CHAPTER 19

Traffic Transport and Access

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

IR_1536

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

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19. Traffic, Transport and Access

19.1 Summary

This chapter provides an overview of existing transport network conditions, including existing road, active transport and rail infrastructure for the Gowrie to Helidon (G2H) section of the Inland Rail Program (the Project). For the construction and operation of the Project, desktop studies and site surveys were undertaken to establish the baseline conditions for the transport infrastructure in the traffic, transport and access study area. The approach included determining the potential traffic generation related to the construction and operation of the proposed rail corridor and determining the potential impacts and cumulative impacts on existing and planned transport infrastructure and facilities.

The Project is compatible with the State and regional planning policies in that the Project will provide a more direct and efficient route through the Toowoomba Range; the Project is co-located with the existing West Morton System; the design provides for connectivity between the Inland Rail and Queensland Rail (QR) networks, and the Project generally follows the Gowrie to Grandchester future state transport corridor, protected under the *Transport Planning and Coordination Act 1994* (Qld) in 2005.

Inland Rail is an open access rail corridor and, as such, does not preclude the use of the corridor by passenger trains; in addition, the design does not preclude the construction of a high-speed passenger service within the Gowrie to Grandchester future state transport corridor at a future date.

In addition to connections in to the QR Network, two grade separations are proposed. Along with the spacing, the design allows for the two assets to operate autonomously during construction and operation, though there will be some distributions during construction due to track possession, which may impact the supply chain. ARTC and QR will continue to discuss interfaces between the networks at a Program level.

To facilitate the Project, a number of local road network changes are warranted in the Gowrie area to maintain access for landholders and provide connectivity for current and future demands. Traffic analysis indicates that the changes will have limited impact on traffic connectivity.

The Project-related traffic consists of traffic generated by both construction and operational activities. The construction transport mode for the Project will primarily be road and rail. It is anticipated that the impacts would predominantly be during the construction phase of the Project. Construction-related traffic has the potential to generate volumes of more than 5 per cent of the background traffic during construction on some transport links; however, this is due to the low volumes of existing traffic on these links. Impacts to the road network during the operation of the Project are expected to be negligible. It is anticipated that only occasional access to and from the corridor will be required to conduct monthly routine inspection and maintenance works during the Project operational phase.

Increases in traffic associated with the Project construction phase are likely to increase vehicle exposure at an existing rail crossing. No new public level crossings are required for the Project and the existing level crossing will be closed, with traffic relocated to a grade-separated crossing, which will mitigate the likelihood of crash potential at level crossings; however, the proposed construction routes intersect existing level crossings, including at Gowrie and Helidon.

The overall aim of the construction and operation of the Project is to maintain the safety and efficiency of all affected transport modes for the Project workforce and other transport system users; avoid or mitigate impacts on the condition of existing transport infrastructure; and ensure any required works are compatible with existing infrastructure and future transport corridors.

19.2 Scope of chapter

The chapter focuses on the Project's impact on the existing road and rail transport infrastructure and:

- Provides an overview of existing transport network conditions, including existing road, active transport and rail traffic
- Provides an overview of baseline operations associated with intersections, road links, pavements, existing road–rail interface locations and road safety
- Describes how existing and proposed transport infrastructure will be affected by the Project at the local and regional level

- Provides a summary of the total Project transport tasks, including workforce, haulage routes, inputs and outputs during the construction and operational phases
- Summarises rail operational traffic and maintenance processes, as an input to the impact assessment
- Summarises traffic impact assessment associated with intersections, road links, road–rail interface locations, pavements, road safety, access and frontage
- Summarises potential cumulative impacts on the wider transport network
- Identifies potential impacts arising from the Project on road, rail, active transport and airports/ports during construction and operation
- Provides mitigation measures to address the identified traffic impacts. The impacts are initially assessed with consideration of the proposed design mitigation measures, and then reassessed to determine residual risk and any need for additional mitigation measures.

The transport of materials, workforce and equipment during construction is expected to primarily use the existing road and rail transport networks. While some materials and workforce will use port and airport facilities, the expected impact from the Project on these facilities is not considered to be significant during the construction phases. Impacts from the Project on the operation and throughputs at ports (containers) has not been assessed in this report.

19.3 Terms of Reference requirements

This chapter is supported by Appendix U: Traffic Impact Assessment.

The Terms of Reference (ToR) describe the matters the proponent must address in the EIS for the Project. This chapter addresses ToR items 11.104 to 11.113, as shown in Table 19.1.

TABLE 19.1: TERMS OF REFERENCE REQUIREMENTS

	Terms of Reference Requirements	Where addressed in the Chapter and the broader EIS
Objectives		
	The construction and operation of the project should aim to: (a) maintain the safety and efficiency of all affected transport modes for the project workforce and other transport system users (b) avoid or mitigate impacts on the condition of transport infrastructure (c) ensure any required works are compatible with existing infrastructure and future transport corridors.	Section 19.8.6
Existing environment		
11.104	Describe and map the existing transport infrastructure and corridors. Provide data on existing road, active transport and rail traffic in the project area.	Section 19.7, Figure 19.1, Figure 19.2, Figure 19.3 and Figure 19.9 Appendix U: Traffic Impact Assessment, Figure 1.2, Figure 1.3, Sections 2.2, 2.3 and 2.6 Appendix C: Design Drawings
11.105	Describe and map where the project's preferred alignment differs from the State's strategic rail corridor and the reasons for any such deviation	Section 19.5.1.1, 19.7.1.1 Figure 19.1, and Figure 19.3 Chapter 2: Project Rationale (Section 2.7) and Chapter 6: Project Description
11.106	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	Section 19.6.3, Section 19.7.1.2 and Section 19.7.9.1 Appendix U: Traffic Impact Assessment, Sections 3.2, 4.4, 6.4.3 and 9.2.5

	Terms of Reference Requirements	Where addressed in the Chapter and the broader EIS
Impact assessment		
11.107	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	Section 19.6.3, Section 19.7.1.2 and Section 19.7.9.1 Appendix U: Traffic Impact Assessment, Sections 3.2, 4.4, 6.4.3 and 9.2.5
11.108	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	Section 19.6 Appendix U: Traffic Impact Assessment, Table 5.1, Figure 1.3, Figure 1.4 and Appendix G to Appendix N
11.109	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 19.8 and 19.10 Appendix U: Traffic Impact Assessment, Section 5.9
11.110	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 State-controlled roads). Discussion should also refer to emergency service access	Sections, 19.8 and 19.10 Appendix U: Traffic Impact Assessment, Sections 5.9 and 6.6.1
11.111	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 19.6 and 19.10 Appendix U: Traffic Impact Assessment, Section 1.6
11.112	Undertake an assessment identifying the potential of subsidence, caused by the project, on infrastructure including the Toowoomba Second Range Crossing Project.	Section 19.8.5 Appendix W: Geotechnical
Mitigation measures		
11.113	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 19.9 Appendix U: Traffic Impact Assessment, Section 9.0

19.4 Legislation, policies, standards and guidelines

This section identifies the relevance of any legislative or policy level objectives and standards that protect or manage transport infrastructure in the context of the Project in Queensland. Table 19.2 lists the applicable legislation, policies and strategies/guidelines relevant to the Project. Further information on the applicable legislation, policies and strategies/guidelines relevant to the Project is provided in Chapter 3: Project Approvals and Appendix U: Traffic Impact Assessment.

TABLE 19.2: SUMMARY OF LEGISLATION, POLICIES AND GUIDELINES

Legislation, policy/ standard or guideline	Relevance to the Project
Legislation	
Transport Planning and Coordination Act 1994 (Qld) (TPC Act)	The objectives of the TPC Act are to improve the economic, trade and regional development performance of Queensland, and the quality of life of Queenslanders, by achieving overall transport effectiveness and efficiency through strategic planning and management of transport resources. The Project also predominantly aligns with the Gowrie to Grandchester rail corridor, a 'Future State Transport Corridor' as identified in the Public Passenger Transport Guideline pursuant to section 8E of the TPC Act.

Legislation, policy/ standard or guideline	Relevance to the Project
Transport Infrastructure Act 1994 (Qld) (TI Act)	The overall objective of the TI Act 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 TPC Act. Any crossings of existing rail lines or works within existing rail corridor will trigger S255-*Interfering with railway* and will require the approval of the railway manager (i.e. QR). Note, ARTC will also seek to be the rail manager for the Inland Rail alignment, with a sub-lease arrangement with Department of Transport and Main Roads (DTMR) (similar to the existing arrangement between DTMR and QR). Further consultation with QR is warranted regarding potential disruptions to the supply chain during construction and measures to minimise these disruptions (i.e. track possessions coincide with planned track maintenance works). Any works within State-controlled roads or access to State-controlled roads (during construction) will trigger s50-*Ancillary works and encroachments*; *s33-Prohibition on road works etc. on State Controlled Roads*; s62-*Management of access between individual properties and State Controlled Roads*/s66-*Road access works within State Controlled Road*. Works are proposed within the Toowoomba Bypass land parcels and Murphys Creek Road road reserve, including permanent and temporary access points.
Transport Coordination Plan 2017–2027 (DTMR, 2017c)	The *Transport Coordination Plan* provides a framework for the coordinated strategic planning and management of transport resources in Queensland over the next decade. The plan is consistent with—and seeks to provide a transport-specific response to—the Queensland Government's overall strategic planning for Queensland, including the government's objectives for the community and the State Infrastructure Plan. The overall objective is to encourage effective integrated planning and efficient management of transport infrastructure.
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 State-controlled roads (SCRs) and local government roads (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 Queensland. The RSNL Act was created following an agreement of the Council of Australian Governments 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. The RSNL Act governs the safe operation of the rail system in Queensland. 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 SCR). A local government authority may temporarily or permanently close a local road to traffic in accordance with the Local Government Act. An adjoining landholder must apply under the Land Act to temporarily or permanently close a local road. ARTC will seek approval under the act for the temporary and permanent closure of local roads, including Morris Road and Cattos Road. Road permits will also be required for works within local road reserves, including establishment of new access points.
Stock Route Management Act 2002 (Qld)	The Queensland stock route network is a network of stock routes and reserves for travelling stock in the State. The *Stock Route Management Act 2002* (Qld) provides for managing the stock route network, recognising that the network has multiple uses, with the primary purpose being for travelling stock (refer Section 98 (2) (a)). All stock routes are classified as roads under the Land Act. The Project does not intersect any declared stock routes under the act.

Legislation, policy/ standard or guideline	Relevance to the Project
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 ensuring the safety of transport services. This Act is relevant to the movement of construction materials (i.e. sleepers) on NSW roads associated with the Project (refer to Appendix U: Traffic Impact Assessment).
Road Transport Act 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 in NSW. Sleepers will be sourced from Grafton and transported via the NSW and Queensland road networks (refer to Appendix U: Traffic Impact Assessment).
Heavy Vehicle (Mass, Dimension and Loading) National Regulation (Queensland Government, 2013)	The Heavy Vehicle (Mass, Dimension and Loading) National Regulation is a law of Queensland under the Heavy Vehicle National Law (Queensland). If required and necessary for the Project, all restricted access vehicles (RAV) and oversize, over mass (OSOM) vehicles required to transport special equipment will apply for the necessary permits from DTMR and other relevant authorities (e.g. QR) and should comply with this law.
State Planning Policy (SPP) (Department of Infrastructure, Local Government and Planning (DILGP, 2017b)	The SPP is a key component of the Queensland land use planning system, which articulates the Queensland Government's 17 State interests in land use planning and development across the following five key themes: ▸ Liveable communities and housing ▸ Economic growth ▸ Environment and heritage ▸ Safety and resilience to hazards ▸ Infrastructure. The SPP is a statutory instrument and requires that State interests be integrated into local government planning schemes. Some State interests in the SPP include assessment benchmarks that apply to certain types of development, where a local government planning scheme does not appropriately integrate the relevant State interest. State interests relevant to the Project include: ▸ Infrastructure integration (DILGP, 2017d)—The Project supports this State interest through the expansion of existing infrastructure associated with the introduction of a heavy freight rail between Melbourne and Brisbane. The Project will also improve efficiencies and performance of rail infrastructure through the Toowoomba Range and interoperability between the ARTC and QR networks. The Project also is open access so passenger services can use the rail corridor, while the design does not preclude a fast rail passenger service within the Gowrie to Grandchester future state transport corridor at a future date (e.g. the design avoids proposed passenger stations). ▸ Transport infrastructure (DILGP, 2017g)—The Project supports this State interest by using the existing West Moreton System rail corridor and the Gowrie to Grandchester future state transport corridor, where possible. Furthermore, the Project has considered and assessed potential impacts to surrounding transport networks and land uses. ▸ Strategic airports and aviation facilities (DILGP, 2017f)—The Project will not create incompatible intrusions or compromise the safety or function of the Toowoomba Airport. There is also the potential for the better linkage between Inland Rail and the airports in the future.

Legislation, policy/ standard or guideline	Relevance to the Project
Local government plans/strategies	
South East Queensland Regional Plan 2009–2031 (Department of Infrastructure and Planning, 2009) (SEQRP)	The purpose of the SEQRP is to manage regional growth and change in the most sustainable way to protect and enhance quality of life in the region. A desired outcome relevant to the Project is Integrated transport: *A connected and accessible region based on an integrated transport system that is planned and managed to support more compact urban growth and efficient travel; connect people, places, goods and services; and promote public transport use, walking and cycling.*
Queensland Freight Strategy Advancing Freight in Queensland (DTMR, 2019a)	The strategy sets a shared vision for the state's freight system, guiding policy, planning and investment decision making over the next 10 years, to give customers greater choice and support economic growth. The strategy has been developed in partnership with the Queensland Ministerial Freight Council and builds on the success of the Moving Freight Strategy by: ▸ setting a clear 10-year vision for Queensland's freight system ▸ providing certainty for customers, industry and government through shared commitments ▸ defining how different stakeholders will work together to achieve the vision for freight in Queensland. The strategy will address our growing freight task in a safe, equitable and collaborative way. It will be implemented through the rolling two-year Queensland Freight Action Plan that outlines how government and stakeholders are ensuring the freight system continues to keep pace with new technologies and economic conditions. Inland Rail is identified in the Queensland Freight Action Plan under the smarter connectivity and access commitment, with the Inland Program recognised as an activity to enhance rail freight access and performance on the metropolitan and regional networks. This will be achieved in part through connections between the Inland Rail networks and existing and future rail networks, as proposed by this Project. The action also notes a flood link study for the route as part of providing resilient freight systems. This works is being undertaken by the Independent International Panel of Experts for Flood Studies, which aims to provide assurance to the public that the flood models and reference design developed by ARTC meet national guidelines and industry best practice.
Queensland Rail Strategic Plan FY2020-2024 (QR, 2020a)	The plan outlines QR vision and purposes for 2020 to 2024, and the key strategic objectives. The plan identifies five organisational objectives which include to enhance customer focus and collaborate with stakeholders and across Queensland Rail to deliver improved transport outcomes relevant to the Project. That is, the Project will provide a more efficient and direct route across the Toowoomba Range, which will benefit current and future rail operators on both the QR and Inland Rail networks. The Project also aligns with Queensland Rail's Safety Strategy to effectively reduce safety risk (e.g. elimination of existing level crossing and potential reduction of rail traffic through Toowoomba and Murphys Creek).
Lockyer Valley Regional Council Local Government Infrastructure Plan (Lockyer Valley Regional Council, 2018)	On 27 June 2018, Lockyer Valley Regional Council (LVRC) adopted amendments to the Gatton Planning Scheme, to insert a Local Government Infrastructure Plan (LGIP). The purpose of the LGIP is to integrate infrastructure planning with the land use planning identified in the planning schemes and provide transparency regarding a local government's intentions for the provision of trunk infrastructure. The planning schemes identify haul routes to be used for extractive industries and these routes were used, where applicable, in the traffic impact assessment (refer Appendix U: Traffic Impact Assessment).
Draft Lockyer Valley Regional Council Planning Scheme—Priority Infrastructure Plan (LVRC, n.d.)	LVRC has developed a Draft Priority Infrastructure Plan. This plan identifies the infrastructure the Lockyer Valley will need between 2014 and 2024 to service the expected population and employment growth over the road network, as well as for community facilities, water supply and sewerage.

Legislation, policy/ standard or guideline	Relevance to the Project
Toowoomba Regional Council Planning Scheme (Toowoomba Regional Council (TRC), 2012)	The *Toowoomba Regional Council Planning Scheme* was prepared in accordance with the *Sustainable Planning Act 2009* (Qld) as a framework for managing development in a way that advances the purpose of the Act. The scheme seeks to advance State and regional policies through more detailed local responses, taking into account the local context. It applies to the Toowoomba Local Government Area (LGA), including all premises, roads internal waterways, and interrelates with the surrounding LGAs. 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
Toowoomba Region *City Centre Master Plan* (TRC, 2010)	The Toowoomba Region *City Centre Master Plan* aims to guide land use planning and transport, as well as identify key projects that will support the overall strategy outlined in the plan. It provides recommendations on how planning schemes can be developed in order to achieve the aims of the master plan and also consists of an implementation plan, which comprises a series of action plans that support the overall Master Plan vision in the short, medium and long term.
Toowoomba Road Safety Strategy (TRC, 2019c)	TRC's *Road Safety Strategy* provides a local framework to enable Council, key road safety stakeholders and the community to actively participate in improving road safety in the region. The strategy is underpinned by the 'Safe System' approach to road safety, whereby all elements of a transport system (user, mode and infrastructure) interact appropriately to create a safe and forgiving environment. Consistent with the *Road Safety Strategy*, road safety audits undertaken during the Project design will comply with the Safe System approach.
Toowoomba Region Sustainable Transport Strategy (TRC, 2014a)	The purpose of the Toowoomba Region 'Strategy' is to guide transport policy, integrated land use and transport planning, and future transport investment decisions to ensure the sustainable economic growth of the region. The Strategy aims to set out the TRC's policy directions and actions around transport elements, such as land use integration, public transport, active transport, freight and air travel, and sets out key plans and projects to implement this policy direction.
Toowoomba Region Local Government Infrastructure Plan (TRC, 2017b)	On 31 May 2017, the TRC adopted Toowoomba Regional Planning Scheme, replacing the Priority Infrastructure Plan with a Local Government Infrastructure Plan.
West Toowoomba Local Plan/Land Use Investigation (TRC, 2017c)	The West Toowoomba land use investigation study is part of the Imagine Tomorrow series of local planning investigations to accommodate the anticipated growth in the area over the coming years. These investigations guide where and how to grow Toowoomba as a regional centre and how to sustainably manage this growth. The Project aims to deliver leading urban design and is based on contemporary planning, urban design and placemaking principles.

Legislation, policy/ standard or guideline	Relevance to the Project
Guidelines	
Queensland Level Crossing Safety Strategy 2012–2021 (DTMR, 2012a)	This strategy complements the *National Railway Level Crossing Safety Strategy* (NLCSS) 2010–2020, which was released by the Australian Transport Council in 2009 to promote national consistency in addressing level crossing safety. (Note: the NLCSS has subsequently been superseded by the NLCSS (2017–2020); however, the Queensland Level Crossing Safety Strategy (QLCSS) refers to the 2010–2020 version). The strategy has a long-term vision of zero harm at public level crossings across Queensland, noting that the strategy does not apply to occupational (private) crossings. 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 that may be accessible to the public, are considered to be a workplace health and safety matter and are managed under separate arrangements. The strategy was refreshed to include the 2019 Update: On Track to Zero Harm given changes in the rail environment. The strategy targets a wide range of initiatives, including: ▸ promoting safe behaviour at rail level crossing ▸ exploring new technology ▸ improving rail level crossing infrastructure ▸ undertaking research and development. The strategy also complements *Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015–2021*(DTMR, 2015c) in the level crossing context. No level crossings are proposed as part of the Project, with the Project also aiming to eliminate an existing level crossing on the QR network (refer Section 19.7.1.2). In addition, the Project will provide a more modern and efficient route that has the potential to reduce rail traffic on the existing West Moreton System. A reduction in traffic on the West Moreton System would also effectively reduce the likelihood of near-miss incidents at level crossings associated with this system between Gowrie and Helidon. The proposed construction routes, however, traverse level crossings, including at Helidon and at Gowrie (refer Section 19.8.2.2). Further consultation with QR is warranted regarding the elimination of the existing level crossing at Gowrie, along with measures to minimise stacking issues at rail level crossings along construction routes.
ONRSR Policy Level Crossing (ONRSR, 2019)	This policy sets out ONRSR's approach and broader expectations for improving the safety of railway operations with regard to existing level crossings and the early design of future road and rail intersections. In accordance with this policy ARTC does not propose any new level crossings and will also eliminate an existing level crossing (refer Section 19.7.1.2).
National Railway Level Crossing Strategy (National Level Crossing Safety Committee, 2017)	This strategy aims to guide national coordination and practice on level crossing safety across jurisdictions. The strategy provides and overview of the purpose and background to the strategy and details the key focus area, actions, outcomes and measurement tools that will ultimately guide the work of the National Level Crossing Safety Committee. The committee is an inter-organisational and inter-jurisdictional forum that supports members to continuously improve safety and leverage organisational resources to minimise duplication of efforts at level crossings. The committee's role is to provide national coordination on level crossing issues, provide guidance, and advice to member organisations to achieve a reduction in the likelihood of crashes and near hits at rail crossings. In accordance with this strategy ARTC does not propose any new level crossings and will also eliminate an existing level crossing (refer Section 19.7.1.2).
Manual of Uniform Traffic Control Devices (MUTCD) Part 7: Railway Crossings (DTMR, 2019e)	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. Part 7 of the MUTCD sets out the various controls used at railway level crossings and describes the devices and assemblies, their use and location to achieve these controls.

Legislation, policy/ standard or guideline	Relevance to the Project
Guide to Traffic Impact Assessment, September 2017 (Queensland) (DTMR, 2017a)	The *Guide to Traffic Impact Assessment* (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 GTIA only applies to the SCRs, local government authorities may choose to adopt or use this as a reference. In general, the 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 (SAR). 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. The traffic impact assessment has been undertaken consistent with the 2017 GTIA as per the ToR (refer Table 19.1). It is noted that an updated version of the GTIA was released in December 2018, after the ToR for the EIS were released. As per the GTIA, the Traffic Impact Assessment (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.
EIS information guideline – Transport (Department of Environment and Heritage Protection, 2016b)	This guideline advises proponents about the information and assessment requirements for the transport section when preparing an EIS. The guideline was considered and applied in this chapter and the supporting traffic impact assessment provided in Appendix U. It is noted that this guideline was superseded in August 2020, by the Department of Environment and Science 2020, Transport—EIS information guideline which has a similar purpose to above.
Roads and Traffic Authority Guide to Traffic Generating Developments (Roads and Traffic Authority (RTA) NSW, 2002)	The RTA *Guide to Traffic Generating Developments* Version 2.2 (2002) (NSW) (NSW 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 for all parties impacted to 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 (RMS email dated 20 September 2018).
Guide to Development in a Transport Environment: Rail (DTMR, 2015b)	The *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 Queensland. 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 Queensland 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.
Guide to Traffic Management Part 12: Traffic Impacts of Developments (Austroads, 2019b)	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 Queensland GTIA publications discussed earlier.

Legislation, policy/ standard or guideline	Relevance to the Project
Guide to Traffic Management Part 3: Traffic Studies and Analysis (Austroads, 2017a)	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.
Guide to Road Design Part 4A: Unsignalized and Signalised Intersections (Austroads, 2017b)	The guide provides information regarding intersections, both signalised and unsignalised. Guidance is provided on intersection sight distances, as well as left and right turn treatments, including the incorporation of auxiliary lanes at intersections and the use and size of traffic islands.
Guide to Road Design Part 6: Intersections, Interchanges and Crossing Management (Austroads, 2019a)	The guide is concerned with traffic management at all types of intersections where road users must join or cross another stream of traffic. It focuses on traffic management issues and treatments related to intersections, interchanges and crossings.
Guide to Traffic Engineering Practice Part 2: Roadway Capacity (Austroads, 1988)	The guide provides information regarding roadway capacity for various road types and provides guidance on the assessment approach for mid-block capacity assessments.
Cycling Aspects of Austroads Guides (Austroads, 2017c)	This guide contains information that relates to the planning, design and traffic management of cycling facilities. The guide 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 on-road and off-road 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.
Guideline for Excess Dimension Vehicles in Queensland, version 8 (DTMR, 2013c)	This guideline is issued as an alternative means of complying with the Transport Operations (Road Use Management—Mass, Dimensions and Loading) Regulation 2005, Part 3—Vehicle dimensions. If required for the Project, all restricted access vehicles (RAV) and OSOM vehicles required to transport special equipment will apply for the necessary permits from DTMR and other relevant authorities, and will comply with this guideline.

19.5 Transport, traffic and access study area

19.5.1 Study area

The transport, traffic and access study area defined for the chapter consists of:

- The extent of the proposed Project rail corridor (the Project disturbance footprint including the temporary construction disturbance footprint and the permanent disturbance footprint), including public roads intersecting the rail alignment (road–rail interface locations) (refer Figure 19.2)
- Public roads impacted by the rail alignment, including changes to the local road network and impacts at intersections, and links in the network
- The road network/s envisaged for the transport of workforce, materials and equipment during the construction and operational phases of the Project (refer Figure 19.4)
- The transport, traffic and access study area (refer Figure 19.1) is the focus for assessing impacts and determining mitigation measures for the Project.

The assessment does not include the consideration of impacts to private roads[1]. Any impacts to private roads will be addressed directly with the impacted landholders as part of the Project's wider consultation process. The use of any private roads during construction would require a specific agreement with the private road owner. Further discussions regarding land use and social considerations can be found in Chapter 8: Land Use and Tenure and Chapter 16: Social.

19.5.1.1 Proposed rail corridor

The Project connects with the eastern end of the Border to Gowrie (B2G) Inland Rail project, adjacent to the Queensland Rail (QR) West Moreton System rail corridor (Western Line) just west of Gowrie. The alignment then travels east parallel to (southern side) the QR Western Line before diverging south east through the Toowoomba Range with an approximately 6.24-kilometre (km) long undrained tunnel. On the eastern side of the tunnel, the alignment continues down the Toowoomba Range, via a series of viaducts, cuttings and embankments, crossing Lockyer Creek, after which it parallels the QR West Moreton System rail corridor (Main Line) to connect with the western extent of the Helidon to Calvert (H2C) Inland Rail project, to the north of Helidon. A detailed description of the corridor is provided in Chapter 6: Project Description.

While the Project alignment generally follows the existing Gowrie to Grandchester future state transport corridor, the alignment does move outside of this preserved corridor in some instances (refer Figure 19.1). Figure 19.3 demonstrates the proposed connection between the Project alignment and the Gowrie to Grandchester strategic corridor at the western tunnel portal.

These deviations to the alignment were in response to the following:

- ARTC, as the delivery agent for Inland Rail, was tasked with further examining the Gowrie to Grandchester future state transport corridor, which was the endorsed route by the Inland Rail Implementation Group (2015) through the Toowoomba Range. The aim of the examination was to identify cost-effective opportunities and improve outcomes beyond the Inland Rail Service Offering (refer Chapter 2: Project Rationale). In 2016, it was determined that a 4.5-km section of track at Wards Hill be further assessed, as there were no critical drivers to assess the western tunnel portal or the tunnel alignment. An alternative option, which deviated to the north around Wards Hill was preferred, due to the removal of a 190 m tunnel and approximately $46 million in savings; the option also provided for a better angle across the Toowoomba Bypass.
- The western tunnel portal location presented did not meet the required 1-in-10,000 Annual Exceedance Probability flood event immunity requirements. The preferred design solution was to maintain the horizontal alignment (i.e. the Gowrie to Grandchester future state transport corridor) through the tunnel, but the western tunnel portal entrance was relocated to the east along the alignment, to an existing high point, to improve flood immunity. The vertical alignment was raised by approximately 7 m to meet this high point. East of the tunnel, the alignment was refined to balance cut/fill and to meet the basis of design for freight rail corridor, which resulted in the alignment moving outside of the Gowrie to Grandchester future state transport corridor between the eastern tunnel portal and McNamaras Road, Withcott.
- Changes to the alignment to accommodate local constraints, such as Withcott Seedlings (significant expansion occurred since the corridor was originally identified) and the Roma Brisbane Gas Pipeline.

Chapter 2: Project Rationale discusses where the Project alignment differs from the protected Gowrie to Grandchester future state transport corridor.

Another notable difference is that the original connection to the West Moreton System rail corridor east of Gowrie does not extend north of the existing QR West Moreton System rail corridor (Western Line). Figure 19.3 demonstrates this connection. The Gowrie to Grandchester future state transport corridor was identified based on a 200 kilometres per hour (km/hr) passenger service; while the premise for the Project is a freight service at maximum speeds of 115 km/hr. The required gradient and curve radius for freight is different to that for a 200 km/hr passenger service and, as such, the Project deviates outside the protected corridor, to the east of the Toowoomba Range Tunnel, to enable the alignment to negotiate the terrain while meeting the freight rail design requirements.

The Project alignment and associated road–rail interface locations are illustrated in 19.2.

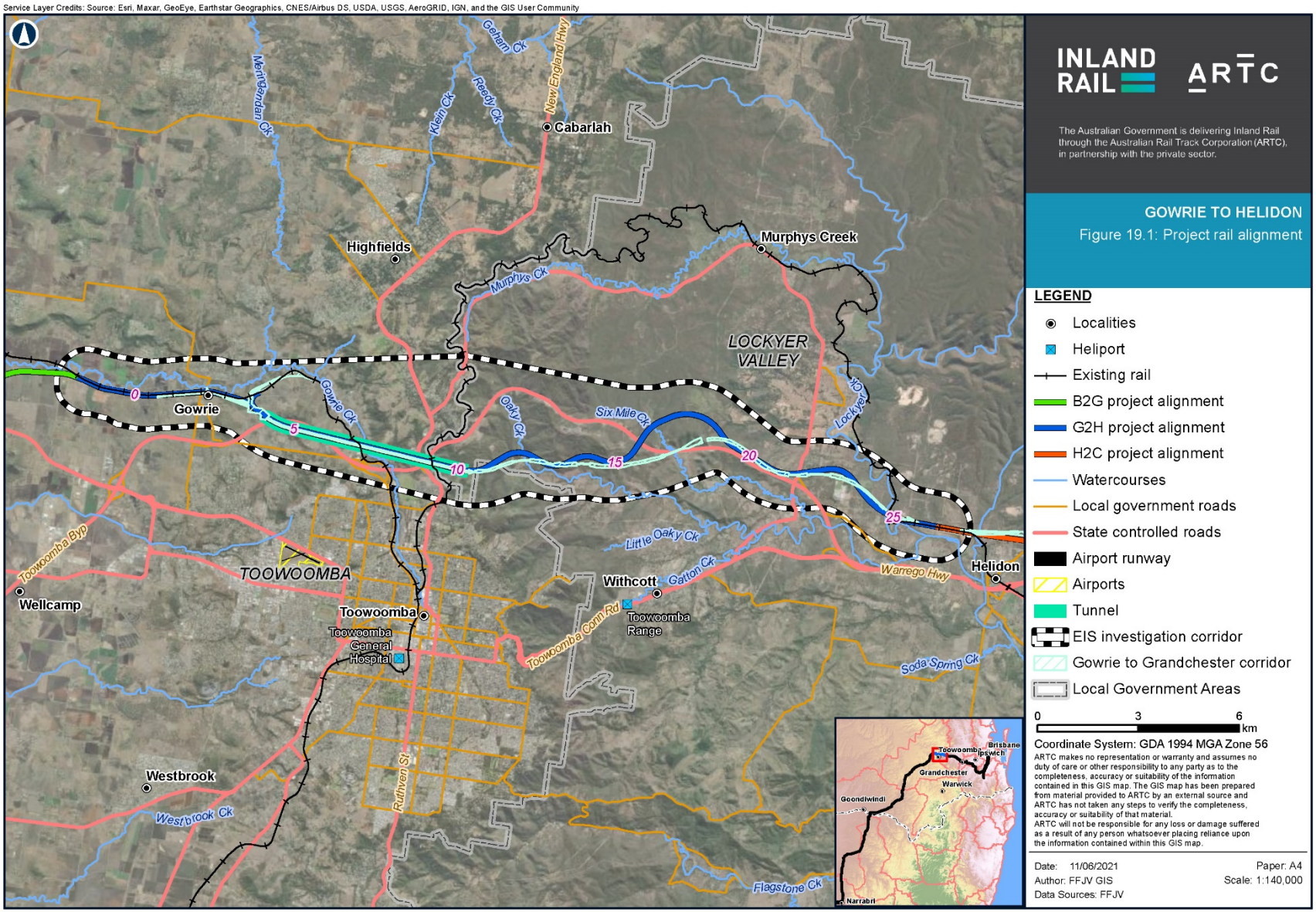
1. A road or driveway on privately-owned property, limited to the use of the owner or a group of owners who share the use and maintain the road without help from a government agency.

The road–rail interface locations included in the transport, traffic and access study area are all public road crossings that will intersect the Project.

Further to these public road crossings, there are several LGRs that intersect the alignment of the Project tunnel. These LGRs are summarised in Table 19.3.

TABLE 19.3: LOCAL GOVERNMENT ROADS INTERSECTING THE TUNNEL PORTION OF THE PROJECT

Road name	Road ID—tunnel section
LGR: TRC	
Boundary Street	(between Project Chainage (Ch) 4.0 and Ch 5.0 km)
Bedford Street	(between Ch 5.0 and Ch 6.0 km)
Goombungee Road	(between Ch 7.0 and Ch 8.0 km)


Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Cabarlah
Highfields
Murphys Creek
LOCKYER VALLEY
Gowrie
TOOWOOMBA
Toowoomba
Wellcamp
Withcott
Helidon
Westbrook
Toowoomba General Hospital
Toowoomba Range
Gowrie Ck
Oaky Ck
Six Mile Ck
Murphys Ck
Little Oaky Ck
Gatton Ck
Warrego Hwy
Toowoomba Byp
Toowoomba Conn Rd
Ruthven St
Westbrook Ck
Soda Spring Ck
Flagstone Ck
New England Hwy
Geham Ck
Reedy Ck
Klein Ck
Merriwendan Ck
Lockyer Ck
0
5
10
15
20
25
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GOWRIE TO HELIDON
Figure 19.1: Project rail alignment
LEGEND
Localities
Heliport
Existing rail
B2G project alignment
G2H project alignment
H2C project alignment
Watercourses
Local government roads
State controlled roads
Airport runway
Airports
Tunnel
EIS investigation corridor
Gowrie to Grandchester corridor
Local Government Areas
0
3
6
km
Coordinate System: GDA 1994 MGA Zone 56
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Data Sources: FFJV
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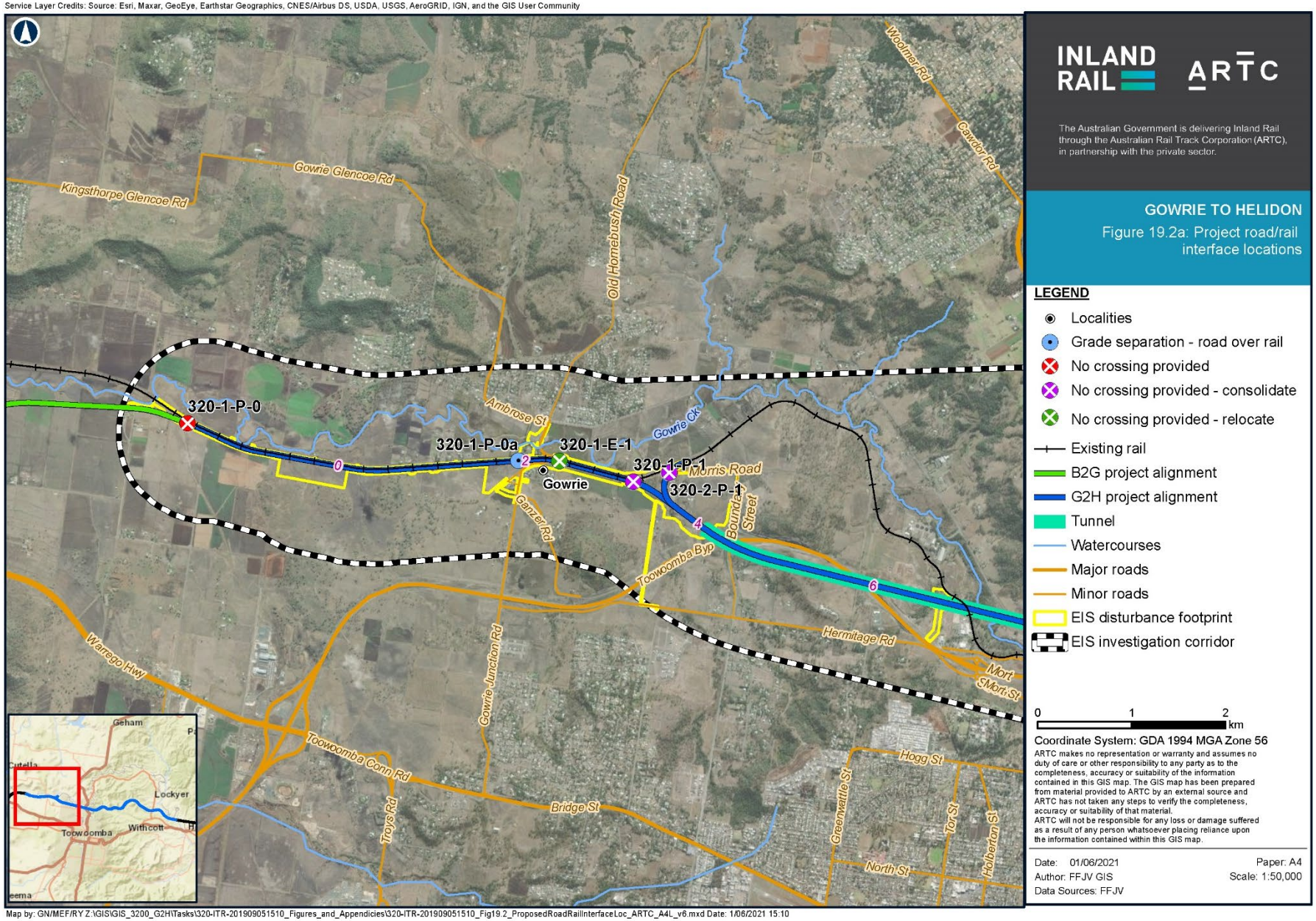
Brisbane
Ipswich
Toowoomba
Grandchester
Warwick
Goondiwindi
Narrabri
Map by: GN / MEF / MF/RY Z:\GIS\GIS_3200_G2H\Tasks\320-ITR-201909051510_Figures_and_Appendicies\320-ITR-201909051510_Fig19.1_Alignment_ARTC_A4L_v6.mxd Date: 11/06/2021 12:18


Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Kingsthorpe Glencoe Rd
Gowrie Glencoe Rd
Old Homebush Road
Woolmer Rd
Gawler Rd
320-1-P-0
320-1-P-0a
320-1-E-1
320-1-P-1
320-2-P-1
Gowrie
Ambrose St
Gowrie Ck
Morris Road
Ganzer Rd
Boundary Street
Toowoomba Byp
Warrego Hwy
Gowrie Junction Rd
Hermitage Rd
Mort St
Toowoomba Conn Rd
Bridge St
Troys Rd
Greenwattle St
Hogg St
Tor St
Holberton St
North St
Geham
Cutella
Lockyer
Toowoomba
Withcott
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GOWRIE TO HELIDON
Figure 19.2a: Project road/rail interface locations
LEGEND
Localities
Grade separation - road over rail
No crossing provided
No crossing provided - consolidate
No crossing provided - relocate
Existing rail
B2G project alignment
G2H project alignment
Tunnel
Watercourses
Major roads
Minor roads
EIS disturbance footprint
EIS investigation corridor
0 1 2 km
Coordinate System: GDA 1994 MGA Zone 56
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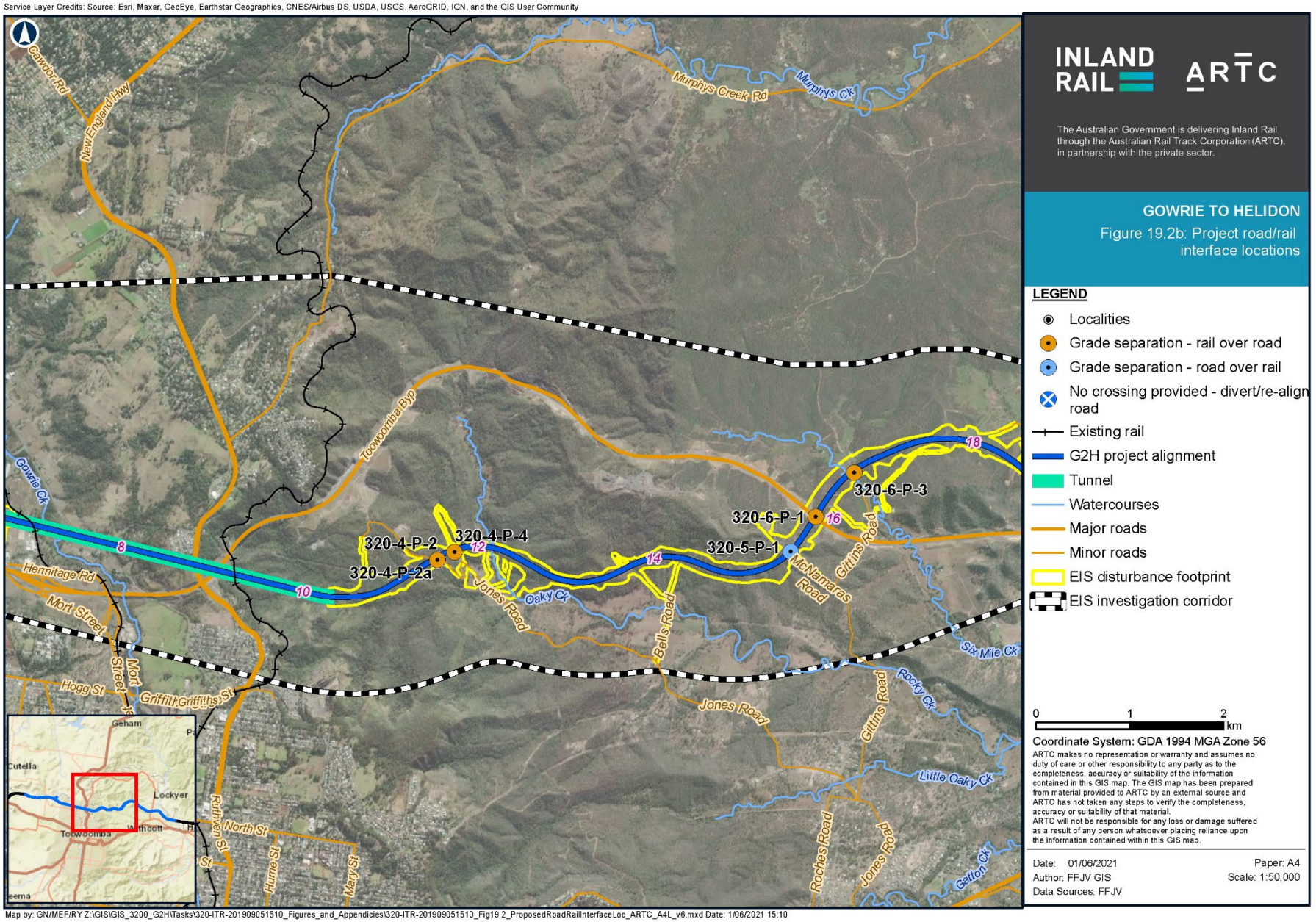
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Crawford Rd
New England Hwy
Murphys Creek Rd
Murphys Ck
Toowoomba Byp
Gowrie Ck
Hermitage Rd
Mort Street
Hogg St
Griffith St
Jones Road
Oaky Ck
Bells Road
McNamaras Road
Giffins Road
Six Mile Ck
Rocky Ck
Little Oaky Ck
Roches Road
Gatton Ck
North St
Hume St
Mary St
Ruthven St
320-4-P-2
320-4-P-2a
320-4-P-4
320-5-P-1
320-6-P-1
320-6-P-3
8
10
12
14
16
18
Geham
Cutella
Lockyer
Toowoomba
Withcott
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GOWRIE TO HELIDON
Figure 19.2b: Project road/rail interface locations
LEGEND
Localities
Grade separation - rail over road
Grade separation - road over rail
No crossing provided - divert/re-align road
Existing rail
G2H project alignment
Tunnel
Watercourses
Major roads
Minor roads
EIS disturbance footprint
EIS investigation corridor
0
1
2
km
Coordinate System: GDA 1994 MGA Zone 56
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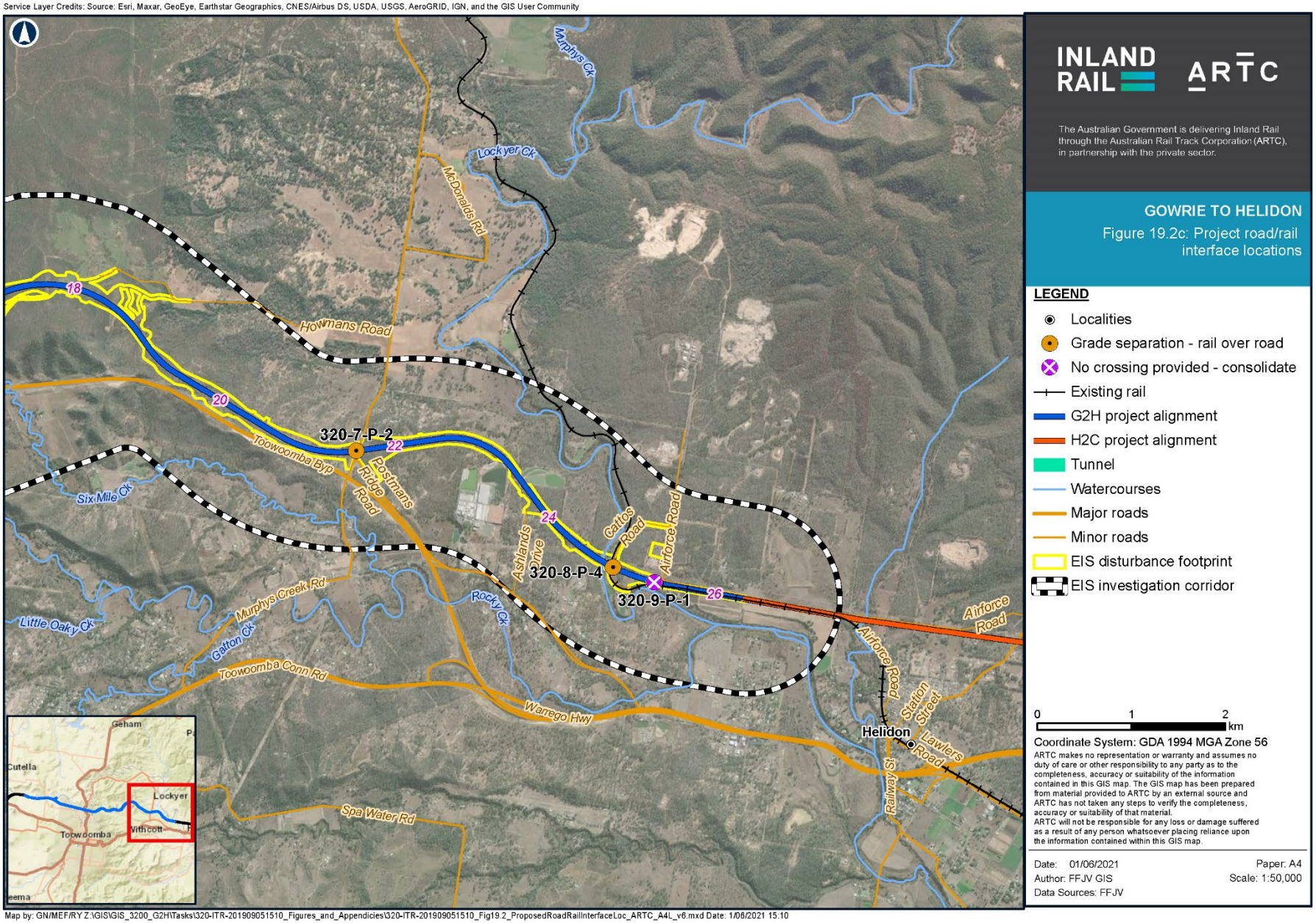
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GOWRIE TO HELIDON
Figure 19.2c: Project road/rail interface locations
LEGEND
Localities
Grade separation - rail over road
No crossing provided - consolidate
Existing rail
G2H project alignment
H2C project alignment
Tunnel
Watercourses
Major roads
Minor roads
EIS disturbance footprint
EIS investigation corridor
320-7-P-2
320-8-P-4
320-9-P-1
18
20
22
24
26
Murphys Ck
Lockyer Ck
McDonalds Rd
Howmans Road
Toowoomba Byp
Postmans Ridge Road
Six Mile Ck
Ashlands Drive
Gattos Road
Airforce Road
Murphys Creek Rd
Rocky Ck
Little Oaky Ck
Gatton Ck
Toowoomba Conn Rd
Warrego Hwy
Spa Water Rd
Helidon
Station Street
Lawlers Road
Railway St
Geham
Cutella
Lockyer
Toowoomba
Withcott
0 1 2 km
Coordinate System: GDA 1994 MGA Zone 56
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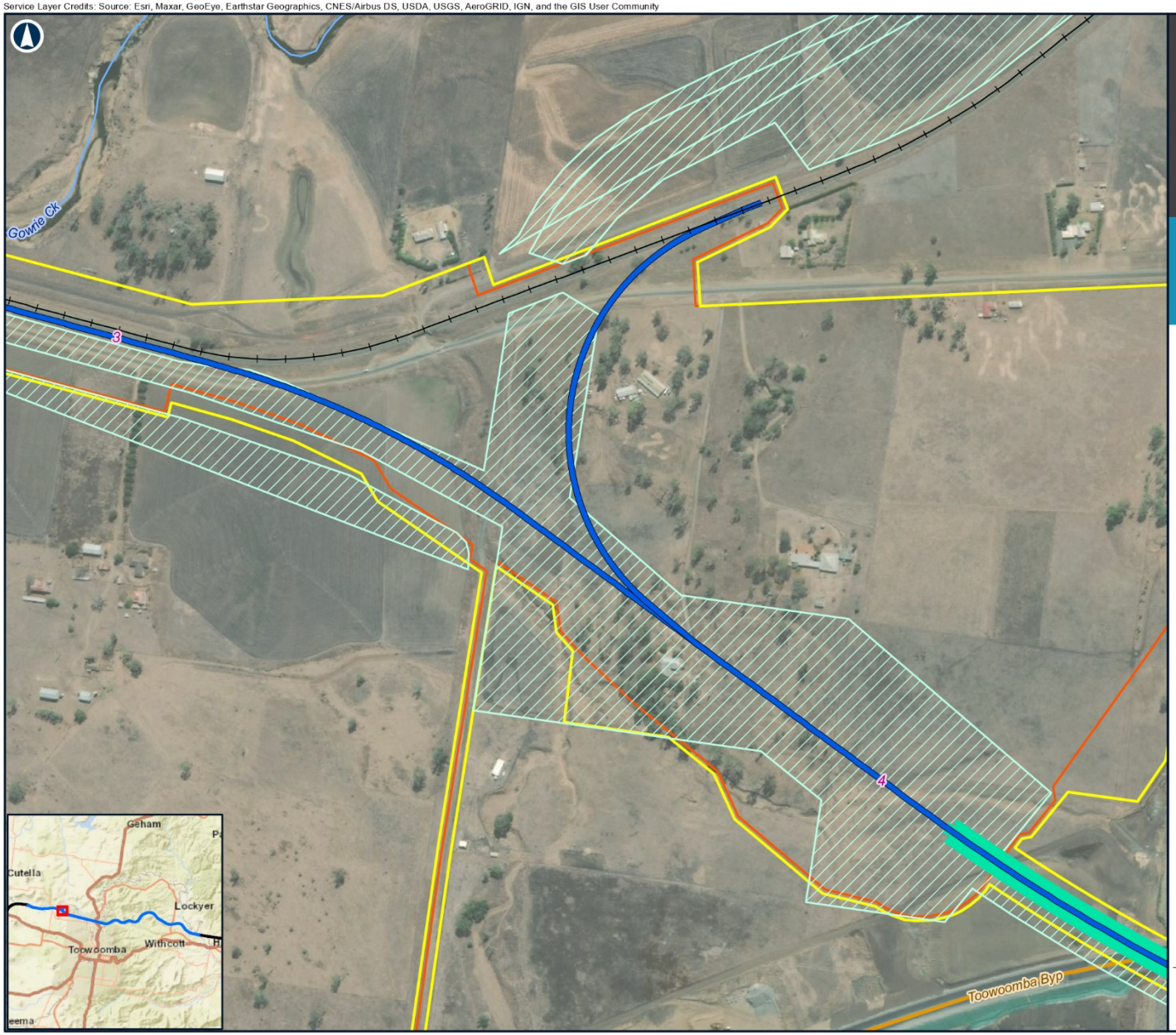

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GOWRIE TO HELIDON

Figure 19.3: Gowrie to Grandchester Strategic corridor and Inland Rail alignment connection

LEGEND

- 5 Chainage (km)
- Existing rail
- G2H project alignment
- Major roads
- Tunnel
- Watercourses
- Gowrie to Grandchester corridor
- Temporary disturbance footprint
- Permanent disturbance footprint

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 56

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19.5.1.2 Construction transport routes

Transportation of materials, equipment and workforce for the construction of the Project will be via existing SCRs and LGRs, along with the existing West Moreton System.

Figure 19.4 illustrates the proposed primary construction transport routes that form part of the transport, traffic and access study area.

All proposed primary construction routes are generally following roads most likely to be used for the transport of each material type, taking into account distance and, where possible, staying on arterial roads and avoiding populated areas such as town centres. All routes passing through, or originating in, Toowoomba have been formed using Toowoomba Bypass (formerly known as Toowoomba Second Range Crossing) predetermined haulage routes as a guide. The National Heavy Vehicle Regulator (NHVR) journey planner was also used to identify roads suitable for heavy vehicles.

It is worth noting that the construction routes assumed as a part of this assessment of the TIA are routes that 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 relevant Local Government Authority (LGA), and the construction contractor and, where relevant, Queensland Rail (QR) during the next phase of the Project..

This is consistent with Section 7.5 of DTMR's GTIA (2017a), which states that the traffic impact assessment '*may be finalised when project contractors are appointed and final traffic generation is clearer*'. Impacts associated with the construction of the Project are discussed in detail in Section 19.8.

Further details on construction transport routes are included in Appendix U: Traffic Impact Assessment.

Spoil disposal routes

It has been assumed that tunnel spoil from the tunnel construction will be stockpiled at the western tunnel portal laydown area and, therefore, no spoil disposal routes are required. This minimises potential impacts on the existing road network as it would remove the need for approximately 36,000 truck movements on the local road network.

Spoil retrieved at the tunnel shaft will be hauled to the western tunnel portal spoil location by road. Tunnel spoil retrieved at the eastern tunnel portal will be either hauled to the spoil disposal site at the western tunnel portal or used for fill purposes along the eastern portion of the Project disturbance footprint. Spoil routes requiring public road use were considered in the TIA.

An opportunity exists for the tunnel spoil from the eastern tunnel portal to be used at an existing Toowoomba Bypass stockpile site north of the eastern tunnel portal (no routes on public roads required). And spoil from the excavation of the intermediate ventilation shaft may be used by the existing TRC Toowoomba Waste Management Centre, directly west of the intermediate ventilation shaft location at Cranley, which will also avoid spoil routes on public roads.

Further discussion on spoil management is provided in Chapter 21: Waste and Resource Management and Appendix T: Spoil Management Strategy.

Quarry routes

Quarry routes for the Project are currently based on licensed quarries located in Mount Marrow, Harlaxton, Wellcamp, Toowoomba, Malu and Jondaryan. These are the closest quarries to the Project likely to be able to provide the required ballast and capping material. The quarry in Harlaxton is in very close proximity to the Project.

For the purpose of the TIA, it has been assumed that the existing licensed quarries in the vicinity of the Project will be used to provide capping material and ballast, and that all ballast and capping material deliveries will be made by road. Quarry construction routes were derived, based on the location of these quarries, and routes most likely to be used for the transportation of material to the various laydown areas.

Other types of quarry materials in addition to ballast and capping may be required for the Project, including cement, aggregate, road formation and drainage materials (other than culverts). These have been not included in this assessment, and the requirements will be assessed as a part of the detailed design for the Project.

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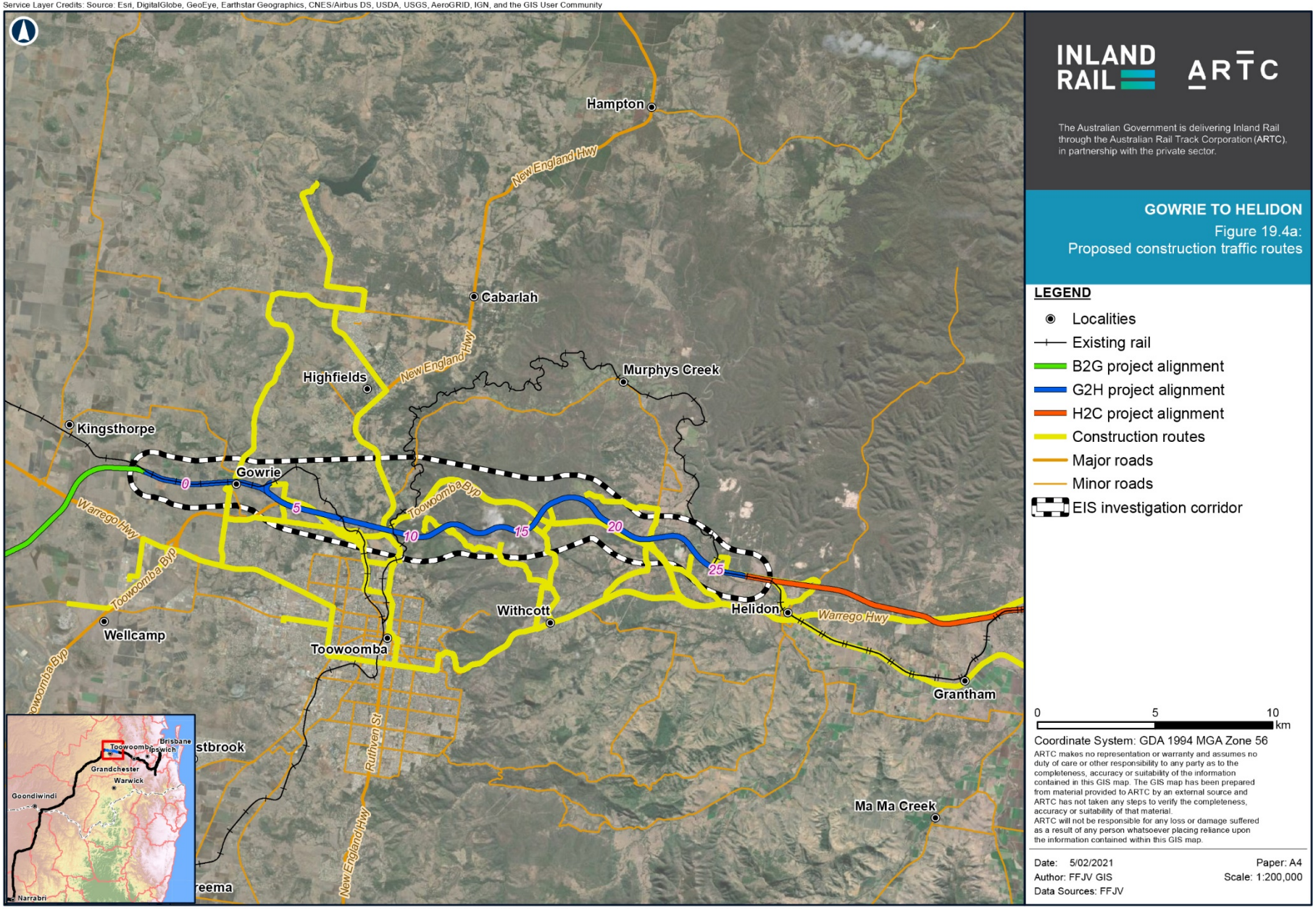

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GOWRIE TO HELIDON

Figure 19.4a:
Proposed construction traffic routes

LEGEND

- Localities
- Existing rail
- B2G project alignment
- G2H project alignment
- H2C project alignment
- Construction routes
- Major roads
- Minor roads
- EIS investigation corridor

0 5 10 km

Coordinate System: GDA 1994 MGA Zone 56

Date: 5/02/2021
Author: FFJV GIS
Data Sources: FFJV

Paper: A4
Scale: 1:200,000

Map by: GN/MEF/IW/MF Z:\GIS\GIS_3200_G2H\Tasks\320-ITR-201909051510_Figures_and_Appendicies\320-ITR-201909051510_Fig19.4_ProposedConstTranspoRoutes_ARTC_A4L_v8.mxd Date: 5/02/2021 11:15

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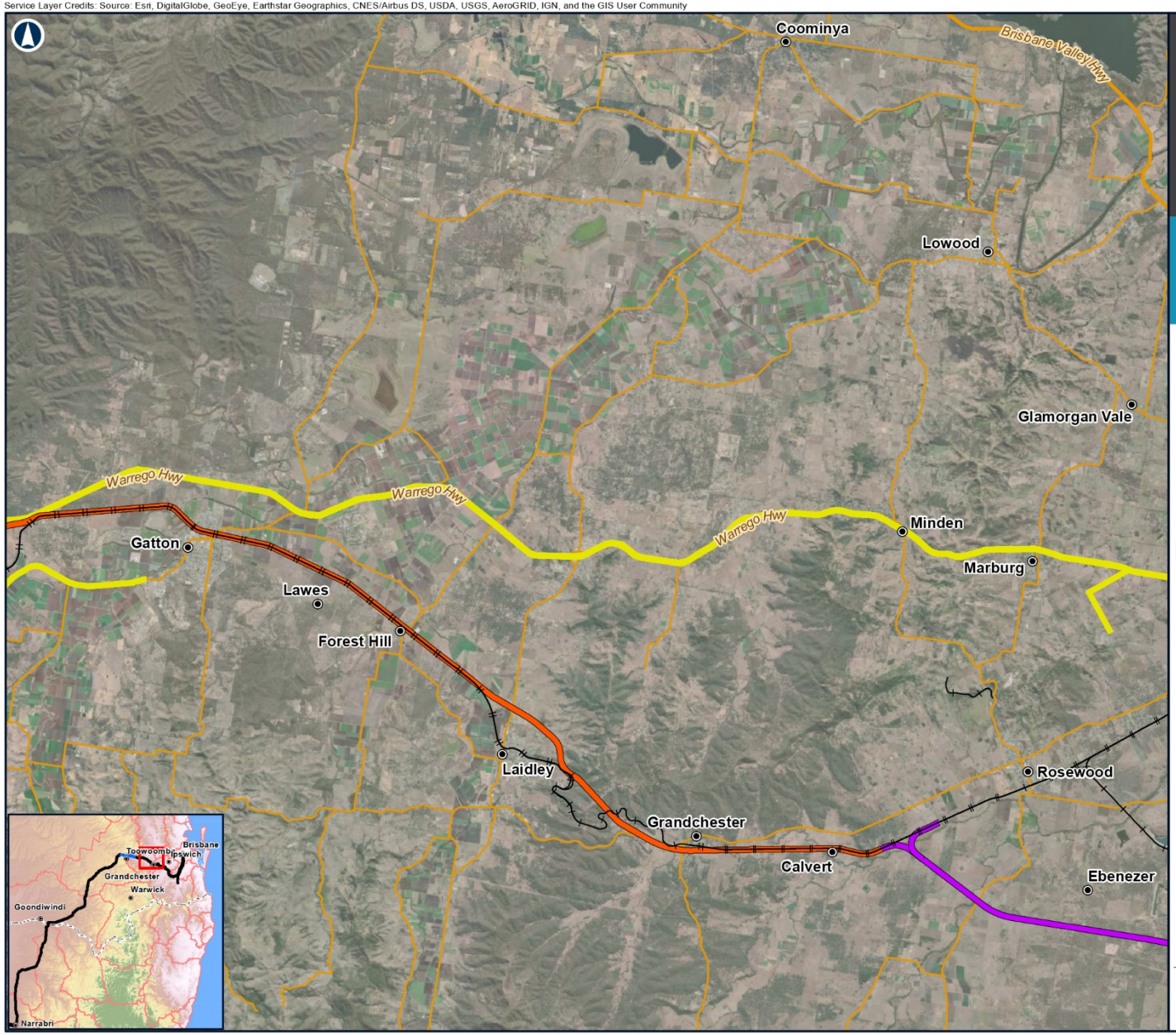

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GOWRIE TO HELIDON

Figure 19.4b:
Proposed construction traffic routes

LEGEND

- Localities
- Existing rail
- H2C project alignment
- C2K project alignment
- Construction routes
- Major roads
- Minor roads
- EIS investigation corridor

0 5 10 km

Coordinate System: GDA 1994 MGA Zone 56

Date: 5/02/2021
Author: FFJV GIS
Data Sources: FFJV

Paper: A4
Scale: 1:200,000

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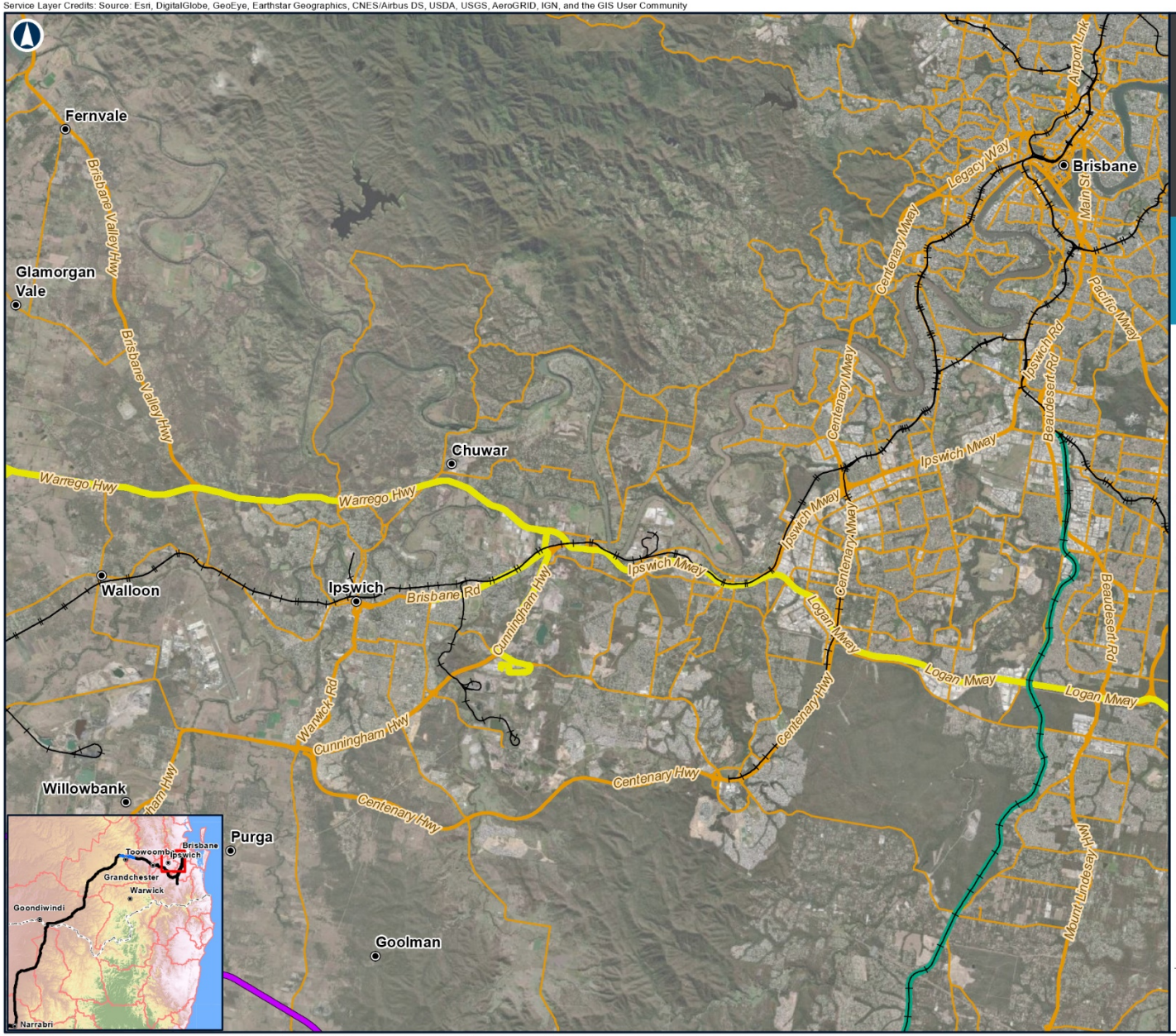

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GOWRIE TO HELIDON

Figure 19.4c:
Proposed construction traffic routes

LEGEND

- Localities
- Existing rail
- C2K project alignment
- K2ARB project alignment
- Construction routes
- Major roads
- Minor roads
- EIS investigation corridor

0 5 10 km

Coordinate System: GDA 1994 MGA Zone 56

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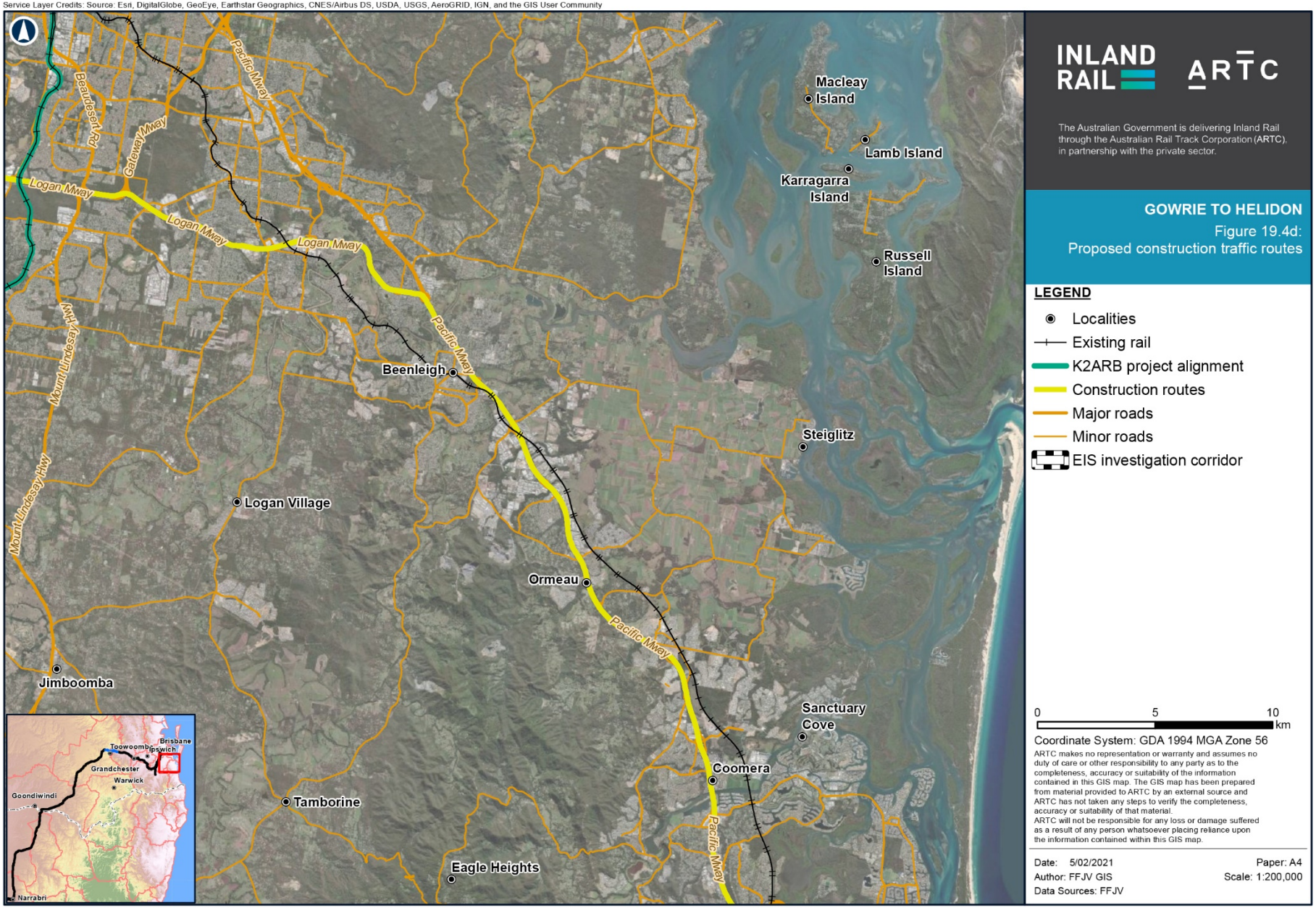
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Macleay Island
Lamb Island
Karragarra Island
Russell Island
Beenleigh
Steiglitz
Logan Village
Ormeau
Jimboomba
Sanctuary Cove
Coomera
Tamborine
Eagle Heights
Logan Mway
Pacific Mway
Gateway Mway
Beaudesert Rd
Mount Lindesay Hwy
Brisbane
Ipswich
Toowoomba
Grandchester
Warwick
Goondiwindi
Narrabri
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GOWRIE TO HELIDON
Figure 19.4d:
Proposed construction traffic routes
LEGEND
Localities
Existing rail
K2ARB project alignment
Construction routes
Major roads
Minor roads
EIS investigation corridor
0
5
10
km
Coordinate System: GDA 1994 MGA Zone 56
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Ready mix concrete route

A potential concrete batch plant site and precast facility for the Project has been identified in the Gowrie area for the Project, refer Table 19.4. This facility will support the tunnel construction only (i.e. facility will be decommissioned post construction).

TABLE 19.4: POTENTIAL CONCRETE BATCH PLANT

ID	Adjoining road	Chainage	Description
G2H-LDN003.7	Morris Road and Boundary Street	Ch 3.70 km	Supports tunnel construction activities (segment production)

Consolidated sleeper routes

For the purposes of the TIA, it has been assumed that ARTC will supply all of the concrete sleepers via the road network, from Grafton in NSW.

Sleeper routes were formulated using the NHVR journey planner, which provided guidance in identifying suitable roads for heavy vehicles and were then consolidated, where feasible, to minimise the number of roads affected. This was achieved by selecting the same roads, where possible, in circumstances where the alternate route did not increase the route distance significantly. Sleeper routes use the Pacific Highway and Warrego Highway, including the Toowoomba Bypass.

19.5.1.3 Construction activity

Workforce

A preliminary estimate of the workforce required to undertake the works, as described in Chapter 6: Project Description, to the nominated program is shown in Figure 19.5. The workforce for this Project is estimated to peak at 596 full time equivalents (FTE) at week 60, and maintain a staff load of approximately 465 FTE between weeks 40 and 122. Throughout the course of the construction period, the average number of workers required is approximately 264 FTE.

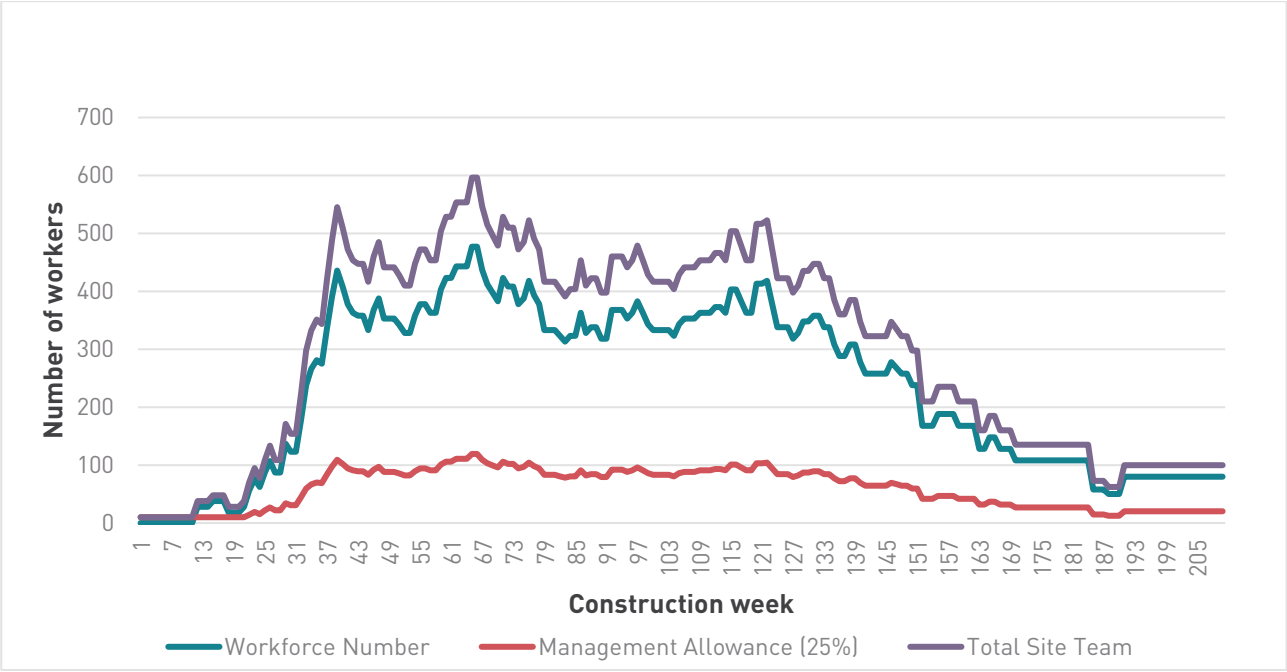


FIGURE 19.5: PROJECTS' ESTIMATED CONSTRUCTION WORKFORCE

The expected workforce graph includes an allowance for site workforce to undertake works onsite. This includes the construction of site facilities, such as concrete batch plants, and the operation of these facilities throughout the construction of the Toowoomba Range Tunnel. Roadworks designed as part of the feasibility design include an allowance for site workforce. This graph does not include workforce allowances for any materials produced offsite at existing facilities.

Despite this number of people onsite, an accommodation facility is not considered necessary due to the reasonably close proximity of larger population centres that will offer both workforce and accommodation options. Parking facilities are proposed at the western and eastern tunnel portal laydown areas, along with other laydown areas along the Project alignment.

Rail activity

For the purpose of the TIA, it has been assumed that rail will be supplied by a single source and will be distributed from the existing QR West Moreton System rail corridor to rail handling yards at either end of the Project alignment. Road networks have been identified to achieve this where further rail transportation is required to distribute rail to designated areas along the Project.

Precast concrete

A concrete batch plant and precast facility is proposed to be located at the western tunnel portal. For the purpose of the traffic, transport and access assessment, all precast material and insitu concrete for the Toowoomba Range Tunnel will be supplied from the proposed concrete batch plant and precast facility. All precast elements for bridge construction are assumed to be supplied from Brisbane. The remaining insitu concrete required along the alignment will be sourced from existing concrete suppliers. Further details on proposed concrete suppliers are included in Appendix U: Traffic Impact Assessment. Concrete used for the construction of the tunnel shaft and the eastern tunnel portal is assumed to come from existing suppliers in Toowoomba.

For the purpose of this assessment, it has been assumed that all precast bridge girders, piers and headstocks required for bridges along the Project will be delivered from suppliers in Brisbane. Precast drainage structures, such as reinforced concrete pipes (RCP) and reinforced concrete box culverts (RCBC), have been assumed to be delivered from suppliers in Toowoomba.

The transportation of precast bridge girders by road will most likely require police escort due the size of the individual girders. To reduce traffic impact, transportation will most likely have to occur outside busy daytime hours and will be subject to further approvals.

Soil disposal

Thirteen cuts along the EIS investigation corridor are required to maintain the required track elevations for the proposed rail line. A combination of heavy ripping, rock hammering, drilling and blasting will be required during this scope of works. Material will be transported by dump trucks or truck and dog trailers.

The Project is anticipated to generate an excess of 1 million cubic metres (m^3) of spoil during the construction phase, which needs to be managed. A number of opportunities exist for the reuse of this material. After first aiming to avoid and reduce spoil where possible, the sustainable reuse of this material will be investigated in the following areas:

- Reuse in the rail corridor
- Reuse in 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
- Reuse for environmental works and land restoration. Examples include:
  - Reuse in the rehabilitation of native vegetation
  - Reuse for landscaping
- Reuse for land reinstatement, including quarries, subject to satisfying closure and operational requirements
- Reuse for landfill covers (day and interim covers) and final capping (where deemed suitable)
- 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
- Dispose offsite as waste
- Disposal of excess spoil as waste at an approved facility licensed 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.

Further details on spoil management is provided in Appendix T: Spoil Management Strategy.

19.5.1.4 Operational transport routes

Operational traffic from the Project is expected to be limited to rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will consist of low volumes of vehicle movements to/from depots and transportation of maintenance material within the rail corridor; therefore, it is expected to be irregular and insignificant.

Consideration of the network operations resulting from modal shift, such as the improvements to highway operations resulting from the shift of freight movements from heavy vehicles to trains, is discussed in Chapter 2: Project Rationale. Chapter 2: Project Rationale also looks at the potential benefit to other sectors, such as agriculture and coal mining, from a modern and efficient rail corridor through the Toowoomba Range.

19.6 Methodology

Desktop studies were undertaken to establish the baseline conditions for the transport infrastructure in the traffic, transport and access study area. Compliance assessment (quantitative) approach was adopted to assess potential traffic impacts and opportunities from the Project. The performance criteria outlined by the GTIA were used to determine the traffic generation related to the construction and operation of the Project and assess the potential impacts on the transport infrastructure and facilities. Following the traffic analysis, a risk assessment of the likelihood and consequence of Project safety risk has been undertaken in accordance with the GTIA risk assessment guideline.

Proposed mitigation measures have been identified to be applied in the detailed design, pre-construction, construction and operational phases of the Project to address specific issues and opportunities, address legislative requirements, accepted government plans, policy and practice (refer Section 19.9). The assessment methodology is presented in Chapter 4: Assessment Methodology.

As part of the desktop studies, the existing road, rail, port and airport facilities were assessed to generate an overview of existing transport modal operations, as shown in Table 19.5. The delivery of materials and machinery will make use of the existing road and rail network during the construction and operation of the Project; thus, most Project impacts are road- and rail-network based.

TABLE 19.5: SUMMARY OF TRANSPORT TASKS BY MODE

Project phase	Road	Rail	Port and airport	Active transport[1]
Construction	Transport of construction material, plant and equipment. The transport of the 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 location			
	Impact of rail crossings on vehicle queues and nearby intersections			
Operation[2]	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			

Table note:
1. Active transport includes non-motorised forms of transport involving physical activity, most commonly walking and cycling
2. Benefits of the Project are outlined in Chapter 2: Project Rationale.

Figure 19.6 illustrates the methodology adopted to identify the background and Project-related traffic volumes. This methodology focused on establishing a background 'without development' traffic scenario for the identified transport, traffic and access study area and comparing this to the scenario, including the Project-generated traffic, i.e. the 'with development' scenario.

The process allowed for the assessment of the Project's traffic impacts on road safety, access and frontage, intersections, road links, pavement and road–rail interfaces. Following the traffic impact assessment, and as necessary, potential mitigation and management measures were developed to address the potential traffic impacts caused by the Project.

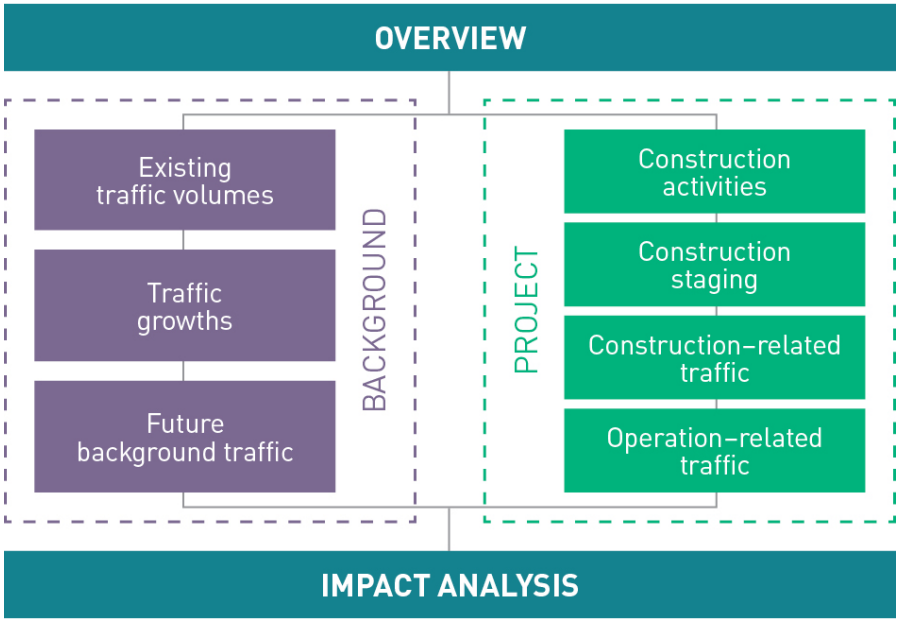


FIGURE 19.6: BACKGROUND AND PROJECT TRAFFIC VOLUMES

The key tasks for the traffic assessment included:

- Desktop review and data collection
- Impact assessment and mitigation.

These tasks are discussed further in the following sections.

19.6.1 Desktop review and data collection

The key data and information inputs required to undertake the traffic and transport assessment included:

- Local government/State policies and strategies potentially influencing the traffic impact assessment 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 (RUMP)
- Designated freight and seasonal traffic routes
- Dangerous goods vehicle routes

- Bus and school bus routes
- Emergency service access
- Stock routes and Travelling Stock Reserves
- 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.

Consultation with DTMR, QR, TRC and LVRC has occurred for Project with respect to changes to the road network, interfaces between the QR and Inland Rail alignments, along with inputs on the Project design and the TIA.

19.6.1.1 Background traffic volumes

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

- Existing traffic volumes: Existing traffic volumes (link and intersections) in the first instance were obtained from road controlling authorities. Base year for traffic data varies from year 2010–2019 due to different sources of council data. Local councils were provided with the base year traffic data and were asked to provide further traffic data for road links with assumed data. This assessment incorporates all data received from local councils, where applicable. Where this data was not available, traffic surveys were commissioned. Refer to the section below for further details on the proposed approach for identifying locations where traffic surveys were undertaken.

  Traffic data was also provided for 2020 in particular Morris Road following the upgrade works, though no other traffic counts were undertaken due to COVID-19.
- In instances where traffic data was not available from road controlling authorities or traffic surveys conducted, traffic volumes were estimated based on the guidance provided by *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988) (which provided base AADT by road type, respective Level of Service (LOS) and K-value). 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 SCR were derived based on historic permanent census traffic data, where available. The traffic growth data is provided in Appendix U: Traffic Impact Assessment, specifically Appendix A for DTMR roads and Appendix B for RMS roads. An evaluation of the traffic growth rates within this traffic data revealed an overall annual average AADT growth rate of 2 per cent. The majority of the calculated growth rates are in line with this assumption regardless. The proportion of this growth which was heavy vehicles varied by link but was generally consistent with the AADT growth and has been assumed as such. This is considered reasonable for current 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 for the assessment of all SCR and LGR for all vehicle types. This was the most conservative and accurate assumption as there is not sufficient historical data to determine growth rates for council roads. This approach is considered reasonable for current design given the observed growth on roads evaluated.
- . The data is provided in Appendix U: Traffic Impact Assessment.
- Future background traffic: Traffic growth data obtained from road controlling authorities was applied to existing traffic volumes to estimate the future background traffic. Redistributed background traffic from permanent road closures due to the Project were accounted for in future year traffic estimates by means of manual reassignment of traffic demands based on reasonably assumed diversions.

Further details on background traffic volumes, including traffic growth rates, are included in Appendix U: Traffic Impact Assessment.

19.6.1.2 Project-related traffic

Construction activities

The major construction transport activities include delivery of quarry materials (ballast, capping materials), pre-cast concrete, ready mix concrete, rail, consolidated sleepers, earthworks materials, workforce trips, delivery of water, and the transportation and movement of plant, tools and other materials.

At this stage, oversize vehicles are only assumed to be required for the transportation of 29 m Super-T precast concrete girders.

Where applicable, the permits and approvals required for oversize vehicles will be sought by the appointed construction contractor once delivery materials and routes are determined.

Table 19.6 summarises the major construction activities and related transport modes for the traffic generated by the respective activities. Plant, tools and other materials to each of the Project laydowns areas are included in the workforce routes.

TABLE 19.6: CONSTRUCTION ACTIVITIES CONTRIBUTING TO TRAFFIC GENERATION AND TRANSPORT MODE

Material	Delivery method	Quantity/volume	Start date	End date
General fill	Road	1,930,099 m^3	August 2022	October 2023
Structural fill	Road	108,303 m^3	September 2022	November 2023
Capping	Road	89,785 m^3	July 2022	November 2023
Spoil	Road	305,224 m^3	March 2023	July 2024
Top ballast	Road	28,469 t	July 2025	July 2025
Bottom ballast	Road	56,938 t	April 2025	May 2025
Sleepers	Road	57,800 items	May 2025	June 2025
Rail	Rail	6,240 t	May 2025	November 2025
Precast concrete—bridges	Road	girders (at various length and size)	May 2023	April 2025
Precast concrete—tunnel	-	122,699 m^3	May 2023	April 2025
Insitu concrete—bridges	Road	56,406 m^3	November 2022	April 2025
Insitu concrete—culverts		545 m^3	April 2022	August 2023
Insitu concrete—tunnel			August 2022	July 2025
1. Western tunnel portal	-	-		
2. Eastern tunnel portal	Road	27,225 m^3		
Shaft	Road	4,667 m^3		
Culverts	Road	items (various sizes)	April 2022	August 2023
Construction water	Road	Approximately 700 ML	March 2022	September 2025

Table notes:
m^3 = cubic metres, t = tonnes, ML = megalitres

Rail has been assumed to be primarily supplied via the closest existing QR West Moreton System rail corridor. This option requires further investigation and consultation with QR. Note the TIA does not allow for the delivery of rail by trucks as it assumed to be delivered via rail from two potential locations at either end of the Project.

The delivery of sleepers has been allowed for, assuming the use of trucks for the whole alignment. Construction water will be supplied from dams, bores and town mains for earthworks, concrete and track works along the whole alignment.

The current intention is to reuse the expected groundwater infiltration into tunnel during construction, including for the cooling of the tunnel boring machine (TBM), or for compaction of spoil at the tunnel support area at Gowrie, in preference to offsite disposal. Further information is provided in Chapter 6: Project Description.

The quantities presented in Table 19.6 have been increased using buffer values that are generally considered acceptable for this type of delivery. The construction starts dates, end dates and distribution of trips was undertaken consistent with the constructability assessment and is considered suitable for the EIS.

Construction staging

The construction period for the Project is proposed to start in 2022 and reach completion in 2026. The construction works are to be staged, with the peak period of the Project construction determined by the start and end dates of all construction-related activities.

Access and egress

Construction vehicle access to the Project disturbance footprint and, ultimately, the rail corridor is proposed to be via the existing road network (e.g. Boundary Street, Jones Road, Gittins Road, Murphys Creek Road and Airforce Road) in conjunction with existing and new access tracks. These access tracks have been chosen to ensure adequate sight distance, safe access/egress path are available (e.g. tracks were designed to avoid areas with a slope greater than 10-degrees, as steeper grades will need special drainage works, restricted the type of vehicle being used and may need hard surfaces) and to minimise erosion (e.g. designed for what the soil can handle, not the vehicle).

Queensland emergency services have also been consulted to identify the access requirements for relevant emergency service vehicles. This information has been incorporated into the design of access tracks for the tunnel and to ensure adequate clearance is provided.

Further investigation of access locations will be undertaken in consultation with relevant landholders and stakeholders once detail around the planned construction methodology is known, which would occur during detailed design stages. All access and egress points, once finalised by the construction contractor, will be communicated to the relevant stakeholders, including all emergency service operators. This is expected to become available during the detailed design stages.

All construction access points would 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 potential disruption to the arterial road network and to minimise conflicting turning traffic with higher volume through traffic.

Where the proposed rail line 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. All new accesses formed as a part of the Project will comply with the TI Act and relevant approvals from DTMR.

A rail maintenance access road (RMAR) is required to facilitate maintenance for critical infrastructure (e.g. turnouts, viaducts), 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.

Construction-related traffic

The number of trips generated by each construction activity was estimated for light vehicle and heavy vehicle trips based on the transport of material quantities and associated construction schedules. The traffic loads/trips were assigned to the corresponding transport route for each construction activity. This allowed for the estimation of peak construction traffic for each construction route and for separate road sections.

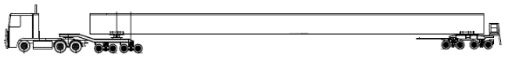
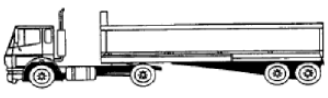
Total trips by construction activity for each road section have been derived using material requirements and delivery schedules developed for the Project. These total trips have been summarised in Table 19.7 by activity and year of construction for the Project and include all trips generated by the construction traffic, both loaded and unloaded. All vehicle trips except for worker trips (workforce routes) are heavy vehicle movements, with workforce trips being light vehicle movements.

TABLE 19.7: TOTAL TRIPS BY ACTIVITY PER YEAR

Material	Vehicle Class	2022	2023	2024	2025	2026
Workers	Austroads Class 1	87,536	87,536	87,536	87,536	43,768
Cut to Fill	Austroads Class 10	32,830	72,362	0	0	0
Tunnel	Austroads Class 10	0	6,209	3,173	0	0
Quarry	Austroads Class 10	4,368	2,503	0	3,285	0
Sleepers	Austroads Class 10	0	0	0	742	0
Precast concrete—Bridges	OSOM vehicle	0	149	1,162	77	0
Precast concrete—Culverts	Austroads Class 9	126	126	706	0	0
Insitu Concrete	Austroads Class 5	1,161	5,190	5,638	1,162	0
Water	Austroads Class 7	12,565	19,244	6,049	14	0

Table 19.8 shows the Austroads vehicle types by construction activity that have been adopted for the assessment. For further details on the construction-related traffic generation, distribution and assignment, refer to Appendix U: Traffic Impact Assessment.

TABLE 19.8: VEHICLES TYPES BY CONSTRUCTION ACTIVITY

Construction activity	Austroads vehicle class	
Workforce	Austroads Class 1 Short Vehicle	
Spoil	Austroads Class 10 7 Axle B-Double (55.5 t)	
Tunnel	Austroads Class 10 7 Axle B-Double (55.5 t)	
Quarry	Austroads Class 10 7 Axle B-Double (55.5 t)	
Sleepers	Austroads Class 10 7 Axle B-Double (55.5 t)	
Precast concrete-bridge	Assumed OSOM Unloaded Class 3 Rigid Truck with 4 Axle Dolly and 4 Axle Jinker (70 t payload)	
Precast concrete-culverts	Austroads Class 9 6 Axle Semitrailer (42.5 t)	
Insitu concrete	Austroads Class 5 4 Axle Rigid Truck (27.5 t)	
Water	Austroads Class 7 4 Axle Semitrailer (31.5 t)	

The construction activities have not been programmed to the day or hour due to the level of assessment that is adequate for an EIS. During the detailed design stage, the program of works can be further detailed when a construction contractor is appointed, to allow for the assessment to consider potential fluctuations in peak deliveries. The detailed assessment will allow for the Traffic Management Plan (TMP) to manage trips to reduce overlapping peak periods and impacts on the wider road network.

For further details on the construction-related traffic generation, distribution and assignment, refer to Appendix U: Traffic Impact Assessment.

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 in the rail corridor).

Seasonal variations

Based on the presence of rural/agricultural land use in the study area, traffic volumes on the road network are likely to increase during harvesting season. During harvesting season, heavy vehicle usage on the local and SCR in the 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.

In order to ensure a conservative analysis, the impacts of seasonal variations were considered as part of the analyses, especially at road–rail interface locations, where the analysis outcomes have provided input into the design. The impact of seasonality was taken into consideration by means of the following:

- Road–rail interface analysis: It was assumed to adopt 95th percentile output results from SIDRA (Signalised & Unsignalised Intersection Design and Research Aid) intersection 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 in the analyses per road type, as derived from the G*uide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988) 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.

Cumulative Impacts

Construction schedules relating to other Inland Rail projects and other major developments in the region were considered to establish schedule overlaps (i.e. where 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 cumulative impacts were assessed in accordance with the methodology outlined in Chapter 4: Assessment Methodology and Chapter 22: Cumulative Impacts, with the results included in Section 19.11.

19.6.1.3 Traffic data collection

Key traffic data and information inputs were acquired from road controlling authorities using formal request(s) for information (RFI). The traffic data supplied by councils had base years that varied from year 2010–2019 due to the availability of different sources of council data. Local councils were provided with the base year traffic data and were asked to provide further traffic data for road links with assumed data. This assessment incorporates all data received from local councils, where applicable. Where this data was not available, traffic surveys were commissioned.

To identify additional data requirements from other data sources, such as traffic surveys, a gap analysis of received data/information was undertaken. The following approach was used in the selection of road segments relevant to the Project, where data needed to be obtained from traffic surveys:

- Assign road details to each road segment in the transport, traffic and access study area
- Identify the duration each road section will be used for construction transport
- Determine the road sections where traffic surveys were recommended, taking into consideration:
  - The indicative increase in traffic volumes due to the Project
  - The location of turning manoeuvres for construction traffic
  - The anticipated duration of construction activities.

Traffic data provided by road controlling authorities was used at locations where available. In all instances where local roads are used for construction, agreement will be made with the asset owner prior to commencing. Data for road links that 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.

Road links envisaged to be impacted by construction routes that did not have available background traffic information either sourced or collected by means of traffic surveys were assumed by adopting the following process:

- Classify each road segment in the transport, traffic and access study area based on the following assumed classification:
  - 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 2000 vehicles, as depicted in *Roads and Traffic Authority (RTA) Guide to Traffic Generating Developments* (Roads and Maritime Services (RMS), 2002) as adopted from the *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988)
  - Urban Collector Road: Volumes derived by assuming LOS B with associated AADT of 3800 vehicles, as depicted in *RTA Guide to Traffic Generating Developments* (RMS, 2002) as adopted from the *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988)
  - Urban Arterial Road: Volumes derived by assuming LOS B with K-value of 0.12, with associated AADT of 2000 vehicles, as depicted in *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 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 2000 vehicles, as depicted in *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988)
  - Rural Arterial Road: Volumes derived by assuming LOS A with K-value of 0.15, with associated AADT of 1600 vehicles, as depicted in *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* (Austroads, 1988)
  - Peak hour flow rates obtained from the various sources were converted to Average Daily Traffic (ADT) volumes by adopting industry suited conversion factors for road segments were data was not available.
- The 7-day 24-hour counts provided by the traffic surveys were assumed to be representative of yearly AADT as there were no additional data sources available for factorisation. This is considered to be suitable for the purposes of this assessment at this stage of the Project.
- Undertake a 5 per cent comparison analysis to identify road segments where peak period Project traffic exceeds the background traffic by 5 per cent or greater. Compile a table to summarise the outcomes of the 5 per cent comparison: 0 to 5 per cent (low increase), 5 to 10 per cent (moderate increase), > 10 per cent (high increase).

The following methodology was developed to aid in the selection of intersections in the transport, traffic and access study area where data was gathered from traffic surveys:

- Undertake the previously mentioned 5 per cent comparison analysis for road segments
- Identify intersections where construction traffic is planned to undertake turn manoeuvres, and undertake turn warrant assessments, to determine if existing treatment type is adequate to facilitate expected base traffic volumes and construction traffic volumes.

19.6.2 Traffic impact assessment methodology

The operational performance of the road network in the transport, traffic and access study area has been assessed to develop an understanding on the potential traffic impacts from the Project according to the DTMR GTIA manual process shown in Figure 19.7.

This process is for the impact assessment of the SCR network and has been extended to the LGR network, except for the pavement impact assessment. Pavement impact assessments were not conducted for affected LGR as the GTIA applies to SCR. Alternative mitigation measures will be developed, such as road visual condition assessments prior, during and post construction, and returning the road to original condition once construction is finished. Such

mitigations will be developed through consultation with relevant councils and road authorities prior to the construction phase.

While use of the guidelines is not mandatory for an impact assessment, they provide a basis for assessing potential impacts from the construction and operation of the Project on the local and regional transport network.

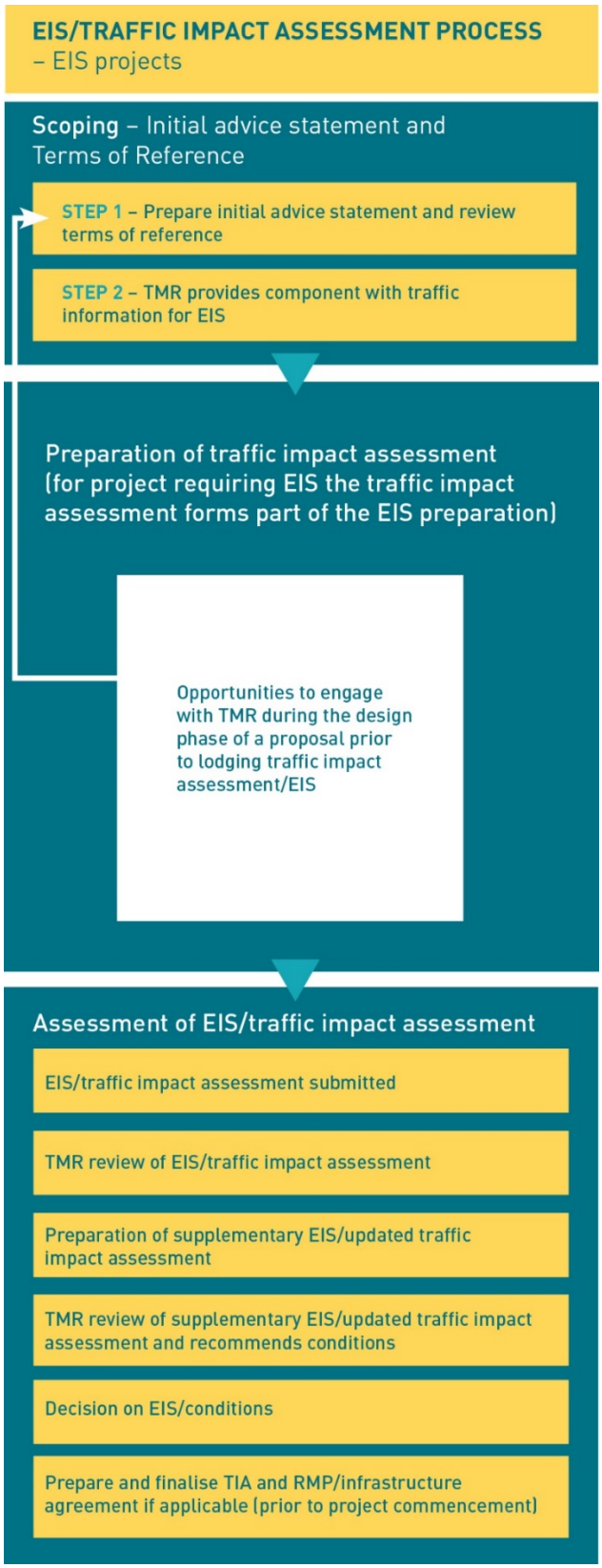


FIGURE 19.7: TRAFFIC IMPACT ASSESSMENT PROCESS

Source: DTMR, 2017a

Figure note: RMP—Road Use Management Plan

The extent of the impacts of Project traffic on other users and on infrastructure can range from being localised to quite dispersed. An analysis boundary has been defined to assess a reasonable level of impact of the additional Project traffic. This boundary is shown in Figure 19.1; however, for the traffic, transport and access assessment, impacts have been assessed wider than this area based on the construction routes assumed to be used for the Project. The GTIA indicates the criteria for determining the area where mitigation measures are required, which is provided in Table 19.9.

TABLE 19.9: MITIGATION CRITERIA

Impact type	Required mitigation
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	The SCR corridor for the extent of the geometric frontage of the site includes works on both the frontage side and potentially on the opposite side of the road. (Potential construction accesses/ laydown areas on Limited Access Roads in the DTMR and RMS network.)
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 standard axle repetitions (SAR) exceed 5 per cent of the base traffic in either direction on the link's SAR 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).

The performance criteria for assessment of traffic and transport impact is outlined in Table 19.10. The LOS criteria are as defined in the *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads, 2017a).

TABLE 19.10: PERFORMANCE CRITERIA

Assessment type	Performance criteria
Traffic impact assessment	Construction and operational traffic generated by the Project equals or exceeds 5 per cent 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 per cent of the existing SAR's on the road section

The impact assessment year is the year at which the impacts of the development are assessed. The impact assessment year varies by impact type because the effects of development can be quite different on infrastructure than they are on other users. The impact years that are to be assessed were adopted from GTIA and are summarised in Table 19.11.

TABLE 19.11: 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 the GTIA was adopted to determine appropriate mitigation measures on road impacts. The mitigation framework is provided in Figure 19.8.

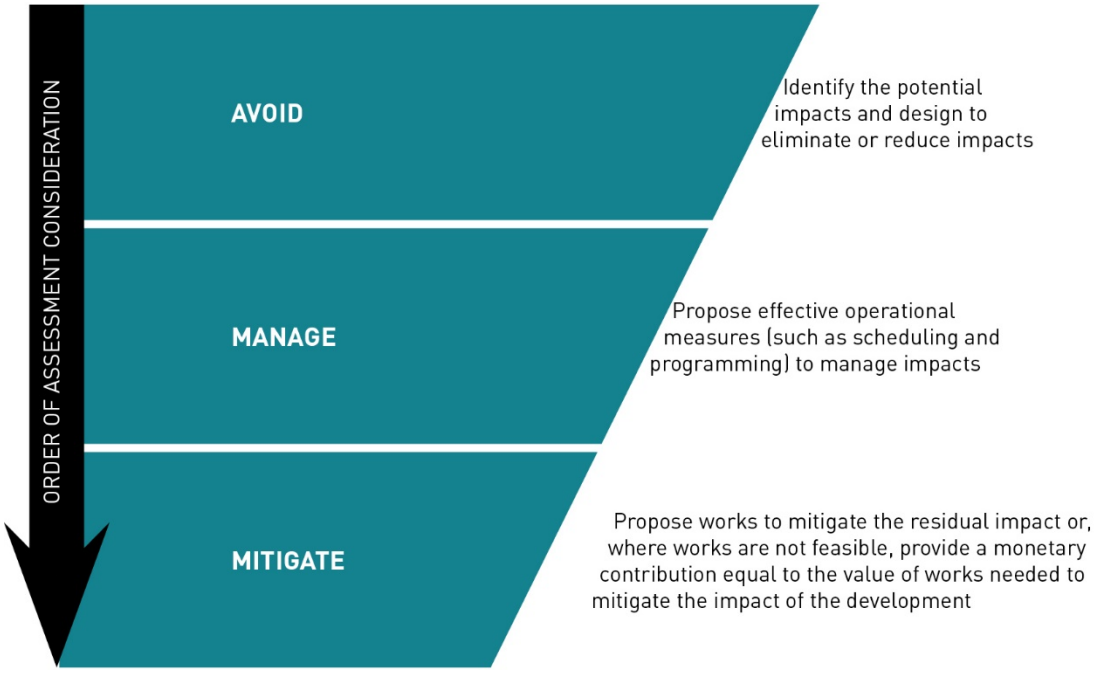


FIGURE 19.8: MITIGATION FRAMEWORK

Source: DTMR, 2017a

19.6.3 Rail impact assessment

The Project is co-located with the existing West Moreton System for approximately 5.6 km; in addition, the Project will traverse the West Moreton System at Gowrie (road-over-rail bridge), at Cranley and Ballard (in tunnel at a depth of approximately 100 m and 200m, respectively) and at Lockyer Creek at Helidon (rail over rail). Design drawings are provided in Appendix C: Design Drawings.

Generally, the design provides sufficient spacing between the QR railway track and the ARTC track to ensure maintenance activities can be undertaken during construction and operation; however, some works will likely require track possessions and speed restrictions. It is expected that these possessions can occur during routine maintenance periods. These requirements will need to be planned and agreed with QR during the detailed design phase to quantify and minimise impact to operations; therefore, the operational performance of the existing rail network in the transport, traffic and access study area is not anticipated to be significantly impacted as a result of the Project construction.

All road–rail and rail–rail interfaces are grade separated and no level crossings are proposed for the Project, which aligns with the aims of the *Queensland Level Crossing Safety Strategy 2012-2021* (DTMR, 2012a). Therefore, an analysis of vehicle delays and queueing as a result of level crossings has not be undertaken for operations; though it should be noted that Project-generated traffic impacts on vehicle delays and queuing issues at nearby closely spaced intersections has been undertaken.

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

ARTC has engaged, and will continue to engage, with the rail manager for the West Moreton System (i.e. QR) regarding potential interfaces between the Project during construction and operations. This includes, but is not limited to, the proposed connections at the western and eastern extents of the Project, the Gowrie spur line, grade

separations, level crossings, track spacing in the rail corridor, final configuration of the railway corridor, relocation and reinstatement of existing rail infrastructure, track possessions and disruptions to supply chains.

The Project disturbance footprint also allows for the relocation and reinstatement of rail maintenance access roads (RMARs) (and other rail infrastructure) associated with the QR network. Impacts to the existing rail facilities are summarised in Section 19.8.3.1.

19.7 Existing environment

19.7.1 Rail network

The West Moreton System, which is managed by QR, runs over 314 km between Rosewood and Miles (QR, 2016b). The system runs between South East Queensland, in the east at Rosewood, and connects to the Western System at Miles in the west. The rail corridor has been in operation since the 1860s, with the first section of railway line in Queensland, between Ipswich and Grandchester, opening in 1865.

The system links rail services from Brisbane to the west and the south west of the State and is a major artery to the Darling Downs via the Toowoomba Range. Traffic to and from the Western and South Western systems, including the Westlander long-distance passenger service, travels along the West Moreton System.

Existing rail operations include passenger, livestock, coal, freight and agricultural products (e.g. grain and cotton).

The section between Helidon and Gowrie, incorporates both the Main Line (45 km) and Western Line (11 km) and is approximately 56 km in length (QR, 2016b). Key features of this section of the West Moreton System based on the *West Moreton System Information Pack – Issue 3.1* (QR, 2016b) include:

- From Helidon, the single-track railway begins the 470 m climb up the Great Dividing Range, passing through nine tunnels, before cresting the range at Harlaxton (612 m above sea level). From Harlaxton, the track descends to the Toowoomba Central Business. After leaving Toowoomba, the system follows a single-track railway along the Darling Downs, gradually dropping until reaching Dalby.
- Train times from Helidon to Toowoomba can be in excess of one and half hours, with speeds restricted in tunnel to 15 km/hr for containers
- Direct access is provided to Willowburn Facility operated by Aurizon
- Access to the Toowoomba Rail Station
- Five level crossings and four occupational crossings occur on the Main Line
- Seven level crossings and four occupational crossings occur on the Western Line, including one at Gowrie Junction Road
- There are seven crossing loops on this section; namely, Lockyer, Murphys Creek, Holmes, Spring Bluff and Rangeview on the Main Line, and Willowburn and Gowrie on the Western Line
- The maximum allowable speed on this line is 80 km/hr, while the slowest speed is 15 km/hr through some areas
- The line has a maximum allowable gross tonnage of 7 million tonnes per annum.

Of the total 28 km of the Project alignment, approximately 5.6 km of the alignment is co-located with the existing QR West Moreton System rail corridor. This includes approximately 4.8 km co-located (to the south) with the Western Line at Gowrie and 800 m co-located (to the north) with the Main Line northwest of Helidon. In addition, connections are provided at the western and eastern extents of the Project to allow traffic to migrate between both rail networks. Table 19.12 details the existing railway interfaces that are present along the alignment.

The existing rail corridor will be widened to accommodate the ARTC rail infrastructure, with a sub-lease arrangement with DTMR required for this infrastructure. Furthermore, the staging of the works and associated impacts will be the subject of an interface agreement between the Inland Rail Program and QR. Coordination with QR will be necessary to maintain access to existing assets for maintenance. Design drawings illustrating the relationship between the Project and the rail network are provided in Appendix C: Design Drawings.

TABLE 19.12: EXISTING RAILWAY INTERFACES

Description of connection	Owner/ manager of network	Chainage
Connection between ARTC G2H and the B2G project	ARTC	Ch -1.76 km
Alignment runs adjacent to QR 'Western Line' with a minimum of 6.5 m between track centres as per Rail Industry Safety and Standards Board	QR	Ch -1.76 km to Ch 3.00 km
Upgrade of QR 'Western Line', e.g. to better manage flooding in the Gowrie area additional culverts under the existing rail corridor are proposed (refer Chapter 13: Surface Water and Hydrology)	QR	Various locations
Connection to QR 'Western Line'	QR	Ch 1.00 km
Connection to QR 'Western Line'	QR	Ch 1.41 km
InterLinkSQ Design		
Stage 1 Connection		Ch -0.66 km
Angle connection to QR 'Western Line'	ARTC	Ch 3.76 km
Co-location with the QR 'Main Line'	QR	Ch 24.85 km
Adjacent with existing QR 'Main Line' with a minimum of 6.5 m between track centres as per Rail Industry Safety and Standards Board (AS 7633:2019) Extension to and upgrade of two existing culvert sets	QR	Ch 25.30 km to Ch 26.29 km
Connection to QR 'Main Line'	QR	Ch 26.29 km
Connection between ARTC G2H and H2C project	ARTC	Ch 26.29 km

19.7.1.1 Gowrie to Grandchester future state transport corridor

The *Gowrie to Grandchester Rail Corridor Study* (QR and Queensland Transport, 2003) investigated a rail corridor that aimed to mitigate the constraints on rail operations caused by the Toowoomba Range and Little Liverpool Range crossings. The study was completed in 2003 and the corridor investigated forms part of the proposed alignment for the Project. As part of the rail corridor study, technical environmental and cultural heritage studies were undertaken. Much of the conclusions of these studies have been used in the development of the Project.

The preferred Project alignment is generally consistent with that of the western portion of the Gowrie to Grandchester future state transport corridor protected under a State Government gazettal under the TPC Act. Differences between the Project alignment and the future state transport corridor are summarised in Section 19.5.1.1, with a detailed discussion provided in Chapter 2: Project Rationale. The Project connects the adjoining projects of B2G to the west and H2C to the east.

The Project design is also such that it does not preclude the construction of a passenger service within the Gowrie to Grandchester future State transport corridor at a future date. Noting that the Project design is a single railway track, which includes over 6 km of viaducts and a 6.24 km tunnel, which will constrain a passenger service within the same rail corridor.

19.7.1.2 Existing rail crossings

Of the 12 existing level rail crossings between Helidon and Gowrie, one existing operational level rail crossing occurs within the Project disturbance footprint. The other level crossings are sufficiently displaced from the Project that impacts on the current operation of these level crossings are unlikely. Table 19.13 outlines the proposed treatment of the existing rail crossing along the proposed rail corridor. Design drawings illustrating the relationship between the Project and the rail crossings are provided in Appendix C: Design Drawings.

TABLE 19.13: EXISTING PUBLIC FORMED ROAD RAIL INTERFACE LOCATIONS

Interface ID	Road name	Proposed treatment
TRC		
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)	No crossing provided—relocate
NA	East Paulsens Road to Morris Road	No crossing provided—relocate

The existing level crossing is a passive level crossing with flashing lights. As a part of the Project, this level crossing is planned to close and will relocate to the proposed Gowrie Junction Road grade separation (at interface ID: 320-1-P-0a); therefore, there will be no operational impacts of a level crossing at this location and the Project will result in a safety benefit to local road users with the removal of this existing level crossing.

There is, however, a risk of queuing and vehicle delays during construction, with this the main access point across the existing rail corridor in Gowrie. Another public level crossing of note along the proposed construction routes is Turner Street at Helidon, while construction routes through Toowoomba will also use public level crossings on North Street (West and East) and Griffith Street.

The existing underpass currently used by residents on East Paulsens Road, to access Morris Road, has a clearance of 3.1 m and is located along a drainage channel. This underpass is used in preference to Old Homebush Road, with the western portion of East Paulsens Road primarily an access track. It is proposed that this underpass be closed to the public and the western section of East Paulsens Road upgraded.

This underpass may be used during construction as an alternative to the existing level crossing; however, the type of vehicle will be constrained by the height and width of the structure.

No occupational crossings are directly impacted by the Project, however access to an existing occupational crossing over the Main Line at Helidon from Cattos Road will be altered.

19.7.2 Public transport networks

The existing public transport routes within Queensland that are likely to be impacted by construction traffic and/or proposed and existing road rail crossings have been identified through a review of TransLink data. Identified routes that may be impacted are provided in Table 19.14.

In addition, to the bus services, the Westlander operated by QR provides a rail passenger service between Brisbane and Charleville. The service operates twice a week (departing in the early evening) from both locations from Tuesday to Friday. The design has included measures to allow the Westlander to operate on the ARTC main line, including allowing access to the Toowoomba railway station from the west and emergency egress from the tunnel.

Any services that are not impacted by the construction or operation of the Project are not included in the summary below.

TABLE 19.14: IMPACTED PUBLIC TRANSPORT SERVICES

Services	Weekday frequency	Impacted roads
KGT (Bus service)	10/day	Warrego Highway New England Highway
300 (Bus service)	-	Margaret Street New England Highway Highfields Road
301 (Bus service)	-	Margaret Street New England Highway Highfields Road
314 (Bus service)	-	Margaret Street New England Highway Highfields Road
315 (Bus service)	-	Margaret Street New England Highway Highfields Road

Services	Weekday frequency	Impacted roads
500 (Bus service)	20/day	River Road Ipswich–Cunningham Highway Connection Road
502 (Bus service)	20/day	Ipswich–Cunningham Highway Connection Road
514 (Bus service)	13/day	Ipswich–Cunningham Highway Connection Road
529 (Bus service)	3/day	Warrego Highway
539 (Bus service)	10/day	Gatton–Helidon Road
901 (Bus service)	18/day	Warrego Highway New England Highway Jellicoe Street North Street Griffiths Street
902 (Bus service)	10/day	Warrego Highway New England Highway
904 (Bus service)	11/day	New England Highway
905 (Bus service)	12/day	Warrego Highway Margaret Street New England Highway
906 (Bus service)	12/day	New England Highway West Street Warrego Highway Bridge Street North Street Greenwattle Street
907 (Bus service)	9/day	Warrego Highway Margaret Street New England Highway Bridge Street North Street
950 (Bus service)	10/day	New England Highway Highfields Road

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 the Project construction phase.

19.7.3 Road network

Several SCRs and LGRs are encompassed in the traffic and transport study area that serve as main transport routes for the Project. The classification categories shown in Section 19.6.1.3 were used to determine the road classifications for the roads that are expected to be used as construction routes.

This section does not identify roads that 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.

19.7.3.1 State-controlled roads

Two SCRs have been identified that interface with the proposed rail corridor. These roads are summarised in Table 19.15. Grade separation is proposed at these locations, with the viaducts over 20 m above the road level (refer Chapter 6: Project Description). Design drawings illustrating the relationship between the Project and the roads are provided in Appendix C: Design Drawings.

TABLE 19.15: STATE-CONTROLLED ROADS: INTERSECTED BY THE PROJECT ALIGNMENT

Interface ID	Road name	Road ID—road section
SCR:		
320-6-P-1	Toowoomba Bypass (previously Toowoomba Second Range Crossing) (operated by Nexus)	319—Toowoomba Bypass (between Ch 15.0 and Ch 16.0 km)
320-7-P-2	Murphys Creek Road	4104—Murphys Creek Road (between Ch 21.0 and Ch 22.0 km)

The Toowoomba Range Tunnel will traverse under several SCRs at a depth of between 50 m and 220 m. These roads are summarised in Table 19.16. Design drawings illustrating the relationship between the Project and the roads are provided in Appendix C: Design Drawings.

TABLE 19.16: STATE-CONTROLLED ROADS: INTERSECTING THE PROJECT TUNNEL ALIGNMENT AT THE SURFACE

Road name	Road ID—road section
SCR: DTMR	
Toowoomba Bypass (previously Toowoomba Second Range Crossing) (operated by Nexus)	319—Toowoomba Bypass (between Ch 4.0 and Ch 5.0 km, Ch 5.0 and Ch 6.0 km and Ch 9.0 and Ch 10.0 km
New England Highway	22A—New England Highway (between Ch 8.0 and Ch 9.0 km)

The SCRs proposed to be used to transport construction materials, equipment and the workforce during construction of the Project are included in Table 19.17 and shown in 19.2. Some of these roads are key national freight routes, including the Warrego Highway, while others, such as the Toowoomba Bypass, are restricted-use routes.

TABLE 19.17: STATE-CONTROLLED ROADS: PROJECT CONSTRUCTION ROUTES

Road name	Road ID—road section
SCR: DTMR	
Cunningham Highway	17B—Between River Road and Redbank Plains Road
Gatton Helidon Road	314—Between Warrego Highway and Woodlands Road
Ipswich Motorway	17A—Between Cunningham Highway and Logan Motorway
Ipswich–Cunningham Highway Connection Road	301—Between River Road and South Station Road
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway
Murphys Creek Road	4104—Between Warrego Highway and Brookside Place
	4104—Between Brookside Place and Toowoomba Bypass
	4104—Between Toowoomba Bypass and Howmans Road
New England Highway	22A—Between Highfields Road and Murphys Creek Road
	22A—Between Murphys Creek Road and Munro Street
	22A—Between Munro Street and North Street
	22A—Between North Street and Warrego Highway
Pacific Motorway	12A—Between Logan Highway and NSW/Queensland border
River Road	309—Between Warrego Highway and Ipswich–Cunningham Highway Connection Road
Toowoomba Bypass	319—Between Toowoomba Cecil Plains Road and Warrego Highway
	319—Between Boundary Street and New England Highway
	319—Between New England Highway and Warrego Highway

Road name	Road ID—road section
Toowoomba Cecil Plains Road	324—Between Boral Quarries and Toowoomba Bypass
	324—Between McDougall Street and Tor Street
Toowoomba Connection Road	315—Between Warrego Highway and Roches Road
	315—Between Roches Road and Murphys Creek Road
	315—Between Murphys Creek Road and Toowoomba Bypass
Warrego Highway	18A—Between Omara Road and Gowrie Junction Road
	18A—Between Gowrie Junction Road and McDougall Street
	18A—Between McDougall Street and Tor Street
	18A—Between Tor Street and Rob Street
	18A—Between Rob Street and Toowoomba Athol Road
	18A—Between Toowoomba Athol Road and New England Highway
	18A—Between New England Highway and James Street
	18A—Between James Street and Tourist Road
	18A—Between Tourist Road and Toowoomba Connection Road
	18A—Between Toowoomba Bypass and Gatton Helidon Road
	18A—Between Gatton Helidon Road and Gatton Esk Road
	18A—Between Gatton Esk Road and Laidley Plainland Road
	18A—Between Laidley Plainland Road and Haigslea Amberley Road
	18A—Between Haigslea Amberley Road and Brisbane Valley Highway
	18A—Between Brisbane Valley Highway and Mount Crosby Road
	18A—Between Mount Crosby Road and Cunningham Highway

19.7.3.2 Local government roads

There are nine named LGRs that directly intersect the Project rail corridor. These roads fall within the jurisdiction of LVRC and TRC and are summarised in Table 19.18. The Project also traverses several unformed roads (i.e. paper roads), including a section of Draper Road and Howmans Road. It is envisaged that these paper roads will be closed under the *Land Act 1994* (Qld) and gazetted as a railway corridor under the TI Act. Design drawings illustrating the relationship between the Project and the roads are provided in Appendix C: Design Drawings.

To facilitate the Project, a number of road upgrades and realignments are required, as summarised in Table 19.18. These changes are generally needed in response to the closure of Morris Road and existing level crossing.

TABLE 19.18: LOCAL GOVERNMENT ROADS: INTERSECTING PROJECT ALIGNMENT

Interface ID	Road name
TRC	
320-1-P-0	Draper Road
320-1-P-0a	Gowrie Junction Road
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)
320-1-P-1 and 320-2-P-1	Morris Road
LVRC	
320-4-P-2 and 320-4-P-2a	Wallens Road
320-4-P-4	Jones Road
320-5-P-1	McNamaras Road
320-6-P-3	Gittins Road
320-8-P-4 and 320-9-P-1	Cattos Road

To facilitate the Project, a number of road upgrades and realignments are required. These roads are summarised in Table 19.19. These changes are generally in response to the closure of Morris Road and the existing level crossing. The changes to the road network are depicted in Appendix C: Design Drawings and are assessed in Appendix U: Traffic Impact Assessment.

TABLE 19.19: PROPOSED CHANGES TO THE LGRS NETWORK

Road name	Extent of impact
Toowoomba Regional Council	
Gowrie Junction Road	Ganzer Road to Morris Road
Old Homebush Road	Gowrie Creek to Gowrie Birnam Road
East Paulsens Road	From intersection with Old Homebush Road east for approximately 1,100 m
Morris Road	Gowrie Junction Road to Road Rail Interface 320-2-P-1
Krienke Road	From intersection with Gowrie Junction Road south west for approximately 400 m
McMahon Road	From intersection Gowrie Junction Road east for approximately 80 m
Lockyer Valley Regional Council	
Wallens Road	Each side of road–rail interface for approximately 350 m
McNamaras Road	Approximately 400 m south east and 200 m north west of road–rail interface
Cattos Road	From intersection with Air Force Road west for approximately 400 m

The Project will also traverse under a number of LGRs, including Boundary Street, Bedford Street and Goombungee Road; while a water pipeline will be constructed in a section of Ganzer Road and Hermitage Road.

There are several LGRs that are proposed to be used during construction of the Project, as shown in Table 19.20, with further detail provided in Appendix U: Traffic Impact Assessment. These fall within the jurisdiction of three LGAs:

- LVRC
- TRC
- Ipswich City Council (ICC).

TABLE 19.20: LOCAL GOVERNMENT ROADS: PROJECT CONSTRUCTION ROUTES

Road name	Road section
LGR: TRC	
Boundary Street	Between Hermitage Road and Toowoomba Bypass
	Between Toowoomba Bypass and Morris Road
Cooby Dam Road	Between Klein Road and Pipeline Road
Gowrie Junction Road	Between Warrego Highway and Ganzer Road
	Between Ganzer Road and Morris Road
Griffiths Street	Between New England Highway and Mort Street
Hermitage Road	Between Gowrie Junction Road and Boundary Street
	Between Boundary Road and Mort Street
	Between Mort Street and Private Access
Highfields Road	Between Klein Road and New England Highway
Klein Road	Between Kleinton School Road and Cooby Dam Road
Kleinton School Road	Between Meringandan Road and Klein Road
Krienke Road	Between Gowrie Junction Road and Morris Road
Larcombe Street	Between North Street and Railway Line
Main Street	Between Meringandan Shirley Road and Klein Road
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road

Road name	Road section
Meringandan Road	Between Highfields Road and Kleinton School Road
Meringandan Shirley Road	Between Main Street and Woolmer Road
Morris Road	Between Gowrie Junction Road and Paulsens Road
	Between Paulsens Road and Boundary Street
Mort Street	Between Hermitage Road and Old Mort Street
	Between Old Mort Street and Mort Street
	Between Toowoomba Bypass and North Street
Munro Street	Between New England Highway and Harlaxton Quarry
North Street	Between Mort Street and New England Highway
Old Goombungee Road	Between Woolmer Road and Old Homebush Road
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road
	Between Gowrie Birnam Road and Paulsens Road
Old Mort Street	Between Mort Street and Mort Street
Omara Road	Between Warrego Highway and Witmack Road
Paulsens Road	Between Morris Road and Old Homebush Road
Pipe Street	Full extent
Pipeline Road*	Full extent
Witmack Road	Between Omara Road and Pipe Street
LGR: LVRC	
Airforce Road	Between William Street and Lockyer Siding Road
	Between Lockyer Sliding Road and Seventeen Mile Road
	Between Seventeen Mile Road and Airforce Road
Arthur Street	Between Georges Street and Mary McKillop Street
	Between Mary McKillop Street and William Street
Ashlands Drive	Full extent
Bells Road	Full extent
Cattos Road	Between Unnamed Road and Airforce Road
George Street	Between Lawlers Road and Arthur Street
Gittins Road	Between Jones Road and McNamaras Road
	Between McNamaras Road and Stevens Road
Howmans Road	Full extent
Jones Road	Between Warrego Highway and Little Oaky Creek Road
	Between Little Oaky Creek Road and Wallens Road
Laidley Street	Between Station Street and Seventeen Mile Road
Lawlers Road	Between Warrego Highway and George Street
Little Oaky Creek Road	Between Roches Road and Jones Road
Mary McKillop Street	Between Turner Street and Arthur Street
McNamaras Road	Between Gittins Road and Unnamed Road
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway
Roches Road	Between Warrego Highway and Little Oaky Creek Road
Seventeen Mile Road	Between Airforce Road and Laidley Street
Station Street	Between Arthur Street and Laidley Street
Turner Street	Between Warrego Highway and Mary MacKillop Street

Road name	Road section
Unnamed Road	Between Airforce Road and Cattos Road
Wallens Road	Between Jones Road and Council Boundary
William Street	Between Arthur Street and Airforce Road
LGR: ICC	
Fairbank Place	Full extent
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty
Newhill Drive	Full extent
Noblevale Way	Between Rob Roy Way and Fairbank Place
Redbank Plains Road	Between Cunningham Highway and Newhill Drive
Rob Roy Way	Full extent

Table note:
* The section of Pipeline Road north of Paton Road that is proposed to be used in the Project is a private road and may be subject to a separate access agreement.

19.7.4 School bus routes

Existing school bus routes that are likely to be impacted by construction traffic and/or changes to the local road networks have been identified through a review of data sourced from the Queensland Government. Identified routes that may be impacted are provided in Table 19.21.

TABLE 19.21: IMPACTED SCHOOL BUS ROUTES

Services	Weekday frequency	Impacted roads	Road–rail interfaces
Queensland school bus routes			
IP1502 AM and PM Hatton Vale, Lowood, Fernvale, Ironbark Area to Ipswich Special School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
IP1503 AM and PM Hatton Vale/Marburg Area to Ipswich Special School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
P1732 AM and PM Hatton Vale Area, Hatton Vale State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
P1751 AM and PM Iredale-Postmans Ridge to Helidon State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
308 (AM and PM): Gowrie State School— Toowoomba	1/AM 1/PM	Gowrie Junction Road Morris Road Paulsens Road Old Homebush Road	320-1-E-1
310 (AM and PM): Gowrie State School— Toowoomba	1/AM 1/PM	Gowrie Junction Road Morris Road Paulsens Road Old Homebush Road	320-1-E-1
316 (AM and PM): Highfields Secondary College, Highfields State School and Toowoomba Christian College—Highfields—Meringandan	1/AM 1/PM	Old Homebush Road Meringandan Road Highfields Road New England Highway	No interface noted

Services	Weekday frequency	Impacted roads	Road–rail interfaces
322 (AM and PM): Toowoomba Grammar School, Toowoomba East State School, Toowoomba State High School (Mount Lofty Campus), Downlands College, Toowoomba State High School (Wilsonton Campus) and Our Lady of Lourdes—Toowoomba—East Toowoomba—Withcott—Helidon	1/AM 1/PM	Warrego Highway North Street	No interface noted
P623 AM and PM Summerholm Area, Hatton Vale State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
S178 Kingsthorpe Secondary to Harristown State High School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
S577 Kingsthorpe/Wellcamp to Harristown State High School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road Toowoomba Cecil Plains Road	No interface noted
S789 Gowrie Mountain—Charlton—Wellcamp to Harristown State High School	1/AM 1/PM	Omara Road Toowoomba Cecil Plains Road	No interface noted
P821 AM and PM Primary and Secondary Services—Glencoe to Gowrie State School		Old Homebush Road	No interface noted
P1751 Iredale–Postmans Ridge to Helidon State School		Warrego Highway Toowoomba Connection Road	No interface noted
61A		Warrego Highway Toowoomba Connection Road	No interface noted
90		Munro Street Warrego Highway	No interface noted
92A	1/day	North Street	No interface noted
92P	1/day	North Street	No interface noted
94A	1/day	North Street New England Highway Griffiths Street	No interface noted
94P	1/day	North Street New England Highway Griffiths Street	No interface noted

19.7.5 Long-distance coach services

Existing long-distance coach services that are likely to be impacted by construction traffic and/or changes to the road network have been identified through a review of data sourced from the Queensland Government. Identified routes that may be impacted are provided in Table 19.22.

TABLE 19.22: IMPACTED LONG-DISTANCE COACH SERVICES

Services	Impacted roads
Toowoomba to Lightning Ridge	New England Highway
Toowoomba to Rockhampton	New England Highway
Toowoomba to Rockhampton	New England Highway, Warrego Highway, Toowoomba Connection Road
Toowoomba to Cunnamulla	New England Highway, Margaret Street, Toowoomba Cecil Plains Road, Hursley Road, New England Highway
Brisbane to Charleville	Gatton Helidon Road, Warrego Highway, Toowoomba Connection Road, Roches Road, New England Highway, Margaret Street, West Street, Bridge Street

Services	Impacted roads
Brisbane to Mount Isa	Cunningham Highway, Warrego Highway, Toowoomba Connection Road, Roches Road, New England Highway, Gatton Helidon Road, Margaret Street, West Street, Bridge Street
Brisbane to Grafton	Pacific Motorway
Brisbane to Grafton (private coach service)	Pacific Motorway, Summerland Way, Villiers Street, Dobie Street

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

19.7.6 Stock routes: Queensland

The Queensland Stock Route Network provides pastoralists with a means of moving stock around Queensland's main pastoral districts as an alternative to motorised transport. Stock routes comprise pathways for moving stock on roads, reserves, unallocated State land and pastoral leases and have no separate title or tenure information. The Stock Route Network is safeguarded by the *Stock Route Network Management Strategy 2020–2025* (Department of Resources, 2021) and is administered under the *Stock Route Management Act 2002* (Qld).

No declared stock routes are intersected by the Project, including the proposed construction routes. The nearest stock route to the Project is associated with the Warrego Highway, west of the Boundary Street intersection. This declared stock route is classified as minor and unused.

There is the potential for private stock routes to be traversed by the Project. Impacts on private stock routes will be determined on a case-by-case basis and in consultation with the relevant landholder and/or stakeholder.

19.7.7 Strategic tourist routes

Primary construction routes that are along existing strategic tourist routes were taken into account as part of this assessment. Primary construction routes which use the following existing tourist routes are:

- Adventure Way, along Warrego Highway, between Omara Road and Ipswich Motorway
- Warrego Way, along Warrego Highway, between Omara Road and Ipswich Motorway
- Pacific Coast Way, along Pacific Motorway, between Logan Motorway and Smith St Motorway
- Bicentennial National Trail, along Jones Road, Gittins Road and Stevens Road.

The Project will also traverse the Bicentennial National Trail at Gittins Road (i.e. a viaduct is proposed at this location, so long-term impacts are anticipated at this location).

19.7.8 Cycling and pedestrian network

A review of the Queensland Principal Cycle Network Plans (PCNP) was undertaken to identify any existing active transport networks that may coincide with proposed road network changes, along with the construction traffic routes in Queensland. The review indicated that Gowrie Junction Road (between Gowrie Birnam Road and Warrego Highway) is part of the PCNP, while other PCNP that coincide with proposed construction traffic routes include the following:

Toowoomba Regional Council

- Omara Road, between Witmack Road and Warrego Highway
- North Street, between Greenwattle Street and Ruthven Street
- Mort Street, between Hermitage Road and West Street
- Hermitage Road, between Mort Street and Hermitage Road East
- McDougall Street, between Rocla Court and Taylor Street
- Highfields Road, between O'Brien Road and New England Highway.

State-controlled roads: Department of Transport and Main Roads

- Ipswich Motorway, between Logan Motorway and Station Road
- Logan Motorway, between Ipswich Motorway and Wembley Road
- River Road, between Warrego Highway and Brisbane Road
- Brisbane Road, between River Road and Hamilton Street
- Ipswich Motorway, between Warrego Highway and Centenary Motorway
- New England Highway, between Griffiths Street and Highfields Road
- Toowoomba Cecil Plains Road, between Hanrahans Road and Toowoomba Bypass
- Toowoomba Bypass, between Toowoomba Cecil Plains Road and Warrego Highway
- Toowoomba Bypass, between Gowrie Junction Road and Hermitage Road
- Warrego Highway, between Mount Crosby Road and Wulkuraka Connection Road
- Warrego Highway, between Holberton Street and Omara Road.

19.7.9 Crash history

19.7.9.1 Rail network safety

There are over 23,500 level crossing across Australia, with over 1,200 level crossings that are connected to the road network in Queensland. As noted in Section 19.7.1, there are 12 level crossings on the West Moreton System between Gowrie and Helidon. There were no collisions on these level crossings in 2019-2020, however Queensland Rail noted that during the 2019-2020 financial year:

- Seven collisions occurred at level crossings, and
- There were 211 near miss incidents, with 33 near miss incidents reported on the West Moreton System between Rosewood and Quilpie (Queensland Rail, 2021).

The overall trend since January-June 2016 across Australia is that the number of freight train incidents with road vehicles has nearly doubled from 0.115 per million freight train km to 0.213 per million freight train km in July-December 2020 (ONRSR, 2021). While there has been a slight decrease in the number of level crossing near misses in the same period, down from 2.817 per million freight train km in January-June 2016 to 2.111 in July-December 2020 (ONRSR, 2021).

The Project plans to eliminate an existing level crossing as part of the Project in preference for a grade-separation solution; however, a number of the construction roads identified for the Project will interface with a rail level crossing, including North Street, Toowoomba and Turner Street at Helidon.

In addition to the level crossing incidents, the ONRSR (2020) noted that during the 2019-2020 financial year there were:

- Four running line collisions between trains and with rolling stock (0.02 per million train km)
- 36 freight train derailments (running line), 0.42 per million freight train km
- 83 train fires (passenger or freight), 0.37 per million passenger/freight train km.

19.7.9.2 Road network incidents

A review of 5-year crash data (between 2012 and 2017) provided by DTMR was undertaken to assess the proposed construction traffic routes. A tabulated summary is provided in Table 19.23.

TABLE 19.23: CRASH HISTORY

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total crashes
LGR: TRC				
Gowrie Junction Road	3.95	4,201	165	3
Griffiths Street	1.43	5,930	91	8
Hermitage Road	3.47	185	52	2
Highfields Road	4.36	2,907	45	12
McDougall Street	0.62	47	1	7
Meringandan Shirley Road	2.56	2,448	28	1
Morris Road	0.7	2,199	134	3
Mort Street	2.81	185	105	28
North Street	3.42	7,710	9	18
Old Goombungee Road	1.54	934	28	2
Omara Road	1.65	28	1	3
Pipe Street	0.27	520	1	1
LGR: LVRC				
Jones Road	8.8	1,160	246	2
Lawlers Road	0.55	2,370	55	1
Little Oaky Creek Road	0.45	793	191	1
Postmans Ridge Road	2.65	447	226	7
SCR: DTMR				
17B—Cunningham Highway	4.3	42,167	11	18
314—Gatton Helidon Road	14.3	5,060	4	27
17A—Ipswich Motorway	8.2	108,841	34	109
301—Ipswich-Cunningham Highway Connection Road	4.7	27,588	166	78
Logan Motorway	30.2	108,841	34	211
4104—Murphys Creek Road	24.5	1,859 to 2,150	133	28
22A—New England Highway	13.5	20,403	29	93
12A—Pacific Motorway	66.6	157,018	34	1104
309—River Road	0.7	7461	176	3
319—Toowoomba Bypass	No data (new road—opened in September 2019)			
324—Toowoomba Cecil Plains Road	1.8	3,117	118	1
315—Toowoomba Connection Road (section of Warrego Highway)	11.7	24,605	424	544
18A—Warrego Highway	105.7	57,860	424	544
LGR: ICC				
Haigslea Malabar Road	1.7	407	41	7
Mount Marrow Quarry Road	1.7	407	41	1
Redbank Plains Road	1.5	15,711	11	8

Table note:
ADT = average daily traffic
Only roads that have experienced crashes in the last 5 years have been included in this table.

19.8 Potential impacts

19.8.1 Changes to the road network

There will be a number of changes to the local road network as a result of the Project, including realignments and upgrades. The majority of the works will occur within the existing road reserve and, in some cases, improve the existing condition (e.g. East Paulsens Road).

The main changes are located in the vicinity of Gowrie and are required to facilitate the construction of the rail corridor, within the existing Gowrie to Grandchester future state transport corridor, across the existing Gowrie Junction Road and Morris Road road reserves (refer Figure 19.9).

At this location, it is proposed to co-locate a crossing loop and the main track with the West Moreton System, impacting Gowrie Junction Road and Morris Road. East of Gowrie, the Project alignment (crossing loop and main track) deviates to the southeast from the West Moreton System, intersecting Morris Road, with a spur line to Toowoomba also intersecting Morris Road. There is the potential for trains to be on the crossing loops for an extended period and, as such, a level crossing is not a feasible option for both Gowrie Junction Road and Morris Road.

ARTC, therefore, proposes to close and realign a section of Gowrie Junction Road/Morris Road/Paulsens Road (i.e. existing level crossing over the West Moreton System). The realignment involves extending the existing section of Gowrie Junction Road on similar bearing from Ganzer Road, traversing over (road-over-rail bridge) the proposed Project alignment, a realigned section of Morris Road, the West Moreton System, Paulsens Road and Gowrie Creek before tying into Old Homebush Road. The bridge will have sufficient clearance to cater for the proposed rail traffic, estimated to be 6.9 m high (double stacked containers).

Access to Paulsens Road and East Paulsens Road will be via the realigned section of Gowrie Junction Road and Old Homebush Road.

An approximately 600-m long section of Morris Road will be closed, including the underpass linking East Paulsens Road to Morris Road. This change will not impact access to existing houses along Morris Road (excluding the properties to be resumed) between Boundary Street and Gowrie Junction Road. While to the east, East Paulsens Road will be upgraded to allow access from Old Homebush Road.

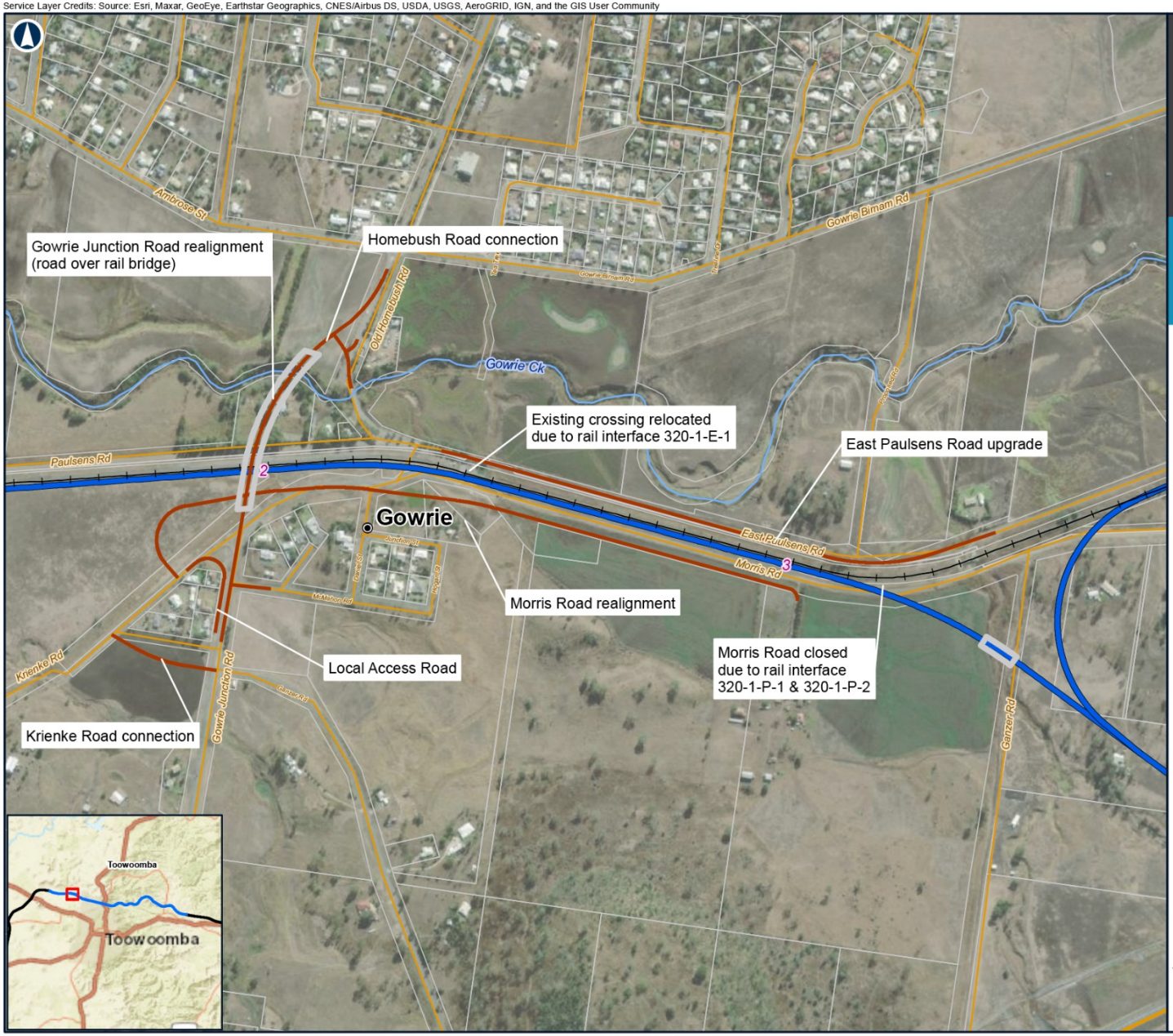
Cattos Road/Airforce Road intersection will also be closed as a result of the Project, with an alternative intersection proposed to the north, with Cattos Road also realigned. There will be no change to Airforce Road or the existing occupational crossing off Cattos Road.

Further details on the changes to the road network are provided in Chapter 6: Project Description and Appendix U: Traffic Impact Assessment, including the traffic analysis of the proposed changes.

There will be impacts to road users and property access as a result of these changes to the road network, including changes to travel times, road closures (temporary and permanent), along with the indirect impacts associated with road works (e.g. visual, noise and air quality).

In addition, works will occur within the road reserves including new access points and installation of services such as the new water pipeline from the western tunnel portal south to Hermitage Road.

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



INLAND RAIL ARTC

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

GOWRIE TO HELIDON

Figure 19.9: Toowoomba Regional Council Road Upgrades/Realignments

LEGEND

- Localities
- Proposed road alignments
- G2H project alignment
- Existing rail
- Watercourses
- Major roads
- Minor roads
- Cadastre
- Bridges

0 0.2 0.4 km

Coordinate System: GDA 1994 MGA Zone 56

Date: 15/06/2021
Author: FFJV GIS
Data Sources:

Paper: A4
Scale: 1:10,000

Map by: KG, AWS Z:\GIS\GIS_3200_G2H\Tasks\320-ITR-201909051510_Figures_and_Appendicies\320-ITR-201909051510_Fig19.9_TRC_RoadUpgradesRealignments_v1.mxd Date: 15/06/2021 15:13

19.8.2 Construction

Construction activities will generate and add a varying amount of Project traffic onto the surrounding road network. New access tracks will be constructed in areas where the Project is not adjacent to existing roads or the existing rail line; in particular, the greenfield segment east of the Toowoomba Range.

Potential impacts associated with construction traffic include:

- Deliveries of large loads may increase road safety hazards
- Potential for impacts on the structural integrity of State-controlled and local roads
- Increase in vehicle emissions (including odours and fumes) impacting on sensitive receptors (refer to Chapter 12: Air Quality)
- Driver frustration resulting from construction traffic and congestion.

Major construction activities will consist of the delivery of: quarry materials (ballast, capping materials); pre-cast concrete; ready mix concrete; rail; consolidated sleepers; earthworks materials; workforce trips; delivery of water; and delivery and movement of plant, tools and other materials.

The hours for the construction phase are expected to be 6.30 am to 6.00 pm every Monday to Friday and 6.30 am to 1.00 pm every Saturday, as per normal construction working hours. Tunnel construction activities will occur 24 hours a day, 7 days a week (24/7). The haulage activity of construction equipment and material is anticipated to occur 7 days a week.

Works outside of standard construction hours will occur throughout the duration of the construction program and will involve:

- Track works, including tamping, ballast profiling, earthworks and formation works
- Delivery of concrete, steel and other construction materials delivered to site by heavy vehicles
- 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 heavy vehicles
- Alternative construction rosters to suit delivery and industrial relations issues may be investigated by the construction contractor
- Various low-intensity activities.

19.8.2.1 Rail network

The Project is co-located with the existing QR network for 5.6 km, while also crossing over the QR network at Gowrie and east of Lockyer Creek. There is the potential for construction works to impact on train operations during works in these areas; however, where possible, the design has provided sufficient buffering to allow most activities to occur without disrupting existing operations, including maintenance activities (e.g. separation distance of 6.5 m). ARTC and the construction contractor will work with QR to identify appropriate measures to avoid or minimise impacts to existing rail operations and infrastructure, including coinciding track possessions (which will generally be scheduled over weekend periods) and proposed maintenance schedules by QR, with extended track possessions occurring over holiday or non-seasonal periods (i.e. outside of grain movement periods).

There is currently one existing level crossing within the Project rail corridor that would be impacted. This existing level crossing is a passive level crossing with flashing lights. As a part of the Project, this level crossing is planned to be closed with an alternative crossing proposed (i.e. Gowrie Junction Road grade separation (at 320-1-P-0a)). In addition, access to the existing underpass from East Paulsens Road to Morris Road will also need to be managed in consultation with QR and the relevant councils during construction, with the intent to close the underpass to the public; therefore, there will be no operational impacts of a level crossing at this location and road safety will improve for all road users as a result of the removal of this level crossing. Table 19.13 shows the location of the existing rail crossings along the proposed alignment.

The Project will also impact existing services within the rail corridor that will also need to be relocated and/or reinstated in consultation with QR. These services will be relocated within the rail corridor, which will be widened to allow for both the QR and ARTC rail infrastructure (i.e. the EIS footprint allows for the widening of the existing rail corridor to the width required for the safe construction and operation of both the rail lines). Some of the works may be undertaken by QR as part of their approval processes. The design has also considered the reinstatement of existing RMARs, which service the West Moreton System.

ARTC will also use the existing rail network to support construction activities, including the delivery of rail.

There are ongoing discussions between ARTC and QR regarding the Inland Rail Program, and potential interfaces during construction and operation, along with matters around the land acquisition and tenure arrangements.

Early consultation during detailed design will be conducted with QR as rail manager of the West Moreton System and the South Western System. These stakeholders will require sufficient time to develop contingencies to mitigate potential disruption. The aim of this early consultation is to inform stakeholders on the programming of construction activities requiring track possessions, the intended effective communication strategies and adopted impact mitigation strategies. Initial consultation with AgForce and local governments will assist with stakeholder identification.

19.8.2.2 Existing level crossing along construction routes

Existing level crossings that are located along the proposed construction transport routes have been summarised in Table 19.24, along with their associated LGA and proposed peak construction vehicles per day.

TABLE 19.24 EXISTING LEVEL CROSSINGS ALONG CONSTRUCTION ROUTES

Level Crossing Road name	Estimated peak construction heavy vehicles per day
TRC	
Warrego Highway (SCR)	1
North Street (East)	17
North Street (West)*	17
Griffiths Street*	67
Paulsens Road (referenced as Gowrie Junction Road by QR)	28
LVRC	
Mary McKillop Street	203
ICC	
Ipswich-Cunningham Highway Connection Road (SCR)	0

Of the level crossings provided in Table 19.24, Griffiths Street and North Street (West) level crossing are incorporated into the signalised intersections at their respective locations, therefore it is not considered that these level crossings will have any significant issues with the additional construction vehicles.

As the construction vehicle volumes are very low at the Warrego Highway and Ipswich-Cunningham Highway Connection Road level crossings, it is not considered that these level crossings will have any significant issues, but should be monitored during construction, with QR notified of any issues.

The level crossing located at Paulsens Road is proposed to be closed as a part of the Project (refer to 19.7.1.2), however engagement and consultation with QR and TRC will be required prior and during construction in order to access this level crossing. Access to the existing underpass to the east of this level crossing (Paulsens Road underpass) will need to be managed in consultation with QR and TRC during construction, with the intent to close this underpass for public access (as discussed in section 19.7.1.2)

Due to the higher estimated construction volumes at Mary McKillop Street at Helidon construction vehicle access at this level crossing will need to be managed in consultation with QR and LVRC in order to mitigate any potential impacts.

Further consultation with the QR will be required prior to the use of these roads and associated level crossings by construction traffic in order to mitigate potential impacts. This consultation and engagement will be required during the detailed design phase, prior to and during construction. This will include consultation on adequate traffic and safety management plans for the level crossings. Furthermore, access into the existing rail corridor at these locations during construction will also need to be managed in consultation with QR and the relevant local government authority.

19.8.2.3 Bus routes

The construction associated with the Project will impact on the school bus route servicing Gowrie State School. This includes roadworks, which may impact on travel times and, potentially, the school route. In addition, the closure of Morris Road will alter the existing bus route, with the impacts to the service to be determined in consultation with the Department of Education, the bus operator and TRC.

The construction routes (18 in Queensland) also overlap with school bus routes, which may disrupt services, along with the potential for interactions between construction vehicles, school buses and students. Given the low frequency of the services, 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 Project construction.

19.8.2.4 Active transport

To identify any existing on-road cycleways that may coincide with proposed construction routes in the Queensland region, a review of the Queensland PCNP has been undertaken. The PCNP is a guide for future cycleway planning and it presents the core routes that are required to increase cycling among the population. Section 19.7.8 shows that several cycling paths within the PCNP coincide with proposed construction traffic routes.

The proposed construction routes currently traverse through areas of moderate-to-high pedestrian activity, including parts of Toowoomba, Withcott and Helidon. While increased heavy vehicle movements through these locations may adversely impact pedestrian movements, the majority of these routes currently facilitate a high proportion of heavy vehicle movements regardless, e.g. Warrego Highway. Notwithstanding, the presence of pedestrian and cycle routes should be considered in the preparation of final construction routes under the detailed design and construction phases of the Project in agreement with the relevant local council and DTMR.

- Owing to the isolated location of the works, and low volume of construction traffic traversing through impacted active travel networks in Lockyer Valley and Toowoomba LGAs, pedestrian or cyclist movements are not expected to be affected by the construction traffic
- There are no active dedicated pedestrian level crossings along the existing corridor, while the one existing vehicular level crossing, which is also part of the PCNP, will be closed and relocated to a grade-separated crossing. No dedicated level crossings (pedestrian or vehicular) are required for this Project.
- As noted in Section 19.7.7, Gittins Road and Jones Road are part of the Bicentennial National Trail. Construction works on Gittins Road may impede access to pedestrians and other users of the trail, though this impact will be temporary, with measures in place to maintain access along this route. Jones Road and Gittins Road are also proposed construction routes and there may be a risk to trail users during this period.

19.8.2.5 Traffic analysis

Traffic growth rates on SCRs were derived based on historic permanent census traffic data, where available. An evaluation of the traffic growth rates in this traffic data revealed an overall annual average AADT growth rate of 2 per cent; however, in the absence of available historical count data or forecast models, the 2 per cent growth rate calculated from the SCRs was adopted in the analyses for all SCRs and LGRs for all vehicle types. Throughout the operational phase, the impacts from the Project are expected to be negligible, given the expected nature of operations (i.e. infrequent vehicle movements to/from depots, transportation of maintenance material within the rail corridor, proposed grade-separated crossings). Traffic growth rates are presented in Appendix U: Traffic Impact Assessment.

The changes to the road network, including the closure of Morris Road, will impact the surrounding network in a variety of ways; however, for the most part, these impacts are minimal and do not change the traffic operation of the network. Furthermore, the capacity analysis shows that there is no material impact on operations for any of the intersections assessed due to the closure of Morris Road.

The three traffic analysis parameters used below were based on identified construction routes and at public road–rail interface locations:

- Five per cent increase in traffic compared to existing traffic (road links and intersections)
- LOS analysis
- Intersection performance analysis.

Five per cent traffic comparison on links

A 5 per cent traffic comparison analysis was undertaken of all construction routes (48 LGRs) and a list of road sections (representing 31 roads), to determine road sections where Project traffic will equate to or exceed 5 per cent over the construction years, is provided in Table 19.25. According to 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. Note that some percentages are high (above a 100 per cent increase in some cases), which is due to low volumes of existing background traffic along the relevant road sections. The temporal change for each of the road sections is provided in Appendix U: Traffic Impact Assessment (Section 6.2.1).

TABLE 19.25: FIVE PER CENT TRAFFIC COMPARISON ANALYSIS ON ROAD SECTION

Road name	Road section	Five percent comparison analysis (maximum change during construction)
LGR: TRC		
Boundary Street	Between Hermitage Road and Toowoomba Bypass	6%
Boundary Street	Between Toowoomba Bypass and Morris Road	33%
Cooby Dam Road	Between Klein Road and Pipeline Road	112%
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	5%
Hermitage Road	Between Gowrie Junction Road and Boundary Street	7%
Hermitage Road	Between Mort Street and Private Access	48%
Highfields Road	Between Klein Road and New England Highway	5%
Klein Road	Between Kleinton School Road and Cooby Dam Road	58%
Kleinton School Road	Between Meringandan Road and Klein Road	13%
Krienke Road	Between Gowrie Junction Road and Morris Road	213%
Main Street	Between Meringandan Shirley Road and Klein Road	17%
Meringandan Road	Between Highfields Road and Kleinton School Road	13%
Morris Road	Between Gowrie Junction Road and Paulsens Road	16%
Morris Road	Between Paulsens Road and Boundary Street	12%
Mort Street	Between Toowoomba Bypass and North Street	5%
Munro Street	Between New England Highway and Harlaxton Quarry	23%
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	5%
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	7%
Old Homebush Road	Between Gowrie Birnam Road and Paulsens Road	10%
Old Mort Street	Between Mort Street and Mort Street	12%
Pipeline Road	Full Extent	305%
LGR: LVRC		
Airforce Road	Between William Street and Lockyer Siding Road	73%
Airforce Road	Between Mary McKillop Street and William Street	16%
Arthur Street	Between Georges Street and Mary McKillop Street	12%
Arthur Street	Between Mary McKillop Street and William Street	50%
Ashlands Drive	Full Extent	7%

Road name	Road section	Five percent comparison analysis (maximum change during construction)
Bells Road	Full Extent	7%
Cattos Road	Between Unnamed Road and Airforce Road	13%
George Street	Between Lawlers Road and Arthur Street	
Gittins Road	Between Jones Road and McNamaras Road	27%
Gittins Road	Between McNamaras Road and Stevens Road	151%
Howmans Road	Full Extent	18%
Jones Road	Between Little Oaky Creek Road and Wallens Road	283%
Lawlers Road	Between Warrego Highway and George Street	7%
Little Oaky Creek Road	Between Roches Road and Jones Road	78%
Mary McKillop Street	Between Turner Street and Arthur Street	50%
McNamaras Road	Between Gittins Road and Unnamed Road	102%
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	220%
Roches Road	Between Warrego Highway and Little Oaky Creek Road	57%
Turner Street	Between Warrego Highway and Mary MacKillop Street	10%
Unnamed Road	Between Airforce Road and Cattos Road	10%
Wallens Road	Between Jones Road and Council Boundary	4060%
William Street	Between Arthur Street and Airforce Road	53%
SCR: DTMR		
Murphys Creek Road	4104—Between Warrego Highway and Brookside Place	14%
Murphys Creek Road	4104—Between Brookside Place and Toowoomba Bypass	14%
Murphys Creek Road	4104—Between Toowoomba Bypass and Howmans Road	14%
10%Toowoomba Bypass	319—Between Boundary Street and New England Highway	10%
Toowoomba Bypass	319—Between New England Highway and Warrego Highway	7%
LGR: ICC		
Fairbank Place	Full Extent	8%
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	19%
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	19%
Noblevale Way	Between Rob Roy Way and Fairbank Place	6%

As noted in the table above, 19 road segments in the Toowoomba LGA (representing 14 roads) and 19 road segments in the Lockyer Valley LGA (representing 17 roads) exceed the 5 per cent of the background traffic during the construction period (minimum of one year). It should be noted that 18 road segments (representing 17 roads) will endure traffic volumes in excess of 5 per cent of the background traffic for all years of construction. This includes Hermitage Road, Krienke Road, Morris Road, Old Mort Road and Pipeline Road in the Toowoomba LGA; and Airforce Road, Arthur Street, Ashlands Drive, Bells Road, Gittins Road, Jones Road, Little Oaky Creek Road, Howmans Road, McNamaras Road, Postmans Ridge Road, Roches Road and Williams Street in the Lockyer Valley LGA.

It should be noted that all three sections of Murphys Creek Road will endure traffic volumes in excess of 5 per cent of the background traffic for all years of construction. Exceedances on the other SCRs will occur in either year one or two of construction.

A summary of the number of roads with construction traffic that exceeds 5 per cent of base AADT during at least one year of construction has been provided for each road authority, in Table 19.26. It is noted that some of the sections exceeded 10 per cent of the background traffic; however, this is primarily due to the low background traffic volumes along these sections.

TABLE 19.26: NUMBER OF ROADS EXCEEDING FIVE PER CENT BASE AADT BY ROAD AUTHORITY

	Number of roads	
Road Authority	**5 10% of base AADT**	**>10% base AADT**
TRC	4	12
LVRC	4	15
DTMR	2	1
ICC	1	2

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.

The impacts identified due to various construction activities are expected to be short-term and only for the duration of the specific activities (refer to construction schedule in Chapter 6: Project Description). Generally, the level of impacts identified would only be for periods less than one year that can be mitigated through adequate traffic management measures.

Level of service comparison on links

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

The results of the LOS comparison indicate that the Project construction traffic will not result in the change to the LOS for all of the construction road sections assessed (refer Appendix U: Traffic Impact Assessment, Section 6.2.2) apart from g the following road section in each direction:

- LVRC:
  - Turner Street—between Warrego Highway and Mary McKillop Street (LOS A to LOS B, due to the addition of up to 18 vehicles/hour during the peak construction hour).

Although there is a change in operational LOS for this road section, the expected operational LOS B is considered acceptable given the short duration of the construction activities; 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. In addition, the operational performance of the road would also return to base conditions after construction is complete. Based on the LOS comparison, it is not expected that the Project would generate the need to upgrade the road network for these temporary construction activities.

Regardless, as per the earlier assessments, it is important that the routes are reviewed in the preparation of the TMP, from a physical and safety perspective, prior to the commencement of construction activities to ensure that they are suitable. This would 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 required to ensure the routes are suitable for the level of construction activity proposed.

Intersection impact assessment

Based on the traffic, transport and access assessment, transportation of materials, workforce and equipment the key transport routes for the Project have been identified. From the analysis of these transport routes, all intersections have been identified that are expected to cater to the movement of construction-related activities during the various construction stages. It is noted that when an upgrade to an intersection is warranted under existing conditions, Project-related impacts will need to be mitigated, regardless of the intersection design or age. The intersections where turning movements along assumed construction routes would occur are provided in Table 19.27.

TABLE 19.27: INTERSECTIONS WITH POTENTIAL CONSTRUCTION IMPACTS

Name	Joint ownership
TRC	
Cooby Dam Road/Pipeline Road	
Kleinton School Road/Klein Road	
Meringandan Road/Kleinton School Road	
Meringandan Road/Highfields Road	
Goombungee Meringandan Road/Meringandan Shirley Road	
Old Goombungee Road/Old Homebush Road	
Morris Road/Krienke Road	
Krienke Road/Unnamed Road	
Gowrie Junction Road/Unnamed Road	
Gowrie Junction Road/Hermitage Road	
Hermitage Road/Boundary Street	
Boundary Street/Toowoomba Bypass Off Ramp	DTMR/Nexus
Boundary Street/Toowoomba Bypass On Ramp	DTMR/Nexus
Mort Street/Old Mort Street (North)	
Mort Street/Old Mort Street (South)	
Mort Street/Griffiths Street	
Mort Street/North Street	
North Street/Larcombe Street	
Omara Road/Witmack Road	
Witmack Road/Pipe Street	
LVRC	
Jones Road/Little Oaky Creek Road	
Jones Road/Bells Road	
Gittins Road/Gittins Road	
Postmans Ridge Road/Ashlands Drive	
Turner Street/Mary McKillop Street	
Arthur Street/Mary McKillop Street	
George Street/Arthur Street	
Arthur Street/Station Street	
Airforce Road/Unnamed Road	
Seventeen Mile Road/Unnamed Road	
Seventeen Mile Road/Laidley Street	
Laidley Street/Station Street	
DTMR	
New England Highway/Highfields Road	TRC
New England Highway/Griffiths Street	TRC
New England Highway/Munro Street	TRC
New England Highway/North Street	TRC
New England Highway/New England Highway	
Toowoomba Connection Road/New England Highway	
Warrego Highway/Toowoomba Cecil Plains Road	

Name	Joint ownership
Warrego Highway/Warrego Highway	
Warrego Highway/Gowrie Junction Road	TRC
Warrego Highway/Toowoomba Bypass off ramp	
Warrego Highway/Omara Road	TRC
Toowoomba Cecil Plains Road/Toowoomba Bypass on ramp	
Toowoomba Cecil Plains Road/McDougall Street	TRC
Toowoomba Connection Road/Roches Road	LVRC
Toowoomba Connection Road/Jones Road	LVRC
Toowoomba Connection Road/Murphys Creek Road	
Murphys Creek Road/Murphys Creek Road	
Murphys Creek Road/Postmans Ridge Road	LVRC
Murphys Creek Road/Howmans Road	LVRC
Warrego Highway/Postmans Ridge Road	LVRC
Warrego Highway Off Ramp/Gatton Helidon Road	
Warrego Highway Off Ramp/Lawlers Road	LVRC
Warrego Highway/Haigslea Malabar Road	ICC
Ipswich Cunningham Highway Connection Road/River Road	
Cunningham Highway/Cunningham Highway	
Cunningham Highway Off Ramp/Redbank Plains Road	ICC
New England Highway/New England Highway	
ICC	
Haigslea Malabar Road/Mount Marrow Quarry Road	
Haigslea Malabar Road/Haigslea Malabar Road	
Rob Roy Way/Noblevale Way	
Noblevale Way/Fairbank Place	
Rob Roy Way/Newhill Drive	

In order to assist in quantifying the number of intersections that may experience potential operational impacts, a preliminary assessment has been undertaken to compare base traffic flows with construction flows to determine intersections that may require upgraded turning treatments to accommodate assumed construction traffic flows. This method is generally consistent with the warrants outlined in *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austroads, 2019a). The timing of any potential upgrade works to intersections will be determined in the detailed design stage of the Project, including any permit changes.

This assessment compares assumed intersection turning movements imputed from available data (based on 50:50 directionality) with construction flows to determine intersections that may require upgraded turning treatments to accommodate temporary construction traffic flows. The assessments were undertaken based on peak construction volumes at the intersection; therefore, these are likely to represent the worst-case construction scenarios at these locations.

The intersections that would experience a development traffic turning volume of more than five vehicles per hour were plotted on the turn warrant graphs from *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austroads, 2019a) Of these, those intersections that indicated that the existing layout was not sufficient to accommodate expected development traffic are summarised in Table 19.28. When an upgrade to an intersection is warranted under existing conditions, mitigation of Project-related impacts is required, regardless of the intersection design or age.

TABLE 19.28: INTERSECTIONS REQUIRING TURN WARRANT TREATMENTS

Intersection with potential operational impacts
LGA: TRC
Cooby Dam Road/Pipeline Road
Gowrie Junction Road/Krienke Road
Meringandan Road/Highfields Road
Kleinton School Road/Klein Road
Krienke Road/Unnamed Road
Meringandan Road/Kleinton School Road
Morris Road/Krienke Road
Mort Street/Old Mort Street
LGA: LVRC
Arthur Street/Mary McKillop Street
Airforce Road/Unnamed Road
George Street/Arthur Street
Gittins Road/Gittins Road
Jones Road/Little Oaky Creek Road
Jones Road/Bells Road
Murphys Creek Road/Postmans Ridge Road
Murphys Creek Road/Murphys Creek Road
Murphys Creek Road/Howmans Road
Postmans Ridge Road/Ashlands Drive
Seventeen Mile Road/Unnamed Road
Turner Street/Mary McKillop Street
Toowoomba Connection Road/Roches Road
Toowoomba Connection Road/Murphys Creek Road
Warrego Highway/Postmans Ridge Road
LGA: ICC
Ipswich Cunningham Highway Connection Road/River Road

During the next stage of the Project, how the access tracks connect to the existing road network will be assessed. This will include determining if the intersections leading to these access tracks and laydown areas will be able to accommodate construction traffic. Any new accesses formed as part of the Project will comply with the TI Act and relevant approvals from DTMR.

In addition to the intersections, the following mass haul restrictions are also noted:

- Gittins Road (Toowoomba Bypass Underpass) has a height restriction of 4.8 m and further investigation is warranted in consultation with DTMR and LVRC about potential solutions, including:
  - Traffic management arrangements will have to be in place during movement of bulk earthworks and materials for bridge construction
  - Earthworks vehicles will have to be appropriately sized to use this clearance envelope. A 30 t Moxy or road legal truck and dogs should not present an issue.
  - The delivery of segmental box girders will have to be controlled and deliveries undertaken using low loaders. The height of a box girder is 3,225 mm. The low-loader height (and cribbing) will have to be less than 1,500 mm to fit.

- Due to the nature of the required earthworks mass haul for the Project, a large volume of material is required to be moved from the west to the east of Murphys Creek Road. The most efficient way to do this will be to use off-road vehicles directly from the point of cut and transport it along the alignment. The interface and temporary traffic management arrangements at Murphys Creek Road will have to fully designed and agreed with DTMR and LVRC.

Other potential constraints to mass haul from the existing road network, includes the single land bridge on Murphy Creek Road (first crossing of Rocky Creek), no right turn from Warrego Highway/Postmans Ridge and Roches roads, along with powerlines, water and gas pipelines underlaying construction routes).

Further information is provided in Appendix U: Traffic Impact Assessment (Section 6.3), including flow impacts to nearby intersections.

19.8.2.6 Pavement impacts on road links

A preliminary desktop pavement impact assessment was undertaken on all potentially affected SCRs based on the existing background traffic data available for the relevant road sections. The following is a summary of the approach and methodology adopted for the preliminary desktop pavement impact assessment for affected SCRs:

- Determine the number and types of vehicles that will be generated by the development, in both construction and operation, and determine sections of the network where pavement assessment is most likely required for each year of implementation
- Convert the development traffic volumes into SARs based on the assumed number of SARs per vehicle
- Undertake a 5 per cent comparison of the background SARs and Project-generated SARs for each link identified to be most likely impacted by the Project.

Table 19.29 lists the DTMR SCR segments that are likely to equate to, or exceed, the 5 per cent SAR threshold.

TABLE 19.29: FIVE PER CENT STANDARD AXLE REPETITIONS (SARS) COMPARISON ANALYSIS ON STATE-CONTROLLED ROAD LINKS

Road name	Road ID—road section	5% comparison analysis
SCRs: DTMR		
Murphys Creek Road	4104—Between Warrego Highway and Brookside Place	159%
	4104—Between Brookside Place and Toowoomba Second Range Crossing	159%
	4104—Between Toowoomba Bypass and Howmans Road	159%
New England Highway	22A—Between Highfields Road and Murphys Creek Road	20%
	22A—Between Murphys Creek Road and Munro Street	25%
	22A—Between Munro Street and North Street	27%
	22A—Between North Street and Warrego Highway	48%
Toowoomba Bypass	319—Between Boundary Street and New England Highway	8%
Toowoomba Cecil Plains Road	324—Between Boral Quarries and Toowoomba Bypass	7%
Warrego Highway	18A—Between New England Highway and James Street	6%
	18A—Between James Street and Tourist Road	6%

The findings of the pavement impact assessment show that five SCRs are likely to cross the 5 per cent SAR threshold, with several road segments exceeding this threshold by a significant margin (over 20 per cent). This analysis is based on the assumption of fully loaded vehicles in each direction, which is conservative to ensure no underestimation of pavement impacts. While it is expected that this may be true for a small percentage of trips, this assumption is considered conservative and would be confirmed during the detailed design stage by the construction contractor.

The analysis indicates that the SCR segments would have a minimal pavement impact given the duration of the construction activities and pavement loading. It is proposed that a more detailed pavement impact assessment will be carried out prior to construction, and in consultation with DTMR, once specific construction routes are determined. This assessment will form part of management plans developed prior to construction and assist DTMR in identifying maintenance costs for the affected road sections.

Further details on the pavement impacts on road links are included in Appendix U: Traffic Impact Assessment.

19.8.2.7 Impacts on emergency services

The Project has the potential to result in the following during construction:

- Increased journey times on road linkages used by construction traffic
- Increased waiting time at intersections used by construction traffic
- Temporarily altered driving conditions in proximity to construction areas, such as reduced speed limits, mobile traffic lights and lane reconfigurations.

These impacts have potential to result in increased response times for emergency services.

Currently, emergency services cannot generally use the existing road–rail interface (320-1-E-1). The proposed grade-separated road–rail interface at Gowrie Junction Road (320-1-P-0a) is likely to improve emergency services access during the operations stage of the project. These upgrades will also likely allow for wet weather travel in the vicinity.

ARTC will continue to work with emergency services, along with the relevant disaster management groups, councils and DTMR to develop protocols and joint working arrangements to address potential impacts on emergency services and service response times during construction; and ensure that access and evacuation routes are retained as required.

Response times for emergency services may be delayed if they encounter significant roadworks. ARTC will work with the relevant emergency services agencies (e.g. QLD Fire and Emergency Services (QFES), QLD Ambulance Service (QAS) and QLD Police Service (QPS)) 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 QFES, QAS and QPS will all be consulted in order to identify suitable emergency access points to the rail corridor. Noting that QFES has been consulted regarding access requirements to the Toowoomba Range Tunnel.

19.8.2.8 Impacts on existing haulage routes

The Project interfaces with Airforce Road and Murphys Creek, which are recognised by the Gatton Planning Scheme as haulage routes. Airforce Road and the southern section of Murphys Creek Road are also heavy vehicle routes (i.e. B-double vehicles up to 25 m).

Airforce Road services a number of industries located to the northwest of Helidon, including forestry, extractive industries, livestock (i.e. Helidon Spa dip), along with transport industries that support the Helidon Magazine Reserve. The Project will not impact directly on these industries; however, the construction works within and adjacent to the Airforce Road road reserve may impact travel times. This includes temporary and partial road closures and potential changes to the level of service. No long-term change to the design of Airforce Road is anticipated as a result of this Project.

The Project also proposes to close the existing Cattos Road/Airforce Road intersection and relocate the intersection to the north. Further consultation is required with LVRC and key stakeholders to confirm whether additional treatments are required at this location to align with the local design standards.

19.8.3 Operation

Potential benefits of the Inland Rail Program and the Project are outlined in Chapter 2: Project Rationale.

19.8.3.1 Rail network

In line with the objectives of the *State Planning Policy* (DILGP, 2017b), ShapingSEQ (DILGP, 2017a), and the *Darling Downs Regional Plan* (Department of State Development, Infrastructure and Planning (DSDIP, 2013a) the Project will provide a modern and efficient rail line through the Toowoomba Range, generally following and compatible with the intent of the Gowrie to Grandchester future state transport corridor. Further information on the benefit of the Project and the wider Inland Rail Program are provided in Chapter 2: Project Rationale.

The Project design is such that the QR and ARTC networks can operate autonomously with connections provided to allow for the migration of traffic across both networks. This includes a spur line allowing existing and future traffic to access the South Western System and facilities in Toowoomba from Brisbane, including the Toowoomba train station and Aurizon's Willowburn facility. The Project also allows for access between the QR network and the future InterLinkSQ intermodal facility at Gowrie.

Operations will also result in an increase in rail consists, both in size and number, through the Toowoomba Range. As described in Chapter 6: Project Description, the length of the current train consists (e.g. H82) is approximately 900 m while the design caters for train consists up to 1,800 m in length. The number of haulage trains will increase as demand increases (33 trains per day in 2027 and 47 trains per day in 2040). Despite the increase in rail traffic, impacts on the road network are negligible as the road–rail interfaces are grade separated.

This will reduce the rail traffic along the existing system between Gowrie and Helidon, though there is a connection allowing for traffic to move between the Inland Rail and Toowoomba, via the Western Line. In line with the QLCSS and the *Toowoomba Road Safety Strategy* (TRC, 2019b) this could reduce the number of near-miss incidents at level crossings and minimise the impact of any incidents that occur. While the Project will result in the elimination of an existing level crossing, with all other road–rail interfaces are grade separated. As there are no public level crossings proposed in the Project, there was no analysis required to determine the operational performance, as all interfaces have been treated with either grade separation or closure.

There are currently no plans to close the section of the West Moreton System associated with the Toowoomba Range. As such, there is the option for rail traffic to operate concurrently on both the ARTC and QR networks in vicinity of the Project, which has been allowed for in the design. A study by DTMR noted that the closure of the QR network from Helidon to Toowoomba could provide a saving of in excess of $7 million (ARTC, 2010a).

There may be some disruptions during maintenance activities, including maintenance of bridge structures over the West Moreton System.

Technical meeting between ARTC, QR and DTMR regarding interfaces between the networks, including connections, track spacings and signalling systems are ongoing and will continue during detailed design. The meetings will also be a platform to discuss the tenure arrangement for the rail corridor (i.e. one large rail corridor with two overarching sub-leases), mitigation strategies for cumulative impacts on residents adjacent to the Project at Gowrie (i.e. where the Western Line and Inland Rail will operate concurrently) and involvement with the South West System Coal Dust Management Plan.

19.8.3.2 Road network

Road traffic during operation is anticipated to be significantly lower than the construction phase, with operational workforce estimated between 15 and 20 FTE. Workforce during operations is assumed to reside in local towns surrounding the Project, with the predominant type of vehicle required during operations being light vehicles typically used in the transportation of workers.

Parking facilities, along with the required access from relevant LGRs (e.g. Boundary Street) has been incorporated into the design at the eastern and western tunnel portals, along with the intermediate ventilation shaft at Cranley. In addition to operational staff, these facilities may receive deliveries, along with waste contractors.

It is, however, 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. Further detailed analysis of these movements is, therefore, not required.

During the operational phase of the Project, it is anticipated that occasional access to and from the corridor will be required to conduct routine inspection and maintenance works. Access will be from dedicated access points along the rail corridor such as Murphys Creek Road and Jones Road, with these access points to be confirmed with the relevant road authorities and where applicable consolidated with access points for other infrastructure (e.g. Powerlink or the Roma Brisbane Gas Pipeline). Maintenance vehicles will use the RMAR (and, in some cases, the rail line) part of the rail corridor, which will allow access to the majority of the rail infrastructure for 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.

Further to this, the proposed changes to the road network will also benefit the local community through the elimination of the existing level crossing and upgrades to the roads; however, it is noted that some individuals will experience longer commute times. In addition, the design allows adequate provision for the Boundary Street (west-facing ramps) linking to the Toowoomba Bypass.

The grade separations will also be of a suitably configured standard that will accommodate appropriate vehicle storage lengths, widths, sight distances, vehicle manoeuvring requirements, and clearances for multi-combination vehicles and over-dimensional vehicles (including agricultural equipment relevant to the road type).

ARTC will continue to consult with the relevant road authorities regarding the operational management of the assets, including maintenance of structures within the road reserve (e.g. rail bridge over the Toowoomba Bypass) and changes to the local road network as a result of the Project (which will be the responsibility of the asset manager once the Project is operational). The outcome of the discussions will inform the execution of relevant road-use management plans and interface agreements.

19.8.3.3 Emergency service vehicles

ARTC has engaged with emergency services and the relevant local disaster management groups to identify access requirements. This information has been incorporated into the design, where applicable, including ensuring evacuation routes and bushfire trails are not adversely impacted. There may also be the opportunity for emergency services to use the RMAR during emergencies such as bushfires.

During operations, response times for emergency services are unlikely to be delayed as the road–rail interfaces are grade separated, with the Project also proposing to eliminate an existing level crossing and improve some of the existing local roads (e.g. East Paulsens Road will be upgraded to allow for all-weather access).

ARTC will continue to work with emergency services to identify emergency access requirements and points; develop protocols and joint working arrangements to address potential impacts on emergency services and service response times during operation; and ensure that access is retained as required.

19.8.4 Impacts on ports and airports

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.

The Inland Rail Program will provide a dedicated freight track from Melbourne to Brisbane—primarily the existing intermodal facilities at Acacia Ridge and Bromelton. From here, the independent rail operators will distribute material via the existing road and rail networks. The *Inland Rail Programme Business Case* (ARTC, 2015a) noted that a dedicated rail line from Acacia Ridge to the Port of Brisbane was not required, with the existing infrastructure suitable until 2030; however, the Australian and Queensland governments announced in April 2018 that study into a dedicated freight rail line from Inland Rail to the Port of Brisbane would be undertaken. The Project will not impact on the safety or efficient operation of any strategic ports.

No strategic airports or aviation facilities are located in the traffic, transport and access study area. The closest facilities are the Toowoomba Wellcamp Airport and Toowoomba Airport, both located more than 8.6 km and 2.5 km south of the Project alignment, respectively. The Project will not create incompatible intrusions or compromise the safety of the airports; therefore, the Project will not impact on the safety or efficient operation of any strategic airports. Refer Chapter 8: Land Use and Tenure for further details.

There may be some overlap between the proposed construction routes and key roads servicing the airports, however, though the existing roads should have sufficient capacity to cater for this temporary increase in traffic (e.g. construction route providing access to the quarry at Wellcamp).

19.8.5 Impacts on Toowoomba Bypass

The topography and alignment of the Toowoomba Range Tunnel is such that the cover to ground surface rises rapidly. Accordingly, the risk of ground deformation caused by excavation-induced settlement along most of the alignment will be negligible. Only at the western and eastern portals, where the tunnel approaches the surface, is there a risk of increased surface settlement. As the groundwater level is estimated to be in rock, and the tunnel is proposed to be undrained in the long-term, the effects from any groundwater drawdown is expected to be negligible.

The tunnel passes through the Toowoomba Range, with the cover to the ground surface rising from around 12 m at the tunnel portals to approximately 220 m near Ch 8.90 km. The initial sections of tunnel at the portals were identified as the critical areas to perform a ground deformation assessment caused by tunnel excavation. At the eastern and western tunnel portals, where the predicted settlement is at its maximum, there is no known infrastructure above the tunnel at these locations. Away from the portals, the predicted settlements reduce, with increased cover above the tunnel, and are not predicted to result in any damage to structures (e.g. Boundary Street bridge over the Toowoomba Bypass, New England Highway, West Moreton System) (refer Section 19.8.5.1).

The design provides adequate spacing for the construction of the Boundary Street off ramps from the Toowoomba Bypass, refer Appendix C: Design Drawings.

The rail bridge over the Toowoomba Bypass has no permanent infrastructure inside the existing roadway. The piers for the bridge are currently designed to be located on the earthworks cut benches outside the existing roadway and will provide a clearance of around 20 m above the road surface. It is expected these will be constructed offline with no impact to the Toowoomba Bypass. The installation of the bridge girders and associated bridge deck will require temporary lane closures of the Toowoomba Bypass while the specific elements are being installed. The detailed construction methodology will be developed in consultation with Nexus and DTMR during detailed design, to minimise the number and length of lane closures.

There may also be a requirement to undertake work within land parcels associated with the Toowoomba Bypass (currently freehold parcels), including fencing and drainage works.

19.8.5.1 Deformation assessment

A ground deformation assessment has been undertaken to investigate the potential impacts of the tunnel excavation along the alignment. There are two components contributing to the ground deformation, which are deformations caused by:

- Tunnel excavation-induced settlement
- Long-term groundwater drawn down, causing consolidation of compressible soils.

The ground deformations from tunnel excavation and from consolidation of compressible soils may not occur at the same location, e.g. peak ground deformations typically occur above the tunnel and ground deformations caused by groundwater drawdown occur where the thickness of compressible soils is greatest for a given drop in groundwater pressure. These locations may not be coincident.

The topography and alignment of the Toowoomba Range Tunnel is such that the cover to ground surface rises rapidly. As such, the risk of ground deformation caused by excavation-induced settlement along most of the alignment will be negligible. Only at the western and eastern tunnel portals, where the tunnel approaches the surface, is there a risk of surface settlement. The tunnel is proposed to be undrained and so the effects from long-term groundwater draw down will be negligible.

The tunnel passes through the Toowoomba Range with the cover to ground surface rising from about 1D (12 m) at the tunnel portals to a maximum 216 m near Ch 8.9 km. The initial sections of tunnel at the portals have been identified as the critical areas to perform a ground deformation assessment caused by tunnel excavation. Ground deformations are expected to be negligible away from the portals.

Empirical methods (Burland, et al.,1996) have been used to estimate the ground movement caused by volume loss during tunnel excavation. The volume loss and trough-width parameters are related to the geological conditions expected at the tunnel face, the ground conditions above the tunnel (e.g. soil, mixed ground, jointed rock) and the construction method. Back analysed parameters from tunnelling projects in similar conditions have been used to estimate the volume loss and trough-width parameters. Although there are no buildings or structures above the tunnel portal areas, the results are presented as a building and structure damage classification assessment, following Boscardin & Cording, 1989). The building damage category method is not applicable to roads and utilities, and acceptable limits are typically provided by the asset owner.

TABLE 19.30: TUNNEL GROUND DEFORMATION ASSESSMENT

Location	Chainage (km)	Cover to ground surface	Volume loss	Trough width parameter	Maximum settlement	Maximum angular distortion	Building damage category
Western tunnel portal	4.10	11.5 m	0.5%	0.5	26 mm	1/500	Moderate
Powerline	4.33	25 m	0.5%	0.5	15 mm	1/1800	n/a
Boundary Street	4.44	35 m	0.5%	0.5	12 mm	1/2700	n/a
Eastern tunnel portal	10.23	13 m	0.5%	0.5	45 mm	1/335	Moderate

Table note:
* Acceptable as there is no known infrastructure above the tunnel at this location

Further modelling of settlement impacts would be undertaken during the detailed design phase when the final Project design is determined. From the detailed modelling, the contractor would identify specific infrastructure that may be potentially impacted, and initiate consultation with the owners with a view to undertaking pre-construction condition reports as required. Such reports would be the starting point for any subsequent claims of damage due to settlement.

As part of the detail design geotechnical investigations 20 inclinometers were installed. Inclinometers (inclinometers) are geotechnical instruments used to measure horizontal displacements of the ground, and also to identify the depth of the slip surface. Inclinometers are widely used to measure lateral soil and wall movements in slopes with signs of instability and deep excavations. The inclinometers will record data on the natural conditions, including ground movements.

19.8.6 Other impacts

The Project is expected to remove a proportion of heavy freight trips from the road network; therefore, potentially improving safety for all road users. The key strategic benefits of Inland Rail, as outlined in Chapter 2: Project Rationale, include, but are not limited to, the following:

- Provide upgraded rail infrastructure that meets the Inland Rail specifications, to enable trains using the Inland Rail corridor to travel between Gowrie and Helidon, connecting with other sections of Inland Rail to the west and east
- Provide a rail link between Melbourne and Brisbane that is interoperable with train operations to Perth, Adelaide, and other locations on the standard-gauge rail network, to serve future rail freight demand, and stimulate growth for inter-capital and regional/bulk rail freight
- Provide an increase in productivity that will benefit consumers through lower freight transport costs
- Provide a step-change improvement in rail service quality in the Melbourne to Brisbane corridor and deliver a freight rail service that is competitive with road
- Improve road safety, ease congestion and reduce environmental impacts by moving freight from road to rail
- Bypass bottlenecks in the existing metropolitan rail networks and free up train paths for other services along the coastal route
- Act as an enabler for regional economic development along the Inland Rail corridor.

19.8.7 Safety 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.

The resulting identified risks for the 'with' and 'without Project' scenarios associated with construction traffic were analysed. 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 relevant 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. The likelihood of an event occurring has been increased to 'possible' in the 'with Project' scenario, in order to provide a conservative assessment and ensure mitigation measures are implemented effectively. Because of this, several road sections have been assigned a risk rating of 'high' in the 'with Project' scenario. This change in risk rating is regarded as conservative, as mitigation is therefore required for the road section.

The following construction traffic routes require potential safety mitigation measures due to being assigned a 'high' risk rating:

- DTMR:
  - Gatton Helidon Road
  - Ipswich Motorway
  - Ipswich–Cunningham Highway Connection Road
  - Logan Motorway
  - Murphys Creek Road
  - New England Highway
  - Pacific Motorway
  - Toowoomba Connection Road
  - Warrego Highway
- LVRC:
  - Postmans Ridge Road
- TRC
  - North Street.

Table 19.31 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.

TABLE 19.31: SAFETY RISK ASSESSMENT: PROJECT PRIMARY CONSTRUCTION ROUTES (WITH PROJECT AND WITH MITIGATION MEASURES)

Road name	With Project risk rating	Proposed mitigation measures	With Project—mitigation risk rating
LGR: TRC			
North Street	High	*As per SCR: DTMR roads, below*	Medium
LGR: LVRC			
Postmans Ridge Road	High	*As per SCR: DTMR roads, below*	Medium
SCR: DTMR			
Gatton Helidon Road	High	Mitigation measures may include but are not limited to: ▸ Fatigue management measures should be introduced and enforced for all workers	Medium
Ipswich Motorway	High		Medium

Road name	With Project risk rating	Proposed mitigation measures	With Project—mitigation risk rating
Ipswich–Cunningham Highway Connection Road	High	▸ 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. ▸ Heavy vehicles 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 ▸ Workers should be made aware of school bus routes as well as typical pick-up and drop-off times in the vicinity of the Project ▸ Temporary traffic management to be implemented, e.g. road signs stipulating reduced speed limits ▸ Road closures (if required) to be performed by police escorts (should it be required) with closure times limited to a maximum of 15 minutes ▸ All OSOM and RAV vehicles will comply with all relevant safety regulations and guidelines set out by DTMR and the NHVR	Medium
Logan Motorway	High		Medium
Murphys Creek Road	High		Medium
New England Highway	High		Medium
Pacific Motorway	High		Medium
Toowoomba Connection Road	High		Medium
Warrego Highway	High		Medium

19.9 Potential mitigation

19.9.1 Mitigation

This section outlines the traffic mitigation measures included as part of the Project design, and the additional mitigation measures that are proposed for the Project to manage predicted traffic, transport and access impacts. The impacts are initially assessed with consideration of the design mitigation measures and then reassessed to determine residual risk after the inclusion of the proposed mitigation measures.

Construction risks have been assessed in accordance with the qualitative impact assessment methodology presented in Chapter 4: Assessment Methodology.

19.9.2 Design considerations and initial mitigation

The mitigation measures and controls presented in Table 19.32 have been factored into the design for the Project and where applicable have been discussed with key stakeholders such as DTMR, QR, and the local councils. It is acknowledged that some of the design measures outlined in Table 19.32 require further consultation with DTMR, QR, and the local councils during detailed design.

These design considerations are proposed to minimise the impacts of the Project and, therefore, contribute to a lowering of the initial impact risk rating for each potential impact.

TABLE 19.32: INITIAL MITIGATION OF RELEVANCE TO TRAFFIC

Aspect	Initial mitigation measures
Traffic	▸ The Project generally follows the Gowrie to Grandchester future state transport corridor, which aligns with the objectives of a number of local and regional plans. The Project also does not preclude the construction of future passenger services within the Gowrie to Grandchester future state transport corridor at a later date. ▸ The Project has been co-located with existing rail and road infrastructure, where possible, minimising the need to develop land that has not previously been subject to disturbance for transport infrastructure purposes ▸ The Project has been designed to minimise the potential for alterations to the public road network or create a permanent change to existing traffic patterns and distributions ▸ The horizontal and vertical alignment has been established to optimise the earthworks required and achieve as close to a net balance as possible. By minimising the material deficit for construction of the Project, the volume of material required to be imported has been reduced. Less imported material equates to fewer construction-phase truck movements and less vehicular emissions. ▸ Where practical, traffic will be constrained to constructed access tracks and to those routes that provide the shortest journey time between origin and destination; thereby, restricting fuel consumption and vehicular emissions. The temporary construction disturbance footprint for the Project has been defined to provide sufficient space for the Project, including road modifications, to be safely and efficiently constructed, with no need for temporary side-tracks to be provided. ▸ Flood impact objectives have been developed for roadways and the existing rail lines. Refer to Appendix M: Hydrology and Flooding for details on hydrology and flooding impacts to existing roads and rail lines.
Rail incidents as a result of development of the Project	▸ The rail alignment has been designed to minimise the likelihood of rail incidents for the types of trains projected to use the Inland Rail network. This has been achieved by adhering to the minimum design requirements of the Basis of Design (refer Chapter 6: Project Description). ▸ The design includes mixed-gauge turnouts at locations where the Project interfaces with existing rail networks or infrastructure, to enable QR rollingstock to join and exit the Inland Rail network ▸ The tunnel and viaduct design includes emergency egress, along with ensuring suitable access for emergency services ▸ The Project provides a more modern, direct and efficient rail alignment to the existing rail corridor. The use of the Project alignment will reduce the number of occupational and level crossings traversed daily, along with eliminating an existing level crossing (reducing traffic disruptions and safety risks at level crossings) ▸ An existing rail crossing over the West Moreton System, Gowrie Junction Road, will be eliminated which is in line with the QLCSS and ONRSR. ARTC also propose to close the underpass between East Paulsens Road and Morris Road to the public.
Rail–rail interfaces	▸ The Project interfaces with the West Moreton System east of Lockyer Creek at Helidon. This interface will be grade separated. ▸ The Toowoomba Range Tunnel is unlikely to impact (construction and operation) on the West Moreton System ▸ The alignment runs adjacent to the QR Western Line and Main Line with a minimum of 6.5 m between track centres as per Rail Industry Safety and Standards Board ▸ The Project design and the Project disturbance footprint allows for the relocation and/or the reestablishment of existing rail infrastructure (e.g. RMARs, signaling equipment, drainage structures including erosion and sediment control measures)

Road–rail interfaces	▸ Grade-separated crossings of existing roads have been adopted instead of level crossings, at all locations for the Project
	▸ The design for the Project has, in all instances, maintained access for private properties. This has been provided through either:
	  ▸ The provision of a crossing point of the rail alignment in the location of the existing private access
	  ▸ The provision of an alternative means of accessing a dwelling or place of work from the public road network

Aspect	Initial mitigation measures
Bridges	▸ Maintenance access to the deck level of all new bridge structures has been incorporated into the design ▸ Bridge clearances have been established in consultation with the owners of existing assets over which the bridge structures span, i.e. DTMR, QR, local councils and private landholders ▸ Bridge footings have been located to avoid damage to the existing road surface, including the Toowoomba Bypass ▸ Pedestrian and cycle paths have been provided on the Gowrie Junction Road Overpass ▸ No public pedestrian access is provided on McNamaras Road bridge as it is a rural road
Access	▸ ARTC have consulted with TRC, LVRC, DTMR, QR, QFES and other key stakeholders through the impact assessment and design development process. As a result, the design for the Project has, in all instances, maintained connectivity across the Project footprint for public roads. The design also maintains access to private and State land.

19.9.3 Proposed mitigation

In order to further manage Project risks, a number of mitigation measures have been proposed for implementation in future phases of Project delivery, as presented in Table 19.33. These proposed mitigation measures have been identified to be applied in the detailed design, pre-construction, construction and operational phases of the Project to address specific issues and opportunities, address legislative requirements, accepted government plans, policies and practices.

Table 19.33 identifies the relevant Project phase, the aspect to be managed and the proposed mitigation measures, which are then factored into the assessment of residual risk/significance in Table 19.34.

The draft Outline Environmental Management Plan (draft Outline EMP) (refer Chapter 23: Draft Outline EMP) provides further context and the framework for implementation of these proposed mitigation and management measures.

TABLE 19.33: TRAFFIC MITIGATION MEASURES

Delivery phase	Aspect	Proposed mitigation measures

Design/ pre-construction	Road safety	▸ Road safety audits will be undertaken pre-construction at level crossings in accordance with the Austroads guidelines to confirm:
		  ▸ The level of protection continues to be appropriate for the construction period until the level crossing is closed and traffic redirected
		  ▸ The infrastructure is appropriate for the traffic conditions during construction.
		▸ Ongoing consultation with local councils/DTMR and asset owners will be undertaken to ensure safety concerns and issues are addressed
		▸ Relevant emergency services will be notified of changes to the road network and of construction activities prior to construction commencing
		▸ Pre- and post-construction inspections of routes to ensure suitability, including a Road Safety Analysis
		▸ Ongoing consultation with Department of Education, TRC and school bus operators in regard to the closure of Morris Road and the proposed road network changes (including timing of the changes to the road network and potential school bus re-routes)

Delivery phase	Aspect	Proposed mitigation measures
Design/ pre-construction [continued]	Road network	▸ A travel demand management (TDM) campaign will be prepared and implemented to inform the public on works and its effect on network operations ▸ Any changes to design and land requirements will be assessed and notified to the relevant stakeholder/agency/council ▸ Road closures (temporary and permanent) to be discussed with DTMR, DNRME, local councils and emergency services, with alternative solutions provided to ensure minimal impact on existing and future traffic ▸ A Traffic Management Plan (TMP) will be prepared prior to the construction phase as a joint effort between the construction contractor, DTMR, relevant local council, QR (where applicable) and an accredited road safety auditor, once preferred construction routes are known. This plan will identify the impact that construction traffic is likely to have on the transport infrastructure and detail any additional measures required to avoid, reduce or mitigate all identified impacts of the Project. ▸ RUMPs for the Project will be developed 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 to minimise the impact on the efficiency of road networks as well as the operational safety of the Project-related vehicles accessing the Project disturbance footprint. The RUMP will be developed in consultation with DTMR, emergency services including QLD Police Service, and the relevant LGA and, where relevant, QR
	Rail–rail interface	▸ Ongoing consultation with DTMR and QR regarding design of the Project, including discussions around relocation of existing services, level crossings, required permits and approvals, and design measures to ensure both networks can operate autonomously
	Road–rail interface	▸ Prepare agreements in writing with stakeholders for public roads and private landholders before detailed design phase
	Intersections	▸ Traffic management plans, traffic control plans and temporary road works, including diversion and signage, will be prepared prior to construction and will consider construction activity delivery timeframes that avoid peak-hour travel conditions ▸ Ongoing consultation with QR during the construction planning process (detailed design phase) to determine scheduling and safety issues with existing QR owned and operated level crossings in close proximity to intersections used by construction vehicles ▸ Temporary intersections will be established in consultation with the relevant road authority and will comply with agreed conditions and design standards.
	Pavement	▸ Pavement impact assessment will be undertaken on SCRs in the detailed design stage once the construction contractor has been appointed and construction routes have been selected. This assessment will identify measures to avoid, reduce or mitigate effects on the pavement life of the SCRs, such as: ▸ Provide a payment contribution for future pavement works ▸ Provide extra pavement width (e.g. to prevent edge degradation) ▸ Provide additional pavement thickness ▸ Seal an unsealed pavement ▸ Provide maintenance during construction ▸ Undertake pavement rehabilitation. ▸ For local control roads, a condition assessment will be undertaken (e.g. National Association of Australian State Road Authorities (NAASRA) roughness count, visual inspections) prior to construction activities commencing, including agreed intervals for further inspections ▸ Identification of any routes that may benefit from load limits

Delivery phase	Aspect	Proposed mitigation measures
Design/ pre-construction [continued]	Access	▸ Confirm and consolidate access tracks, where possible, leveraging the existing road network and existing access tracks. Where required, enter into an agreement with the landholder for the use or establishment of the access tracks, along with whether the track will be left insitu or rehabilitated. ▸ Confirm, in consultation with landholders, required access across the rail alignment in response to service of a property or private stock route ▸ Ongoing consultation with local councils/DTMR and asset owners will be undertaken to ensure proposed access arrangements are suitable ▸ The RMAR strategy will be updated to ensure it remains consistent with changes in design
Construction	Road safety	▸ Fatigue management measures will be introduced and enforced for all workers during construction ▸ Pre- and post-construction inspections of routes to ensure suitability, including a Road Safety Analysis ▸ Road safety measures will be implemented, taking 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 ▸ Relevant emergency services will be notified in advance prior to the movement of all hazardous/dangerous or oversize construction material and equipment ▸ All OSOM and RAV vehicles will comply with all relevant safety regulations and guidelines set out by DTMR and the NHVR ▸ Consideration will 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 may be installed ▸ Consultation with relevant local councils will 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 considered. Temporary traffic management will be implemented, e.g. road signs stipulating reduced speed limits as per the TMP. ▸ Ongoing consultation will be undertaken with relevant local councils, DTMR, Police, emergency services and affected property owners/occupiers to inform of Project status, likely traffic disruptions and temporary road closures ▸ Temporary road closures to be performed by police escorts (should it be required) with closure times limited to a maximum of 15 minutes ▸ 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 relevant road authority.

Delivery phase	Aspect	Proposed mitigation measures
Construction [continued]	Road network	▸ A TDM campaign to inform the public on works and its effect on network operations will be implemented ▸ The TMP will be implemented and reviewed periodically for effectiveness by stakeholders ▸ Heavy vehicles may be associated with the construction activities and, therefore, use of school bus routes will be avoided if possible, or carefully managed, to avoid conflicts ▸ Consideration will 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 to be made aware of school bus routes as well as typical pick-up and drop-off times in the vicinity of the Project ▸ Temporary traffic management to be implemented, e.g. road signs stipulating reduced speed limits ▸ Road closures (if required) to be performed by police escorts (if required) with closure times limited to a maximum of 15 minutes ▸ Ongoing consultation will be undertaken with relevant local councils, DTMR, Police, emergency services and affected property owners/occupiers to inform of Project status, likely traffic disruptions and temporary road closures ▸ Directional signage and line marking around construction sites and the surrounding network to be implemented as per the relevant traffic management plan, including using Variable Message Signs if appropriate ▸ Relevant emergency services will be notified in advance, prior to the movement of all hazardous/dangerous or oversize construction material and equipment ▸ Secondary alternative construction route activities will be determined as part of the TMP, in the event that the primary route is blocked off by an emergency/accident ▸ Consolidation of construction routes and access points, with due consideration of the other Inland Rail projects
	Intersection	▸ Traffic management plans, traffic control plans and temporary road works will be implemented and reviewed to ensure effectiveness ▸ TMP will be implemented and reviewed periodically by stakeholders to ensure intersection operations are effective
	Pavement	▸ Install wheel washers on all Project vehicles and/or equipment that exit onto sealed roads from unpaved roads ▸ 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 disturbance footprint ▸ For local control roads, a condition assessment will be undertaken (e.g. NAASRA roughness count) ongoing intervals during construction and at the conclusion of construction activities, as agreed with local councils prior to construction commencing ▸ The use of a SCR and LGR owner-approved maintenance contractor to maintain impacted roads 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.
	Access	▸ RMARs to be reviewed and updated once detail around the planned construction methodology is known, which would occur during the detailed design stage. RMARs will facilitate maintenance for critical infrastructure (e.g. turnouts) and provide access for emergency recovery. ▸ Access roads to be left insitu or rehabilitated, subject to agreements with landholders

Delivery phase	Aspect	Proposed mitigation measures
Operation	Road network	▸ A protocol will be developed between ARTC and emergency service providers, defining appropriate and coordinated responses and communication in the event of emergencies during operations
	Road–rail interface	▸ Road safety audits will be undertaken at the road–rail interface locations post opening in accordance with the Austroads guidelines. Road/rail interface locations will be reviewed to confirm: ▸ The level of protection continues to be appropriate ▸ The infrastructure is appropriate for the traffic conditions

19.10 Impact assessment

Potential impacts to traffic impacts associated with the Project in the construction and operation phases are outlined in Table 19.34. These impacts have been subjected to a compliance assessment as per the relevant methodology outlined in the DTMR GTIA.

The initial risk assessment is undertaken on the basis that the design measures (or initial mitigation measures) have been incorporated into the Project design (refer Table 19.32). Proposed additional mitigation measures in Table 19.33, were then applied, as appropriate, to the specific phase of the Project, to reduce the level of potential impact.

The residual risk level of the potential impacts was then reassessed after the proposed mitigation measures were applied. The residual risk levels were compared to the initial risk levels in order to assess the effectiveness of the mitigation measures. The resulting residual risk levels are shown in Table 19.34, and summarised in Appendix U: Traffic Impact Assessment. In all instances, the residual risk levels are lower than the initial levels.

In addition to this risk assessment and Project Primary Construction Route safety assessment provided, a safety assessment will be undertaken in the detailed design phase, including the proposed access locations, upgraded and nearby intersections, affected active transport facilities and road–rail interface locations consistent with the GTIA. This may include road safety assessments and/or road safety audits to identify if the detailed design introduces any additional safety issues.

TABLE 19.34: IMPACT ASSESSMENT FOR POTENTIAL TRAFFIC IMPACTS ASSOCIATED WITH THE PROJECT

	Primary impacting process					
Value/element	**Primary impacting process**	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**	**Magnitude of impact**	**Likelihood of impact**
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.	**Probable** It is reasonable to assume that some traffic impacts at key intersections will occur during the construction period.	Moderate	In consultation with DTMR, RMS, relevant local councils and where applicable QR, develop cost-effective solutions to alleviate additional traffic impacts from the construction-related activities. These may include: ▸ Physical works (temporary or permanent), where appropriate, to remove or reduce need for other mitigation measures ▸ TMP will be prepared prior to construction, in accordance with the latest edition of: ▸ *Traffic control at work sites—Technical Manual* (Transport for New South Wales, 2018b) and Australian Standard 1742.3:2019 *Manual of uniform traffic control devices, Part 3: Traffic control for works on roads* (Standards Australia, 2019) ▸ *Queensland Manual of Uniform Traffic Control Devices: Part 3 – Works on Roads* (DTMR, 2019d) and the *Traffic and Road Use Management Manual: Volume 7 Road Works* (DTMR, 2012b) ▸ *Roads and Maritime Supplement to Australian Standard AS1742.2-2009: Manual of Uniform Traffic Control Devices - Part 2: Traffic control devices for general use* (RMS, 2019) ▸ Note: DTMR documents to take precedence on DTMR SCRs if the documents conflict with another organisation's documents. ▸ Road safety measures at intersections will take into consideration: speed restrictions; driver fatigue; in-vehicle communications; heavy vehicle turning signage; demarcations; safety checks; interaction with public transport; transport of hazardous and dangerous goods; and emergency response and disaster management ▸ TMP will consider construction activity delivery timeframes that avoid peak-hour travel conditions ▸ Where existing intersection turn warrants are not sufficient to accommodate construction vehicle turn movements, physical works (temporary or permanent) should be considered. This assessment will be undertaken once the construction contractor has been appointed, and final construction traffic routes and vehicle loads have been determined. ▸ The mitigation strategy for intersections would not preclude physical works as a strategy to 1. Avoid, 2. Manage, 3. Mitigate impacts as per *Guide to Road Design Part 6: Intersections, Interchanges and Crossing Management* (DTMR, 2019a) , the key mitigation measures will include physical works, where appropriate.	Low

	Primary impacting process					
Value/element	**Primary impacting process**	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**	**Magnitude of impact**	**Likelihood of impact**
Road links	Operational efficiency	**Moderate** Traffic impacts along primary construction routes affecting traffic operations along key routes	**Probable** It is reasonable to assume that some traffic impacts along primary construction routes will occur over the construction period	Moderate	In consultation with DTMR, RMS, relevant local councils and where applicable QR, employ traffic management strategies in order to mitigate impacts along road links. These may include: ▸ Physical works (temporary or permanent), where appropriate, to remove or reduce need for other mitigation measures ▸ TMP according to DTMR and RMS specifications ▸ Travel demand management campaigns ▸ Directional signage and line marking around construction sites and the surrounding network ▸ Specific TMP for special events developed in conjunction with the relevant stakeholders ▸ Relevant emergency services to be notified in advance prior to changes to the road network, and of the movement of all construction activity commencing, particularly hazardous/dangerous or oversize construction material and equipment ▸ Road closures (temporary and permanent) to be discussed with DTMR, DNRME, local councils and emergency services, with alternative solutions provided to ensure minimal impact on existing and future traffic ▸ Secondary alternative construction route activities to be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency/accident ▸ Travel demand management (TDM) campaign to inform the public on works and their effect on network operations ▸ Ongoing consultation will be undertaken with relevant local councils, DTMR, Police, emergency services and affected property owners/occupiers to inform of Project status, likely traffic disruptions and temporary road closures ▸ Consultation with QR will be required prior to use of existing level crossings. During construction, mitigations for existing level crossings along the construction routes may be required depending on the specific activity and the locations. The construction contractor will be required to consult QR to determine appropriate controls at existing level crossings ▸ The mitigation strategy for road links will not preclude physical works as a strategy to 1. Avoid, 2. Manage, 3. Mitigate impacts as per Guide to Road Design Part 6: Intersections, Interchanges and Crossing Management (DTMR, 2019a). The key mitigation measures will include physical works where appropriate.	Low

	Primary impacting process					
Value/element	**Primary impacting process**	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**	**Magnitude of impact**	**Likelihood of impact**
Pavements	Operational efficiency	**Moderate** Increased percentage of heavy vehicles along SCR from Project construction traffic, resulting in pavement degradation	**Probable** It is reasonable to assume that some pavement degradation as a result of Project construction traffic will occur over the construction period	Moderate	Mitigation measures may include: ▸ 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 ▸ All vehicles, machinery and mobile construction equipment will be required to carry a clean-down record. Mobile weed clean-down facilities will be provided at construction areas accessed by public roads and of high-risk weed infestation depending on construction staging and methodology. ▸ Installation of shaker grids or rumble pads at site exit points from the construction disturbance footprint	Low
Road Safety—primary construction routes	Safety	**Moderate** Decreased road safety along construction traffic routes as a result of increased traffic, changes in heavy vehicle 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: ▸ Fatigue management measures to be introduced and enforced for all workers ▸ Any required works to be identified in ongoing RUMPs prepared to support the Project ▸ Heavy vehicles may be associated with the construction activities and, therefore, use of school bus routes will be avoided, if possible, or carefully managed to avoid conflicts ▸ Consideration will 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 may be installed ▸ Temporary traffic management to be implemented, e.g. road signs stipulating reduced speed limits	Low

	Primary impacting process					
Value/element	**Primary impacting process**	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**	**Magnitude of impact**	**Likelihood of impact**
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	**Probable**	Moderate	▸ If required, any level crossings should be provided with warning signage, line marking, and other relevant controls, in accordance with the relevant national and ARTC standards, and with TMP and RUMP procedures, to accommodate traffic and operational efficiency during construction ▸ Direct and guide active mode users at road–rail interface locations, to improve safety and reduce the likelihood of any significant traffic delays due to incidents ▸ A protocol will be developed between ARTC and emergency service providers, defining appropriate and co-ordinated responses and communication in the event of emergencies during operations	Low
Road Safety—Road–rail interface	Safety	**Extreme** If possible, the introduction of open level crossings on the road network may result in high severity crashes between traffic and trains	**Unlikely** As there are no level crossings proposed for the Project, the likelihood of an incident occurring at a road–rail interface is unlikely	Moderate	▸ The Project does not propose to include any level crossings along the alignment, with the removal of the sole existing level crossing (320-1-E-1) aligning with the QLCSS strategy ▸ During the operational stage, the diversion of existing traffic onto the Project rail alignment will likely reduce the overall interaction at level crossings in the vicinity of the Project	Low/ Moderate

19.11 Cumulative impacts

The traffic generation from other developments in the region at the planning, design or construction stage were considered in the cumulative impact assessment. This assessment was undertaken to ensure that the combined impacts of the background projects were thoroughly considered, to enable stakeholders to make informed decisions. The projects listed in Table 19.35 were identified in Chapter 22: Cumulative Impacts, as projects within the cumulative impact area of interest for the Project, which are either currently underway, expected to undergo future expansion or are going through an approval process.

Further details on cumulative impacts are included in Chapter 22: Cumulative Impacts and Appendix U: Traffic Impact Assessment.

TABLE 19.35: PROJECTS CONSIDERED IN CUMULATIVE ASSESSMENT

Project and Proponent	Location	Description	Project status	Construction dates	Impact significance
Border to Gowrie (Inland Rail)—ARTC	Rail alignment from the NSW/QLD border to Gowrie	Approximately 146 km of new dual-gauge track and 78 km of upgraded track from the NSW/Queensland border, near Yelarbon, to Gowrie Junction, northwest of Toowoomba in Queensland	Draft EIS being prepared by ARTC	2021 to 2026	Medium
Helidon to Calvert (Inland Rail)—ARTC	Rail alignment from Helidon to Calvert	The H2C project will include the following: ▸ 47 km single-track dual-gauge freight rail line to accommodate double-stack freight trains up to 1,800 m long ▸ Tunnel through the Little Liverpool Range	Draft EIS being prepared by ARTC	2021 to 2026	Medium
Wellcamp Business Park	Wellcamp, Queensland	The Wellcamp Business Park is a 500-hectare (ha) industrial and commercial park that forms part of the Toowoomba Enterprise Hub. The Business Park is in close proximity to the Toowoomba Wellcamp Airport and other major transportation infrastructure.	Operational—subject to continuing construction and expansion	Ongoing	Low
Witmack Industry Park and Charlton Logistics Park	Wellcamp, Queensland	The Witmack Industry Park is a large industrial land development that offers large size industrial land parcels. Businesses situated within the Witmack Industrial Park include the Toowoomba Pulse Data Centre. The Charlton Logistics Park is part of the Toowoomba Enterprise Hub and provides fully serviced 2 ha sites and is well situated for potential transport and logistics operators due to its proximity to transport infrastructure.	Operational—subject to continuing construction and expansion	Ongoing	Low

Project and Proponent	Location	Description	Project status	Construction dates	Impact significance
New Acland Coal Mine Stage 3 expansion — New Acland Coal Pty Ltd (, a subsidiary of New Hope Corporation Limited)	35 km northwest of Toowoomba	Expansion of the existing New Acland open-cut coal mine to up to 7.5 million tonnes per annum	EIS approved with conditions in 2014	Ongoing	Low
Defence Housing Australia (DHA)—Mt Lofty Development	Toowoomba, suburb of Mount Lofty	Former rifle range redeveloped into a master planned residential community comprising of 342 lots. Some lots will be retained by DHA on which homes will be built for Defence members and their families with remaining lots available for public purchase.	Development application and EPBC referral lodged in June 2018. Unknown as development application rejected.	To be confirmed	Low
InterLinkSQ	13 km west of Toowoomba	200 ha of new transport, logistics and business hub. Located on the narrow-gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways.	Under construction	2017 to 2037	Medium
Gatton West Industrial Zone (GWIZ)	3 km northwest of Gatton	Industrial development including a transport and logistics hub on the Warrego Highway	N/A	2019 to 2024	Low
TRC/Waste Management (non-sewerage)/ Lot 7 SP203236/ Queensland/ Waste Management Facility, 379 Love Road, Wyreema, Queensland	Wyreema, Queensland	A new waste transfer facility that caters for the Toowoomba region's northern and southern growth corridors. Will replace the existing Greenmount landfill and was previously a sewage treatment plant.	Design is currently underway with development assessment application lodged in July/August 2019	Expected to be completed in 2022	Low

Project and Proponent	Location	Description	Project status	Construction dates	Impact significance
Cross River Rail	Dutton Park to Bowen Hills under Brisbane River and Central Business District	A new north–south rail line connecting Dutton Park to Bowen Hills under the Brisbane River and Central Business District	EIS Complete An application for evaluation of the environmental effects of a proposed change to the Cross River Rail project. The Coordinator-General stated a new lapse date for the Coordinator-General's EIS evaluation report of 31 December 2024.	2019 to 2025	Low
Bromelton State Development Area	Bromelton, Queensland	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 landholders in the SDA.	Bromelton SDA Development Scheme was approved by Governor in Council, December 2017	2016–2031	Low

TABLE 19.36: IMPACT SIGNIFICANCE

Impact significance	Consequence
Low	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	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	Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Specific approval conditions required. Targeted monitoring program necessary where appropriate.

As part of the Project impact assessment of traffic and transport, a large range of mitigation measures have been proposed at local and State levels for construction and operation of the Project. To further mitigate potential cumulative impacts, the other assessable projects will also have to successfully implement similar mitigation measures.

Mitigation measures proposed for the Project relating to safety, intersection impacts, link road impacts, pavement impacts, and road–rail interface impacts would suffice in order to mitigate for the cumulative impacts as a result of these projects.

It is noted that during the detailed design stage of the Project, it may be feasible to consolidate routes between the Project and other Inland Rail packages. This will be required to be reassessed by the construction contractor in consultation with DTMR and the relevant LGA at the detailed design stage of the Project.

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.

The Project may have an overlap of construction schedules and proposed construction routes, however, 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 19.9, are likely sufficient in order to mitigate for the cumulative impacts as a result of the Project.

It will be necessary to assess the overlap between the other Inland Rail packages, particularly with respect to the Helidon area between the Project and the H2C project. This will be required to be further assessed during the detailed design stage.

19.12 Stakeholder consultation

Extensive consultation has been undertaken with key stakeholders, including QR, DTMR and relevant local councils, including LVRC and TRC, refer Appendix D: Community Consultation and Appendix Q: Social Impact Assessment. This includes inputs from LVRC and TRC into the Project design and the traffic impact assessment, including traffic counts. The councils also provided feedback on the TIA prior to the finalisation of the assessment.

Technical meetings have also been held between DTMR and QR at a Program level to discuss a range of topics relevant to all parties including interfaces between State-controlled roads and the existing rail network, design and operational standard, policies and system, land acquisition, tenure arrangements etc.

This consultation is continuing and will continue throughout the EIS process and into detailed design, with the aim of resolving design and interfaces issues in the form of such documents as road-use management plans, approvals, traffic management plans and interface agreements.

Full details of the stakeholder consultation are provided in Chapter 5: Stakeholder Engagement.

19.13 Conclusion

The Project is one of the 13 separate projects that make up the Inland Rail Program. This section of Inland Rail involves the design and construction of approximately 28 km of new dual-gauge track. The Project extends from the existing West Moreton System rail corridor at Gowrie and joins the existing rail corridor west of Helidon. It crosses the two LGAs of Lockyer Valley and Toowoomba. The traffic and transport assessment has focused on the Project's impact on the existing road and rail transport infrastructure in Queensland. The key findings are summarised below:

- Existing operational conditions:
  - The transport, traffic and access study area encompasses several SCRs and LGRs that serve as main transport corridors for the Project. The traffic analysis indicated that:
    - Two SCRs have been identified that will interface with the proposed rail alignment and two SCRs are expected to see construction traffic exceed 5 per cent of the background traffic
    - Forty local government roads have been identified that are expected to see construction traffic exceed 5 per cent of the background traffic; however, the impact to many of these roads is expected to be minimal, as the high percentage of construction traffic is a function of the low existing traffic volumes
    - Eighteen cycle routes are identified in Queensland that might be impacted by construction traffic; however, the majority of these routes currently facilitate a high proportion of heavy vehicle movements regardless of the Project
    - Seventeen existing public transport services in Queensland may be impacted by construction traffic and/or proposed and existing road–rail crossings. Given the low frequency of these services, the impact is expected to be negligible.

  - Twenty-eight existing Queensland school bus routes that are likely to be impacted by construction traffic have been identified, using data sourced from TransLink, of which only six are expected to experience construction traffic in excess of 5 per cent of the background traffic. Given the low frequency of school bus services, and temporary nature of the construction activities, it is expected that there will be minimal impact to services during construction of the Project.
  - Five existing long-distance coach services may be impacted by construction traffic; however, the impacts on these long-distance coach services are expected to be minimal due to the low frequency of the services
  - There are no formal stock routes identified in the transport, traffic and access study area that would be impacted by the Project.

- Rail operational traffic and maintenance processes:
  - Rail operational road traffic volumes are likely to be negligible with no envisaged impact to operational conditions of the surrounding road networks.
- Traffic impact assessment:
  - The traffic impacts associated with intersections, road links, road–rail interface locations, pavements, road safety, and access and frontage have been assessed
  - The Project-related traffic consists of traffic generated by both construction and operational activities. It is anticipated that the impacts would primarily be during the construction of the Project.
  - Certain road network sections will experience construction-related traffic volumes in excess of 5 or 10 per cent of the background traffic during the construction phase. The results of the LOS comparison between the 'with Project' and 'without Project' development scenarios indicate that the Project may potentially cause a minor change in LOS for some road sections during each year of construction.
  - Based on the LOS comparison, it is not expected that the Project would generate the need to upgrade the road network for such a short duration of impact, and adequate traffic and road use management strategies and mitigation measures have been identified.
- Cumulative impact assessment:
  - To enable stakeholders to make informed decisions, consideration has been 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 projects in the region at planning, design or construction stage. For the traffic analysis, only developments that have already submitted EIS documentation or Supplementary EIS to the Coordinator-General have been considered, as well as other Inland Rail projects; however, the 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 19.8.6, are likely sufficient in order to mitigate for the cumulative impacts as a result of the Project. A qualitative cumulative impact assessment and associated results are provided in Chapter 22: Cumulative Impacts.
- Mitigation measures:
  - Traffic, transport and access mitigation measures have been included as part of the Project design, to manage potential impacts. To further manage Project risks, a number of additional mitigation measures have been proposed. The additional mitigation measures will be implemented during future delivery phases of the Project. With additional mitigation measures in place, the residual risk level of potential impacts was found to reduce.

This assessment has found that the Project will maintain the safety and efficiency of all potentially affected transport modes. This includes the Project workforce and other transport system users. This assessment has also found that the condition of existing transport infrastructure (including pavements) will be maintained during Project construction works and operations.

The Project will be compatible with existing transport infrastructure, future transport corridors and the surrounding road network.