out Logan City Council's (LCC) intention for development over the next 20 years and seeks to advance State and regional planning through more detailed local response. The Local Government Infrastructure Plan is incorporated in the planning scheme and identifies trunk infrastructure necessary to service urban development in a coordinated and cost-effective manner. In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation 2017, provisions of this local government planning scheme do not apply to the Project. Notwithstanding this, the zoning intent for these areas as determined by the planning schemes have been taken into consideration when determining impacts of the Project on future land uses in the area.
Logan City Futures Strategy	The Futures Strategy shows strategic priorities of the City of Logan in line with the Australian Government's Smart Cities Plan. The strategy investigates future innovation and prosperity, connectivity, council, community and place, and outlines objectives and key targets of LCC.

Legislation, policy/ standard or guideline	Relevance to the Project
Strategy for Road Safety in the City of Logan (2017-2021)	This Strategy is a partnership between LCC and DTMR, Queensland Police Service (QPS), Queensland Health and the Royal Automobile Club of Queensland Limited (RACQ). The strategy outlines several key action areas aimed at improving the safety of roads throughout Logan. The intention is to collaborate with the Logan City community to prevent road trauma through safe and responsible road use, safe roads and safe vehicles. Where necessary, the Project should adopt the actions outlined in the strategy to improve road safety.
Ipswich City Planning Scheme (2006)	The purpose of the Ipswich City Planning Scheme is to act as a framework for managing development in a way that advances previous planning documents. It will identify assessable and self-assessable development and identify anticipated outcomes in the Local Government area as the context for assessing development. Part of this Scheme includes the Local Government Infrastructure Plan which provides desired standards of service for the transport network, plans for trunk infrastructure and a schedule of works for planned infrastructure in Ipswich City. The Project passes through the local government authority of Ipswich City Council (ICC). In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation, provisions of this local government planning scheme do not apply to the Project. Notwithstanding this, the zoning intent for these areas as determined by the planning schemes have been taken into consideration when determining impacts of the Project on future land uses in the area.
City of Ipswich Transport Plan (2016)	The City of Ipswich Transport Plan outlines the Council's high-level aspirations to advance the transport system in Ipswich by identifying current key transport challenges, setting a vision and objective for the transport system and identifying appropriate policy focuses and actions.
Scenic Rim Regional Council Planning Scheme (2020)	The Scenic Rim Planning Scheme 2020 and accompanying Planning Scheme Policies were adopted by Scenic Rim Regional Council (SRRC) on 20 January 2020. The Scenic Rim Planning Scheme sets out SRRC's intention for the future development in the planning scheme area over the next 20 years. The planning scheme seeks to advance state and regional policies through more detailed local responses, while taking into account the local context. The Project passes through SRRC local government area. When proposing a development within the local government authority, the Scenic Rim Regional Council Planning Scheme will identify if a development is assessable, self-assessable or exempt under the planning scheme. The planning scheme also seeks to achieve desired environmental outcomes. ▪ Overall outcomes for zones and overlays, or for the purpose of a code ▪ Specific outcomes for zones, overlays and codes ▪ Probable solutions for a specific outcome or probable solutions for complying with a code. In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation 2017, provisions of this local government planning scheme do not apply to the Project. Notwithstanding this, the zoning intent for these areas as determined by the planning schemes have been taken into consideration when determining impacts of the Project on future land uses in the area.
Guidelines	
Queensland Level Crossing Safety Strategy 2012-2021	This strategy complements the National Railway Level Crossing Safety Strategy (NRLCSS) (2010-2020), which was released by the Australian Transport Council in 2009 to promote national consistency in addressing level crossing safety. (Note: the NRLCSS has subsequently been superseded by the NRLCSS (2017-2020). However, the Queensland Level Crossing Safety Strategy (QLCSS) refers to the 2010-2020 version). A reliable state transport network is vital for connecting people, places, goods and services. It is in everyone's interests that road and rail users work together to make this network as safe and efficient as possible. The strategy focuses on all users of level crossings, including train crew and passengers, road vehicle drivers, riders, passengers and pedestrians. These crossings, including any which may be accessible to the public, are considered to be a workplace health and safety matter and are managed under separate arrangements. This strategy will be used with its associated key performance indicators in order to ensure that mitigation measures determined for all public road / rail interface locations (level crossings) through the analysis process focus on safety, risk and operational efficiency.

Legislation, policy/ standard or guideline	Relevance to the Project
Guideline to Traffic Impact Assessment (GTIA), September 2017 (Queensland)	The GTIA has been used as a point of reference for the traffic and transport assessment, as it relates to roads and intersections affected by the construction and operation of the Project. GTIA provides information about the processes involved to assess road impacts triggered by a proposed development. While it is not mandatory, the GTIA provides a basis for the assessment of road impacts and has been adopted for the preliminary assessment on traffic and pavement impacts by the Project. Although the Guidelines only apply to the SCRs, Local Government Authorities may choose to adopt or use this as a reference. In general, DTMR will consider a development's road impacts to be 'insignificant' if the development generates an increase in traffic on SCRs of less than 5 per cent (%) over existing levels, either measured in terms of annual average daily traffic (AADT) or Standard Axle Repetitions (SARs). Inputs to the GTIA process typically include the existing traffic levels, the Project construction timeframe, and that of other projects, volume of construction materials, haul vehicles and their capacities, and therefore the number of new or additional Project-related trips likely to use the network. The use of the assessment process recommended in the GTIA will provide the Project with clarification on likely traffic impacts on nominated haulage routes, intersections and other affected roads. It is noted that an updated version of the GTIA was released in December 2018, after the Terms of Reference (ToR) for the Project were released. This assessment has been undertaken consistent with the 2017 GTIA consistent with the ToR.
Roads and Traffic Authority (RTA) Guide to Traffic Generating Developments	The RTA Guide to Traffic Generating Developments Version 2.2 (2002) (NSW) (the guide) outlines all aspects of traffic generation considerations relating to developments. The guide provides information regarding traffic issues for those submitting Development Applications, and for those involved in the assessment of these applications. The overall objective is all parties impacted have access to common information relevant to the development approval process. The information provided gives background into the likely impacts of traffic from various types of developments and associated mitigation measures, thereby illustrating the importance of accurate development assessment. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments. The GTIA manual is used as overarching guideline document. This was consulted with Roads and Maritime Services (RMS) where RMS was in agreement of using the GTIA manual as the main guideline document for the TIA.
Manual of Uniform Traffic Control Devices (MUTCD) Part 7: Railway Crossings	The MUTCD series covers all mandatory road and rail related traffic control devices likely to be required for the Project. The use of signs, markings and other devices at railway level crossings and affected roads, based on uniform standards and practices, is essential in the interests of safety for both rail traffic and road users. This part of the MUTCD sets out the various controls used at railway, cane railway and combined railway/cane railway level crossings and describes the devices and assemblies, their use and location to achieve these controls.
DTMR Guide to Development in a Transport Environment: Rail Transport and Main Roads, June 2015	The DTMR Guide to Development in a Transport Environment: Rail provides important information for the planning, design or delivery of development in the vicinity of railways in QLD. It is intended for use as a technical reference document. The guide provides specific technical guidance to assist development proponents to achieve compliance with the performance outcomes and acceptable outcomes in the QLD state development assessment provisions (SDAP) in relation to managing impacts of development on railway safety, structural integrity and operation. The guide also provides useful information in relation to the operational constraints and requirements when undertaking construction work within the railway environment.
Austroads Guide to Traffic Management Part 12: Traffic Impact Assessments (2016)	This Guide helps traffic and transport practitioners identify and manage the impacts on the road arising from land use developments. The impacts being considered are those directly affecting road users of all classes, from large freight vehicles and buses to cyclists and pedestrians. It is a useful supplement to the NSW Guide and Qld GTIA publications discussed earlier.
Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (2017)	In the context of the Austroads Guide, Part 3: Traffic Studies and Analysis outlines the importance of traffic data and its analysis for traffic management and traffic control within a network. It serves to ensure some degree of consistency in conducting traffic studies and surveys. It provides guidance on the different types of traffic studies and surveys that can be undertaken, their use and application, and methods for traffic data collection and analysis.

Legislation, policy/ standard or guideline	Relevance to the Project
Austroads Guide to Traffic Engineering Practice Part 2: Roadway Capacity, 1988	The guide provides information regarding roadway capacity for various road types. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments.
Cycling Aspects of Austroads Guides (Austroads, 2017)	This guideline contains information that relates to the planning, design and traffic management of cycling facilities. The guideline provides: ■ An overview of planning and traffic management considerations and cross references to other Austroads Guides and texts for further detailed information ■ A summary of design guidance and criteria relating to onroad and offroad cycle facilities together with a high level of cross referencing to the relevant Austroads Guides for further information ■ Information and cross-references on the provision for cyclists at structures, traffic control devices, construction and maintenance considerations and end-of-trip facilities.
Australian Level Crossing Assessment Model (ALCAM) (2016)	ALCAM is an assessment tool used to identify key potential risks at level crossings and to assist in the prioritisation of crossings for upgrades. The risk model is used to support a decision-making process regarding both road and pedestrian level crossings and to help determine traffic cost effective treatments.

1.4 Terms of reference requirements

The TIA partly addresses the Project specific transport matters outlined in Part B, Section 11 of the Project ToR. The transport ToR have been reproduced in Table 1.2, alongside the relevant sections of this report (and the Environmental Impact Statement (EIS) chapter) where these elements have been addressed.

Table 1.2 Terms of reference requirements

Terms of reference requirements	Addressed in report
Existing environment	
11.109. Describe and map the existing transport infrastructure and corridors. Provide data on existing road, active transport and rail traffic in the project area.	Sections 2.2, 2.3, 2.4 and 4, and Figure 1.2 and 1.3.
11.110. Describe and map where the project's preferred alignment differs from the State's strategic rail corridors, including the Southern Freight Rail Corridor and the reasons for any such deviation	Chapter 19, Section 19.4.1 EIS Chapter 2: Project Rationale, Section 2.7, Figure 2.3, Figure 2.4 and Figure 2.5
11.111. Describe how the project complies with the Queensland Level Crossing Safety Strategy 2012–2021 for new road/rail interfaces and the impacts on existing road/rail interfaces.	Sections 1.3, 3.2 and 9.5
Impact assessment	
11.112. Assess the impacts of the project on individual road/rail crossings and any cumulative impacts on the wider transport network in the context of the Queensland level crossing safety strategy.	Sections 4.4, 6.4.3 and 11
11.113. The EIS should include a clear summary of the total transport task for the project, including workforce, haulage routes, inputs and outputs during the construction and operational phases.	Sections 5 and 6, Figure 1.3, Table 5.1 and Appendix A to H
11.114. Present the transport assessment in separate sections for each project affected mode (road, active transport and rail) as appropriate for each phase of the project.	Section 6
11.115. Provide sufficient information to allow an independent assessment of how existing and proposed transport infrastructure will be affected by project transport at the local and regional level (for example, local roads and SCRs). Discussion should also refer to emergency service access.	Section 6 and Section 6.6.1

Terms of reference requirements	Addressed in report
11.116. Include details of the adopted assessment methodology for impacts on roads within the road impact assessment report in accordance with the Department of Transport and Main Roads' Guide to Traffic Impact Assessment.	Section 1.6
Mitigation measures	
11.117. Discuss and recommend how identified impacts will be mitigated. Mitigation strategies are to be prepared in close consultation with relevant transport authorities (including local government).	Section 9

1.5 Traffic impact assessment study area

The study area defined for the TIA (hereby referred to as the TIA study area) consists of:

- The extent of the Project, including public roads intersecting the Project (road-rail interface locations), shown in Figure 1.2
- The road network envisaged for the transport of workforce, materials and equipment during the construction and operational phases of the project, shown in Figure 1.3.

The TIA study area was the focus area for assessing impacts and determining and mitigation measures for the Project.

The TIA does not consider the impacts to private roads. Any impacts to private roads are addressed directly with the impacted landowners as part of the Project's wider consultation process. The use of any private roads during construction would require a specific agreement between the delivery contractor and the private road owner.

1.5.1 Proposed rail corridor

The proposed rail corridor for the Project generally follows the protected Southern Freight Rail Corridor (SFRC) which was gazetted as future railway land by the QLD Government on 5 November 2010. This corridor links the West Moreton System near Calvert to the interstate rail line near Kagaru, north of Beaudesert. The proposed Project and EIS investigation corridor is illustrated in Figure 1.1.

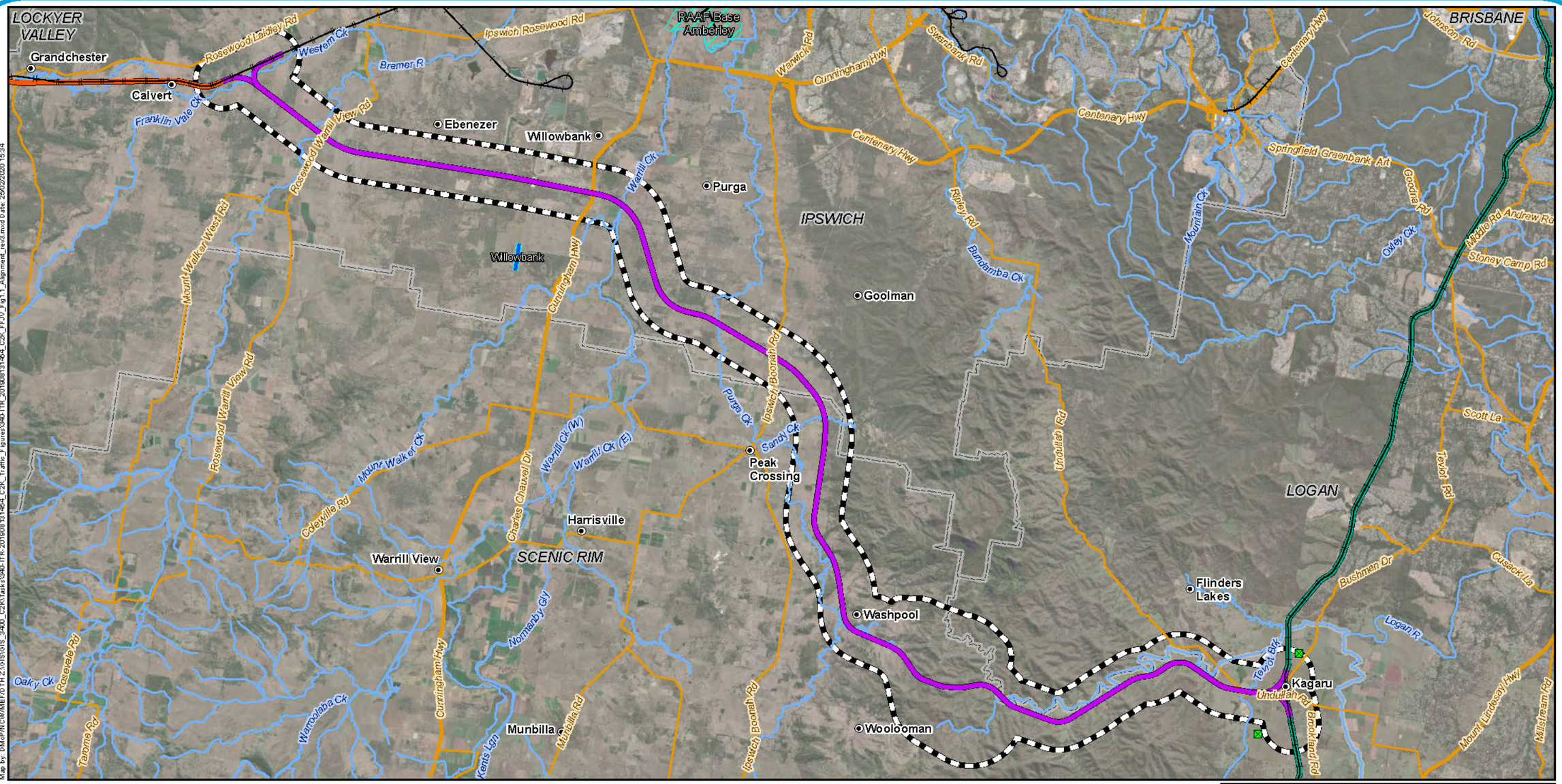
The proposed road/rail interface locations that form part of the TIA study area are indicated in Figure 1.2. The road/rail interface locations comprise public formed roads only. The road/rail interface locations included in this TIA study area are all public road crossings which are envisaged to intersect the Project. The road/rail interface locations are described in more detail within Section 3.2.

The rail corridor is a minimum of 40 m wide, with wider areas to accommodate earthworks associated with large cut or fill locations, longitudinal drainage earthworks and drainage structures, rail infrastructure, access roads and fencing. Corridor fencing is generally located on the corridor boundary at minimum 3.5 m from the extent of earthworks.

The disturbance footprint allowance provides for a minimum 5 m footprint beyond the permanent footprint for fencing and temporary drainage structures, erosion and sediment control and utilities connections.

The disturbance footprint also provides for the roadworks associated with the construction of the railway, including realigned and new roads. A 20 m road corridor has typically been allowed for all new and realigned roads.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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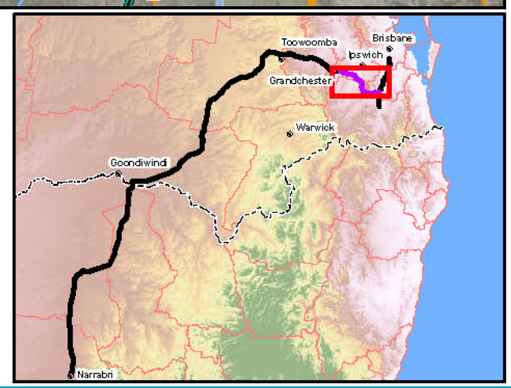
Legend

- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Watercourses
- Major roads
- Minor roads
- Landing ground
- Airport runway
- Minor runway centreline
- Airports
- EIS investigation corridor
- Local Government Areas



A3 scale: 1:150,000

0 1 2 3 4 5km

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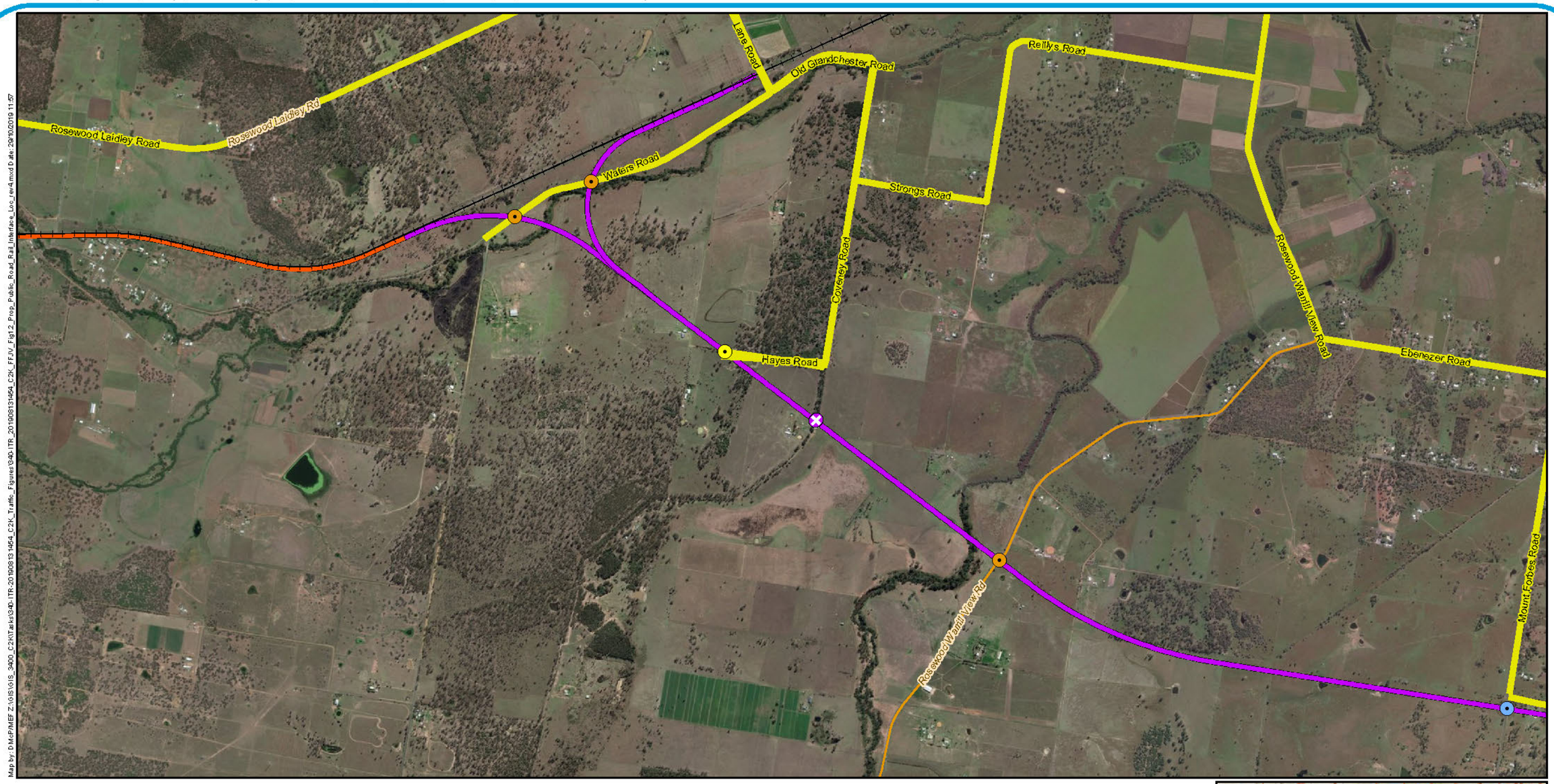
Calvert to Kagaru
Figure 1.1: Proposed Project

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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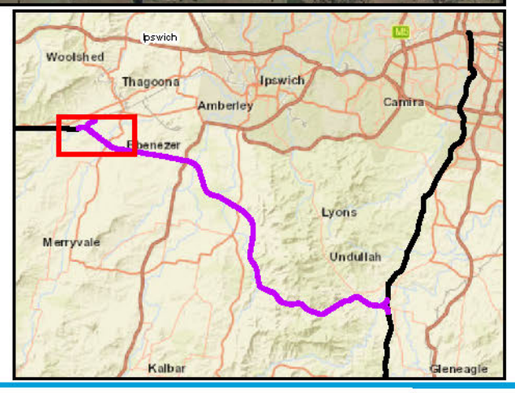
Legend

- 5 Chainage (km)
- Existing rail
- H2C project alignment
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Active level crossing
- Grade separation - rail over
- Grade separation - road over
- No crossing provided - consolidate



A3 scale: 1:25,000
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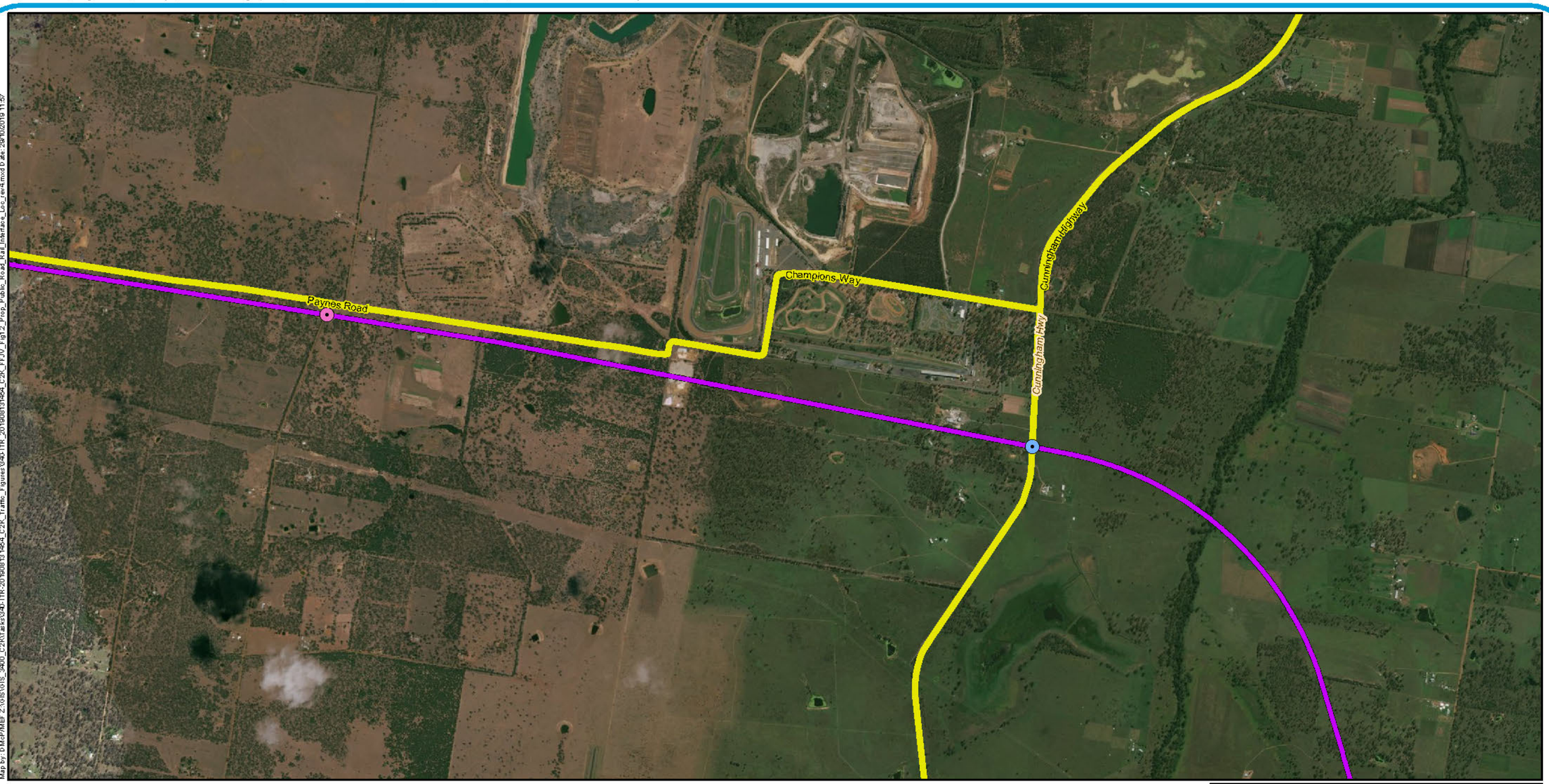
Calvert to Kagaru
Figure 1.2a: Project road-rail interface locations

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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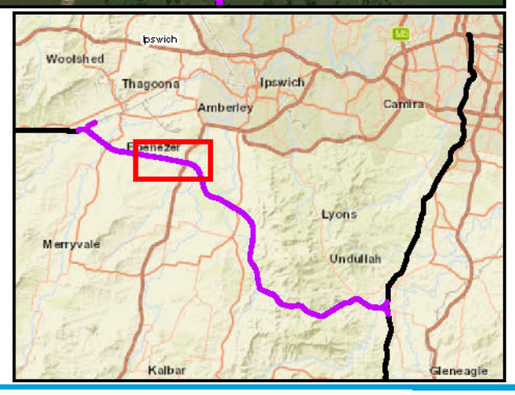
Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Passive level crossing
- Grade separation - road over



A3 scale: 1:25,000
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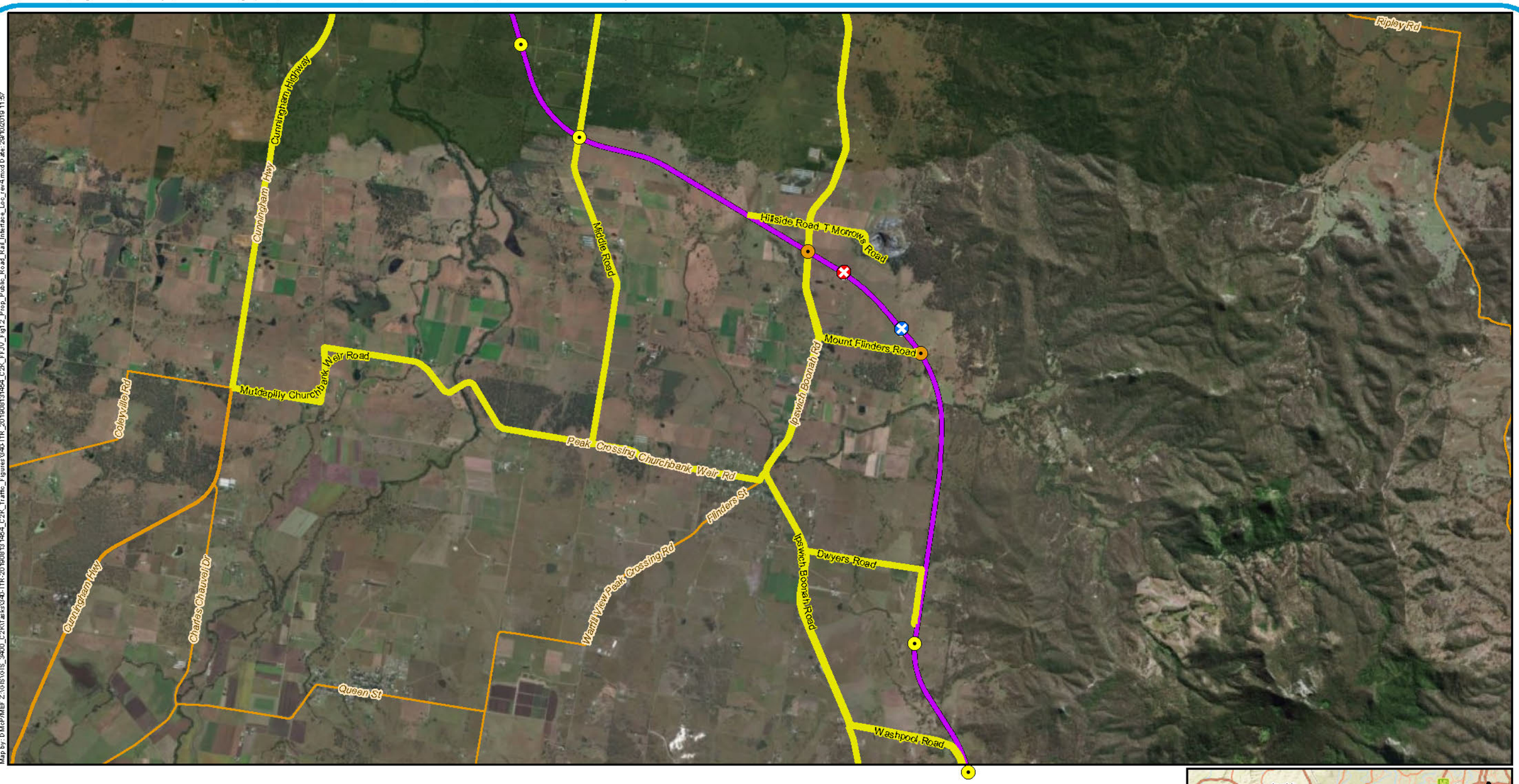
Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

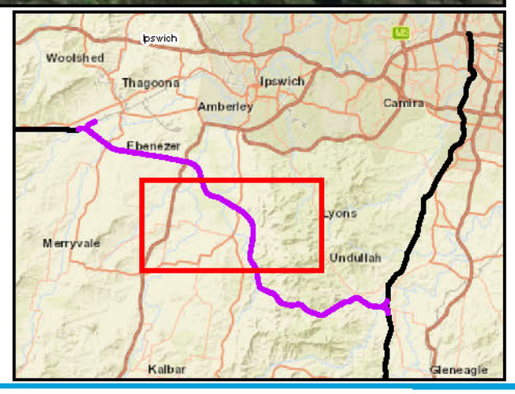
Calvert to Kagaru
Figure 1.2b: Project road-rail interface locations

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Active level crossing
- Grade separation - rail over
- No crossing provided
- No crossing provided - divert/re-align road



A3 scale: 1:60,000
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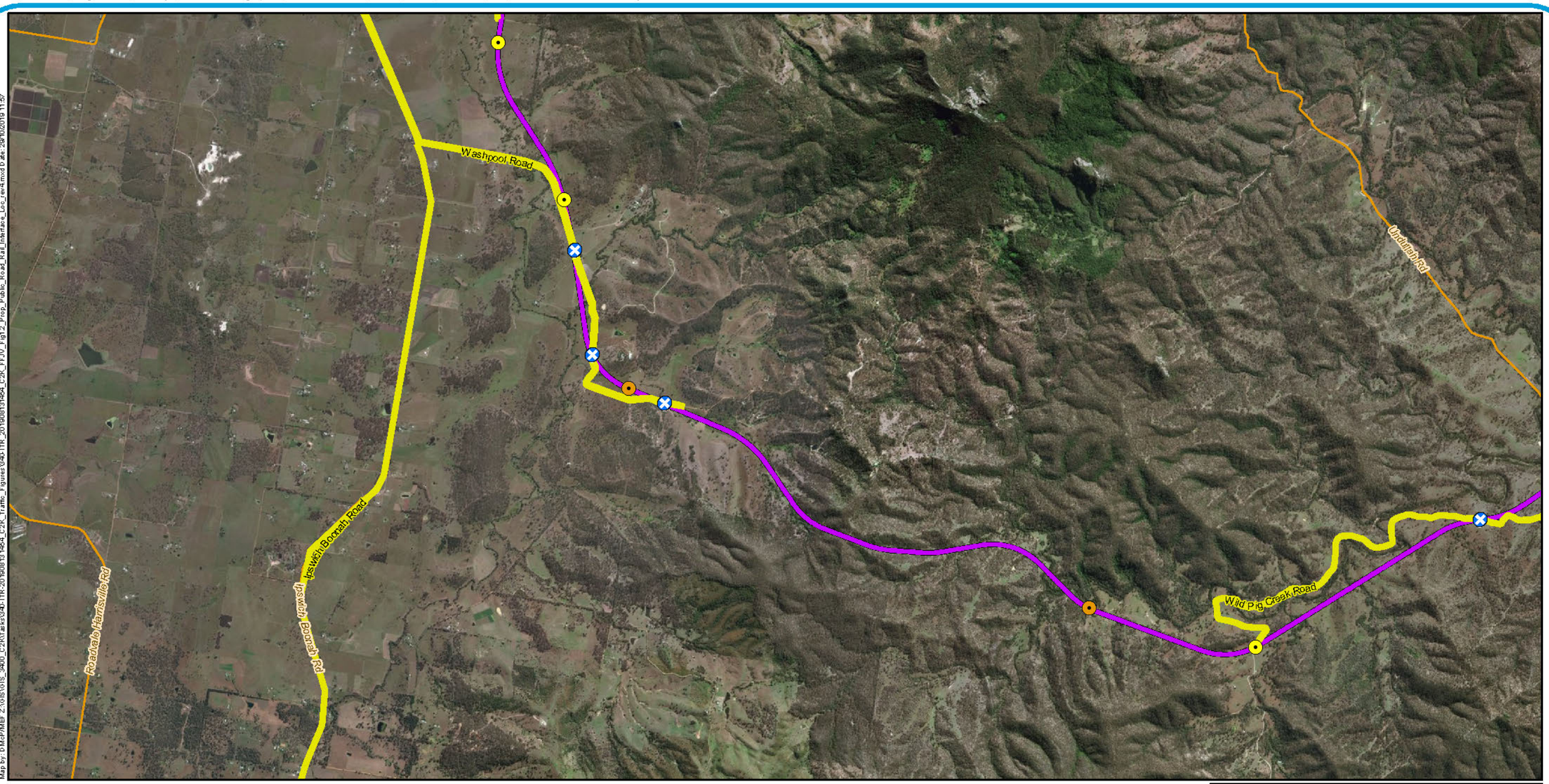
Future Freight
Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Figure 1.2c: Project road-rail interface locations

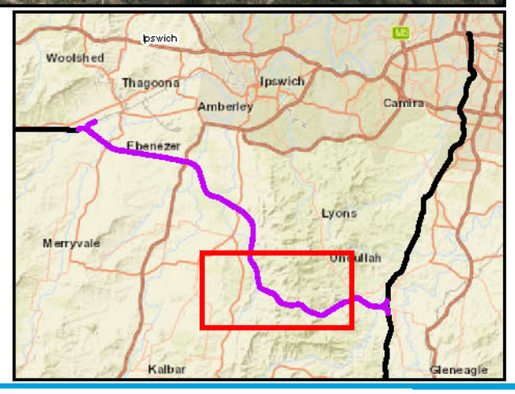
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Map by: D:\MxP\MEF Z:\GIS\GIS_3400_C2K\Tasks\3340-ITR-20190813-1454_C2K_Traffic_Figures\3340-ITR_20190813145 4_C2K_FFJV_Fig1.2_Prop_Public_Road_Rail_Interface_Loc_rev4.mxd Date: 29/10/2019 11:57

Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Active level crossing
- Grade separation - rail over
- No crossing provided - divert/re-align road



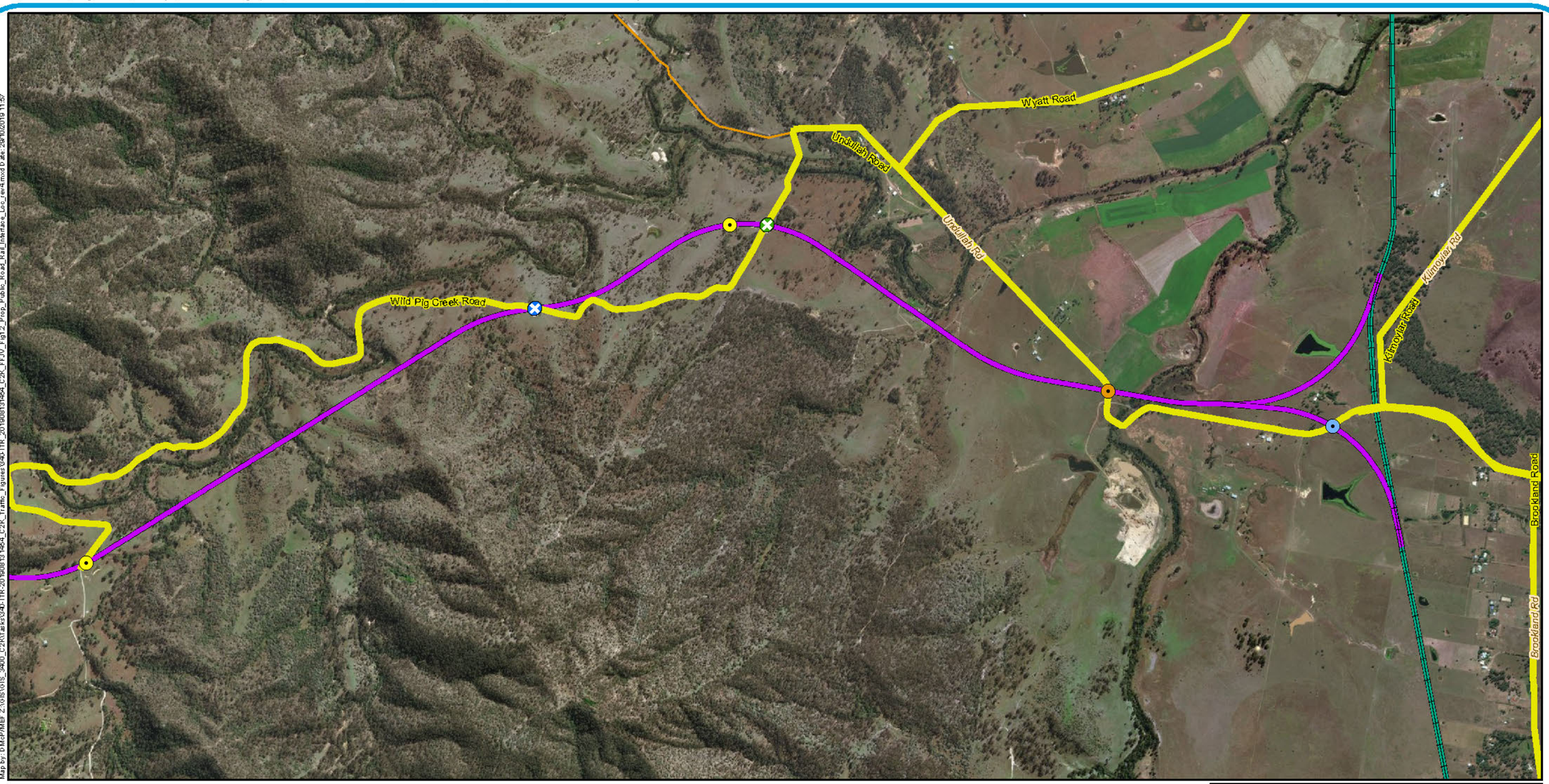
A3 scale: 1:50,000
0 0.35 0.7 1.05 1.4 1.75 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Figure 1.2d: Project road-rail interface locations

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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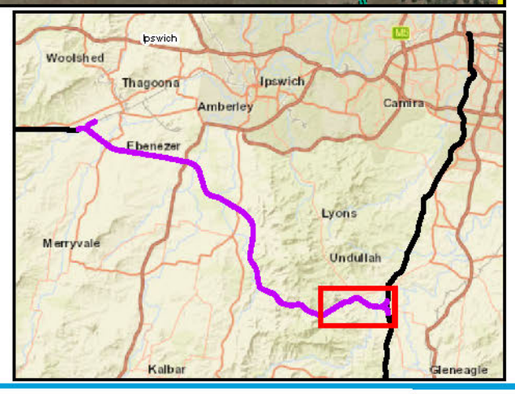
Legend

- 5 Chainage (km)
- Existing rail
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Construction routes
- Active level crossing
- Grade separation - rail over
- Grade separation - road over
- No crossing provided - relocate
- No crossing provided - divert/re-align road



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Future Freight
Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Figure 1.2e: Project road-rail interface locations

1.5.2 Primary construction transport routes

The proposed primary road-based construction transport routes that form part of the TIA study area are indicated in Figure 1.3. The construction routes proposed as a part of this assessment may be used by workforce or in the transportation of quarry materials (ballast, capping materials), other bulk materials, precast concrete, ready-mix concrete, rail, sleepers, earthworks materials, spoil, water, plant, tools and other materials. However, the determination of the final construction and HV routes will be subject to consultation between DTMR, the local government authority and the construction contractor.

The primary road-based construction routes comprises the existing road network (both SCRs and LGRs) and will be used to transport materials, equipment and workforce for the construction of the Project.

Although other roads might also be used for transport during construction activities, they will not be the primary construction routes and will have significantly less construction traffic volumes. The impact on these roads is expected to be insignificant and is therefore not evaluated in detail.

This assessment assumes that rail will be supplied by a single source and will be distributed from the closest existing Queensland Rail (QR) and ARTC rail network to various points along the Project. Primary road-based construction routes have been identified where further transportation is required to distribute rail to designated areas along the alignment.

The Project's primary construction routes are described in more detail in Section 5. The proposed construction route maps for all road-based transport materials are also provided in Appendix A through Appendix H.

1.5.3 Operational transport routes

The key transport tasks during the operational phase of the Project are expected to be rail maintenance, workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will be irregular and insignificant due to the expected nature of maintenance tasks (low vehicle movements to/from depots, transportation of maintenance material within the rail corridor).

While the Project may encourage the construction of intermodal freight facilities or industrial developments, each of these developments will be subject to a separate development application (and associated TIA) and are not relevant to this assessment.

Similarly, this TIA does not consider changes to the network operations resulting from modal shift, such as the improvement and benefits to highway operations resulting from the shift of freight movements from HVs to trains.

1.6 Methodology

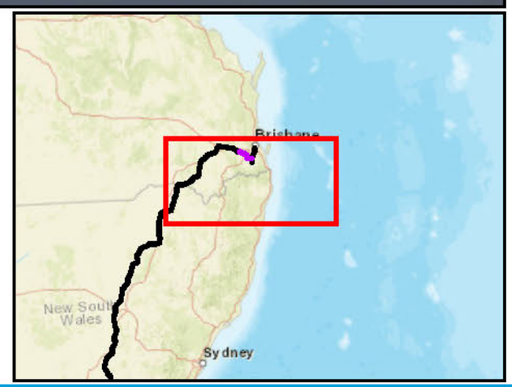
This section outlines the methodology that was adopted for the TIA for the construction and operational phases of the project. DTMR's GTIA manual has been used as the basis for this TIA. The methodology followed within this TIA is consistent with the methodology outlined in the GTIA and consists of:

- Desktop studies to establish the baseline conditions for the transport infrastructure within the TIA study area
- Determining the traffic generation related to the construction and operation of the Project
- Identifying the potential impacts on the transport infrastructure and users
- Developing measures to avoid, manage and mitigate impacts
- Undertaking a risk assessment of potential traffic impacts
- Undertaking a cumulative assessment of other committed projects of significance.

Map by: DMcP/MEF Z:\GIS\GIS_3400_C2K\Tasks\3420-ITR-20190813\454_C2K_Traffic_Figures\3420-ITR_20190813\454_C2K_FFJV_Fig1.3_Overall_Construction_routes_rev5.mxd Date: 4/11/2019 15:32

Legend

- Localities
- Existing rail
- N2NS project alignment
- NS2B project alignment
- B2G project alignment
- G2H project alignment
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- NSW/QLD border
- C2K Construction routes



A3 scale: 1:1,500,000

0 10 20 30 40 50 km

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Issue date: 04/11/2019 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru

Figure 1.3: Overall construction traffic routes

It is noted that an updated version of the GTIA was released in December 2018, after the ToR for the Project were released. This assessment has been undertaken consistent with the 2017 GTIA consistent with the ToR. However, as per the GTIA, the TIA will need to be finalised when project contractors are appointed, and the final traffic generation is clearer. It is recommended that any future TIA be prepared consistent with the December 2018 version of the GTIA.

An initial high-level summary of the expected transport task by mode was undertaken for the existing road, rail, port and airport facilities to establish the assessment requirements during the construction and operational phases of the Project. This summary has been provided in Table 1.3 and shows the expected Project transport tasks by mode. While some workforce movements may use active transport (i.e. walking and cycling), this is not expected to be significant given the remote locations of the worksites. The transportation of materials and equipment will typically make use of the existing road and rail network. Therefore, the majority of impacts were considered to be road and rail network related.

Table 1.3 Summary of transport tasks by mode

Project phase	Road	Rail	Port and airport	Active transport
Construction	Transport of construction material, plant and equipment. The transport of workforce to and from site.	Transport of construction material (i.e. rail)	No impact expected	No impact expected
	Impact of permanent road closures and realignments on surrounding road network and road/rail interface locations.			
	Impact of rail crossings on vehicle queues and nearby intersections.			
Operation	Rail maintenance workforce movements.	Operations and maintenance	No impact expected	No impact expected
	Impact of permanent road closures and realignments on surrounding road network and road/rail interface locations.			
	Transport of maintenance materials as required.			
	Impact of rail crossings on vehicle queues and nearby intersections.			

A brief overview of the methodology adopted to identify the background and Project related traffic volumes is summarised in Figure 1.4. This centred on establishing a background, 'without Project' traffic scenario for the identified TIA study area and comparing this to the scenario including the Project generated traffic, i.e. the 'with Project' scenario. The process allows for the assessment of the traffic impacts of the Project in terms of road safety, access and frontage, intersections, road links, pavement, road/rail interfaces, active travel, stock routes and school routes. Following the impact assessment potential mitigation and management measures were formulated to address the potential traffic impacts caused by the Project.

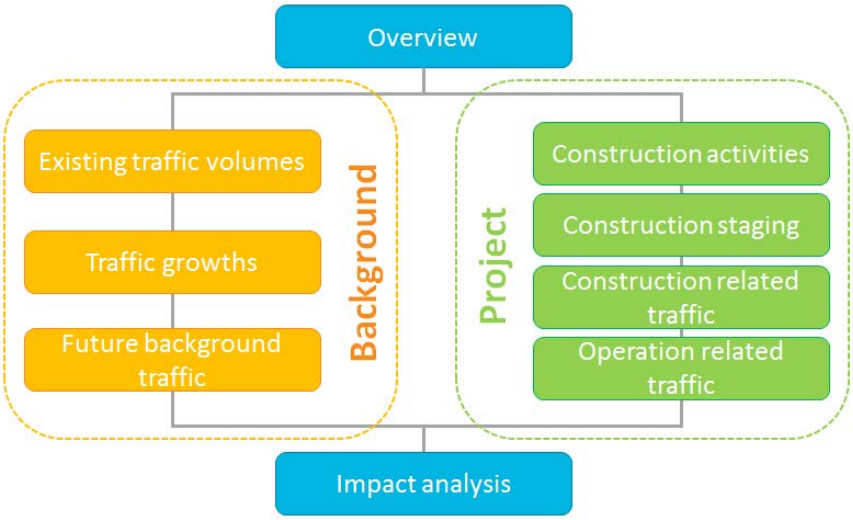


Figure 1.4 **Background and Project traffic volumes**

1.6.1 Desktop review and data collection

The key data and information inputs required to undertake the TIA are provided in the following list. Inputs required from road controlling authorities were requested by a formal Request for Information (RFI).

- Local government/State policies and strategies potentially influencing the TIA for the Project
- Road configurations and access policies (existing and proposed)
- Road network and hierarchy maps
- Road link capacity thresholds
- Road classification details, including typical cross sections
- Existing traffic data
- Traffic growth
- Programmed road works and upgrades
- Future planned road network
- Approved and future development plans
- Road use management plans
- Designated freight and seasonal traffic routes
- Dangerous goods vehicle routes
- Bus and school bus routes
- Stock routes and travelling stock routes
- Multi-combination routes and zones
- Standard axle loads and existing pavement condition
- Prevailing structural integrity issues (i.e. vulnerable structures)
- Structural capacity/life of structures
- Crash data.

Assumptions were made in instances where requested data was not available. These have been documented in the TIA as appropriate.

The following section describes the approach for obtaining background and Project traffic volumes for use in the impact assessments:

- Background traffic:
  - Existing traffic volumes: Existing traffic volumes (link and intersections) in the first instance were obtained from road controlling authorities. Where this data was not available, traffic surveys were commissioned. Refer to the following sections for further detail on the proposed approach for identifying locations where traffic surveys were undertaken. In instances where traffic data was not available from road controlling authorities or traffic surveys, traffic volumes were estimated based on the guidance provided by Austroads Part 2 – Guide to Traffic Engineering Practice: Roadway Capacity which provided base average annual daily traffic volumes by road type, respective level of service (LOS) and K-value, where the K-value represents the ratio between the 30th highest hourly peak volume and AADT. The proposed assumed volumes were subsequently provided to the relevant road controlling authorities for review.
  - Traffic growth rates: Traffic growth rates on SCRs were derived based on historic permanent census traffic data where available. An evaluation of the traffic growth rates within this traffic data revealed an overall annual average AADT growth rate of 2 per cent. The proportion of this growth which was HVs varied by link but was generally consistent with the AADT growth and has been assumed as such. This is considered reasonable for the design. Traffic growth rates were requested from all asset owners impacted by construction traffic. However, in the absence of available historical count data or forecast models, the 2 per cent growth rate calculated from the SCR was adopted in the analyses for all SCRs and LGRs for all vehicle types. This is considered reasonable for the design given the observed growth on roads evaluated. The data and evaluation are provided in Appendix L of this report for DTMR roads and Appendix M of this report for RMS roads
  - Future background traffic: Traffic growth was applied to existing traffic volumes to estimate the future background traffic. This was done by means of a compound traffic growth estimation procedure which can be equated as:

    $$AADTx = AADTy1 \times (1 + GR)^{(x-y1)}$$

    Where:

    AADTy1 = AADT in the first year of evaluation

    AADTx = AADT in year x

    GR = growth rate

    y1 = first year (1)

    x = year of calculation

- Project traffic:
  - Construction activities: The major construction activities include the transportation of quarry materials (ballast, capping materials), other bulk materials, precast concrete, ready-mix concrete, rail, consolidated sleepers, earthworks materials, workforce, spoil, water, plant, tools and other materials.
  - Construction staging: Staging will relate to the start and end dates of all construction related activities within the envisaged construction period. The start and end dates of all associated construction were taken into account in order to determine the peak period for the Project along road segments for each construction route road segment. The construction schedule with anticipated road segment based peak loads/volumes is described in more detail in Section 5.
  - Construction related traffic: The number of trips generated by each construction activity was estimated for light vehicle and HV trips based on the transport of material quantities and associated construction schedules, including workforce trips. The traffic loads/trips were assigned to the corresponding primary construction transport route for each construction activity. This allowed for the estimation peak construction traffic for each primary construction route and also for separate road sections.

- Operational traffic: The major transport tasks during the operational phase of the Project are expected to be rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will be irregular and insignificant due to the expected nature of maintenance tasks (low vehicle movements to/from depots, transportation of maintenance material within the rail corridor) and therefore not evaluated in detail.

- Cumulative impacts:
  - Construction schedules: Construction schedules relating to other Inland Rail projects and major developments in the region were taken into account in order to establish schedule overlaps (i.e. where primary construction routes are used for several Inland Rail projects during the peak period). This process was used as part of a cumulative impact assessment process. The traffic generation from other developments and projects within the TIA study area was also considered as part of the cumulative impact assessment process. The cumulative impacts have been assessed qualitatively, and the results included in Section 11.

A gap analysis of received data/information was undertaken to identify additional data required from other sources, such as traffic surveys, to determine existing traffic volumes along primary construction routes for use in the impact assessment. The following approach was proposed to aid in the selection of road segments within the TIA study area where data was to be obtained from traffic surveys:

- Assign road details to each road segment within the TIA study area: number of lanes, posted speed limited, road surface etc.
- Identify the duration each road segment will be used for construction transport. Durations were identified with nominated assumed periods (i.e. short: <6 months; moderate 6-12 months; long: >12 months).
- Determine the road segments where traffic surveys were recommended, taking into consideration the increase in traffic volumes due to the Project and the duration of construction (refer Table 1.4).

Table 1.4 Proposed selection criteria for traffic survey locations

Increase in traffic due to project	Long duration	Moderate duration	Short duration
High increase	Traffic survey recommended	Traffic survey recommended	No traffic survey recommended
Moderate increase	Traffic survey recommended	No traffic survey recommended	No traffic survey recommended
Low increase	No traffic survey recommended	No traffic survey recommended	No traffic survey recommended

Traffic data provided by road controlling authorities on road links that was considered appropriate for use in the impact assessment did not require traffic surveys. The following approach was proposed to aid in the selection of intersections within the TIA study area where data was obtained from traffic surveys:

- Using the 5 per cent comparison analysis undertaken for road segments, identify intersections where construction traffic is required to undertake turn manoeuvres and where the increase in traffic is either moderate or high
- Referring to the intersections identified above, traffic surveys were undertaken based on the selection criteria presented in Table 1.4.

Regardless of duration and increase in traffic, it has been assumed that traffic surveys for local roads will not be undertaken. The use of local roads for construction traffic is not preferred as these roads are not generally designed for regular HV use. The use of these roads has been avoided unless no practicable alternative route was available. Traffic data provided by road controlling authorities was used at locations where available.

Data for road links which were expected to be impacted by primary construction routes and did not have available background traffic information either sourced or collected by means of traffic surveys were assumed. In these situations, the local government authority was consulted. The flow volumes were assumed by adopting the following process:

- Classify each road segment within the TIA study area based on the following assumed classifications:
  - Urban local road
  - Urban collector road
  - Urban arterial road
  - Rural local road
  - Rural collector road
  - Rural arterial road
- Flow rates were estimated based on the following:
  - Urban local road: Volumes derived by assuming LOS A with associated AADT of 2,000 vehicles as depicted in RTA Guide to Traffic Generating Developments, 2002 as adopted from the Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988
  - Urban collector road: Volumes derived by assuming LOS B with associated AADT of 3,800 vehicles as depicted in RTA Guide to Traffic Generating Developments, 2002 as adopted from the Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988
  - Urban arterial road: Volumes derived by assuming LOS B with K-value of 0.12 with associated AADT of 2,000 vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988
  - Rural local road: Volumes derived by assuming 400 AADT based on a review of proximate rural local roads
  - Rural collector road: Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988
  - Rural arterial road: Volumes derived by assuming LOS A with K-value of 0.15 with associated AADT of 1,600 vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988
- Peak hour flow rates obtained from the various sources were converted to average daily traffic volumes (ADT) by adopting industry standard conversion factors.

1.6.2 Impact assessment and mitigation

1.6.2.1 Road network impact assessment

The operational performance of the road network in the TIA study area was assessed to develop an understanding on the potential traffic impacts from the Project. The TIA study area primarily consists of roads in QLD, however, it also extends to some parts of NSW due to the transport of sleepers from Grafton. This report provides a summary of the findings of the analysis and will identify potential mitigation measures and transport management strategies.

To be consistent with GTIA, the process shown in Figure 1.5 was used for the purpose of the TIA and EIS. This process is used for the assessing the envisaged impact of Project generated traffic on the SCR network and has also been extended to the LGR network (subject to further discussion with local governments). It does not apply to private roads. While use of the guideline is not mandatory, it provides a basis for assessing potential impacts from the construction and operational phases on the local and regional transport network. Where relevant to NSW, it has been agreed with and accepted by RMS that the GTIA manual will be used as the TIA guideline document. All road sections within this TIA follow the same assessment process.

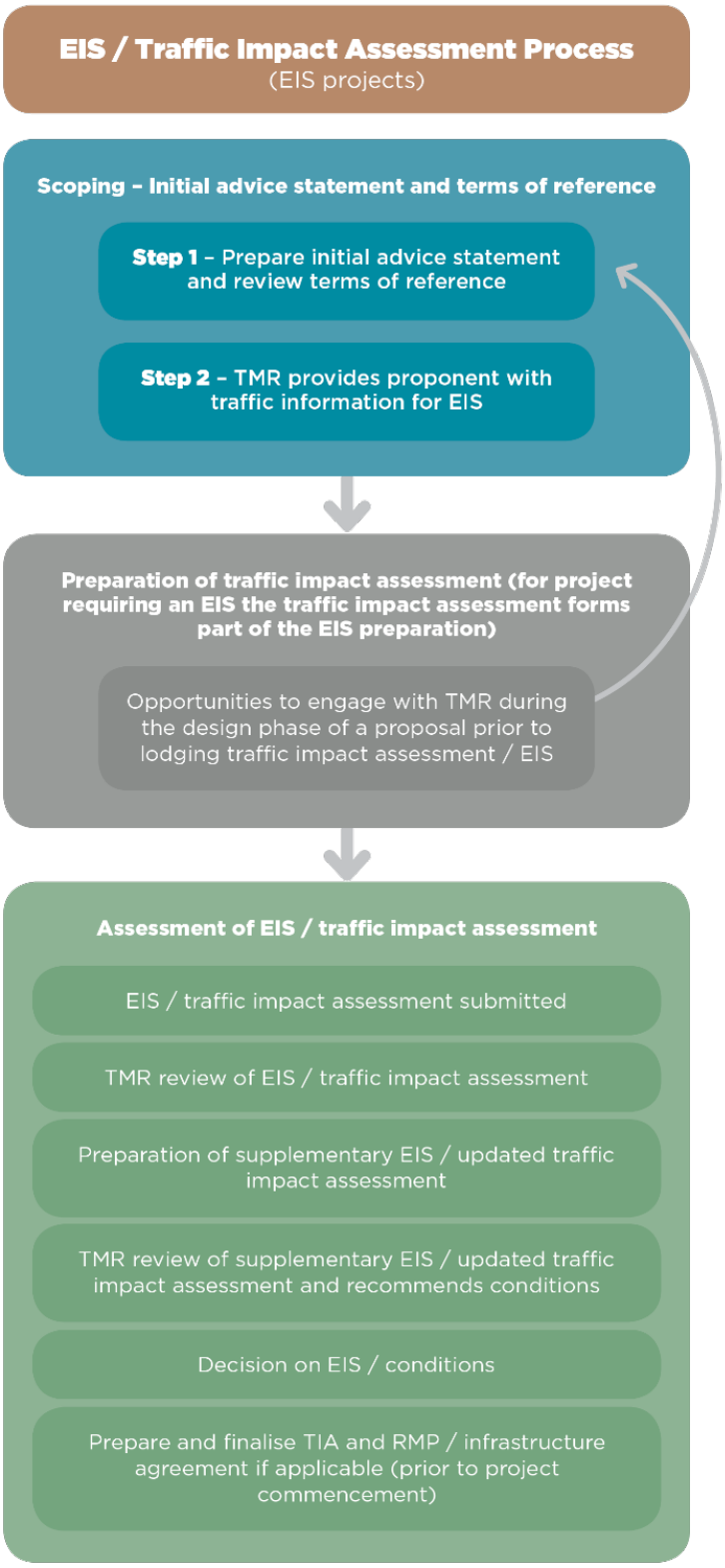


Figure 1.5 **Traffic impact assessment process**

Source: GTIA Sept 2017

The extent of the impact of Project traffic on other users and on infrastructure can range from being localised to quite dispersed. The GTIA defines conditions for determining an analysis boundary has been defined within which to assess the impact of the additional Project traffic. This boundary is the TIA study area. The TIA study area would aim to define where impacts would most likely occur at intersections and on links in the network surrounding the Project. The GTIA conditions and process for determining the TIA study area is provided in Table 1.5.

Table 1.5 Traffic impact assessment study area by impact type

Impact type	TIA study area
Road safety	All intersections where the Project traffic exceeds 5 per cent of the base traffic for any movement in the design peak periods in the year of opening of each stage. All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link in the design peak periods in the year of opening of each stage.
Access and frontage	Potential construction accesses/lay down areas on limited access roads in the DTMR and RMS networks.
Intersection delay	All intersections where the Project traffic exceeds 5 per cent of the base traffic for any movement in the design peak periods in the year of opening of each stage.
Road link capacity	All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link's AADT in the year of opening of each stage.
Pavement	All road links where the Project SARs exceed 5 per cent of the base traffic in either direction on the link's SARs in the year of opening of each stage.
Transport infrastructure	All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link's AADT in the year of opening of each stage, or where DTMR or RMS identifies prevailing structural integrity issues of transport infrastructure (for example, bridges or culverts).

Source: Adopted from GTIA Sept 2017

Table 1.6 outlines the performance criteria for assessment of traffic and transport impact. The LOS criteria are as defined in the Austroads Guide to Traffic Management: Part 3 Traffic Studies and Analysis (2017). (AUSTROADS publications are publicly available online).

Table 1.6 Performance criteria

Assessment type	Performance criteria
TIA	Construction and operational traffic generated by the Project equals or exceeds 5% of the existing AADT on the road section.
	LOS C can be considered the minimum standard on rural roads. However, LOS D may be accepted in case of event traffic.
	LOS E should be considered the limit of acceptable for urban area operation and remedial works would be needed if LOS F would otherwise result.
Pavement impact assessment	Construction and operational traffic generated by the Project equals or exceeds 5% of the existing SARs on the road section.

The impact assessment year is the year in which the impacts of the Project are assessed. The impact assessment year varies by impact type because the effects of the Project can be quite different on infrastructure than they are on other users. The impact years which are to be assessed were adopted from GTIA and summarised in Table 1.7.

Table 1.7 Impact assessment years

Impact type	Impact assessment year
Road safety	Year of construction + year of opening of each stage including the final stage
Access and frontage	Year of construction + year of opening of each stage including the final stage and 10 years after the year of opening of the final stage for access intersections (includes both new and amended accesses)
Intersection delay	Year of construction + year of opening of each stage including the final stage
Road link capacity	Year of construction + year of opening of each stage including the final stage

Impact type	Impact assessment year
Pavement	Year of construction + year of opening of each stage including the final stage over a 20 year design period
Transport infrastructure	Year of construction + year of opening of each stage including the final stage.

The impact assessment and mitigation process contained in GTIA was adopted to determine appropriate mitigation measures on road impacts. The mitigation framework is provided in Figure 1.6.

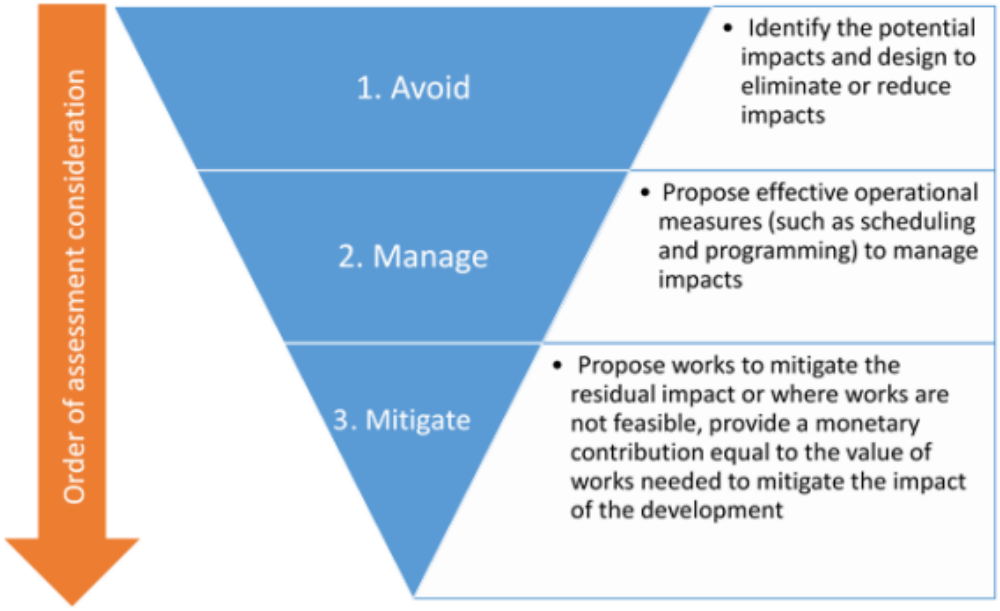


Figure 1.6 Mitigation framework

Source: Figure 1 GTIA Sept 2017

1.6.2.2 Rail crossing impact assessment

The rail crossing impact assessment describes how the project complies with the QLCSS. Hereafter, the assessment focuses on vehicle delay and queueing analysis, demonstrating how the Project-generated traffic impacts on vehicle delays and queuing issues at the public rail crossing and at nearby closely spaced intersections. This analysis was undertaken for the Project at proposed public rail crossings only as there are no existing operational rail crossings within the TIA study area.

Should road realignments, diversions and/or closures have a significant impact, assessments of the increased travel time and wider network impacts are considered.

1.6.2.3 Rail network impact assessment

Scope exists within the disturbance footprint for the Project to be constructed parallel to sections of existing operational railway without impacting operations. Therefore, the operational performance of the existing rail network in the TIA study area is not anticipated to be significantly impacted as a result of the Project construction. Construction of connections to existing rail network is planned to occur during routine maintenance periods. Therefore, impacts to the rail network are not expected.

1.6.2.4 Port and airports impact assessment

During the construction and operational phases, the expected impact from the Project on ports and airports is not considered to be significant as the transport of materials, workforce and equipment is expected to primarily use the existing road and rail transport networks.

Whilst the Inland Rail Program proposes to utilise the existing freight line from Acacia Ridge to the Port of Brisbane, this particular project (Calvert to Kagaru) is not located within close proximity to the Port. The Project will not impact on the safety or efficient operation of any strategic ports. Impacts from the Project on the operation and throughputs at ports (freight containers) is not in the scope of this report and has not been assessed.

The Project is located in excess of 5 km from the nearest strategic airport, the Royal Australian Air Force (RAAF) Base Amberley.

The Project is located within the 8 km and 13 km wildlife hazard buffer zone, and the 45 m and 90 m height restriction zone (which apply to defence airfields and joint-user airfields and may limit the height of new structures or additions to existing structures). Due to the height restriction zones, use of construction plant, placement of bridges, or operation of double-stacked freight could impact RAAF Base Amberley. However, the Project is not proposed to result in incompatible intrusions or compromise the safety of the RAAF Base Amberley. It is proposed that during the next stages of the Project that impacted stakeholders be consulted.

Whilst it is expected that construction traffic routes will use Ipswich Rosewood Road, a major road adjacent to RAAF Base Amberley, this is not expected to significantly impact on the operations of the base. Further details on the road network and intersection impacts on Ipswich Rosewood Road are discussed within Section 6.

1.6.2.5 Road safety impact assessment

The road safety impact assessment has been undertaken as per the framework laid out in Part C of the GTIA. This framework relies on the principle that a road's safety is not significantly worsened as a result of the Project, and that any pre-existing or Project-introduced unacceptable safety risk is addressed. This process has been utilised to determine safety risks along the Project construction traffic routes and Project road rail interface locations.

1.6.2.6 Cumulative impact assessment

To enable stakeholders to make informed decisions, consideration needs to be given to the potential impacts of other major projects in the area to ensure that the combined impacts of the projects are accounted for. The traffic generation estimations from other major developments will be considered as part of a cumulative assessment process. The cumulative impact assessment is provided in Section 11. This will include adjacent Inland Rail sections as well as other committed major projects of significance.

1.6.3 Stakeholder consultation

Consultation was held with relevant stakeholders throughout the development of this report. Consultation was held throughout the data collection process by means of formal RFIs which were sent to relevant stakeholders, emails as well as formal meetings which addressed the proposed TIA process, impacted assets, adopted manuals and procedures, assumptions (such as traffic growth rates, assumed base volumes etc.) and proposed mitigation measures. The key stakeholders consulted include:

- DTMR
- RMS
- Clarence Valley Council (CVC)
- LCC
- SRRC
- ICC
- Rosewood State High School
- Rosewood State School.

2 Existing conditions

2.1 Existing land uses

Existing land uses along the EIS investigation corridor are discussed and mapped as part of the existing conditions assessment and requirements of GTIA.

The existing land uses which occur along the EIS investigation corridor are indicated in Figure 2.1 which identifies grazing land as the predominant land use. The next most common land uses are also generally of an agricultural nature, being land classified as grazing modified pastures, irrigated modified pastures, irrigated perennial horticulture and irrigated cropping. The rural nature of the surrounding land uses indicates that the surrounding road network would generally consist of low traffic volumes, with potential seasonal variations during harvesting seasons.

2.2 Existing road network

The TIA study area encompasses several SCRs and LGRs that serve as primary construction transport routes for the Project. These roads are further described in the following sections.

This section does not identify roads which are to be used during the operational phase of the Project, as the operational phase traffic would only account for irregular maintenance and emergency service vehicles. The operational traffic is envisaged to make use of the existing road system and account for low volume traffic with no impact on existing operations.

2.2.1 State-controlled roads

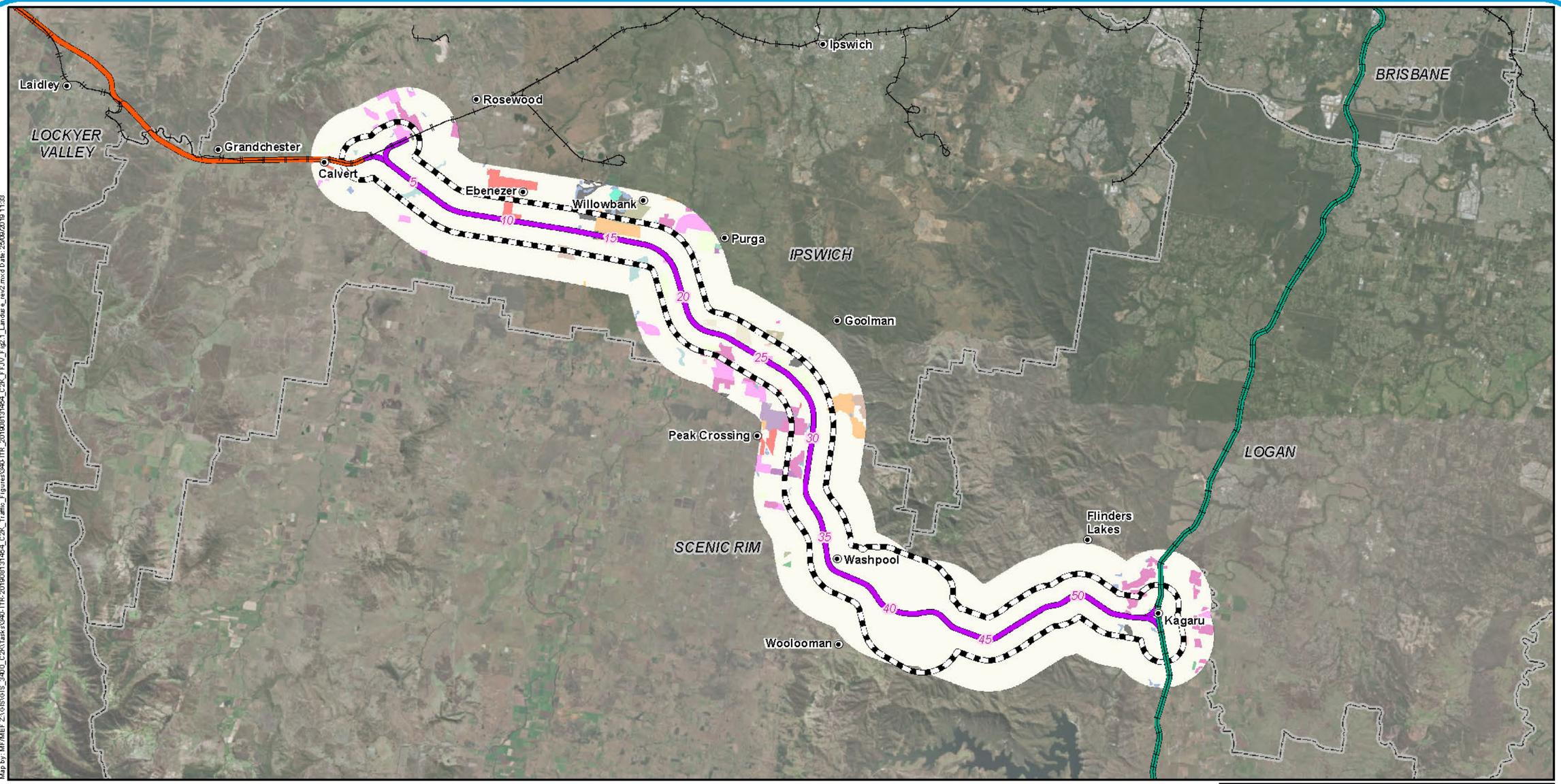
Three SCRs directly intersect the Project. These are summarised in Table 2.1.

Table 2.1 State-controlled roads intersecting the Project

Road name	Road ID - road section
Rosewood Warrill View Road	305 – Rosewood Warrill View Road (between Ch 5.0 km and Ch 6.0 km)
Cunningham Highway	17B – Cunningham Highway (between Ch 23.0 km and Ch 25.0 km)
Ipswich Boonah Road	211 – Ipswich Boonah Road (between Ch 10.0 km and Ch 11.0 km)

Several SCRs are proposed to be used to transport construction materials, equipment and workforce during construction of the Project. These are summarised in Table 2.2. The construction routes by activity are listed in Appendix A through Appendix H.

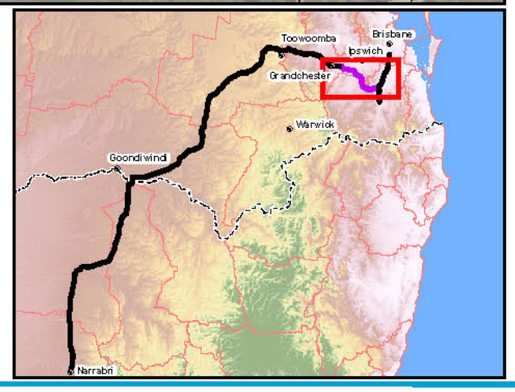
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Map by: MF/MEF Z:\GIS\GIS_3400_C2K\Tasks\3940_ITR_20190813\464_C2K_FFJV_Fig2.1_Landuse_rev2.mxd Date: 25/09/2019 11:33

Legend

- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- EIS investigation corridor
- Local Government Areas
- Nature conservation
- Managed resource protection
- Other minimal use
- Grazing native vegetation
- Plantation forestry
- Grazing modified pastures
- Cropping
- Perennial horticulture
- Land in transition
- Irrigated modified pastures
- Irrigated cropping
- Irrigated perennial horticulture
- Irrigated seasonal horticulture
- Intensive horticulture
- Intensive animal husbandry
- Manufacturing and industrial
- Residential
- Services
- Transport and communication
- Mining
- Waste treatment and disposal
- Reservoir/dam
- Marsh/wetland



A3 scale: 1:200,000

0 1.5 3 4.5 6 7.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/09/2019 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Figure 2.1: Existing land use

Table 2.2 State-controlled roads: Project construction routes

Road name	Road ID - road section
State-controlled roads: DTMR	
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access
	212 - Between Wyaralong Dam Access and Tilley Road
	212 - Between Tilley Road and Sandy Creek Road
	212 - Between Sandy Creek Road and Bromelton House Road
	212 - Between Bromelton House Road and Ilbogan Road
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road
	17B - Between Redbank Plains Road and Ripley Road
	17B - Between Ripley Road and Ipswich Boonah Road
	17B - Between Ipswich Boonah Road and Middle Road
	17B - Between Middle Road and Ipswich Rosewood Road
	17B - Between Ipswich Rosewood Road and Champions Way
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road
Haigslea Amberley Road	3041 - Between Karrabin Rosewood Road and Warrego Highway
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road
	211 - Between Warrill View Peak Crossing Road and Dwyers Road
	211 - Between Dwyers Road and Washpool Road
	211 - Between Washpool Road and Beaudesert Boonah Road
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway
Ipswich Rosewood Road	304 - Between Cunningham Highway and Ipswich Rosewood Road
	304 - Between Ipswich Rosewood Road and Karrabin Rosewood Road
Karrabin Rosewood Road	3002 - Between Rosewood Laidley Road and Haigslea Amberley Road
	3002 - Between Haigslea Amberley Road and Moffatt Street
Logan Motorway	Between Ipswich Motorway and Pacific Motorway
	Between Ipswich Motorway and Centenary Highway
	Between Centenary Highway and Mount Lindesay Highway
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border
	25A - Between Logan Motorway and Undullah Road
	25A - Between Undullah Road and Allan Creek Road
	25A - Between Allan Creek Road and Eaglesfield Street
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border
Rosewood Laidley Road	308 - Between Karrabin Rosewood Road and Lane Road
	308 - Between Lane Road and Grandchester Mount Mort Road
	308 - Between Grandchester Mount Mort Road and Crown Street
Rosewood Warrill View Road	305 - Between Ipswich Rosewood Road and Reillys Road
	305 - Between Reillys Road and Ebenezer Road
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway
	18A - Between Brisbane Valley Highway and Pine Mountain Road
	18A - Between Pine Mountain Road and Cunningham Highway
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road

Road name	Road ID - road section
Warwick Road	301 – Between Moffatt Road and Lobb Street
	301 – Between Lobb Street and Cunningham Highway
State-controlled roads: RMS	
Pacific Motorway	Between Qld/NSW border and Gwydir Highway
Summerland Way	Between NSW/Qld Border and Bruxner Way
	Between Bruxner Way and Red Lane
	Between Trenayr Road and Turf Street

2.2.2 Local Government Roads

There are several LGRs which intersect directly with the Project. These roads are summarised in Table 2.3.

Table 2.3 Local government roads intersecting the Project

Interface ID	Road name
Local government roads: SRRC	
340-9-P-7a	Dwyers Road
340-10-P-3a	Washpool Road
340-10-P-4a	Washpool Road
340-10-P-4d	Washpool Road
340-10-P-4f	Washpool Road
340-11-P-2	Washpool Road
340-13-P-3	Wild Pig Creek Road
340-14-P-1	Wild Pig Creek Road
340-15-P-2b	Proposed Wild Pig Creek Road
340-15-P-3	Wild Pig Creek Road
340-16-P-1	Undullah Road
340-16-P-3	Undullah Road
Local government roads: ICC	
340-1-P-2	Waters Road
340-1-P-4	Waters Road
340-1-P-6	Hayes Road
340-1-P-9	Coveney Road
340-3-P-1	Mount Forbes Road
340-3-P-11	M Hines Road
340-6-P-2	Glencairn Road
340-6-P-7	Middle Road
340-8-P-1	Castle Hill Lane
340-8-P-3	Shepherd Road (Truloff Road)
340-8-P-4	Mount Flinders Road

The LGRs which are proposed to be used to transport construction materials, equipment and workforce during construction of the Project are provided in Table 2.4.

Table 2.4 Local Government Roads: Project construction routes

Road name	Road section
Local government roads: CVC	
Bent Street	Between Craig Street and Gwydir Highway
Charles Street	Between Bent Street and Pacific Highway
Clark Road	Full extent
Craig Street	Between Villiers Street and Bent Street
Dobie Street	Between Villers Street and Summerland Way
Red Lane	Between Summerland Way and Trenayr Road
Trenayr Road	Between Summerland Way and Clark Road
	Between Clark Road and Red Lane
Villers Street	Between Craig Street and Dobie Street
Local government roads: ICC	
Briggs Road	Full extent
Champions Way	Between Cunningham Highway and Paynes Road
Coopers Road	Between Cunningham Highway and Ebenezer Road
Coveney Road	Full extent
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road
Edwards Street	Between Ripley Road and Briggs Road
Fairbank Place	Full extent
Hayes Road	Full extent
Hillside Road	Full extent
Lane Road	Between Rosewood Laidley Road and Waters Road
Macalister Street	Between Moffatt Street and Park Street
Middle Road	Between Cunningham Highway and Bill Morrow Road
	Between Bill Morrow Road and Ipswich City Council boundary
Moffatt Street	Between Karrabin Rosewood Road and Macalister Street
	Between Macalister Street and Warwick Road
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road
Mount Forbes Road	Between Ebenezer Road and Paynes Road
Mount Marrow Quarry Road	Full extent
Newhill Drive	Full extent
Noblevale Way	Full extent
Old Grandchester Road	Between Lane Road and Strongs Road
Old Toowoomba Road	Between Toongarra Road and Moffatt Street
Park Street	Between Macalister Street and Warwick Road
Paynes Road	Between Champions Way and Mount Forbes Road
Redbank Plains Road	Between Cunningham Highway and Newhill Drive
Reillys Road	Between Strongs Road and Rosewood Warrill View Road
Ripley Road	Between Cunningham Highway and Edwards Street
Rob Roy Way	Full extent
Strongs Road	Between Coveney Road and Rileys Road
	Between Old Grandchester Road and Coveney Road

Road name	Road section
T Morrows Road	Full extent
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road
Waters Road	Between Lane Road and Kuss Road
Local government roads: LCC	
Kilmoylar Road	Between LCC boundary and Wyatt Road
Undullah Road	Between Mount Lindesay Highway and LCC boundary
	Between Wyatt Road and Wild Pig Creek Road
Wild Pig Creek Road	Full extent
Wyatt Road	Between Kilmoylar Road and Undullah Road
Local government roads: SRRC	
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road
Brookland Road	Between Undullah Road and Allan Creek Road
Cryna Road	Full extent
Dwyers Road	Full extent
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street
Enterprise Drive	Full extent
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road
Kilmoylar Road	Between Undullah Road and LCC boundary
Middle Road	Between Ipswich City Council boundary and Peak Crossing Churchbank Weir Road
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road
Undullah Road	Between LCC Boundary and Brookland Road
	Between Brookland Road and Kilmoylar Road
	Between Kilmoylar Road and south of Brennans Dip Road
Washpool Road	Between Ipswich Boonah Road to 5.5 km east of Ipswich Boonah Road
Wild Pig Creek Road	Full extent

2.2.3 Public transport networks

Existing public transport routes within QLD and NSW that may be impacted by construction traffic and/or proposed and existing road rail crossings have been identified using data sourced from TransLink and Transport for New South Wales. Identified routes that may be impacted are provided in Table 2.5.

Table 2.5 Impacted public transport networks

Services	Weekday frequency	Impacted roads	Road rail crossing
Queensland public transport routes			
509	2 per hour	Warwick Road, Ripley Road	-
515	3 per hour	Warwick Road, Coopers Road	-
539	1 per hour	Rosewood Laidley Road	-
New South Wales public transport routes			
Route 375C (Private Bus Service)	1 per hour	Dobie Street, Grafton	-
Route 376 (Private Bus Service)	1 per hour	Summerland Way, Grafton	-
Route 377 (Private Bus Service)	1 every 2 hours	Turf Street, Grafton	-

Given the low frequency of public bus services, it is expected that public transport services would not be substantially impacted from an operational and service reliability perspective as a result of the Project generated traffic during construction.

Public transport maps are provided in Appendix P.

2.2.4 School bus routes

Existing school bus routes that may be impacted by construction traffic and/or proposed and existing road rail crossings has been identified using data sourced from the QLD and NSW governments. Identified routes that may be impacted are shown in Table 2.6.

It should be noted that there may be additional school bus routes that are not publicly available and have therefore not been captured in Table 2.6. Consultation with relevant council authorities should be undertaken prior to the construction stage of the Project once construction routes have been finalised to ensure that all public transport routes that may be impacted by construction traffic have been accounted for.

Table 2.6 Impacted school bus routes

Services	Weekday frequency	Impacted roads	Road rail crossing
Queensland school bus routes			
S848 AM and PM Grandchester, Laidley State High School	1 x AM 1 x PM	Rosewood Laidley Road	-
S187 AM and PM Calvert, Ashwell Area, Ashwell SS and Rosewood SHS	1 x AM 1 x PM	Rosewood Laidley Road	-
S175 AM - PM Rosevale, Mt Walker Areas, Rosewood SHS	1 x AM 1 x PM	Rosewood Warrill Road	340-2-P-2
S743 AM and PM Lower Mt Walker Area, Rosewood SHS	1 x AM 1 x PM	Rosewood Warrill Road	340-2-P-2
S646 AM and PM Mt Forbes Area, Rosewood SHS	1 x AM 1 x PM	Mount Forbes Road, Cunningham Highway	340-3-P-1
P1422 AM and PM Service - Purga to Peak Crossing SS	1 x AM 1 x PM	Peak Crossing Churchbank Weir Road	340-6-P-7 340-7-P-5
S258 AM and PM Peak Crossing, Purga Area to Bremer SHS	1 x AM 1 x PM	Peak Crossing Churchbank Weir Road	340-6-P-7 340-7-P-5
IP1701 SWD AM and PM run - Boonah to Ipswich	1 x AM 1 x PM	Ipswich Boonah Road, Cunningham Highway	340-7-P-5
P1241 AM and PM Peak Crossing Area, Peak Crossing SS	1 x AM, 1 x PM	Washpool Road	340-10-P-4a

Services	Weekday frequency	Impacted roads	Road rail crossing
IP1502 AM and PM Hatton Vale, Lowood, Fernvale, Ironbark area to Ipswich Special Schools	1 x AM, 1 x PM	Moffatt Street, Cunningham Highway	-
IP1503 AM Hatton Vale/ Marburg Area to Ipswich Special Schools	1 x AM, 1 x PM	Cunningham Highway	-
P429 AM and PM Gleneagle Area, Gleneagle SS and Beaudesert SHS	1 x AM, 1 x PM	Allan Creek Road, Mt Lindesay Highway	-
New South Wales school bus routes			
AM/PM services travelling to/from Grafton High School, Grafton Public School, South Grafton High School, South, South Grafton Public School, St Mary's Primary School, St Joseph's Primary School, Clarence Valley Anglican School, Westlawn Public School	AM and PM services as per school requirements	Bent Street, Grafton	-

Given the low frequency of the services, it is expected that school buses would not be substantially impacted from an operational and service reliability perspective as a result of the Project generated traffic during the Project construction. Nonetheless, bus operators should be consulted as part of the Project and made aware of the various construction activities. Further details regarding mitigation measures are provided within Section 9.

2.2.5 Long distance coach services

Existing long distance coach services that are likely to be impacted by construction traffic and/or proposed and existing road rail crossings have been identified using data sourced from the QLD and NSW Government and are shown in Table 2.7.

Table 2.7 Impacted long distance coach services

Services	Impacted roads	Road rail crossing
Queensland routes		
Brisbane to Mount Isa (private coach service)	Cunningham Highway	-
	Moffatt Street	-
	Karrabin Rosewood Road	-
	Warrego Highway	-
Brisbane to Charleville	Cunningham Highway	-
	Moffatt Street	-
	Karrabin Rosewood Road	-
	Warrego Highway	-
Brisbane to Grafton (private coach service)	Pacific Motorway	-
New South Wales routes		
Brisbane to Grafton (private coach service)	Pacific Motorway	-
	Summerland Way, Grafton	-
	Villiers Street, Grafton	-
	Dobie Street, Grafton	-

Given the low frequency of long-distance coach services, it is expected that long distance buses would not be impacted from an operational perspective as a result of the Project generated traffic during the construction and operational stage.

2.2.6 Stock routes

No formal stock routes would be impacted by the Project. Consultation is ongoing with landholders to identify impacts, if any, to informal stock routes. Any routes that intersect construction routes will be mitigated as per Section 9.

2.2.7 Strategic tourist routes

Existing strategic tourist routes which are envisaged to be impacted by primary construction routes were taken into account as part of this TIA. Identified routes which may be impacted include:

- Adventure Way, along Warrego Highway between Haigslea Amberley Road and Ipswich Motorway
- Warrego Way, along Warrego Highway between Haigslea Amberley Road and Ipswich Motorway
- Pacific Coast Way, along Pacific Highway between Logan Motorway and Smith St Motorway.

2.3 Existing rail facilities

QR owns and manages QLD's regional freight network and operates both suburban and long-distance passenger services for the QLD Government. QR's regional freight network comprises seven different systems in the State, with the Project connecting to the West Moreton System east of Calvert. Products hauled on the QR regional network is primarily thermo-coal originating from and hauled on the West Moreton System, while grain is the primary product on the South Western system.

The Project connects the Brisbane to Sydney railway near Kagaru.

2.3.1 West Moreton System – Rosewood to Toowoomba

Key components of the West Moreton System are:

- Rosewood is the boundary between the Western and the Metropolitan Systems and is the termination station for QR's electrified network
- The track structure is 41 kg/m long welded rail (LWR) on timber sleepers with some 60/50 kg/m rail on concrete sleepers, with a with a maximum allowable axle load of 15.75 tonne axle load (TAL)
- The line has a maximum allowable gross tonnage of 7 million tonnes per annum
- The maximum allowable speed on this line is 80 km/hr, while the slowest speed is 15 km/hr through some of the tunnel sections
- This line is 105.1 km in length with the number of tracks varying from single to dual
- There are 45 level crossings along this line made up of public, occupation, flood lights and boom gate types.

2.3.2 Brisbane to Sydney Railway

The Brisbane to Sydney Interstate Line begins at Maitland in NSW and ends at Roma Street Railway Station in Brisbane, QLD although freight services terminate at the yard at Acacia Ridge on the outskirts of Brisbane. Along the route, the railway passes through the towns of Dungog, Gloucester, Wingham, Taree, Kendall, Wauchope, Kempsey, Macksville, Nambucca Heads, Urunga, Sawtell, Coffs Harbour, Grafton, Casino and Kyogle. After the standard gauge line ends at Acacia Ridge, it forms a dual gauge line into Brisbane, running alongside parts of the Beenleigh railway line.

The line is owned by RailCorp but leased to ARTC until 2064. NSW TrainLink operates three daily express passenger train (XPT) services from Sydney terminating at Grafton, Casino and Brisbane. The only freight train that regularly services this railway is a cement and sugar train for Grafton.

2.4 Existing active transport networks

2.4.1 Cycling and pedestrian network

A review of the Queensland Principal Cycle Network Plans (PCNP) was undertaken in order to identify any existing on-road cycle paths that may coincide with proposed construction traffic routes within QLD. The PCNP shows core routes that are required to increase cycling amongst the population and is used to guide future planning.

This review showed that the following cycle routes within the PCNP coincide with proposed construction traffic routes:

- Edwards Street, between Briggs Road and Ripley Road
- Moffatt Street, between Brisbane Street and Warwick Road
- Mt Lindesay Highway, between Cunningham Highway and Cusack Lane
- Redbank Plains Road, between Cunningham Highway and Newhill Drive
- Ripley Road, between Edwards Street and Cunningham Highway
- Warwick Road, between Cunningham Highway and Saleyards Road.

In addition to the PCNP, proposed construction routes may coincide with sections of the Boonah to Ipswich Trail, the multi-use recreation trail connecting Ipswich and Boonah. This may include sections of Wild Pig Creek Road.

Similarly, a review of cycle networks within NSW was undertaken using the online RMS 'Cycleway Finder' tool to identify any existing on-road cycle paths that may coincide with proposed construction routes. This review showed that the cycle route on Summerland Way, through the city centre of Casino and the city of Grafton may be impacted by construction traffic. Relevant PCNP maps are provided in Appendix P.

2.5 Existing emergency services

Table 2.8 profiles QPS, Queensland Ambulance Services (QAS) and Queensland Fire and Emergency Services (QFES) stations that are within the EIS investigation corridor in the Ipswich and Scenic Rim local government area (LGA). A similar number of emergency services were noted in the LGAs, except for one more ambulance station and two more fire stations noted in the Scenic Rim LGA. This is likely attributable to the Scenic Rim covering a wider geographic area and having a potentially higher bush fire threat, due to the rural nature of the area.

Table 2.8 Emergency services, June 2018

LGA	Police stations	Ambulance stations	Fire stations	Justice
Ipswich	7	4	6	Ipswich Courthouse
Scenic Rim	7	5	8	Beaudesert Magistrates Court

Source: QGSO, QAS, QFES, QPS 2018

Within proximity to the EIS investigation corridor the following QPS Stations are located:

- Rosewood Police Station – John Street, Rosewood
- Harrisville Police Station – Church Street, Harrisville
- Boonah Police Station – Highbury Street, Boonah.

Within proximity to the EIS investigation corridor the following Fire Stations are located:

- Rosewood Fire Station – John Street, Rosewood
- Harrisville Fire Station – Queen Street, Harrisville

- Warrill View Rural Fire Brigade – Bath Street, Warrill View
- Flinders Peak Rural Fire Brigade – Flinders Dolomite Road, Peak Crossing
- Roadvale Rural Fire Brigade – Gray Street, Roadvale.

The following Ambulance Stations are located in proximity to the EIS Investigation Corridor:

- Rosewood Ambulance Station – John Street, Rosewood
- Boonah Ambulance Station.

For larger scale emergencies, emergency services are provided from Ipswich.

The results of consultation with local emergency service providers indicated the need for cooperation with services, prior to the construction period, to ensure planning for service capacity is informed by accurate workforce estimates and construction programming.

3 Proposed works

3.1 Rail alignment

The Project is one of 13 projects that complete the Inland Rail Program. The Project includes the establishment of approximately 53 km of new single-track railway, consisting of approximately 53 km of dual gauge railway (standard (1,435 mm) and narrow (1,067 mm) gauge). The proposed works for the Project includes:

- 53 km of single track dual gauge rail line
- 1,015 m Teviot Range tunnel
- Four crossing loops
- Tie-ins to the existing West Moreton System and Sydney to Brisbane Interstate Line
- 27 new bridge structures
  - 16 rail bridges over waterways
  - 3 rail bridges over road
  - 5 bridges over waterways and roads
  - 3 road bridges over rail.

The Project is generally located with the existing SFRC, which was protected in November 2010 as future railway land under Section 242(1) of the TI Act.

The Project comprises sections of new track in greenfield areas and sections of new track adjacent to existing railway lines (brownfield). The Project links the West Moreton System near Calvert to the interstate Brisbane to Sydney railway near Kagaru, north of Beaudesert. ARTC have utilised design requirements and parameters to be applied across the Inland Rail Program, including:

- Train length: 1,800 m with future proofing for ultimate 3,600 m train length
- Axle load/max speed: 21 tonne axle load at 115 km/h, 25 tonne axle load at 80 km/h with future proofing for 30 tonne axle load at 80 km/h
- Double stacking: 7.1 m clearance above rail for double stack operation
- Interoperability: Full interoperability with interstate connectivity to QLD narrow gauge regional network. Connects to NSW Country Regional Network to provide for standard gauge connections to the ports of Melbourne, Port Kembla, Sydney, Newcastle, Brisbane, Adelaide and Perth.

It is noted that although ARTC are applying for approval to build infrastructure to accommodate trains up to 1,800 m in length, infrastructure will be designed such that the future extension of some crossing loops to accommodate 3,600 m trains is not precluded. ARTC intend to acquire the land for the future 3,600 m crossing loop extension with the initial land acquisition, however, the approval for the construction of future 3,600 m crossing loops will be subject to separate approval applications in the future. This assessment is based on 1,800 m train lengths.

The number of trains capable of running on the railway will ultimately depend on the final grades and preferred alignment, the type of trains, traffic volumes on connecting railways, and loading and unloading times. The train volumes are expected to average 33 services per day in 2026, increasing to an average of 47 train services per day in 2040.

The Project will be fenced with three or four strand barbed wire fence. The fencing is reflective of the largely agricultural land use of this section of the Project and seeks to ensure that stock and people do not enter the track. It is also consistent with fencing used in other sections of the railway line.

3.2 Road/rail interface locations

The Project alignment intersects SCRs and LGRs at several locations, with a number proposed to be level crossings. Consistent with the QLCSS, the proposed treatments/level of protection at road/rail interfaces that are proposed as level crossings are based on the outcome of the assessment undertaken by ARTC using the ALCAM which considers factors such as future road traffic numbers, vehicle types, train numbers, speeds and sighting distances.

The ALCAM assessment is carried out separate to this TIA and any identified changes to road/rail interfaces subsequent to what has been identified in this report will be incorporated through an updated TIA in the next design stage.

Assessment of road/rail crossings on private roads is not in scope for the TIA.

To maintain suitable distance between the Project and the existing road network and minimise the potential for new level crossings, there may be a need to realign sections of the existing road network. Road network alterations such as road closures, deviations, realignments were included for the purpose of this TIA.

3.2.1 Existing road/rail interface locations

There are no existing level crossings within the EIS investigation corridor, therefore no impacts are expected.

3.2.2 Proposed road/rail interface locations

Table 3.1 tabulates the proposed public road/rail interface locations and road closures along public formed roads that are associated with the EIS Investigation Corridor. The selection of treatment has been undertaken consistent with the infrastructure strategies contained within the QLCSS through the minimisation of level crossings where appropriate.

Where level crossings are currently proposed, the level of protection for the proposed road/rail interface geometry has been assessed using the ALCAM to identify risks. The outcome of these assessments are presented below and used for this TIA.

In future stages of the project, the road/rail interface geometry may change and the level crossing will be reassessed using ALCAM to determine the future level of protection required.

Table 3.1 Proposed public formed road/rail interface locations

Interface ID	Road name	Proposed treatment
State-controlled road: DTMR		
340-2-P-2	Rosewood Warrill View Road	Grade separation - rail over
340-5-P-2	Cunningham Highway	Grade separation - road over
340-7-P-5	Ipswich Boonah Road	Grade separation - rail over
Local government road: SRRC		
340-9-P-7a	Dwyers Road	Active level crossing
340-10-P-3a	Washpool Road	Active level crossing
340-10-P-4a	Washpool Road	No crossing provided - road divert/re-align
340-10-P-4d	Washpool Road	No crossing provided - road divert/re-align
340-10-P-4f	Washpool Road	Grade separation – rail over
340-11-P-2	Washpool Road	No crossing provided - road divert/re-align
340-13-P-3	Wild Pig Creek Road	Grade separation – rail over
340-14-P-1	Wild Pig Creek Road	Active level crossing
340-15-P-2b	Wild Pig Creek Road	Active level crossing
340-15-P-3	Wild Pig Creek Road	No crossing provided - relocate

Interface ID	Road name	Proposed treatment
340-16-P-1	Undullah Road	Grade separation - rail over
340-16-P-3	Undullah Road	Grade separation - road over
Local government road: ICC		
340-1-P-2	Waters Road	Grade separation - rail over
340-1-P-4	Waters Road	Grade separation - rail over
340-1-P-6	Hayes Road	Active level crossing
340-1-P-9	Coveney Road	No crossing provided - consolidate
340-3-P-1	Mount Forbes Road	Grade separation - road over
340-3-P-11	M Hines Road	Passive level crossing
340-6-P-2	Glencairn Road	Active level crossing
340-6-P-7	Middle Road	Active level crossing
340-8-P-1	Castle Hill Lane	No crossing provided
340-8-P-3	Truloff Road	No crossing provided - road divert/re-align
340-8-P-4	Mount Flinders Road	Grade separation - rail over

3.3 Construction activities

The major construction activities for the Project comprises transportation of quarry materials (ballast, capping materials), precast concrete, ready-mix concrete, rail, consolidated sleepers, earthworks materials, spoils, workforce, delivery of water, delivery/collection of plant, tools and other materials. Further details on construction activities and traffic are provided in Section 5.

3.4 Road alterations

This section discusses potential alterations to the local road network during the construction phase of the Project. These proposed alterations may include both temporary and permanent alterations to the road network to facilitate the construction of the Project and road closures and diversions along the EIS investigation corridor (i.e. in the vicinity of road/rail interface locations).

3.4.1 Road realignments and diversions

The proposed public road realignments, diversions and closures for public formed roads are summarised in Table 3.2. The traffic impacts and appropriate mitigation measures associated with these road alterations will be evaluated as part of the TIA.

Table 3.2 Proposed road realignments, diversions and closures for the Project

Interface ID	Road name	Proposed treatment
Local government: SRRC		
340-10-P-4a	Washpool Road	No crossing provided - road divert/re-align
340-10-P-4d	Washpool Road	No crossing provided - road divert/re-align
340-11-P-2	Washpool Road	No crossing provided - road divert/re-align
340-15-P-3	Wild Pig Creek Road	No crossing provided - relocate
Local government: ICC		
340-1-P-9	Coveney Road	No crossing provided - consolidate
340-8-P-1	Castle Hill Lane	No crossing provided
340-8-P-3	Truloff Road	No crossing provided - road divert/re-align

The alterations are to the public road network are not expected to create a permanent change to existing traffic patterns and distributions at the majority of these sites as:

- The road network alterations mainly consist of road realignments whereby existing traffic patterns will be maintained
- Existing geometric lane configurations can be maintained within the newly proposed road realignments.

Temporary diversions and realignments may be required as part of construction, however, specific details will not be known until construction programming is progressed to a sufficient level of detail. This is likely to occur during project detailed design.

4 Baseline operations

This section discusses the existing operational conditions for the impacted SCRs and LGRs.

4.1 Existing road links

4.1.1 Level of service definition

LOS is a qualitative measure describing the operational conditions within a traffic flow. This will be determined for both the existing road links for baseline conditions and during the various construction stages where the Project's construction activities could potentially have an impact on the operational performance of the road network. The findings from the analysis will lead to the formulation of potential mitigation measures to address the identified impacts.

LOS is defined in terms of service measures such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience. The practical application of LOS to different road environments considers factors such as road hierarchy, volume/capacity ratios, terrain types, proportion of HVs and road gradients. The methodology and LOS criteria have been obtained from the Guide to Traffic Management Part 3: Traffic Studies and Analysis and Highway Capacity Manual (2016).

Each of the six LOS categories represents a range of operating conditions and the driver's perception of those conditions, and can generally be described as:

- LOS A: 'Level of service A' is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
- LOS B: is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with LOS A
- LOS C: is also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
- LOS D: is close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
- LOS E: occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select their desired speeds and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause flow breakdown.
- LOS F: is in the zone of forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Road authorities generally prefer to design new rural road projects for LOS A or B at opening and LOS C to D in the design year. However, some rural projects and most urban projects will have practical and financial limits on the extent of work that can be achieved and consequently the performance criteria will have to be negotiated throughout the traffic analysis process. In this regard an analysis of the existing LOS on the road network provides a useful benchmark by which to assess changes as a result of development.

The colours adopted to represent the various LOS throughout this TIA are as shown in Table 4.1.

Table 4.1 Level of service

LOS A
LOS B
LOS C
LOS D
LOS E
LOS F

4.1.2 Two-lane two-way analysis criteria

The LOS criteria are based on the design hour volume to AADT ratio with respective saturation flows per terrain type as obtained from Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity and is provided in Table 4.2 and Table 4.3. The LOS criteria were used for uninterrupted two-lane two-way roads with level terrain, rolling terrain and mountainous conditions. The LOS criteria adopted are for the purpose of identifying any changes to the network performance in the future scenarios by comparing the without and with the additional traffic generated by the Project.

Table 4.2 Saturation flow rate: Uninterrupted two-lane-two-way rural roads (vehicles per day)

Design hour volume to AADT ratio (K-value)	Level of service				
	A	B	C	D	E
	Level terrain				
0.1	2,400	4,800	7,900	13,500	22,900
0.11	2,200	4,400	7,200	12,200	20,800
0.12	2,000	4,000	6,600	11,200	19,000
0.13	1,900	3,700	6,100	10,400	17,600
0.14	1,700	3,400	5,700	9,600	16,300
0.15	1,600	3,200	5,300	9,000	15,200
	Rolling terrain				
0.1	1,100	2,800	5,200	8,000	14,800
0.11	1,000	2,500	4,700	7,200	13,500
0.12	900	2,300	4,400	6,600	12,300
0.13	900	2,100	4,000	6,100	11,400
0.14	800	2,000	3,700	5,700	10,600
0.15	700	1,800	3,500	5,300	9,900
	Mountainous terrain				
0.1	500	1,300	2,400	3,700	8,100
0.11	400	1,200	2,200	3,400	7,300
0.12	400	1,100	2,000	3,100	6,700
0.13	400	1,000	1,800	2,900	6,200
0.14	300	900	1,700	2,700	5,800
0.15	300	900	1,600	2,500	5,400

Source: Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988

Table 4.3 Saturation flow rate: Uninterrupted two-lane-two-way rural roads (vehicles per hour per lane)

Design hour volume to AADT ratio (K-value)	Level of service				
	A	B	C	D	E
	Level terrain				
0.1	250	500	800	1,350	2,300
0.11	250	500	800	1,350	2,300
0.12	250	500	800	1,350	2,300
0.13	250	500	800	1,350	2,300
0.14	250	500	800	1,350	2,300
0.15	250	500	800	1,350	2,300
	Rolling terrain				
0.1	50	300	500	800	1,500
0.11	50	300	500	800	1,500
0.12	50	300	500	800	1,500
0.13	50	300	500	800	1,500
0.14	50	300	500	800	1,500
0.15	50	300	500	800	1,500
	Mountainous terrain				
0.1	50	150	250	350	800
0.11	50	150	250	350	800
0.12	50	150	250	350	800
0.13	50	150	250	350	800
0.14	50	150	250	350	800
0.15	50	150	250	350	800

Source: Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity, 1988. Values rounded to the nearest 50.

4.1.3 Baseline traffic volumes

Baseline traffic volumes (AADT) and HV percentages by direction have been provided in Table 4.4 for each road section along the Project construction traffic routes. This table also provides the road hierarchy and data source for each of these road segments. The data sources used in the assessment have been provided in Table 4.5.

Table 4.4 Baseline traffic volumes

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
State-controlled roads: DTMR								
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	Rural Arterial	A	2017	1,686	8%	1,667	12%
	212 - Between Wyaralong Dam Access and Tilley Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
	212 - Between Tilley Road and Sandy Creek Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
	212 - Between Sandy Creek Road and Bromelton House Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
	212 - Between Bromelton House Road and Ilbogan Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	Urban Motorway	A	2017	22,117	17%	20,050	16%
	17B - Between Redbank Plains Road and Ripley Road	Urban Motorway	A	2017	17,027	13%	17,927	15%
	17B - Between Ripley Road and Ipswich Boonah Road	Urban Arterial	A	2017	9,896	14%	10,214	19%
	17B - Between Ipswich Boonah Road and Middle Road	Rural Motorway	A	2017	10,301	13%	10,520	12%
	17B - Between Middle Road and Ipswich Rosewood Road	Rural Motorway	A	2017	10,301	13%	10,520	12%
	17B - Between Ipswich Rosewood Road and Champions Way	Rural Arterial	A	2017	3,329	24%	3,500	19%
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	Rural Arterial	A	2017	3,329	13%	3,500	12%
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	Rural Arterial	A	2017	2,712	15%	2,232	18%
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	Rural Arterial	A	2017	2,850	13%	3,063	11%
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	Rural Arterial	A	2017	2,850	13%	3,063	11%
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
	211 - Between Dwyers Road and Washpool Road	Rural Arterial	A	2017	1,686	8%	1,667	12%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
	211 - Between Washpool Road and Beaudesert Boonah Road	Rural Arterial	A	2017	1,686	8%	1,667	12%
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	Urban Motorway	A	2017	54,594	5%	54,247	3%
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	Rural Arterial	A	2017	3,891	17%	3,820	15%
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	Rural Arterial	A	2017	1,541	15%	1,563	11%
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	Rural Arterial	A	2017	2,103	7%	1,933	11%
	32 - Between Haigslea Amberley Road and Moffatt Street	Rural Arterial	A	2017	2,179	7%	2,478	8%
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	Urban Motorway	G	2017	54,594	5%	54,247	3%
	Between Ipswich Motorway and Centenary Highway	Urban Motorway	G	2017	54,594	5%	54,247	3%
	Between Centenary Highway and Mount Lindesay Highway	Urban Motorway	G	2017	54,594	5%	54,247	3%
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	Rural Arterial	A	2017	1,038	16%	1,032	16%
	25A - Between Logan Motorway and Undullah Road	Rural Motorway	A	2017	13,201	15%	10,427	9%
	25A - Between Undullah Road and Allan Creek Road	Rural Motorway	A	2017	4,709	10%	4,751	15%
	25A - Between Allan Creek Road and Eaglesfield Street	Rural Motorway	A	2017	4,709	10%	4,751	15%
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	Urban Motorway	A	2017	25,088	9%	24,221	9%
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	Rural Arterial	A	2017	1,608	14%	1,510	12%
	38 - Between Lane Road and Grandchester Mount Mort Road	Rural Arterial	A	2017	1,608	14%	1,510	12%
	38 - Between Grandchester Mount Mort Road and Crown Street	Rural Arterial	A	2018	895	14%	906	7%
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	Rural Arterial	A	2017	1,541	15%	1,563	11%
	35 - Between Reillys Road and Ebenezer Road	Rural Arterial	A	2017	1,541	15%	1,563	11%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Warwick Road	301 – Between Moffatt Road and Lobb Street	Urban Arterial	H	2017	6,017	8%	6,017	8%
	301 – Between Lobb Street and Cunningham Highway	Urban Arterial	H	2017	8,114	11%	8,114	11%
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	Rural Motorway	A	2017	17,087	15%	15,819	15%
	18A - Between Brisbane Valley Highway and Pine Mountain Road	Urban Motorway	A	2017	23,696	14%	21,237	17%
	18A - Between Pine Mountain Road and Cunningham Highway	Urban Motorway	A	2017	29,392	14%	28,468	15%
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	Rural Collector	A	2017	126	13%	126	13%
State-controlled roads: RMS								
Pacific Motorway	Between Qld/ NSW border and Gwydir Highway	Urban Motorway	C	2017	7,242	24%	8,982	23%
Summerland Way	Between NSW/Qld Border and Bruxner Way	Rural Arterial	C	2017	1,680	15%	1,940	16%
	Between Bruxner Way and Red Lane	Rural Arterial	C	2017	1,680	15%	1,940	16%
	Between Trenayr Road and Turf Street	Rural Arterial	C	2017	12,553	5%	12,529	5%
Local government roads: CVC								
Bent Street	Between Craig Street and Gwydir Highway	Urban Local	D	2018	2,000	15%	2,000	15%
Charles Street	Between Bent Street and Pacific Highway	Urban Local	D	2018	2,000	15%	2,000	15%
Clark Road	Full Extent	Rural Local	D	2018	400	15%	400	15%
Craig Street	Between Villiers Street and Bent Street	Urban Collector	D	2018	3,800	15%	3,800	15%
Dobie Street	Between Villers Street and Summerland Way	Urban Collector	D	2018	3,800	15%	3,800	15%
Red Lane	Between Summerland Way and Trenayr Road	Rural Local	D	2018	400	15%	400	15%
Trenayr Road	Between Summerland Way and Clark Road	Rural Collector	D	2018	2,000	15%	2,000	15%
	Between Clark Road and Red Lane	Rural Collector	D	2018	2,000	15%	2,000	15%
Villers Street	Between Craig Street and Dobie Street	Urban Collector	D	2018	3,800	15%	3,800	15%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Local government roads: ICC								
Briggs Road	Full Extent	Urban Local	I	2010	2,712	15%	2,712	15%
Champions Way	Between Cunningham Highway and Paynes Road	Rural Local	I	2010	735	15%	735	15%
Coopers Road	Between Cunningham Highway and Ebenezer Road	Rural Collector	I	2010	833	15%	833	15%
Coveney Road	Full Extent	Rural Collector	F	2019	13	19%	13	5%
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	Rural Collector	I	2010	467	15%	467	15%
Edwards Street	Between Ripley Road and Briggs Road	Urban Collector	I	2010	2,629	15%	2,629	15%
Fairbank Place	Full Extent	Urban Local	I	2019	148	33%	127	25%
Hayes Road	Full Extent	Rural Local	I	2018	50	15%	50	15%
Hillside Road	Full Extent	Rural Local	I	2018	50	15%	50	15%
Lane Road	Between Rosewood Laidley Road and Waters Road	Rural Collector	F	2018	116	17%	101	13%
Macalister Street	Between Moffatt Street and Park Street	Urban Local	F	2019	643	3%	839	11%
Middle Road	Between Cunningham Highway and Bill Morrow Road	Rural Arterial	F	2018	207	27%	261	11%
	Between Bill Morrow Road and Ipswich City Council Boundary	Rural Collector	F	2018	207	27%	261	11%
Moffatt St	Between Karrabin Rosewood Road and Macalister Street	Urban Collector	I	2010	5,064	15%	5,064	15%
	Between Macalister Street and Warwick Road	Urban Collector	I	2010	5,064	15%	5,064	15%
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	Rural Collector	I	2015	248	9%	244	9%
Mount Forbes Road	Between Ebenezer Road and Paynes Road	Rural Local	F	2019	238	12%	234	15%
Mount Marrow Quarry Road	Full Extent	Rural Collector	F	2018	202	52%	205	49%
Newhill Drive	Full Extent	Urban Local	F	2019	606	45%	659	36%
Noblevale Way	Full Extent	Rural Local	F	2019	223	35%	229	39%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Old Grandchester Road	Between Lane Road and Strongs Road	Rural Arterial	I	2018	19	15%	19	15%
Old Toowoomba Road	Between Toongarra Road and Moffatt Street	Urban Local	I	2010	10,912	15%	10,912	15%
Park Street	Between Macalister Street and Warwick Road	Rural Collector	I	2010	306	15%	306	15%
Paynes Road	Between Champions Way and Mount Forbes Road	Urban Arterial	I	2010	385	10%	66	26%
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	Rural Collector	I	2010	7,856	12%	7,856	12%
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	Urban Collector	I	2018	19	15%	19	15%
Ripley Road	Between Cunningham Highway and Edwards Street	Urban Local	I	2010	4,936	15%	4,936	15%
Rob Roy Way	Full Extent	Rural Local	F	2019	430	44%	411	37%
Strongs Road	Between Coveney Road and Rileys Road	Rural Collector	I	2010	19	15%	19	15%
Strongs Road	Between Old Grandchester Road and Coveney Road	Rural Collector	I	2010	19	15%	19	15%
T Morrows Road	Full Extent	Rural Collector	F	2019	92	75%	93	75%
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	Rural Collector	I	2010	159	15%	159	15%
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road	Rural Arterial	I	2010	4,309	15%	4,309	15%
Waters Road	Between Lane Road and Kuss Road	Rural Collector	F	2018	60	17%	60	13%
Local government roads: LCC								
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	Rural Collector	I	2012	153	14%	153	14%
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	Rural Arterial	I	2018	60	13%	62	7%
	Between Wyatt Road and Wild Pig Creek Road	Rural Collector	I	2015	29	31%	29	31%
Wyatt Road	Between Kilmoylar Road and Undullah Road	Rural Collector	G	2018	50	15%	50	15%
Wild Pig Creek Road	Full Extent	Rural Local	I	2018	40	15%	40	15%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Local government roads: SRRC								
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	Rural Collector	I	2017	299	15%	299	15%
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road	Rural Collector	I	2018	55	15%	55	15%
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	Rural Collector	I	2017	581	27%	581	27%
Brookland Road	Between Undullah Road and Allan Creek Road	Rural Collector	F	2018	224	15%	245	16%
Cryna Road	Full Extent	Rural Local	H	2009	207	22%	187	15%
Dwyers Road	Full Extent	Rural Collector	F	2018	19	41%	19	45%
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	Urban Collector	I	2018	900	15%	900	15%
Enterprise Drive	Full Extent	Rural Local	I	2018	540	39%	540	39%
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	Rural Collector	I	2018	179	16%	179	16%
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	Rural Collector	I	2018	271	9%	271	9%
Middle Road	Between Ipswich City Council Boundary and Peak Crossing Churchbank Weir Road	Rural Collector	F	2018	207	27%	261	11%
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	Rural Collector	I	2018	79	15%	79	15%
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	Rural Collector	I	2018	100	15%	100	15%
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road	Rural Collector	I	2018	327	15%	327	15%
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road	Rural Arterial	F	2018	556	42%	556	49%
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	Rural Collector	I	2018	149	15%	149	15%
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road	Rural Collector	I	2018	59	15%	59	15%

Road name	Road section	Road hierarchy	Data source	Traffic volume base year	Gazettal/northbound /eastbound		Anti-gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Undullah Road	Between LCC Council Boundary and Brookland Road	Rural Arterial	I	2015	29	31%	29	31%
	Between Brookland Road and Kilmoylar Road	Rural Collector	I	2015	29	31%	29	31%
	Between Kilmoylar Road and S of Brennans Dip Road	Rural Collector	I	2015	29	31%	29	31%
Washpool Road	Between Ipswich Boonah Road to 5.5km E of Ipswich Boonah Road	Rural Collector	F	2018	79	16%	78	20%
Wild Pig Creek Road	Full Extent	Rural Local	I	2018	40	15%	40	15%

Table 4.5 Traffic data sources

Source ID	Traffic data source
A	Volumes obtained from DTMR detailed segment and weekly reports
B	Volumes adopted from adjacent DTMR road segment
C	Volumes obtained from RMS opensource Traffic Viewer. Adjacent road link volumes were adopted on links where traffic information is not available.
D	**Urban Local Road** - Volumes derived by assuming LOS A with associated AADT of 2,000 vehicles/day
	Urban Collector Road - Volumes derived by assuming LOS B with associated AADT of 3,800 vehicles/day
	Rural Local Road - Volumes derived by assuming AADT of 400 vehicles/day
	Rural Collector Road - Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 vehicles/day
E	**Rural Arterial Road** - Volumes derived by assuming LOS A with K-value of 0.15 with associated AADT of 1,600 vehicles/day
	Urban Arterial Road - Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 vehicles/day
F	Volumes obtained through 7-day 24-hour traffic surveys
G	Volumes adopted from adjacent surveyed link road or adjacent DTMR detailed segment and weekly reports
H	Volumes obtained from Queensland Globe.
I	Volumes obtained from relevant authority.

4.2 Existing intersection performance

An increase in vehicles through an intersection as a result of the Project will likely increase traffic delays. Increases in delays potentially have an economic and social impact on the community through increased travel times, driver impatience (leading to possible crashes) and the associated economic cost of these delays to private and commercial/HV trips according to the GTIA. The following input types are required as a basis to evaluate existing intersection performance:

- Existing intersection geometry and lane configuration data
- Existing traffic signal phasing and sequence data where required
- Vehicle movement data
- Peak hour traffic volume data.

The delay-based analyses criteria adopted for the purposes of the TIA are provided in Table 4.6. The table indicates the LOS per intersection control type associated with a respective delay per vehicle measured in seconds.

Table 4.6 Level of service definitions based on vehicle delay in seconds

Level of service	Signals	Roundabout	Sign control
A	d ≤ 10	d ≤ 10	d ≤ 10
B	10 d ≤ 20	10 d ≤ 20	10 d ≤ 15
C	20 d ≤ 35	20 d ≤ 35	15 d ≤ 25
D	35 d ≤ 55	35 d ≤ 50	25 d ≤ 35
E	55 d ≤ 80	50 d ≤ 70	35 d ≤ 50
F	d < 80	d < 70	d < 50

Source: SIDRA User Guide; d: delay

In the absence of traffic count data at intersections, an assessment has been undertaken to highlight intersections which are more likely to experience impacts resulting from the addition of construction traffic flows consistent with the warrants outlined in Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings.

4.3 Existing pavement load (standard axle repetitions)

A preliminary desktop pavement impact assessment was undertaken based on the existing background traffic data available for the relevant road sections. The HV component of the AADT was calculated for the existing traffic conditions along road sections most likely to have a pavement impact. These traffic volumes were converted into SARs based on the HV classes provided by road controlling authorities which will consist of an appropriate standard axle repetition per HV (SAR/HV) rate for each vehicle class. A SAR is a unit measurement which converts the wheel loads of traffic to an equivalent number of standard loads which is usually expressed in terms of the equivalent number of 80 kilo-Newtons (kN) single axle load. It is a measure of defining the cumulative damaging effect to the pavement of the actual traffic. The SAR for the background HV component was calculated based on the provided HV splits for the relevant road sections.

4.3.1 Equivalent axle load per heavy vehicle type: Queensland

This information was used to estimate base SARs over a 20-year design life as well as the envisaged additional project generated SARs at each year of implementation. Detailed road segment reports with 12 bin vehicle breakdown details were used to calculate SARs/HV along SCRs on the DTMR road network. The SARs/HV was calculated by means of the methodologies set out in Austroads Guide to Pavement Technology Part 2: Pavement Structural Design 2012 (as referenced in the GTIA. It is noted that a more recent version of this guide is available and should be used for pavement design) using data provided by DTMR. The SARs/HV along the DTMR road network with associated primary construction routes are provided in Table 4.7. Assumed values were sourced from similar adjacent road segments.

Table 4.7 Standard axle repetitions/heavy vehicles on primary construction routes along Department of Transport and Main Roads: State-controlled roads

Road name	Road section	Source	SAR/HV	
			Gazettal	Anti-Gazettal
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	Assumed	2.19	2.05
	212 - Between Wyaralong Dam Access and Tilley Road	Assumed	2.19	2.05
	212 - Between Tilley Road and Sandy Creek Road	Assumed	2.19	2.05
	212 - Between Sandy Creek Road and Bromelton House Road	Assumed	2.19	2.05
	212 - Between Bromelton House Road and Ilbogan Road	Assumed	2.19	2.05
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	Assumed	2.65	2.76
	17B - Between Redbank Plains Road and Ripley Road	Calculated	2.47	2.44
	17B - Between Ripley Road and Ipswich Boonah Road	Calculated	2.34	2.37
	17B - Between Ipswich Boonah Road and Middle Road	Calculated	2.65	2.76
	17B - Between Middle Road and Ipswich Rosewood Road	Calculated	2.47	2.44
	17B - Between Ipswich Rosewood Road and Champions Way	Calculated	2.47	2.37

Road name	Road section	Source	SAR/HV	
			Gazettal	Anti-Gazettal
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	Calculated	2.56	2.40
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	Calculated	1.96	1.93
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	Calculated	2.14	2.22
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	Calculated	2.19	2.05
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	Calculated	2.14	2.22
	211 - Between Dwyers Road and Washpool Road	Calculated	2.19	2.05
	211 - Between Washpool Road and Beaudesert Boonah Road	Assumed	2.19	2.05
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	Calculated	2.27	3.06
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	Calculated	2.03	2.02
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	Assumed	2.03	2.02
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	Calculated	1.91	1.92
	32 - Between Haigslea Amberley Road and Moffatt Street	Calculated	2.02	2.03
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	Assumed	2.27	3.06
	Between Ipswich Motorway and Centenary Highway	Assumed	2.27	3.06
	Between Centenary Highway and Mount Lindesay Highway	Assumed	2.27	3.06
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	Assumed	2.27	3.06
	25A - Between Logan Motorway and Undullah Road	Assumed	2.27	3.06
	25A - Between Undullah Road and Allan Creek Road	Assumed	2.27	3.06
	25A - Between Allan Creek Road and Eaglesfield Street	Assumed	2.27	3.06
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	Assumed	2.27	3.06
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	Calculated	1.94	1.99
	38 - Between Lane Road and Grandchester Mount Mort Road	Calculated	1.94	1.99
	38 - Between Grandchester Mount Mort Road and Crown Street	Calculated	1.94	1.99
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	Assumed	2.03	2.02
	35 - Between Reillys Road and Ebenezer Road	Assumed	2.03	2.02
Warwick Road	301 – Between Moffatt Road and Lobb Street	Assumed	1.91	1.92
	301 – Between Lobb Street and Cunningham Highway	Assumed	1.91	1.92

Road name	Road section	Source	SAR/HV	
			Gazettal	Anti-Gazettal
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	Calculated	2.38	2.38
	18A - Between Brisbane Valley Highway and Pine Mountain Road	Calculated	2.44	2.54
	18A - Between Pine Mountain Road and Cunningham Highway	Calculated	2.30	2.29
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	Assumed	2.14	2.22

4.3.2 Equivalent axle load per heavy vehicle type: New South Wales

SAR/HV values were used as part of the pavement impact analysis for the primary construction routes along RMS SCRs. SARs were also determined for the primary construction routes along RMS SCRs. As annual 12 bin vehicle breakdown information was not available for RMS Road available, SAR/HV information provided within Austroads Guide to Pavement Technology Part 2: Pavement Structural Design 2012 was used based on Weigh-In-Motion (WIM) sites across NSW. As not all roads were represented in the guide, SAR/HV values were assumed based on similar, proximate roads.

Table 4.8 outlines the road name and the assumed WIM site used for the purpose of the analysis.

Table 4.8 Standard axle repetitions/heavy vehicles on all Weigh-In-Motion sites across New South Wales

Project road assessed	WIM site road name	WIM ID	Location	%HV	SAR/HV
Pacific Motorway	Pacific Highway	283	Brunswick Heads	14.2	2.30
Summerland Way	New England Highway	700	Branxton	14.4	2.19
	New England Highway	AR	Armidale	18.7	1.97

4.3.3 Existing standard axle repetitions over 20-year design life

SARs for the background HV component were calculated based on the HV splits for the relevant road sections. It must be noted that all base pavement loading SARs were calculated as granular pavement with thin bituminous surfacing with a load damage unit equivalent to SAR4 (i.e. an SAR with a load damage exponent 4), irrespective of pavements containing one or more boundary layers for both DTMR and RMS roads. This is because raw road asset data from DTMR does not capture loaded and unloaded HV movements which do not make it feasible to calculate SAR5s and SAR12s (load damage units applicable to pavements with one or more boundary layers. This was completed in accordance with the following process:

- The existing background traffic data (AADT) for the relevant road sections, where available, were obtained from DTMR and RMS
- Relevant SAR rates were applied to existing HV proportions for each direction of travel
- Determine the existing SAR4s for each construction route road section on all affected SCRs in accordance with Section 6.4 of the GTIA Manual
- A 2 per cent HV growth rate was used and applied to determine future projected yearly SARs over a 20-year design life
- Existing SAR4s and associated capacities was graphically represented for each link over a 20-year design life.

Detailed findings of existing SARs across a 20-year design life are provided in Appendix O.

4.4 Existing rail crossings

There are currently no existing level crossings within the EIS investigation corridor that will be impacted. Therefore, no assessment is necessary for existing rail crossings. The EIS investigation corridor consists of greenfield rail tracks which would encompass new proposed level crossings.

4.5 Existing road safety issues (crash data)

Crash data for the TIA study area was obtained for the most recent and available five-year time period from DTMR and RMS. As a result, the analysis has considered the following time periods:

- DTMR: 01/11/2012 to 31/10/2017
- RMS: 01/07/2012 to 30/06/2017.

Note that DTMR and RMS apply different categorisations for crash severity. As a result, crash data has been summarised separately for each of these regions. Additionally, DTMR does not report on non-injury (i.e. uncategorised) crashes as of 2010, therefore, non-injury crashes have been removed from the RMS dataset in this analysis.

4.5.1 Crash analysis: Construction routes

Based on the provided DTMR and RMS data, a breakdown of reported incidents by crash severity within the TIA study area has been provided in Table 4.9. The TIA study area for this analysis has been defined as road sections along which construction traffic travels. Figures illustrating proposed construction traffic routes and crashes occurring along these routes within the 5-year period have been provided in Appendix K.

In order to provide additional context into crash activity along construction traffic routes, Table 4.9 also provides the road section lengths, existing background volumes (AADT) and expected average daily construction traffic volumes (ADT) within the identified peak construction period. This table also identifies the Definition for Coding Accidents (DCA) Code Group (see Table 4.10 for DCA Code Group descriptions) that occurs most frequently (highest prevalence out of total accidents by magnitude based on the data provided).

Table 4.9 Construction traffic route crash data summary

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total 5 year crashes	Crash severity					Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	Uncategorised	DCA Code Group	DCA (%)
State-controlled Roads: DTMR											
Beaudesert Boonah Road	6	3,300	125	4	1	3	0	0		2	50
Cunningham Highway	31.7	6,800 – 42,000	306	112	3	60	35	14		16	20
Haigslea Amberley Road	3.4	5,000	8	8	1	1	4	2		4	38
Ipswich Boonah Road	17.6	3,400-4,000	326	29	2	12	10	5		4	0
Ipswich Motorway	8.4	54,000	45	104	0	45	41	18		4	31
Ipswich Rosewood Road	12.8	3,100-7,700	347	11	1	4	2	4		4	50
Karrabin Rosewood Road	18.5	3,700-4,700	58	60	1	18	32	9		4	0
Logan Motorway	30	109,000	45	264	2	109	129	24		4	0
Mt Lindesay Highway	54.8	2,100-24,000	127	315	8	145	130	32		4	29
Pacific Arterial	66.6	49,000	45	1,104	12	403	558	131		4	54
Rosewood Laidley Road	16.5	1,800-3,100	35	23	3	12	7	1		19	30
Rosewood Warrill View Road	No crashes										
Warwick Road	5.4	12,000 – 16,228	192	48	1	14	27	6		4	33
Warrego Highway	18.2	33,000-58,000	8	148	2	67	68	11		4	28
Warrill View Peak Crossing Road	No crashes										
State-controlled Roads: RMS											
Pacific Motorway	66.6	16,000	17	1,104	12	403	558	131		16	54
Summerland Way	4.8	3,700-25,000	45	14	0	4	8	2	1	1	50
Local Government Roads											
CVC											
Bent Street	1.5	4,000	45	11	0	2	8	1		16	27
Charles Street	No crashes										

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total 5 year crashes	Crash severity					Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	Uncategorised	DCA Code Group	DCA (%)
Clark Road	No Crash Data Available										
Craig Street	0.1	7,600	45	8	0	2	4	2	2	4	38
Dobie Street	1.7	7,600	45	4	0	0	4	0		1	100
Red Lane	No Crash Data Available										
Trenayr Road	No Crash Data Available										
Villiers Street	1.3	7,600	45	8	0	2	4	2		1	63
LCC											
Kilmoylar Road	No crashes										
Undullah Road	11.6	58 – 122	137	1	0	1	0	0		2	100
Wyatt Road	No crashes										
Wild Pig Creek Road	11.6	157	141	1	0	1	0	0		2	100
SRRC											
Allan Creek Road	3.1	598	133	1	0	0	1	0		20	100
Brabazon Road	No crashes										
Bromelton House Road	5.3	1, 162	133	1	0	0	1	0		15	100
Brookland Road	7.1	290	133	3	0	0	3	0		17	67
Cryna Road	No crash data available										
Dwyers Road	No crashes										
Eaglesfield Street	0.7	1,800	116	11	0	2	7	2		1	82
Enterprise Drive	No crashes										
Ilbogan Road	No crashes										
Kilmoylar Road	3.6	542	137	3	0	2	1	0		17	67
Middle Road	13.4	468	4	2	0	0	2	0		16	50

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total 5 year crashes	Crash severity					Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	Uncategorised	DCA Code Group	DCA (%)
Mutdapilly Churchbank Weir Road	No crashes										
Peak Crossing Churchbank Weir Road	4.7	200 – 654	13	2	1	1	0	0		4	50
Sandy Creek Road	No crashes										
Thiedke Road	No crashes										
Tilley Road	No crashes										
Undullah Road	11.6	58	128	1	0	1	0	0		2	100
Washpool Road	No crashes										
Wild Pig Creek Road	11.6	157	141	1	0	1	0	0		2	100
ICC											
Briggs Road	No crashes										
Champions Way	No crashes										
Coopers Road	5.4	5,424	34	1	0	0	1	0		16	100
Coveney Road	No crashes										
Ebenezer Road	No crashes										
Edwards Street	1.1	5,258	27	3	0	1	2	0		1	33
Fairbank Place	No crashes										
Hayes Road	No crashes										
Hillside Road	No crashes										
Lane Road	No crashes										
Macalister Street	No crashes										
Middle Road	8.7	468	144	2	0	0	2	0		16	50
Moffatt Street	1.2	10,128	192	6	0	2	4	0		1	83
Mount Flinders Road	No crashes										

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total 5 year crashes	Crash severity					Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	Uncategorised	DCA Code Group	DCA (%)
Mount Forbes Road	No crashes										
Mount Marrow Quarry Road	No crashes										
Newhill Drive	No crashes										
Noblevale Way	No crashes										
Old Grandchester Road	No crashes										
Old Toowoomba Road	No crashes										
Park Street	No crashes										
Paynes Road	No crashes										
Redbank Plains Road	1	15,711	7	4	0	2	2	0		4	50
Reillys Rd	No crashes										
Ripley Road	1	9,872	27	12	0	9	2	1		1	33
Rob Roy Way	No crashes										
Strongs Road	No crashes										
T Morrows Road	No crashes										
Thagoona Haigslea Road	No crashes										
Waters Road	No crashes										

Table 4.10 DCA Code Group Descriptions

DCA Code Group	DCA code group description
Multiple vehicle crashes	
1	From adjacent approaches
2	Head on
3	Opposing vehicle turning
4	Rear end
5	Lane change
6	Parallel lanes, turning
7	U-turn
8	Entering roadway
9	Overtaking, same direction
10	Hit parked vehicle
11	Hit railway train
Single vehicle crashes	
12	Pedestrian
13	Obstruction on carriageway
14	Hit animal
15	Off carriageway on straight
16	Off carriageway on straight, hit object
17	Out of control on straight
18	Off carriageway on curve
19	Off carriageway on curve, hit object
20	Out of control on curve
Exceptions	
21	Exceptions (i.e. crashes which are unlikely to be attributable to and road environment factor)

4.5.2 Crash analysis: road/rail interface locations

Crashes by crash severity and type which have occurred within a 200 m radius from existing and proposed public road/rail interface locations (formed roads only) have been evaluated. A summary of these findings has been provided in Table 4.11, and a figure showing the proposed road rail interface and 200 m buffer has been provided in Appendix J.

The findings show that no crashes in the 5-year period have occurred within 200 m of the proposed public road/rail interfaces.

Table 4.11 Crash analysis: Proposed public road/rail interface (formed roads only, within 200 m radius)

Interface ID	Road name	Recorded crashes (200 m radius)
Department of Transport and Main Roads		
340-2-P-2	Rosewood Warrill View Road	No crashes
340-5-P-2	Cunningham Highway	No crashes
340-7-P-5	Ipswich Boonah Road	No crashes
Scenic Rim Regional Council		
340-9-P-7a	Dwyers Road	No crashes
340-10-P-3a	Washpool Road	No crashes

Interface ID	Road name	Recorded crashes (200 m radius)
340-10-P-4a	Washpool Road	No crashes
340-10-P-4d	Washpool Road	No crashes
340-11-P-4f	Washpool Road	No crashes
340-11-P-2	Washpool Road	No crashes
340-13-P-3	Wild Pig Creek Road	No crashes
340-14-P-1	Wild Pig Creek Road	No crashes
340-15-P-2b	Wild Pig Creek Road	No crashes
340-15-P-3	Wild Pig Creek Road	No crashes
340-16-P-1	Undullah Road	No crashes
340-16-P-3	Undullah Road	No crashes
Ipswich City Council		
340-1-P-2	Waters Road	No crashes
340-1-P-4	Waters Road	No crashes
340-1-P-6	Hayes Road	No crashes
340-1-P-9	Coveney Road	No crashes
340-3-P-1	Mount Forbes Road	No crashes
340-3-P-11	M Hines Road	No crashes
340-6-P-2	Glencairn Road	No crashes
340-6-P-7	Middle Road	No crashes
340-8-P-1	Castle Hill Lane	No crashes
340-8-P-3	Shepherd Road (Truloff Road)	No crashes
340-8-P-4	Mount Flinders Road	No crashes

4.6 Other latent developments

The traffic generation estimations from other major developments will be considered as part of a cumulative assessment process. The cumulative impact evaluation is provided in Section 11. This will include adjacent Inland Rail sections as well as other committed major projects of significance.

5 Construction traffic generation and assignment

5.1 Construction transport modes

The construction TIA contained within this report has been undertaken based on the construction task, material sources, quantities, modes, routes and durations identified in the Project constructability review outlined within this section. However, the ultimate the determination of the final construction and HV routes will be subject to detailed design and consultation between DTMR, the local government authority and the construction contractor. Existing multi-combination HV routes for the TIA study area have been provided in Appendix I.

The construction transport will primarily be by road, other than rail sections which will be transported by existing rail corridors as well as roads. Table 5.1 lists the major construction activities and related transport modes for the traffic generated by the respective activities.

Table 5.1 Construction activities contributing to traffic generation and transport mode

Material	Delivery method	Quantity/volume	Start date	End date
General fill	Road/haul routes	4,237,167 m^3 (excluding any contingency)	18/08/2022	10/04/2024
Structural fill	Road/haul routes	461,377 m^3	N/A	N/A
Spoil	Road	1,622,504 m^3	29/06/2022	10/04/2024
Capping	Road	336,716 m^3	19/12/2023	26/03/2025
Top ballast	Road	63,800 t	23/06/2025	01/08/2025
Bottom ballast	Road	128,200 t	03/01/2025	05/04/2025
Sleepers	Road	106,250 number	24/02/2025	07/03/2025
Rail	Rail	12,000 t	03/02/2025	04/04/2025
Precast concrete – bridge	Road	Girders (at various length and size)	09/02/2023	26/06/2025
Precast concrete – culverts	Road	various sizes	15/06/2022	07/06/2024
In-situ concrete – bridge and culverts	Road	88,196 m^3	29/06/2022	20/06/2025
Construction Water	Road	954 ML	18/01/2022	06/08/2025

5.2 Construction staging

Staging relates to construction start and end dates of all construction related activities within the envisaged construction period. The start and end dates of all associated construction are taken into account in order to determine the peak period for the Project. Although some materials might be delivered prior to construction start and end dates, it was conservatively assumed that delivery and construction start and end dates would occur during the same time.

Construction schedules relating to other committed projects of significance have been considered in the Cumulative Assessment in Section 11.

5.3 Estimated material requirements

The construction TIA has been undertaken based on the material sources, quantities and durations identified for the Project. Alternative material sources have been identified and detailed in the TIA. Should further alternative sources be identified, these may be assessed using the process documented in this report and, if required, mitigation measures applied as defined in Section 9.

5.3.1 Borrow pits

No borrow pits have been identified in the Project. Sufficient cut material is currently available for general fill. It is anticipated that structural fill and capping material will be sourced from nearby existing quarries.

5.3.2 Spoil material

The estimated earthworks quantities per kilometre of chainage are illustrated in Figure 5.1. The Project is anticipated to produce approximately: 5,859,671 m^3 of cut material during construction, primarily from surface works. Approximately 4,237,167 m^3 of this cut material (including 824,534 m^3 of rock) is estimated to be suitable for immediate reuse as general earth fill for the construction of zoned embankments. This leaves an excess of approximately 1,622,504 m^3 of spoil to be managed or treated with the potential for reuse.

A number of opportunities exist for the reuse of this material. Table 5.2 details options for management of spoil generated by the Project and how this TIA has considered these options which are presented in order of preference.

Table 5.2 Spoil management hierarchy

Rank	Options	Example	Consideration in TIA
1	Avoid and reduce spoil	Reduce the amount of spoil generated by the Project, through reducing the extent and scale of cut where an immediate reuse opportunity in proximity to the source location does not exist, e.g. sections of the Project where a surplus of material will be generated	Spoil material generation associated with the Project is proposed to be reduced with the use of road headers rather than drill and blast methods. Wherever practical, spoil material generation will continue to be minimised as the Project progresses through the detailed design and construction phases post-EIS. Further details on the proposed spoil management strategy is provided in Chapter 21: Waste and Resource Management of this EIS.
2	Reuse within the rail corridor	Reuse within the Project, subject to the material complying with the ARTC Earthworks Material Specification, to establish formation, fill embankments and mounds within short haulage distance of the source location	Approximately 4,237,167 m^3 of cut material (including 824,534 m^3 of rock) is estimated to be suitable for immediate reuse as general earth fill for the construction of zoned embankments. It has been assumed that this material will be transported within the rail corridor along RMAR.
3	Reuse for environmental works and land restoration	Examples include: ■ Reuse in the rehabilitation of native vegetation ■ Reuse for landscaping ■ Reuse for land reinstatement, including end-of-life mines (Ebenezer Mine, New Hope and West Moreton) ■ Reuse for landfill covers (day and interim covers) and final capping (where deemed suitable).	Spoil excess of approximately 1,622,504 m^3 is proposed to be reused for land reinstatement at end-of-life mines located along Ipswich-Rosewood Road (Ebenezer Mine and New Hope). Approval for these sites to accept material has yet to be advanced. This is proposed to be hauled via road from laydown areas along the alignment to these locations.
4	Reuse on other development	Reuse for fill embankments and mounds on projects within a reasonable haulage distance from the site, prioritising other components of the Inland Rail Program	Not considered in the TIA
5	Dispose offsite as waste	Disposal of excess spoil as waste at an approved facility licenced to receive the material. Offsite disposal to landfill should only occur if the material is considered unsuitable without treatment for other uses, e.g. due to contamination.	Not considered in the TIA

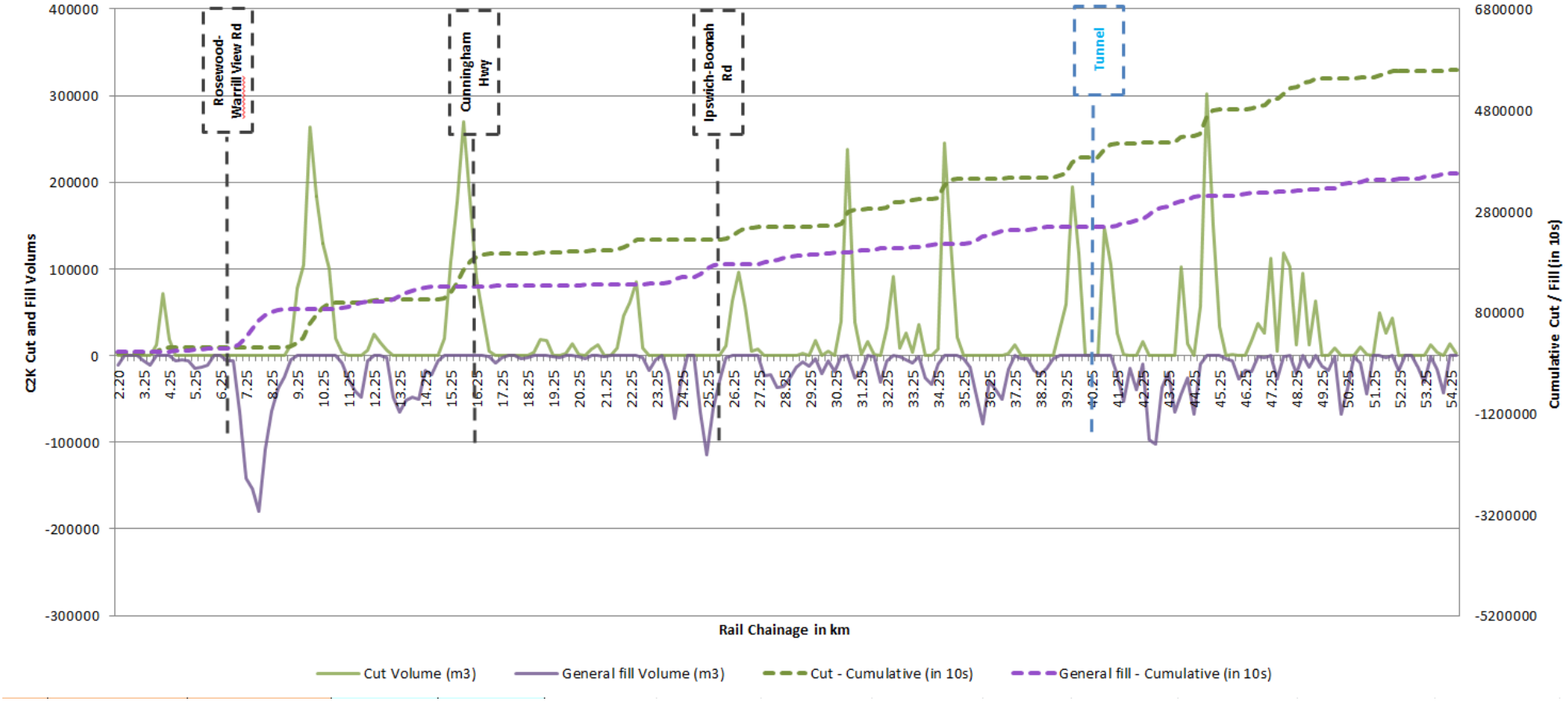


Figure 5.1 **Estimated earthworks quantities**

5.3.3 Quarry material

The expected volumes of capping and rail ballast for the Project have been provided in Table 5.3. Total amounts for ballast and capping are based on the following assumptions:

- Bottom ballast: 2 tonnes per metre of alignment
- Top ballast: 1 tonne per metre of alignment
- Capping: 2 tonnes per metre of alignment.

Table 5.3 Quarry materials

Material type	Quarry site	Supply chainage (km)		Quantity (t)	Laydown	Comment
		From	To			
Bottom ballast	Mount Marrow Quarry	0	8.45	16,900	C2K-LDN004.8	Including additional turnout
	Purga Quarry	8.45	14.35	16,200	C2K-LDN012.1	Including passing loop
	Purga Quarry	14.35	21.30	13,900	C2K-LDN016.6	-
	Purga Quarry	21.30	31.80	26,000	C2K-LDN026.0	Including passing loop
	Purga Quarry	31.80	41.55	20,600	C2K-LDN037.6	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	41.55	49.65	21,900	C2K-LDN045.5	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	49.65	54.50	12,700	C2K-LDN053.8	Including additional turnout
Top ballast	Mount Marrow Quarry	0	8.45	8,450	C2K-LDN004.8	Including additional turnout
	Purga Quarry	8.45	14.35	8,100	C2K-LDN012.1	Including passing loop
	Purga Quarry	14.35	21.30	6,950	C2K-LDN016.6	-
	Purga Quarry	21.30	31.80	12,700	C2K-LDN026.0	Including passing loop
	Purga Quarry	31.80	41.55	10,300	C2K-LDN037.6	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	41.55	49.65	10,950	C2K-LDN045.5	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	49.6	54.50	6,350	C2K-LDN053.8	Including additional turnout
Capping	Mount Marrow Quarry	0	8.45	16,900	C2K-LDN004.8	Including additional turnout
	Purga Quarry	8.45	14.35	16,200	C2K-LDN012.1	Including passing loop
	Purga Quarry	14.35	21.30	13,900	C2K-LDN016.6	-
	Purga Quarry	21.30	31.80	26,000	C2K-LDN026.0	Including passing loop
	Purga Quarry	31.80	41.55	20,600	C2K-LDN037.6	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	41.55	49.65	21,900	C2K-LDN045.5	Including passing loop
	Bromelton quarries/ Cryna Road Quarry	49.65	54.50	12,700	C2K-LDN053.8	Including additional turnout

5.3.4 Precast and bulk concrete

The type and number of precast concrete elements and estimates of bulk concrete requirements for bridges and culverts has been provided in Table 5.4 and Table 5.5.

Table 5.4 Concrete logistics for bridge construction

ID	Bridge name	Laydown	Approx. length (m)	Structure	Crossing type	Span length (m)	Span number	No. of precast girders/ deck units per span	Bridge width (m)	Deck area (m^2)	Deck type	Pier type	Abutment type	Pier and abutment foundation	Concrete trucks	Precast trucks
340-BR02	Western Creek 2 Rail Bridge	C2K-LDN002.8	782	Rail	Waterway + Road	23	34	2	3.97	3,105	Type D1	Type 7 Type 9	Type 5	CIP Piles	1,004	68
340-BR01	Western Creek 1 Rail Bridge	C2K-LDN002.8	966	Rail	Waterway + Road	23	42	2	3.97	3,835	Type D1	Type 7 Type 9	Type 5	CIP Piles	1,252	84
340-BR03	Bremer River Rail Bridge	C2K-LDN005.8	684	Rail	Waterway + Road	38	18	3	4.55	3,112	Type D9	Type 7 Type 9 Type 11	Type 9	CIP Piles	1,156	54
340-BR04	Mount Forbes Road Bridge	C2K-LDN009.7	72	Road	Rail	23/26/23	3	16	10.5	756	1100 deep deck units + 220 slab	-	-	CIP Piles	215	5
340-BR05	UT Ebenezer Creek Rail Bridge	C2K-LDN014.6	207	Rail	Waterway	23	9	4	8.47	1,753	Type D3	Type 10	Type 6	CIP Piles	413	36
340-BR06	Cunningham Highway Bridge	C2K-LDN016.6	53	Road	Rail	15/23/15	3	34	22.5	1,193	950 deep deck units + 220 slab	-	-	CIP Piles	315	34
340-BR07	Warrill Creek Rail Bridge	C2K-LDN016.6	713	Rail	Waterway	23	31	2	3.97	2,831	Type D1	Type 7 Type 9	Type 5	CIP Piles	1,038	62
340-BR08	Purga Creek 1 Rail Bridge	C2K-LDN023.2	621	Rail	Waterway	23	27	2	3.97	2,465	Type D1	Type 7 Type 9	Type 5	CIP Piles	1,180	54
340-BR09	Purga Creek 2 Rail Bridge	C2K-LDN023.2	759	Rail	Waterway	23	33	2	3.97	3,013	Type D1	Type 9	Type 5	CIP Piles	1,466	66
340-BR10A	Ipswich-Boonah Road Rail Bridge	C2K-LDN026.0	88	Rail	Road	25/38/25	3	3	4.55	400	Type D9	Type 31	Type 9	CIP Piles	108	9

ID	Bridge name	Laydown	Approx. length (m)	Structure	Crossing type	Span length (m)	Span number	No. of precast girders/ deck units per span	Bridge width (m)	Deck area (m^2)	Deck type	Pier type	Abutment type	Pier and abutment foundation	Concrete trucks	Precast trucks
340-BR10B	Ipswich-Boonah Road Loop Rail Bridge	C2K-LDN026.0	88	Rail	Road	25/38/25	3	3	4.55	400	Type D9	Type 31	Type 9	CIP Piles	108	9
340-BR11	Mount Flinders Road Rail Bridge	C2K-LDN027.8	69	Rail	Road	23	3	2	3.97	274	Type D1	Type 7	Type 5	CIP Piles	98	6
340-BR12	Sandy Creek Rail Bridge	C2K-LDN028.7	115	Rail	Waterway	23	5	2	3.97	457	Type D1	Type 7 Type 9	Type 5	CIP Piles	147	10
340-BR13	UT1 Purga Creek Rail Bridge	C2K-LDN035.8	115	Rail	Waterway	23	5	4	8.47	974	Type D3	Type 8	Type 6	CIP Piles	232	20
340-BR14	UT2 Purga Creek Rail Bridge	C2K-LDN036.6 C2K-LDN036.8	138	Rail	Waterway	23	6	4	8.47	1,169	Type D3	Type 8 Type 10	Type 6	CIP Piles	317	24
340-BR15	Washpool Road Rail Bridge	C2K-LDN036.6 C2K-LDN036.8	69	Rail	Road	23	3	4	8.47	584	Type D3	Type 8	Type 6	CIP Piles	132	12
340-BR16	UT3 Purga Creek Rail Bridge	C2K-LDN037.6	98	Rail	Waterway	14	7	2	3.97	389	Type D5	Type 1 Type 1A	Type 1	CIP Piles	122	5
340-BR17	UT4 Purga Creek Rail Bridge	C2K-LDN037.6	299	Rail	Waterway	23	13	2	3.97	1,187	Type D1	Type 7 Type 9	Type 5	CIP Piles	381	26
340-BR18	UT3 Dugandan Rail Bridge	C2K-LDN042.0	184	Rail	Waterway	23	8	2	3.97	730	Type D1	Type 7 Type 9 Type 11	Type 5	CIP Piles	250	16
340-BR19	UT1 Dugandan Creek Rail Bridge	C2K-LDN043.6	138	Rail	Waterway + Road	23	6	2	3.97	548	Type D1	Type 11 Type 13	Type 5	CIP Piles	311	12
340-BR20	Dugandan Creek 1 Rail Bridge	C2K-LDN043.6	161	Rail	Waterway	23	7	2	3.97	639	Type D1	Type 11 Type 13	Type 5	CIP Piles	352	14

ID	Bridge name	Laydown	Approx. length (m)	Structure	Crossing type	Span length (m)	Span number	No. of precast girders/ deck units per span	Bridge width (m)	Deck area (m^2)	Deck type	Pier type	Abutment type	Pier and abutment foundation	Concrete trucks	Precast trucks
340-BR21	Dugandan Creek 2 Rail Bridge	C2K-LDN043.6	230	Rail	Waterway	23	10	2	3.97	913	Type D1	Type 9 Type 11	Type 5	CIP Piles	415	20
340-BR22	Wild Pig Creek Rail Bridge	C2K-LDN045.5	115	Rail	Waterway	23	5	4	8.47	974	Type D3	Type 10 Type 12	Type 6	CIP Piles	257	20
340-BR23	UT2 Dugandan Creek Rail Bridge	C2K-LDN047.1	161	Rail	Waterway	23	7	4	8.47	1,364	Type D3	Type 8 Type 10 Type 12	Type 6	CIP Piles	328	28
340-BR24	UT1 Woollaman Creek Rail Bridge	C2K-LDN050.5	207	Rail	Waterway	23	9	2	3.97	822	Type D1	Type 7 Type 9 Type 11	Type 5	CIP Piles	324	18
340-BR25	UT2 Woollaman Creek Rail Bridge	C2K-LDN051.5	230	Rail	Waterway	23	10	2	3.97	913	Type D1	Type 7 Type 9 Type 11	Type 5	CIP Piles	388	20
340-BR26	Teviot Brook Rail Bridge	C2K-LDN052.6	722	Rail	Waterway + Road	30 x 2 3+1 x 32	31	D1- 2 D2 - 3	3.97	2,866	Type D1 - side spans Type D2 - centre span	Type 7 Type 9 Type 11 Type 13	Type 5	CIP Piles	1,547	93
340-BR27	Undullah Road Bridge	C2K-LDN053.8	70	Road	Rail	20/25/25	3	16	10.5	735	1050 deep deck units + 220 slab	-	typical	CIP Piles	218	5

Table 5.5 Concrete logistics for culvert construction

ID	Chainage (km)	Laydown	Type	Number of cells	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Headwall concrete volume (m^3)	Base concrete volume (m^3)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C0.341	0.341	C2K-LDN002.8	RCBC	5	1.80	1.5	30.97	154.9	24	84	108	63	18	7
C7.38	7.381	C2K-LDN009.7	RCP	20	1.20		68.14	1,362.7	46	0	46	558	8	56
C7.46	7.461	C2K-LDN009.7	RCP	40	1.20		67.50	2,700.1	90	0	90	1,107	15	111
C7.76	7.755	C2K-LDN009.7	RCP	10	1.50		71.36	713.6	34	0	34	292	6	30
C7.9	7.899	C2K-LDN009.7	RCP	15	1.20		74.97	1,124.5	34	0	34	461	6	47
C8.68	8.680	C2K-LDN009.7	RCP	4	1.20		31.55	126.2	10	0	10	52	2	6
C8.98	8.980	C2K-LDN09.7	RCP	2	1.50		19.44	38.9	8	0	8	16	2	2
C11.31	11.306	C2K-LDN012.1	RCP	5	1.20		36.33	181.7	12	0	12	74	2	8
C11.93	11.931	C2K-LDN012.1	RCP	12	1.20		51.49	617.9	28	0	28	253	5	26
C12.53	12.532	C2K-LDN014.2	RCP	12	1.20		9.24	110.9	28	0	28	45	5	5
C13.44	13.438	C2K-LDN014.2	RCP	15	2.40		55.14	827.1	110	0	110	339	19	34
C13.54	13.541	C2K-LDN014.2	RCP	18	1.20		47.32	851.7	42	0	42	349	7	35
C13.63	13.625	C2K-LDN014.2	RCP	15	1.20		38.76	581.4	34	0	34	238	6	24
C13.68	13.680	C2K-LDN014.2	RCP	5	1.20		37.27	186.3	12	0	12	76	2	8
C13.74	13.740	C2K-LDN014.2	RCP	10	1.20		36.54	365.4	24	0	24	150	4	15
C13.8	13.800	C2K-LDN014.2	RCP	5	1.20		37.20	186.0	12	0	12	76	2	8
C13.86	13.860	C2K-LDN014.2	RCP	25	1.20		37.99	949.8	58	0	58	389	10	39
C13.91	13.912	C2K-LDN014.2	RCP	25	1.20		38.27	956.6	58	0	58	392	10	40
C19.38	19.383	C2K-LDN016.6	RCP	27	1.20		10.80	291.7	62	0	62	120	11	12
C20.48	20.480	C2K-LDN021.8	RCP	8	1.20		10.43	83.4	18	0	18	34	3	4
C20.57	20.567	C2K-LDN021.8	RCP	10	1.20		13.97	139.7	24	0	24	57	4	6
C20.62	20.620	C2K-LDN021.8	RCP	16	1.20		12.65	202.4	36	0	36	83	6	9
C21.4	21.400	C2K-LDN021.8	RCP	21	1.05		10.34	217.2	40	0	40	89	7	9
C26.99	26.990	C2K-LDN026.0	RCP	8	1.20		27.83	222.6	18	0	18	91	3	10

ID	Chainage (km)	Laydown	Type	Number of cells	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Headwall concrete volume (m^3)	Base concrete volume (m^3)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C27.15	27.148	C2K-LDN026.0	RCP	4	1.05		25.67	102.7	8	0	8	42	2	5
C27.7	27.702	C2K-LDN026.0	RCBC	4	2.10	2.1	34.60	138.4	24	88	112	57	19	6
C27.84	27.840	C2K-LDN026.0	RCP	1	1.05		31.56	31.6	2	0	2	13	1	2
C28.18	28.180	C2K-LDN026.0	RCP	15	2.10		27.22	408.3	88	0	88	167	15	17
C28.6	28.600	C2K-LDN026.0	RCP	3	1.20		31.48	94.4	8	0	8	39	2	4
C29.24	29.240	C2K-LDN032.1	RCP	2	1.05		27.40	54.8	4	0	4	22	1	3
C29.38	29.380	C2K-LDN032.1	RCP	4	0.90		26.90	107.6	6	0	6	44	1	5
C29.76	29.756	C2K-LDN032.1	RCP	2	1.50		32.33	64.7	8	0	8	27	2	3
C29.94	29.938	C2K-LDN032.1	RCBC	9	2.10	2.1	58.55	526.9	52	332	384	216	64	22
C30.31	30.310	C2K-LDN032.1	RCP	2	2.10		37.28	74.6	12	0	12	31	2	4
C30.41	30.406	C2K-LDN032.1	RCP	3	1.20		21.11	63.3	8	0	8	26	2	3
C31.14	31.135	C2K-LDN032.1	RCP	3	2.40		51.06	153.2	22	0	22	63	4	7
C31.78	31.782	C2K-LDN032.1	RCP	6	1.20		30.23	181.4	14	0	14	74	3	8
C32.12	32.120	C2K-LDN032.1	RCBC	2	3.00	2.4	42.37	84.7	22	77	99	35	17	4
C32.26	32.263	C2K-LDN032.1	RCP	1	1.20		28.28	28.3	4	0	4	12	1	2
C32.92	32.915	C2K-LDN032.1	RCP	7	0.90		14.47	101.3	12	0	12	42	2	5
C33.21	33.208	C2K-LDN032.1	RCP	5	0.90		25.85	129.2	8	0	8	53	2	6
C33.31	33.308	C2K-LDN032.1	RCBC	5	2.40	2.4	18.14	90.7	38	66	104	37	18	4
C33.38	33.380	C2K-LDN032.1	RCP	7	1.35		25.15	176.1	20	0	20	72	4	8
C33.71	33.711	C2K-LDN032.1	RCP	2	0.90		14.08	28.2	4	0	4	12	1	2
C33.81	33.814	C2K-LDN032.1	RCBC	9	2.40	2.1	30.68	276.1	66	199	265	113	45	12
C34.21	34.210	C2K-LDN032.1	RCP	50	1.20		32.94	1646.9	114	0	114	675	19	68
C36.08	36.075	C2K-LDN035.8	RCP	2	2.40		56.71	113.4	16	0	16	46	3	5
C38.82	38.820	C2K-LDN039.5	RCBC	2	3.00	2.7	23.01	46.0	22	42	64	19	11	2
C41.37	41.370	C2K-LDN042.0	RCP	1	2.10		65.97	66.0	6	0	6	27	1	3

ID	Chainage (km)	Laydown	Type	Number of cells	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Headwall concrete volume (m^3)	Base concrete volume (m^3)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C41.43	41.425	C2K-LDN042.0	RCP	1	1.20		28.31	28.3	4	0	4	12	1	2
C41.53	41.532	C2K-LDN042.0	RCP	1	1.20		32.35	32.3	4	0	4	13	1	2
C41.73	41.725	C2K-LDN042.0	RCP	4	2.40		84.06	336.2	30	0	30	138	5	14
C42.17	42.167	C2K-LDN042.0	RCP	1	1.65		43.79	43.8	4	0	4	18	1	2
C42.5	42.500	C2K-LDN042.0	RCP	2	1.50		83.48	167.0	8	0	8	68	2	7
C43.8	43.795	C2K-LDN043.6	RCP	2	1.50		80.39	160.8	8	0	8	66	2	7
C44.24	44.235	C2K-LDN043.6	RCP	6	1.50		83.09	498.5	20	0	20	204	4	21
C44.48	44.481	C2K-LDN045.5	RCP	1	1.20		44.98	45.0	4	0	4	18	1	2
C45.66	45.661	C2K-LDN045.5	RCP	4	1.20		15.11	60.4	10	0	10	25	2	3
C46.47	46.465	C2K-LDN045.5	RCP	1	2.40		48.82	48.8	8	0	8	20	2	3
C46.6	46.595	C2K-LDN045.5	RCP	1	2.40		38.46	38.5	8	0	8	16	2	2
C47.22	47.222	C2K-LDN047.1	RCBC	8	1.20	0.9	19.07	152.5	18	55	73	63	13	7
C47.52	47.523	C2K-LDN047.1	RCP	1	1.35		30.35	30.4	4	0	4	12	1	2
C47.72	47.722	C2K-LDN047.1	RCP	1	1.05		36.70	36.7	2	0	2	15	1	2
C48.33	48.334	C2K-LDN047.1	RCP	12	1.50		53.15	637.8	40	0	40	261	7	27
C48.94	48.940	C2K-LDN050.2	RCP	1	2.10		39.74	39.7	6	0	6	16	1	2
C49.27	49.273	C2K-LDN050.2	RCP	2	1.05		11.80	23.6	4	0	4	10	1	1
C49.48	49.480	C2K-LDN050.2	RCP	2	1.20		34.01	68.0	6	0	6	28	1	3
C49.59	49.590	C2K-LDN050.2	RCP	1	1.80		24.49	24.5	6	0	6	10	1	2
C49.75	49.747	C2K-LDN050.2	RCP	1	1.65		20.85	20.8	4	0	4	9	1	1
C50.17	50.165	C2K-LDN050.2	RCP	6	1.50		53.51	321.1	20	0	20	132	4	14
C50.9	50.900	C2K-LDN050.2	RCP	1	2.40		30.08	30.1	8	0	8	12	2	2
C51.78	51.780	C2K-LDN052.6	RCP	2	1.35		21.52	43.0	6	0	6	18	1	2
C53.47	53.473	C2K-LDN053.8	RCP	1	1.20		23.00	23.0	4	0	4	9	1	1
C54.01	54.010	C2K-LDN053.8	RCP	2	1.80		43.65	87.3	10	0	10	36	2	4

ID	Chainage (km)	Laydown	Type	Number of cells	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Headwall concrete volume (m^3)	Base concrete volume (m^3)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C54.13	54.132	C2K-LDN053.8	RCP	2	1.35		40.89	81.8	6	0	6	34	1	4
C1.08	1.079	C2K-LDN053.8	RCP	3	1.65		22.00	66.0	12	0	12	27	2	3
C1.42	1.419	C2K-LDN053.8	RCBC	3	1.50	1.5	30.60	91.8	10	42	52	38	9	4

5.3.5 Construction water requirements

Overall, an allowance of 190 L of water per m^3 of earthworks has been made in building up the estimated water demand requirements. This is a conservative estimate based upon actual requirements to date recorded on the Toowoomba Second Range Crossing project. The main construction elements requiring water including quantity, quality and flow rate are detailed in Table 5.6. Any work on potential admixtures for water for earthworks or concrete production may impact the quantity and quality of water required.

Table 5.6 Construction water requirements

Construction activity/ process/phase	Uses/requirement	Quantity	Quality	Flow rate	Supply
Earthworks	Material conditioning and general dust suppression	High	Low	High	River, dam or bore
Concrete (by concrete supplier)	Bridge and culvert locations	Medium	High	Low	Town mains due to quality requirements
Trackworks	Ballast dust suppression during ballasting and regulating activities	Medium	Low	Low	River, dam or bore

Water supply to meet the expected demand is available from the Churchbank Weir (Warrill Creek) and Wyaralong Dam. Water will be supplied to various points along the Project for activities including earthworks, trackwork and dust suppression.

5.3.5.1 Construction water requirements – earthworks

The greatest water demand on the Project will be for the earthworks which predominately includes conditioning of material, haul road and laydown maintenance and dust suppression. Generally, earthworks operations require low quality water from sources such as dams and watercourses, and ideally high-quality water sources should be avoided for these construction activities.

Material conditioning will consume approximately 100 L of water per m^3 of fill, however this is variable, dependent upon material properties. The water demand for conditioning of the earthworks material on the Project is approximately 480 ML of water in total.

General dust suppression across the site will be a constant activity. An allowance of approximately 50 L of water per m^3 of fill has been made which equates to 240 ML of water in total.

Haul road and laydown area maintenance will also require water. An allowance of 40 L of water per m^3 of fill has been made which equates to 190 ML of water.

The total earthworks water requirements along the Project (ML vs Chainage) are provided in Figure 5.2.

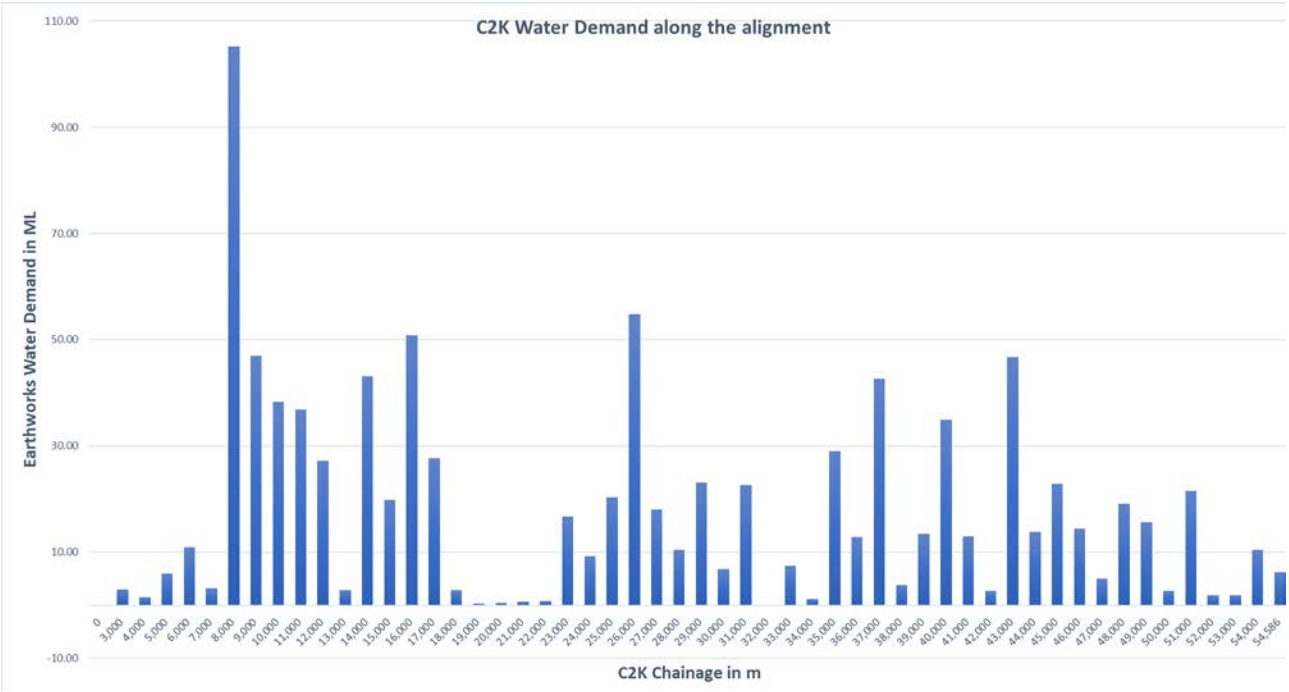


Figure 5.2 Water demand along Project

5.3.5.2 Construction water requirements – concrete

Any water supply associated with concrete works will be required to be in accordance with AS 1379 Specification and Supply of Concrete. Two potential concrete batch plant sites have been identified within the EIS Investigation Corridor. Further investigation in future design and constructability review phases of the Project will be required to determine their applicability for the Project. No specific water demand for these possible sites has been included at this stage.

The concrete will come from established concrete batch plants. The water required to produce this concrete has not been included within this report.

5.3.5.3 Construction water requirements – track works

The predominant use of construction water during track works is for dust suppression relating to ballasting works, and in particular ballast dropping and ballast regulating works during track tamping activities. An approximate allowance of 6 L per track metre has been considered for ballast dropping and 4 L per track metre for tamping and regulating activities. By adopting this allowance, the track works activity will consume approximately 28 ML of water.

5.3.5.4 Construction water requirements – waste water

The tunnel construction is expected to produce a constant volume of waste water that will either have to be treated or disposed of according to further testing. Tunnel wastewater discharge is currently expected to require treatment from a water treatment plant prior to release in order to meet the current environmental conditions of Purga Creek. The treated wastewater will require consideration of discharge quality and current water quality condition (including flow conditions) of the watercourse before discharge occurs.

5.4 Workforce

A preliminary estimate of the construction workforce required to undertake the works to the nominated program is shown in Figure 5.3. Workforce on site for the Project is estimated to peak at 620 full time equivalent (FTE) between weeks 65 and 75. The average number of FTE workforce on site across the full construction period is planned to be 271 personnel.

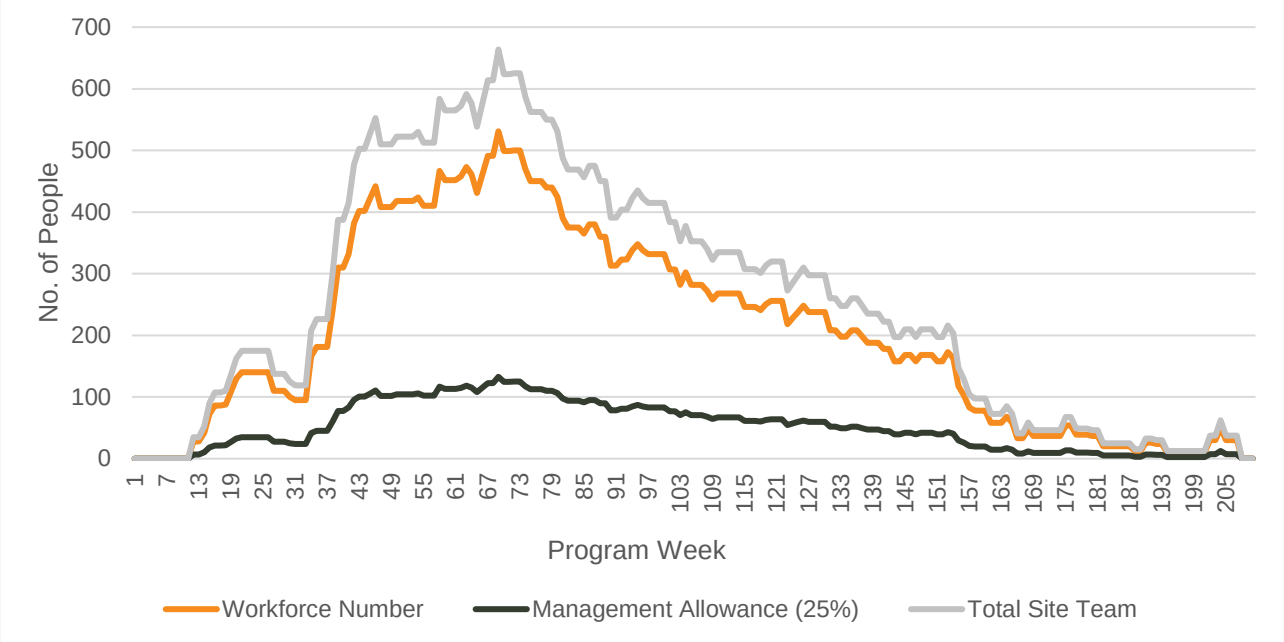


Figure 5.3 Estimated site workforce

Despite this number of personnel on site, an accommodation camp is not considered necessary due to the reasonably close proximity of population centres that will offer both workforce and accommodation options, summarised in Table 5.7 and shown in Figure 5.4.

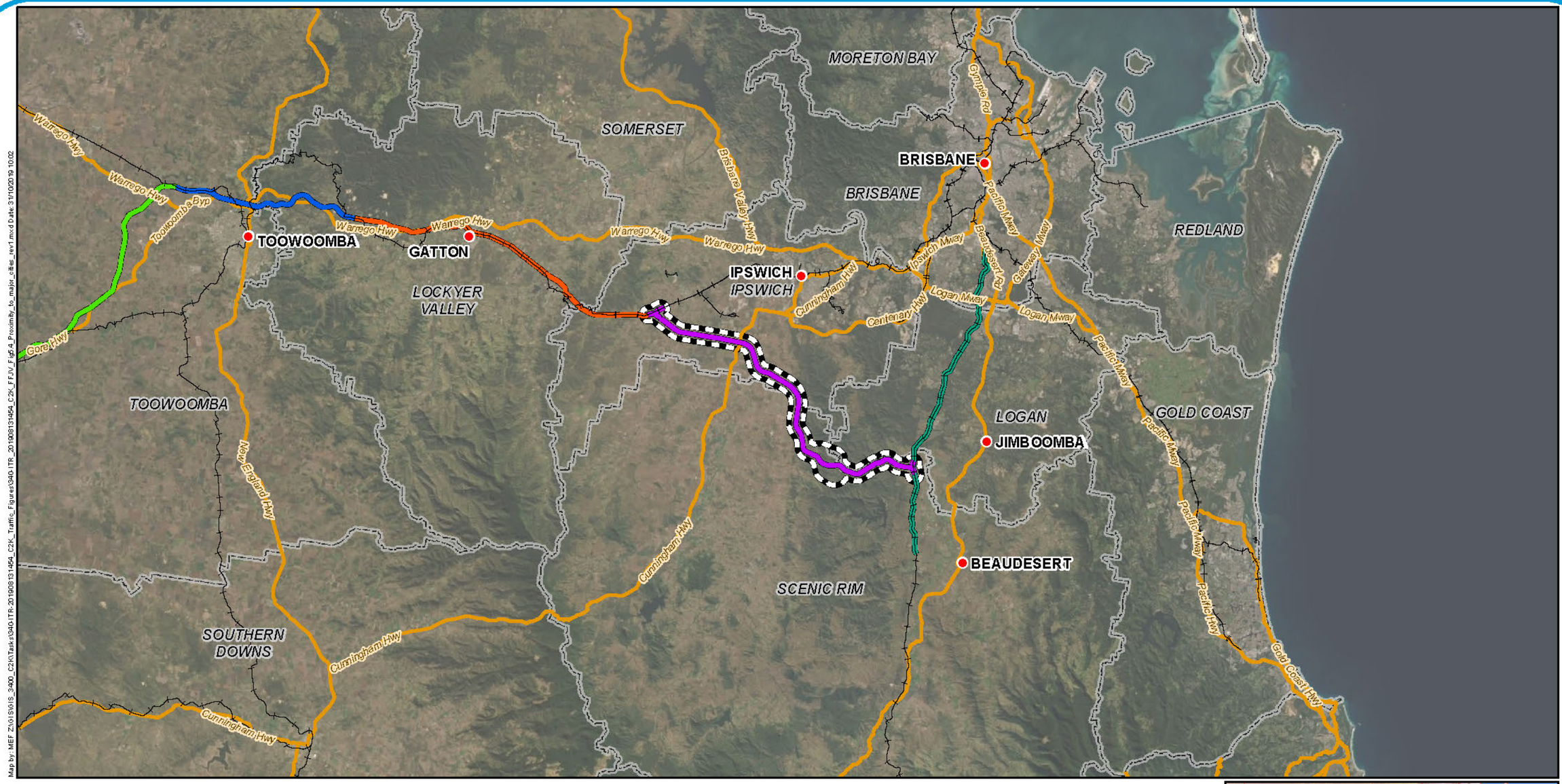
Table 5.7 Available accommodation

Town/city	Population	No. of hotels/motels [1]	No of available rentals (as of May 2018)[2]
Brisbane	2,054,000	850	1,500
Ipswich	218,000	30	5,00
Logan	303,390	20 [2]	1,400
Jimboomba	13,201	0	20
Beaudesert	6,395	10	50
Gatton	6,870	5	50
Toowoomba	100,000	100	500

Table notes:

1 Based on available, published data. Rounded estimates
2 Rounded estimates

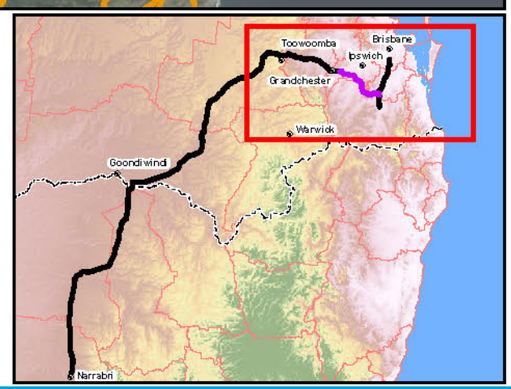
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Map by: MEF Z:\GIS\GIS_3400_C2K\Tasks\3401ITR_20190813\1464_C2K_Traffic_Figures\3401ITR_20190813\1464_C2K_FFJV_Fig5-4_Proximity_to_major_cities_rev1.mxd Date: 31/10/2019 10:02

Legend

- 5 Chainage (km)
- Major centres
- Existing rail
- B2G project alignment
- G2H project alignment
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- EIS investigation corridor
- Local Government Areas



A3 scale: 1:600,000

0 4.5 9 13.5 18 22.5 km

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Issue date: 31/10/2019 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru

Figure 5.4: C2K alignment proximity to major centres

5.5 Working hours

The construction program will be based on the following worksite hours:

- General construction activities:
  - Monday to Friday – 6.30 am to 6.00 pm
  - Saturday – 6.30 am to 1.00 pm
  - No work planned on Sundays or public holidays
- Track possessions, when the construction contractor has control over an operating railway, will proceed on a 7 day/24-hour period
- Track possession of QR assets will generally be allocated over weekend periods, with extended track possession over holiday periods or non-seasonal periods (i.e. outside of grain movement periods).

Extended working hours would be considered permissible where there are no nearby sensitive receptors or impacts to receivers can be appropriately managed. Any changes to working hours would be supported by assessing impacts to sensitive receptors. Works outside of standard construction hours may occur throughout the duration of the construction program and will involve:

- Delivery of concrete, steel, and other construction materials delivered to site by HVs
- Movements of heavy plant and materials
- Arrival and departure of construction staff during shift change-overs
- Roadworks to arterial roads
- Traffic control crews, including large truck mounted crash attenuator vehicles, medium rigid vehicles, and lighting towers
- Incident response including tow-trucks for light, medium, and HVs
- Alternative construction rosters to suit delivery and industrial relations issues may be investigated by the construction contractor.

The construction program is based on a five-day week at full productivity. The 0.5 day on Saturday is to account for maintenance and cycle time calculations that the contractor will carry out. This level of conservatism is deemed appropriate at this stage of design and program development.

5.6 Construction activity transport routes

For the purpose of the TIA, it has been assumed that all construction material deliveries are being made to laydown area delivery points along the Project. Primary construction routes determined for the Project are used for the purpose of the TIA. Proposed construction transport routes are identified in Section 2.2. Appendix A to Appendix H illustrate the various primary construction routes.

5.6.1 Access tracks and haul routes

Several access tracks, outlined in Table 5.8, will be developed to facilitate access to the laydown and construction sites located along the length of the Project. These access tracks have to be developed with an adequate pavement treatment suitable for the material type to be stored at the locations and vehicle type required to access the location.

Haul routes should be developed considering several factors such as separation requirements, one-way or two-way vehicle movements, overtaking requirements and vehicle weights to use the road. Haul routes will firstly look to adopt the future Rail Maintenance Access Road (RMAR) footprint or the formation prior to creating new tracks that will require future restoration once the construction work has been completed.

When planning for the exact location of access tracks and haul routes, an assessment should be made of above and underground services that may be affected by oversized loads or weights. This assessment should also consider the asset owners' maintenance access requirements.

Table 5.8 Temporary access track

ID	Adjoining road	Chainage (km)	Length (m)	Note
C2K-TRK005.8	Coveney Road	5.8	570	On future RMAR
C2K-TRK014.6	Paynes Road	14.6	1,500	On future RMAR
C2K-TRK023.0	Ipswich-Boonah Road	23.0	3,700	On future RMAR
C2K-TRK028.6	Mt Flinders Road	28.6	550	New alignment
C2K-TRK028.8	Dwyers Road	28.8	2,400	On future RMAR
C2K-TRK034.4	Washpool Road	34.4	2,450	On future RMAR
C2K-TRK039.0	Tunnel Portal West	39.0	2,200	Partial on future RMAR/Partial new road alignment
C2K-TRK042.4	Tunnel Portal East	41.0	6,700	New alignment from Wild Pig Creek Road, partial on future RMAR
C2K-TRK047.0	Wild Pig Creek Road access track	47.0	1,110	New alignment

Where a track is noted as 'On future RMAR' then it is within the disturbance footprint and using the footprint of the future RMAR. New alignments are required to get access to the construction sites.

5.6.2 Consolidated sleeper routes

For the purposes of this assessment, it has been assumed that ARTC will supply all of the concrete sleepers. The concrete sleepers are assumed to originate from New South Wales and be will distributed via the road network to various laydown areas.

Sleeper routes have been formulated using the National Heavy Vehicle Regulator (NHVR) journey planner which provides guidance in identifying suitable roads for HVs. The sleeper routes have then been consolidated where feasible to minimise the number of roads affected. This will be achieved by selecting the same roads where possible in circumstances where the alternate route does not increase the route distance significantly.

Two overarching sleeper routes have so far been generated for the Project and these include:

- North of the tunnel uses the Pacific Highway
- South of the tunnel uses Summerland Way and the Mount Lindesay Highway.

5.6.3 Delivery of water

Water supply is assumed to be available from Churchbank Weir located in south Ipswich, and Wyaralong Dam which is located north-west of Beaudesert. Water will be supplied to various points along the Project for activities including earthworks, trackwork and dust suppression.

5.6.4 Delivery and collection of plant, tools and materials

Delivery and collection of plant, tools and materials is expected to follow the same routes as workforce routes (refer Section 5.4).

5.6.5 Flash butt welding facility

It has been assumed that flash butt welding (FBW) facilities will be positioned at several locations along the alignment. It is unlikely that the Project will require a significantly sized FBW facility to support the requirements of such delivery equipment as a track laying machine. It is also assumed that rail will be delivered via the closest rail network (QR Western Line and ARTC Brisbane to Sydney Interstate Line).

The rail from this point can be:

- Positioned along the alignment in short rail lengths (<28 m) via trucks using the local road network or running along the alignment where possible. The rail can then be welded on-site and installed.
- Transported to an established FBW facility to be welded up into LWR (<400 m). The rail can then be transported down the rail corridor using rail roller.

The delivery of the rail via an external rail network will require further investigation and consultation with the asset owner of the network.

5.6.6 Precast concrete routes

For the purpose of the TIA, it has been assumed that precast concrete for the Project will be delivered from Ipswich and Brisbane. Routes are based on roads most likely to be used for the transportation of precast concrete taking into account input from the NHVR journey planner which provided guidance in identifying suitable roads for HVs based on gazetted HV routes and vehicle class restrictions. If any need arises for an oversize vehicle movement (excess mass or over-dimensional loads), DTMR and NVHR and other relevant authorities will be notified and permissions will be obtained as required under the *Transport Operations (Road Use Management) Act 1995* (Qld) and National HV Law and Regulations and the QLD modifications under the Heavy Vehicle National Law Regulation 2014. The permitting process and requirements do not form part of the scope of this TIA report.

It is assumed that all precast material for the Project will be supplied from Ipswich or Brisbane. Figure 5.5 shows the location of potential precast and bulk concrete facilities near the Project.

5.6.7 Quarry routes

Quarry routes for the Project are currently based on quarries located in Mount Marrow, Purga and Bromelton. These are the closest quarries to the Project likely to be able to provide the required ballast and capping. The quarry in Purga is in very close proximity to the Project.

For the purpose of the TIA it has been assumed that all ballast and capping deliveries will be made by road. Routes are based on roads most likely to be used for the transportation of quarry materials, taking into account distance and where possible staying on arterial roads and outside town centres.

Plans illustrating potential locations of the quarries relative to the Project are illustrated in Figure 5.6.

5.6.8 Rail routes

It has been assumed that rail will be supplied by a single source and will be distributed from the closest existing QR and ARTC rail network to various points along the Project where possible. Where further transportation is required to distribute rail to designated areas along the Project, road networks have been identified.

Rail will be delivered to three locations via the rail network – Rosewood, Lanefield and Kagaru. Thereafter, rail will be transported through the disturbance footprint and via the road network where appropriate. The rail routes that use road networks were formulated using the NHVR journey planner which provides guidance in identifying suitable roads for HVs. It is expected that QPS escorts will be required for transporting the rail via the road network.

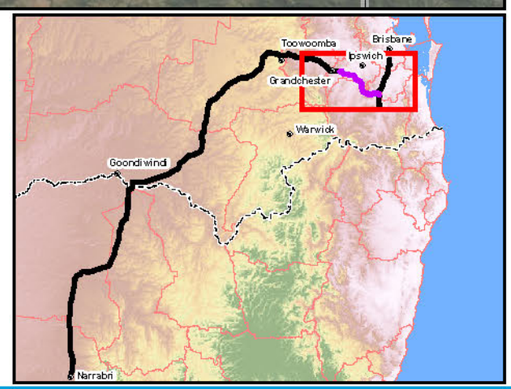
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map by: MEF Z:\GIS\GIS_3400_C2K\Task\3340\TR-20190813145 4_C2K_Traffic_Figures\3340-TR-20190813145 4_C2K_FFJV_Fig5.5_Concrete_suppliers_rev2.mxd Date: 5/11/2019 12:58

Glamorgan Vale
SOMERSET
Minden
Marburg
Warrego Hwy
Gatton
Grantham
Lawes
Forest Hill
LOCKYER VALLEY
Ma Ma Creek
Laidley
Boral Concrete Laidley
Grandchester
Calvert
Ebenezer
Willowbank
Rosewood
IPSWICH
Walloon
Ipswich
Brisbane Rd
Boral Concrete Ipswich
Cunningham Hwy
Rocla Precast Concrete Wacol
Humes Precast Concrete
Wagner Precast
Enco PRE cast Pty Ltd
Chuwar
Brisbane Valley Hwy
BRISBANE
Ipswich Mway
Logan Mway
Pacific Mway
Gateway Mway
Beaudesert Rd
Mount Lindesay Hwy
Capalaba
REDLAND
Beenleigh
Logan Village
LOGAN
Ormeau
GOLD COAST
Jimboomba
Purga
Goolman
Peak Crossing
Harrisville
Warrill View
Washpool
Flinders Lakes
Kagaru
Woolooman
Munbilla
SCENIC RIM
Tamborine
Eagle Heights
North Tamborine
Mount Tamborine
Kalbar
Aratula
Boonah
Beaudesert
Sunmix Concrete Pty Ltd
TOOWOOMBA
SOUTHERN DOWNS

Legend

- Concrete supplier
- Precast concrete supplier
- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- EIS investigation corridor
- Local Government Areas



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0 2 4 6 8 10 km

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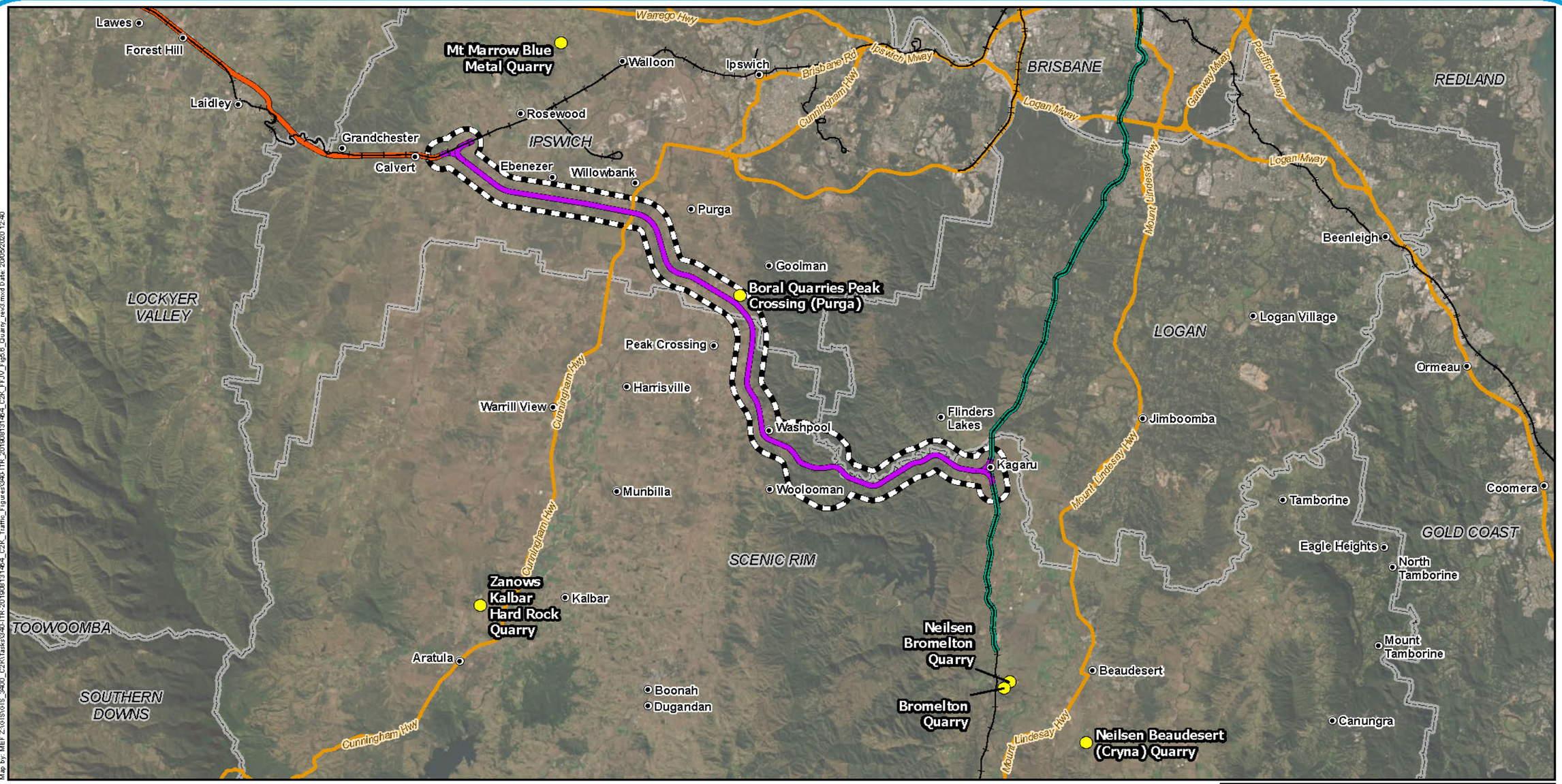
Calvert to Kagaru
Figure 5.5: C2K concrete suppliers

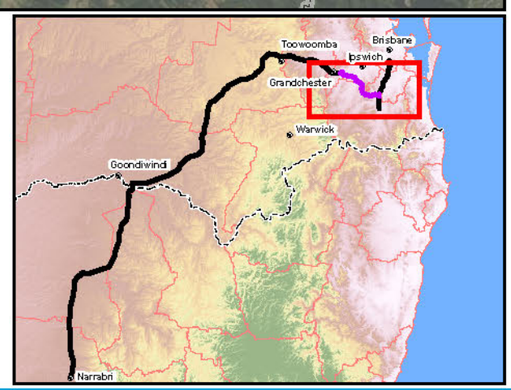
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Map by: MEF Z:\GIS\GIS_3400_C2K\Tasks\3340-ITR-20190813\464_C2K_Traffic_Figures\3340-ITR_20190813\464_C2K_FFJV_Fig5.6_Quarry_rev3.mxd Date: 20/05/2020 12:40

Legend

- 5 Chainage (km)
- Localities
- Quarry
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- EIS investigation corridor
- Local Government Areas



A3 scale: 1:290,490

0 2 4 6 8 10 km

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Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru

Figure 5.6: Quarry locations in the vicinity of C2K alignment

5.6.9 Ready-mix concrete routes

Two locations have been identified as potential concrete batch plant sites for the Project and are shown in Table 5.9. These locations are located along the vicinity of the EIS Investigation Corridor. The western tunnel portal is specifically to provide concrete products for tunnel construction and the potential site at Undullah Road is due to the potential for travel time limitations when supplying concrete from established batch plants on the northern side of the Project.

Table 5.9 Potential concrete batch plants

ID	Adjoining road	Chainage (km)	Description
C2K-LDN039.5	Tunnel Portal West	39.5	Support tunnel construction activities.
C2K-LDN053.8	Undullah Road	53.8	Support construction activities on eastern side of the tunnel.

5.6.10 Spoil routes

The Project produces approximately 1,622,504 m^3 of spoil to be managed or treated with the potential for reuse. A number of opportunities exist for the beneficial use of this material which have been detailed in EIS Chapter 21: Waste and Resource Management of the EIS.

The traffic assessment has conservatively assumed that all of this excess spoil material will be transported by road to end-of-life mines located along Ipswich-Rosewood Road (Ebenezer mine and New Hope mine). Approval for these sites to accept material has yet to be advanced.

5.6.11 Structural fill and capping

For the purposes of this assessment, it has been assumed that capping is transported by truck from commercial quarries along the Project. If there is a lack of suitable structural fill material from cuts, it is expected that structural fill will be sourced from the same quarry the capping material is sourced from.

5.6.12 Road network and restrictions on vehicle size

The transport corridors identified have taken into consideration the restrictions on vehicle sizes through the NHVR Journey Planner Tool. However, if any need arises for an oversize vehicle movement (excess mass or over-dimensional loads), DTMR and NVHR and other relevant authorities will be notified and permissions will be obtained as required under the *Transport Operations (Road Use Management) Act 1995* (Qld) and National Heavy Vehicle Law and Regulations and the Queensland modifications under the Heavy Vehicle National Law Regulation 2014. Obtaining vehicle permits is beyond the scope of this TIA. Further information on permits and approvals has been provided in Chapter 3: Project Approvals of the EIS.

Maps showing the multi-combination HV routes in the region have been provided in Appendix I.

5.6.13 Load restricted bridges

Table 5.10 lists bridges and culverts with load restrictions that are currently used by construction traffic routes. A number of these bridges will require further investigation and inspection, the outcomes of which may lead to upgrading for construction and operational purposes.

Table 5.10 Load limited bridges affected proposed construction traffic routes

Name of bridge	Load limit	Council/DTMR	Construction routes	Comment
Churchbank Bridge	15 t	SRRC	Water	
Dwyers Bridge	43 t	SRRC	Sleepers Precast concrete Concrete Workforce	
Ferguson Reserve Bridge	Unknown	SRRC	Sleepers Quarry Water	Bridge only required when road is flooded.
J S Cochrane Bridge	Unknown	SRRC/LCC	Precast concrete Concrete Workforce	
Dunn Bridge	Unknown	SRRC	Quarry Sleepers Water	
Undullah Road Rail Overpass	30 t	SRRC	Sleepers Quarry Precast concrete Concrete Workforce Water	Further assessment of this bridge will be required.
Brookland Bridge	Unknown	SRRC	Precast concrete Concrete Workforce	Bridge closed, creek crossing to the north of the bridge when creek not in flood.
Wibraham Bridge	43 t	SRRC/LCC	Sleepers Quarry Precast concrete Concrete Workforce Water	Part of Wild Pig Creek Road. Discussions with LCC have indicated that if this bridge requires upgrading a box culvert solution is preferable. ARTC will need to agree a suitable solution with SRRC during detailed design.
Heck Bridge	36 t	SRRC/LCC	Sleepers Quarry Precast concrete Concrete Workforce Water	Part of Wild Pig Creek Road. Discussions with LCC have indicated that if this bridge requires upgrading a box culvert solution is preferable. ARTC will need to agree a suitable solution with SRRC during detailed design.
Edward O'Neil Bridge	10 t	SRRC/LCC	Sleepers Quarry Concrete Workforce Water	This bridge has recently been upgraded and its suitability should be assessed before detailed design.
Woodhill Bridge	43 t	LCC	Precast concrete Concrete Workforce	Timber structure. Further assessment of this bridge will be required.
Wyatt Road Rail Overpass	13 t (timber)	ARTC	Sleepers Quarry Precast concrete Concrete Workforce Water	This bridge will have to be upgraded as part of the works. ARTC will use the road once a week with a 12.5 m rigid truck.
Egan Bridge	43 t	SRRC	Sleeper	Can be bypassed by redirection sleeper routes via the M1.
Beaudesert Boonah Road Culvert (23382)	Class 2 Single Trip	DTMR	Spoil disposal	

5.7 Construction schedule

This assessment supports Project planning and approval and presents an approach that supports the EIS. Typically, with respect to construction methodologies:

- They are conventional in nature and readily delivered by the contracting market
- They are associated with upper-bound impacts where these are feasible from cost planning/program perspectives. The EIS considers models that will give the detailed design phase flexibility with respect to delivery.
- The work-fronts, sequence and resources deployed are aimed at achieving the master-schedule to provide ARTC comfort that the project can be delivered within the target timeframe
- Anticipated land and access requirements respond to assumptions made above.

The following broad milestone dates were agreed as a basis for the current assessment:

- Early works 2021
- Line opening 2026.

The following assumptions have been made with respect to the overall construction schedule:

- Contractor access to the entire corridor available immediately post-award
- A contingency period for ARTC and for testing and commissioning has been allowed at the end of the Project construction.

5.8 Fire ant zones

The Project alignment passes through Fire Ant Zone 1 from Ch 14.2 to Ch 24.7 km with the rest of the alignment located in Fire Ant Zone 2. Under the *Biosecurity Act 2014* (Qld), all Queenslanders have a general biosecurity obligation to manage biosecurity risks and threats that are under their control, they know about or they are expected to know about. In terms of fire ants, a biosecurity risk exists when dealing with materials that are relevant to the Project that the pest can be carried in, including:

- Soil
- Turf
- Mulch
- Baled hay or straw
- Mining or quarry products.

Individuals and organisations moving or storing fire ant carriers can fulfil their general biosecurity obligation by:

- Understanding what fire ants look like and what materials they might be moved in
- Being aware if you are working in a fire ant biosecurity zone
- Being aware of movement controls relevant to the fire ant carrier you intend to move
- Cleaning down machinery and equipment used when dealing with fire ant carriers before moving the equipment off site
- Conducting inspections of material that can carry fire ants for any ant activity
- Reporting suspect ants online or by calling Biosecurity Queensland on phone number 13 25 23.

5.8.1 Managing fire ant carriers

The Biosecurity Regulation 2016 (Qld) prescribes procedures that must follow when moving or storing a fire ant carrier.

5.8.2 Checking for fire ants

To be able to successfully check for fire ants, a person must be suitably trained. Biosecurity Queensland provides free fire ant training sessions to assist with the identification of fire ants.

Common areas to look include:

- The perimeter of the site
- Garden and lawn areas
- Waste material storage areas
- Storage areas for equipment used for dealing with fire ant carriers
- Around buildings
- In and around unused equipment.

Before excavating or disturbing the ground, thorough visual check should be completed for any signs of fire ants. In the event that fire ants are identified, or any suspect ants should be reported to Biosecurity Queensland within 24 hours.

5.8.3 Removing the top one metre of soil

A fire ant colony in soil is usually found within the top 1 m layer of soil. The soil below can be accessed and safely moved off-site by removing this top metre of soil from ground level. The top layer of soil can be removed from site to a disposal facility without a biosecurity instrument permit. This top layer of soil should not be mixed with other soil layers that are being moved.

The below outlines certain conditions that must be met before moving fire ant carriers for soil movement within the fire ant biosecurity zones. In particular, there are different levels of controls for moving soil.

Table 5.11 Fire ant zone restrictions

Fire ant carrier	Fire Ant Biosecurity Zone 1	Fire Ant Biosecurity Zone 2	Fire Ant Biosecurity Zone 3
Soil (includes fill, clay, scrapings, and any material removed from the ground at a site where earthworks are being carried out).	A biosecurity instrument permit is required to move soil from a property within Fire Ant Biosecurity Zone 1, unless: ■ soil remains within Fire Ant Biosecurity Zone 1, or ■ soil is moved to a waste facility within Fire Ant Biosecurity zones 1 or 2	A biosecurity instrument permit is required to move soil from a property within Fire Ant Biosecurity Zone 2, unless: ■ soil remains within Fire Ant Biosecurity Zone 2 or is moved to Fire Ant Biosecurity Zone 1, or ■ soil is moved to a waste facility within Fire Ant Biosecurity zones 1 or 2	A biosecurity instrument permit is required to move soil from a property within Fire Ant Biosecurity Zone 3, unless: ■ soil remains within Fire Ant Biosecurity Zone 3, or ■ soil is moved to a waste facility within Fire Ant Biosecurity Zone 3

In terms of managing the movement of soil within the two identified fire ant zones along the Project, once the upper topsoil layers are removed, the risk of finding fire ants in the underlying material is greatly reduced and highly unlikely. Treatment and handling of any underlying material will need to be confirmed with Biosecurity Queensland.

The biosecurity instrument permit request can be obtained from a Biosecurity Queensland inspector or online (https://www.daf.qld.gov.au/business-priorities/biosecurity/about-biosecurity/apply-for-a-biosecurity-instrument-permit).

5.9 Traffic generation by activity

This section presents the traffic generated based on the quantities of construction materials, workforce and equipment in the above sections.

At this stage, no oversize vehicles are anticipated to be used for construction activities. However, if any need arises for an oversize vehicle movement (excess mass or over-dimensional loads) or restricted access vehicle (RAV) movements, the relevant authorities (DTMR, NVHR and other relevant authorities) will be notified and permissions will be obtained as required under the *Transport Operations (Road Use Management) Act 1995* (Qld) and National Heavy Vehicle Law and Regulations and the Queensland modifications under the Heavy Vehicle National Law Regulation 2014. Obtaining vehicle permits is beyond the scope of this TIA.

In order to take into account additional trips generated by factors such as quality compliance and breakages during construction, buffer factors have been applied to each construction activity. These also cater for potential minor changes to material volumes resulting from design and rail alignment updates (horizontal or vertical). It is also envisaged that these factors would cover any peak delivery times within the broad timeframes for the Project. This is discussed further in the below sections. The adjustment/buffer factors are provided in Table 5.12.

Table 5.12 Estimated buffers

Material	Delivery method	Estimated buffer for traffic assessment
General fill	Road	5% - there is no import of general fill.
Structural fill	Road	10%
Capping	Road	10%
Top ballast	Road	7.5%
Bottom ballast	Road	7.5%
Sleepers	Road	2.5%
Rail	Rail	2.5%
Precast concrete – bridge	Road	2.5% (to allow for a few broken beams)
In-situ concrete – bridge and culverts	Road	5% (over-excavation, wastage)
Culverts	Road	2.5% (quality compliance)
Construction water	Road	10%

Total trips by construction activity for each road section have been derived using material requirements and delivery schedules developed for the Project. These total trips have been summarised in Table 5.13 by activity and year of construction for the project.

Table 5.13 Total trips by activity per year

Material	2021	2022	2023	2024	2025	2026
Workers	7,537	90,446	90,446	90,446	90,446	37,686
Insitu concrete	0	2,398	5,904	5,208	1,936	0
Precast concrete	0	285	1,434	478	175	0
Quarry	0	0	0	4,274	8,110	0
Rail	0	0	0	0	205	0
Spoil	0	23,986	73,030	4,767	0	0
Sleepers	0	0	0	0	1,366	0
Water	0	8,729	16,714	17,056	9,949	0

The total trips are distributed along the construction routes (including accommodation), resulting in the total trips by road section as shown in Table 5.14 by year of construction.

Peak daily trips along each road segment have been calculated from the total trips by construction activity using the following key assumptions:

- 261 working days per year, resulting in an average of 22 working days per month. This is a conservative assumption as it does not take into account potential deliveries occurring on Saturdays or Sundays.
- Equal distribution of loads throughout the delivery period:
  - Buffer factors provided in Table 5.12 are to cover any potential ‘peak’ delivery times within this period
  - Peak delivery movements for different construction activities will likely not coincide with each other as the start date of construction activities are typically reliant on the end date of others.

Table 5.14 Total loads per year

Road name	Road section	2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR							
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	0	0	21,079	4,767	0	0
	212 - Between Wyaralong Dam Access and Tilley Road	0	756	24,900	8,748	2,322	0
	212 - Between Tilley Road and Sandy Creek Road	0	756	24,900	8,748	2,322	0
	212 - Between Sandy Creek Road and Bromelton House Road	0	756	24,900	8,997	3,318	0
	212 - Between Bromelton House Road and Ilbogan Road	0	0	0	680	1,368	0
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	0	0	0	0	812	0
	17B - Between Redbank Plains Road and Ripley Road	0	285	1,221	413	940	0
	17B - Between Ripley Road and Ipswich Boonah Road	0	1,273	4,029	2,568	2,155	0
	17B - Between Ipswich Boonah Road and Middle Road	1,807	34,033	55,746	29,073	25,860	9,034
	17B - Between Middle Road and Ipswich Rosewood Road	1,506	30,419	64,415	23,665	21,927	7,528
	17B - Between Ipswich Rosewood Road and Champions Way	1,506	21,058	21,415	20,854	22,914	7,528
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	0	5,697	6,877	6,877	4,012	0
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	0	0	0	0	182	0
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	2,415	40,364	61,774	36,917	34,452	12,075
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	1,360	29,107	50,381	24,258	18,983	6,798
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	1,360	28,527	52,057	25,933	19,756	6,798
	211 - Between Dwyers Road and Washpool Road	1,058	24,913	48,230	22,267	16,026	5,292
	211 - Between Washpool Road and Beaudesert Boonah Road	0	0	21,079	4,767	0	0
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	0	0	0	0	994	0
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	0	23,989	73,104	4,854	205	0
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	0	4	78	1,321	1,779	0
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	754	9,052	9,052	9,450	10,473	3,772
	32 - Between Haigslea Amberley Road and Moffatt Street	754	9,052	9,052	9,052	9,052	3,772

Road name	Road section	2021	2022	2023	2024	2025	2026
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	0	0	0	0	994	0
	Between Ipswich Motorway and Centenary Highway	0	0	212	66	47	0
	Between Centenary Highway and Mount Lindesay Highway	0	0	212	66	47	0
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	0	0	0	0	372	0
	25A - Between Logan Motorway and Undullah Road	0	0	212	66	47	0
	25A - Between Undullah Road and Allan Creek Road	2,561	31,545	32,634	32,354	31,096	12,805
	25A - Between Allan Creek Road and Eaglesfield Street	2,561	31,545	32,634	32,354	31,096	12,805
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	0	0	0	0	994	0
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	754	9,056	9,129	9,974	9,410	3,772
	38 - Between Lane Road and Grandchester Mount Mort Road	0	598	1,196	1,432	358	0
	38 - Between Grandchester Mount Mort Road and Crown Street	0	598	1,196	1,432	358	0
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	0	2	3	1,234	1,779	0
	35 - Between Reillys Road and Ebenezer Road	0	1,889	2,077	2,046	1,251	0
Warwick Road	301 – Between Moffat Road and Lobb Street	4,222	50,661	50,661	50,661	50,661	21,109
	301 – Between Lobb Street and Cunningham Highway	4,222	50,661	50,661	50,661	50,661	21,109
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	0	0	0	0	182	0
	18A - Between Brisbane Valley Highway and Pine Mountain Road	0	0	0	0	182	0
	18A - Between Pine Mountain Road and Cunningham Highway	0	0	0	0	182	0
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	0	2,275	5,103	5,103	2,977	0
State-controlled roads: RMS							
Pacific Motorway	Between Qld/NSW border and Gwydir Highway	0	0	0	0	994	0
Summerland Way	Between Qld/NSW border and Bruxner Way	0	0	0	0	372	0
	Between Bruxner Way and Red Lane	0	0	0	0	372	0
	Between Trenayr Road and Turf Street	0	0	0	0	994	0

Road name	Road section	2021	2022	2023	2024	2025	2026
Local Government Roads: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	0	994	0
Charles Street	Between Bent Street and Pacific Highway	0	0	0	0	994	0
Clark Road	Full Extent	0	0	0	0	994	0
Craig Street	Between Villiers Street and Bent Street	0	0	0	0	994	0
Dobie Street	Between Villers Street and Summerland Way	0	0	0	0	994	0
Red Lane	Between Summerland Way and Trenayr Road	0	0	0	0	372	0
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	0	994	0
	Between Clark Road and Red Lane	0	0	0	0	372	0
Villers Street	Between Craig Street and Dobie Street	0	0	0	0	994	0
Local government roads: ICC							
Briggs Road	Full Extent	0	988	2,808	2,155	1,215	0
Champions Way	Between Cunningham Highway and Paynes Road	903	14,218	14,331	14,601	14,172	4,517
Coopers Road	Between Cunningham Highway and Ebenezer Road	301	5,770	6,220	5,690	5,629	1,506
Coveney Road	Full Extent	453	7,329	7,518	8,718	8,469	2,266
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	301	5,770	6,220	5,690	5,629	1,506
Edwards Street	Between Ripley Road and Briggs Road	0	988	2,808	2,155	1,215	0
Fairbank Place	Full Extent	0	285	1,221	413	128	0
Hayes Road	Full Extent	453	7,312	7,484	8,715	8,409	2,266
Hillside Road	Full Extent	301	3,614	3,614	3,614	3,614	1,506
Lane Road	Between Rosewood Laidley Road and Waters Road	754	9,650	10,318	9,734	9,052	3,772
Macalister Street	Between Moffatt Street and Park Street	4,523	54,275	54,275	54,275	54,275	22,615
Middle Road	Between Cunningham Highway and Bill Morrow Road	301	3,614	18,438	5,408	3,933	1,506
	Between Bill Morrow Road and Ipswich City Council Boundary	0	0	912	1,095	639	0
Moffatt Street	Between Karrabin Rosewood Road and Macalister Street	754	9,052	9,052	9,052	9,052	3,772
	Between Macalister Street and Warwick Road	4,222	50,661	50,661	50,661	50,661	21,109

Road name	Road section	2021	2022	2023	2024	2025	2026
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	453	5,438	5,712	6,436	6,924	2,266
Mount Forbes Road	Between Ebenezer Road and Paynes Road	301	3,881	4,144	3,645	4,378	1,506
Mount Marrow Quarry Road	Full Extent	0	0	0	398	1,239	0
Newhill Drive	Full Extent	0	285	1,221	413	128	0
Noblevale Way	Full Extent	0	285	1,221	413	128	0
Old Grandchester Road	Between Lane Road and Strongs Road	453	5,438	5,438	5,438	5,438	2,266
Old Toowoomba Road	Between Toongarra Road and Moffatt Street	754	9,052	9,052	9,052	9,052	3,772
Park Street	Between Macalister Street and Warwick Road	4,523	54,275	54,275	54,275	54,275	22,615
Paynes Road	Between Champions Way and Mount Forbes Road	301	7,084	7,286	7,376	6,945	1,506
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	285	1,221	413	128	0
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	0	1,891	2,080	3,280	3,031	0
Ripley Road	Between Cunningham Highway and Edwards Street	0	988	2,808	2,155	1,215	0
Rob Roy Way	Full Extent	0	285	1,221	413	128	0
Strongs Road	Between Coveney Road and Rileys Road	0	1,891	2,080	3,280	3,031	0
	Between Old Grandchester Road and Coveney Road	453	5,438	5,438	5,438	5,438	2,266
T Morrows Road	Full Extent	0	0	0	2,517	4,879	0
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	0	0	0	398	1,239	0
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road	754	9,052	9,052	9,052	9,052	3,772
Waters Road	Between Lane Road and Kuss Road	301	4,212	4,880	4,296	3,614	1,506
Local government roads: LCC							
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	2,108	26,051	30,528	31,524	29,325	10,540
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	2,561	31,545	32,846	32,420	31,143	12,805
Undullah Road	Between Wyatt Road and Wild Pig Creek Road	2,108	26,051	30,528	31,524	29,325	10,540
Wyatt Road	Between Kilmoylar Road and Undullah Road	2,108	26,051	30,528	31,524	29,325	10,540
Wild Pig Creek Road	Full Extent	2,108	26,051	30,637	31,774	29,708	10,540

Road name	Road section	2021	2022	2023	2024	2025	2026
Local government roads: SRRC							
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	0	756	24,900	9,677	4,687	0
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road	0	0	0	0	0	0
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	0	756	24,900	9,677	4,687	0
Brookland Road	Between Undullah Road and Allan Creek Road	0	756	24,900	9,677	4,687	0
Cryna Road	Full Extent	0	0	0	680	996	0
Dwyers Road	Full Extent	301	3,614	3,897	3,692	3,891	1,506
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	2,561	30,733	30,733	30,733	30,733	12,805
Enterprise Drive	Full Extent	0	812	1,901	1,621	363	0
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	0	0	0	680	1,368	0
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	2,108	26,051	30,528	31,524	29,325	10,540
Middle Road	Between Ipswich City Council Boundary and Peak Crossing Churchbank Weir Road	0	0	912	1,095	639	0
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	0	5,697	6,877	6,877	4,012	0
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	0	847	3,389	3,389	1,977	0
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road	0	1,428	2,626	2,808	1,638	0
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road	0	0	0	249	996	0
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	0	0	0	680	1,368	0
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road	0	0	0	0	0	0
Undullah Road	Between LCC Council Boundary and Brookland Road	2,561	31,545	32,846	32,420	31,143	12,805
	Between Brookland Road and Kilmoylar Road	2,561	32,301	57,746	42,097	35,830	12,805
	Between Kilmoylar Road and S of Brennans Dip Road	453	6,250	6,359	5,688	6,138	2,266
Washpool Road	Between Ipswich Boonah Road to 5.5km E of Ipswich Boonah Road	1,058	24,913	27,081	17,474	16,026	5,292
Wild Pig Creek Road	Full Extent	2,108	26,051	30,637	31,774	29,708	10,540

Table 5.15 summarises the peak daily traffic volumes which would occur along each road segment of the proposed primary construction routes for each year of construction.

Table 5.15 Peak daily trips per road section by years

Road name	Road ID - Road section	2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR							
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	0	0	107	107	0	0
	212 - Between Wyaralong Dam Access and Tilley Road	0	11	122	122	15	0
	212 - Between Tilley Road and Sandy Creek Road	0	11	122	122	15	0
	212 - Between Sandy Creek Road and Bromelton House Road	0	11	122	125	25	0
	212 - Between Bromelton House Road and Ilbogan Road	0	0	0	10	27	0
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	0	0	0	0	37	0
	17B - Between Redbank Plains Road and Ripley Road	0	3	7	4	38	0
	17B - Between Ripley Road and Ipswich Boonah Road	0	12	21	13	38	0
	17B - Between Ipswich Boonah Road and Middle Road	82	177	306	198	135	82
	17B - Between Middle Road and Ipswich Rosewood Road	68	164	306	177	114	68
	17B - Between Ipswich Rosewood Road and Champions Way	68	86	87	105	117	68
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	0	26	26	26	26	0
Haigslea Amberley Road	3041 - Between Karrabin Rosewood Road and Warrego Highway	0	0	0	0	8	0
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	110	197	326	222	187	110
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	62	155	285	180	98	62
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	62	162	291	187	99	62
	211 - Between Dwyers Road and Washpool Road	48	148	276	172	80	48
	211 - Between Washpool Road and Beaudesert Boonah Road	0	0	107	107	0	0
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	0	0	0	0	45	0
Ipswich Rosewood Road	304 - Between Cunningham Highway and Ipswich Rosewood Road	0	201	347	107	5	0
	304 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	0	0	0	21	30	0
Karrabin Rosewood Road	3002 - Between Rosewood Laidley Road and Haigslea Amberley Road	34	34	34	50	58	34
	3002 - Between Haigslea Amberley Road and Moffatt Street	34	34	34	34	34	34

Road name	Road ID - Road section	2021	2022	2023	2024	2025	2026
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	0	0	0	0	45	0
	Between Ipswich Motorway and Centenary Highway	0	0	1	1	1	0
	Between Centenary Highway and Mount Lindesay Highway	0	0	1	1	1	0
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	0	0	0	0	17	0
	25A - Between Logan Motorway and Undullah Road	0	0	1	1	1	0
	25A - Between Undullah Road and Allan Creek Road	116	124	127	126	126	116
	25A - Between Allan Creek Road and Eaglesfield Street	116	124	127	126	126	116
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	0	0	0	0	45	0
Rosewood Laidley Road	308 - Between Karrabin Rosewood Road and Lane Road	34	34	35	40	40	34
	308 - Between Lane Road and Grandchester Mount Mort Road	0	5	5	10	5	0
	308 - Between Grandchester Mount Mort Road and Crown Street	0	5	5	10	5	0
Rosewood Warrill View Road	305 - Between Ipswich Rosewood Road and Reillys Road	0	0	0	21	30	0
	305 - Between Reillys Road and Ebenezer Road	0	8	8	8	8	0
Warwick Road	301 – Between Moffatt Road and Lobb Street	192	192	192	192	192	192
	301 – Between Lobb Street and Cunningham Highway	192	192	192	192	192	192
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	0	0	0	0	8	0
	18A - Between Brisbane Valley Highway and Pine Mountain Road	0	0	0	0	8	0
	18A - Between Pine Mountain Road and Cunningham Highway	0	0	0	0	8	0
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	0	19	19	19	19	0
State-controlled roads: RMS							
Pacific Motorway	Between Qld/NSW border and Gwydir Highway	0	0	0	0	17	0
Summerland Way	Between NSW/Qld Border and Bruxner Way	0	0	0	0	45	0
	Between Bruxner Way and Red Lane	0	0	0	0	17	0
	Between Trenayr Road and Turf Street	0	0	0	0	45	0

Road name	Road ID - Road section	2021	2022	2023	2024	2025	2026
Local government roads: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	0	45	0
Charles Street	Between Bent Street and Pacific Highway	0	0	0	0	45	0
Clark Road	Full Extent	0	0	0	0	45	0
Craig Street	Between Villiers Street and Bent Street	0	0	0	0	45	0
Dobie Street	Between Villers Street and Summerland Way	0	0	0	0	45	0
Red Lane	Between Summerland Way and Trenayr Road	0	0	0	0	17	0
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	0	45	0
	Between Clark Road and Red Lane	0	0	0	0	17	0
Villers Street	Between Craig Street and Dobie Street	0	0	0	0	45	0
Local government roads: ICC							
Briggs Road	Full Extent	0	10	15	11	27	0
Champions Way	Between Cunningham Highway and Paynes Road	41	56	56	69	77	41
Coopers Road	Between Cunningham Highway and Ebenezer Road	14	24	24	23	34	14
Coveney Road	Full Extent	21	28	28	50	58	21
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	14	24	24	23	34	14
Edwards Street	Between Ripley Road and Briggs Road	0	10	15	11	27	0
Fairbank Place	Full Extent	0	3	7	4	1	0
Hayes Road	Full Extent	21	28	28	50	58	21
Hillside Road	Full Extent	14	14	14	14	14	14
Lane Road	Between Rosewood Laidley Road and Waters Road	34	39	39	39	34	34
Macalister Street	Between Moffatt Street and Park Street	206	206	206	206	206	206
Middle Road	Between Cunningham Highway and Bill Morrow Road	14	14	144	21	21	14
Middle Road	Between Bill Morrow Road and ICC Boundary	0	0	4	4	4	0
Moffatt St	Between Karrabin Rosewood Road and Macalister Street	34	34	34	34	34	34
	Between Macalister Street and Warwick Road	192	192	192	192	192	192
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	21	21	24	36	36	21
Mount Forbes Road	Between Ebenezer Road and Paynes Road	14	16	17	15	26	14
Mount Marrow Quarry Road	Full Extent	0	0	0	16	16	0
Newhill Drive	Full Extent	0	3	7	4	1	0

Road name	Road ID - Road section	2021	2022	2023	2024	2025	2026
Noblevale Way	Full Extent	0	3	7	4	1	0
Old Grandchester Road	Between Lane Road and Strongs Road	21	21	21	21	21	21
Old Toowoomba Road	Between Toongarra Road and Moffatt Street	34	34	34	34	34	34
Park Street	Between Macalister Street and Warwick Road	206	206	206	206	206	206
Paynes Road	Between Champions Way and Mount Forbes Road	14	30	31	42	50	14
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	3	7	4	1	0
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	0	8	8	29	38	0
Ripley Road	Between Cunningham Highway and Edwards Street	0	10	15	11	27	0
Rob Roy Way	Full Extent	0	3	7	4	1	0
Strongs Road	Between Coveney Road and Rileys Road	0	8	8	29	38	0
Strongs Road	Between Old Grandchester Road and Coveney Road	21	21	21	21	21	21
T Morrows Road	Full Extent	0	0	0	55	55	0
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	0	0	0	16	16	0
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road	34	34	34	34	34	34
Waters Road	Between Lane Road and Kuss Road	14	18	19	19	14	14
Local government roads: LCC							
Kilmoylar Road	Between LCC Boundary and Wyatt Road	96	107	122	130	137	96
Undullah Road	Between Mount Lindesay Highway and LCC Boundary	116	124	128	127	127	116
	Between Wyatt Road and Wild Pig Creek Road	96	107	122	130	137	96
Wyatt Road	Between Kilmoylar Road and Undullah Road	96	107	122	130	137	96
Wild Pig Creek Road	Full Extent	96	107	122	134	141	96
Local government roads: SRRC							
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	0	11	122	133	52	0
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road	0	0	0	0	0	0
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	0	11	122	133	52	0
Brookland Road	Between Undullah Road and Allan Creek Road	0	11	122	133	52	0
Cryna Road	Full Extent	0	0	0	10	10	0
Dwyers Road	Full Extent	14	14	15	15	26	14

Road name	Road ID - Road section	2021	2022	2023	2024	2025	2026
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	116	116	116	116	116	116
Enterprise Drive	Full Extent	0	7	10	9	9	0
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	0	0	0	10	27	0
Kilmoylar Road	Between Undullah Road and LCC Boundary	96	107	122	130	137	96
Middle Road	Between ICC Boundary and Peak Crossing Churchbank Weir Road	0	0	4	4	4	0
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	0	26	26	26	26	0
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	0	13	13	13	13	0
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road	0	6	11	11	11	0
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road	0	0	0	10	10	0
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	0	0	0	10	27	0
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road	0	0	0	0	0	0
Undullah Road	Between LCC Boundary and Brookland Road	116	124	128	127	127	116
	Between Brookland Road and Kilmoylar Road	116	135	248	259	173	116
	Between Kilmoylar Road and S of Brennans Dip Road	21	28	29	28	32	21
Washpool Road	Between Ipswich Boonah Road to 5.5 km east of Ipswich Boonah Road	48	148	276	73	80	48
Wild Pig Creek Road	Full Extent	96	107	122	134	141	96

6 Traffic impact assessment

6.1 Traffic analysis

This section examines the impact of the Project on the road network. The Project related traffic consists of traffic generated by both construction and operational activities. However, it is anticipated that the impacts would primarily be during the construction phase of the Project. Throughout the operational phase, the impacts from the Project are expected to be low given the expected nature of operations (i.e. low vehicle movements to/from depots, transportation of maintenance material within the rail corridor) and associated Project traffic volumes to not trigger the 5 per cent threshold outlined in the GTIA.

6.1.1 Traffic growth rates

Traffic growth rates on SCRs were derived based on historic permanent census traffic data where available. Traffic growth rates were determined for road segments along SCR's envisaged to be impacted by the Project.

An evaluation of the traffic growth rates is provided in Appendix L for DTMR roads and Appendix M for RMS roads and revealed an overall AADT growth rate of 2 per cent which was adopted in the following analyses. In the absence of data to determine traffic growth rates, an average annual growth rate of 2 per cent for SCRs and LGRs was assumed.

6.1.2 Seasonal variation

Based on the dominant rural/agricultural land uses of the EIS investigation corridor, traffic volumes on the road network are likely to increase during harvesting season. During this season, HV usage on local and main roads in the TIA study area increases as trucks transport grain and tractors and harvesters move between properties. Farming machinery is generally much larger and slower than other vehicles using the roads and may result in localised delays. The impact of seasonal variation was taken into account as part of the analyses especially at road/rail interface locations, where the analysis outcomes provide input into the design.

In order to ensure as conservative analysis, the impact of seasonal variation was taken into account for the construction period, especially at road rail interface locations, where the analysis outcomes provide input into the design. The impact of seasonality was taken into consideration by means of:

- Road/rail interface analysis: It was considered to adopt 95th percentile output results from SIDRA modelling results instead of industry standard 85th percentile outputs. This is considered conservative as it accounts for additional vehicle queue and delay which might be induced through higher traffic volumes and slower moving vehicles.
- The LOS thresholds and associated K-values used within the analyses per road type as derived from the Austroads Part 2 – Guide to Traffic Engineering Practice: Roadway Capacity already accounts for the 30th highest hour traffic volumes of similar road types. This provides for upper LOS threshold limits which accounts for any micro fluctuations and peaks in traffic throughout the year.
- Seasonality is to be considered further in the development of the Traffic Management Plan (TMP) discussed in Section 9.2.

6.2 Construction phase

This section examines the impact of the Project related traffic on the existing road network operation. The following traffic analysis was performed on identified primary construction routes:

- Comparison of the Project traffic to the existing traffic to determine if the 5 per cent threshold is breached (road links and intersections)
- LOS analysis
- Intersection impact assessment analysis.

6.2.1 5 per cent traffic comparison on links

According to the GTIA, for the 5 per cent traffic comparison, the percentage traffic impact is calculated by expressing the traffic generated by the Project (future design years) as a percentage of the background traffic. A summary of the 5 per cent traffic comparison analysis is provided in Table 6.2 and Table 6.3 for all road sections in the transport corridor. This is provided for both directions of travel. Table 6.1 indicates the parameters adopted for the percentage comparison.

Table 6.1 Percentage impact parameter

Percentage impact range	Colour highlighted
Less than 5%	Green
Greater than or equal to 5% and <10%	Orange
Greater than or equal to 10%	Red

Table 6.2 5 per cent comparison summary (gazettal/northbound/eastbound directions)

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR							
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	0.0%	0.0%	5.7%	5.5%	0.0%	0.0%
	212 - Between Wyaralong Dam Access and Tilley Road	0.0%	0.6%	6.4%	6.3%	0.8%	0.0%
	212 - Between Tilley Road and Sandy Creek Road	0.0%	0.6%	6.4%	6.3%	0.8%	0.0%
	212 - Between Sandy Creek Road and Bromelton House Road	0.0%	0.6%	6.4%	6.5%	1.3%	0.0%
	212 - Between Bromelton House Road and Ilbogan Road	0.0%	0.0%	0.0%	0.5%	1.4%	0.0%
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
	17B - Between Redbank Plains Road and Ripley Road	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
	17B - Between Ripley Road and Ipswich Boonah Road	0.0%	0.1%	0.2%	0.1%	0.3%	0.0%
	17B - Between Ipswich Boonah Road and Middle Road	0.7%	1.6%	2.6%	1.7%	1.1%	0.7%
	17B - Between Middle Road and Ipswich Rosewood Road	0.6%	1.4%	2.6%	1.5%	0.9%	0.6%
	17B - Between Ipswich Rosewood Road and Champions Way	1.9%	2.3%	2.3%	2.7%	3.0%	1.7%
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	0.0%	0.7%	0.7%	0.7%	0.7%	0.0%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	3.6%	6.3%	10.2%	6.8%	5.6%	3.2%
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	2.0%	4.9%	8.9%	5.5%	2.9%	1.8%
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	3.4%	8.7%	15.3%	9.6%	5.0%	3.1%
	211 - Between Dwyers Road and Washpool Road	2.6%	8.0%	14.6%	8.9%	4.1%	2.4%
	211 - Between Washpool Road and Beaudesert Boonah Road	0.0%	0.0%	5.7%	5.5%	0.0%	0.0%
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	0.0%	4.7%	7.9%	2.4%	0.1%	0.0%
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	0.0%	0.0%	0.0%	1.2%	1.6%	0.0%
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	1.5%	1.5%	1.4%	2.1%	2.4%	1.4%
	32 - Between Haigslea Amberley Road and Moffatt Street	1.5%	1.4%	1.4%	1.4%	1.3%	1.3%
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
	Between Ipswich Motorway and Centenary Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Between Centenary Highway and Mount Lindesay Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%
	25A - Between Logan Motorway and Undullah Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25A - Between Undullah Road and Allan Creek Road	2.3%	2.4%	2.4%	2.3%	2.3%	2.1%
	25A - Between Allan Creek Road and Eaglesfield Street	2.3%	2.4%	2.4%	2.3%	2.3%	2.1%
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	2.0%	1.9%	1.9%	2.2%	2.1%	1.8%
	38 - Between Lane Road and Grandchester Mount Mort Road	0.0%	0.3%	0.3%	0.5%	0.3%	0.0%
	38 - Between Grandchester Mount Mort Road and Crown Street	0.0%	0.5%	0.5%	1.0%	0.5%	0.0%
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	0.0%	0.0%	0.0%	1.2%	1.6%	0.0%
	35 - Between Reillys Road and Ebenezer Road	0.0%	0.5%	0.5%	0.5%	0.5%	0.0%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Warwick Road	301 – Between Moffatt Road and Lobb Street	2.9%	2.9%	2.8%	2.8%	2.7%	2.7%
	301 – Between Lobb Street and Cunningham Highway	2.2%	2.1%	2.1%	2.1%	2.0%	2.0%
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	18A - Between Brisbane Valley Highway and Pine Mountain Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	18A - Between Pine Mountain Road and Cunningham Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	0.0%	13.9%	13.6%	13.4%	13.1%	0.0%
State-controlled roads: RMS							
Pacific Motorway	Between Qld/NSW border and Gwydir Highway	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%
Summerland Way	Between NSW/Qld Border and Bruxner Way	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%
	Between Bruxner Way and Red Lane	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%
	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Local government roads: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
Charles Street	Between Bent Street and Pacific Highway	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
Clark Road	Full Extent	0.0%	0.0%	0.0%	0.0%	9.8%	0.0%
Craig Street	Between Villiers Street and Bent Street	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Dobie Street	Between Villers Street and Summerland Way	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Red Lane	Between Summerland Way and Trenayr Road	0.0%	0.0%	0.0%	0.0%	3.7%	0.0%
Trenayr Road	Between Summerland Way and Clark Road	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
	Between Clark Road and Red Lane	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%
Villers Street	Between Craig Street and Dobie Street	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Local government roads: ICC							
Briggs Road	Full Extent	0.0%	0.3%	0.4%	0.3%	0.7%	0.0%
Champions Way	Between Cunningham Highway and Paynes Road	4.5%	6.1%	5.9%	7.1%	7.8%	4.1%
Coopers Road	Between Cunningham Highway and Ebenezer Road	1.3%	2.3%	2.3%	2.1%	3.0%	1.2%
Coveney Road	Full Extent	152.3%	206.4%	202.4%	348.9%	398.7%	137.9%
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	2.4%	4.0%	4.0%	3.7%	5.4%	2.1%
Edwards Street	Between Ripley Road and Briggs Road	0.0%	0.3%	0.4%	0.3%	0.8%	0.0%
Fairbank Place	Full Extent	0.0%	1.7%	4.1%	2.4%	0.7%	0.0%
Hayes Road	Full Extent	38.8%	52.4%	51.4%	88.1%	100.9%	35.2%
Hillside Road	Full Extent	25.8%	25.3%	24.8%	24.3%	23.8%	23.4%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Lane Road	Between Rosewood Laidley Road and Waters Road	27.9%	30.9%	30.7%	30.1%	25.7%	25.2%
Macalister Street	Between Moffatt Street and Park Street	30.7%	30.1%	29.5%	29.0%	28.4%	27.8%
Middle Road	Between Cunningham Highway and Bill Morrow Road	6.2%	6.1%	63.0%	9.1%	8.8%	5.6%
Middle Road	Between Bill Morrow Road and Ipswich City Council Boundary	0.0%	0.0%	1.8%	1.8%	1.7%	0.0%
Moffatt St	Between Karrabin Rosewood Road and Macalister Street	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
	Between Macalister Street and Warwick Road	3.0%	3.0%	2.9%	2.9%	2.8%	2.8%
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	7.4%	7.2%	8.3%	12.1%	11.8%	6.7%
Mount Forbes Road	Between Ebenezer Road and Paynes Road	5.5%	6.4%	6.4%	5.7%	9.6%	5.0%
Mount Marrow Quarry Road	Full Extent	0.0%	0.0%	0.0%	7.0%	6.8%	0.0%
Newhill Drive	Full Extent	0.0%	0.4%	1.0%	0.6%	0.2%	0.0%
Noblevale Way	Full Extent	0.0%	1.1%	2.7%	1.6%	0.5%	0.0%
Old Grandchester Road	Between Lane Road and Strongs Road	104.9%	102.9%	100.9%	98.9%	96.9%	95.0%
Old Toowoomba Road	Between Toongarra Road and Moffatt Street	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
Park Street	Between Macalister Street and Warwick Road	54.1%	53.1%	52.0%	51.0%	50.0%	49.0%
Paynes Road	Between Champions Way and Mount Forbes Road	2.9%	6.2%	6.1%	8.2%	9.6%	2.6%
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	0.0%	39.3%	38.6%	141.5%	177.8%	0.0%
Ripley Road	Between Cunningham Highway and Edwards Street	0.0%	0.2%	0.2%	0.2%	0.4%	0.0%
Rob Roy Way	Full Extent	0.0%	0.6%	1.4%	0.8%	0.2%	0.0%
Strongs Road	Between Coveney Road and Rileys Road	0.0%	33.6%	32.9%	120.8%	151.7%	0.0%
Strongs Road	Between Old Grandchester Road and Coveney Road	104.9%	102.9%	100.9%	98.9%	96.9%	95.0%
T Morrows Road	Full Extent	0.0%	0.0%	0.0%	54.5%	53.4%	0.0%
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	0.0%	0.0%	0.0%	7.6%	7.4%	0.0%
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Waters Road	Between Lane Road and Kuss Road	21.5%	28.1%	28.2%	27.7%	19.9%	19.5%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Local government roads: LCC							
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	52.5%	57.6%	64.2%	67.4%	69.4%	47.6%
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	182.8%	190.6%	193.2%	187.7%	184.0%	165.6%
	Between Wyatt Road and Wild Pig Creek Road	291.9%	320.4%	356.7%	374.6%	385.8%	264.4%
Wyatt Road	Between Kilmoylar Road and Undullah Road	180.6%	198.2%	220.7%	231.8%	238.7%	163.6%
Wild Pig Creek Road	Full Extent	225.7%	247.8%	276.5%	297.9%	306.4%	204.4%
Local government roads: SRRC							
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	0.0%	3.5%	36.4%	38.7%	14.9%	0.0%
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	0.0%	1.8%	18.7%	19.9%	7.7%	0.0%
Brookland Road	Between Undullah Road and Allan Creek Road	0.0%	4.7%	49.5%	52.7%	20.3%	0.0%
Cryna Road	Full Extent	0.0%	0.0%	0.0%	3.6%	3.5%	0.0%
Dwyers Road	Full Extent	67.9%	66.6%	70.5%	69.1%	120.6%	61.5%
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	12.2%	11.9%	11.7%	11.5%	11.3%	11.0%
Enterprise Drive	Full Extent	0.0%	1.3%	1.8%	1.6%	1.5%	0.0%
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	0.0%	0.0%	0.0%	5.0%	13.1%	0.0%
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	33.3%	36.6%	40.7%	42.7%	44.0%	30.2%
Middle Road	Between Ipswich City Council Boundary and Peak Crossing Churchbank Weir Road	0.0%	0.0%	1.8%	1.8%	1.7%	0.0%
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	0.0%	30.5%	29.9%	29.3%	28.7%	0.0%
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	0.0%	11.9%	11.6%	11.4%	11.2%	0.0%
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road	0.0%	1.8%	2.9%	2.9%	2.8%	0.0%
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road	0.0%	0.0%	0.0%	1.6%	1.6%	0.0%
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	0.0%	0.0%	0.0%	6.0%	15.7%	0.0%
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Undullah Road	Between LCC Council Boundary and Brookland Road	354.6%	369.7%	374.8%	364.0%	356.8%	321.2%
	Between Brookland Road and Kilmoylar Road	354.6%	403.9%	727.4%	742.5%	485.5%	321.2%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
	Between Kilmoylar Road and S of Brennans Dip Road	62.7%	83.6%	84.0%	79.8%	89.3%	56.8%
Washpool Road	Between Ipswich Boonah Road to 5.5 km E of Ipswich Boonah Road	57.4%	173.1%	316.9%	82.4%	88.5%	52.0%
Wild Pig Creek Road	Full Extent	225.7%	247.8%	276.5%	297.9%	306.4%	204.4%

Table 6.3 5 per cent comparison summary (Anti-gazettal/southbound/westbound directions)

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR							
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	0.0%	0.0%	5.7%	5.6%	0.0%	0.0%
	212 - Between Wyaralong Dam Access and Tilley Road	0.0%	0.6%	6.5%	6.4%	0.8%	0.0%
	212 - Between Tilley Road and Sandy Creek Road	0.0%	0.6%	6.5%	6.4%	0.8%	0.0%
	212 - Between Sandy Creek Road and Bromelton House Road	0.0%	0.6%	6.5%	6.5%	1.3%	0.0%
	212 - Between Bromelton House Road and Ilbogan Road	0.0%	0.0%	0.0%	0.5%	1.4%	0.0%
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
	17B - Between Redbank Plains Road and Ripley Road	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
	17B - Between Ripley Road and Ipswich Boonah Road	0.0%	0.1%	0.2%	0.1%	0.3%	0.0%
	17B - Between Ipswich Boonah Road and Middle Road	0.7%	1.5%	2.6%	1.6%	1.1%	0.7%
	17B - Between Middle Road and Ipswich Rosewood Road	0.6%	1.4%	2.6%	1.5%	0.9%	0.5%
	17B - Between Ipswich Rosewood Road and Champions Way	1.8%	2.2%	2.2%	2.6%	2.9%	1.6%
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	0.0%	0.7%	0.7%	0.6%	0.6%	0.0%
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	3.3%	5.8%	9.5%	6.3%	5.2%	3.0%
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	1.9%	4.6%	8.2%	5.1%	2.7%	1.7%
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	3.4%	8.8%	15.5%	9.8%	5.1%	3.1%
	211 - Between Dwyers Road and Washpool Road	2.7%	8.0%	14.7%	9.0%	4.1%	2.4%
	211 - Between Washpool Road and Beaudesert Boonah Road	0.0%	0.0%	5.7%	5.6%	0.0%	0.0%
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	0.0%	4.8%	8.1%	2.4%	0.1%	0.0%
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	0.0%	0.0%	0.0%	1.2%	1.6%	0.0%
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	1.6%	1.6%	1.6%	2.3%	2.6%	1.5%
	32 - Between Haigslea Amberley Road and Moffatt Street	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
	Between Ipswich Motorway and Centenary Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Between Centenary Highway and Mount Lindesay Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%
	25A - Between Logan Motorway and Undullah Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	25A - Between Undullah Road and Allan Creek Road	2.3%	2.4%	2.4%	2.3%	2.3%	2.1%
	25A - Between Allan Creek Road and Eaglesfield Street	2.3%	2.4%	2.4%	2.3%	2.3%	2.1%
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	2.1%	2.1%	2.0%	2.3%	2.2%	1.9%
	38 - Between Lane Road and Grandchester Mount Mort Road	0.0%	0.3%	0.3%	0.6%	0.3%	0.0%
	38 - Between Grandchester Mount Mort Road and Crown Street	0.0%	0.5%	0.5%	1.0%	0.5%	0.0%
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	0.0%	0.0%	0.0%	1.2%	1.6%	0.0%
	35 - Between Reillys Road and Ebenezer Road	0.0%	0.5%	0.4%	0.5%	0.4%	0.0%
Warwick Road	301 – Between Moffatt Road and Lobb Street	2.9%	2.9%	2.8%	2.8%	2.7%	2.7%
	301 – Between Lobb Street and Cunningham Highway	2.2%	2.1%	2.1%	2.1%	2.0%	2.0%
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	18A - Between Brisbane Valley Highway and Pine Mountain Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	18A - Between Pine Mountain Road and Cunningham Highway	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	0.0%	13.9%	13.6%	13.4%	13.1%	0.0%
State-controlled roads: RMS							
Pacific Motorway	Between Qld/NSW border and Gwydir Highway	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Summerland Way	Between NSW/Qld Border and Bruxner Way	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%
	Between Bruxner Way and Red Lane	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%
	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Local government roads: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
Charles Street	Between Bent Street and Pacific Highway	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
Clark Road	Full Extent	0.0%	0.0%	0.0%	0.0%	9.8%	0.0%
Craig Street	Between Villiers Street and Bent Street	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Dobie Street	Between Villers Street and Summerland Way	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Red Lane	Between Summerland Way and Trenayr Road	0.0%	0.0%	0.0%	0.0%	3.7%	0.0%
Trenayr Road	Between Summerland Way and Clark Road	0.0%	0.0%	0.0%	0.0%	2.0%	0.0%
	Between Clark Road and Red Lane	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%
Villers Street	Between Craig Street and Dobie Street	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
Local government roads: ICC							
Briggs Road	Full Extent	0.0%	0.3%	0.4%	0.3%	0.7%	0.0%
Champions Way	Between Cunningham Highway and Paynes Road	4.5%	6.1%	5.9%	7.1%	7.8%	4.1%
Coopers Road	Between Cunningham Highway and Ebenezer Road	1.3%	2.3%	2.3%	2.1%	3.0%	1.2%
Coveney Road	Full Extent	152.3%	206.4%	202.4%	348.9%	398.7%	137.9%
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	2.4%	4.0%	4.0%	3.7%	5.4%	2.1%
Edwards Street	Between Ripley Road and Briggs Road	0.0%	0.3%	0.4%	0.3%	0.8%	0.0%
Fairbank Place	Full Extent	0.0%	2.0%	4.8%	2.8%	0.8%	0.0%
Hayes Road	Full Extent	38.8%	52.4%	51.4%	88.1%	100.9%	35.2%
Hillside Road	Full Extent	25.8%	25.3%	24.8%	24.3%	23.8%	23.4%
Lane Road	Between Rosewood Laidley Road and Waters Road	32.0%	35.5%	35.2%	34.5%	29.6%	29.0%
Macalister Street	Between Moffatt Street and Park Street	23.6%	23.1%	22.6%	22.2%	21.8%	21.3%
Middle Road	Between Cunningham Highway and Bill Morrow Road	4.9%	4.8%	50.0%	7.2%	6.9%	4.5%
Middle Road	Between Bill Morrow Road and Ipswich City Council Boundary	0.0%	0.0%	1.4%	1.4%	1.4%	0.0%
Moffatt St	Between Karrabin Rosewood Road and Macalister Street	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
	Between Macalister Street and Warwick Road	3.0%	3.0%	2.9%	2.9%	2.8%	2.8%
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	7.5%	7.3%	8.5%	12.3%	12.0%	6.8%
Mount Forbes Road	Between Ebenezer Road and Paynes Road	5.6%	6.5%	6.5%	5.8%	9.8%	5.1%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Mount Marrow Quarry Road	Full Extent	0.0%	0.0%	0.0%	6.9%	6.7%	0.0%
Newhill Drive	Full Extent	0.0%	0.4%	0.9%	0.5%	0.2%	0.0%
Noblevale Way	Full Extent	0.0%	1.1%	2.6%	1.6%	0.5%	0.0%
Old Grandchester Road	Between Lane Road and Strongs Road	104.9%	102.9%	100.9%	98.9%	96.9%	95.0%
Old Toowoomba Road	Between Toongarra Road and Moffatt Street	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
Park Street	Between Macalister Street and Warwick Road	54.1%	53.1%	52.0%	51.0%	50.0%	49.0%
Paynes Road	Between Champions Way and Mount Forbes Road	16.7%	36.0%	35.8%	47.9%	55.8%	15.1%
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	0.0%	39.3%	38.6%	141.5%	177.8%	0.0%
Ripley Road	Between Cunningham Highway and Edwards Street	0.0%	0.2%	0.2%	0.2%	0.4%	0.0%
Rob Roy Way	Full Extent	0.0%	0.6%	1.5%	0.9%	0.3%	0.0%
Strongs Road	Between Coveney Road and Rileys Road	0.0%	33.6%	32.9%	120.8%	151.7%	0.0%
Strongs Road	Between Old Grandchester Road and Coveney Road	104.9%	102.9%	100.9%	98.9%	96.9%	95.0%
T Morrows Road	Full Extent	0.0%	0.0%	0.0%	53.9%	52.9%	0.0%
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	0.0%	0.0%	0.0%	7.6%	7.4%	0.0%
Toongarra Road	Between Karrabin Rosewood Road and Old Toowoomba Road	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Waters Road	Between Lane Road and Kuss Road	21.5%	28.1%	28.2%	27.7%	19.9%	19.5%
Local government roads: LCC							
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	52.5%	57.6%	64.2%	67.4%	69.4%	47.6%
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	176.9%	184.5%	187.0%	181.6%	178.0%	160.3%
	Between Wyatt Road and Wild Pig Creek Road	291.9%	320.4%	356.7%	374.6%	385.8%	264.4%
Wyatt Road	Between Kilmoylar Road and Undullah Road	180.6%	198.2%	220.7%	231.8%	238.7%	163.6%
Wild Pig Creek Road	Full Extent	225.7%	247.8%	276.5%	297.9%	306.4%	204.4%
Local government roads: SRRC							
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	0.0%	3.5%	36.4%	38.7%	14.9%	0.0%
Brabazon Road	Between Beaudesert Boonah Road and Allan Creek Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	0.0%	1.8%	18.7%	19.9%	7.7%	0.0%

Road name	Road ID - Road section	Year of construction					
		2021	2022	2023	2024	2025	2026
Brookland Road	Between Undullah Road and Allan Creek Road	0.0%	4.3%	45.3%	48.2%	18.5%	0.0%
Cryna Road	Full Extent	0.0%	0.0%	0.0%	4.0%	3.9%	0.0%
Dwyers Road	Full Extent	67.9%	66.6%	70.5%	69.1%	120.6%	61.5%
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	12.2%	11.9%	11.7%	11.5%	11.3%	11.0%
Enterprise Drive	Full Extent	0.0%	1.3%	1.8%	1.6%	1.5%	0.0%
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	0.0%	0.0%	0.0%	5.0%	13.1%	0.0%
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	33.3%	36.6%	40.7%	42.7%	44.0%	30.2%
Middle Road	Between Ipswich City Council Boundary and Peak Crossing Churchbank Weir Road	0.0%	0.0%	1.4%	1.4%	1.4%	0.0%
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	0.0%	30.5%	29.9%	29.3%	28.7%	0.0%
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	0.0%	11.9%	11.6%	11.4%	11.2%	0.0%
	Between Mutdapilly Churchbank Weir Road and Ipswich Boonah Road	0.0%	1.8%	2.9%	2.9%	2.8%	0.0%
Sandy Creek Road	Between Beaudesert Boonah Road and Swan Gully Road	0.0%	0.0%	0.0%	1.6%	1.6%	0.0%
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	0.0%	0.0%	0.0%	6.0%	15.7%	0.0%
Tilley Road	Between Beaudesert Boonah Road and Allan Creek Road	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Undullah Road	Between LCC Council Boundary and Brookland Road	354.6%	369.7%	374.8%	364.0%	356.8%	321.2%
	Between Brookland Road and Kilmoylar Road	354.6%	403.9%	727.4%	742.5%	485.5%	321.2%
	Between Kilmoylar Road and S of Brennans Dip Road	62.7%	83.6%	84.0%	79.8%	89.3%	56.8%
Washpool Road	Between Ipswich Boonah Road to 5.5 km E of Ipswich Boonah Road	58.1%	175.4%	320.9%	83.5%	89.6%	52.6%
Wild Pig Creek Road	Full Extent	225.7%	247.8%	276.5%	297.9%	306.4%	204.4%

Table 6.2 and Table 6.3 show that that significant construction impacts are expected in all years of construction, with Year 2022 to Year 2025 of the construction phase likely generating the highest construction related traffic volumes on the surrounding road network. Although some of the sections exceeded 10 per cent of the background traffic by significant margins, this is primarily due to the low background traffic volumes along these sections.

A summary of the number of roads with construction traffic that exceeds 5 per cent of base AADT has been provided for each road authority in Table 6.4. For these routes, certain sections will generate construction related traffic volumes in excess of 5 or 10 per cent of the background traffic during the construction phase.

The percentage comparison by itself, does not provide an accurate overview of the Project's impact on the surrounding road network as it does not reflect the magnitude of the Project related traffic volumes on the operational performance of the road network. Further comparisons to identify the magnitude of the project related traffic against the background traffic are further discussed and the results are presented in Section 6.2.2.

The impacts identified due to various construction activities are expected to be short term and only for the duration of the specific activities. Generally, the level of impacts identified would only be for periods less than one year which can be mitigated through adequate traffic management measures.

Table 6.4 Number of roads exceeding 5 per cent base AADT by road authority

Road Authority	Number of roads links	
	5–10% of base AADT	>10% base AADT
DTMR	7	4
CVC	1	0
ICC	6	14
LCC	0	5
SRRC	0	15

6.2.2 Level of service comparison on links

The primary aim of the LOS analysis is to determine the level of impact the Project generated traffic has on the road network by determining the change in LOS in the peak hour for each road section. The following section provides a summary of the performance analyses carried out to determine the "without" and "with Project" traffic LOS for various construction route road sections during the year construction is expected.

Peak hour traffic volumes were derived from peak daily volumes using the following key assumptions:

- Material delivery movements will be evenly distributed across the standard 12 hours of construction
- It has been assumed that two shifts will occur per day with 50 per cent of total staff working each shift. Staff shift changeovers have been conservatively assumed to occur simultaneously with the background traffic peak hour.

As per the GTIA, LOS C is considered to be the minimum standard on rural roads, although a LOS D may be acceptable during events such as construction. Therefore, all road sections currently operating above LOS D are considered to be operating above the acceptable standard. The LOS analysis was only undertaken for the construction route sections which exceed the 5 per cent threshold. For the purpose of comparing the expected LOS for each affected road section, the performance "with" and "without" the Project related traffic is summarised in Table 6.5 and Table 6.6.

Table 6.5 Primary construction routes level of service results gazettal direction/northbound/eastbound

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR														
Beaudesert Boonah Road	Between Ipswich Boonah Road and Wyaralong Dam Access	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Wyaralong Dam Access and Tilley Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Tilley Road and Sandy Creek Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Sandy Creek Road and Bromelton House Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
Ipswich Boonah Road	Between Cunningham Highway and Mt Flinders Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
	Between Mt Flinders Road and Warrill View Peak Crossing Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
	Between Warrill View Peak Crossing Road and Dwyers Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Dwyers Road and Washpool Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Washpool Road and Beaudesert Boonah Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
Ipswich Rosewood Road	Between Cunningham Highway and Ipswich Rosewood Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
Warrill View Peak Crossing Road	Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: CVC														
Clark Road	Full Extent	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: ICC														
Champions Way	Between Cunningham Highway and Paynes Road	Two-lane two-way	A	B	B	B	B	B	B	B	B	B	B	B
Coveney Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Hayes Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Hillside Road	Full Extent	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Lane Road	Between Rosewood Laidley Road and Waters Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Macalister Street	Between Moffatt Street and Park Street	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Middle Road	Between Cunningham Highway and Bill Morrow Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Forbes Road	Between Ebenezer Road and Paynes Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Marrow Quarry Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Old Grandchester Road	Between Lane Road and Strongs Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Park Street	Between Macalister Street and Warwick Road	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Paynes Road	Between Champions Way and Mount Forbes Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Reillys Road	Between Strongs Rd and Rosewood Warrill View Rd	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Strongs Road	Between Coveney Road and Rileys Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Strongs Road	Between Old Grandchester Road and Coveney Road	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
T Morrows Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Waters Road	Between Lane Road and Kuss Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Local government roads: LCC														
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Undullah Road	Between Wyatt Road and Wild Pig Creek Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Wyatt Road	Between Kilmoylar Road and Undullah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Wild Pig Creek Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: SRRC														
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Brookland Road	Between Undullah Road and Allan Creek Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Dwyers Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Road and Cunningham Highway	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Undullah Road	Between LCC Council Boundary and Brookland Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
	Between Brookland Road and Kilmoylar Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
	Between Kilmoylar Road and S of Brennans Dip Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Washpool Road	Between Ipswich Boonah Road to 5.5km E of Ipswich Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Wild Pig Creek Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Table 6.6 Primary construction routes level of service results anti-gazettal direction/southbound/westbound

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
State-controlled roads: DTMR														
Beaudesert Boonah Road	Between Ipswich Boonah Road and Wyaralong Dam Access	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Wyaralong Dam Access and Tilley Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Tilley Road and Sandy Creek Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Sandy Creek Road and Bromelton House Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
Ipswich Boonah Road	Between Cunningham Highway and Mt Flinders Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
	Between Mt Flinders Road and Warrill View Peak Crossing Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
	Between Warrill View Peak Crossing Road and Dwyers Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Dwyers Road and Washpool Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
	Between Washpool Road and Beaudesert Boonah Road	Two-lane two-way	B	B	B	B	B	B	B	B	B	B	B	B
Ipswich Rosewood Road	Between Cunningham Highway and Ipswich Rosewood Road	Two-lane two-way	C	C	C	C	C	C	C	C	C	C	C	C
Warrill View Peak Crossing Road	Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: CVC														
Clark Road	Full Extent	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: ICC														
Champions Way	Between Cunningham Highway and Paynes Road	Two-lane two-way	A	B	B	B	B	B	B	B	B	B	B	B
Coveney Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Ebenezer Road	Between Coopers Road and Rosewood Warrill View Rd	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Hayes Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Hillside Road	Full Extent	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Lane Road	Between Rosewood Laidley Road and Waters Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Macalister Street	Between Moffatt Street and Park Street	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Middle Road	Between Cunningham Highway and Bill Morrow Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Flinders Road	Between Ipswich Boonah Road and Shepherd Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Forbes Road	Between Ebenezer Road and Paynes Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mount Marrow Quarry Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Old Grandchester Road	Between Lane Road and Strongs Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Park Street	Between Macalister Street and Warwick Road	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Paynes Road	Between Champions Way and Mount Forbes Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Reillys Road	Between Strongs Road and Rosewood Warrill View Road	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
Strongs Road	Between Coveney Road and Rileys Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Strongs Road	Between Old Grandchester Road and Coveney Road	Midblock Analysis (1 Lane)	A	A	A	A	A	A	A	A	A	A	A	A
T Morrows Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Thagoona Haigslea Road	Between Mount Marrow Quarry Road and Karrabin Rosewood Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Waters Road	Between Lane Road and Kuss Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Local government roads: LCC														
Kilmoylar Road	Between LCC Council Boundary and Wyatt Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Undullah Road	Between Mount Lindesay Highway and LCC Council Boundary	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Undullah Road	Between Wyatt Road and Wild Pig Creek Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Wyatt Road	Between Kilmoylar Road and Undullah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Local government roads: SRRC														
Allan Creek Road	Between Mount Lindesay Highway and Brookland Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Bromelton House Road	Between Allan Creek Road and Beaudesert Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Brookland Road	Between Undullah Road and Allan Creek Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Dwyers Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	Midblock Analysis (1 Lane)	A	A	A	A	A	A	B	B	B	B	B	B
Ilbogan Road	Between Beaudesert Boonah Road and Thiedke Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Kilmoylar Road	Between Undullah Road and LCC Council Boundary	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Mutdapilly Churchbank Weir Road	Between Peak Crossing Churchbank Weir Rd and Cunningham Highway	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Peak Crossing Churchbank Weir Road	Between Warrill View Peak Crossing Road and Mutdapilly Churchbank Weir Rd	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Thiedke Road	Between Ilbogan Road and Mt Lindesay Highway	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Undullah Road	Between LCC Council Boundary and Brookland Rd	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
	Between Brookland Road and Kilmoylar Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
	Between Kilmoylar Road and S of Brennans Dip Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Washpool Road	Between Ipswich Boonah Road to 5.5 km east of Ipswich Boonah Road	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A
Wild Pig Creek Road	Full Extent	Two-lane two-way	A	A	A	A	A	A	A	A	A	A	A	A

The results of the LOS comparison indicate that the Project construction traffic may cause a change to LOS along the following construction traffic routes in each direction unless otherwise specified:

- ICC:
  - Champions Way between Cunningham Highway and Paynes Road (LOS A to LOS B)
  - Macalister Street between Moffatt Street and Park Street (LOS A to LOS B)
  - Park Street between Macalister Street and Warwick Road (LOS A to LOS B)
- SRRC:
  - Eaglesfield Street between Mount Lindesay Highway and Tina Street (LOS A to LOS B).

Although there is a change in operational LOS for the road sections above, the expected operational LOS B is considered acceptable given the construction activities are expected to be less than a year. Therefore, during the construction phase, apart from the identified road sections and the explanations provided above; the operational LOS of the overall road network will be no worse as a result of the project.

Based on the LOS comparison, it is not expected that the Project would generate the need to upgrade the road network for these short term construction activities. However, it is important that the routes are reviewed in the preparation of a TMP from a physical and safety perspective prior to the commencement of construction activities to ensure that they are suitable. This should include joint visual inspection of all routes by the design and construction contractor, the asset owner and an accredited road safety auditor to agree on routes and any works require to ensure the routes are suitable for the level of construction activity proposed. This requirement is discussed further in Section 9. Detailed road link analyses outputs have been provided in Appendix N.

6.2.3 Level of service comparison on links with assumed base traffic volumes

LOS analyses were also undertaken along links where base traffic volumes were required to be assumed due to insufficient data. The primary aim of the LOS analysis is to determine the level of impact the Project generated traffic has on the road network by determining the change in LOS in the peak hour for each road section. The following section provides a summary of the performance analyses carried out to determine the “without” and “with Project” traffic LOS for various construction route road sections during the year construction is expected.

Peak hour traffic volumes were derived from peak daily volumes using the following key assumptions:

- Material delivery movements will be evenly distributed across the standard 12 hours of construction
- It has been assumed that two shifts will occur per day with 50 per cent of total staff working each shift. Staff shift changeovers have been conservatively assumed to occur simultaneously with the background traffic peak hour.

As per the GTIA, LOS C is considered to be the minimum standard on rural roads, although a LOS D may be acceptable during events such as construction. Therefore, all road sections currently operating above LOS D are considered to be operating above the acceptable standard. The LOS analysis was only undertaken for the construction route sections which exceed the 5 per cent threshold. Table 6.7 and Table 6.8 summarises the LOS results of the ‘without’ and ‘with’ Project traffic LOS.

Table 6.7 Level of service results for links with assumed volumes - gazettal direction/northbound/eastbound

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Local government roads: CVC														
Bent Street	Between Craig Street and Gwydir Highway	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Charles Street	Between Bent Street and Pacific Highway	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Clark Road	Full Extent	Midblock analysis (1 lane)	A	A	A	A	A	A	A	A	A	A	A	A
Craig Street	Between Villiers Street and Bent Street	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C
Dobie Street	Between Villers Street and Summerland Way	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C
Red Lane	Between Summerland Way and Trenayr Road	Midblock analysis (1 lane)	A	A	A	A	A	A	A	A	A	A	A	A
Trenayr Road	Between Summerland Way and Clark Road	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Trenayr Road	Between Clark Road and Red Lane	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Villers Street	Between Craig Street and Dobie Street	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C

Table 6.8 Level of service results for links with assumed volumes - anti-gazettal direction/southbound/westbound

Road name	Road ID - Road section	Analysis type	Without Project traffic						With Project traffic					
			2021	2022	2023	2024	2025	2026	2021	2022	2023	2024	2025	2026
Local government roads: CVC														
Bent Street	Between Craig Street and Gwydir Highway	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Charles Street	Between Bent Street and Pacific Highway	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Clark Road	Full Extent	Midblock analysis (1 lane)	A	A	A	A	A	A	A	A	A	A	A	A
Craig Street	Between Villiers Street and Bent Street	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C
Dobie Street	Between Villers Street and Summerland Way	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C
Red Lane	Between Summerland Way and Trenayr Road	Midblock analysis (1 lane)	A	A	A	A	A	A	A	A	A	A	A	A
Trenayr Road	Between Summerland Way and Clark Road	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Trenayr Road	Between Clark Road and Red Lane	Midblock analysis (1 lane)	B	B	B	B	B	B	B	B	B	B	B	B
Villers Street	Between Craig Street and Dobie Street	Midblock analysis (1 lane)	C	C	C	C	C	C	C	C	C	C	C	C

The results of the LOS comparison indicate that the Project construction traffic would not cause a change to LOS along construction traffic routes that have assumed traffic volumes.

Regardless, as per the earlier assessments, it is important that the routes are reviewed in the preparation of a TMP from a physical and safety perspective prior to the commencement of construction activities to ensure that they are suitable. This should include joint visual inspection of all routes by the design and construction contractor, the asset owner and an accredited road safety auditor to agree on routes and any works require to ensure the routes are suitable for the level of construction activity proposed. This requirement is discussed further in Section 9. Detailed road link analyses outputs have been provided in Appendix N.

6.2.4 Traffic management strategies on links

Traffic management strategies to be introduced in order to mitigate impacts along link roads should include:

- Travel demand management (TDM) campaign to inform the public on works and its effect on network operations
- Construction TMP to be prepared and approved by the construction contractor, DTMR, Council and an accredited road safety auditor. The TMP should address managing hours of work and deliveries, staff transport and staff parking, with the provision of on-site tool storage where practicable.
- Ongoing consultation with relevant local government councils, State authorities, QPS, emergency services and affected property owners/occupiers
- Directional signage and line marking around construction sites and the surrounding network, including using Variable Message Signs (VMS)
- All OSOM and RAV vehicles should comply with Guideline for Excess Dimension Vehicles in Queensland version 8, 2013 in terms of transport safety.
- Specific TMPs for special events developed in conjunction with the relevant stakeholders
- Relevant emergency services will be notified in advance prior to before the movement of all hazardous/dangerous or oversize construction material and equipment
- Secondary alternative construction route activities will be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency.

Detailed mitigation measures are provided in Section 9.

6.3 Construction intersection impact assessment

For the transportation of materials, workforce, as well as equipment, key transport routes have been identified. From the analysis of these transport corridors, key intersections have been identified which are expected to cater to the movement of construction related activities during the various construction stages. The intersections where turning movements along primary construction routes occur based on the Project construction routes are provided in Table 6.9.

Table 6.9 Intersections with construction traffic turn movements

Name	Joint ownership
DTMR	
Beaudesert Boonah Road/Bromelton House Road	SRRC
Beaudesert Boonah Road/Sandy Creek Road	SRRC
Beaudesert Boonah Road/Wyaralong Dam Access	SRRC
Beaudesert Boonah Road/Ilbogan Road	SRRC
Beaudesert Boonah Road/Tilley Road	SRRC
Cunningham Highway/Champions Way	ICC

Name	Joint ownership
Cunningham Highway/Coopers Road	ICC
Cunningham Highway/Ipswich Rosewood Road	
Cunningham Highway/Middle Road	ICC
Ipswich Boonah Road/Dwyers Road	SRRC
Ipswich Boonah Road/Mt Flinders Road	SRRC
Ipswich Boonah Road/T Morrows Road	ICC
Ipswich Boonah Road/Warrill View Peak Crossing Road	
Ipswich Boonah Road/Washpool Road	SRRC
Ipswich Rosewood Road/Rosewood Warrill View Road/School Street	ICC
Karrabin Rosewood Road/Haigslea Amberley Road	ICC
Karrabin Rosewood Road/Thagoona Haigslea Road	ICC
Mt Lindesay Highway/Eaglesfield Street	SRRC
Mt Lindesay Highway/Enterprise Drive	SRRC
Mt Lindesay Highway/Mt Lindesay Highway	
Mt Lindesay Highway/Thiedke Road	SRRC
Mt Lindesay Highway/Undullah Road	LCC
Rosewood Laidley Road/Karrabin Rosewood Road/Ipswich Rosewood Road	
Rosewood Laidley Road/Lane Road	ICC
Rosewood Warrill View Road/Reillys Road	ICC
Rosewood Warrill View Road/Ebenezer Road	ICC
Warrill View Peak Crossing Road/Peak Crossing Churchbank Weir Road	
Warwick Road/Moffatt Street	ICC
RMS	
Pacific Highway/Charles Street	CVC
Summerland Way/Bruxner Highway	
Summerland Way/Dobie Street	CVC
Summerland Way/Mt Lindesay Road	
Summerland Way/Red Lane	
Summerland Way/Trenayr Road	CVC
CVC	
Charles Street/Bent Street	
Dobie Street/Villiers Street	
Trenayr Road/Clark Road	
Trenayr Road/Red Lane	
Villiers Street/Craig Street	
ICC	
Briggs Rd/Edwards Street	
Coveney Road/Hayes Road	
Ebenezer Road/Mt Forbes Road	
Macalister Street/Moffatt Street	
Macalister Street/Park Street	
Mt Forbes Road/Paynes Road	

Name	Joint ownership
Thagoona Haigslea Road/Mt Marrow Quarry Road	
Noblevale Way/Fairbank Place	
Old Toowoomba Road/Moffatt Street	
Old Toowoomba Road/Toongarra Road	
Ripley Road/Edwards Street	
Rob Roy Way/Newhill Drive	
Rob Roy Way/Noblevale Way	
Strongs Road/Coveney Road	
Strongs Road/Reillys Road	
Thagoona Haigslea Road/Thagoona Haigslea Road	
Waters Road/Lane Road/Old Grandchester Road	
LCC	
Kilmoylar Road/Wyatt Road	
Undullah Road/Undullah Road	
Undullah Road/Wyatt Road	
Undullah Road/Wild Pig Creek Road	
SRRC	
Allan Creek Road/Brabazon Road	
Ilbogan Road/Thiedke Road	
Mutdapilly Churchbank Weir Road/Mutdapilly Churchbank Weir Road	
Peak Crossing Churchbank Weir Road/Middle Road	
Undullah Road/Brookland Road	
Undullah Road/Kilmoylar Road	

As outlined in Section 1.6.1, traffic survey considerations were based on intersections where construction traffic was envisaged to undertake turn manoeuvres and the combination of expected increase in traffic and associated construction duration. Traffic surveys were conducted at locations where the expected construction traffic experience a high increase with associated long and moderate duration, or a moderate increase with associated long construction duration. However, at the time traffic survey locations were determined, specific details regarding the construction traffic schedules of each construction activity were not available.

Table 6.9 above highlights the intersections which are expected to experience any number of turning movements during construction. The absence of traffic counts at these intersections prohibits the 5 per cent comparison at these intersections. Therefore, in order to assist in in quantifying the number of intersections which may experience potential operational impacts, an assessment has been undertaken to highlight intersections which are more likely to experience impacts. These intersections are summarised in Table 6.11, with detailed assessment results outlined in the sections below this table.

This assessment compares base traffic flows and construction flows to determine intersections which are expected to require upgraded turning treatments to accommodate construction traffic flows consistent with the warrants outlined in Austroads Guide to Traffic Management Part 6. Figure 6.1 indicates the left turn volume (Q_L) and right turn volume (Q_R), as well as the values used to calculate the major road traffic volume parameter (Q_M). The value of Q_M is calculated as outlined in Table 6.10.

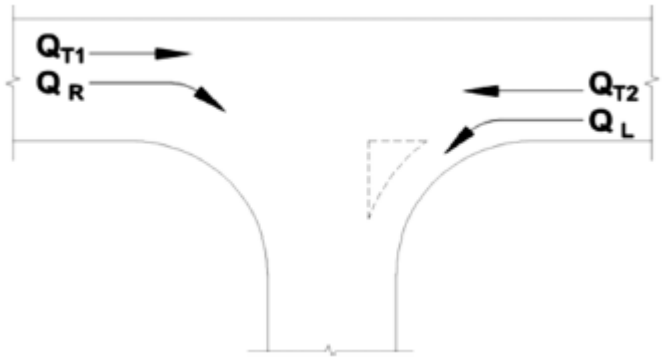


Figure 6.1 Calculation of the major road traffic volume (Q_M)

Source: Austroads 2017

Table 6.10 Calculation of the major road traffic volume (Q_M)

Road type	Turn type	Splitter island	Q_M (vehicles per hour)
Two-lane two-way	Right	No	= $Q_{T1} + Q_{T2} + Q_L$
		Yes	= $Q_{T1} + Q_{T2}$
	Left	Yes or no	= Q_{T2}
Four-lane two-way	Right	No	= 50% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 50% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 50% x Q_{T2}
Six-lane two-way	Right	No	= 33% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 33% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 33% x Q_{T2}

Source: Austroads 2017

It should be noted that these temporary upgrades would only be required in the absence of appropriate traffic management strategies at these locations. Details on appropriate traffic management strategies have been provided in Section 9.3.

These upgraded turning treatments outlined in this methodology are warranted only temporarily for construction traffic. Therefore, discussions will be required with DTMR and Council's during the Project's next phase to determine the permanence of such upgrades. Given the typical duration of construction activities generally being less than a year, traffic management strategies may be introduced in order to mitigate construction related traffic impacts at intersections.

Table 6.11 Intersections with potential operational impacts due to Project construction traffic

Name	Joint ownership
Department of Transport and Main Roads	
Ipswich Boonah Road/Dwyers Road	SRRC
Ipswich Boonah Road/Washpool Road	SRRC
Rosewood Laidley Road/Lane Road	ICC
Beaudesert Boonah Road/Bromelton House Road	SRRC
Ebenezer Road/Mt Forbes Road	ICC

6.3.1 Ipswich Boonah Road/Dwyers Road

The Project construction methodology proposes to include laydown area adjacent to Dwyers Road approximately 2.5 km east of the Ipswich Boonah Road/Dwyers Road intersection. Construction vehicles transporting precast concrete, sleepers, in-situ concrete and workers are expected to access this laydown area via Peak Crossing by turning left from Ipswich-Boonah Road into Dwyers Road. No Project traffic is proposed to enter Dwyers Road from the south.

Currently, there are low flows along Dwyers Road (i.e. 38 vehicles per day, two-way). It is assumed that this equates to 3 vehicles turning into Dwyers Road from Ipswich Boonah Road during the peak hour. A BAL (basic left turn) treatment is currently provided at this intersection, as shown in Figure 6.2.

Figure 6.2 Ipswich Boonah Road/Dwyers Road existing layout

The Project traffic assessment demonstrates that the turning movements into Dwyers Road are expected to peak in 2025, with up to 5 vehicles per hour expected to turn into Dwyers Road from Ipswich Boonah Road. These turning volumes, along with the through movement volumes on Ipswich Boonah Road are summarised in Table 6.12. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads Guide to Traffic Management Part 6 is demonstrated in Figure 6.3.

Table 6.12 Ipswich Boonah Road/Dwyers Road turning treatment volumes

Scenario	Ipswich Boonah Road peak hour volume (Q_M, one-way)	Peak hour left turn volume into Dwyers Road (Q_L)
Existing volumes	887	3
Forecast volumes without Project (2025)	1039	3
Project traffic	82	5
Volumes for treatment assessment	1121	8

Table note:
Numbers may not sum due to rounding.

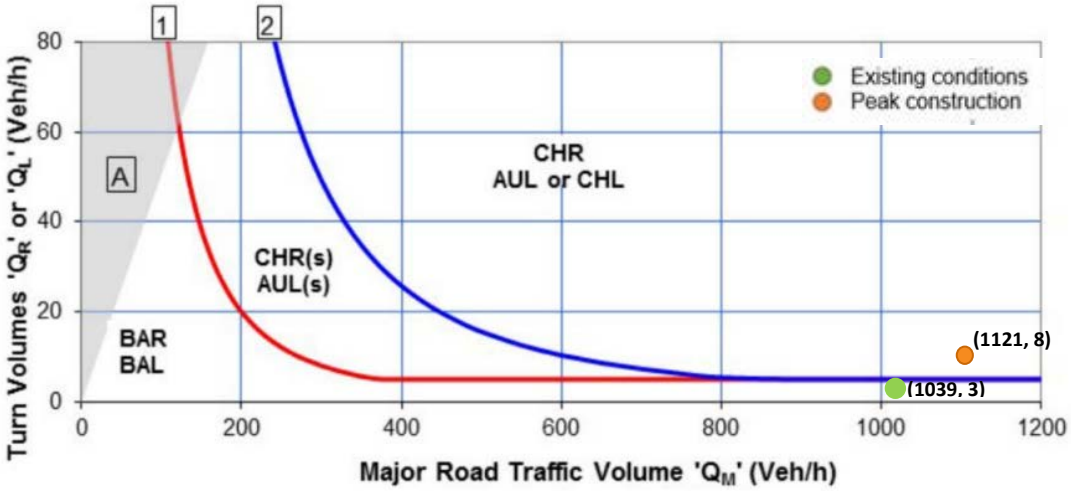


Figure 6.3 Ipswich-Boonah Road/Dwyers Road turning treatment assessment

Figure 6.3 demonstrates that as a minimum, an auxiliary left turn AUL turning treatment is required to accommodate the turning volumes at this intersection during construction. This should be designed consistent with the requirements of Austroads Guide to Road Design Part 4A and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, but to be confirmed with the construction contractor). It is noted that this treatment is only required during construction, with the requirement no longer necessary post-construction and as such may be agreed to be managed through temporary traffic measures rather than permanent upgrades, as to be agreed between the design and construction contractor and the asset owner.

6.3.2 Ipswich Boonah Road/Washpool Road

The Project construction methodology proposes to include laydown area adjacent to Washpool Road approximately 2 km east of the Ipswich Boonah Road/Washpool Road intersection. Construction vehicles transporting precast concrete, sleepers, in-situ concrete, quarry materials, spoil, water and workers are expected to access this laydown area via Peak Crossing by turning left from Ipswich-Boonah Road into Washpool Road. No Project traffic is proposed to enter Washpool Road from the south.

Currently, there are low flows along Washpool Road (i.e. 157 vehicles per day, two-way). It is assumed that this equates to 12 vehicles turning into Washpool Road from Ipswich Boonah Road during the peak hour. A BAL treatment is currently provided at this intersection, as shown in Figure 6.4.

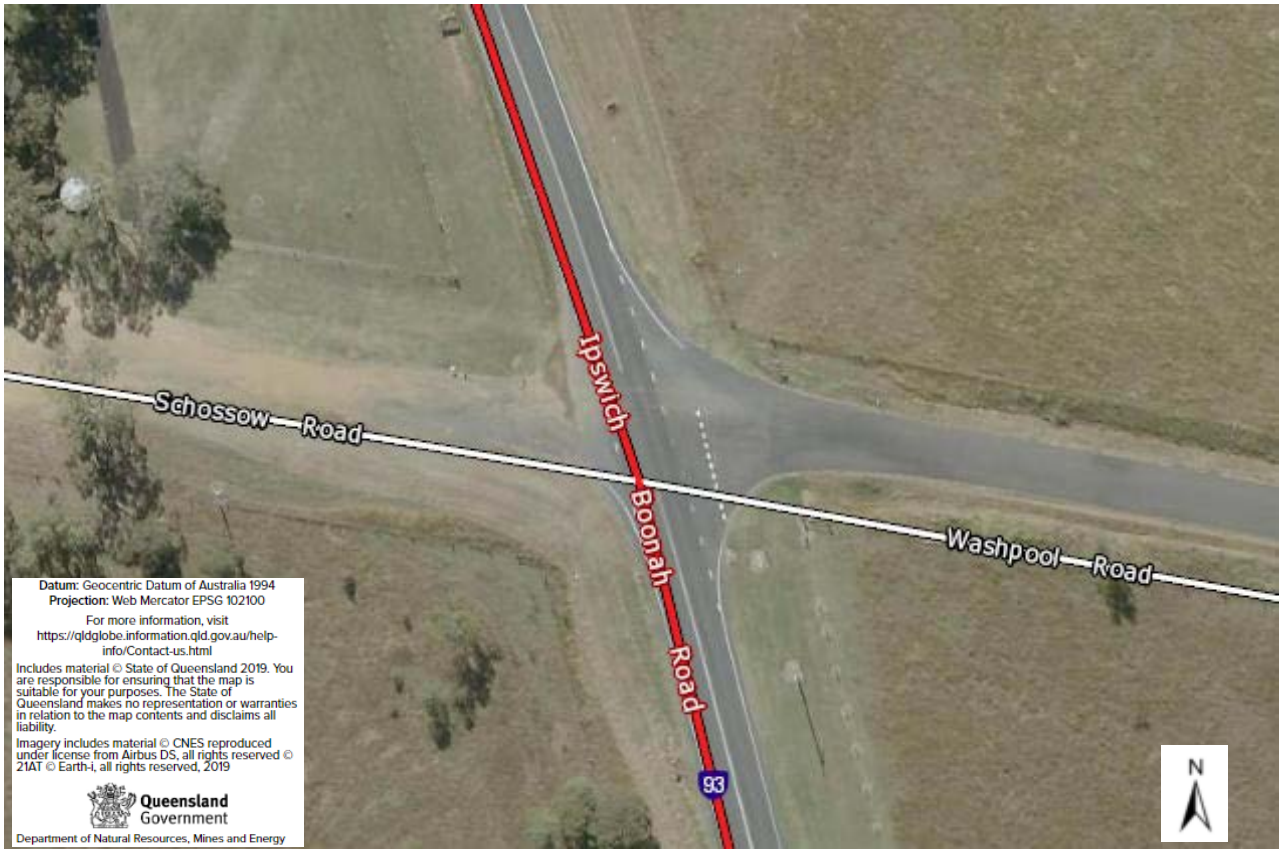


Figure 6.4 Ipswich Boonah Road/Washpool Road existing layout

The Project traffic assessment demonstrates that the turning movements into Washpool Road are expected to peak in 2023, with up to 24 vehicles per hour expected to turn into Washpool Road from Ipswich Boonah Road. These turning volumes, along with the through movement volumes on the Ipswich Boonah Road are summarised in Table 6.13. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads Guide to Traffic Management Part 6 is demonstrated in Figure 6.5.

Table 6.13 Ipswich Boonah Road/Washpool Road turning treatment volumes

Scenario	Ipswich Boonah Road peak hour volume (Q_M, one-way)	Peak hour left turn volume into Washpool Road (Q_L)
Existing volumes	887	12
Forecast volumes without Project (2023)	999	13
Project traffic	82	24
Volumes for treatment assessment	1081	37

Table note:
Numbers may not sum due to rounding.

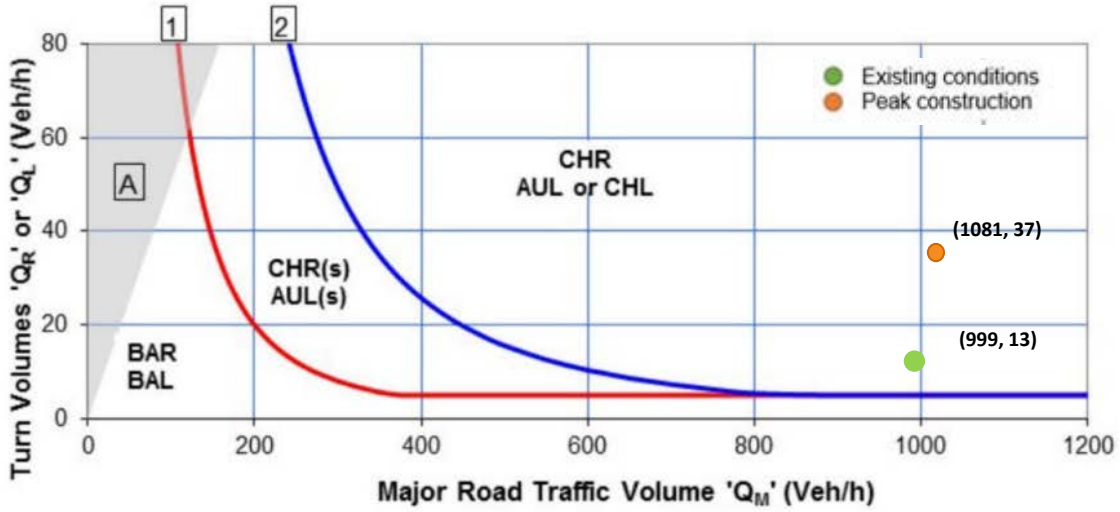


Figure 6.5 Ipswich-Boonah Road/Washpool Road turning treatment assessment

Figure 6.5 demonstrates that as a minimum, an AUL turning treatment is required to accommodate the turning volumes at the Ipswich-Boonah Road intersection during construction. This should be designed consistent with the requirements of Austroads Guide to Road Design Part 4A and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, but to be confirmed with the construction contractor). It is noted that upgrade of the intersection is already warranted given the existing traffic flows through the intersection. Therefore, agreement is required between the design and construction contractor and the asset owner to determine where the responsibility for upgrading this intersection to accommodate the construction traffic lies. This discussion should be undertaken during the Project of the TMP once construction routes are finalised and agreed between the design and construction contractor and the asset owners.

6.3.3 Rosewood Laidley Road/Lane Road

Construction vehicles transporting precast concrete, in-situ-concrete and workers are expected to utilise the Rosewood Laidley Road/Lane Road intersection to access a laydown area located adjacent to Waters Road. These vehicles are expected to access this laydown by turning left from Rosewood Laidley Road into Lane Road. Construction vehicles transporting concrete are also expected to access this laydown area by turning right from Rosewood Laidley Road into Lane Road.

Currently, there are low flows along Lane Road (i.e. 217 vehicles per day, two-way). It is assumed that this equates to 16 vehicles turning left and right into Lane Road from Rosewood Laidley Road during the peak hour. A BAL and BAR treatment is currently provided at this intersection, as shown in Figure 6.6.

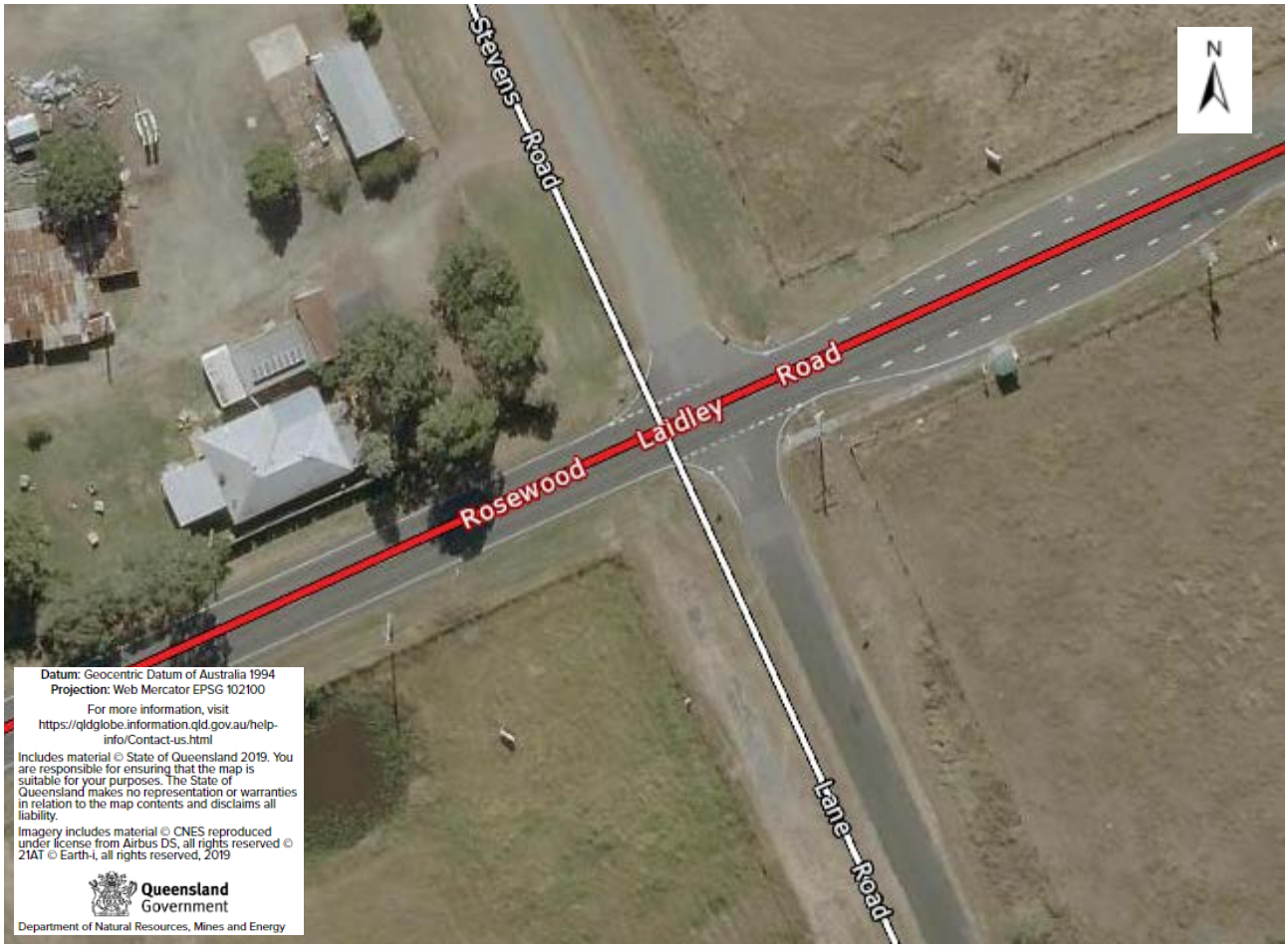


Figure 6.6 Rosewood Laidley Road/Lane Road existing layout

The Project traffic assessment demonstrates that the turning movements into Lane Road are expected to peak in 2024, with up to 20 vehicles per hour expected to turn left and right (combined) into Lane Road from Rosewood Laidley Road. These turning volumes, along with the through movement volumes on the Rosewood Laidley Road are summarised in Table 6.14 and Table 6.15.

To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads Guide to Traffic Management Part 6 is demonstrated in Figure 6.7 and Figure 6.8.

Table 6.14 Rosewood Laidley Road/Lane Road turning treatment volumes – left turn

Scenario	Rosewood Laidley Road peak hour volume (Q_M, one-way)	Peak hour left turn volume into Lane Road (Q_L)
Existing volumes	234	16
Forecast volumes without project (2024)	269	18
Project traffic	10	10
Volumes for treatment assessment	279	29

Table note:
Numbers may not sum due to rounding.

Table 6.15 Rosewood Laidley Road/Lane Road turning treatment volumes – right turn

Scenario	Rosewood Laidley Road peak hour volume (Q_M, two-way)	Peak hour right turn volume into Lane Road (Q_R)
Existing volumes	468	16
Forecast volumes without project (2024)	537	18
Project traffic	20	10
Volumes for treatment assessment	558	29

Table note:
Numbers may not sum due to rounding.

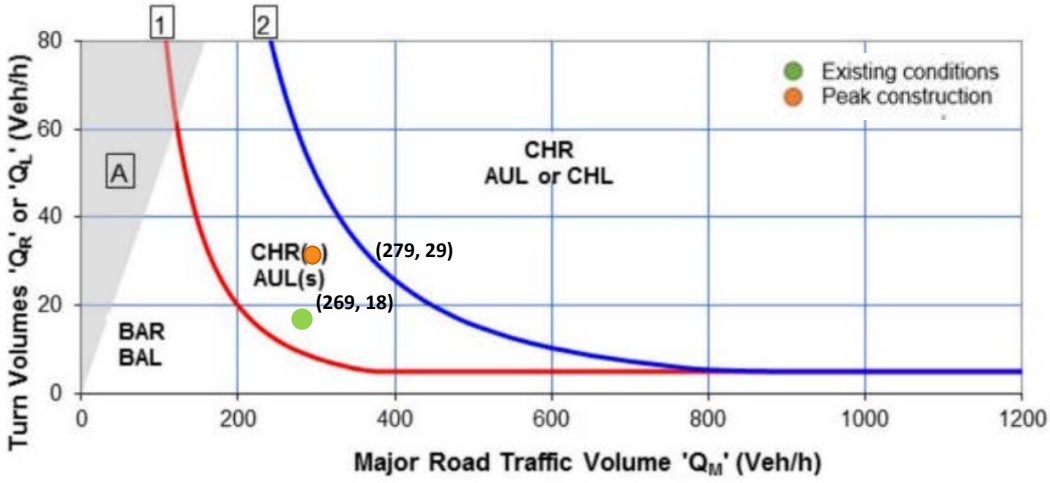


Figure 6.7 Rosewood Laidley Road/Lane Road turning treatment assessment – left turn

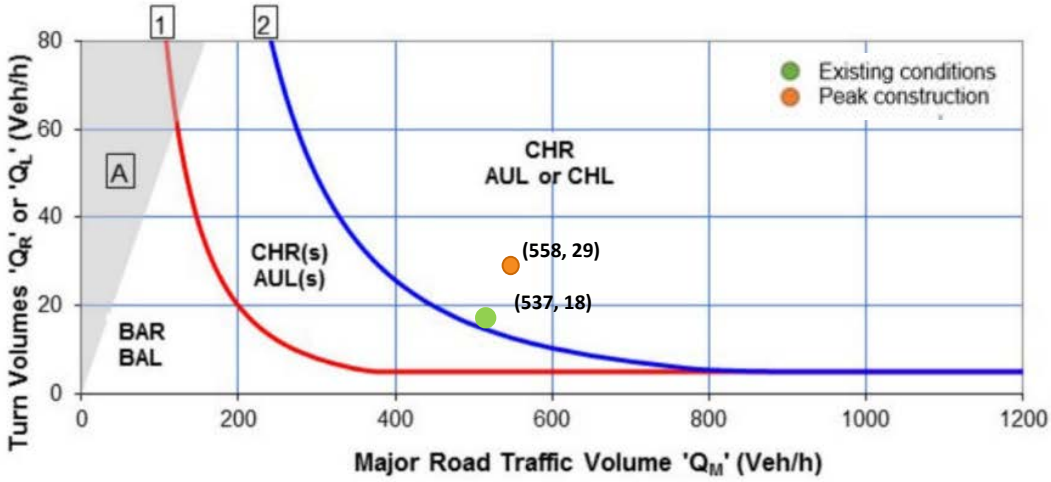


Figure 6.8 Rosewood Laidley Road/Lane Road turning treatment assessment – right turn

Figure 6.7 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the intersection during construction. Figure 6.8 demonstrates that as a minimum, a CHR turning treatment is required to accommodate the turning volumes at the intersection during construction.

These treatments should be designed consistent with the requirements of Austroads Guide to Road Design Part 4A and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, but to be confirmed with the construction contractor). It is noted that both of these treatments are warranted under existing conditions given the existing traffic flows through the intersection. Therefore, agreement is required between the design and construction contractor and the asset owner to determine where the responsibility for upgrading this intersection to accommodate the construction traffic lies. This discussion should be undertaken during the development of the TMP once construction routes are finalised and agreed between the design and construction contractor and the asset owners.

6.3.4 Beaudesert Boonah Road/Bromelton House Road

Construction vehicles transporting sleepers, quarry materials, water and spoil are expected to utilise the Beaudesert Boonah Road/Bromelton House Road intersection.

Currently, the flows along Bromelton House Road are approximately 1,163 vehicles per day, two-way. It is assumed that this equates to 87 vehicles turning right into Bromelton House Road from Beaudesert Boonah Road during the peak hour. An AUR treatment is currently provided at this intersection, as shown in Figure 6.9.

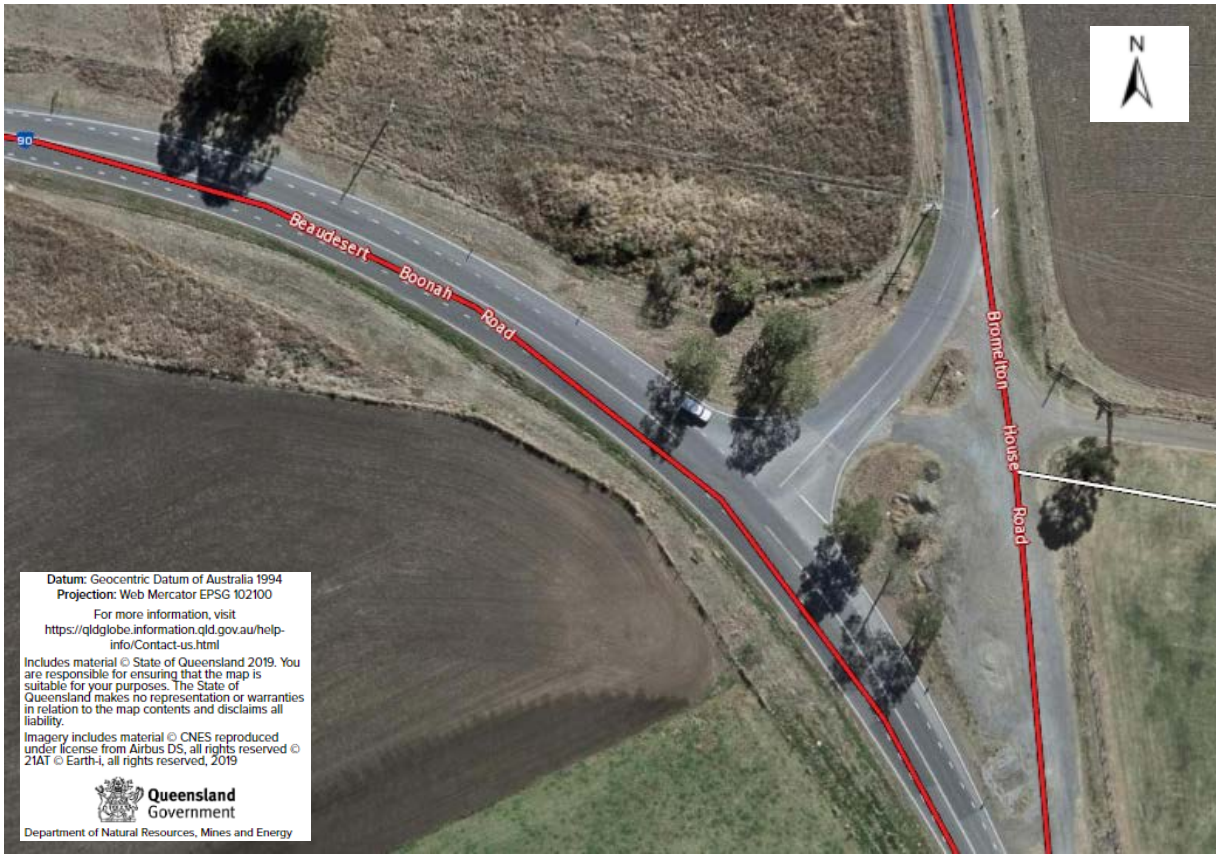


Figure 6.9 Beaudesert Boonah Road/Bromelton House Road existing layout

The Project traffic assessment demonstrates that the turning movements into Bromelton House Road are expected to peak in 2024, with up to 6 vehicles per hour expected to right into Bromelton House Road from Beaudesert Boonah Road. These turning volumes, along with the through movement volumes on the Beaudesert Boonah Road are summarised in Table 6.16. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads Guide to Traffic Management Part 6 is demonstrated in Figure 6.10.

Table 6.16 Beaudesert Boonah Road/Bromelton House Road turning treatment volumes – right turn

Scenario	Beaudesert Boonah Road peak hour volume (Q_M, one-way)	Peak hour left turn volume into Bromelton House Road (Q_L)
Existing volumes	251	87
Forecast volumes without project (2024)	289	100
Project traffic	4	6
Volumes for treatment assessment	293	106

Table note:

Numbers may not sum due to rounding.

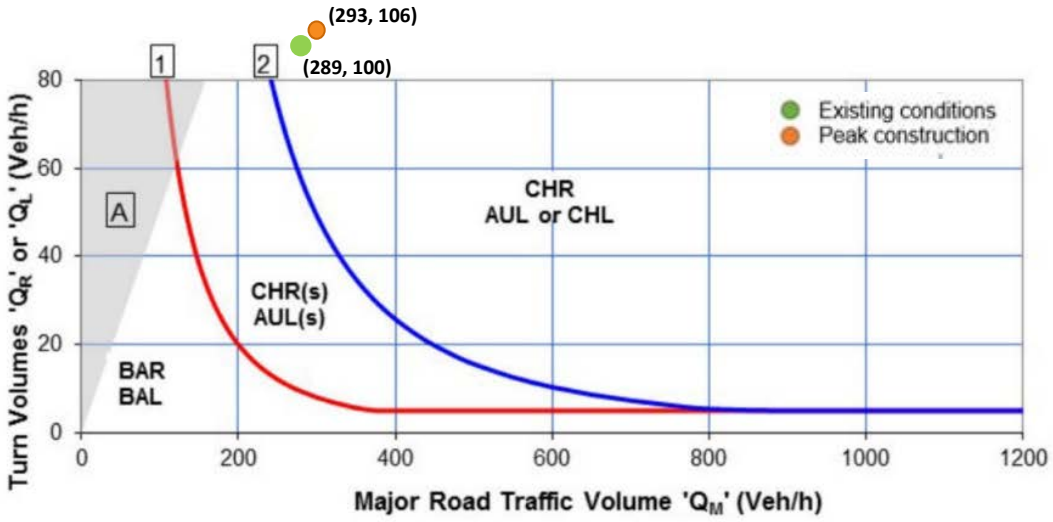


Figure 6.10 Beaudesert Boonah Road/Bromelton House Road turning treatment assessment – right turn

Figure 6.10 demonstrates that as a minimum, a CHR turning treatment is required to accommodate the turning volumes at the intersection during construction.

This treatment should be designed consistent with the requirements of Austroads Guide to Road Design Part 4A and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, but to be confirmed with the construction contractor). It is noted that both of these treatments are warranted under existing conditions given the existing traffic flows through the intersection. Therefore, agreement is required between the design and construction contractor and the asset owner to determine where the responsibility for upgrading this intersection to accommodate the construction traffic lies. This discussion should be undertaken during the development of the TMP once construction routes are finalised and agreed between the design and construction contractor and the asset owners.

6.3.5 Ebenezer Road/Mt Forbes Road

Construction vehicles transporting precast concrete, in-situ-concrete, water and workers are expected to utilise the Ebenezer Road/Mt Forbes Road intersection.

Currently, there are low flows along Mt Forbes Road (i.e. 472 vehicles per day, two-way). It is assumed that this equates to 35 vehicles turning left and right into Mt Forbes Road from Ebenezer Road during the peak hour. A BAL and BAR treatment is currently provided at this intersection, as shown in Figure 6.11.

Figure 6.11 Ebenezer Road/Mt Forbes Road existing layout

The Project traffic assessment demonstrates that the turning movements into Mt Forbes Road are expected to peak in 2025, with up to 9 vehicles per hour expected to turn left and right (combined) into Mt Forbes Road from Ebenezer Road. These turning volumes, along with the through movement volumes on the Ebenezer Road are summarised in Table 6.17 and Table 6.18. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads Guide to Traffic Management Part 6 is demonstrated in Figure 6.12 and Figure 6.13.

Table 6.17 Ebenezer Road/Mt Forbes Road turning treatment volumes – left turn

Scenario	Ebenezer Road peak hour volume (Q_M, one-way)	Peak hour left turn volume into Mt Forbes Road (Q_L)
Existing volumes	70	35
Forecast volumes without project (2025)	94	40
Project traffic	5	4
Volumes for treatment assessment	99	44

Table note:
Numbers may not sum due to rounding.

Table 6.18 Ebenezer Road/Mt Forbes Road turning treatment volumes – right turn

Scenario	Ebenezer Road peak hour volume (Q_M, two-way)	Peak hour right turn volume into Mt Forbes Road (Q_R)
Existing volumes	140	35
Forecast volumes without project (2025)	189	40
Project traffic	5	4
Volumes for treatment assessment	194	44

Table note:
Numbers may not sum due to rounding.

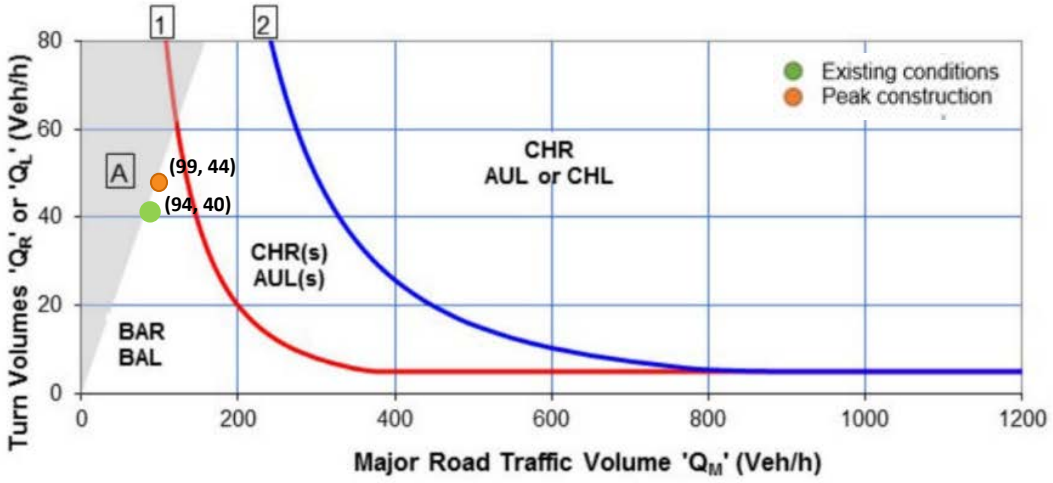


Figure 6.12 Ebenezer Road/Mt Forbes Road turning treatment assessment – left turn

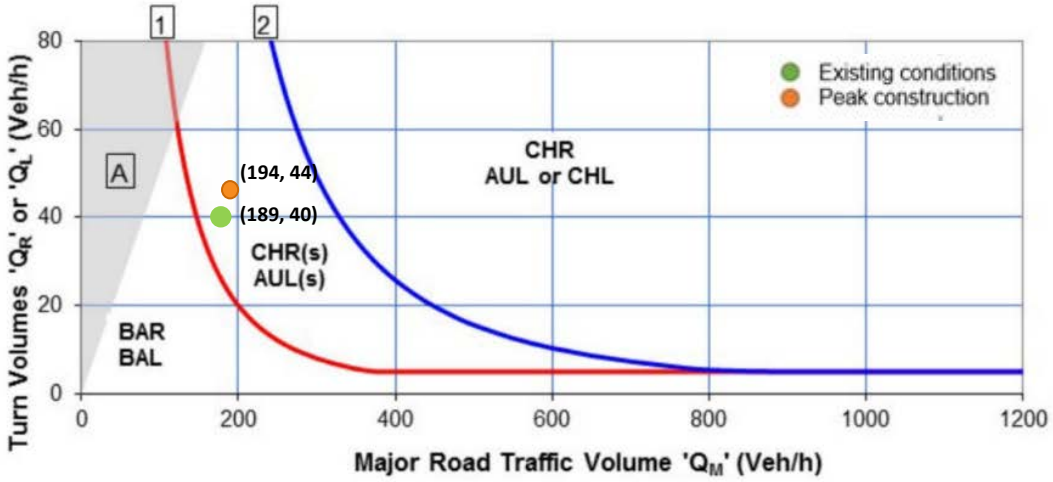


Figure 6.13 Ebenezer Road/Mt Forbes Road turning treatment assessment – right turn

Figure 6.12 demonstrates that as a minimum, a BAL turn treatment is required to accommodate the turning volumes at the intersection during construction. Figure 6.13 demonstrates that as a minimum, a CHR(s) turning treatment is required to accommodate the turning volumes at the intersection during construction.

The required turning treatments should be designed consistent with the requirements of Austroads Guide to Road Design Part 4A and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, but to be confirmed with the construction contractor). It is noted that both of these treatments are warranted under existing conditions given the existing traffic flows through the intersection. Therefore, agreement is required between the design and construction contractor and the asset owner to determine where the responsibility for upgrading this intersection to accommodate the construction traffic lies. This discussion should be undertaken during the development of the TMP once construction routes are finalised and agreed between the design and construction contractor and the asset owners.

6.3.6 Traffic management strategies at intersections

Traffic management strategies to be introduced in order to mitigate impacts along intersections should include:

- TMPs should be prepared prior to construction in accordance with the latest edition of the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction. Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

- Temporary road works, including diversion and signage, should be in accordance with the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works.
- Fatigue management measures should be introduced and enforced for all workers
- Any required works to be identified in ongoing Road Use Management Plans (RUMPs) prepared to support the Project
- All OSOM and RAV vehicles should comply with Guideline for Excess Dimension Vehicles in Queensland version 8, 2013 in terms of transport safety.

There are no operational traffic mitigation measures proposed as Project traffic would only relate to construction traffic.

6.4 Operational phase

6.4.1 Workforce

Workforce during operational stages is assumed to reside within local surrounding towns near the Project and be made up of local resident employees. It is assumed that a negligible number of new trips will be generated as existing trips would be accounted for and the dispersed nature of these trips across the road network would have a minimal impact on road network operational performance. Therefore, a detailed analysis was not considered necessary as part of the TIA.

6.4.2 Maintenance

During the operational phase of the Project, it is anticipated that occasional access to and from the alignment will be required to conduct routine inspection and maintenance works. Maintenance vehicles will use the access track that will be constructed for the majority of the inspection and maintenance activities. However, these activities are likely to be infrequent and the related traffic volumes are likely to be minimal with no envisaged impact to operational conditions of the surrounding road network. These traffic volumes are envisaged not to exceed 5 per cent of base conditions. Therefore, a detailed analysis was not considered necessary as part of the TIA.

6.4.3 Rail crossings

The operational performance of public level crossings along formed roads in the TIA study area were assessed to provide an understanding of the impacts on performance during operation stages, also taking into account any potential impact of diverted traffic created by road closures. The rail crossing impact assessment focuses on vehicle delay and queueing analysis, demonstrating how the Project generated traffic impacts on vehicle delays and queuing issues at the rail crossing, and at nearby closely spaced intersections.

The following scenarios were evaluated:

- Future Year 2026 and 2036 AM and PM peak hour analysis of proposed crossings: Operational railway traffic with background road traffic + operational traffic + traffic diversions if any (only at locations where short stacking might be of impact).

6.4.3.1 Analysis assumptions

Analysis of the level crossings was conducted based on the following inputs:

- The design vehicle (train) considered for the analysis account for a length of 1,800 m in future year 2026 and 1,800 m in year 2036

- Vehicle wait time at passive crossings were calculated by means of using the Australian Standard 1742.7, MUTCD – Railway crossings. The estimated wait time is considered a function of:
  - The distance of the train from the crossing at the point where a driver approaching the rail crossing sights a train, judges a stop is needed, decelerates and stops at a giveaway line
  - The time it takes the train to drive along the distance from where the vehicle sees the train and decides to decelerate
  - The time it takes the train to cross the level crossing
  - Design vehicle consisting of a B-double for input parameters.

The following points describe the assumptions relating to the operation and sequence of operations at active level crossings, vehicle wait times at active level crossings and SIDRA analysis methodology used to determine the traffic impacts of level crossings for the project.

- Operation of the active level crossings are described as follows:
  - Active level crossings utilise warning devices to warn road users of the approach of a train. The warning devices operate when the approaching train is at a minimum warning time from entering the road/rail interface. The level crossing warning time is defined as the minimum time of operation of the warning equipment for the fastest train from the initiation of the warning sequence until the front of the train reaches the road-rail intersection.
  - For Inland Rail, the minimum warning device protection is defined as being an active level crossing controlled by flashing lights and half boom barriers. The minimum signage, line marking and assembly for this crossings' type is defined in AS 1742.7 and is a RX-5 flashing light assembly and half boom barriers. (Note, the standard the term RX-5 is synonymous with the term Type F Highway signal).
  - Operation of this type of crossing requires the warning devices to be initiated and maintained automatically by the detection of a train, using crossing control devices that operate on the approach side of the level crossing. This ensures the correct minimum warning time is obtained.
- Typical active level crossing sequence of operations which were adopted in the assessment are as follows:
  - If no train is approaching the level crossing then the Type F highway signals are extinguished, the half-boom barriers are a fully raised position and no audible warning can be heard
  - As a train approaches the level crossing then, at the minimum warning time point (t=0), the crossing control devices trigger the Type F highway signals to commence and they continue to flash alternately. At the same time warning bells are also triggered to commence and continue to sound. The minimum warning time in QLD is 25 seconds for Type F lights and boom barrier installations.
  - After 11 seconds (t=11) time interval the half-boom barriers commence to lower and after an additional 11 to 13 seconds (t=22-25) they shall reach the fully lowered position and one of the warning bells is silenced. Where there are large articulated vehicles (B triples or Road trains), the delay before the booms commence lowering can be increased by a further 5 seconds to 16 seconds. In this instance the minimum warning time would be increased accordingly.
  - After the minimum approach time has expired (t=25-30) the front of the approaching train will reach the level crossing
  - When the train has cleared the crossing, the booms commence to rise to the upright position and the remaining warning bell will be silenced. Unless a second train is approaching the level crossing, in the holding section, as the rear of the first train passes clear of the level crossing and there is insufficient time for the half-boom barriers to rise and remain in the fully raised position there set time interval before commencing to lower for the second train, then the boom barriers remain lowered until the rear of the second train has also passed clear of the level crossing.

- After the last train has cleared the level crossing, the booms commence to rise to the upright position and the remaining warning bell will be silenced. The half-boom barriers reach the fully raised position within 10 seconds and the Type F highway signals become extinguished.

- Train speed and train clearance time calculations and assumptions (as obtained from road/rail interface) for the level crossing are as follows:
  - Train clearance times were calculated based on an assumed maximum train speed of 115 km/h
  - Calculation of the freight train acceleration rate
  - Distance of the level crossing from passing loops
  - Distance required to accelerate to maximum turnout speed (50 km/h)
  - Distance travelled while at constant maximum turnout speed
  - Distance required to accelerate to maximum speed after whole train has passed turnout
  - Total distance required to reach maximum speed for train starting from turnout
  - Total vehicle wait time with train length of 1,800 m were estimated to be 104 seconds (including boom closure times)
- Active level crossings were modelled in SIDRA as follows:
  - The railway crossing was represented by a straight road with two phases. A Dummy Movement is specified to represent the train movement in Phase B when vehicle movements are stopped
  - Phase times have been calculated assuming two trains cross within the peak hour
  - The Minimum Green Time for the Dummy Movement is specified as input so that the road closure time for the train is Minimum Green Time plus the Yellow and All-Red Times for Phase B. The remaining time which is allocated to Phase A which allows vehicles to cross the level crossing.
- For the purpose of the analysis it was assumed that there will be two trains per peak hour, i.e. two barrier closures in the peak hour for both existing and with Project traffic scenarios
- The current anticipated number of trains is of 33 services per day in 2026 increasing to an average of 47 train services per day in 2040.

6.4.3.2 Site analysed

To determine the impact of the level crossing operations on the road networks, SIDRA analyses were undertaken at active and passive level crossing locations along the alignment. These analyses were not undertaken at sites which only served low levels of local/occupational volumes. Table 6.19 provides a summary of the active level crossings and passive level crossings along the Project alignment, and whether SIDRA analyses were deemed necessary.

Table 6.19 Active/passive level crossing sites (public and formed roads only)

Interface ID	Road name	Proposed treatment	SIDRA analysis?	Comment
Scenic Rim Regional Council				
340-9-P-7a	Dwyers Road	Active level crossing	No	Low volume occupational traffic
340-10-P-3a	Washpool Road	Active level crossing	Yes	
340-14-P-1	Wild Pig Creek Road	Active level crossing	No	Gravel road which only services assumed low volume occupational traffic.
340-15-P-2b	Wild Pig Creek Road	Active level crossing	No	Assumed low volume occupational traffic

Interface ID	Road name	Proposed treatment	SIDRA analysis?	Comment
Ipswich City Council				
340-1-P-6	Hayes Road	Active level crossing	No	Gravel road which only services assumed low volume occupational traffic.
340-3-P-11	M Hines Road	Passive level crossing	No	Gravel road which only services low volume occupational traffic.
340-6-P-2	Glencairn Road	Active level crossing	No	Gravel road which only services low volume occupational traffic.
340-6-P-7	Middle Road	Active level crossing	Yes	

6.4.3.3 Analysis results

Based on the assumptions outlined in the above sections, the following rail crossing wait times were calculated:

- 340-6-P-7 Middle Road: 104 seconds
- 340-10-P-3a Washpool Road: 161 seconds.

The SIDRA analysis results, which take into account this wait time, are provided in Table 6.20. The results show the queue and delay associated with the proposed level crossing for the two future year scenarios.

Table 6.20 Level crossing analysis results

Road rail interface location			Year 2026 (1,800 m train length)				Year 2036 (1,800 m train length)			
			With Project				With Project			
			Volume * (veh/h)	Queue (m)	Delay s (s)	LOS	Volume* (veh/h)	Queue (m)	Delays (s)	LOS
340-6-P-7: Middle Road										
AM	Middle Road (N)	T	20	7.7	3.4	A	24	9.4	3.4	A
	Middle Road (S)	T	26	11.4	3.4	A	32	14.0	3.5	A
PM	Middle Road (N)	T	44	17.5	3.5	A	54	21.5	3.5	A
	Middle Road (S)	T	21	9.2	3.4	A	26	11.3	3.4	A
340-10-P-3a: Washpool Road										
AM	Washpool Road (E)	T	14	8.6	7.9	A	17	10.5	7.9	A
	Washpool Road (W)	T	10	6.0	7.9	A	12	7.4	7.9	A
PM	Washpool Road (E)	T	11	7.0	7.9	A	14	8.4	7.9	A
	Washpool Road (W)	T	11	6.8	7.9	A	14	8.1	7.9	A

Table notes:

* SIDRA modelled volumes may differ slightly from inputs due to rounding

** Queue length less than one car length (6m)

The results of the analysis indicate that the proposed level crossing along Middle Road (340-6-P-7) would operate at LOS A in the AM and PM peak in the year 2026 and 2036 with minimal impacts to queueing and delays in each of these scenarios. SIDRA analysis indicates that the maximum queue length along the north approach of the crossing would be 22 m in the 2036 PM peak, with maximum queue length along the south approach being 14 m in the 2036 AM peak. These modelled queue lengths do not have an impact on any existing adjacent intersections.

Further, the analysis indicates that the proposed level crossing along the proposed Washpool Road (340-10-P-3a) would also operate at LOS A in the AM and PM peak in the year 2026 and 2036 with minimal impacts to queueing and delays in each of these scenarios. Maximum modelled queue lengths along the east approach is 11 m in the 2036 AM peak. Along the west approach, maximum modelled queue length is 8 m in the 2036 PM peak. These modelled queue lengths do not have an impact on any existing adjacent intersections.

6.4.4 Traffic management strategies at level crossings

- Any required works to be identified in the Environmental Management Plan (EMP) that will be prepared to support the Project
- Level crossings should be designed in order to provide for safe design standards where sufficient stacking and sight distances prevail
- Grade separation of the rail line at road crossings:
  - Delays to road vehicles would be removed entirely, and the safety risks associated with train/vehicle conflict avoided
  - This will require a significant variation to the proposal, and would have additional impacts in terms of construction footprint, costs and environmental issues
  - Due to the low volume of vehicles that are envisaged to cross the rail line, grade separation is not likely to be feasible at most level crossing locations
- During construction, options for impact mitigation will depend on the specific activity being undertaken, and the location where it is occurring. It will be up to the construction contractor to select and implement appropriate controls.

6.5 Active transport impacts

6.5.1 Pedestrian and cycle network

A review of the Queensland PCNP was undertaken in order to identify any existing on-road cycle paths that may coincide with proposed road rail interfaces within Queensland. It was found that no cycle paths under the PCNP would be affected by proposed road rail interfaces.

Regardless, the presence of pedestrian and cycle routes should be considered in the preparation of final construction routes under the design and construction phase of the project in agreement with the relevant local council.

6.6 Other road impacts

As part of the TIA, Project impacts other than those affecting the existing road network will also be considered. These other impacts include impacts on stock routes, cycling and pedestrian networks, public transport networks, school bus routes an operation of emergency services.

6.6.1 Impacts on emergency services

During construction and operations, response times for emergency services may be delayed if encountering significant roadworks or passing trains at level crossings. ARTC will work with emergency services to develop protocols and joint working arrangements to address potential impacts on emergency services and service response times during construction and operation and ensure that access is retained as required.

The operational workforce will not create any significant population increase and is therefore unlikely to result in any other significant increased demand for services or infrastructure.

The emergency services in QLD should be consulted prior to construction of emergency access points to identify possible solutions to minimise the potential impacts.

6.6.2 Impacts on stock routes

There are no known stock routes which would be impacted by the Project.

6.6.3 Public transport impacts

A high-level review of public transport data showed that no existing public transport routes will likely be affected by proposed road rail interface sites.

6.6.4 School bus service impacts

Table 6.21 shows the school bus routes that may be affected by proposed road rail interface sites in the Project. The majority of the road rail interfaces identified are proposed to be grade separated with the exception of 340-6-P-7 Middle Road which is proposed to be an active level crossing, and 340-10-P-4a which is proposed to be realigned. This is expected to impact bus routes P1422, S258, and P1241, however, due to the low frequency of these services, it is not expected to significantly impact these school bus routes.

There may be additional school bus routes that are not publicly available and have therefore not been captured in this assessment. Consultation with relevant council authorities should be undertaken prior to the construction stage of the Project once construction routes have been finalised to ensure that all school bus routes that may be impacted by construction traffic have been accounted for.

Table 6.21 School bus routes affected by proposed road rail interface sites

Services	Weekday frequency	Road rail crossings	Proposed treatment
S175 AM - PM Rosevale, Mt Walker Areas, Rosewood SHS	1 x AM 1 x PM	340-2-P-2 Rosewood Warrill View Road	Grade Separation - Rail over
S743 AM and PM Lower Mt Walker Area, Rosewood SHS	1 x AM 1 x PM	340-2-P-2 Rosewood Warrill View Road	Grade Separation - Rail over
S646 AM and PM Mt Forbes Area, Rosewood SHS	1 x AM 1 x PM	340-3-P-1 Mount Forbes Road	Grade Separation - Road over
P1422 AM and PM Service - Purga to Peak Crossing SS	1 x AM 1 x PM	340-6-P-7 Middle Road 340-7-P-5 Ipswich Boonah Road	Active LX Grade Separation - Rail over
S258 AM and PM Peak Crossing, Purga Area to Bremer SHS	1 x AM 1 x PM	340-6-P-7 Middle Road 340-7-P-5 Ipswich Boonah Road	Active LX Grade Separation - Rail over
IP1701 SWD AM and PM run - Boonah to Ipswich	1 x AM 1 x PM	340-7-P-5 Ipswich Boonah Road	Grade Separation - Rail over
P1241 AM and PM Peak Crossing Area, Peak Crossing SS	1 x AM 1 x PM	340-10-P-4a Washpool Road	No Crossing Provided - Road divert/re-align

Construction routes are expected to interact with school bus routes on the following roads:

- Rosewood Laidley Road
- Rosewood Warrill Road
- Mount Forbes Road,
- Cunningham Highway
- Peak Crossing Churchbank Weir Road
- Ipswich Boonah Road
- Washpool Road
- Moffatt Street
- Allan Creek Road
- Mt Lindesay Highway
- Bent Street, Grafton.

Given the low frequency, it is expected that school bus services would not be substantially impacted from an operational and service reliability perspective as a result of the Project generated traffic during the Project construction. The presence of bus routes should be considered in the preparation of the Construction Environmental Management Plan (CEMP), as discussed in Section 9.

6.6.5 Access and egress

Construction vehicle access would be via the existing road network and proposed access tracks. These access points must be chosen such that adequate sight distance and a safe access/egress path are available. Further investigation of access locations will be required once additional detail around the planned construction methodology is known. This is expected to become available during the detailed design stages. All construction access points should be designed in accordance with Australian Standards with adequate sight lines to ensure they operate in a safe and efficient manner. In addition, where possible, access will be provided from secondary roads to minimise the potential disruptions to the arterial road network and to minimise conflicting turning traffic with higher volume through traffic.

Where the proposed alignment is in close proximity to arterial roads with limited alternative access routes, specific traffic management will be put in place. Where possible, access will be provided along the rail corridor from a nearby secondary road. Encroachment of construction works into existing road reserves is not anticipated.

A RMAR is required to facilitate maintenance for critical infrastructure (e.g. turnouts), and to provide access for emergency recovery. Formation level access has been proposed for all turnout locations, and, where reasonably practical, for the full extent of crossing loops. Operational maintenance activities will use the existing road network to travel to the rail corridor. Once in the rail corridor, the RMAR incorporated into the design of the Project will be used in preference to the existing road network for project maintenance activities.

7 Pavement impact assessment

A preliminary desktop pavement impact assessment was undertaken on all envisaged affected SCR roads based on the existing background traffic data available for the relevant road sections. The HV component of the AADT was calculated for both the construction period by adopting the background HV percentages from the traffic data provided by DTMR.

All base pavement loading SAR were calculated as granular pavement with thin bituminous surfacing with a load damage unit equivalent to ESA/SAR4 and load damage exponent 4, irrespective of pavements containing one or more bound layers for both DTMR and RMS roads. This is because raw road asset data from DTMR does not capture loaded and unloaded HV movements which do not make it feasible to calculate SAR5 and SAR12 (load damage units applicable to pavements with one or more boundary layers). For Project purposes all generated traffic pavement loading also accounts for SAR4 irrespective of pavement type.

Where the number of SARs of the additional Project related traffic equals or exceeds the existing pavement life, the pavement is considered to be impacted and further assessment (detailed design) separate to the TIA is required. Where the number of Project generated SAR's does not exceed the remaining pavement life, a marginal cost per additional SAR-km should be calculated to direct towards maintenance works or other mitigation measures be provided as agreed with the relevant road controlling authority

Pavement impact assessments were not conducted for affected LGRs as the GTIA methodology applies to SCRs. Alternative mitigation measures will be developed for all construction routes such as road visual condition assessments prior, during and post construction and returning the road to original condition once construction is finished. Such mitigation measures will be developed through consultation with local governments prior to construction commencing and are discussed in Section 9.6.

The pavement impact assessment is for use in this report only and is not proposed to be used for pavement design.

It is noted that an updated version of the GTIA was released in December 2018, after the ToR for the Project were released. An accompanying practice note (Guide to Traffic Impact Assessment Practice Note: Pavement Impact Assessment (December 2018)) was also released at this time. This assessment has been undertaken consistent with the 2017 GTIA consistent with the ToR. However, as per the GTIA, the TIA will need to be finalised when project contractors are appointed and the final traffic generation is clearer. It is recommended that the updated TIA be prepared consistent with the December 2018 version of the GTIA, and the associated Pavement Impact Assessment Practice Note.

7.1 Methodology

The pavement assessment as part of the TIA process was undertaken for SCR road links where the Project generated traffic SAR's exceed 5 per cent of the base traffic SARs in either direction on the link in the year of analyses. The impacts on pavements were identified and measures implemented to avoid, reduce or mitigate the effects of additional pavement loading as result of Project traffic on pavement life. The typical duration of construction activities is expected to be less than a year and is likely to involve intensive haulage. The pavement impacts of this haulage over the construction period should also be assessed. The following section provides a brief summary of the approach and methodology adopted for the preliminary desktop pavement impact assessment for envisaged affected SCRs:

- Determine the number and types of vehicles that will be generated by the Project during the construction phase, and determine sections of the network where pavement assessment is most likely required for each year of implementation
- Convert the Project traffic volumes into SAR4s based on the assumed number of SARs per vehicle
- Conduct a 5 per cent comparison of the background traffic SAR4 (as calculated in Section 4.3) and project generated SAR4s for each link identified to be most likely impacted by the Project.

The construction routes assumed as a part of this assessment are routes which the construction contractor may use. However, ultimately, the determination of the final construction and HV routes will be subject to consultation between DTMR, the local government authority and the construction contractor. The below analysis should be undertaken as a part of the design and construction phase when the final construction routes are finalised by the construction contractor:

- Determine if the Project-generated SAR4 pavement loading will consume the remaining design life pavement capacity during the impact mitigation period on any section of the road network. Project generated SAR4 will be applied to base SAR4 and compared to existing allowable SAR capacities. This will graphically be represented for each link over a 20 year design life.
- If the remaining SAR capacity is consumed then according to the GTIA manual a pavement design for that section of pavement to return the pavement to its pre-Project SAR capacity at the end of the impact mitigation period should be done. The pavement design is separate to a Traffic Impact Assessment and considered to be dealt with as part of the detailed design and construction phase. The TIA will indicate whether the remaining SAR capacity will be consumed and if a pavement design will be required.
- For marginal SAR impacts, defined as cases where the remaining pavement SAR capacity will not be consumed during the impact mitigation period, the relevant marginal cost rate per SAR-km from DTMR's marginal cost database (as detailed following) for each SCR section in the TIA study area will be identified. The contribution required to offset pavement impacts will be calculated using the following formula:

$$\text{Pavement Contribution} = \sum_{i=1}^{n} ((\text{C} + \text{O})\text{i x MCi x Li})$$

Where:

i is each road segment triggered

C is construction period SARs

O is operational period SARS for the impact mitigation period

MC is the relevant marginal cost (per SAR-km) prescribed in the department's database for each road segment

L is the length of road section in km

n is the number of road segments triggered in the TIA study area.

DTMR has determined marginal cost values for road-wear due to increased axle loads for the entire SCR network (with the exception of concrete pavements). For sealed roads, these marginal costs are calculated by using the Freight Axle Mass Limits Investigation Tool (FAMLIT) and will be obtained from DTMR.

The FAMLIT assessment methodology does not cater for unsealed roads. Transport and Main Roads has adopted the Australian Local Road Deterioration Study (LRDS) gravel loss model to calculate marginal cost estimates per vehicle pass for various combinations of network and traffic parameters, and grading frequency. These cost rates will be obtained from the department in the event where gravel road are to be assessed.

7.2 Assumptions

Assumptions regarding the construction design vehicles to be used are provided in the following sections. Table 7.1 indicates the Austroads vehicle types by construction activities that have been adopted for the assessment.

Table 7.1 Vehicle types by construction activity

Construction activity	Austroads Vehicle Class
Rail	Class 10
Sleepers	Class 10
Quarry	Class 10
Precast Concrete	OSOM vehicle
Insitu Concrete	Class 5
Water	Class 7
Tunnel Spoil	Class 10
Spoil	Class 10
Workers	Class 1

The SAR parameters used for the construction vehicles are provided in Table 7.2. To ensure no underestimation of SARs in any direction, fully loaded vehicles have been assumed in both directions. This is considered a conservative assumption and should be confirmed by the future delivery contractor.

Table 7.2 Project Traffic Standard Axle Repetitions Parameters

Vehicle classes	Total fully loaded SAR/HV
Class 5 4 Axle Rigid Truck (27.5 tonne) 	4.09
Class 7 4 Axle Semitrailer (31.5 tonnes) 	5.02
Class 10 7 Axle B-Double (55.5 tonne) 	7.72
OSOM for Precast concrete bridges Unloaded Class 3 Rigid Truck with 4 Axle Dolly and 4 Axle Jinker (70t payload) 	12.21

7.3 Analysis and findings

Table 7.3 provides a summary of SCR road segments where Project SARs are expected to exceed the 5 per cent threshold for each year of construction, noting that Year 2021 and Year 2026 only have worker vehicles which will be travelling to site in light vehicles and have therefore been excluded from the analysis.

Table 7.3 5% Standard Axle Repetitions Comparison

Road name	Road ID - Road section	Year of construction			
		2022	2023	2024	2025
State-controlled roads: DTMR					
Beaudesert Boonah Road	212 - Between Ipswich Boonah Road and Wyaralong Dam Access	0.0%	110.7%	24.5%	0.0%
	212 - Between Wyaralong Dam Access and Tilley Road	2.6%	123.7%	37.9%	7.6%
	212 - Between Tilley Road and Sandy Creek Road	2.7%	125.6%	38.4%	7.7%
	212 - Between Sandy Creek Road and Bromelton House Road	2.6%	123.7%	39.1%	12.6%
	212 - Between Bromelton House Road and Ilbogan Road	0.0%	0.0%	3.5%	6.9%
Cunningham Highway	17B - Between Ipswich Motorway and Redbank Plains Road	0.0%	0.0%	0.0%	0.2%
	17B - Between Redbank Plains Road and Ripley Road	0.1%	0.6%	0.2%	0.3%
	17B - Between Ripley Road and Ipswich Boonah Road	0.5%	1.6%	0.8%	0.7%
	17B - Between Ipswich Boonah Road and Middle Road	7.4%	20.2%	4.0%	2.1%
	17B - Between Middle Road and Ipswich Rosewood Road	7.4%	27.7%	3.3%	2.0%
	17B - Between Ipswich Rosewood Road and Champions Way	2.1%	2.6%	2.0%	3.7%
	17B - Between Champions Way and Mutdapilly Churchbank Weir Road	6.2%	7.4%	7.3%	4.1%
Haigslea Amberley Road	341 - Between Karrabin Rosewood Road and Warrego Highway	0.0%	0.0%	0.0%	0.4%
Ipswich Boonah Road	211 - Between Cunningham Highway and Mt Flinders Road	28.0%	78.7%	18.4%	12.7%
	211 - Between Mt Flinders Road and Warrill View Peak Crossing Road	30.2%	80.7%	16.9%	5.4%
	211 - Between Warrill View Peak Crossing Road and Dwyers Road	64.1%	182.4%	42.7%	14.0%
	211 - Between Dwyers Road and Washpool Road	64.1%	180.6%	42.3%	13.4%
	211 - Between Washpool Road and Beaudesert Boonah Road	0.0%	111.7%	24.8%	0.0%
Ipswich Motorway	17A - Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.3%
Ipswich Rosewood Road	34 - Between Cunningham Highway and Ipswich Rosewood Road	37.6%	112.4%	7.4%	0.3%
	34 - Between Ipswich Rosewood Road and Karrabin Rosewood Road	0.0%	0.6%	4.4%	7.2%
Karrabin Rosewood Road	32 - Between Rosewood Laidley Road and Haigslea Amberley Road	0.0%	0.0%	2.0%	7.0%

Road name	Road ID - Road section	Year of construction			
		2022	2023	2024	2025
	32 - Between Haigslea Amberley Road and Moffatt Street	0.0%	0.0%	0.0%	0.0%
Logan Motorway	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.3%
	Between Ipswich Motorway and Centenary Highway	0.0%	0.1%	0.0%	0.0%
	Between Centenary Highway and Mount Lindesay Highway	0.0%	0.1%	0.0%	0.0%
Mount Lindesay Highway	25B - Between Thiedke Road and NSW/Qld Border	0.0%	0.0%	0.0%	1.5%
	25A - Between Logan Motorway and Undullah Road	0.0%	0.2%	0.1%	0.0%
	25A - Between Undullah Road and Allan Creek Road	0.5%	1.2%	1.0%	0.2%
	25A - Between Allan Creek Road and Eaglesfield Street	0.5%	1.2%	1.0%	0.2%
Pacific Motorway	12A - Between Logan Highway and NSW/Qld Border	0.0%	0.0%	0.0%	0.3%
Rosewood Laidley Road	38 - Between Karrabin Rosewood Road and Lane Road	0.0%	0.6%	2.6%	0.8%
	38 - Between Lane Road and Grandchester Mount Mort Road	1.5%	2.9%	3.4%	0.8%
	38 - Between Grandchester Mount Mort Road and Crown Street	3.3%	6.5%	7.7%	1.9%
Rosewood Warrill View Road	35 - Between Ipswich Rosewood Road and Reillys Road	0.0%	0.0%	3.8%	7.1%
	35 - Between Reillys Road and Ebenezer Road	5.9%	6.4%	6.0%	3.9%
Warwick Road	301 – Between Moffatt Road and Lobb Street	0.0%	0.0%	0.0%	0.0%
	301 – Between Lobb Street and Cunningham Highway	0.0%	0.0%	0.0%	0.0%
Warrego Highway	18A - Between Haigslea Amberley Road and Brisbane Valley Highway	0.0%	0.0%	0.0%	0.1%
	18A - Between Brisbane Valley Highway and Pine Mountain Road	0.0%	0.0%	0.0%	0.0%
	18A - Between Pine Mountain Road and Cunningham Highway	0.0%	0.0%	0.0%	0.0%
Warrill View Peak Crossing Road	216 - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road	79.4%	174.5%	171.1%	97.8%
State-controlled roads: RMS					
Pacific Motorway	Between Qld/NSW border and Gwydir Highway	0.0%	0.0%	0.0%	0.3%
Summerland Way	Between NSW/Qld Border and Bruxner Way	0.0%	0.0%	0.0%	0.7%
	Between Bruxner Way and Red Lane	0.0%	0.0%	0.0%	0.7%
	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	0.9%

The analysis indicates that a number of SCR road segments are likely to exceed the 5 per cent SAR threshold, with some road sections exceeding this threshold by a significant margin.It should however be noted that the assumption of fully loaded vehicles in each direction is conservative to ensure no underestimation of pavement impacts. Road sections that exceed the 5 per cent SAR threshold have been provided in Table 12.3.

Table 7.4 State-controlled Roads with construction traffic exceeding 5 per cent of base Standard Axle Repetitions

Road name	Road section
State-controlled roads: DTMR	
Beaudesert Boonah Road	Between Ipswich Boonah Road and Wyaralong Dam Access
	Between Wyaralong Dam Access and Tilley Road
	Between Tilley Road and Sandy Creek Road
	Between Sandy Creek Road and Bromelton House Road
	Between Bromelton House Road and Ilbogan Road
Cunningham Highway	Between Ipswich Boonah Road and Middle Road
	Between Middle Road and Ipswich Rosewood Road
	Between Champions Way and Mutdapilly Churchbank Weir Rd
Ipswich Boonah Road	Between Cunningham Highway and Mt Flinders Rd
	Between Mt Flinders Rd and Warrill View Peak Crossing Rd
	Between Warrill View Peak Crossing Road and Dwyers Road
	Between Dwyers Road and Washpool Road
	Between Washpool Road and Beaudesert Boonah Road
Ipswich Rosewood Road	Between Cunningham Highway and Ipswich Rosewood Road
	Between Ipswich Rosewood Road and Karrabin Rosewood Road
Karrabin Rosewood Road	Between Rosewood Laidley Road and Haigslea Amberley Road
Rosewood Laidley Road	Between Grandchester Mount Mort Road and Crown Street
Rosewood Warrill View Road	Between Ipswich Rosewood Road and Reillys Road
	Between Reillys Road and Ebenezer Road
Warrill View Peak Crossing Road	Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road

Figure 7.1 to Figure 7.20 show the SAR assessment results for these road sections. This assessment shows that while the development SARs are expected to increase over the duration of construction activities, this would be a temporary increase in pavement loadings over the pavement mitigation period of 20 years.

The analysis indicates that the SCR road segments located in QLD would have a minimal pavement impact given the duration of the construction activities and pavement loading.

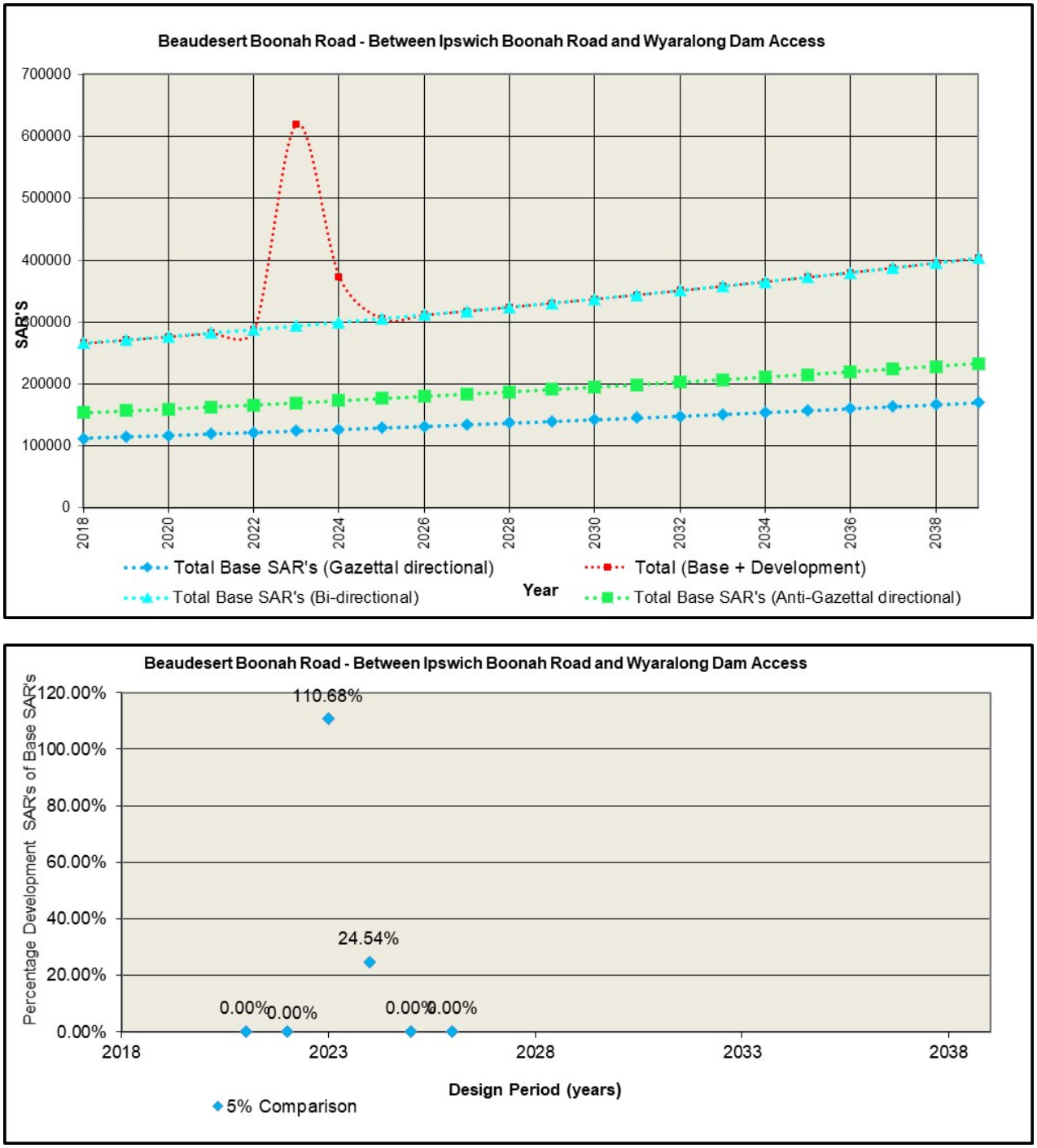
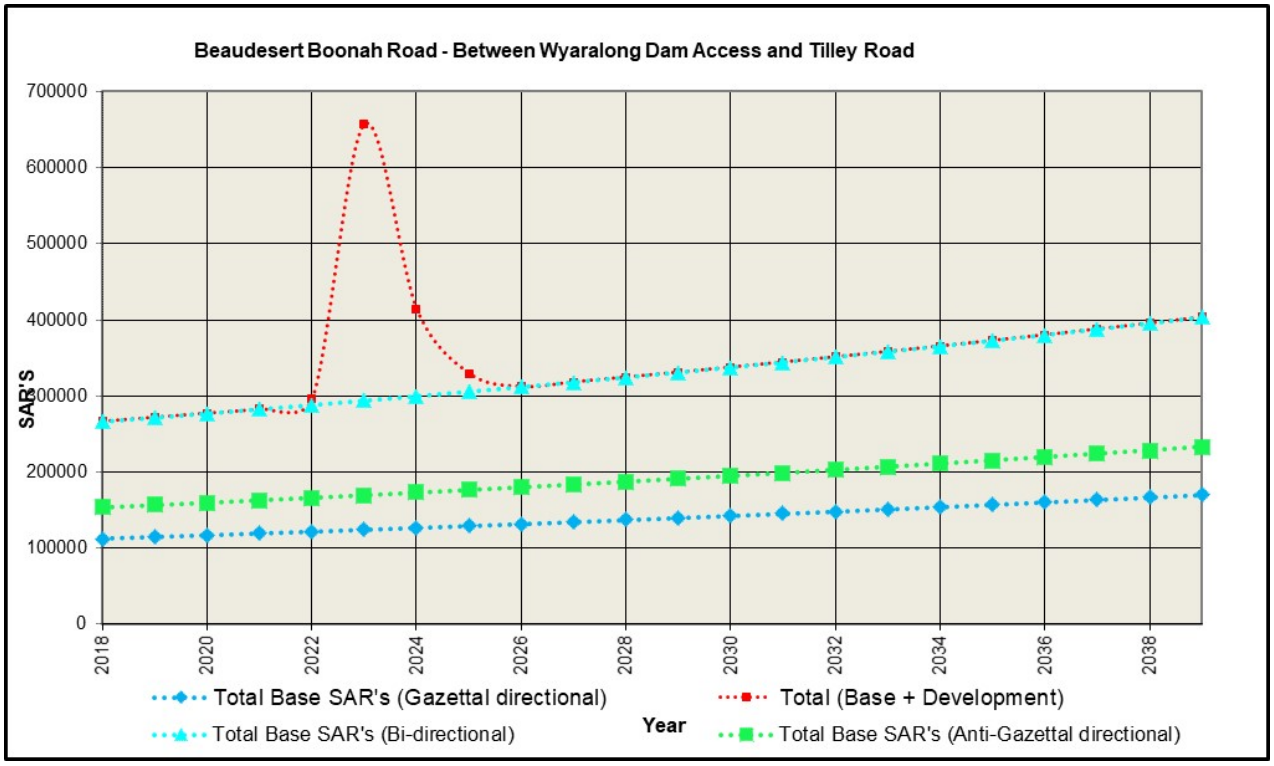


Figure 7.1 **Standard Axle Repetitions Results: Beaudesert Boonah Road - Between Ipswich Boonah Road and Wyaralong Dam Access**



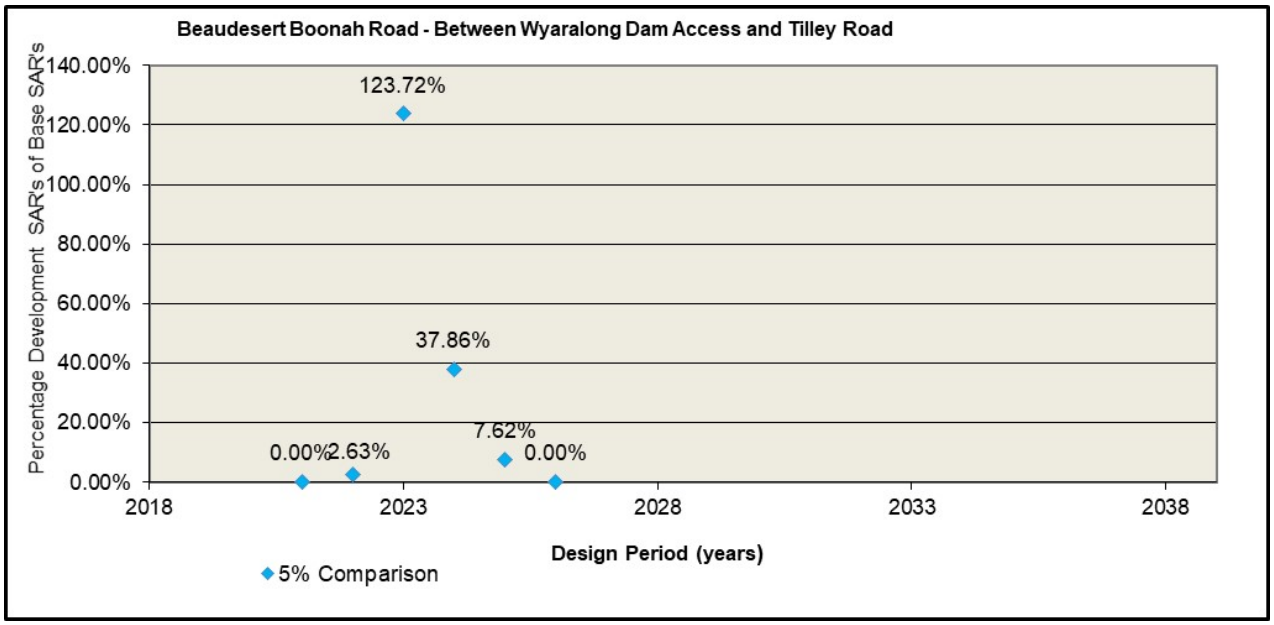
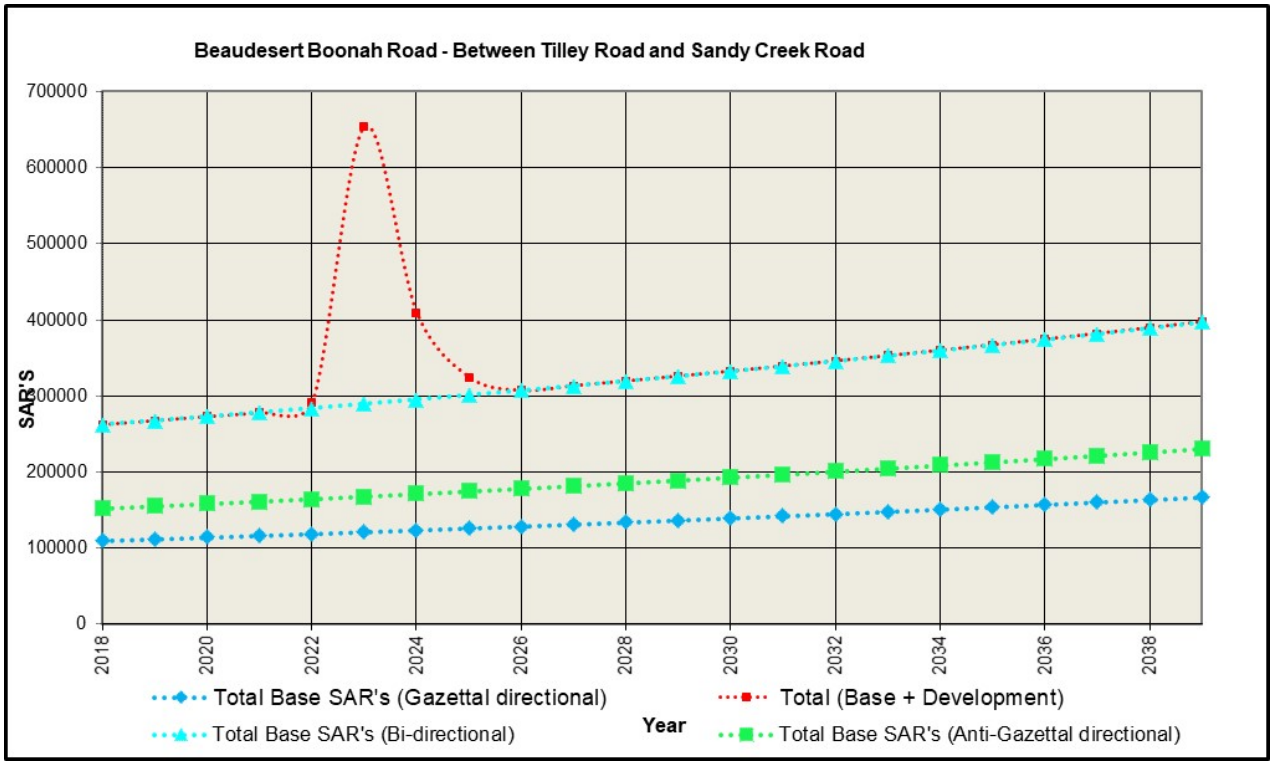


Figure 7.2 **Standard Axle Repetitions Results: Beaudesert Boonah Road - Between Wyaralong Dam Access and Tilley Road**



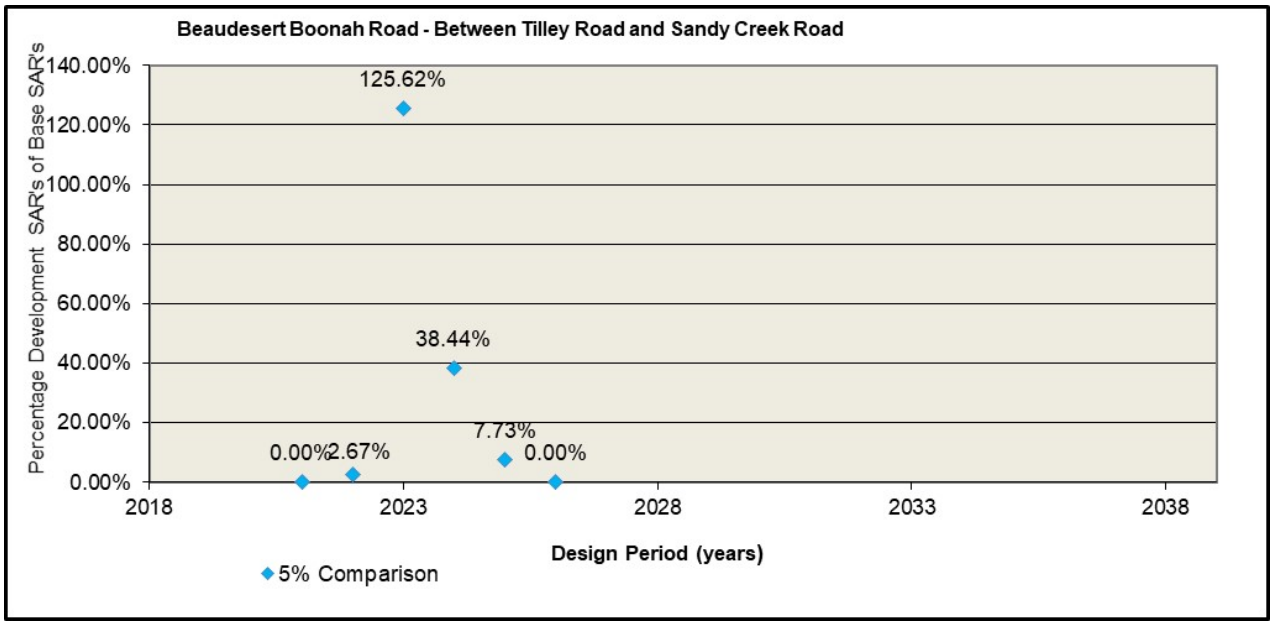


Figure 7.3 **Standard Axle Repetitions Results: Beaudesert Boonah Road - Between Tilley Road and Sandy Creek Road**

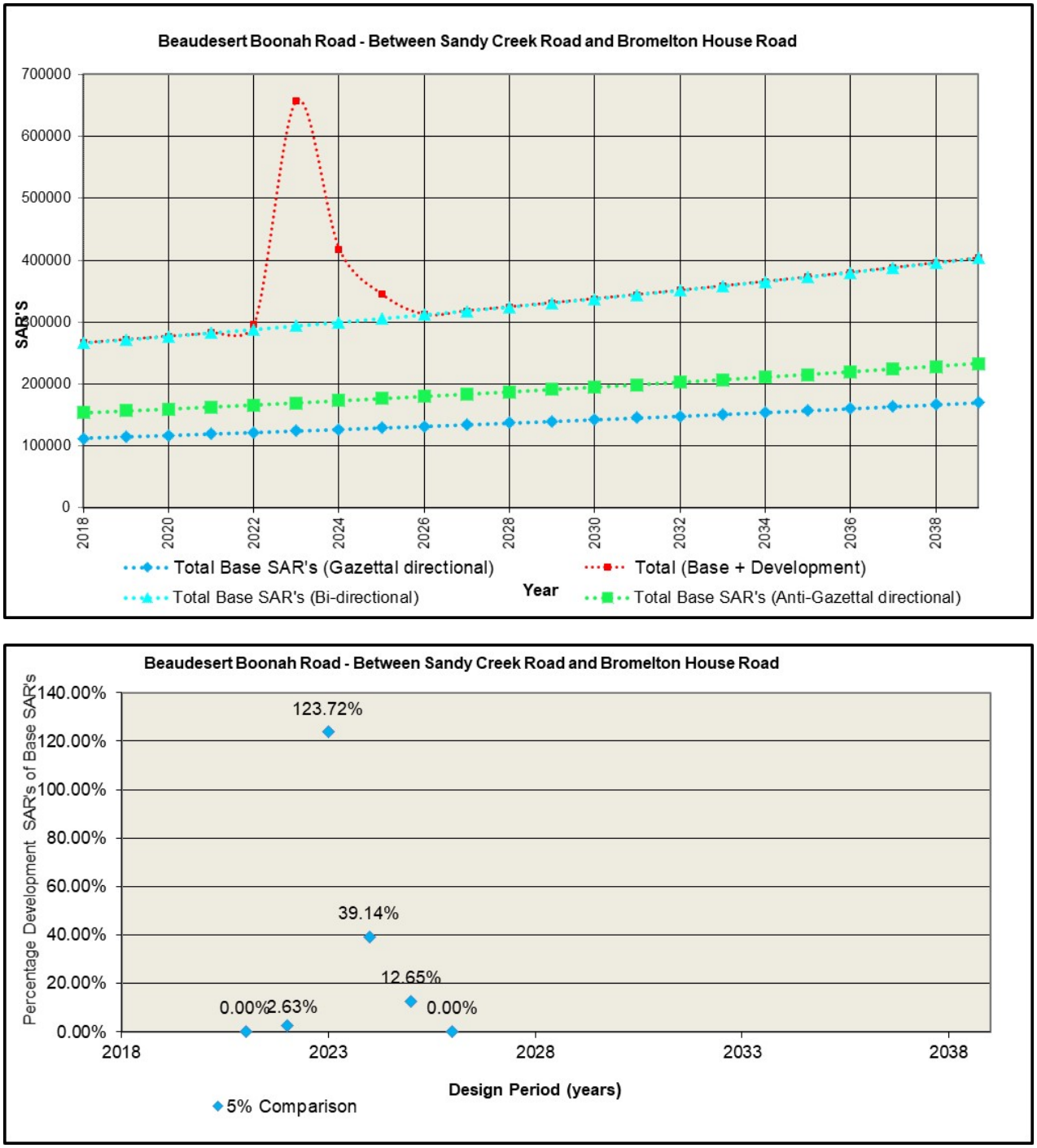


Figure 7.4 **Standard Axle Repetitions Results: Beaudesert Boonah Road - Between Sandy Creek Road and Bromelton House Road**

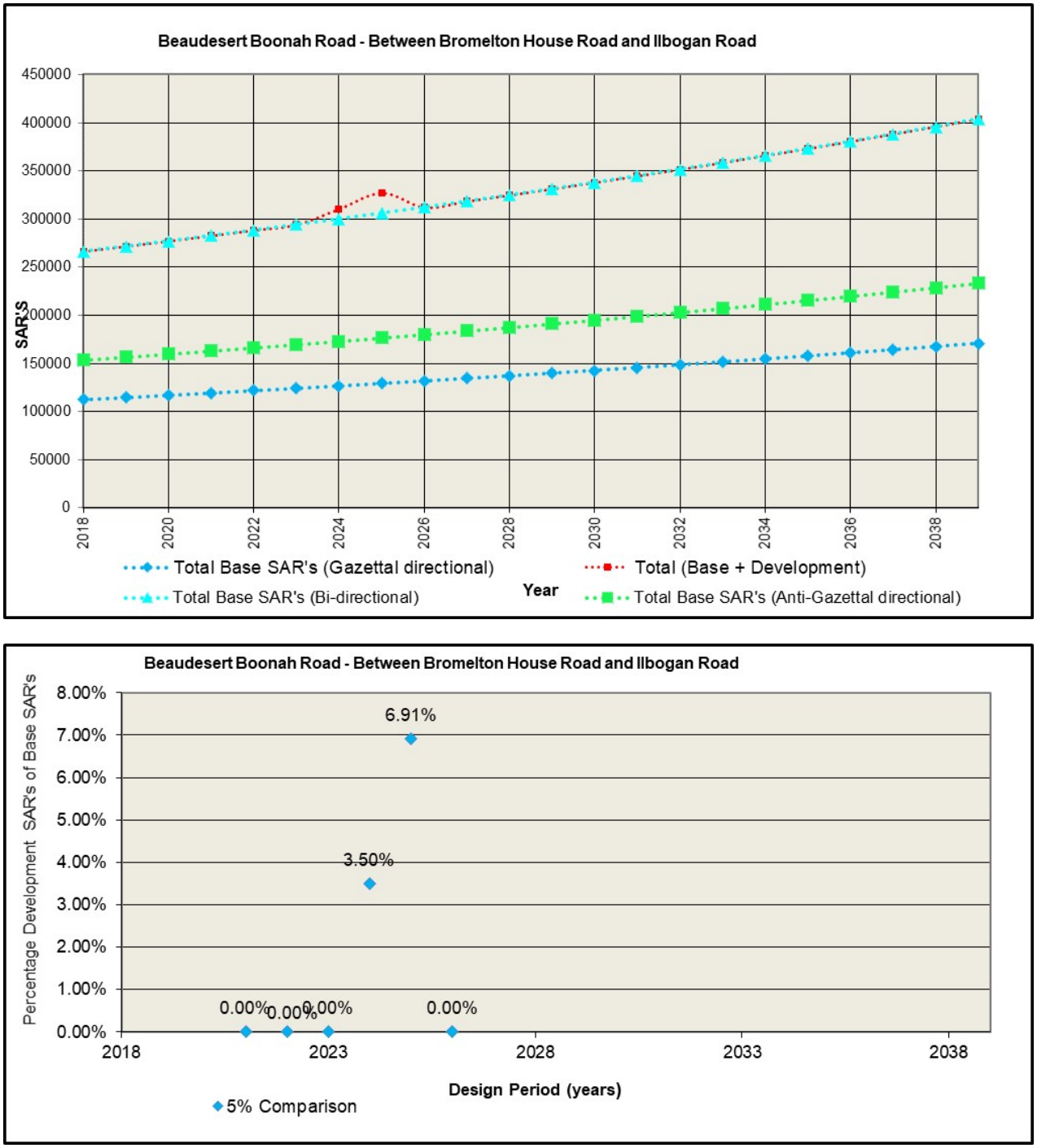


Figure 7.5 **Standard Axle Repetitions Results: Beaudesert Boonah Road - Between Bromelton House Road and Ilbogan Road**

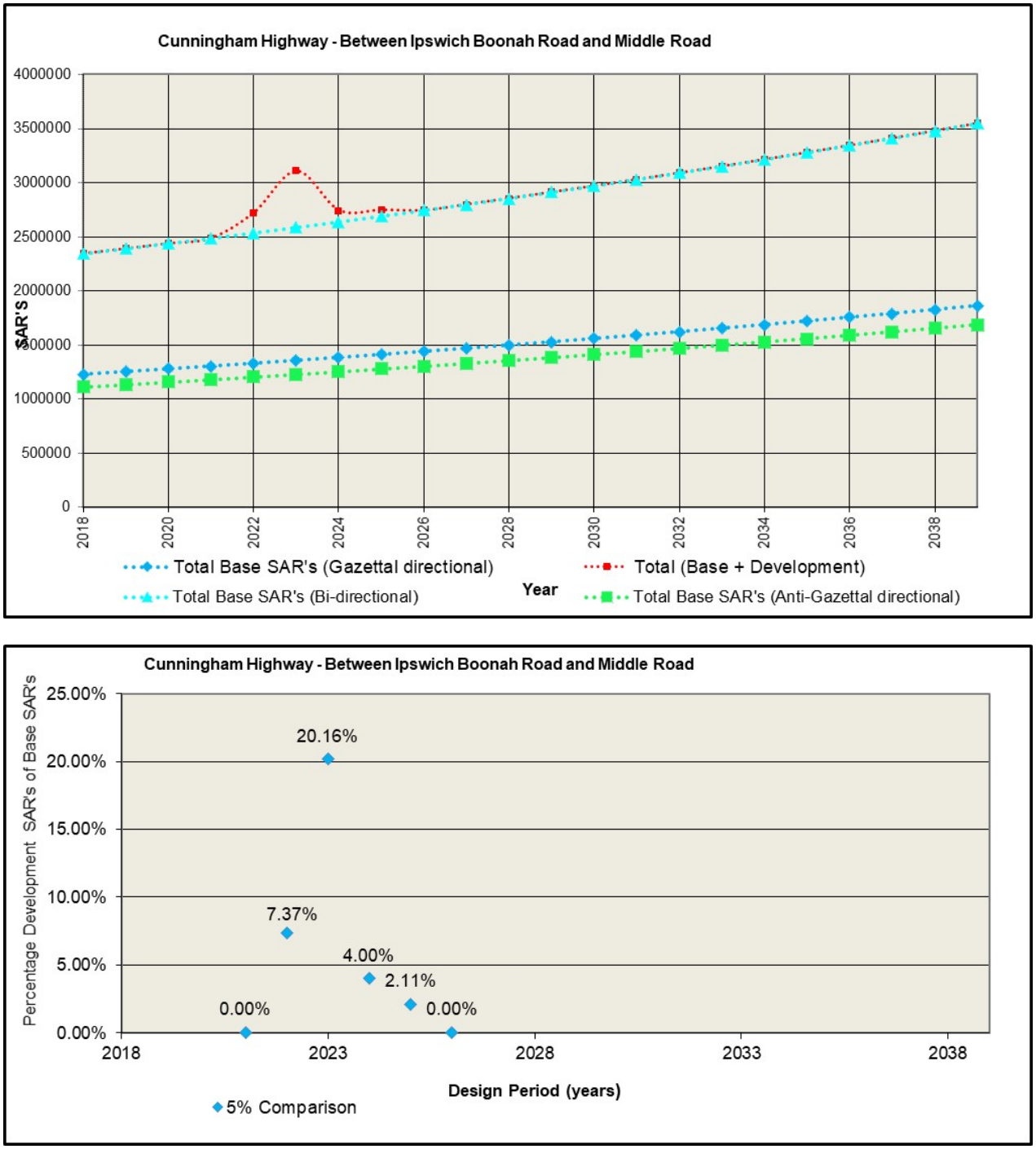


Figure 7.6 **Standard Axle Repetitions Results: Cunningham Highway - Between Ipswich Boonah Road and Middle Road**

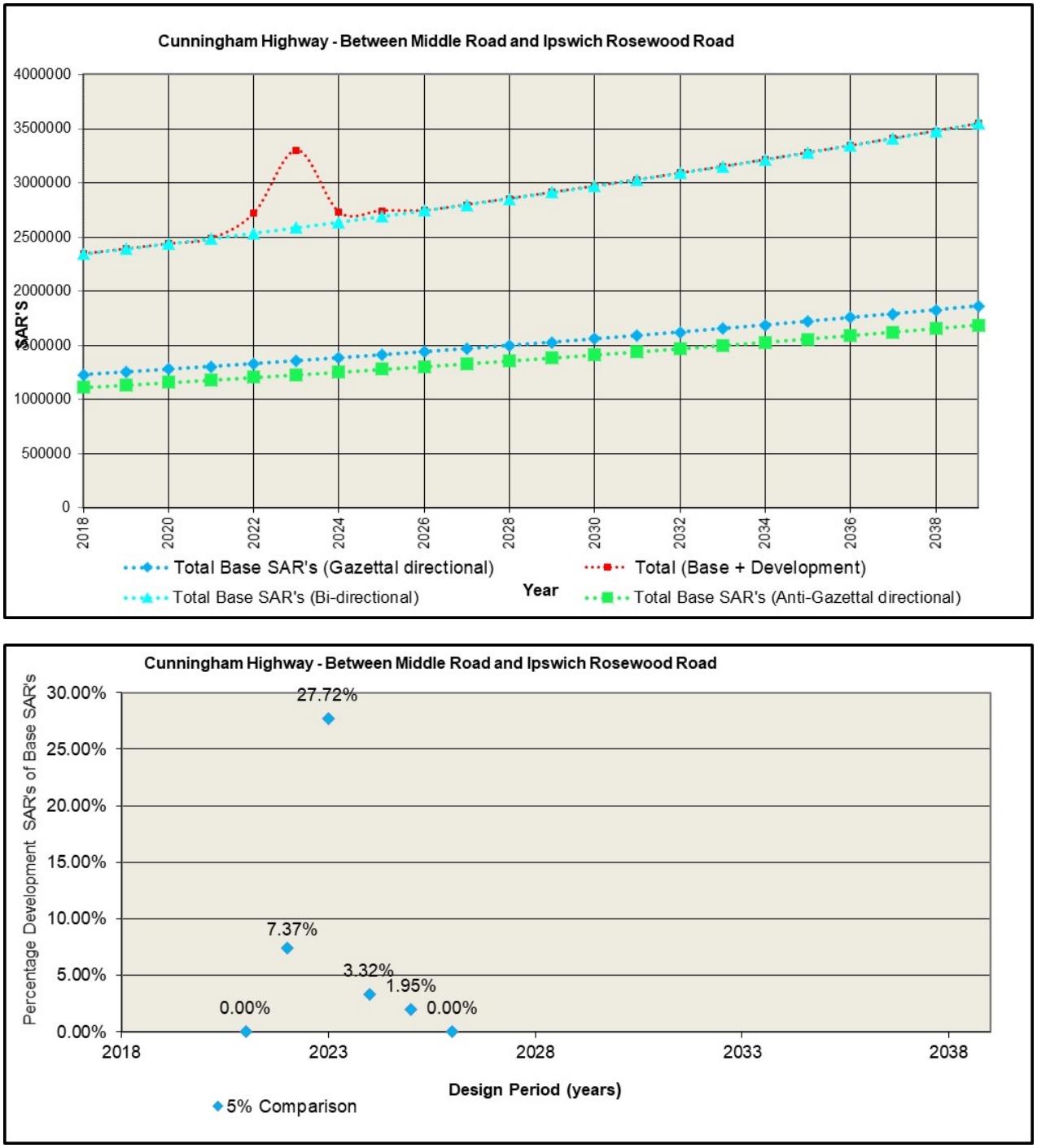


Figure 7.7 **Standard Axle Repetitions Results: Cunningham Highway - Between Middle Road and Ipswich Rosewood Road**

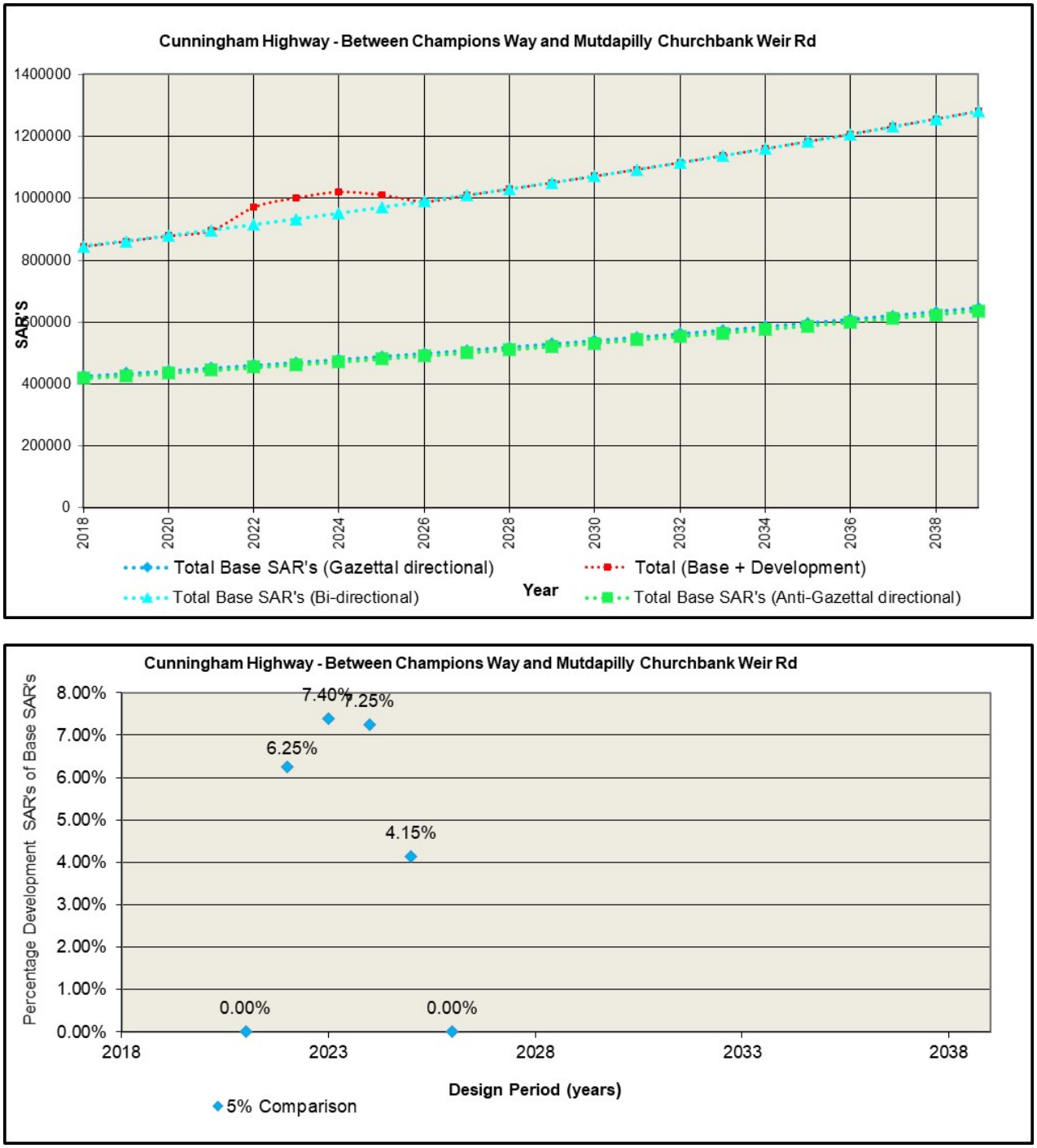


Figure 7.8 **Standard Axle Repetitions Results: Cunningham Highway - Between Champions Way and Mutdapilly Churchbank Weir Road**

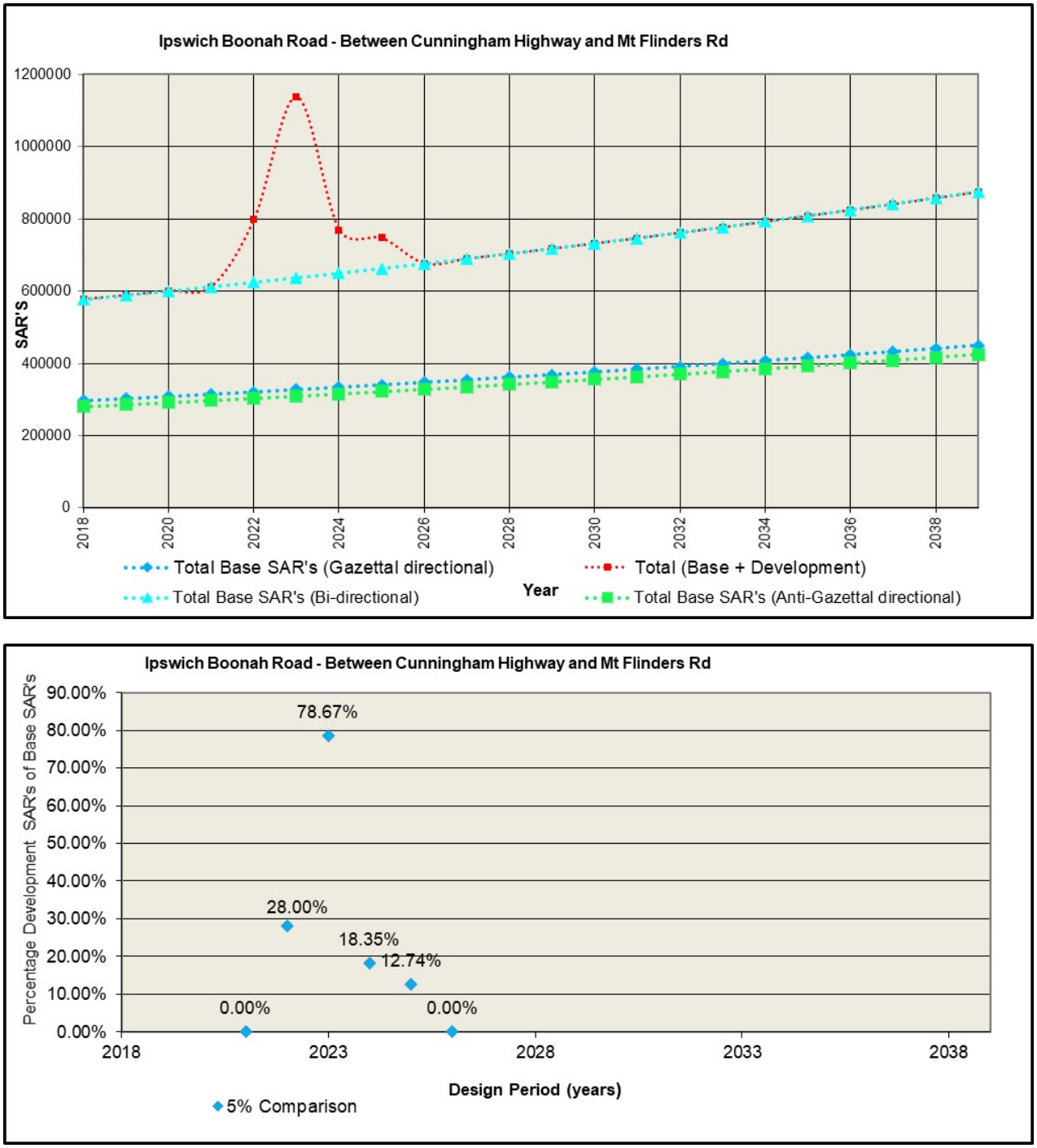


Figure 7.9 **Standard Axle Repetitions Results: Ipswich Boonah Road - Between Cunningham Highway and Mt Flinders Road**

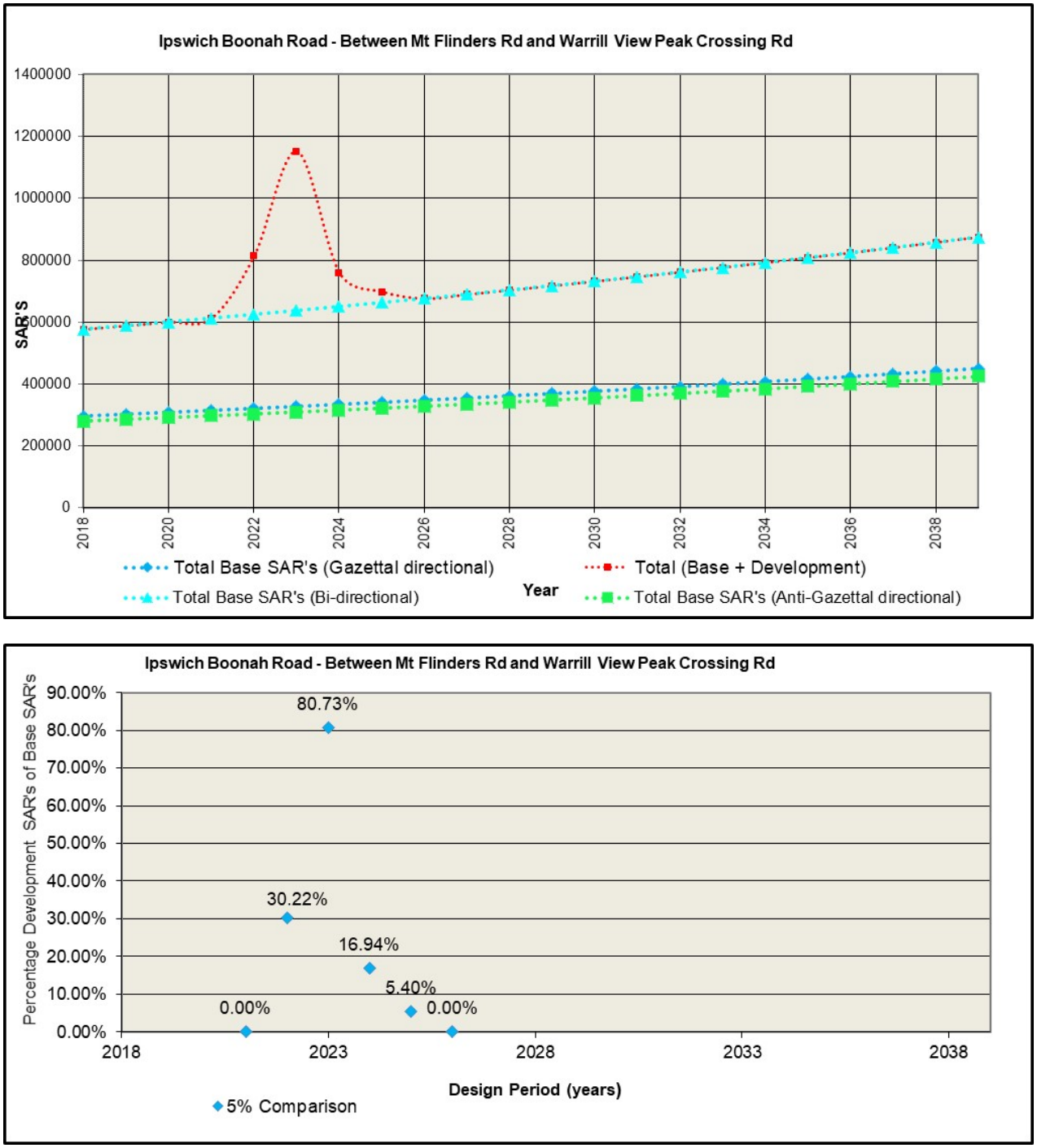


Figure 7.10 **Standard Axle Repetitions Results: Ipswich Boonah Road - Between Mt Flinders Road and Warrill View Peak Crossing Road**

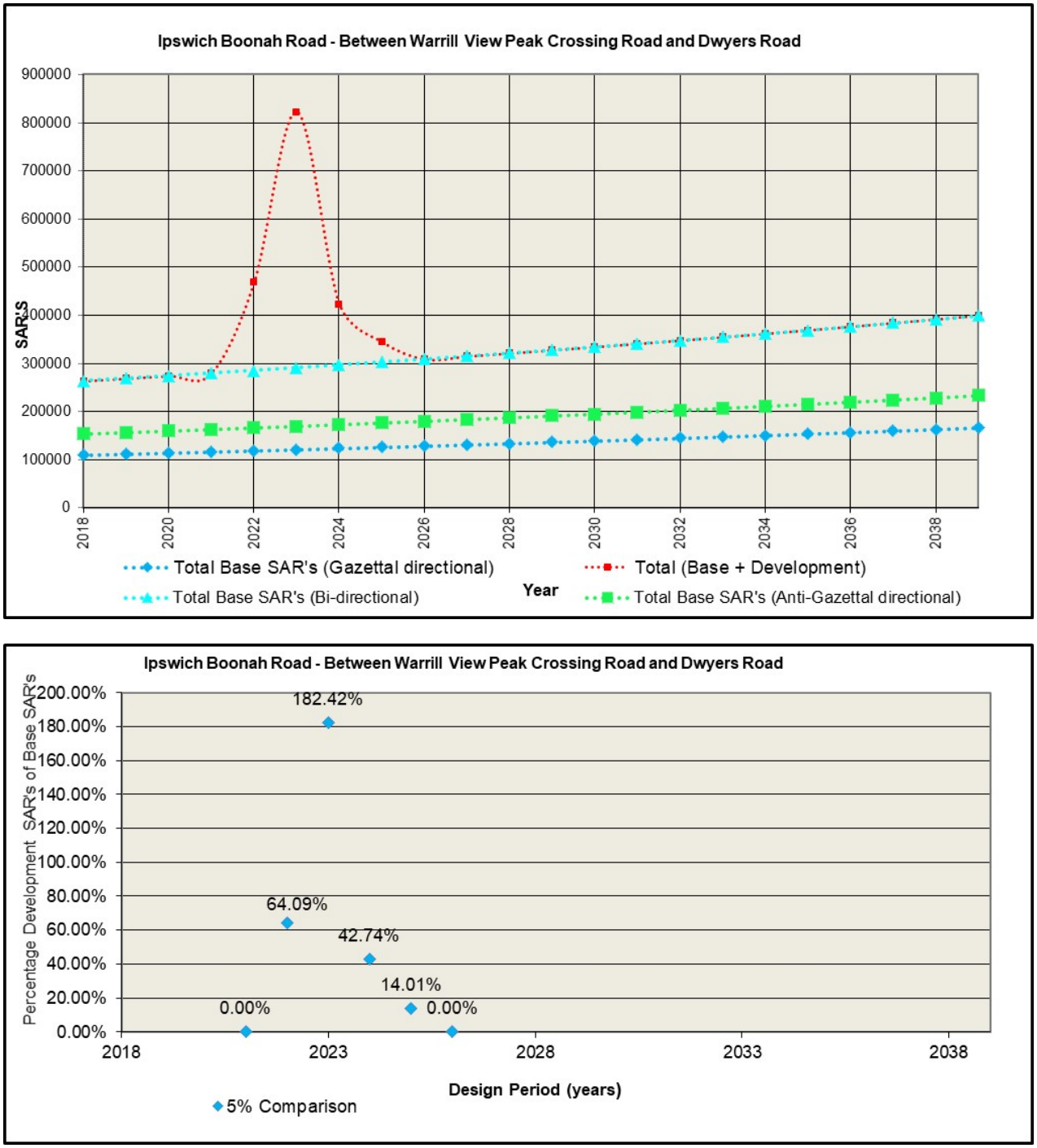
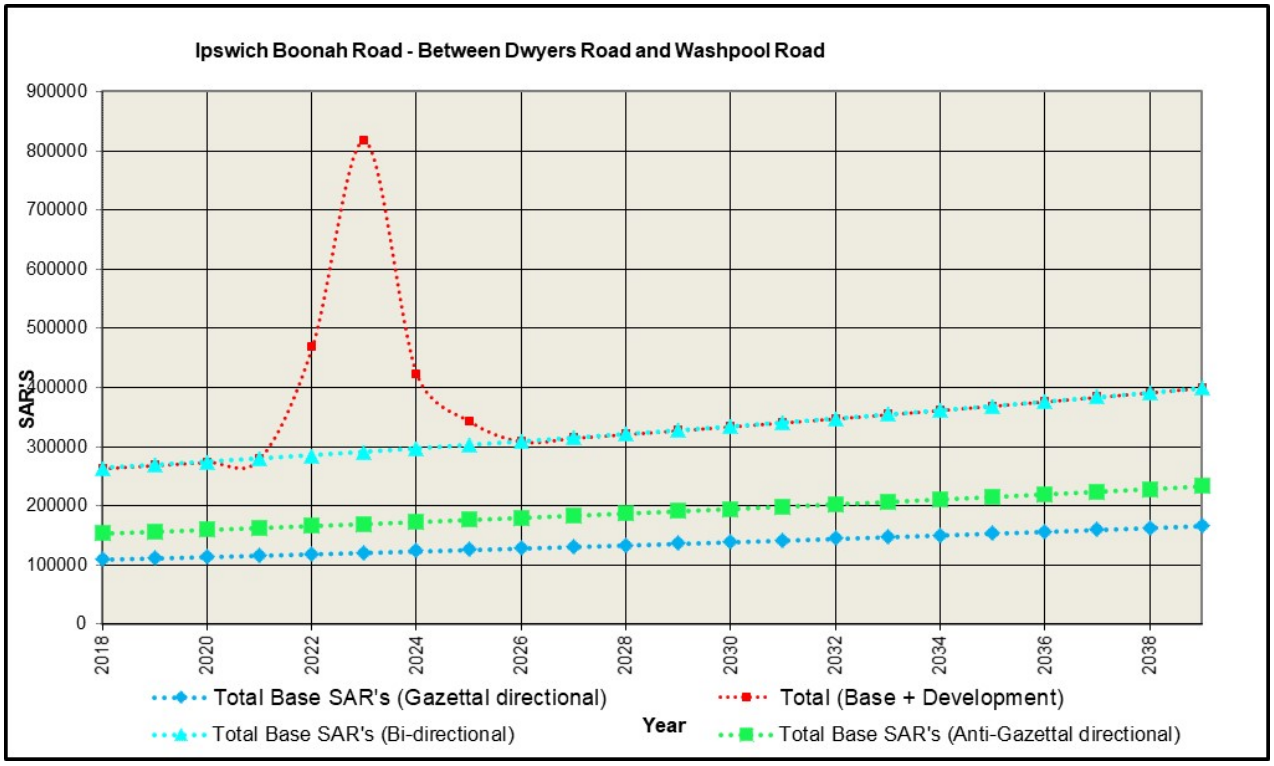


Figure 7.11 **Standard Axle Repetitions Results: Ipswich Boonah Road - Between Warrill View Peak Crossing Road and Dwyers Road**



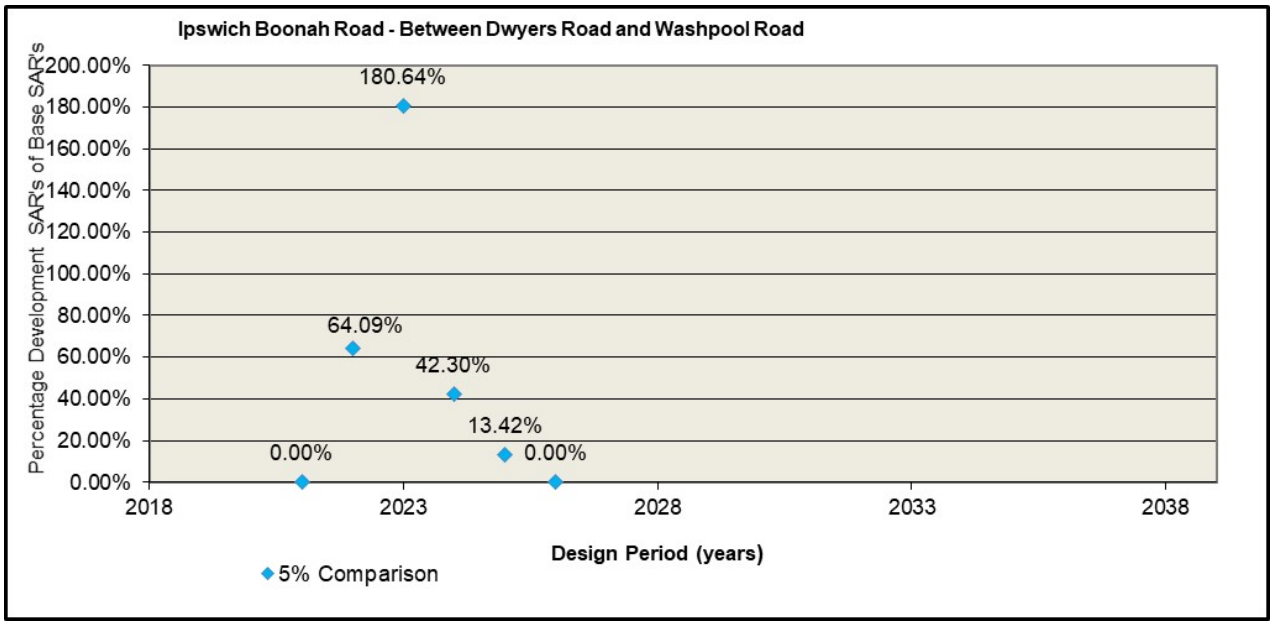
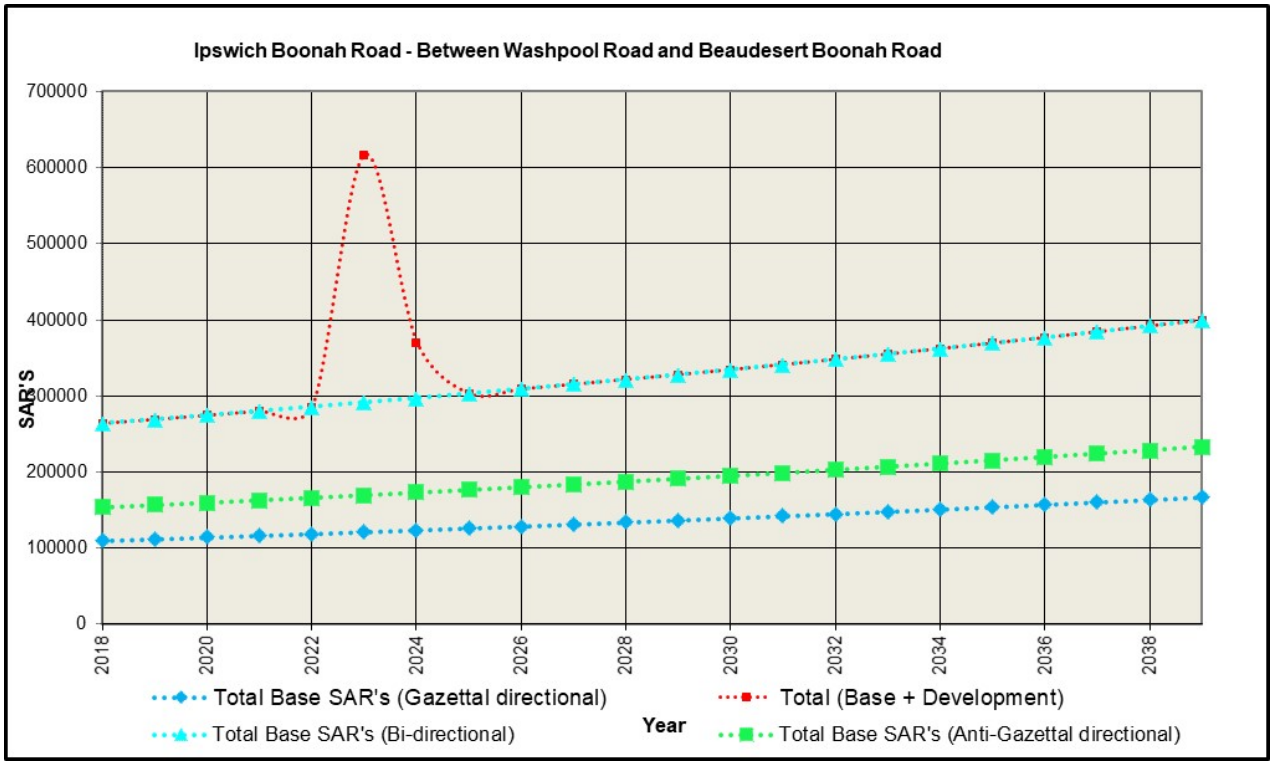


Figure 7.12 **Standard Axle Repetitions Results: Ipswich Boonah Road - Between Dwyers Road and Washpool Road**



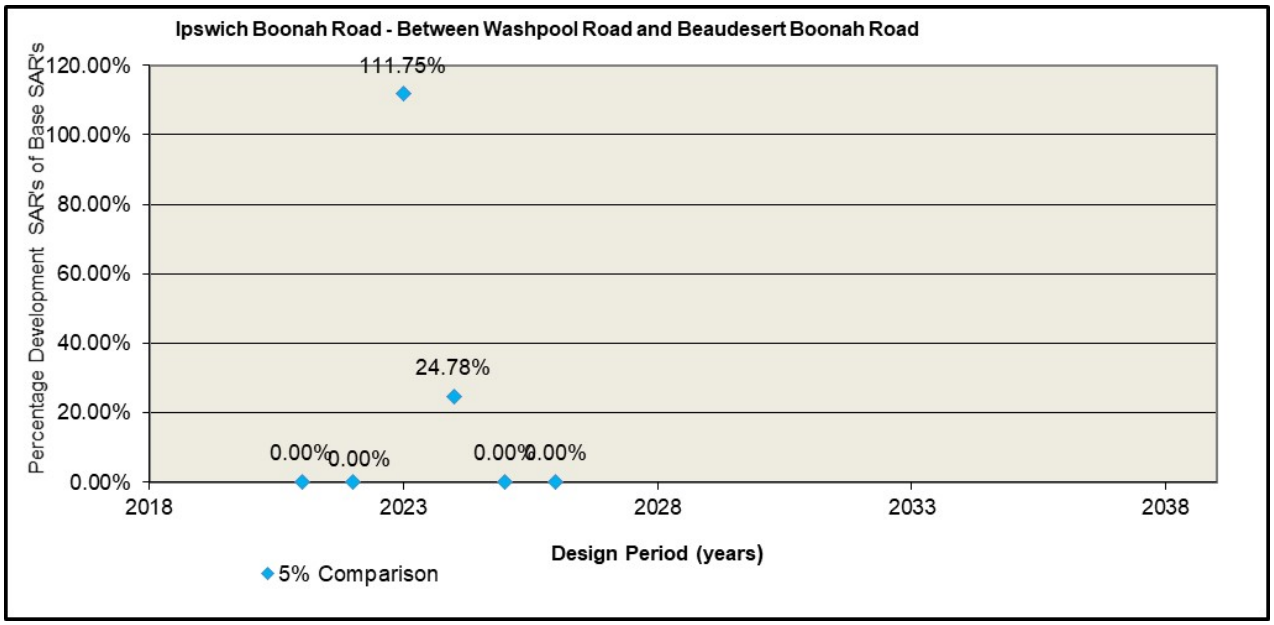


Figure 7.13 **Standard Axle Repetitions Results: Ipswich Boonah Road - Between Washpool Road and Beaudesert Boonah Road**

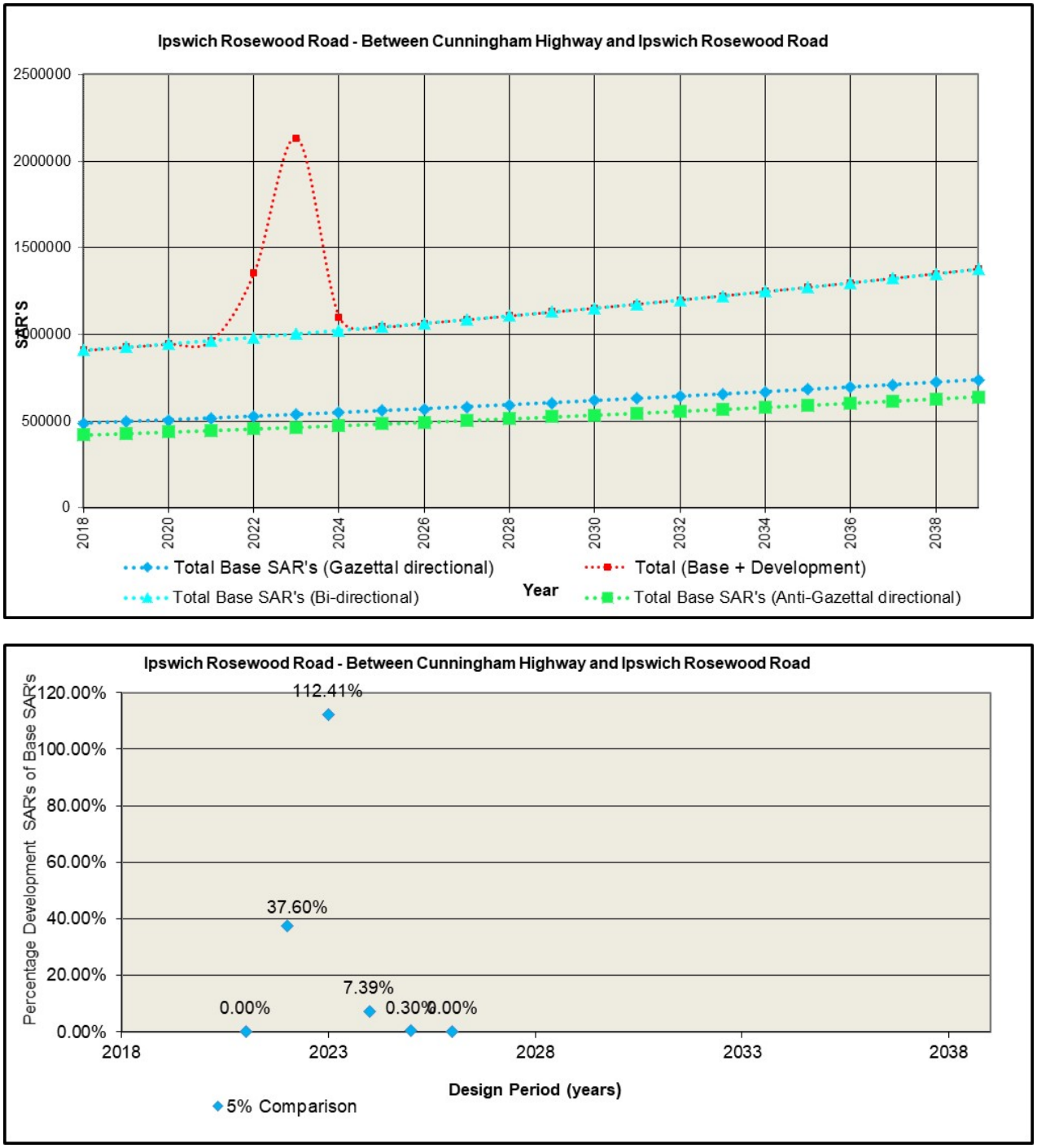


Figure 7.14 **Standard Axle Repetitions Results: Ipswich Rosewood Road - Between Cunningham Highway and Ipswich Rosewood Road**

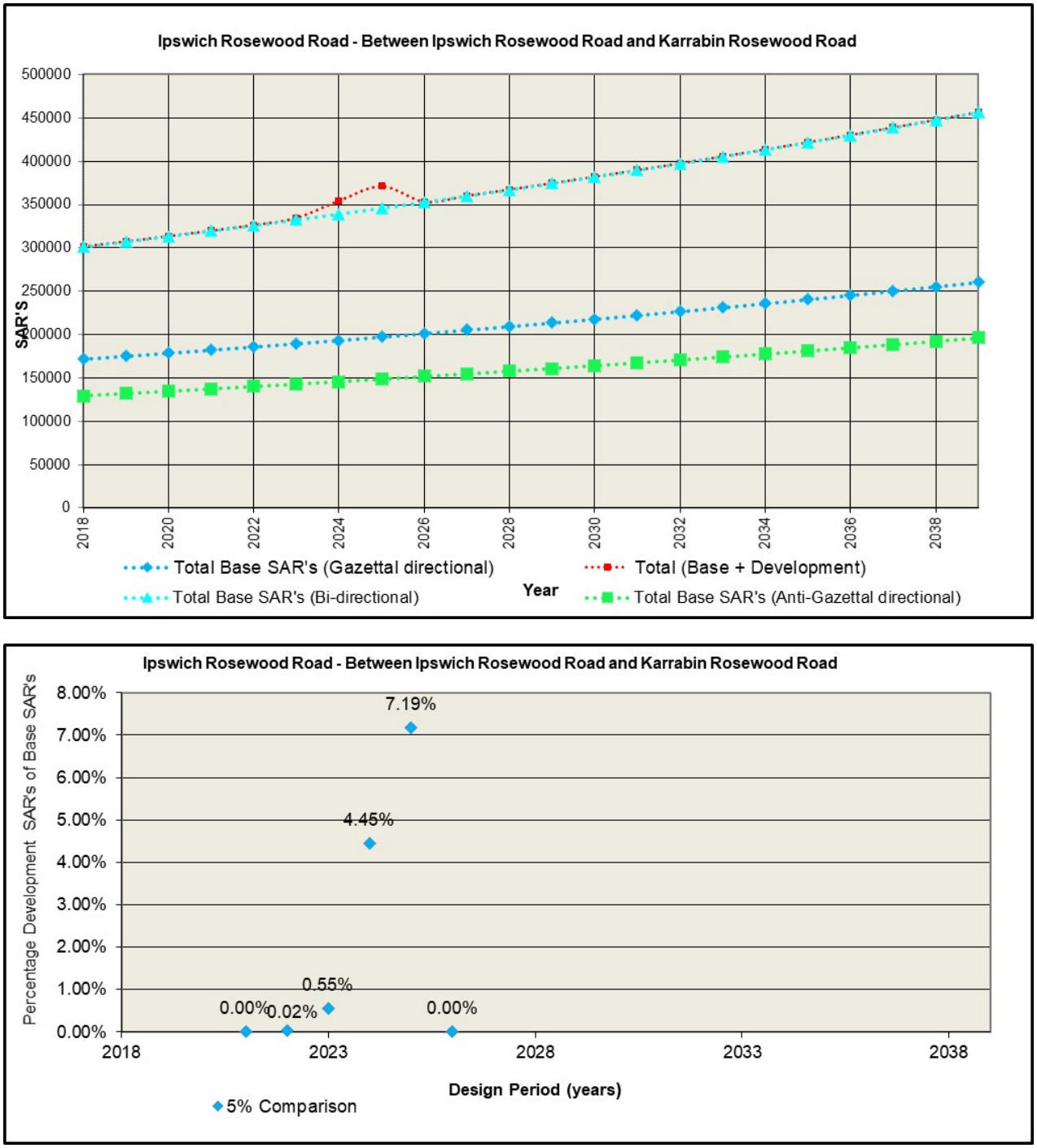


Figure 7.15 **Standard Axle Repetitions Results: Ipswich Rosewood Road - Between Ipswich Rosewood Road and Karrabin Rosewood Road**

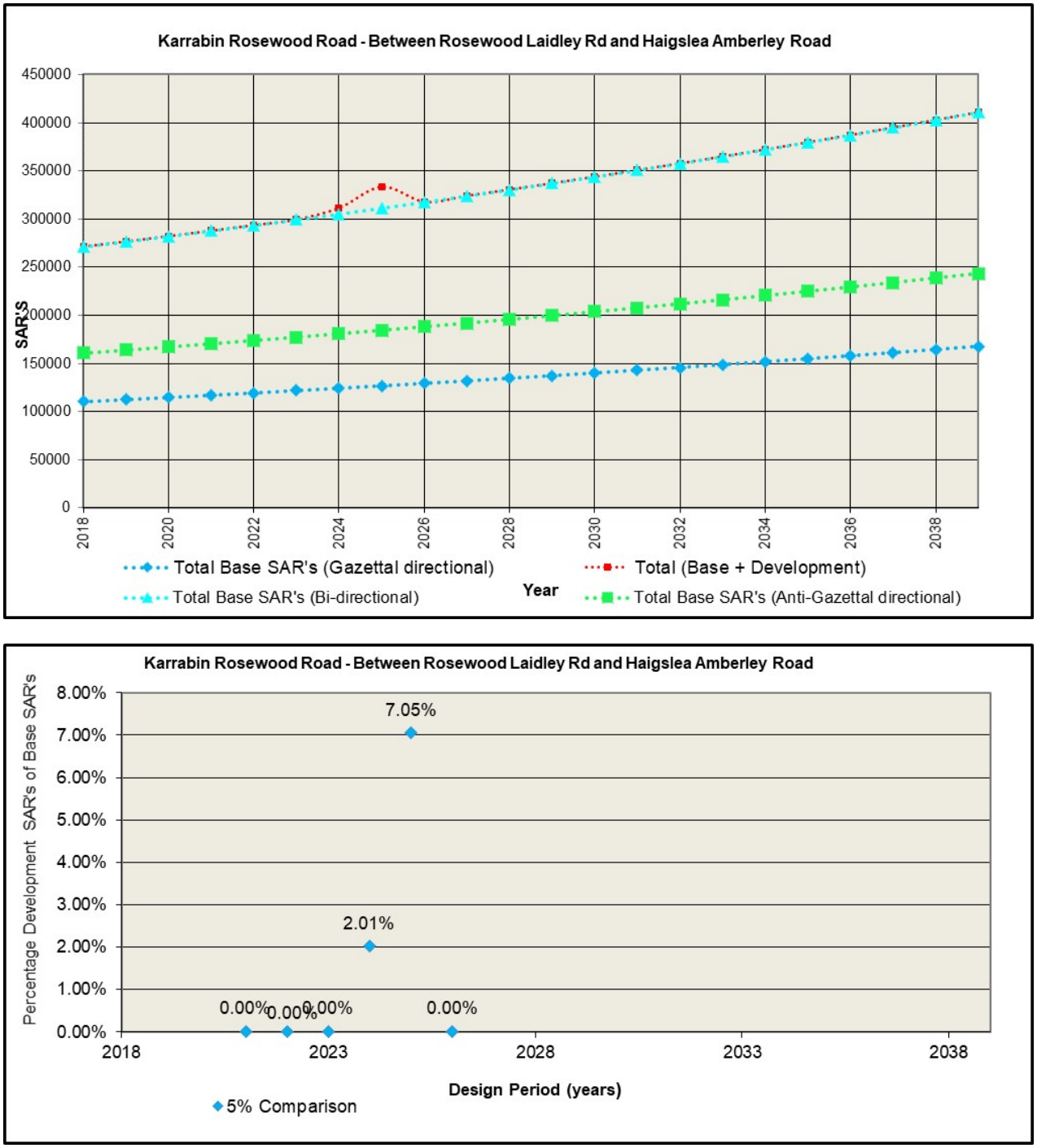


Figure 7.16 **Standard Axle Repetitions Results: Karrabin Rosewood Road - Between Rosewood Laidley Road and Haigslea Amberley Road**

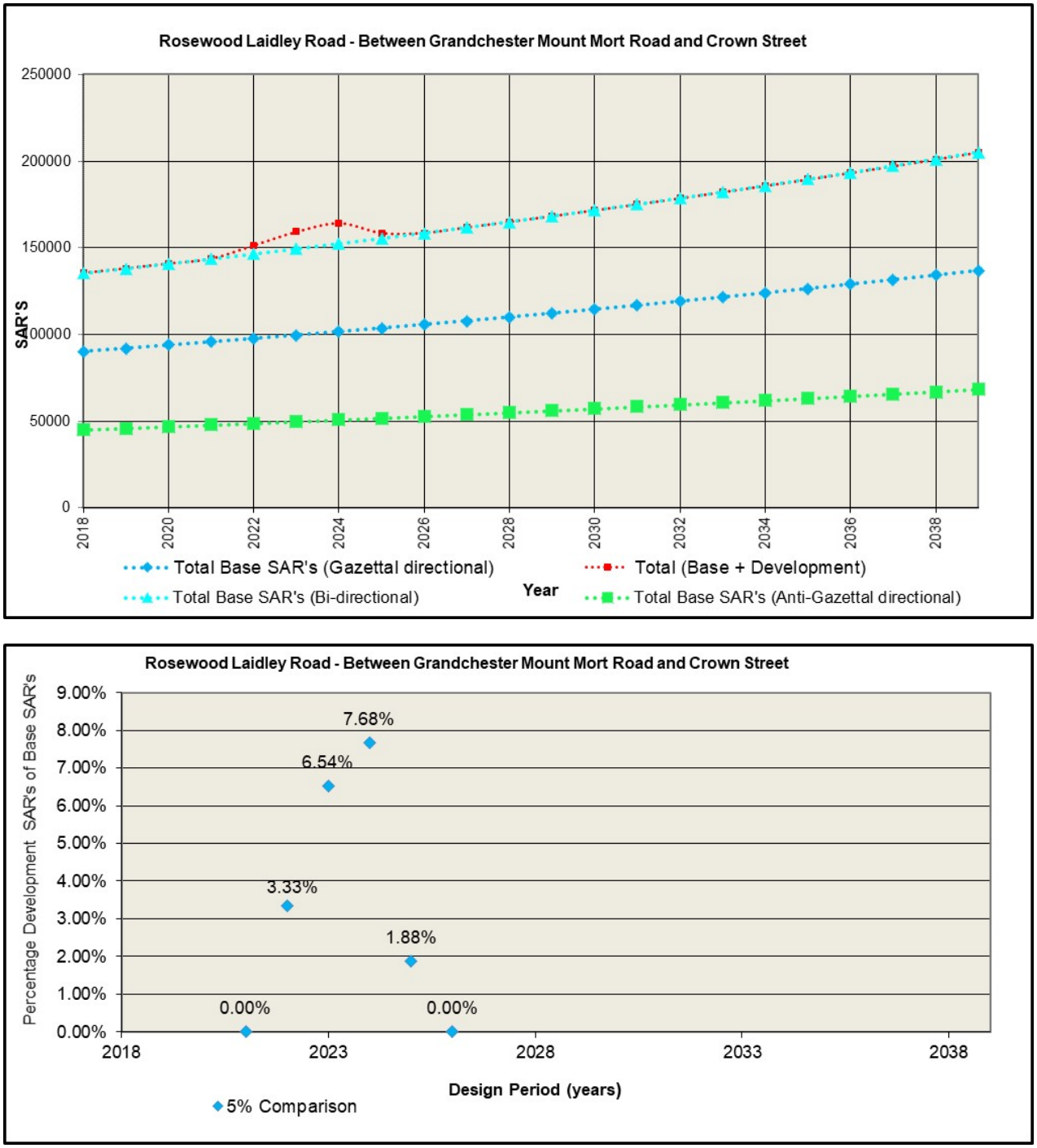
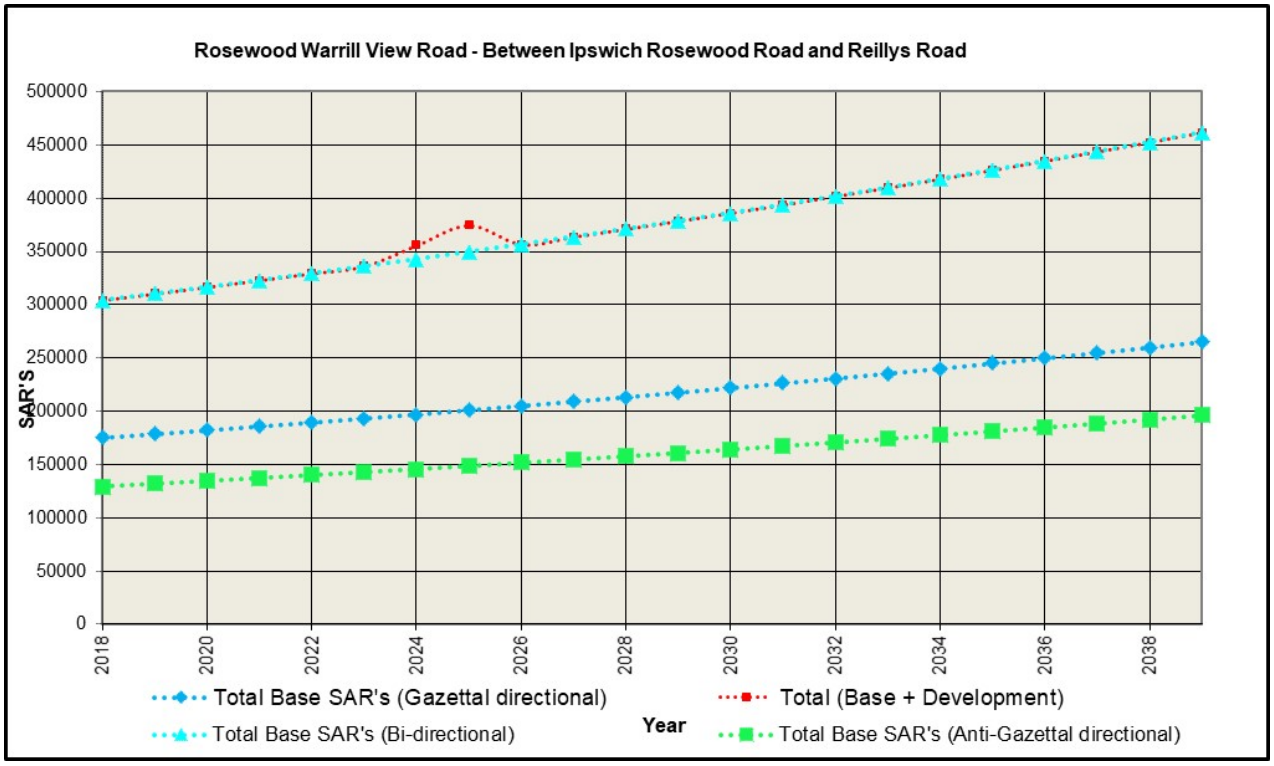


Figure 7.17 **Standard Axle Repetitions Results: Rosewood Laidley Road - Between Grandchester Mount Mort Road and Crown Street**



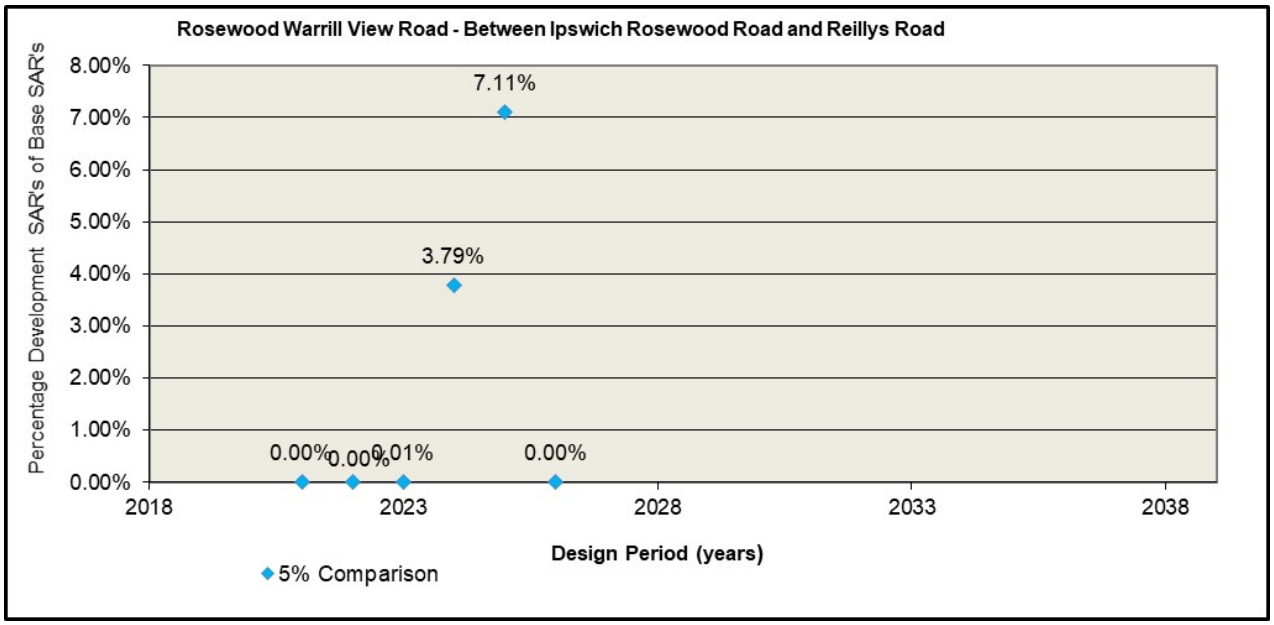
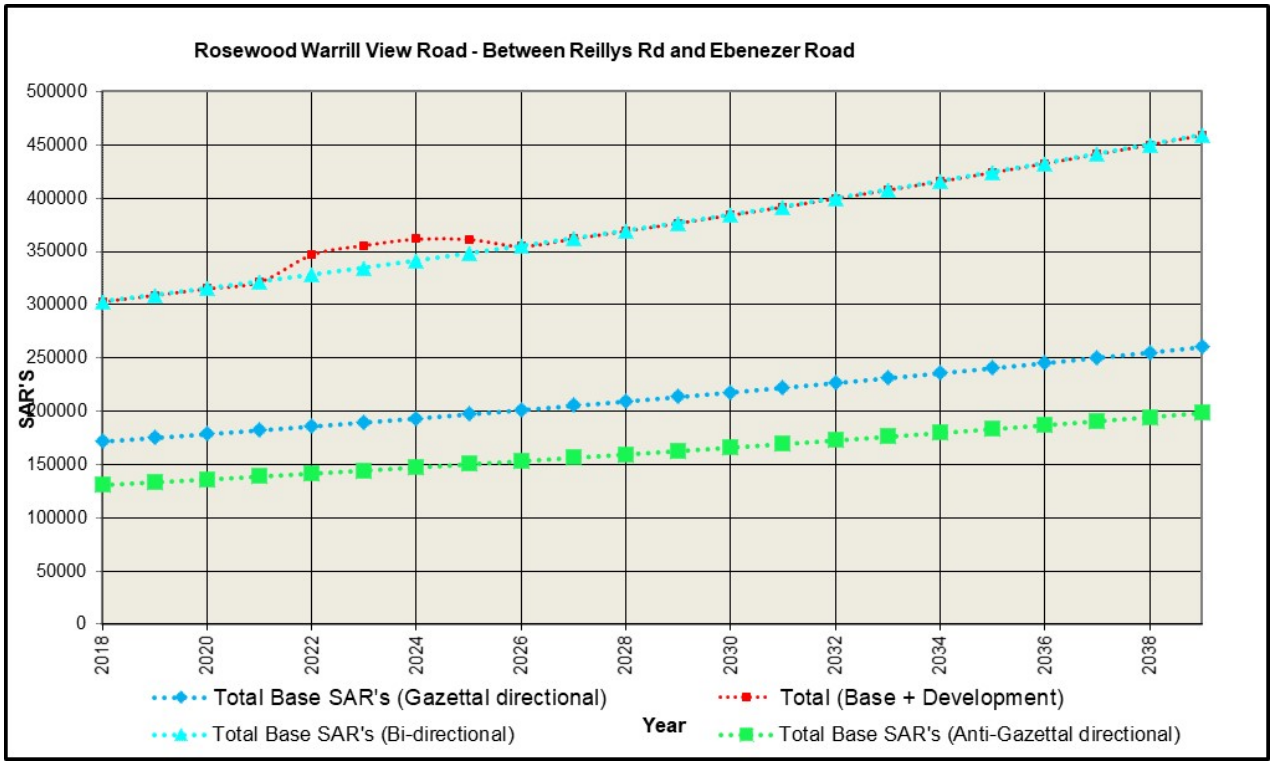


Figure 7.18 **Standard Axle Repetitions Results: Rosewood Warrill View Road – Between Ipswich Rosewood Road and Reillys Road**



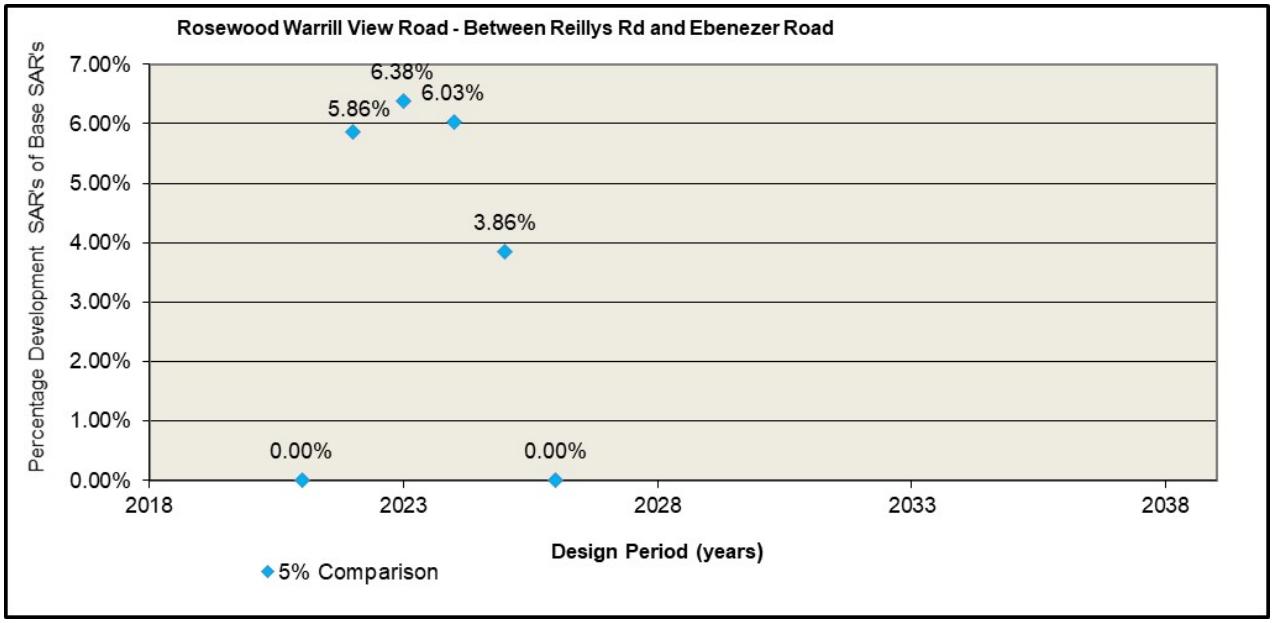
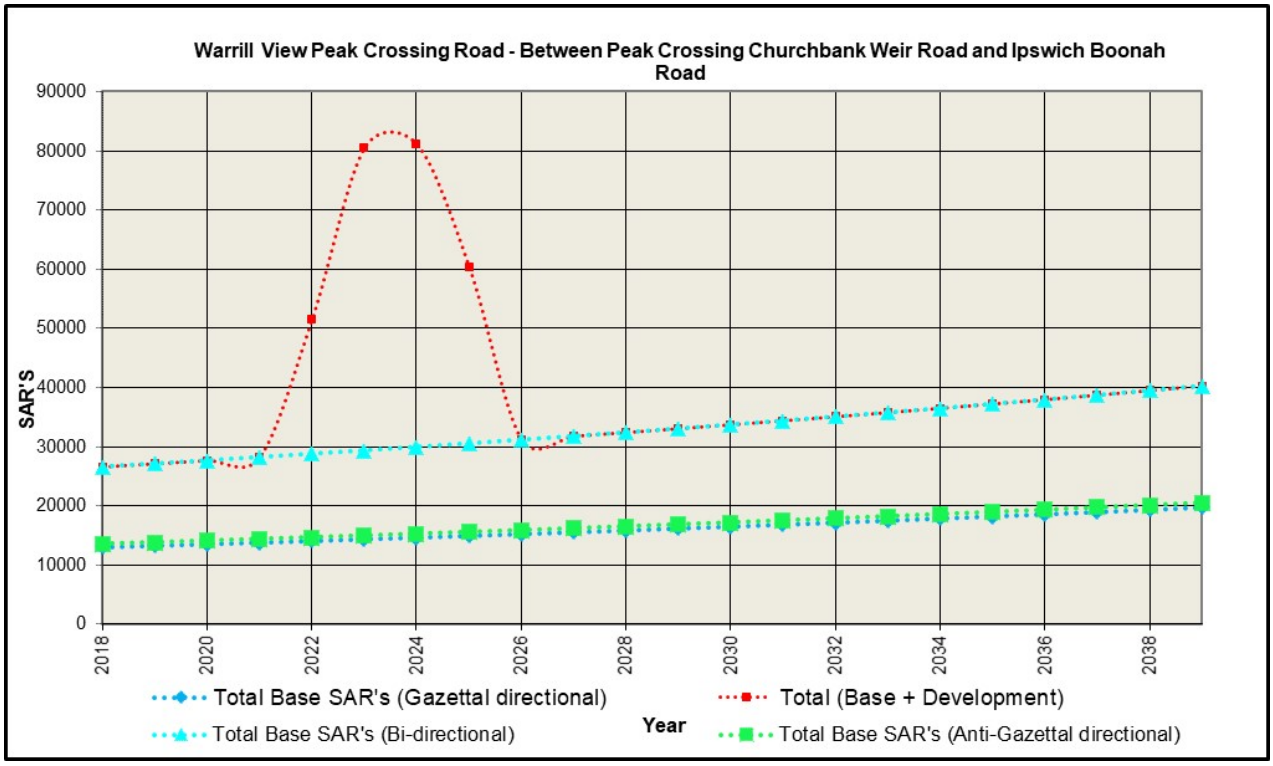


Figure 7.19 **Standard Axle Repetitions Results: Rosewood Warrill View Road - Between Reillys Road and Ebenezer Road**



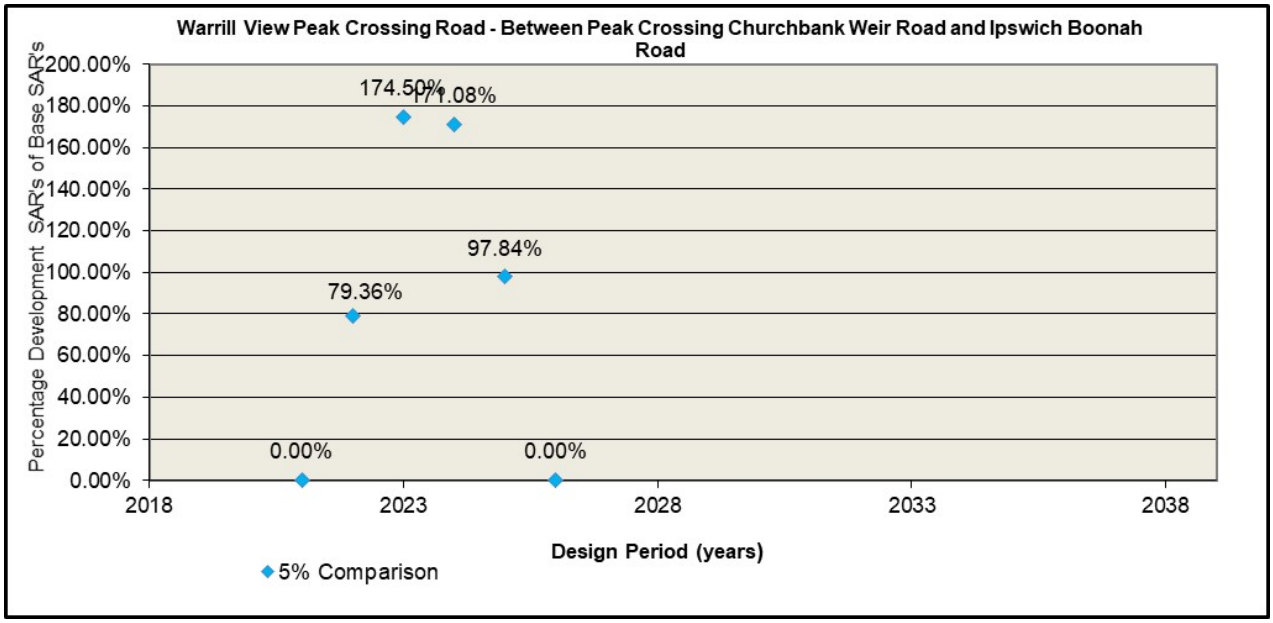


Figure 7.20 **Standard Axle Repetitions Results: Warrill View Peak Crossing Road - Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road**

Detailed analysis outputs and results are provided in Appendix O.

It is recommended that a more detailed pavement impact assessment should be carried out prior to construction and in consultation with DTMR once specific construction routes are agreed to determine marginal cost contributions. This should form part of the RUMP to be developed prior to construction. This will assist further discussions with DTMR to identify potential contribution towards the maintenance costs for the affected road sections as a result of additional pavement loading.

7.3.1 Traffic management strategies for pavement impacts

The following impact mitigation strategy is proposed in order to mitigate the envisaged additional pavement loading resulting from the generation of short term construction related traffic:

- Undertake a pavement impact assessment consistent with the process detailed in the GTIA and identify measures to avoid, reduce or mitigate effects on the pavement life of the SCR. Typical measures include:
  - Provide a payment contribution for future pavement works (for marginal SAR impacts)
  - Provide extra pavement width (for example, to prevent edge degradation)
  - Provide additional pavement thickness
  - Resealing an ageing sealed road
  - Seal an unsealed pavement
  - Provide maintenance during construction
  - Undertake pavement rehabilitation.
- Undertake a pavement condition assessment prior to and post construction activities as well as at ongoing intervals during construction
- Install wheel washers on all project vehicles and/or equipment that exit onto sealed roads from unpaved roads
- Install shaker grids or rumble pads at site exit points from construction activities.

Detailed mitigation measures are provided in Section 9.

8 Safety assessment

8.1 Methodology

The road safety impact assessment has been undertaken as per the framework laid out in Part C of the GTIA. This framework relies on the principle that a road's safety is not significantly worsened as a result of the Project, and that any pre-existing or Project-introduced unacceptable safety risk is addressed. The GTIA acknowledges that safety is not readily quantifiable and may require scoring based on expert opinion on the changes to likelihood and/or consequence of a risk being realised.

With this in mind, the road safety assessment process undertaken in the following sections includes:

- Establishing the existing safety risks relevant to the TIA study area. It is proposed that existing safety issues will be obtained from consultation with the road controlling authorities and a desktop review of relevant available data and information including published crash histories.
- Identifying the likely new risks or modified risks resulting from the Project
- Completing a risk assessment of the likelihood and consequence of safety risks being increased as a consequence of Project traffic
- Recommending management and mitigation works to ensure the existing safety risk rating for the road is not worsened as a result of the Project and that any unacceptable safety risk is addressed.

This process has been utilised to determine safety risks along the Project construction traffic routes and Project road rail interface locations.

8.2 Existing safety issues

The existing safety issues along construction traffic routes and road rail interface locations has been assessed and provided in Section 4.5.1 and Section 4.5.2. These existing safety issues, namely the number of reported crashes and crash severities for each construction traffic route and road rail interface location have been used to inform the consequence classifications provided in the sections below.

8.3 Risk assessment

A safety risk assessment based on existing crash history has been undertaken along the Project construction traffic routes and road rail interface locations for the following scenarios:

- Without the Project
- With the Project
- With the Project and with mitigation measures (required only if the score in the 'with Project' situation is higher than in the 'without Project' situation, or if the 'without Project' score is in the 'high' category).

As per Part C of the GTIA, road safety risk is considered in terms of changes in:

- Likelihood: how often an event or situation is expected to take place
- Consequence: the effect, result, or outcome of something occurring.

Classifications for likelihood and consequence that have been used in this risk assessment have been provided in Table 8.1 and Table 8.2 respectively. The resulting risk ratings have been provided in Table 8.3. These risk ratings are reflective of those provided in Table 9.3.2(a) of the GTIA.

Table 8.1 Consequence classification – based on five-year reported crash data

Consequence	Safety Risk Classification
Extreme	One or more reported fatalities
Major	One or more reported crashes resulting in hospitalisation
Moderate	One or more reported crashes resulting in medical treatment
Minor	One or more reported crashes resulting in minor injuries treatment
Not significant	No crashes

Table 8.2 Risk likelihood description

Likelihood	Description
Almost certain	Crash severity occurs more than ten times per year
Likely	Crash severity occurs or would potentially occur about five times or more per year
Possible	Crash severity occurs or is likely to occur about once per year
Unlikely	Crash severity occurs or is likely to occur about once every five years
Rare	Crash severity occurs or is likely to occur less frequently than once every five years

Table 8.3 Risk rating

Likelihood	Consequence				
	Not significant	Minor	Moderate	Major	Extreme
Almost certain	Medium	Medium	High	High	High
Likely	Medium	Medium	Medium	High	High
Possible	Low	Medium	Medium	Medium	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Medium	Medium

8.3.1 Risk assessment results

8.3.1.1 Construction traffic

The resulting identified risks for the 'with' and 'without Project' scenarios associated with construction traffic have been provided in Table 8.4. The consequence for the 'without Project' scenario has been based on the highest reported crash severity for each construction traffic route, and the likelihood has been based on the frequency at which this crash severity occurred over the five-year period. The consequence in the 'with Project' scenario has been taken to be the same as in the 'without Project', and the likelihood of occurrence has been determined based on the likely changes to road safety as a result of construction related traffic.

Table 8.4 identifies that the following construction traffic routes require safety mitigation measures based on the design assessment:

- DTMR:
  - Ipswich Boonah Road
  - Beaudesert Boonah Road
  - Cunningham Highway
  - Haigslea Amberley Road
  - Ipswich Motorway
  - Ipswich Rosewood Road

  - Karrabin Rosewood Road
  - Logan Motorway
  - Mt Lindesay Highway
  - Pacific Arterial
  - Rosewood Laidley Road
  - Warrego Highway
- RMS:
  - Pacific Motorway
- SRRC:
  - Peak Crossing Churchbank Weir Road
- ICC:
  - Warwick Road.

Table 8.5 provides the 'with Project' and 'with Project mitigation measures' safety risk assessment for the routes that have been identified to require safety mitigation measures. This table shows that following the provision of appropriate mitigation measures, all risk scores are either returned back to 'without Project' levels or below the 'high' level.

It should be noted that the construction routes assumed as a part of this assessment are routes which the construction contractor may use. However, the determination of the final construction and HV routes will be subject to consultation between DTMR, the local government authority and the construction contractor. The above analysis should be undertaken again as a part of the design and construction phase when the final construction routes are finalised by the construction contractor. Additionally, the safety assessment of the intersections used by construction traffic should be undertaken when the construction routes are finalised.

Table 8.4 Safety Risk Assessment: Project Primary Construction Routes (without and with Project)

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
State-controlled roads: DTMR							
Beaudesert Boonah Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Cunningham Highway	Extreme	Possible	High	Extreme	Possible	High	**Required**
Haigslea Amberley Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Ipswich Boonah Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Ipswich Motorway	Major	Likely	High	Major	Likely	High	**Required**
Ipswich Rosewood Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Karrabin Rosewood Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Logan Motorway	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Mt Lindesay Highway	Extreme	Possible	High	Extreme	Possible	High	**Required**
Pacific Arterial	Extreme	Possible	High	Extreme	Possible	High	**Required**
Rosewood Laidley Road	Extreme	Possible	High	Extreme	Possible	High	**Required**
Rosewood Warrill View Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Warwick Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Warrego Highway	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Warrill View Peak Crossing Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
State-controlled roads: RMS							
Pacific Arterial	Extreme	Possible	High	Extreme	Possible	High	**Required**
Summerland Way	Major	Possible	Medium	Major	Possible	Medium	Not required
Local government roads: CVC							
Bent Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Charles Street	No Crash Data Available						
Clark Road	No Crash Data Available						
Craig Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Dobie Street	Moderate	Possible	Medium	Moderate	Possible	Medium	Not required

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
Red Lane	No Crash Data Available						
Trenayr Road	No Crash Data Available						
Villiers Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Local government roads: LCC							
Kilmoylar Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Undullah Road	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Wyatt Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Local government roads: SRRC							
Allan Creek Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Not required
Brabazon Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Bromelton House Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Not required
Cryna Road	No Crash Data Available						
Brookland Road	Moderate	Possible	Medium	Moderate	Possible	Medium	Not required
Dwyers Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Eaglesfield Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Enterprise Drive	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Ilbogan Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Kilmoylar Road	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Middle Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Not required
Mutadipilly Churchbank Weir Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Sandy Creek Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Peak Crossing Churchbank Weir Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Thiedke Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Tilley Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
Undullah Road	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Washpool Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Wild Pig Creek Road	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Local government roads: ICC							
Briggs Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Champions Way	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Coopers Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Not required
Coveney Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Ebenezer Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Edwards Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Fairbank Place	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Hayes Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Hillside Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Lane Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Macalister Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Middle Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Not required
Moffatt Street	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Mount Flinders Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Mount Forbes Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Mount Marrow Quarry Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Newhill Drive	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Noblevale Way	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Old Grandchester Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Old Toowoomba Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Park Street	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Paynes Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
Redbank Plains Road	Major	Unlikely	Medium	Major	Possible	Medium	Not required
Reillys Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Ripley Road	Major	Possible	Medium	Major	Possible	Medium	Not required
Rob Rob Way	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Strongs Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
T Morrows Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Thagoona Haigslea Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required
Waters Road	Not Significant	Rare	Low	Not Significant	Possible	Low	Not required

Table 8.5 Safety Risk Assessment: Project Primary Construction Routes (with Project and with mitigation measures)

Road name	With Project			Proposed mitigation measures	With Project – with mitigation		
	Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
State-controlled roads: DTMR							
Ipswich Boonah Road	Extreme	Unlikely	Medium	Mitigation measures may include but are not limited to: ■ Fatigue management measures should be introduced and enforced for all workers ■ Pre and post construction inspections of routes to ensure suitability, including a Road Safety Analysis ■ ARTC contractor to identify any damage to road from construction traffic. Any damage or decreased asset life resulting from construction traffic to be addressed through consultation process with the road authority ■ HVs may be associated with the construction and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts ■ Consideration should be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed ■ Workers should be informed of school bus routes and typical pick-up and drop-off times near the Project ■ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits. ■ Road closures (if required) to be performed by QPS escorts (should it be required) with closure times limited to a maximum of 15 minutes ■ All OSOM and RAV vehicles should comply with Guideline for Excess Dimension Vehicles in Queensland version 8, 2013 in terms of transport safety.	Extreme	Unlikely	Medium
Beaudesert Boonah Road	Extreme	Unlikely	Medium		Extreme	Unlikely	Medium
Cunningham Highway	Extreme	Possible	High		Extreme	Unlikely	Medium
Haigslea Amberley Road	Extreme	Unlikely	Medium		Extreme	Unlikely	Medium
Ipswich Motorway	Major	Likely	High		Major	Unlikely	Medium
Karrabin Rosewood Road	Extreme	Unlikely	Medium		Extreme	Unlikely	Medium
Logan Motorway	Extreme	Unlikely	Medium		Extreme	Unlikely	Medium
Mt Lindesay Highway	Extreme	Possible	High		Extreme	Unlikely	Medium
Pacific Arterial	Extreme	Possible	High		Extreme	Unlikely	Medium
Rosewood Laidley Road	Extreme	Possible	High		Extreme	Unlikely	Medium
Warrego Highway	Extreme	Unlikely	Medium		Extreme	Unlikely	Medium

Road name	With Project			Proposed mitigation measures	With Project – with mitigation		
	Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
State-controlled roads: RMS							
Pacific Arterial	Extreme	Possible	High	As per DTMR Roads, above	Extreme	Unlikely	Medium
Local government roads: SRRC							
Peak Crossing Churchbank Weir Road	Extreme	Unlikely	Medium	As per DTMR Roads, above	Extreme	Unlikely	Medium
Local government roads: ICC							
Warwick Road	Extreme	Unlikely	Medium	As per DTMR Roads, above	Extreme	Unlikely	Medium

8.3.1.2 Road rail interface

Identified safety risks for the 'with' and 'without Project' scenarios associated with road rail interface locations have been provided in Table 8.6. Since all road rail crossings in the project are proposed, no existing safety issues are applicable. As a result, the 'without Project' scenario is not applicable. For level crossings, the 'with Project' scenario has been assigned a consequence of 'extreme' in the safety assessment as any incident at a road rail crossing is likely to be of a high consequence. Without appropriate mitigation measures, it is reasonable to expect that such an event may occur a few times a year. As a result, the likelihood has been assigned as 'likely' resulting in all road rail interface locations being 'high' and requiring safety mitigation measures.

Grade separated crossings and proposed closures have been mitigated through the design to remove the likelihood of incident. While a consequence would still be 'extreme', the likelihood have been assigned 'unlikely'. These treatments do not require further mitigation.

Table 8.6 Safety Risk Assessment: Road Rail Interface (without and with Project)

Road Rail Interface ID	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
DTMR							
340-2-P-2	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-5-P-2	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-7-P-5	*Not applicable**			Extreme	Unlikely	Medium	Not required
ICC							
340-1-P-2	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-1-P-4	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-1-P-6	*Not applicable**			Extreme	Likely	High	Required
340-1-P-9	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-3-P-1	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-3-P-11	*Not applicable**			Extreme	Likely	High	Required
340-6-P-2	*Not applicable**			Extreme	Likely	High	Required
340-6-P-7	*Not applicable**			Extreme	Likely	High	Required
340-8-P-1	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-8-P-3	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-8-P-4	*Not applicable**			Extreme	Unlikely	Medium	Not required
SRRC							
340-9-P-7a	*Not applicable**			Extreme	Likely	High	Required
340-10-P-3a	*Not applicable**			Extreme	Likely	High	Required
340-10-P-4a	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-10-P-4d	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-10-P-4f	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-11-P-2	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-13-P-3	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-14-P-1	*Not applicable**			Extreme	Likely	High	Required
340-15-P-2b	*Not applicable**			Extreme	Likely	High	Required

Road Rail Interface ID	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
340-15-P-3	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-16-P-1	*Not applicable**			Extreme	Unlikely	Medium	Not required
340-16-P-3	*Not applicable**			Extreme	Unlikely	Medium	Not required

Table note:

* No existing level crossing, therefore without Project scenario is not applicable

Table 8.7 provides the 'with Project' and 'with Project mitigation measures' safety risk assessment. This table shows that following the provision of appropriate mitigation measures at level crossing locations, the likelihood of an extreme incident has been rated as being 'rare' resulting in all risk scores being below the 'high' level.

Table 8.7 Safety Risk Assessment: Road Rail Interface (with out and with mitigation measures)

Road Rail Interface ID	With Project			Mitigation required?	With Project – with mitigation		
	Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
340-1-P-6	Extreme	Likely	High	Level crossings should be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant national and ARTC standards. Level crossings should be designed in order to provide for safe design standards where sufficient stacking and, sight distances, lane marking and signage prevail for a design vehicle consisting of a low loader. Threshold and ALCAM assessment to be undertaken to determine the appropriate protection type for the proposed crossing. Road safety audits will be undertaken at the level crossings during design, pre and post opening in accordance with the Austroads guidelines. Level crossings will be reviewed to confirm: ■ That the level of protection continues to be appropriate ■ That the infrastructure is appropriate for the traffic conditions ■ That the crossing is designed to provide suitable stacking and sight distance.	Extreme	Unlikely	Medium
340-3-P-11	Extreme	Likely	High		Extreme	Unlikely	Medium
340-6-P-2	Extreme	Likely	High		Extreme	Unlikely	Medium
340-6-P-7	Extreme	Likely	High		Extreme	Unlikely	Medium
340-9-P-7a	Extreme	Likely	High		Extreme	Unlikely	Medium
340-10-P-3a	Extreme	Likely	High		Extreme	Unlikely	Medium
340-14-P-1	Extreme	Likely	High		Extreme	Unlikely	Medium
340-15-P-2b	Extreme	Likely	High		Extreme	Unlikely	Medium

9 Mitigation and management

9.1 Preliminary road use management during construction

9.1.1 Preliminary Road Use Management Plan

As stated in the DTMR's GTIA, "the RUMP is a plan specifically for managing road related issues and is based on negotiation with industry to best manage current and future increases in district road use/access by specific freight commodities and specific types of HVs to alleviate and manage adverse traffic management risks and road impacts".

The purpose of this TIA is to support the delivery and assessment of the Project. The construction routes assumed as a part of this assessment are routes which the construction contractor may use. However, the determination of the final construction and HV routes will be subject to construction contractor consultation with DTMR and the local government authority.

Therefore, it is recommended that a detailed RUMP be developed for the Project before construction commences separate to the TIA. The purpose of developing the RUMP for the Project is to identify, where required, appropriate traffic and transport management strategies for the use of the SCRs and LGRs for each of the construction stages of the Project and minimise the impact on the efficiency of road networks as well as the operational safety of the Project related vehicles accessing the construction sites.

The purpose of developing the RUMP for the Project is to identify, where required, appropriate traffic and transport management strategies for the use of the SCR and LGR for each of the construction stages of the Project and minimise the impact on the efficiency of road networks as well as the operational safety of the Project related vehicles accessing the construction sites. The RUMP should:

- Summarise updated project traffic information on which the updated road impact assessment and proposed mitigation strategies are based
- Briefly list roles and responsibilities for RUMP implementation, and
- Detail finalised impact mitigation strategies, focusing on controls-based or road-use management strategies. Road-use management strategies include:
  - Use of variable message signs
  - Travel demand management
  - Use of shuttle buses to transport workers
  - Avoiding peak hour traffic, especially near schools / bus routes
  - Fatigue management strategies.

Where road realignments or closures are envisaged, traffic management requirements associated with these works will have to be included in the RUMP. This will need to include the requirements for obtaining necessary approvals and permits from relevant authorities as well as notifying the community on any changes to traffic conditions during the construction and operations phase.

A Fatigue Management Plan will also be created as part of the wider RUMP and all HV operators will be required to adhere to the restrictions set out in the plan. The purpose of the plan is to define restrictions on travel times and durations for drivers transporting materials or equipment to the site. As trip schedules and driver rosters are some of the key factors in managing driver fatigue, the Fatigue Management Plan will apply to all HV operators working on the project including suppliers and contractors.

The RUMP will be developed in consultation with DTMR, emergency services and local Councils to develop strategies to minimise the effects of the Project's transport activities during the construction phase, on the existing and future road corridors.

9.1.2 Construction Environmental Management Plan

A CEMP will be prepared prior to construction commencing. The CEMP will include a TMP, attached as an appendix to the CEMP, which will outline:

- Traffic demand
- Routing
- Controls
- Special vehicle requirements
- How works to accommodate these are integrated into the operation of the road network
- Identifies and considers all foreseeable risks.

The TMP will be developed by the proponent in consultation with DTMR, Council and an accredited road safety auditor. This plan will identify the impacts that construction traffic is likely to have on the transport infrastructure and detail ameliorative measures required to mitigate all identified impacts of the Project. This may include potential temporary or permanent intersection works.

The TMP will detail measures to:

- Safely manage traffic when undertaking works in in road reserve
- Safely manage traffic when undertaking works in in road reserve
- Minimise traffic delays resulting from the development/ construction
- Manage construction vehicles accessing and leaving the site
- Maintain satisfactory property access
- Minimise disruption to adjacent properties
- Minimise disturbance to the environment
- Meet the requirements of legislation and codes of practice regarding traffic management
- Cater for special events.

The TMP will take into consideration:

- Final construction routes
- Approaches to seasonality and stock routes,
- Areas of significant pedestrian and cyclist activity
- Standard hours of work and deliveries
- Specific hours of deliveries impacted by local land uses (e.g. school zones)
- Bus service operators (e.g. public transport, school buses, long distance services)
- Emergency services
- Staff transport
- Staff parking, with the provision of on-site tool storage where practicable.

The TMP should detail the most effective methods for truck vehicle movements to and from the site to ensure efficiency, safety and limited disruption to all road users. It should be prepared prior to construction in accordance with the latest edition of the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction.

Works identified within the TMP may require the preparation of Traffic Control Plans (TCP's), also referred to as Traffic Guidance Schemes. TCP's detail the traffic control signs, devices and measures to be applied at work sites to warn traffic and guide it through, or past, a work area or temporary hazard. This includes plan/diagram that illustrates the arrangement of signage and devices used to manage traffic. Highlight the temporary signage, markings, speed zones, barriers and works with the aim to:

- Warn drivers of the changes to the usual conditions
- Inform drivers about the changing conditions
- Guide driers through the work sties
- Ensure safety of works and external road users.

Specific TCP's are required for each separate element of the works identified to be undertaken within the TMP. A Form M994 should be completed and signed by a certified Level 3 Traffic Management Operator should any Regulatory Traffic Signs/Devices associated with any SCRs be required.

Temporary road works, including diversion and signage, should be in accordance with the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works.

9.2 Road link mitigation measures

Relevant mitigation measures based on the LOS analyses findings are provided within this section of the TIA. The analyses conducted in Section 6.2.1 indicated that there were several roads that exceeded the 5 per cent background traffic threshold with the additional construction traffic. For roads links with less than the 5 per cent background traffic threshold, no impact is expected.

Out of these roads, a number of roads were determined to exhibit a decrease in the LOS experienced by road users. These roads are summarised in Table 9.1.

Table 9.1 Road segments with change in LOS

Road name	Road section	Change of LOS
Ipswich City Council		
Champions Way	Between Cunningham Highway and Paynes Road	LOS A to LOS B
Macalister Street	Between Moffatt Street and Park Street	LOS A to LOS B
Park Street	Between Macalister Street and Warwick Road	LOS A to LOS B
Scenic Rim Regional Council		
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	LOS A to LOS B

Although these are the only roads currently identified as decreasing LOS, other roads may be identified upon determination of the final construction and HV routes. The following mitigation measures in Table 9.2 are applicable to SCRs and LGRs are impacted by Project construction traffic, irrespective of whether they have demonstrated a decrease in the LOS.

Table 9.2 Road link mitigation measures

Phase	Mitigation	Mitigation outcome
Construction	TDM campaign to inform the public on works and its effect on network operations	Relieve congestion by encouraging travel outside of peaks or mode shift by the public, and increase awareness of construction works

Phase	Mitigation	Mitigation outcome
	Construction Traffic Management Plan prepared as a joint effort between the construction contractor, DTMR, Council and an accredited road safety auditor. This plan will identify the impacts that construction traffic is likely to have on the transport infrastructure and detail ameliorative measures required to mitigate all identified impacts of the Project. The CEMP will include condition assessment of the road pavement for all construction traffic routes. This will be required to occur before the commencement of any operations and ongoing throughout construction at intervals agreed in writing between the contractor and the asset owner. The agreed plans will take into account: ■ Approved construction routes ■ Approaches to seasonality and stock routes ■ Areas of significant pedestrian and cyclist activity ■ Standard hours of work and deliveries ■ Specific hours of deliveries impacted by local land uses (e.g. school zones) ■ Bus service operators (e.g. Public transport, school buses, long distance services) ■ Emergency services ■ Staff transport ■ Staff parking, with the provision of on-site tool storage where practicable.	Limit impact to the public and asset owners by managing construction movements and deliveries during peak hours, and minimising construction staff traffic by the use of shuttles and public transport
	Ongoing consultation with relevant Councils, RMS, DTMR, QPS, emergency services and affected property owners/occupiers to inform of project status and likely disruptions.	Minimise traffic and transport impacts during construction
	Directional signage and line marking around construction sites and the surrounding network, including using VMS if appropriate.	Direct and guide drivers and pedestrians past construction sites, and advice of potential delays, traffic diversions, speed restrictions or alternate routes.
	Specific TMPs for special events developed in conjunction with the relevant stakeholders.	Bespoke plans to provide safe and efficient pedestrian, cycle, public transport and traffic flows during occasional events to minimise disruption to the community throughout construction.
	Relevant emergency services should be notified in advance prior to the movement of all hazardous/dangerous or oversize construction material and equipment.	Discussions will identify any pre-identified emergency response routes which may be impacted by the transport corridors as well as possible solutions to minimise any potential impacts.
	Secondary alternative construction route activities should be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency/accident.	Secondary construction routes will facilitate the continued construction activities and thus managing costs and schedule.
Operational	Develop a protocol between ARTC and emergency service providers, defining appropriate and co-ordinated responses and communication in the event of emergencies during operations, (e.g. access to real time information about crossing times and access to alternate crossing points).	Protocol will minimise any impact to emergency services due to potential changes to the road network and Project operation.

9.3 Intersection mitigation measures

As outlined in Section 6.3.6, due to the construction duration of generally less than a year and associated low to moderate increase in traffic, it is not anticipated that intersection upgrades would be required during the construction period. However, TCPs should be implemented alongside the TMP and CEMP associated with the road link mitigation strategies. These plans will ensure that intersection geometry and capacity is taken into account when selecting and agreeing construction traffic routes. The accredited road safety auditor present during the visual inspections of the construction routes will highlight whether safety issues may arise through the movement of construction vehicles through these intersections.

Where required, the introduction of TCPs will be to:

- Warn drivers of changes to the usual road conditions
- Inform drivers about changing conditions
- Guide drivers through the work site
- Ensure the safety of works and external road users.

The following sections outline where the use of the TCPs and TMPs will need to be considered based on the Project and associated construction assumptions.

9.3.1 Clarence Valley Council – NSW

Based on the Project, the key intersections within CVC to be considered within the preparation of the TMP include:

- Charles Street/Bent Street
- Dobie Street/Villiers Street
- Pacific Highway/Charles Street
- Summerland Way/Dobie Street
- Summerland Way/Trenayr Road
- Trenayr Road/Clark Road
- Trenayr Road/Red Lane
- Villiers Street/Craig Street.

TMPs, TCPs and temporary road works including diversion and signage should all be prepared prior to construction in accordance with the latest edition of the Traffic control at work sites: Technical Manual, 2018 and Australian Standard 1742.3, Manual of uniform traffic control devices - Traffic control for works on roads. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

9.3.2 Ipswich City Council

The key intersections within ICC to be considered within the preparation of the TMP include:

- Briggs Rd/Edwards Street
- Coveney Road/Hayes Road
- Cunningham Highway/Champions Way
- Cunningham Highway/Coopers Road
- Cunningham Highway/Middle Road

- Ebenezer Road/Mt Forbes Road
- Ipswich Boonah Road/T Morrows Road
- Ipswich Rosewood Road/Rosewood Warrill View Road/School Street
- Karrabin Rosewood Road/Haigslea Amberley Road
- Karrabin Rosewood Road/Thagoona Haigslea Road
- Macalister Street/Moffatt Street
- Macalister Street/Park Street
- Mt Forbes Road/Paynes Road
- Noblevale Way/Fairbank Place
- Old Toowoomba Road/Moffatt Street
- Old Toowoomba Road/Toongarra Road
- Ripley Road/Edwards Street
- Rob Roy Way/Newhill Drive
- Rob Roy Way/Noblevale Way
- Rosewood Laidley Road/Lane Road
- Rosewood Warrill View Road/Reillys Road
- Rosewood Warrill View Road/Ebenezer Road
- Strongs Road/Coveney Road
- Strongs Road/Reillys Road
- Thagoona Haigslea Road/Mt Marrow Quarry Road
- Thagoona Haigslea Road/Thagoona Haigslea Road
- Warwick Road/Moffatt Street
- Waters Road/Lane Road/Old Grandchester Road.

TMPs should be prepared prior to construction in accordance with the latest edition of the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction. Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

A Form M994 should be completed and signed by a certified Level 3 Traffic Management Operator should any Regulatory Traffic Signs/Devices associated with any SCRs be required. A completed Form M994 is to be part of the TMP for submission to DTMR.

Temporary road works, including diversion and signage, should be in accordance with the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works.

9.3.3 Logan City Council

Based on the Project, the key intersections within LCC to be considered within the preparation of the TMP include:

- Kilmoylar Road/Wyatt Road
- Mt Lindesay Highway/Undullah Road

- Undullah Road/Undullah Road
- Undullah Road/Wild Pig Creek Road
- Undullah Road/Wyatt Road.

TMPs should be prepared prior to construction in accordance with the latest edition of the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction. Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

A Form M994 should be completed and signed by a certified Level 3 Traffic Management Operator should any Regulatory Traffic Signs/Devices associated with any SCRs be required. A completed Form M994 is to be part of the TMP for submission to DTMR.

Temporary road works, including diversion and signage, should be in accordance with the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works.

9.3.4 Roads and Maritime Service

Based on the Project, the key intersections for RMS to be considered within the preparation of the TMP include:

- Pacific Highway/Charles Street
- Summerland Way/Bruxner Highway
- Summerland Way/Dobie Street
- Summerland Way/Mt Lindesay Road
- Summerland Way/Red Lane
- Summerland Way/Trenayr Road.

TMPs, TCPs and temporary road works including diversion and signage should all be prepared prior to construction in accordance with the latest edition of the Traffic control at work sites: Technical Manual, 2018 and Australian Standard 1742.3, Manual of uniform traffic control devices - Traffic control for works on roads. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

9.3.5 Transport and Main Roads

Based on the Project, the key intersections for DTMR to be considered within the preparation of the TMP include:

- Beaudesert Boonah Road/Bromelton House Road
- Beaudesert Boonah Road/Sandy Creek Road
- Beaudesert Boonah Road/Wyaralong Dam Access
- Beaudesert Boonah Road/Ilbogan Road
- Beaudesert Boonah Road/Tilley Road
- Cunningham Highway/Champions Way
- Cunningham Highway/Coopers Road

- Cunningham Highway/Ipswich Rosewood Road
- Cunningham Highway/Middle Road
- Ipswich Boonah Road/Dwyers Road
- Ipswich Boonah Road/Mt Flinders Road
- Ipswich Boonah Road/T Morrows Road
- Ipswich Boonah Road/Warrill View Peak Crossing Road
- Ipswich Boonah Road/Washpool Road
- Ipswich Rosewood Road/Rosewood Warrill View Road/School Street
- Karrabin Rosewood Road/Haigslea Amberley Road
- Karrabin Rosewood Road/Thagoona Haigslea Road
- Mt Lindesay Highway/Eaglesfield Street
- Mt Lindesay Highway/Enterprise Drive
- Mt Lindesay Highway/Mt Lindesay Highway
- Mt Lindesay Highway/Thiedke Road
- Mt Lindesay Highway/Undullah Road
- Rosewood Laidley Road/Karrabin Rosewood Road/Ipswich Rosewood Road
- Rosewood Laidley Road/Lane Road
- Rosewood Warrill View Road/Reillys Road
- Rosewood Warrill View Road/Ebenezer Road
- Warrill View Peak Crossing Road/Peak Crossing Churchbank Weir Road
- Warwick Road/Moffatt Street.

TMPs, TCPs and temporary road works including diversion and signage should all be prepared prior to construction in accordance with the latest edition of the Traffic control at work sites: Technical Manual, 2018 and Australian Standard 1742.3, Manual of uniform traffic control devices - Traffic control for works on roads. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

9.3.6 Scenic Rim Regional Council

Based on the Project, the key intersections within SRRC to be considered within the preparation of the TMP include:

- Allan Creek Road/Brabazon Road
- Beaudesert Boonah Road/Bromelton House Road
- Beaudesert Boonah Road/Sandy Creek Road
- Beaudesert Boonah Road/Wyaralong Dam Access
- Beaudesert Boonah Road/Ilbogan Road
- Beaudesert Boonah Road/Tilley Road
- Ilbogan Road/Thiedke Road
- Ipswich Boonah Road/Dwyers Road

- Ipswich Boonah Road/Mt Flinders Road
- Ipswich Boonah Road/Washpool Road
- Mt Lindesay Highway/Eaglesfield Street
- Mt Lindesay Highway/Enterprise Drive
- Mt Lindesay Highway/Thiedke Road
- Mutdapilly Churchbank Weir Road/Mutdapilly Churchbank Weir Road
- Peak Crossing Churchbank Weir Road/Middle Road
- Undullah Road/Brookland Road
- Undullah Road/Kilmoylar Road.

TMPs should be prepared prior to construction in accordance with the latest edition of the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction. Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management. TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.

A Form M994 should be completed and signed by a certified Level 3 Traffic Management Operator should any Regulatory Traffic Signs/Devices associated with any SCRs be required. A completed Form M994 is to be part of the TMP for submission to DTMR.

Temporary road works, including diversion and signage, should be in accordance with the Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works.

9.4 Road safety mitigation measures

Relevant mitigation measures based on the safety analyses findings are provided within this section of the TIA. The following mitigation measures are proposed:

- Fatigue management measures should be introduced and enforced for all workers
- Any required works to be identified in ongoing CEMP prepared to support the project
- HVs may be associated with the construction activities and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts
- Consideration should be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed
- Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits
- Level crossings should be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant national and ARTC standards
- The Project will be fenced with three or four strand barbed wire fence. The fencing is reflective of the largely agricultural land use of this section of the Project and seeks to ensure that stock and people do not enter the track. It is also consistent with fencing used in other sections of the railway line.

9.5 Road/rail interface mitigation measures

Relevant mitigation measures based on the analyses findings at road/rail interface locations will be provided within this section of the TIA. Table 9.3 outlines the potential impact and mitigation measures.

Table 9.3 Road/rail interface mitigation measures

Phase	Mitigation	Mitigation outcome
Construction	Level crossings will be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant standards in accordance with TMP and RUMP procedures. Options for impact mitigation will depend on the specific activity being undertaken, and the location where it is occurring. It will be up to the construction contractor to select and implement appropriate controls. Road safety audits will be undertaken at the level crossings post construction in accordance with the Austroads guidelines. Level crossings will be reviewed to confirm: ■ The level of protection is appropriate ■ The infrastructure is appropriate for the traffic conditions.	Direct and guide active mode users at road /rail interface locations, improving safety and reduces the likelihood of any significant traffic delays due to incidents.
Operational	Road safety audits will be undertaken at the level crossings post opening in accordance with the Austroads guidelines. Post commissioning, the level crossing will be managed as a part of business as usual for the relevant road and rail manager under the terms of the signed interface agreement. Level crossings will be reviewed to confirm: ■ That the level of protection continues to be appropriate ■ That the infrastructure is appropriate for the traffic conditions.	Make further enhancements to safety measures and further reduce the likelihood of delays.
	Increase in traffic associated with the Project is likely to increase vehicle exposure at rail crossings. Public level crossings should be designed in order to provide for safe design standards where sufficient stacking and, sight distances, lane marking and signage prevail for a design vehicle consisting of a low loader	To ensure safe design standards are implemented to minimise and mitigate the impact significance and likelihood of crashes which may occur at level crossings.
	ALCAM assessment will be undertaken for all public road and pedestrian level crossings	To ensure safe design standards are implemented to minimise and mitigate the impact significance and likelihood of crashes which may occur at level crossings.
	■ Implement key actions outlined within the QLCSS, including: – Promoting level crossing safety through public awareness campaigns – Maintain a high standard of data collection including near miss reporting. – Maintain level crossing infrastructure in accordance with Australian Standards.	Promote ongoing safety improvements at road rail interface locations.

9.6 Pavement mitigation measures

Relevant mitigation measures from a pavement impact perspective are provided within this section of the report. The mitigation measures provide for a robust strategic traffic and road use management strategy in order to mitigate and minimise pavement related impacts. These mitigation measures apply to both SCR and LGRs envisaged to be used as primary construction routes.

Some of the mitigation measures were developed based on consultation with affected road authorities and councils. The proposed strategy to mitigate against the pavement and service deterioration after the project cycle, is provided in Table 9.4.

Table 9.4 Pavement mitigation measures

Phase	Mitigation	Mitigation outcome
Construction	Install wheel washers on all Project vehicles and/or equipment that exit onto sealed roads from unpaved roads.	Will prevent track-out and deterioration of the pavement surface.
	A rock bed may be installed as appropriate at vehicle/equipment site exit points.	
	Install shaker grids or rumble pads at site exit points from construction activities.	Reduce the potential for soil spill onto transport corridors and the deterioration of the pavement surface.
	SCRs: Undertake a pavement impact assessment consistent with the process detailed in the GTIA and identify measures to avoid, reduce or mitigate effects on the pavement life of the SCR. Typical measures include: ■ Provide a payment contribution for future pavement works (for marginal SAR impacts). ■ Provide extra pavement width (for example, to prevent edge degradation) ■ Provide additional pavement thickness ■ Seal an unsealed pavement ■ Provide maintenance during construction ■ Undertake pavement rehabilitation.	Mitigation measures identified and implemented to avoid, reduce or mitigate the effects of the construction traffic on the pavement life of the SCR and ensure no worsening to SCR pavements as a result of increased vehicle traffic from the Project.
	Local government unsealed roads: Undertake condition assessments prior to, during and post construction activities. Assessments may include: ■ Visual condition assessments ■ Video and laser roughness rating ■ Roughometer analysis ■ Gravel depth sampling ■ Dynamic cone penetrometer testing.	A condition assessment is advised sufficient to be able to mitigate for the construction related traffic impacts so that the impacted road is taken back to a similar condition to what it was in the pre-construction visual pavement condition assessment. ARTC contractor to identify any damage to road from construction traffic. Any damage or decreased asset life resulting from construction traffic to be addressed through consultation process with the road authority.
	Local government sealed and asphalt roads: Undertake a condition assessment (e.g. NAASRA roughness count) prior and post construction activities, as well as at ongoing intervals during construction. These intervals should be agreed with Council before construction commences. Undertake condition assessments prior to, during and post construction activities. Assessments may include: ■ Visual condition assessments ■ Video and laser roughness rating ■ Roughometer analysis ■ Gravel depth sampling ■ Dynamic cone penetrometer testing.	The current condition of the pavements will be classified based on the Australian Guide to Pavement Technology 05-11 Table 4.1. The degradation of the pavements based on NAASRA roughness count will be calculated, enabling the impact of construction traffic and the works required to restore the pavement to the pre-construction condition to be quantified. Where the level of roughness measured prior to construction exceeds the maximum desirable level for the class of road, the road has already exceeded its design life. In these cases, the intervention required shall be agreed on a case by case basis with the road controlling authority.

Phase	Mitigation	Mitigation outcome
	LGRs Undertake a PIA for select LGRs that exceed 5% of construction traffic to identify the need for early pavement works.	To identify the need for early works along LGRs that may be significantly impacted by HV movements as a result of construction traffic
	The use of a LGR and SCR owner approved maintenance contractor to maintain the envisaged impacted road for the duration of the construction period. This may entail works such as crack sealing, pothole patching, edge repairs, resealing and grading (of gravel roads) etc. Where requested, LGR's may maintain gravel roads within their jurisdiction and recover costs from the construction contractor (to be agreed prior to construction). The CEMP will include condition assessment of the road pavement for all construction traffic routes. This will be required to occur before the commencement of any operations and ongoing throughout construction at intervals agreed in writing between the contractor and the asset owner.	To ensure that pavement deterioration as a result of construction related traffic is mitigated during and post construction.

9.7 Additional considerations

The NHVR regulates all vehicles over 4.5T GVM and coordinates road access permits for these vehicles. Any new permits required as part of the Project construction or operation will be made through the NHVR. It is a requirement for these permits to be reviewed and approved by the relevant asset owner.

10 Risk assessment summary

This section provides a brief summary of the potential traffic impacts associated from the construction phase of the Project which has been identified as the key traffic generator. This has included an assessment of the risk associated with the impacts identified. The risk assessment has considered the following:

- Magnitude of impact (or consequence) through an assessment of the traffic impact from the Project on the road sections along the Project corridor
- Likelihood of impact or the probability of the impact occurring.

The probability analysis assesses the likelihood of impact occurring during the assessment period and the consequence analysis assesses the level of impact, or consequence, that a hazard or impact may cause. Table 10.1 and Table 10.2 shows the parameters used to determine the risk levels associated with the key impacts identified for the Project.

Table 10.1 Probability analysis

Score	Likelihood
6	Almost certain
5	High likelihood
4	Probably
3	Possibly
2	Unlikely
1	Extremely remote

Table 10.2 Consequence analysis

Score	Consequence
6	Extreme
5	Very high
4	High
3	Moderate
2	Low
1	Very low

Table 10.3 summarises the risk matrix used to identify the risks associated with the traffic impacts related to the Project.

Table 10.3 Risk matrix

			Consequence					
			1	2	3	4	5	6
			Very low	Low	Moderate	High	Very high	Extreme
Likelihood	6	Almost certain	7	8	9	10	11	12
	5	High likelihood	6	7	8	9	10	11
	4	Probably	5	6	7	8	9	10
	3	Possibly	4	5	6	7	8	9
	2	Unlikely	3	4	5	6	7	8
	1	Extreme remote	2	3	4	5	6	7

Table 10.4 summarises the resulting risk level applied based on the scores in Table 10.3.

Table 10.4 Risk level matrix

Score	Risk Level
11 to 12	Extreme risk
8 to 10	High risk
4 to 7	Moderate risk
2 to 3	Low risk

Table 10.5 summarises the key traffic impacts identified with the Project and also includes the proposed mitigation measures required to reduce the level of risks and to maintain an overall high level of operational efficiency for the road network.

Table 10.5 Impact assessment summary

Aspect	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)		
Traffic impacts from construction activities						
Intersections	Operational efficiency	**Moderate** Traffic impacts at the key intersections impacting operations. Adequacy of intersection configuration to cater for haulage vehicles.	**Probably** It is reasonable to say that some traffic impacts at key intersections will probably occur during the construction period.	**Moderate**	In consultation with DTMR, RMS and local government authorities, develop cost effective solutions to alleviate additional traffic impacts from the construction related activities. These may include but are not limited to: ■ TMPs should be prepared prior to construction in accordance with the latest edition of: – Traffic control at work sites - Technical Manual, 2018 and Australian Standard 1742.3, Manual of uniform traffic control devices - Traffic control for works on roads – Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads and the Traffic and Road Use Management Manual: Volume 7 Road Works – Roads and Maritime Supplement to Australian Standard 1742 Manual for Uniform Traffic Control Devices. ■ Road safety measures at intersections should take into consideration speed restrictions, driver fatigue, in-vehicle communications, HV turning signage, demarcations, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management ■ TMPs should consider construction activity delivery timeframes which avoid peak hour travel conditions.	**Low**

Aspect	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**		
Road Links	Operational efficiency	**Moderate** Traffic impacts along primary construction routes affecting traffic operations along key routes.	**Probably** It is reasonable to say that some traffic impacts along primary construction routes will probably occur over the construction period.	**Moderate**	In consultation with DTMR and local government authorities, employ traffic management strategies in order to mitigate impacts along road links. These may include but are not limited to: ▪ Construction TMP prepared as a joint effort between the construction contractor, DTMR, local government authorities and an accredited road safety auditor identifying the impacts that construction traffic is likely to have on the transport infrastructure and detail ameliorative measures required to mitigate all identified impacts of the Project ▪ Directional signage and line marking around construction sites and the surrounding network ▪ Specific TMPs for special events developed in conjunction with the relevant stakeholders ▪ Relevant emergency services should be notified in advance prior to the movement of all hazardous/dangerous or oversize construction material and equipment ▪ Secondary alternative construction route activities should be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency/accident ▪ TDM campaign to inform the public on works and its effect on network operations ▪ Ongoing consultation with relevant stakeholders to inform of project status and likely disruptions.	**Low**
Pavements	Operational efficiency	**Moderate** Increased percentage of HVs along SCRs from Project construction traffic, resulting in pavement degradation.	**Probably** It is reasonable to assume that some pavement degradation as a result of Project construction traffic will probably occur over the construction period.	**Moderate**	Mitigation measures may include but are not limited to: ▪ Undertaking visual assessments prior to, during and post construction activities, with the impacted road improved to a similar condition to the initial visual pavement condition ▪ Installation of wheel washers on all project vehicles travelling from unsealed to sealed roads ▪ Installation of shaker grids or rumble pads at site exit points from construction activities.	**Low**

Aspect	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)		
Road Safety – Primary Construction Routes	Safety	**Moderate** Decreased road safety along construction traffic routes as a result of increased traffic, changes in HV mix, or fatigue for long distance trips.	**Possible** It is reasonable to assume that an incident involving a project construction vehicle is possible over the construction period	**Moderate**	Mitigation measures may include but are not limited to: ▪ Fatigue management measures should be introduced and enforced for all workers ▪ Any required works to be identified in ongoing RUMPs prepared to support the project. ▪ HVs may be associated with the construction activities and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts ▪ Consideration should be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed ▪ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits.	**Low**
Traffic impacts from operational activities						
Road/Rail Interface	Operational efficiency	**Moderate** Additional delay to through traffic with reduced operational efficiency as a result of construction activities	**Probably**	**Moderate**	Mitigation measures may include but are not limited to: ▪ Level crossings should be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant standards in accordance with TMP and RUMP procedures to accommodate traffic and operational efficiency during construction. Direct and guide active mode users at road /rail interface locations, improving safety and reduces the likelihood of any significant traffic delays due to incidents.	**Low**
Road Safety – Road/Rail Interface	Safety	**Extreme** Introduction of open level crossings on the road network may result in high severity crashes between traffic and trains.	**Probably** Without appropriate mitigation strategies, the likelihood of an incident occurring at a rail crossing is probable.	**High**	▪ Level crossings should be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant standards ▪ Public level crossings designed in order to provide for safe design standards where sufficient stacking and, sight distances, lane marking and signage prevail for a design vehicle consisting of a low loader ▪ Road safety audits will be undertaken at the level crossings during design, pre and post opening in accordance with the Austroads guidelines. – In accordance with National and State Rail Safety Law requirements, public road crossings will be subject to an Interface Agreement with the relevant road manager in order to ensure that safety risks are identified and minimised so far as is reasonably practicable during operations.	**Moderate**

11 Cumulative impacts

11.1 Regionally significant projects overview

To enable stakeholders to make informed decisions, consideration needs to be given to the potential impacts of other major projects in the area to ensure that the combined impacts of the projects are accounted for. There are currently several other developments in the region at planning, design or construction stage. The traffic generation estimations from these developments has thus been considered in this qualitative cumulative impact assessment.

For the traffic analysis, only developments that have already submitted EIS documentation or Supplementary EIS (SEIS) to the Coordinator-General have been considered as well as other Inland Rail projects. Other projects which were considered as part of the TIA are provided in Table 11.1.

Table 11.1 Projects considered in cumulative assessment

Project and proponent	Location	Description	Project status	Construction dates
Kagaru to Acacia Ridge and Bromelton (K2ARB) (ARTC)	Rail corridor from Kagaru to Acacia Ridge and Bromelton	Enhancing and connecting the existing rail corridor (approximately 49 km) from northeast of Kagaru to Acacia Ridge and from south of Kagaru to Bromelton	Proponent awaiting coordinated project decision by the Coordinator-General	2023 to 2025
Helidon to Calvert (H2C) (ARTC)	Rail alignment from Helidon to Calvert	▪ 47 km single-track dual-gauge freight rail line to accommodate double stack freight trains up to 1,800 metres long ▪ 1.1 km tunnel through the Little Liverpool Range ▪ Construction of rail infrastructure, culverts, bridges, viaducts and crossing loops ▪ Connection to the existing West Moreton System. ▪ Ancillary works including road and public utility crossings and realignments	Proponent currently preparing EIS	2021 to 2026
Greater Flagstone Priority Development Area (PDA) (Queensland Government)	Located within Logan City, west of Jimboomba and the Mount Lindesay Highway, along the Brisbane-Sydney rail line.	When fully developed, it is anticipated that the Greater Flagstone PDA will provide approximately 50,000 dwellings to house a population of up to 120,000 people.	PDA declared by the Queensland State Government on 8 October 2011	2011 to 2041
Bromelton State Development Area (SDA) (Queensland Government)	South of Kagaru in Bromelton	Delivery of critical infrastructure within the Bromelton SDA will support future development and economic growth. This includes a trunk water main and the Beaudesert Town Centre Bypass. This infrastructure provides opportunities to build on the momentum of current development activities by major landowners in the SDA.	The current version of the Bromelton SDA Development Scheme was approved by Governor in Council, December 2017 The Development Scheme is managed by the Coordinator-General	2016 to 2031

Project and proponent	Location	Description	Project status	Construction dates
Ripley Valley PDA (Queensland Government)	Approximately 5 km south-west of the Ipswich CBD and south of the Cunningham Highway	The Ripley Valley PDA covers a total area of 4680 ha and is an opportunity to provide approximately 50,000 dwellings to house a population of approximately 120,000 people. It is located in one of the largest industry growth areas in Australia and offers opportunities for further residential growth to meet the region's affordable housing needs.	PDA declared by State Government on 8 October 2011	2009 to 2031
South West Pipeline: Bulk Water Connection to Beaudesert (SEQWater)	East of Kagaru, running north from Beaudesert	The proposal is investigating a bulk water pipeline connection from the Southern Regional Water Pipeline to Beaudesert, connecting Beaudesert to the southeast Queensland Water Grid. The pipeline will pass through the site of the future Wyaralong Water Treatment Plant	Currently completing detailed Business Case	2021
RAAF Base Amberley future works (Department of Defence)	RAAF Base Amberley	White paper dedicated future upgrades to RAAF Base Amberley at a cost of $1 billion	N/A	2016 to 2022
Cross River Rail (Queensland Government)	Brisbane City	A new north-south rail line connecting Dutton Park to Bowen Hills under the Brisbane River and CBD	EIS Complete New lapse date for the Coordinator-General's EIA evaluation report on 31 December 2024 at the time of writing	2019 to 2024
Remondis Waste to Energy facility (Remondis)	Swanbank Industrial Estate	Remondis has announced plans to build a $400 million energy-from-waste facility in Swanbank, south of Ipswich	Proponent awaiting draft terms of reference for EIS	2021 to 2023

11.2 Qualitative assessment

The qualitative assessment takes into account the relevance factor of the regionally significant projects as indicated in Table 11.2.

Table 11.2 Relevance Factor

Aspect	Relevance Factor		
	Low	Medium	High
Probability of Impact	1	2	3
Duration of Impact	1	2	3
Magnitude/Intensity of Impact	1	2	3
Sensitivity of Receiving Environment	1	2	3

The sum of the relevance factor gives a consequence based on an impact significance, shown in Table 11.3.

Table 11.3 Impact Significance

Impact significance	Sum of relevant factors	Consequence
Low	1-6	Negative impacts need to be managed by standard environmental management practices. Special approval conditions unlikely to be necessary. Monitoring to be part of general project monitoring program.
Medium	7-9	Mitigation measures likely to be necessary and specific management practices to be applied. Specific approval conditions are likely. Targeted monitoring program required where appropriate.
High	10-12	Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Specific approval conditions required. Targeted monitoring program necessary where appropriate.

The resulting qualitative impact assessment and associated results has been provided in Table 11.4.

Table 11.4 Qualitative cumulative impacts assessment

Project and Proponent	Impact significance	Qualitative assessment consequence	Mitigation measures
Kagaru to Acacia Ridge and Bromelton (K2ARB)	**Medium**	An overlap of construction schedules occur but impact of construction traffic (i.e. construction traffic routes, estimated construction traffic volumes) cannot yet be determined as Project in its current design.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.
Helidon to Calvert (H2C)	**Medium**	An overlap of construction schedules and proposed construction routes might create increase in construction traffic volumes. Mitigation measures are likely to be necessary and specific management practices to be applied. Targeted monitoring program would be required where appropriate.	Mitigation measures relating to safety, intersection impacts, link road impacts, pavement impacts and road/rail interface impacts as described in Section 11 would suffice in order to mitigate for the cumulative impacts as a result of the H2C project.
Greater Flagstone Priority Development Area (PDA)	**Low**	An overlap of construction schedules occur, but the impact of Flagstone construction traffic will be marginal as duration of the development project will be constructed in stages spanning up to 30 years, and therefore not concentrated when the C2K Project is to be constructed.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.
Bromelton State Development Area (SDA)	**Medium**	The work is in progress on this project which can create an overlap of construction schedules and proposed construction routes, resulting in increase in construction traffic volumes. However, the duration of development project spans up to 15 years. Therefore, its impacts are not likely to be concentrated or significantly impact the Project. The exact construction routes for this project are unknown, therefore mitigation measures may be necessary and specific management practices to be applied. Targeted monitoring program would be required where appropriate.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.

Project and Proponent	Impact significance	Qualitative assessment consequence	Mitigation measures
Ripley Valley PDA	**Medium**	An overlap of construction schedules occur, but the impact of Ripley Valley construction traffic will be marginal as duration of the development project will be constructed in stages spanning up to 22 years, and therefore not concentrated when the C2K Project is to be constructed.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.
South West Pipeline: Bulk Water Connection to Beaudesert	**Medium**	An overlap of construction schedules occur but impact of construction traffic (i.e. construction traffic routes, estimated construction traffic volumes) cannot yet be determined as project start date is not confirmed. The exact construction routes for this project are unknown, therefore mitigation measures may be necessary and specific management practices to be applied. Targeted monitoring program would be required where appropriate.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.
RAAF Base Amberley future works	**Medium**	The work is in progress on this project which can create an overlap of construction schedules and proposed construction routes, resulting in increase in construction traffic volumes. The exact construction routes for this project are unknown, therefore mitigation measures may be necessary and specific management practices to be applied. Targeted monitoring program would be required where appropriate.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.
Cross River Rail	**Medium**	An overlap of construction schedules occur which may result in an overlap of construction routes for some materials. However, Cross River Rail is located approximately 43 km from the Project at Kagaru. Therefore, it is unlikely to result in material cumulative traffic impacts. As the exact construction routes for this project are unknown, mitigation measures may be necessary and specific management practices to be applied.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans
Remondis Waste to Energy facility (Remondis)	**Medium**	An overlap of construction schedules occur but impact of construction traffic (i.e. construction traffic routes, estimated construction traffic volumes) cannot yet be determined as the proponent is awaiting the draft terms of reference. The exact construction routes for this project are unknown, although are likely to overlap with Project proposed construction routes given their close proximity to the Remondis project. Therefore, mitigation measures may be necessary and specific management practices to be applied. Targeted monitoring program would be required where appropriate.	▪ Construction traffic management plans ▪ Ongoing consultation with affected parties ▪ Road use management plans ▪ Travel demand management campaigns.

The qualitative cumulative impact assessment shows that although a number of the identified major projects may create an overlap of construction and proposed construction schedules, exact construction routes for these projects are currently unknown. Specific mitigation measures that can be implemented across all of the projects to minimise the potential exacerbation of impacts on traffic and transport values as a result of interactions between the projects include:

- Construction traffic management plans
- Ongoing consultation with affected parties
- Road use management plans
- Travel demand management campaigns.

However, the H2C project may have an overlap of construction schedules and proposed construction routes which, in combination with construction traffic volumes generated by the Project might result in increased construction traffic volumes across the external road network. The mitigation measures relating to safety, intersection impacts, link road impacts, pavement impacts and road/rail interface impacts as described in Section 11 are likely sufficient in order to mitigate for the cumulative impacts as a result of the H2C project.

12 Conclusion and recommendations

12.1 Summary of impacts and proposed mitigation measures

As part of the overall assessments carried out for the Project, the traffic and transport impact assessment has evaluated a comprehensive range of issues encompassing potential impacts of the construction and operation phase of the Project on the surrounding transport infrastructure. The report also examines the potential traffic and pavement impacts from the movement of materials, workforce and equipment on the surrounding road network during the construction phase of the Project.

12.1.1 Transport task

Total trips by construction activity for each road section have been derived using material requirements and delivery schedules developed for the Project. These total trips have been summarised in Table 12.1 by activity and year of construction for the project.

Table 12.1 Total trips by activity per year

Material	2021	2022	2023	2024	2025	2026
Workers	7,537	90,446	90,446	90,446	90,446	37,686
Insitu concrete	0	2,398	5,904	5,208	1,936	0
Precast concrete	0	285	1,434	478	175	0
Quarry	0	0	0	4,274	8,110	0
Rail	0	0	0	0	205	0
Spoil	0	23,986	73,030	4,767	0	0
Sleepers	0	0	0	0	1,366	0
Water	0	8,729	16,714	17,056	9,949	0

The major transport tasks during the operational phase of the Project are expected to be rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will be irregular and insignificant due to the expected nature of maintenance tasks (low vehicle movements to/from depots, transportation of maintenance material within the rail corridor).

12.1.2 Traffic impacts – link roads

The results of the LOS comparison between the “with” and “without” Project scenarios indicated that the Project may potentially cause a minor change in LOS for some road sections during each year of construction. Road sections considered to have a moderate change in LOS for the duration of construction are provided in Table 12.2.

Table 12.2 Road links with moderate change in level of service

Road name	Road name	Worst LOS during construction
Local Government Roads: Ipswich City Council		
Champions Way	Between Cunningham Highway and Paynes Road	LOS B
Macalister Street	Between Moffatt Street and Park Street	LOS B
Park Street	Between Macalister Street and Warwick Road	LOS B
Local Government Roads: Scenic Rim Regional Council		
Eaglesfield Street	Between Mount Lindesay Highway and Tina Street	LOS B

Although there is a change in operational LOS for the road sections above, the expected operational LOS B is considered acceptable given the construction activities are expected to be less than one year at most locations. Therefore, during the construction phase, apart from the identified road sections and the explanations provided above; the operational LOS of the overall road network will be no worse as a result of the project.

Based on the LOS comparison, it is not expected that the Project would generate the need to upgrade the road network for these short term construction activities. However, it is important that the routes are reviewed in the preparation of a TMP from a physical and safety perspective prior to the commencement of construction activities to ensure that they are suitable. This should include joint visual inspection of all routes by the design and construction contractor, the asset owner and an accredited road safety auditor to agree on routes and any works require to ensure the routes are suitable for the level of construction activity proposed. This requirement is discussed further in Section 9.

12.1.3 Traffic impacts – intersections

Given the duration of construction activities generally being less than a year and associated low to moderate increase in traffic, Traffic Management Strategies may be introduced in order to mitigate construction related traffic impacts at intersections. However, in the absence of Traffic Management Strategies, the following intersections highlighted as likely to experience potential construction impacts resulting from the assumed construction routes:

- Ipswich Boonah Road/Dwyers Road
- Ipswich Boonah Road/Washpool Road
- Rosewood Laidley Road/Lane Road
- Beaudesert Boonah Road/Bromelton House Road
- Ebenezer Road/Mt Forbes Road.

These intersections potentially require turning treatments to accommodate the construction related turning volumes. Generally, these treatments are only required during construction, with the requirement no longer necessary post-construction and as such may be agreed to be managed through temporary traffic measures rather than permanent upgrades, as to be agreed between the design and construction contractor and the asset owner.

12.1.4 Traffic impacts – pavements

A preliminary desktop pavement impact assessment was undertaken on all envisaged affected DTMR and RMS SCR roads based on the existing background traffic data available for the relevant road sections. The analysis included a 5 per cent comparison of the background traffic SARs (as calculated in Section 7.2) and Project generated SARs for each link identified to be most likely impacted by the Project. To ensure no underestimation of SARs in any direction, fully loaded vehicles have been assumed in both directions. This is considered a conservative assumption and should be confirmed by the future delivery contractor.

The analysis indicates that a number of DTMR SCR road segments are likely to exceed the 5 per cent SAR threshold, with some road sections exceeding this threshold by a significant margin. No RMS SCR road segments are expected to exceed the 5 per cent SAR threshold.

Road sections that exceed this threshold have been provided in Table 12.3. It should however be noted that the assumption of fully loaded vehicles in each direction is conservative to ensure no underestimation of pavement impacts.

Table 12.3 State-controlled Roads with construction traffic exceeding 5 per cent of base Standard Axle Repetitions

Road name	Road section
State-controlled roads: DTMR	
Beaudesert Boonah Road	Between Ipswich Boonah Road and Wyaralong Dam Access
	Between Wyaralong Dam Access and Tilley Road
	Between Tilley Road and Sandy Creek Road
	Between Sandy Creek Road and Bromelton House Road
	Between Bromelton House Road and Ilbogan Road
Cunningham Highway	Between Ipswich Boonah Road and Middle Road
	Between Middle Road and Ipswich Rosewood Road
	Between Champions Way and Mutdapilly Churchbank Weir Rd
Ipswich Boonah Road	Between Cunningham Highway and Mt Flinders Rd
	Between Mt Flinders Rd and Warrill View Peak Crossing Rd
	Between Warrill View Peak Crossing Road and Dwyers Road
	Between Dwyers Road and Washpool Road
	Between Washpool Road and Beaudesert Boonah Road
Ipswich Rosewood Road	Between Cunningham Highway and Ipswich Rosewood Road
	Between Ipswich Rosewood Road and Karrabin Rosewood Road
Karrabin Rosewood Road	Between Rosewood Laidley Road and Haigslea Amberley Road
Rosewood Laidley Road	Between Grandchester Mount Mort Road and Crown Street
Rosewood Warrill View Road	Between Ipswich Rosewood Road and Reillys Road
	Between Reillys Road and Ebenezer Road
Warrill View Peak Crossing Road	Between Peak Crossing Churchbank Weir Road and Ipswich Boonah Road

In the absence of detailed existing pavement life information along RMS roads, it is recommended that a more detailed pavement impact assessment should be carried out prior to construction and in consultation with RMS. This should form part of the RUMP to be developed prior to construction. This will assist with further discussions with RMS to identify potential contribution towards the maintenance costs for the affected road sections which should be dealt with post EIS.

A pavement impact assessment was not conducted for envisaged affected LGRs as the GTIA currently only requires this assessment for SCRs. Appropriate pavement mitigation measures were developed in consultation with relevant LGAs and are to be applied to both SCR and LGR. These mitigation measures are provided in Section 9. Such mitigation measures will be finalised through consultation with LGAs.

12.1.5 Traffic impacts – road/rail interface

The operational performance of the proposed public level rail crossings in the EIS Investigation Corridor was assessed to provide an understanding of the impacts on performance during operation stages. The rail crossing impact assessment focuses on vehicle delay and queueing analysis, demonstrating how the Project generated traffic impacts on vehicle delays and queuing issues at the rail crossing, and at nearby closely spaced intersections. The following scenarios were evaluated:

- Future Year 2026 and 2036 AM and PM peak hour analysis of proposed crossings: Operational Railway Traffic with background road traffic + operational traffic + traffic diversions if any (only at locations where short stacking might be of impact).

The analyses results indicate that acceptable LOS would prevail with minimal impact to vehicle queueing and delay should the proposed level crossings be implemented. Findings for specific level crossings are as follows:

- Middle Road (340-6-P-7)

  The results of the analysis indicate that the proposed level crossing along Middle Road (340-6-P-7) would operate at LOS A in the AM and PM peak in the year 2026 and 2036 with minimal impacts to queueing and delays in each of these scenarios. SIDRA analysis indicates that the maximum queue length along the north approach of the crossing would be 22 m in the 2036 PM peak, with maximum queue length along the south approach being 14 m in the 2036 AM peak. These modelled queue lengths do not have an impact on any existing adjacent intersections.

- Washpool Road (340-10-P-3a)

  The analysis indicates that the proposed level crossing along the proposed Washpool Road (340-10-P-3a) would also operate at LOS A in the AM and PM peak in the year 2026 and 2036 with minimal impacts to queueing and delays in each of these scenarios. Maximum modelled queue lengths along the east approach is 11 m in the 2036 AM peak. Along the west approach, maximum modelled queue length is 8 m in the 2036 PM peak. These modelled queue lengths do not have an impact on any existing adjacent intersections.

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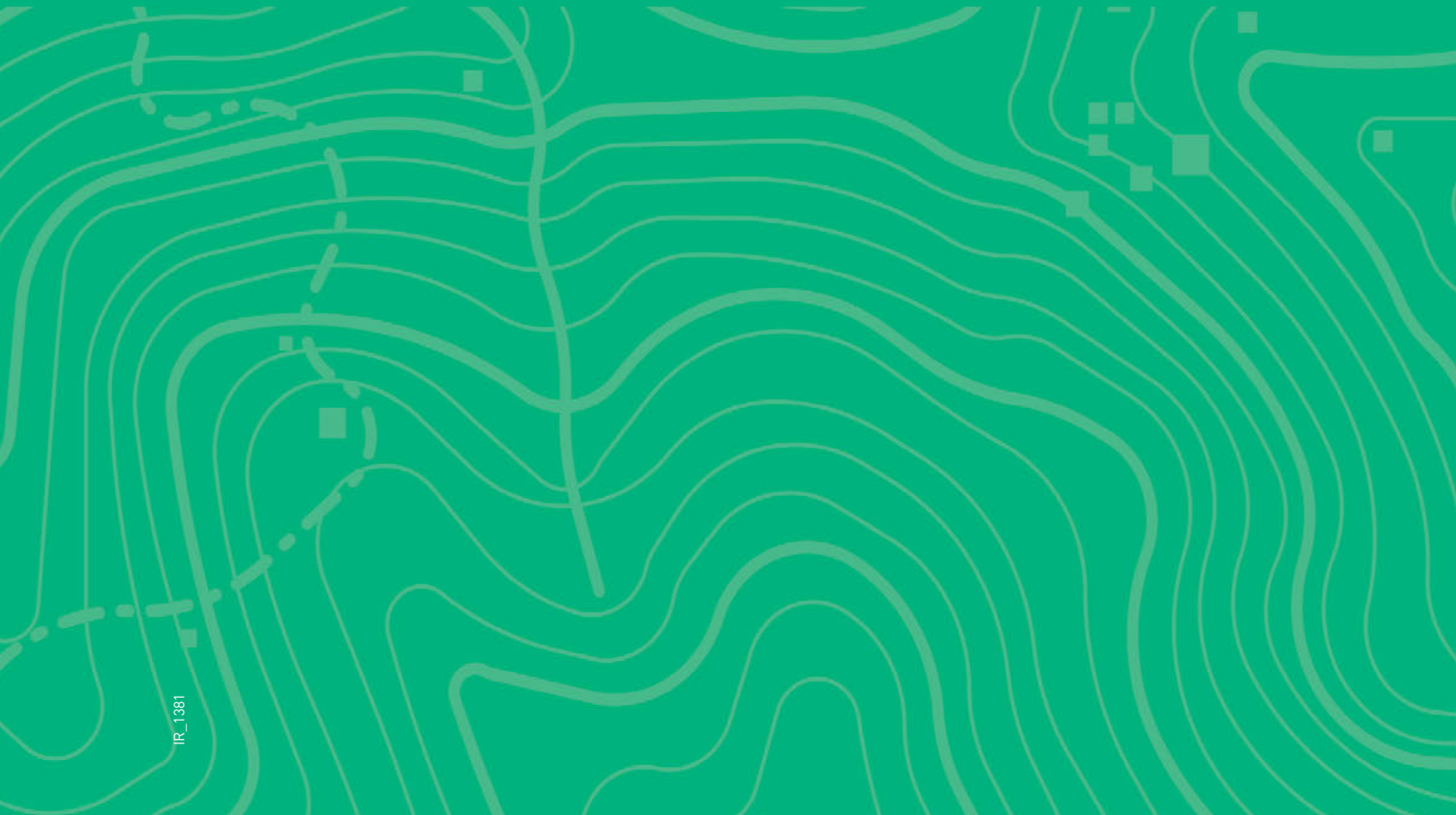
APPENDIX U

Traffic Impact Assessment Technical Report

Appendix A Rail Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



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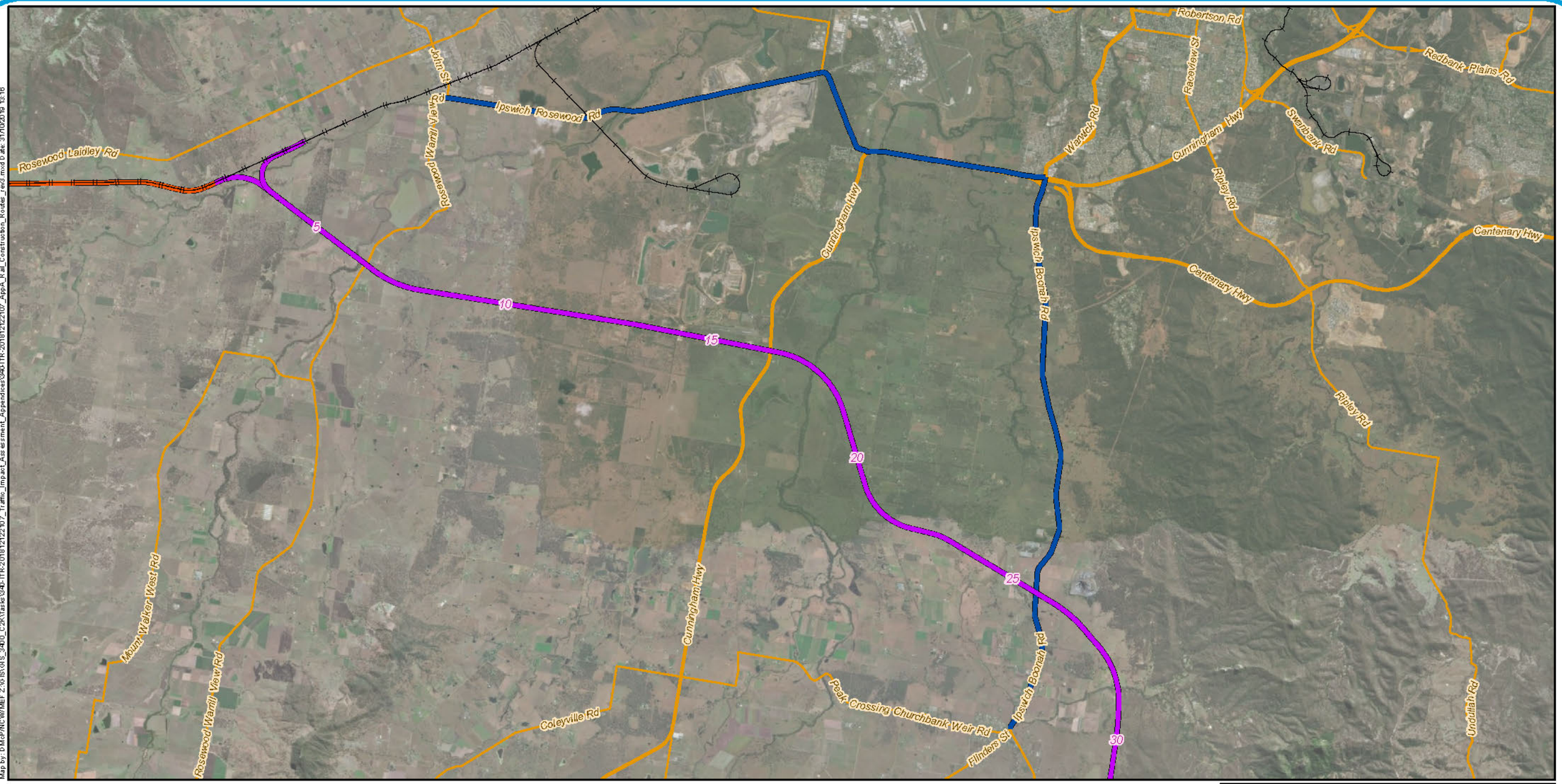

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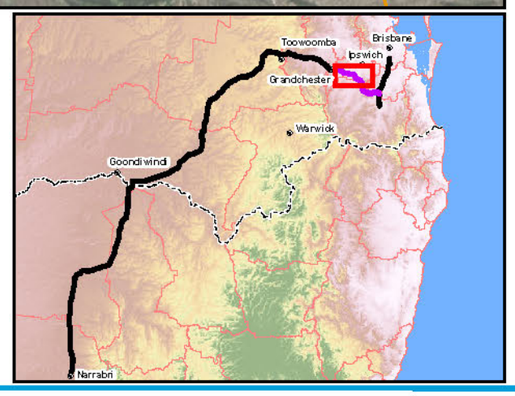
Legend

- 5 Chainage (km)
- Existing rail
- H2C project alignment
- C2K project alignment
- Major roads
- Minor roads
- Rail construction routes



A3 scale: 1:100,000

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Future Freight
Integrating Community, Environment and Engineering

Issue date: 31/10/2019 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

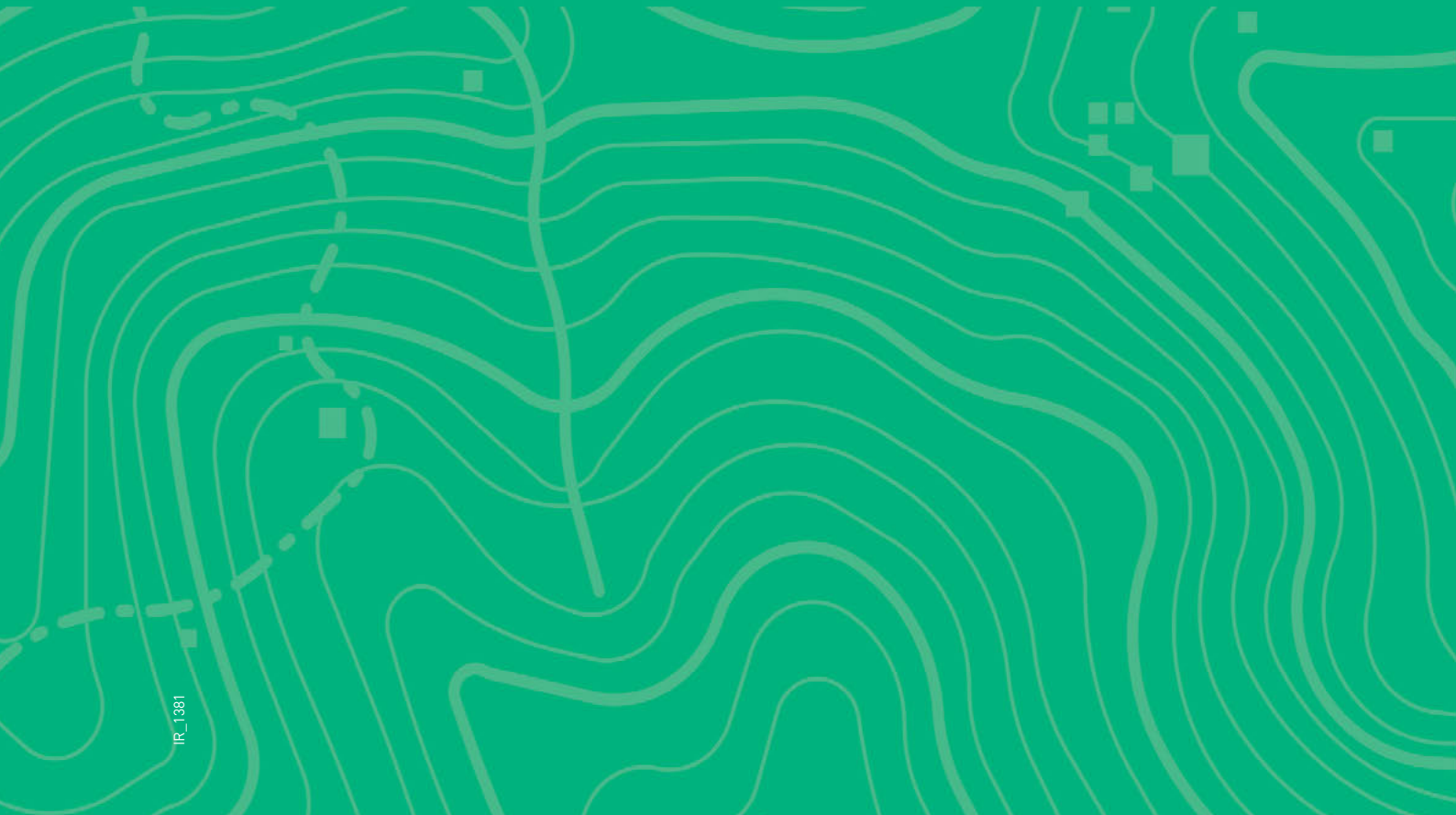
Calvert to Kagaru
Appendix A: Rail construction routes

APPENDIX U

Traffic Impact Assessment Technical Report

Appendix B Quarry Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Mt Marrow Blue Metal Quarry
Walloon
Ipswich
Laidley
Rosewood
Grandchester
Calvert
Ebenezer
Willowbank
Purga
Goolman
Boral Quarries Peak Crossing (Purga)
Peak Crossing
Harrisville
Warrill View
Washpool
Flinders Lakes
Jimboomba
Kagaru
Munbilla
Woolooman
Kalbar
Aratula
Boonah
Dugandan
Neilsen Bromelton Quarry
Bromelton Quarry
Beaudesert
Neilsen Beaudesert (Cryna) Quarry
Logan Village
Beenleigh
Steiglitz
Ormeau
Macleay Island
Lamb Island
Karragarra Island
Russell Island
Sanctuary Cove
Coomera
Tamborine
Eagle Heights
North Tamborine
Mount Tamborine
Nerang
Gold Coast
Canungra
Brisbane Rd
Ipswich Mway
Logan Mway
Gateway Mway
Pacific Mway
Cunningham Hwy
Centenary Hwy
Mount Lindesay Hwy
Pacific Hwy
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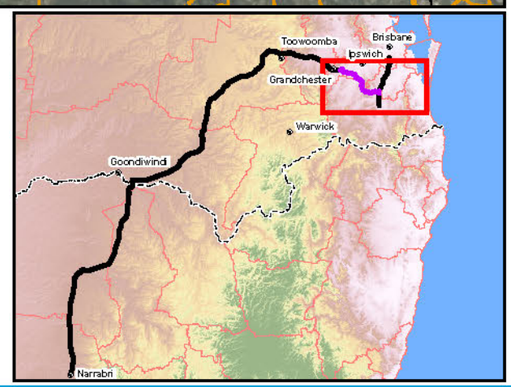

Legend

- 5 Chainage (km)
- Localities
- Quarry
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Quarry construction routes

A3 scale: 1:275,000

0 2 4 6 8 10km

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Coordinate System: GDA 1994 MGA Zone 56

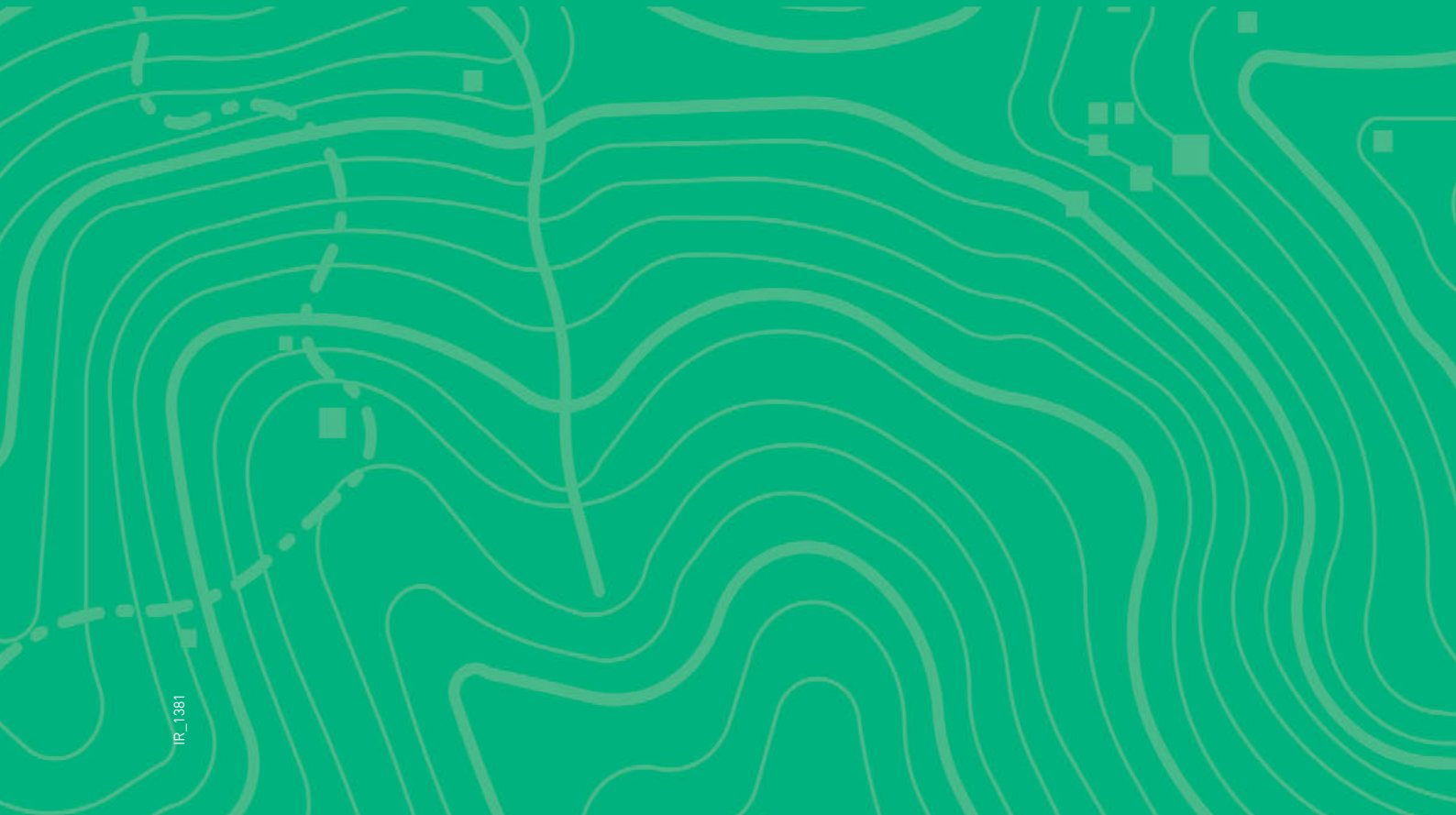
Calvert to Kagaru
Appendix B: Quarry construction routes

APPENDIX U

Traffic Impact Assessment Technical Report

Appendix C Concrete Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Map by: RB/MEF Z:\GIS\GIS_3400_C2K\Tasks\3400-ITR-20181212\2107_AppC_Concreate_Construction_Routes_rev5.mxd Date: 5/11/2019 12:59

Boral Concrete Laidley

Boral Concrete Ipswich

Sunmix Concrete Pty Ltd

Ropeley Rd
Blenheim Rd
Mount Berryman Rd
Mulgowie Rd
Karrabin Rosewood Rd
Rosewood Laidley Rd
Ipswich Rosewood Rd
Grandchester Mount Mort Rd
Mount Walker West Rd
Rosewood Warrill View Rd
Cunningham Hwy
Brisbane Rd
Ipswich Mway
Alice St
Jones Rd
Logan Mway
Blunder Rd
Paradise Rd
Gowan Rd
Compton Rd
Pacific Mway
Johnson Rd
Beaudesert Rd
Logan Mway
Kingston Rd
Loganlea Rd
Logan River Rd
Wurage Rd
Centenary Hwy
Jacaranda Rd
Andrew Rd
Mount Lindesay Hwy
Park Ridge Rd
Chambers Flat Rd
Logan Reserve Rd
Scott La
Tewantin Rd
Gusack La
Bushman Dr
Camp Cable Rd
Waterford Tamborine Rd
Willstream Rd
Mundoolun Rd
Beenleigh Rd
Mundoolun Connection Rd
Coleyville Rd
Cunningham Hwy
Munbilla Rd
Roadvale Harrisville Rd
Brookyard Rd
Mount Lindesay Hwy
Beaudesert Boonah Rd
Tarome Rd
Muller Rd
Tavistville Rd
Tarome Rd
Cunningham Hwy
Lake Moogerah Rd
Boonah Passfern Rd
5
10
15
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25
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35
40
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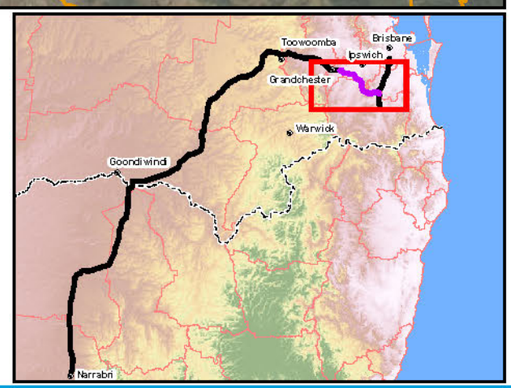
50

Legend

- 5 Chainage (km)
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Concrete supplier
- Concrete construction routes



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Issue date: 05/11/2019 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru

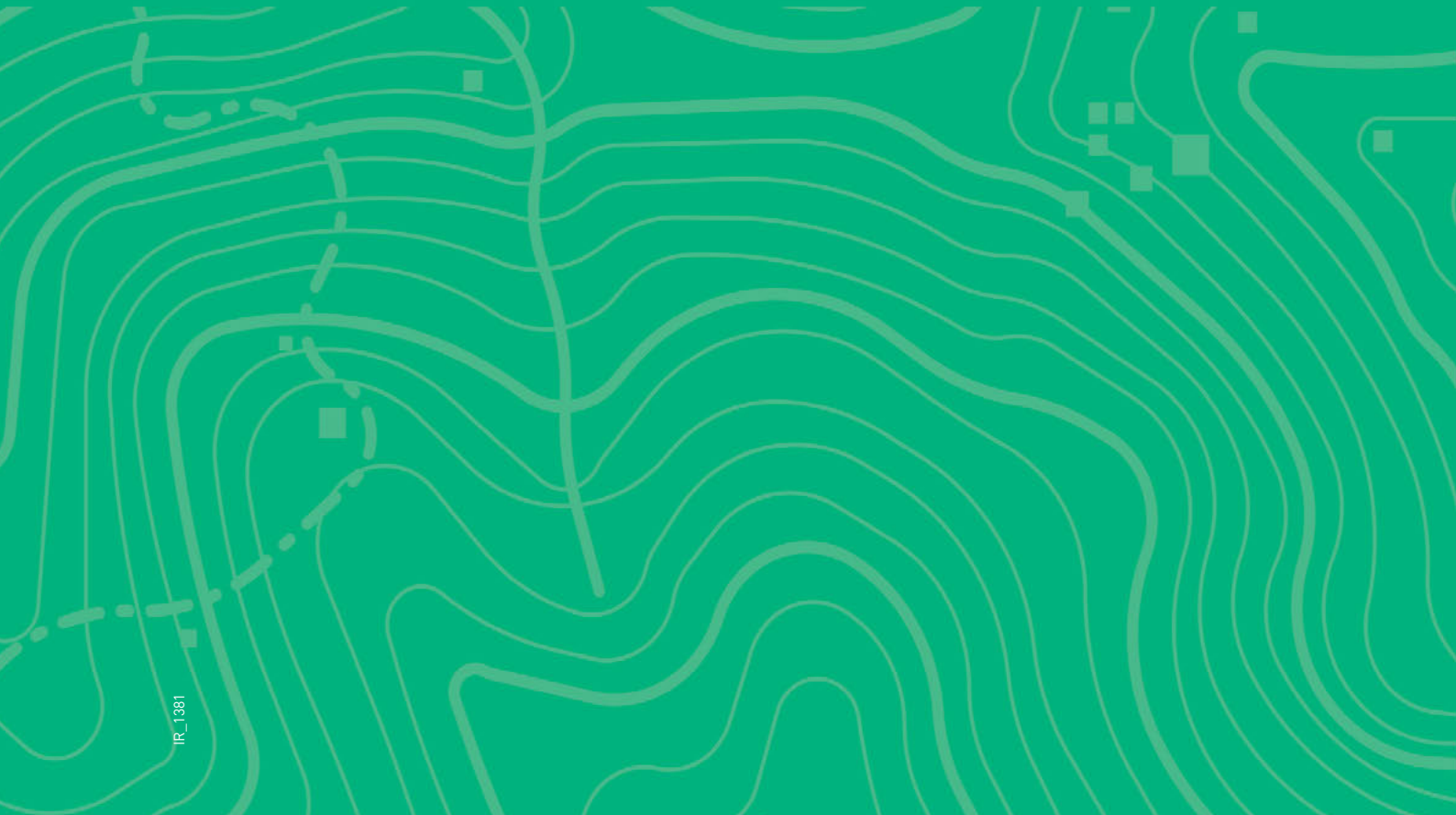
Appendix C: Concrete construction routes

APPENDIX U

Traffic Impact Assessment Technical Report

Appendix D Precast concrete Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



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Enco PRE cast Pty Ltd

Wagner Precast

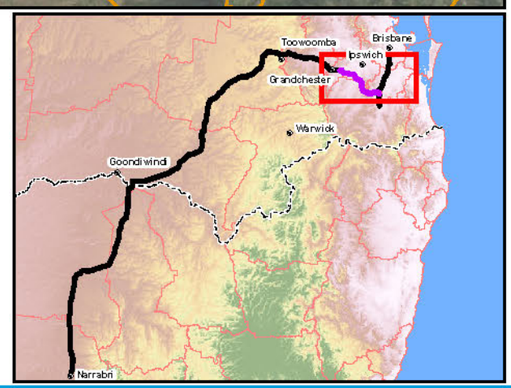
Rocla Precast

Concrete Wacol

Humes Precast Concrete

Legend

- 5 Chainage (km)
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Precast concrete supplier
- Precast concrete construction routes



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0 1.5 3 4.5 6 7.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 05/11/2019 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

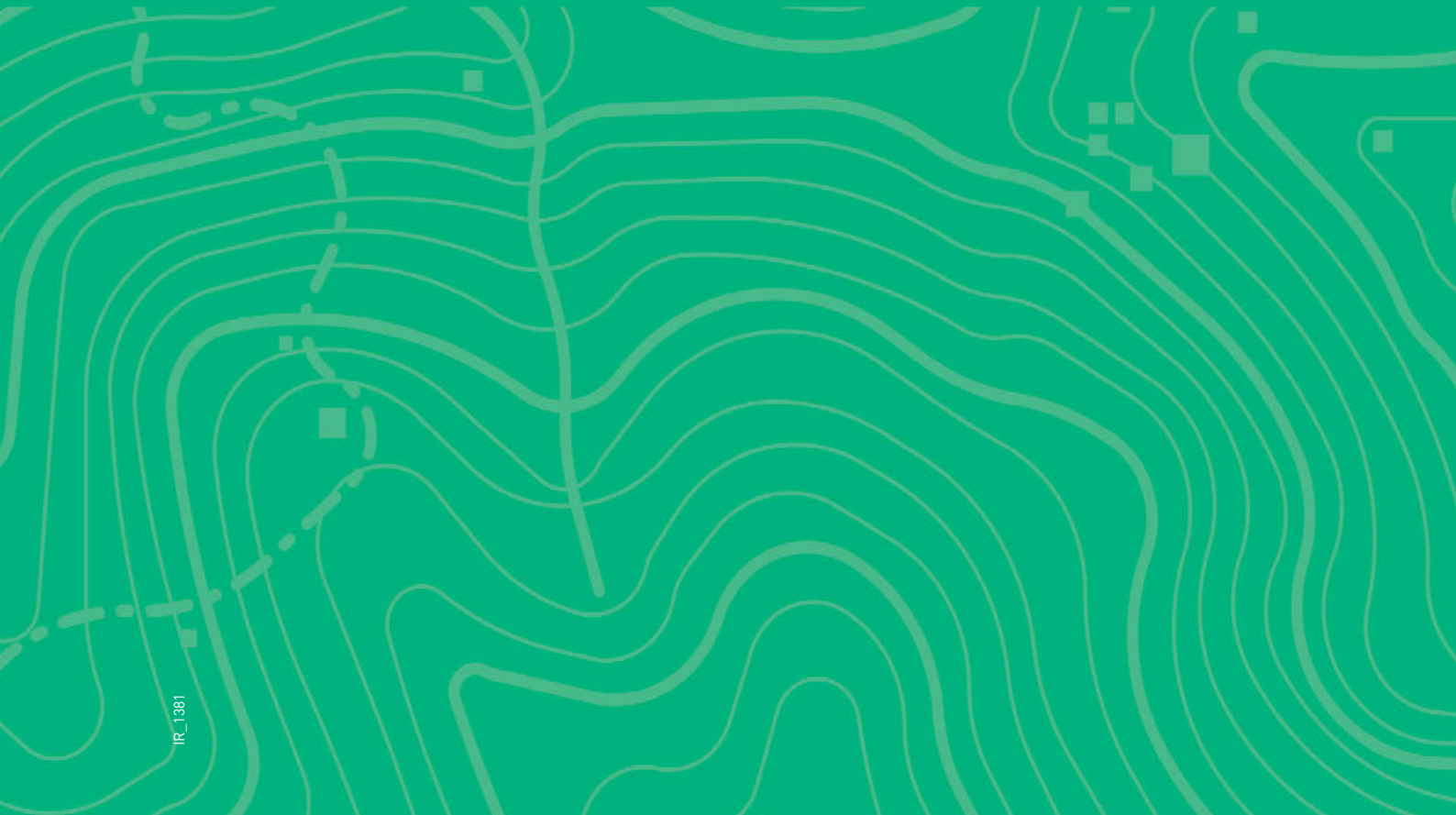
Calvert to Kagaru
Appendix D: Precast concrete routes

APPENDIX U

Traffic Impact Assessment Technical Report

Appendix E Workforce Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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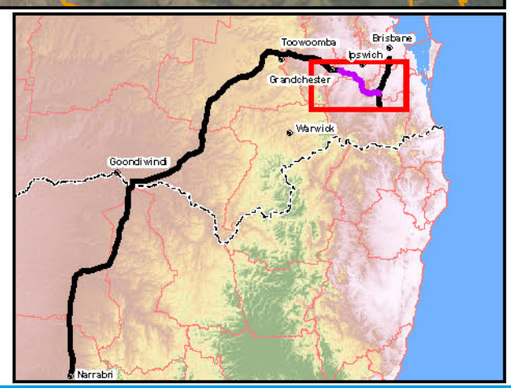
Laidley
Grandchester
Calvert
Walloon
Rosewood
Ebenezer
Willowbank
Purga
Ipswich
Goolman
Peak Crossing
Harrisville
Warrill View
Munbilla
Washpool
Wooloomban
Kalbar
Aratula
Boonah
Flinders Lakes
Kagaru
Jimboomba
Logan Village
Tamborine
Beaudesert

Ropeley Rd
Blenheim Rd
Mount Berryman Rd
Mulgowie Rd
Grandchester Mount Rd
Karrabin Rosewood Rd
Rosewood Laidley Rd
Ipswich Rosewood Rd
Mount Walker West Rd
Rosewood Warrill View Rd
Cunningham Hwy
Centenary Hwy
Brisbane Rd
Ipswich Mway
Alice St
Jones Rd
Logan Mway
Blunder Rd
Paradise Rd
Johnson Rd
Beaudesert Rd
Gowan Rd
Compton Rd
Pacific Mway
Kingston Rd
Logan Mway
Loganlea Rd
Logan River Rd
Wuraga Rd
Mount Lindesay Hwy
Park Ridge Rd
Chambers Flat Rd
Logan Reserve Rd
Yarrol Rd
Coleyville Rd
Scott La
Tewantin Rd
Bushman Dr
Gusack La
Camp Cable Rd
Waterford Tamborine Rd
Willstream Rd
Mundoolun Rd
Beenleigh Rd
Mundoolun Connection Rd
Brookyard Rd
Munbilla Rd
Beaudesert Boonah Rd
Cunningham Hwy
Roadvale Harrisville Rd
Tarome Rd
Muller Rd
Tavistville Rd
Lake Moogerah Rd
Boonah Fassifern Rd

5 10 15 20 25 30 35 40 45 50

Legend

- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Workforce construction routes



A3 scale: 1:250,000
0 1.5 3 4.5 6 7.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 04/11/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

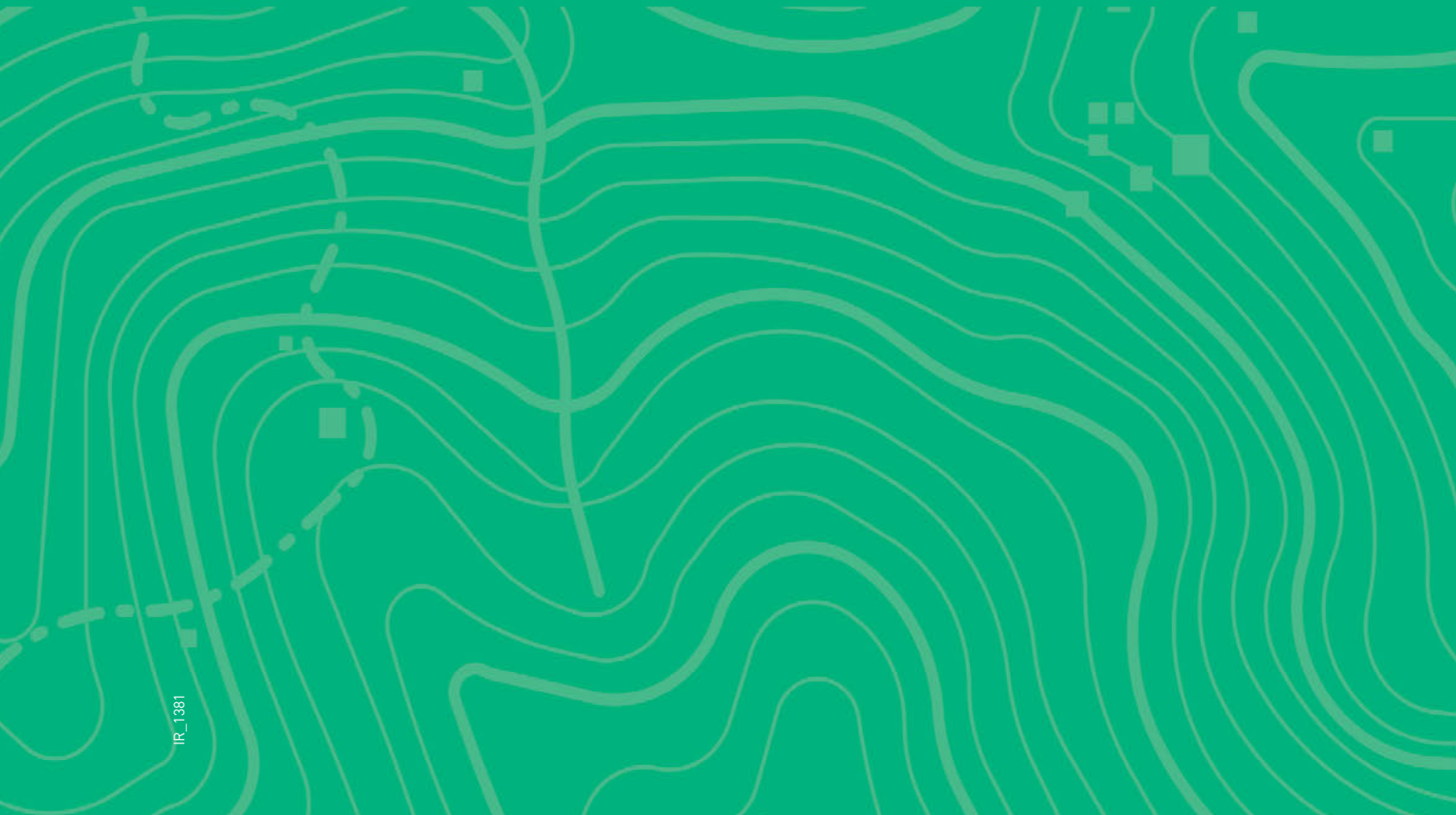
Calvert to Kagaru
Appendix E: Workforce construction routes

APPENDIX U

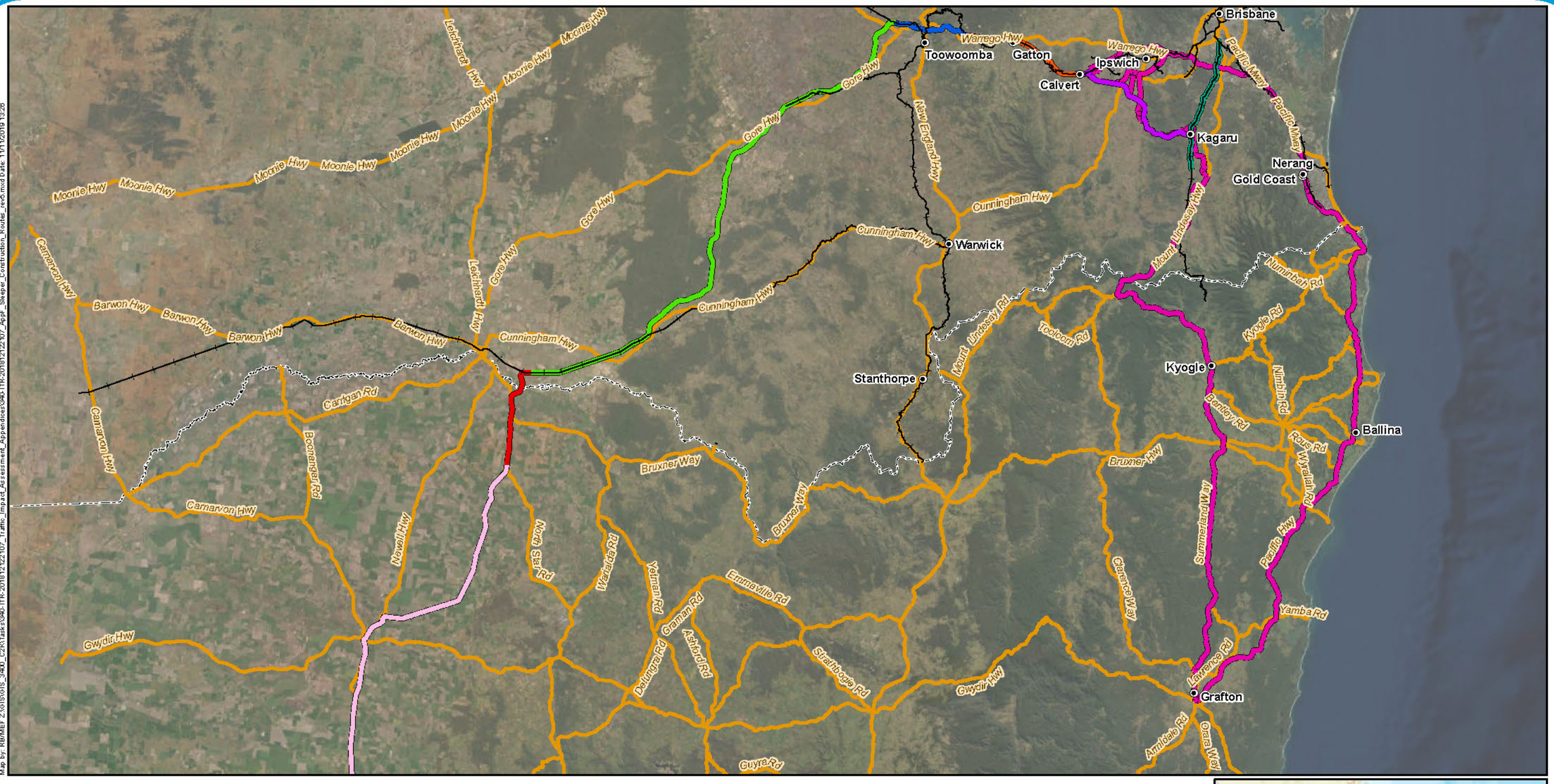
Traffic Impact Assessment Technical Report

Appendix F Sleeper Construction Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



IR_1381



Legend

- Localities
- Existing rail
- N2NS project alignment
- NS2B project alignment
- B2G project alignment
- G2H project alignment
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- QLD/NSW border
- Sleeper construction routes

A3 scale: 1:1,500,000

0 10 20 30 40 50km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 11/11/2019 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

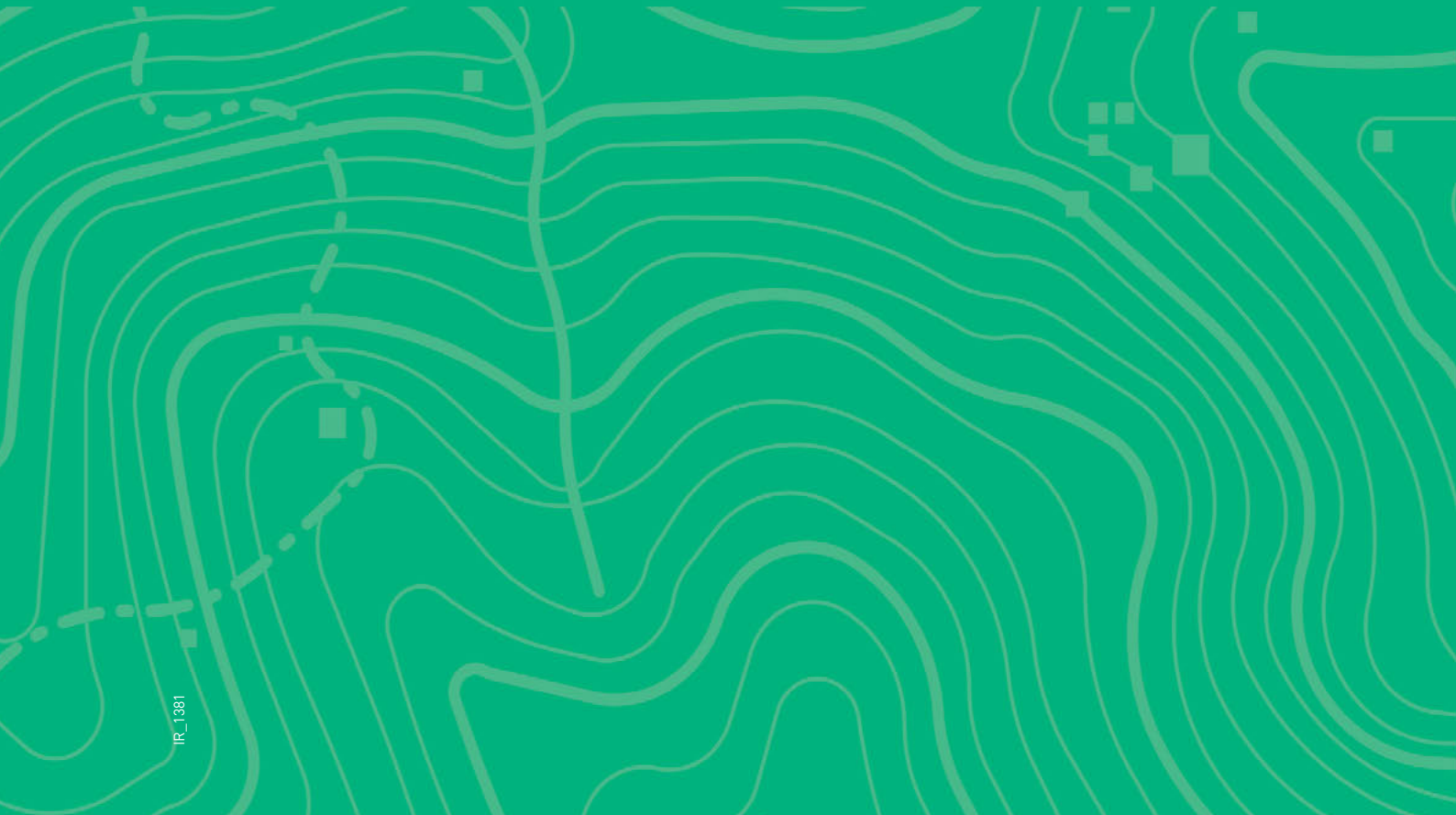
Calvert to Kagaru
Appendix F: Sleeper construction routes

APPENDIX U

Traffic Impact Assessment Technical Report

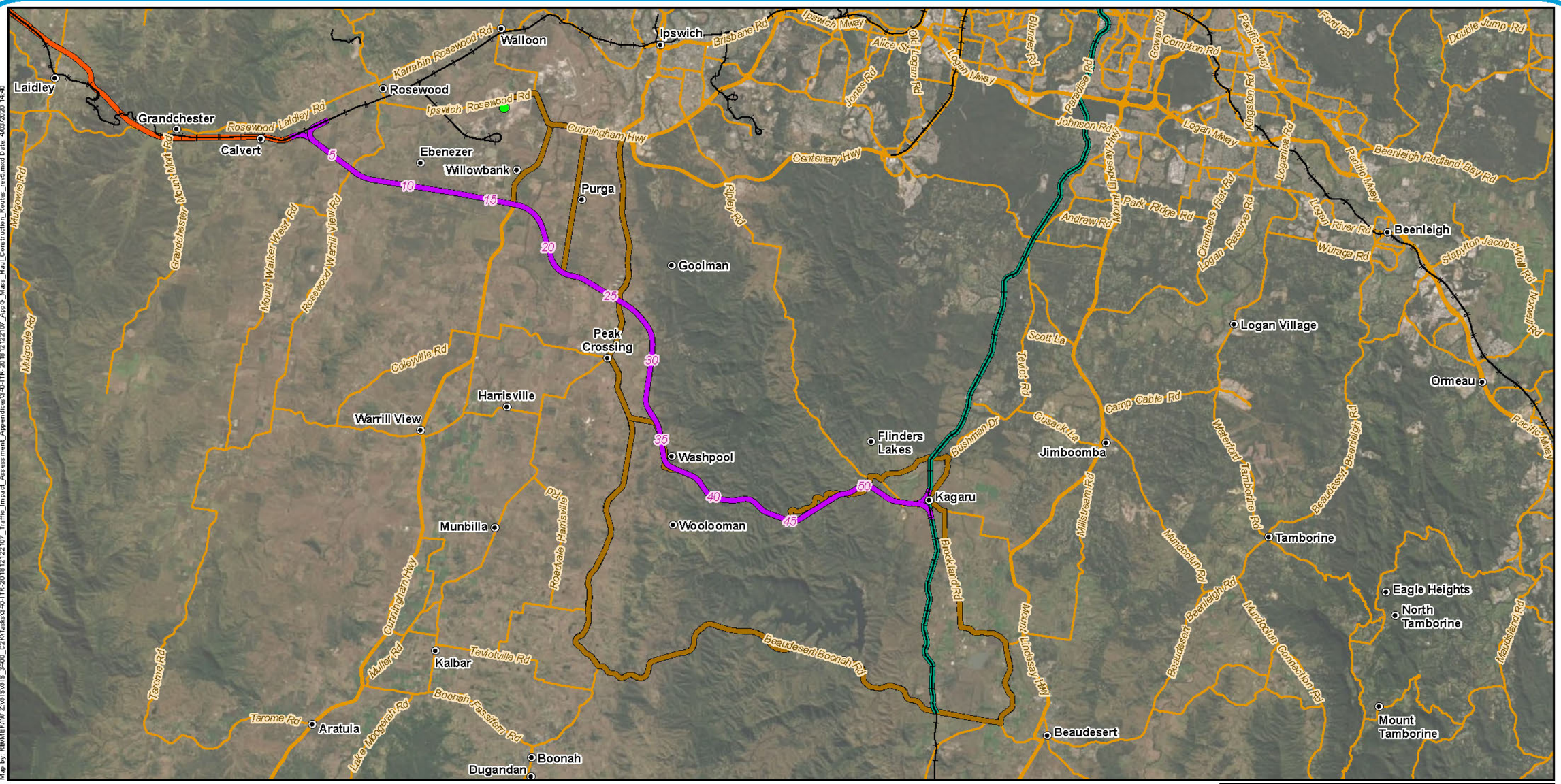
Appendix G Mass Haul Construction Routes

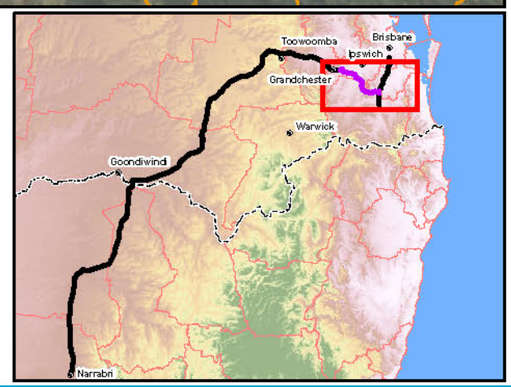
CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



IR_1381

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Legend

- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Spoil disposal location
- Mass haul construction routes

A3 scale: 1:250,000

0 1.5 3 4.5 6 7.5km

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Integrating Community, Environment and Engineering

Issue date: 4/03/2019 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix G: Mass haul construction routes

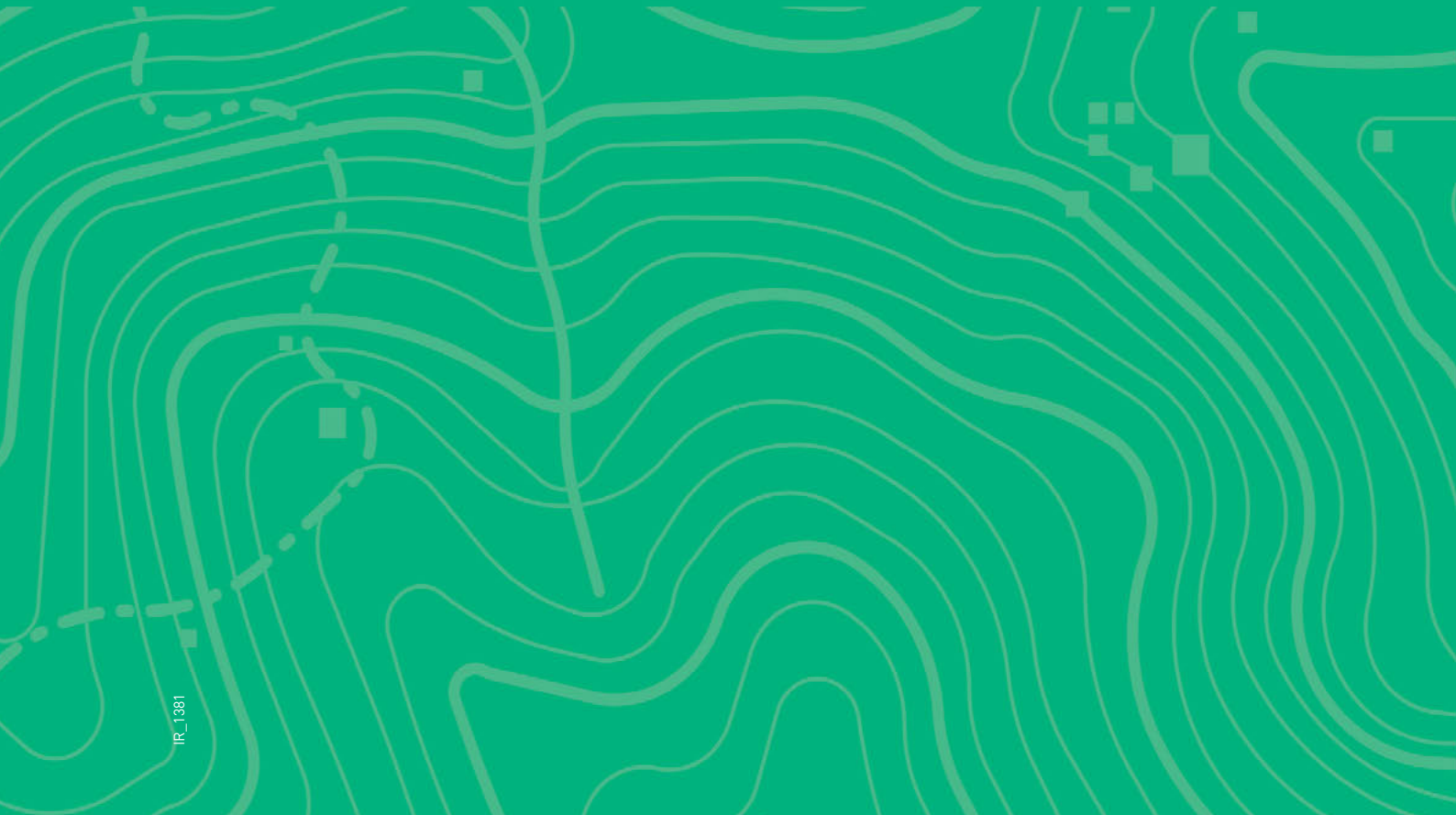
Map by: RB/MEF/IW Z:\GIS\GIS_3400_C2K\Tasks\3400-ITR-20181212\2107_App'G_Mass_Haul_Construction_Router_rev5.mxd Date: 4/03/2020 14:40

APPENDIX U

Traffic Impact Assessment Technical Report

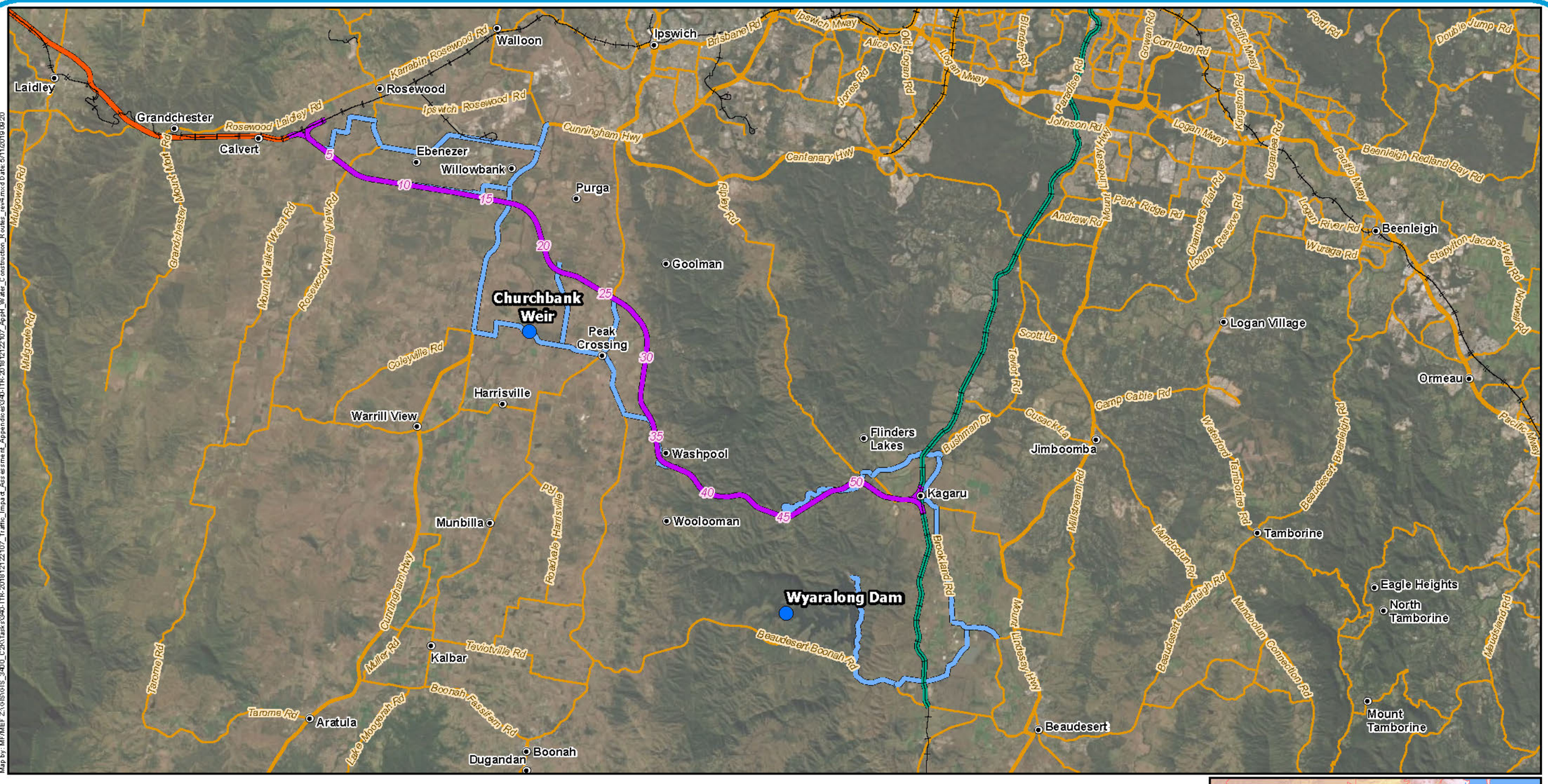
Appendix H Water Construction Routes

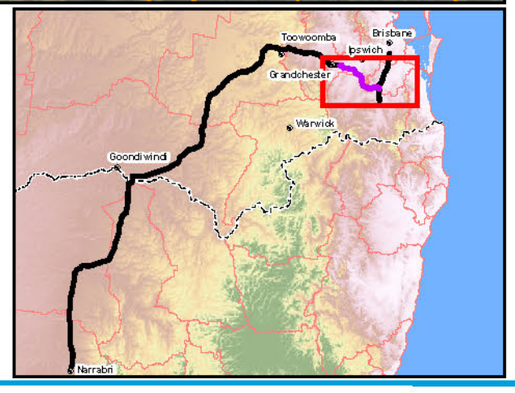
CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



IR_1381

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Legend

- 5 Chainage (km)
- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Water source
- Water construction routes

A3 scale: 1:250,000

0 1.5 3 4.5 6 7.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 04/11/2019 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix H: Water construction routes

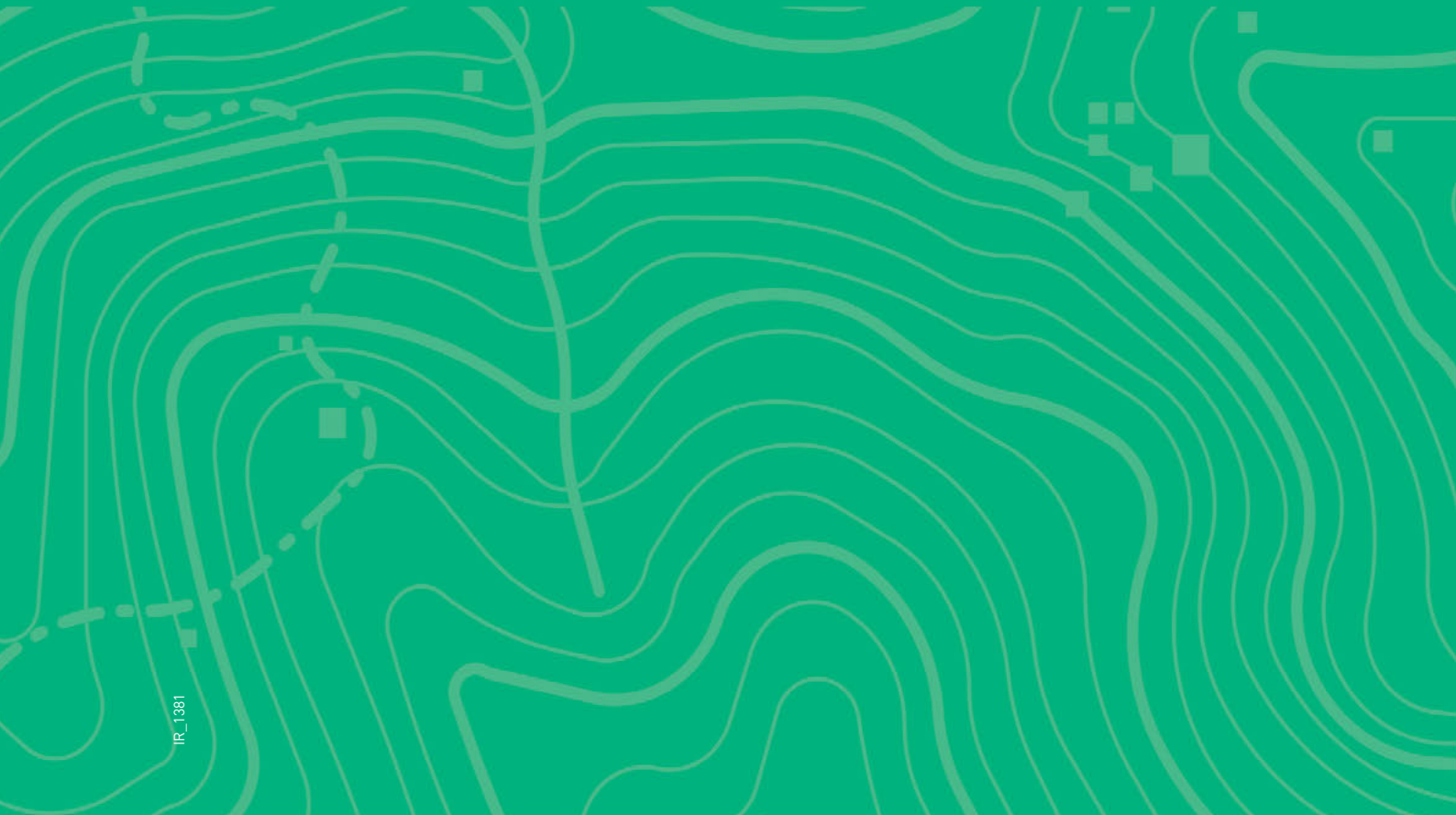
Map by: MF/MEF Z:\GIS\GIS_3400_C2K\Tasks\3400-ITR-20181212\2107_Traffic_Impact_Assessment_Appendices\3400-ITR-20181212107_AppH_Water_Construction_Routes_rev4.mxd Date: 5/11/2019 09:20

APPENDIX U

Traffic Impact Assessment Technical Report

Appendix I Multi-Combination Heavy Vehicle Routes

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



IR_1381

MULTI-COMBINATION ROUTES IN QUEENSLAND

Queensland Government

SECTION 1

Map updated:18/10/2017

SEE INDIVIDUAL AREA MAPS FOR DETAIL
(refer to index)

B-DOUBLES
23 metre routes
23 & 25 metre routes

ROAD TRAINS
Type 1 routes
Type 1 & 2 routes

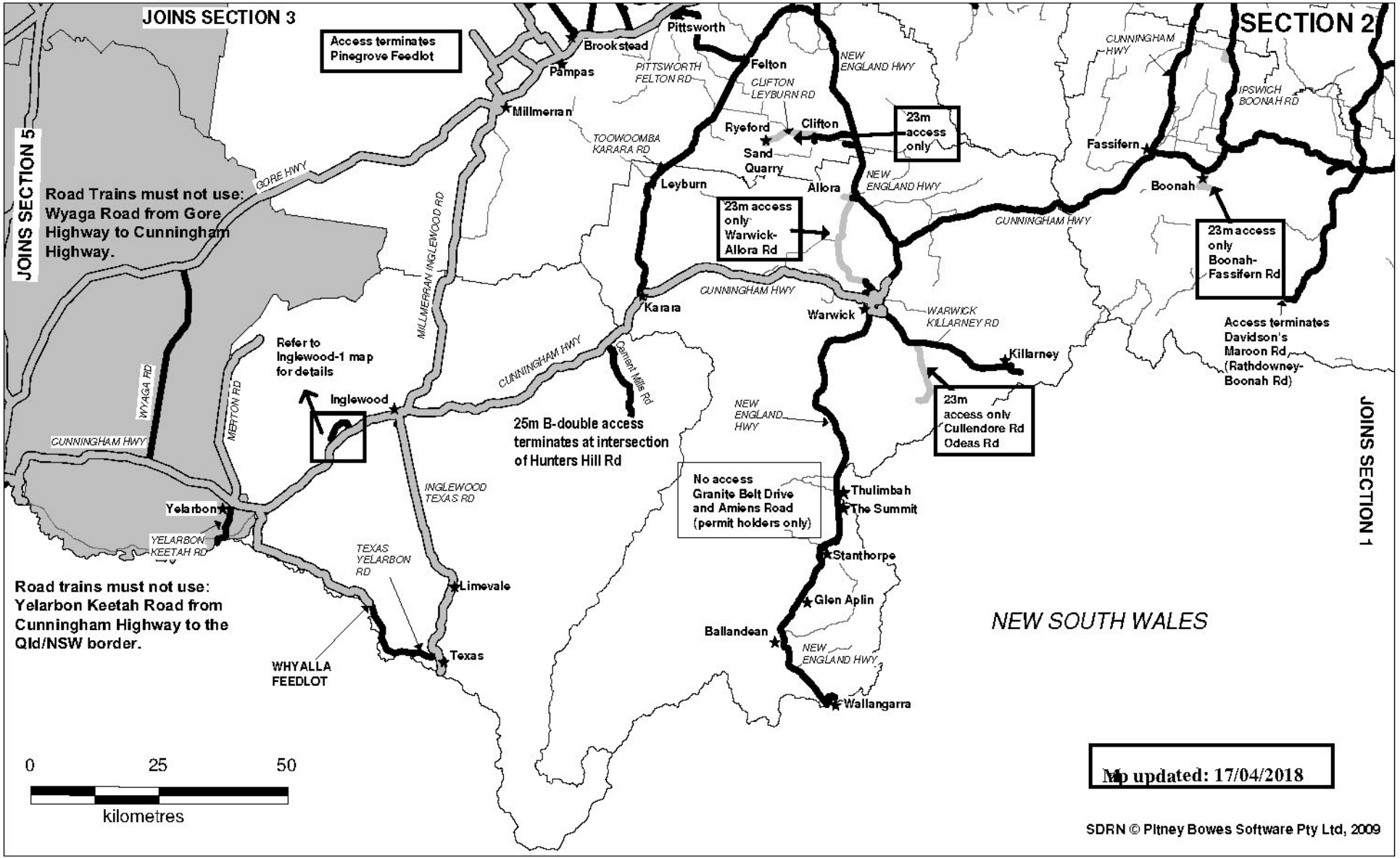
NO ROAD TRAINS
or B-DOUBLES

REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREA

Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes

MULTI-COMBINATION ROUTES IN QUEENSLAND

Queensland Government

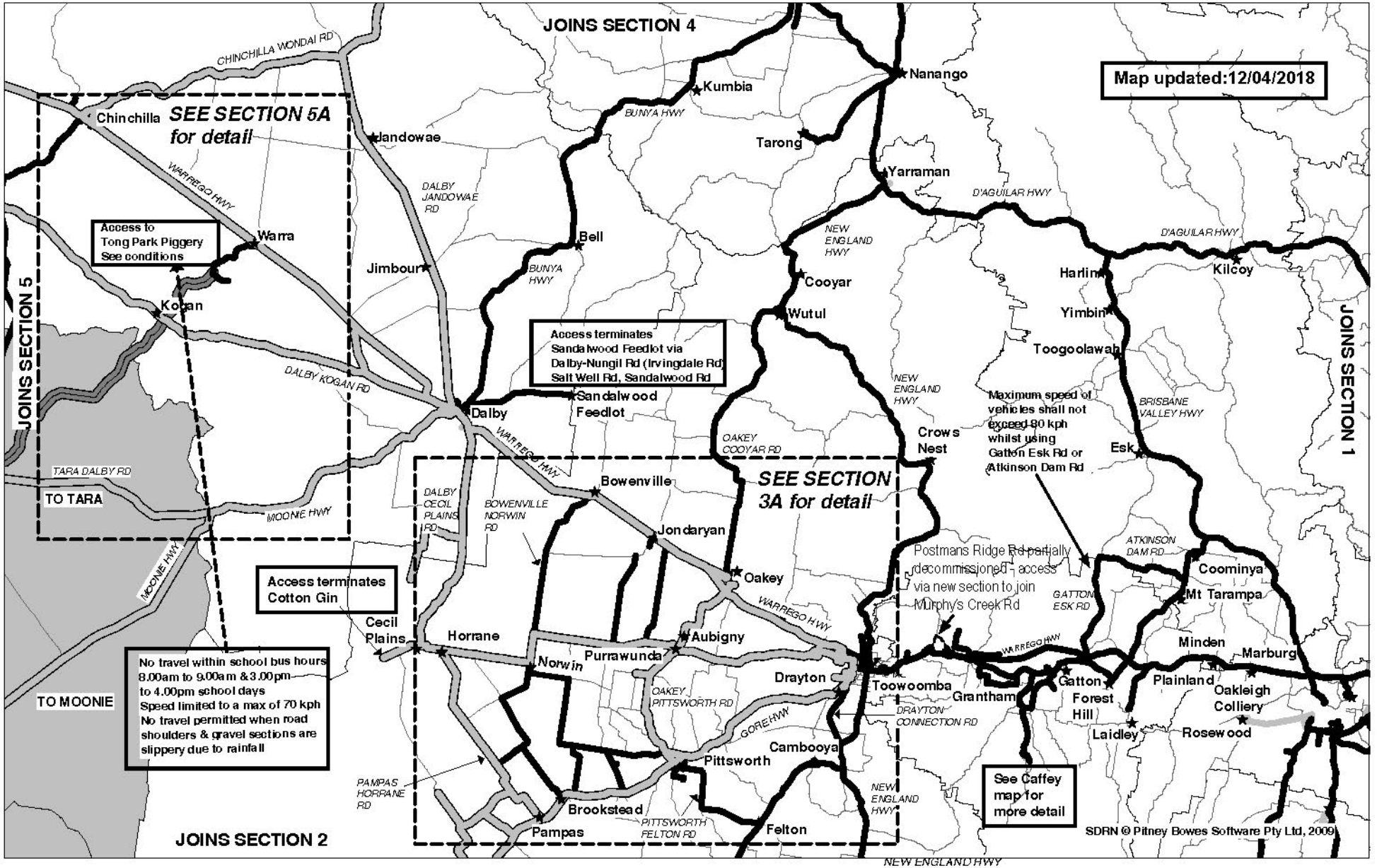


B-DOUBLES	ROAD TRAINS	NO ROAD TRAINS or B-DOUBLES
23 metre routes	Type 1 routes	
23 & 25 metre routes	Type 1 & 2 routes	

REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS
Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes

MULTI-COMBINATION ROUTES IN QUEENSLAND

Queensland Government



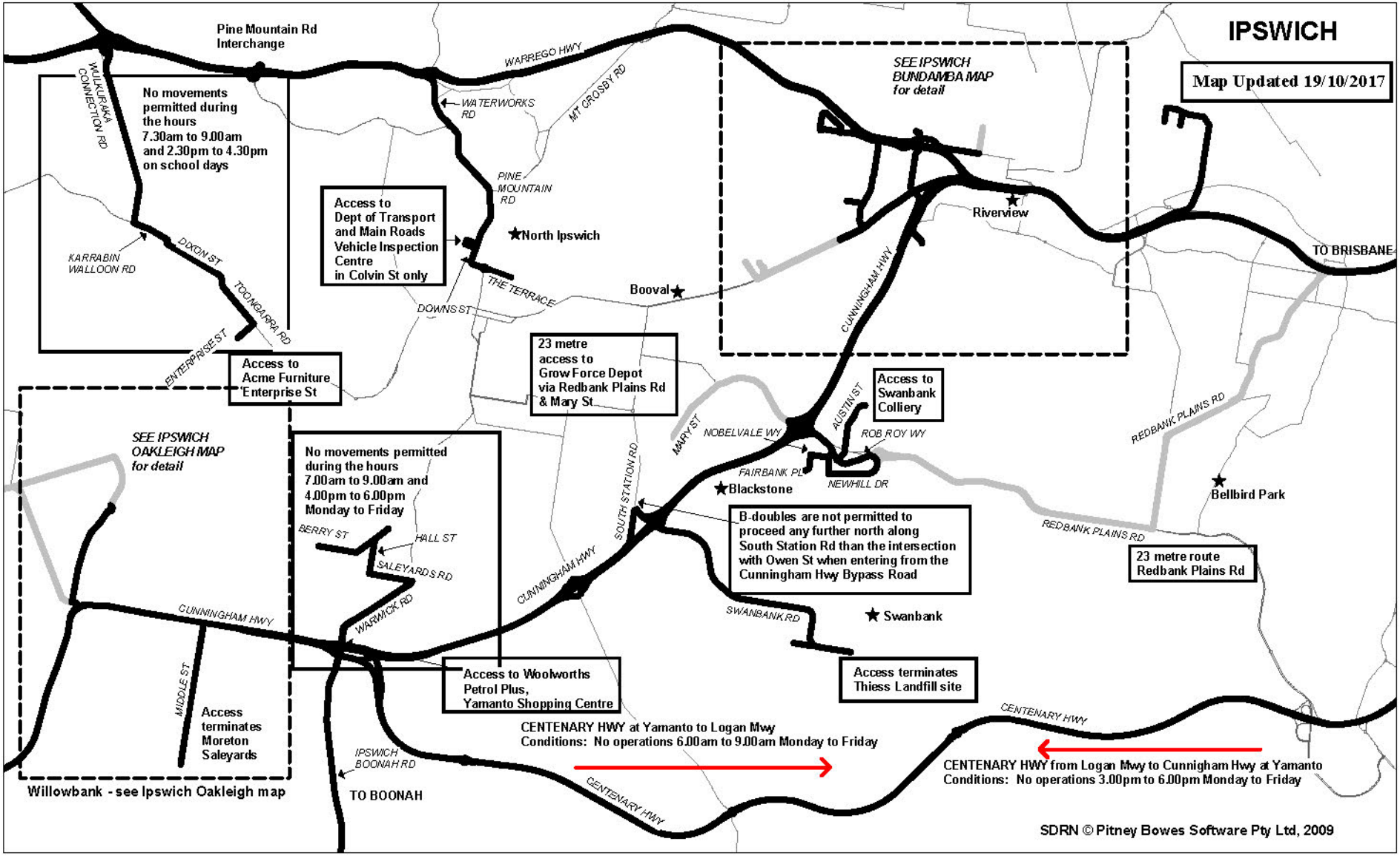
B-DOUBLES	ROAD TRAINS	NO ROAD TRAINS or B-DOUBLES
23 metre routes	Type 1 routes	
23 & 25 metre routes	Type 1 & 2 routes	

REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS

Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes

MULTI-COMBINATION ROUTES IN QUEENSLAND

Queensland Government



B-DOUBLES
- 23 metre routes
- 23 & 25 metre routes

ROAD TRAINS
- Type 1 routes
- Type 1 & 2 routes

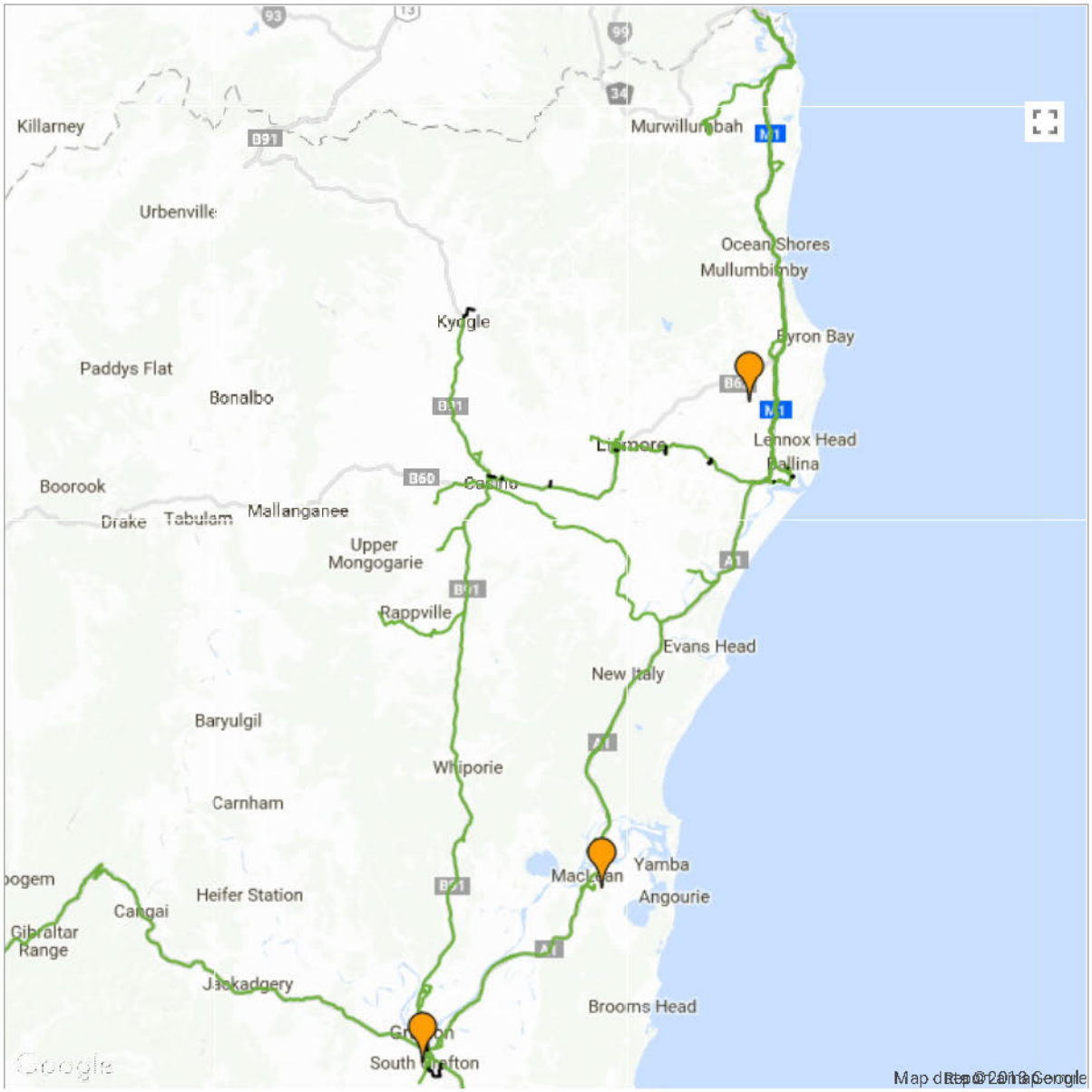
NO ROAD TRAINS or B-DOUBLES

REFER TO LEGEND FOR DETAILS OF OPERATIONS IN THE SHADED AREAS

Note: 23 & 25 metre B-doubles can access Type 1 & 2 road train routes

NSW Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map

Map last updated: 03/05/2018



Legend

GML and CML networks

- 25/26m B-double Routes
- Approved Routes With Travel Conditions
- Exception Routes (not approved)
- Approved Areas
- Approved Areas with Travel Conditions
- Restricted Structures - Bridges
- Restricted Structures with Conditional Access - Bridges
- Restricted Structures - Intersections
- Restricted Structures - Intersections with Conditional Access
- Low Clearance Bridge (< 4.3m) - Through Traffic on Bridge
- Low Clearance Bridge (< 4.3m) - Through Traffic under Bridge

Network Disclaimer

The networks are available for short combinations (up to 19 metres long) and B-doubles that comply with the requirements contained in the Heavy Vehicle National Law (HVNL); the National Class 2 Heavy Vehicle B-double Authorisation (Notice) and the adjoining NSW Schedule and for Higher Mass Limits (HML) the New South Wales Higher Mass Limits Declaration 2015. These networks are based on a maximum vehicle width of 2.5 metres and are subject to sign-posted restrictions.

Provide feedback

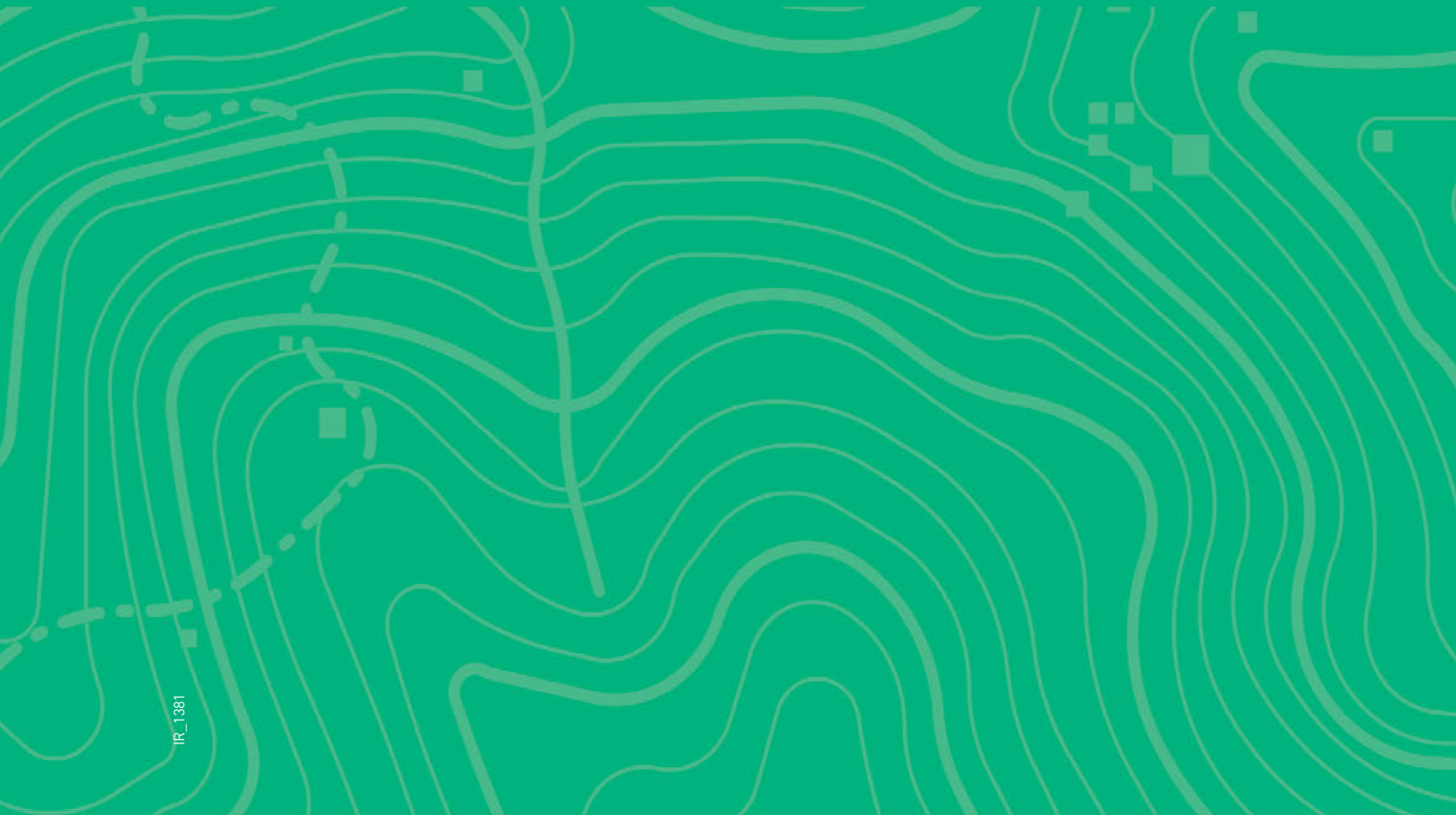
Contact Roads and Maritime Services | Phone: 131 782

APPENDIX U

Traffic Impact Assessment Technical Report

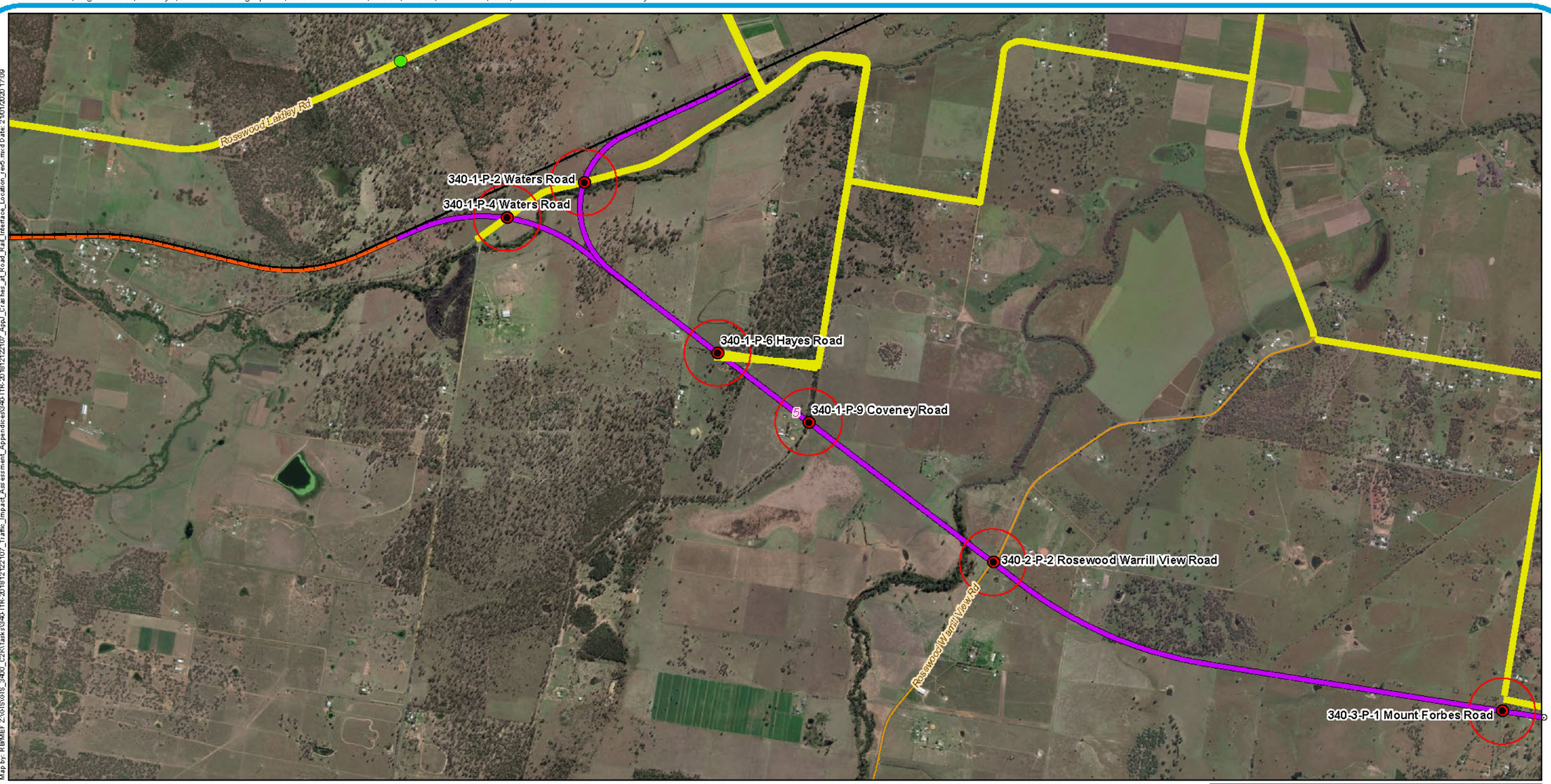
Appendix J Existing Crashes at Road/ Rail Interface Locations

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT



IR_1381

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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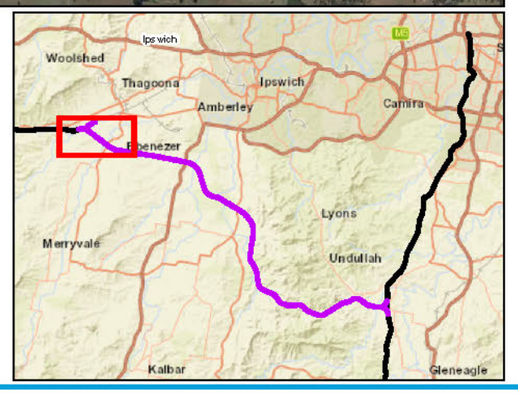
Legend

- 5 Chainage (km)
- Existing rail
- H2C project alignment
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Road Rail Interface
- Hospitalisation
- 200m buffer

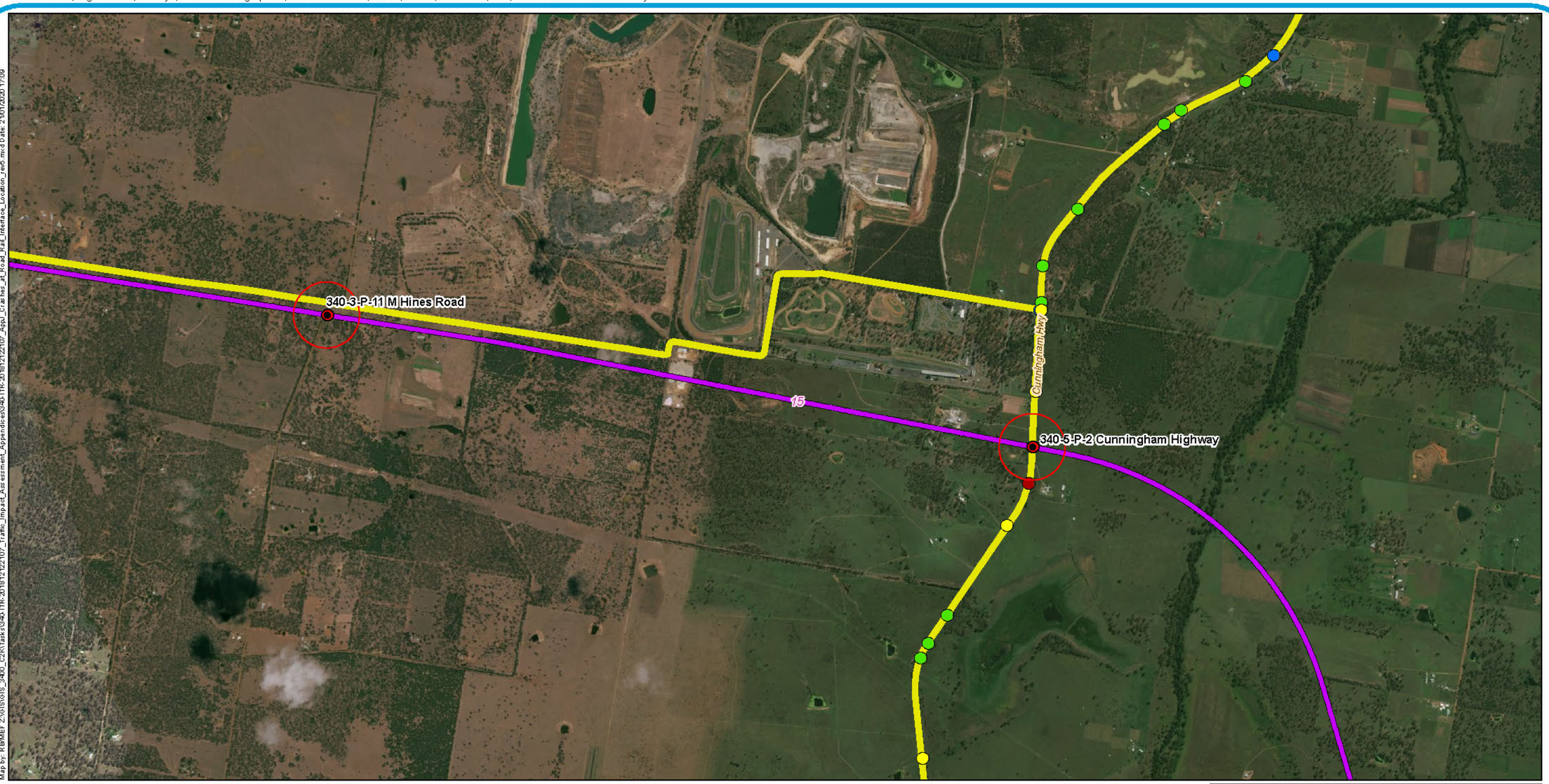


A3 scale: 1:25,000
0 0.15 0.3 0.45 0.6 0.75km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 21/01/2020 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix J1: Crashes at road-rail interface locations



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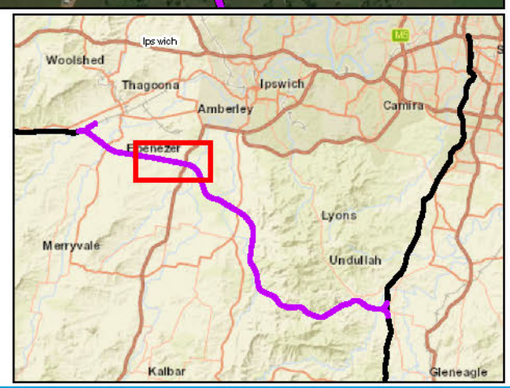
Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Road Rail Interface
- Fatal
- Hospitalisation
- Medical treatment
- Minor injury
- 200m buffer



A3 scale: 1:25,000

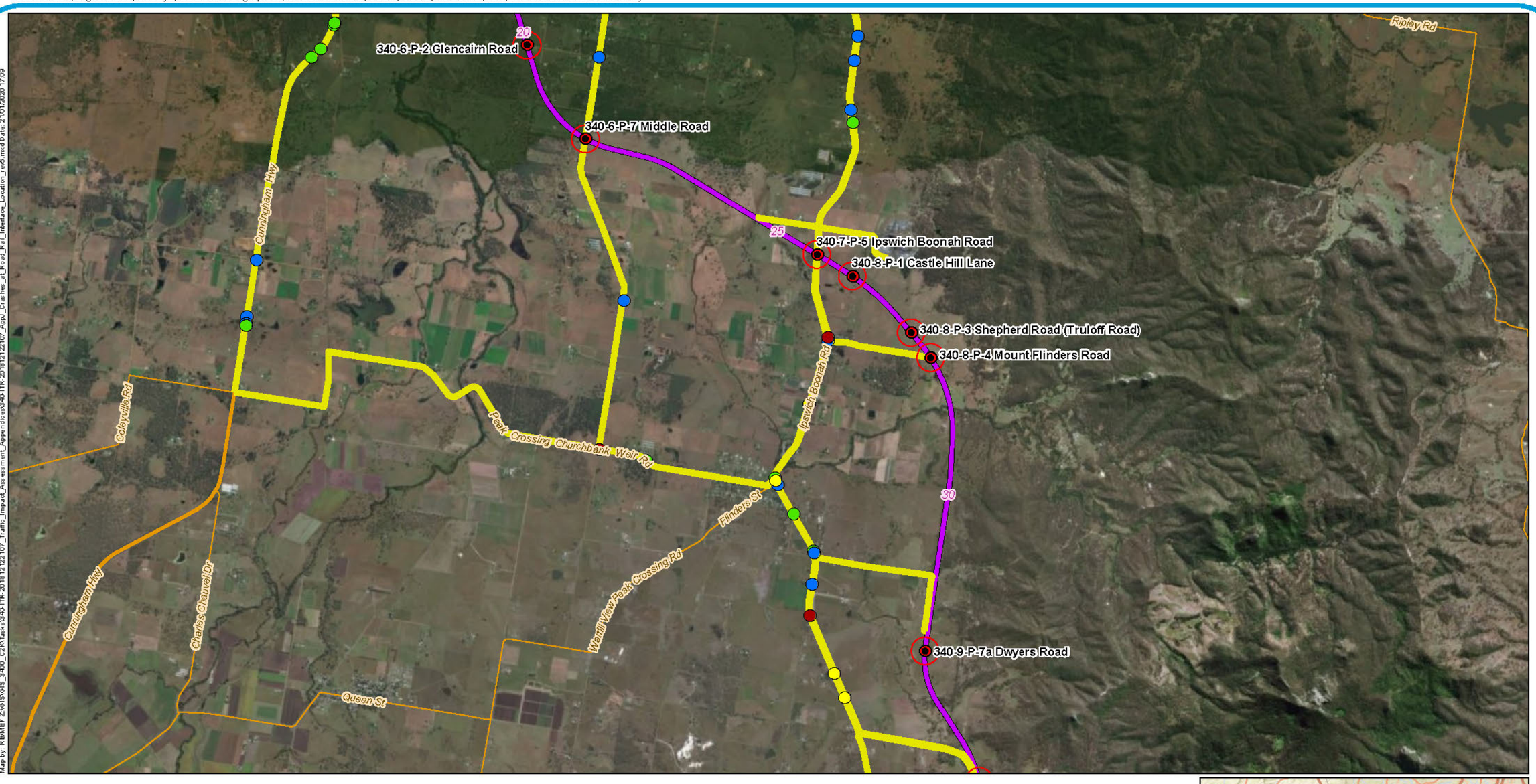
0 0.15 0.3 0.45 0.6 0.75km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 21/01/2020 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix J2: Crashes at road-rail interface locations

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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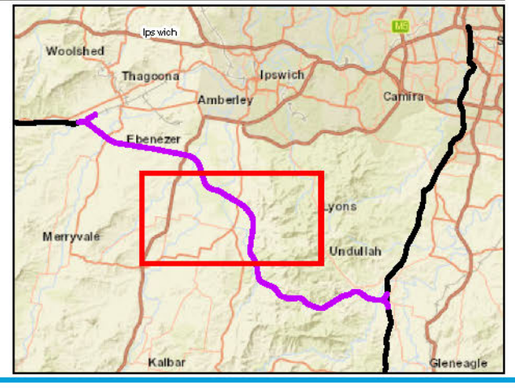
Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Road Rail Interface
- Fatal
- Hospitalisation
- Medical treatment
- Minor injury
- 200m buffer



A3 scale: 1:60,000
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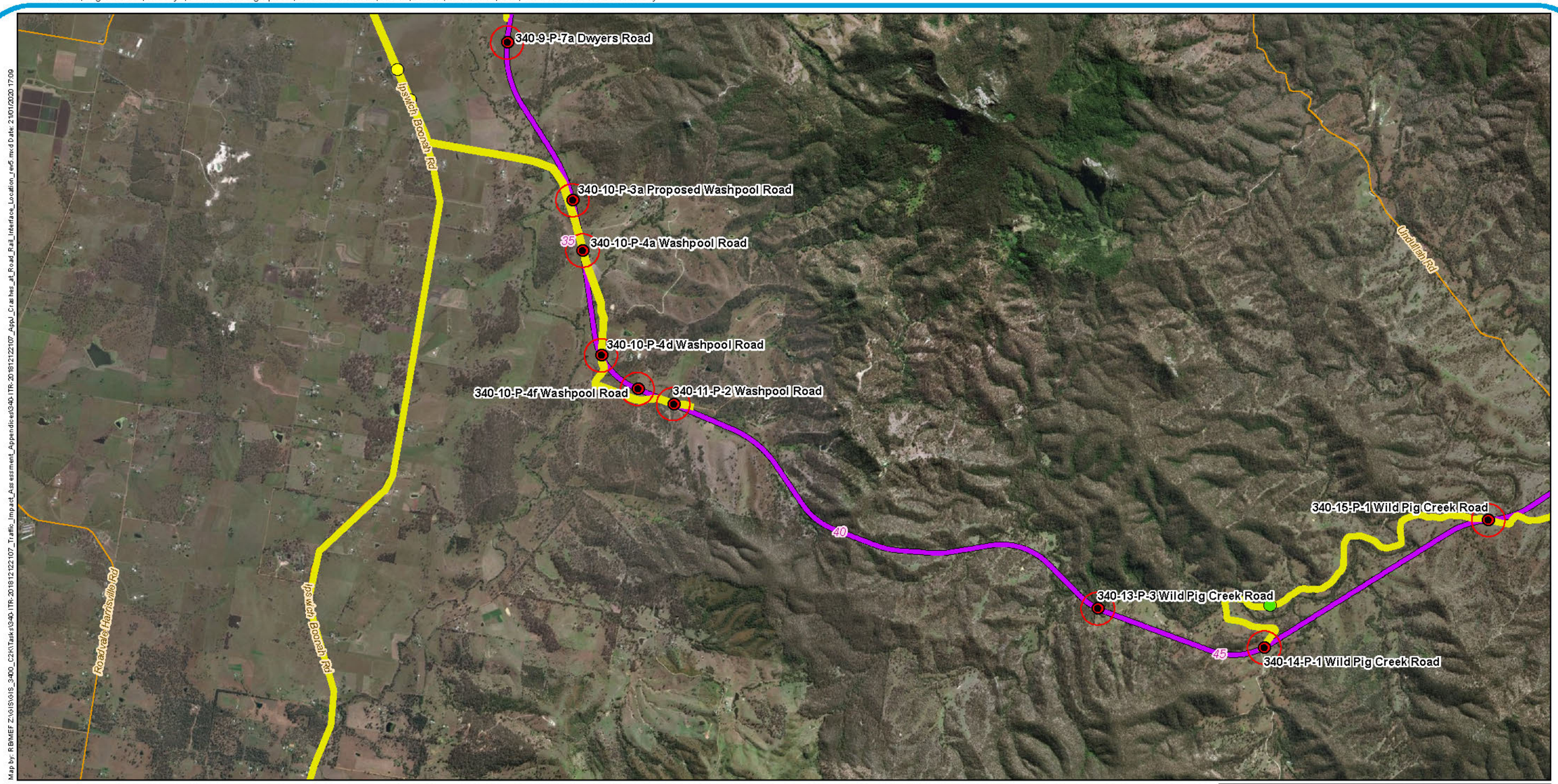
Future Freight
Integrating Community, Environment and Engineering

Issue date: 21/01/2020 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix J3: Crashes at road-rail interface locations



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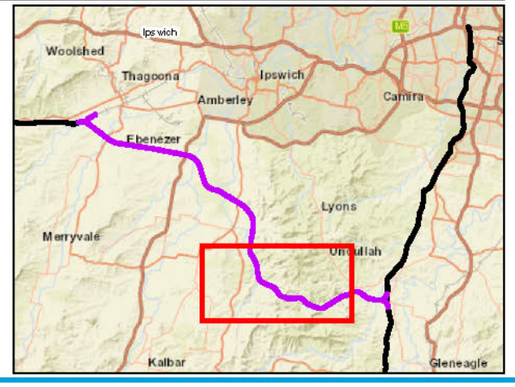
Legend

- 5 Chainage (km)
- C2K project alignment
- Major roads
- Minor roads
- Construction routes
- Road Rail Interface
- Hospitalisation
- Minor injury
- 200m buffer



A3 scale: 1:50,000

0 0.35 0.7 1.05 1.4 1.75km

Future Freight
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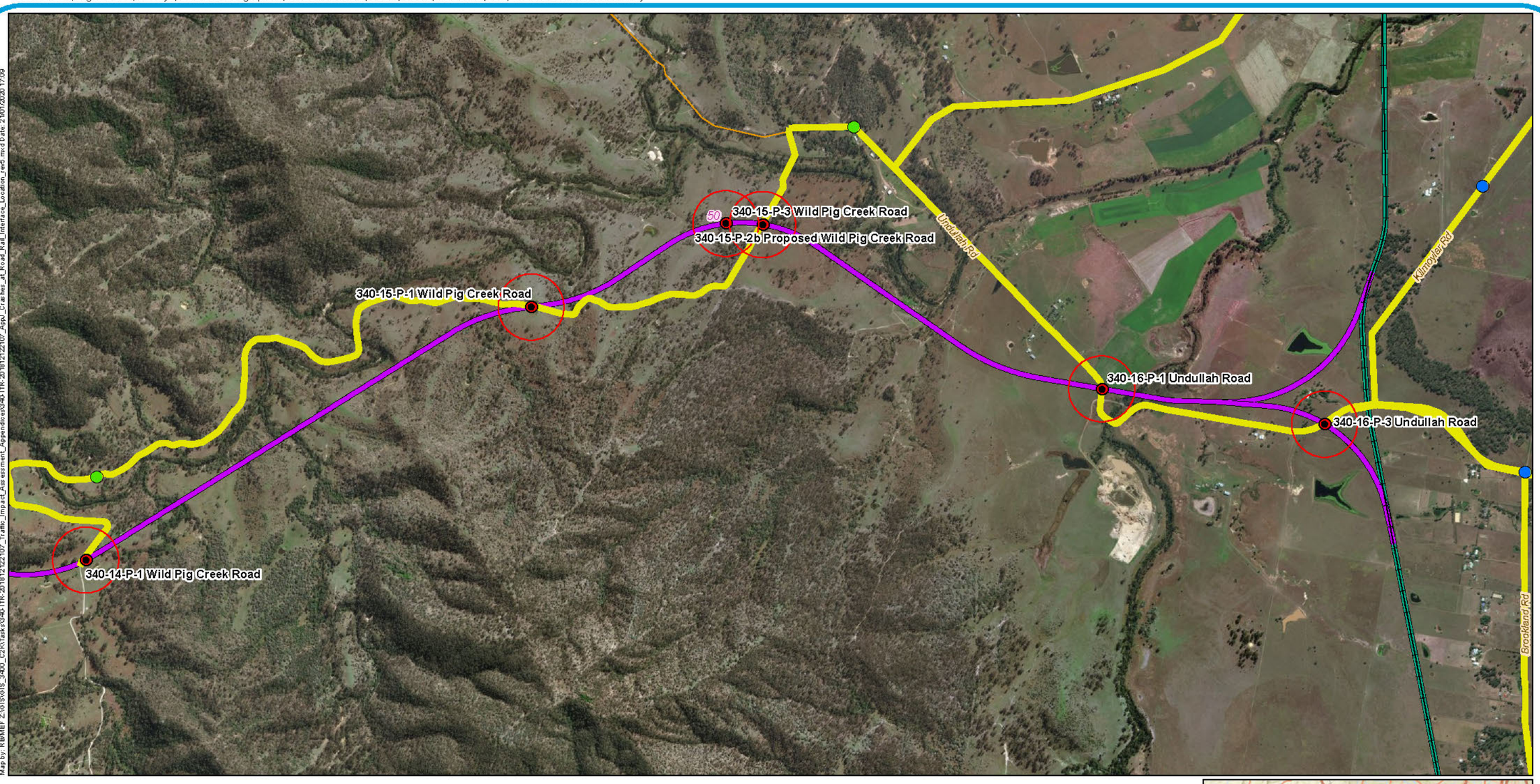
Issue date: 21/01/2020 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix J4: Crashes at road-rail interface locations

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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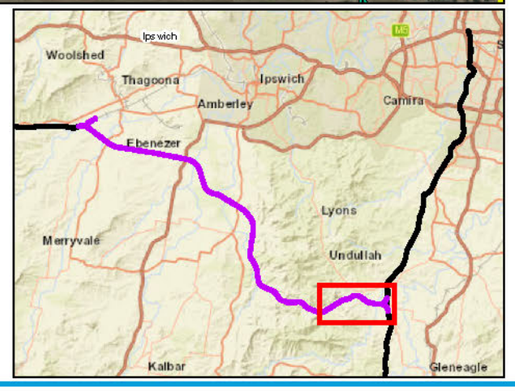
Legend

- 5 Chainage (km)
- Existing rail
- C2K project alignment
- K2ARB project alignment
- Major roads
- Minor roads
- Construction routes
- Road Rail Interface
- Hospitalisation
- Medical treatment
- 200m buffer



A3 scale: 1:25,000
0 0.15 0.3 0.45 0.6 0.75km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 21/01/2020 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Calvert to Kagaru
Appendix J5: Crashes at road-rail interface locations