CHAPTER

20

Traffic and transport

NORTH STAR TO NSW/QUEENSLAND BORDER ENVIRONMENTAL IMPACT STATEMENT

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

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20. Traffic and transport

20.1 Scope of chapter

This chapter focuses on the North Star to NSW/Queensland Border project (the proposal) and the proposal's impact on the existing road and rail transport infrastructure.

This chapter:

- 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 proposal at the local and regional level
- Summarises the total proposal tasks of the proposal, 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 assessments
- Summarises traffic impact assessments associated with intersections, road links, road–rail interface locations, pavements, road safety, access and frontage
- Identifies the potential impacts of the proposal on road, rail, active transport and airports/ports during its construction and operation
- Provides mitigation measures to address the identified traffic impacts. The impacts were initially assessed considering the design mitigation measures and then reassessed to determine residual risk after the proposed mitigation measures were incorporated into the assessment.

Further detail on the technical aspects of the traffic impact assessment are available in Appendix M: Traffic Impact Assessment.

20.1.1 Secretary's Environmental Assessment Requirements

This chapter has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as shown in Table 20.1.

TABLE 20.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS COMPLIANCE

	Item 7: Transport and Traffic
Desired performance outcome	Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.
Current guidelines	*Guide to Traffic Management—Part 3 Traffic Studies and Analysis* (Austroads, 2007c) *Guide to Traffic Generating Developments Version 2.2* (RTA, 2002) *Cycling Aspects of Austroads Guides* (Austroads, 2014) *NSW Bicycle Guidelines Version 1.2* (RTA, 2005) *Planning Guidelines for Walking and Cycling* (DIPNR, 2004) *Construction of New Level Crossing Policy* (TfNSW, 2018b) *Future Transport Strategy 2056* (TfNSW, 2018a) *NSW Draft Freight and Ports Plan* (TfNSW, 2018c) *NSW Sustainable Design Guidelines Version 4.0* (TfNSW, 2017) *Australian Level Crossing Assessment Model* (ALCAM, 2016) *Railway Crossing Safety Series 2011, Plan: Establishing a Railway Crossing Safety Management Plan* (RTA, 2011).

SEARs requirement	EIS section
Item 7.1 The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists, bus services and train operations) impacts, including, but not necessarily limited to:	
a) a considered approach to route identification and scheduling of transport movements	Section 20.3.1 Section 20.6.1
b) the number, frequency and size of construction-related vehicles (passenger, commercial and heavy vehicles, including spoil management movements and track machines)	Section 20.4.1.2
c) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements) and assessment of traffic impacts on these routes including identifying traffic management measures to mitigate any impacts	Section 20.4.1.1 Section 20.7.2 Section 20.8
d) the closure, diversion or reconfiguration of elements of the road network associated with the construction of the Project	Section 20.6.1.3
e) safe access and egress to/from the classified road network.	Section 20.4.1.2 Section 20.7.2.2
Item 7.2 The Proponent must assess (and model) the operational transport impacts of the Project, including:	
a) the performance of key level crossings and intersections	Section 20.7.2.2 Section 20.7.3.1
b) wider transport interactions (local and regional roads, cycling, public and freight transport and the broader NSW rail network)	Section 20.5.2
c) identification of traffic and transport measures to mitigate any impacts.	Section 20.8
Item 7.3 The Proponent must assess the feasibility of level crossings (existing and proposed) and justify the safety and operational impacts and/or benefits of the proposed crossing type, taking into account the NSW Government's *Construction of New Level Crossings Policy*.	Section 20.5.1.1 Section 20.7.3.1
Item 7.4 In the assessment of level crossings, the EIS must consider:	
a) the *NSW Government's Construction of New Level Crossings Policy*	Section 20.7.3.1
b) level crossing ALCAM assessments for public crossings and site-specific risk assessments. The Proponent must demonstrate how they reduce risks identified so far as is reasonably practicable (SFAIRP)	Section 20.8.1
c) consistency with any interface agreements and related safety management plans, including draft interface agreements and draft safety management plans	Table 20.30
d) the practice of upgrading active public level crossings to boom gates and flashing lights adopted by the *NSW Level Crossing Improvement Program*	No existing crossings, so not applicable
e) the rationalisation of private and public level crossings in line with the *NSW Government's Level Crossing Closures Policy*	No existing crossings, so not applicable
f) operation of level crossings regarding road and rail travel speeds, vehicle types, train lengths, train numbers, road and rail traffic volumes, vehicle queuing and sight distance.	Section 20.7.3.1

20.2 Legislation, policies, standards and guidelines

This section identifies the relevant policies, standards and guidelines that apply to the assessment of traffic and transport for the proposal. Legislation that applies to the proposal is discussed in Chapter 5: Planning and Assessment Process.

TABLE 20.2 SUMMARY OF LEGISLATION, POLICIES AND GUIDELINES

Legislation, policy, strategy or guideline	Relevance to the proposal
State (NSW)	
Transport Administration Act 1988 (NSW)	The objectives of the Act relate to administering the transport services provided to the people of NSW and include: ▸ Providing an efficient and accountable framework for the governance of the delivery of transport services ▸ Promoting the integration of the transport system ▸ Enabling effective planning and delivery of transport infrastructure and services ▸ Facilitating the mobilisation and prioritisation of key resources across the transport sector ▸ Coordinating the activities of those engaged in the delivery of transport services ▸ Maintaining independent regulatory arrangements for securing the safety of transport services. As the proposal is wholly contained within NSW, the proposal would promote the objectives outlined in the Act.
Roads Act 1993 (NSW)	The objects of the *Roads Act 1993 No 33 (NSW)* relevant to the proposal are: a) to set out the rights of members of the public to pass along public roads b) to set out the rights of persons who own land adjoining a public road to have access to the public road c) to establish the procedures for the opening and closing of a public road d) to provide for the classification of roads e) to provide for the declaration of Roads and Maritime Services (RMS) and other public authorities as roads authorities for both classified and unclassified roads f) to confer certain functions (in particular, the function of carrying out road work) on RMS and on other roads authorities g) to provide for the distribution of the functions conferred by this Act between RMS and other roads authorities h) to regulate the carrying out of various activities on public roads. Additional sections of the Act that are relevant to the proposal include: Section 138 (1) A person must not: a) erect a structure or carry out a work in, on or over a public road b) dig up or disturb the surface of a public road c) remove or interfere with a structure, work or tree on a public road d) pump water into a public road from any land adjoining the road e) connect a road (whether public or private) to a classified road, otherwise than with the consent of the appropriate roads' authority. Overall, this Act is relevant to the proposal as the proposal would involve works to Crown roads. The Act governs the application of traffic control devices, electrical equipment or other facilities on roads or road shoulders, footpaths, structures under or over the proposal and control of vehicles (other than vehicles used on the railway itself) and animals along construction routes within NSW.

Legislation, policy, strategy or guideline	Relevance to the proposal
Rail Safety National Law (NSW)	The *Rail Safety National Law* was created following an agreement of the *Council of Australian Governments* (COAG) to deliver a consistent approach to rail safety policy and regulations. It was also designed to remove the inconsistencies between the previous state and territory rail safety regimes. The objects of this *Rail Safety National Law* (NSW) that are relevant to the Project are: a) to make provision for a national system of rail safety, including by providing a scheme for national accreditation of rail transport operators in respect of railway operations b) to provide for the effective management of safety risks associated with railway operations c) to provide for the safe carrying out of railway operations d) to provide for continuous improvement of the safe carrying out of railway operations e) to make special provision for the control of particular risks arising from railway operations f) to promote public confidence in the safety of transport of persons or freight by rail g) to promote the provision of advice, information, education and training for safe railway operations h) to promote the effective involvement of relevant stakeholders, through consultation and cooperation, in the provision of safe railway operations.
State (Qld)	
Transport Infrastructure Act 1994 (Qld)	The overall objective of the 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 *Transport Planning and Coordination Act 1994* (QLD). 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. Any works within state-controlled roads (SCR) or access to SCRs (during construction) will trigger: ▸ s50. Ancillary works and encroachments ▸ s33. Prohibition on roadworks on state-controlled roads ▸ s62. Management of access between individual properties and state-controlled roads section ▸ s66. Road access works within state-controlled road. This Act is relevant to the movement of construction materials on Queensland roads associated with the proposal.
Land Act 1994 (Qld)	The 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. Chapter 3, Part 2, Division 2 contains the provisions relating to the temporary or permanent closure of a road, including SCR and local government roads and declared stock routes. The Act is relevant to permits required to support the movement of construction materials on Queensland SCRs and local government roads.
Local Government Act 2009 (Qld)	The Act sets out the responsibilities of local government authorities regarding the construction, improvement, control and management of traffic on local roads (excluding SCRs). A local government authority may temporarily or permanently close a local road to traffic in accordance with the *Local Government Act*. An adjoining landowner must apply under the *Land Act* to temporarily or permanently close a local road.

Legislation, policy, strategy or guideline	Relevance to the proposal
Policies/strategies	
Construction of New Level Crossings Policy (TfNSW, 2011)	The policy provides guidance and direction to transport planners and infrastructure managers in the ongoing development and management of the NSW rail network. The approach by Transport for NSW (TfNSW) and rail and road agencies, is to avoid building new level crossings, wherever possible, given the inherent risk. This policy outlines the process for opening a new level crossing and issues to be considered. The development application must take into consideration: ▸ The implications for traffic safety ▸ The feasibility of alternative means of access to the development that does not involve use of level crossings and ▸ Any comments received from the Chief Executive Officer of the rail authority on the proposal. For the purpose of the assessment, the *Construction of New Level Crossing Policy* will be used with its associated key performance indicators in order to ensure that mitigation measures determined for all public road–rail interface locations (level crossings) through the analysis process focus on safety, risk and operational efficiency.
Future Transport Strategy 2056 (TfNSW, 2018a)	This strategy is an update of NSW's *Long-Term Transport Master Plan*. It acknowledges the vital role transport plays in the land use, tourism and economic development of towns and cities. It includes issue-specific and place-based supporting plans that shift the focus away from individual modes of transport, toward integrated solutions. The strategy and plans also focus on the role of transport in delivering movement and place outcomes that support the character of the places and communities we want for the future. The document aligns with the Greater Sydney commission, Infrastructure NSW, the Department of Premier and Cabinet, and the Department of Planning, Industry and Environment. Inland Rail project will mean major infrastructure changes to rail track in regional NSW including: ▸ 37 km of new track from Illabo to Stockinbingal ▸ 107 km of upgraded track from Parkes to Narromine ▸ 307 km of new track from Narromine to Narrabri ▸ 183 km of upgraded track and 3km of new track from Narrabri to North Star ▸ 52 km of new track from North Star to the NSW/Queensland border. The strategy will ensure the proposal optimises the movement of freight in NSW through efficient links to ports and economically sustainable freight hubs.
Level Crossing Closures Policy, (TfNSW, 2018b)	The purpose of the policy *Level Crossing Closures Policy* is to provide guidance and direction to transport planners and infrastructure managers in the ongoing development and management of the NSW rail network. It is the position of TfNSW that the closure of public and private level crossings in NSW is to be pursued where it is practical and cost effective to do so.
NSW Freight and Ports Plan 2018–2023, (TfNSW, 2018c)	The plan provides industry with the continuity and certainty it needs for the state's future growth and prosperity. The plan encourages government and industry to collaborate on clear initiatives and targets to make the NSW freight tasks more efficient and safer and it will address key issues for the safe, efficient and sustainable movement of freight across NSW, including: ▸ Effective planning and corridor protection for future freight infrastructure and growth ▸ Balancing freight and passenger movements ▸ Improved cross-border harmonisation ▸ Facilitation and introduction of technologies to improve safety and efficiency. The proposal will improve the efficiency, capacity and safety of the freight network in NSW by providing a dedicated rail corridor linking NSW to Victoria and Queensland. The proposal is noted as part of an outer Sydney orbital freight corridor and key north–south freight corridor across NSW.

Legislation, policy, strategy or guideline	Relevance to the proposal
NSW Level Crossing Improvement Program	Transport for NSW allocates supplementary funding for level crossing upgrades and to support initiatives such as safety awareness and police enforcement campaigns through the *NSW Level Crossing Improvement Program.* Upgrade locations funded by the *NSW Level Crossing Improvement Program* are identified through a priority ranking approach using the *Australian Level Crossing Assessment Model* (ALCAM), a review of NSW safety incident data, and consultation with relevant road managers and rail infrastructure managers.
New England North West Regional Transport Plan (TfNSW, 2013)	The plan provides a blueprint for the future of transport in the 10 regions, including the New England North West, and sets a strategic direction for the delivery of transport infrastructure and services in the state's regions over the next 20 years. Importantly, the plan supports the implementation of the *NSW Long-Term Transport Master Plan* which sets the strategic framework to guide transport decision-making in NSW. The proposal will support these regional transport plans with the introduction of a new rail corridor through New England North West region.
Level Crossing Strategy Council's Strategic Plan for NSW Level Crossings 2010–2020 (TfNSW, 2010)	The strategic plan provides the framework for a consistent approach to the management of level crossings across NSW by road and rail agencies. The proposal is aligned with the intent of the strategic plan. The vision of this plan is for no fatalities at level crossings in NSW. Key guiding principles of this plan that are applicable to the proposal include: ▸ Road and rail infrastructure managers are responsible for implementing risk reduction treatments based on their respective risk frameworks and priorities ▸ Reducing safety risks at level crossings by undertaking thorough assessment of site conditions (both rail and road) and a consideration of the effectiveness of existing and potential controls. The application of low-cost treatments will be considered in the first instance. Higher-cost road and rail management measures will be considered when necessary ▸ Where the development of either the road or rail network leads to a change in a risk profile resulting in the need for an upgrade of a level crossing, the associated costs for both the road and rail components will be met by the developer.
Gwydir Shire Council Community Strategic Plan, 2017–2027 (Gwydir Shire Council, 2017a)	A high-level plan that reflects the community's main priorities and aspirations. This plan is the basis of the other Council documents as it outlines five goals for the Council over the next 10 years, that is: ▸ A healthy and cohesive community ▸ Building the business base ▸ An environmentally responsible shire ▸ Proactive regional and local leadership ▸ Organisation management.
Gwydir Shire Council Delivery Program, 2017–2021 (Gwydir Shire Council, 2017b)	The delivery program takes the strategic goals outlined in the *Community Strategic Plan* and incorporates them into strategic actions. This document is the single point of reference for all principal activities to be taken by the Council during their term in office. The document also outlines the Council's mission and core values. The proposal is generally consistent with the program.
Gwydir Shire Council Transport Asset Management Plan, 2011 (Gwydir Shire Council, 2017d)	The Council has a suite of integrated planning and reporting documents including the *Transport, Sewerage and Water Supply Asset Management Plans*. *The Transport Asset Management Plan* outlines the Council's plan to advance Gwydir's transport system. The document identifies the infrastructure needs of the Council to enable people to get to work, recreation, school, farm produce to markets and goods and services to shops. The document also outlines the actions required to deliver this to an agreed level of service in the most cost-effective manner. The proposal is generally consistent with the management plan.
Gwydir Shire Economic Development Strategy, 2017–2020 (Gwydir Shire Council, 2017c)	The strategy provides the direction and framework for encouraging, supporting and facilitating economic development within the Gwydir Shire. The document provides an economic snapshot of the Council and the infrastructure required to meet its ambitions. The key industries within the Council are discussed with an economic lens and looks at how the Council intends to help grow them. The proposal is generally consistent with the strategy.

Legislation, policy, strategy or guideline	Relevance to the proposal
Moree Plains Shire Council (MPSC) Community Strategic Plan, 2017–2027 (MPSC, 2017a)	The overarching document in the Council's integrated planning and reporting framework. It translates the priorities and aspirations of the community into long-term strategic goals, that is: ▸ An inclusive, caring community ▸ Sustainable spaces and places ▸ A vibrant regional economy ▸ A leading organisation. The proposal is generally consistent with the strategic plan.
Moree Plains Shire Council Delivery Program 2017–2021 (MPSC, 2017b)	A statement of commitment to the community from each newly elected council. Where the *Community Strategic Plan* identifies a role for Council in delivering a community strategy, the *Delivery Program* is designed as the single point of reference for all principal activities undertaken. The proposal is generally consistent with the strategic plan.
Moree Plains Shire Council Asset Management Strategy 2017 (MPSC, 2017c)	The *Asset Management Strategy* is prepared to assist Council in improving the way it delivers services from infrastructure including roads, bridges, paths, stormwater drainage, parks and recreation, buildings, water and sewer. The document outlines how the asset portfolio will be used to meet the service delivery needs of the Council's community into the future.
Guidelines	
Guideline to Traffic Impact Assessment (GTIA), (DTMR, 2018)	The GTIA has been used as a point of reference for the traffic and transport assessment, as it relates to roads and intersections affected by the construction and operation of the proposal. The GTIA has been agreed with and accepted by the RMS as the traffic impact assessment guideline document. 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 proposal. Although the guidelines only apply to the SCRs, local government authorities may choose to adopt or use this as a reference. In general, the Department of Transport and Main Roads (DTMR) will consider a development's road impacts to be 'insignificant' if the development generates an increase in traffic on SCRs of less than 5 per cent over existing levels, either measured in terms of annual average daily traffic (AADT) or standard axle repetitions (SARs).
	Inputs to the GTIA process typically include the existing traffic levels, the proposal construction timeframe and that of other projects, volume of construction materials, haul vehicles and their capacities and therefore the number of new or additional proposal-related trips likely to use the network. The use of the assessment process recommended in the GTIA will provide the proposal with clarification on likely traffic impacts on nominated haulage routes, intersections and other affected roads. An updated version of the GTIA was released in December 2018. This was updated to include a clarification regarding the calculation of pavement contributions. Since this is not a significant update, this assessment has been undertaken consistent with the 2017 GTIA.
Manual of Uniform Traffic Control Devices Part 7: Railway Crossings (AS 1742.7: 2016) (Standards Australia, 2016)	The *Manual of Uniform Traffic Control Devices* series covers all mandatory road and rail related traffic control devices likely to be required for the proposal. The use of signs, markings and other devices at railway level crossings and affected roads, based on uniform standards and practices, is essential in the interests of safety for both rail traffic and road users. This part of the manual sets out the various controls used at railway, cane railway and combined railway/cane railway level crossings and describes the devices and assemblies, their use and location to achieve these controls.

Legislation, policy, strategy or guideline	Relevance to the proposal
Roads and Traffic Authority Guide to Traffic Generating Developments (RMS, 2002)	This guide outlines all aspects of traffic generation considerations relating to developments. The guide provides information regarding traffic issues for those submitting development applications and for those involved in the assessment of these applications. The overall objective is all parties impacted have access to common information relevant to the development approval process. The information provided gives background into the likely impacts of traffic from various types of developments and associated mitigation measures, thereby illustrating the importance of accurate development assessment. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments. The GTIA manual is used as overarching guideline document for NSW roads, as agreed with RMS.
Austroads Guide to Pavement Technology Part 2: Pavement Structural Design (Austroads, 2017a)	This guide provides advice on the structural design of sealed road pavements. It covers detailed discussion of subgrade evaluation, pavement materials evaluation, analysis of traffic loading and structural design in addition to other factors relevant to pavement design.
Austroads Guide to Traffic Management Part 12: Traffic Impact Assessments (Austroads, 2016)	This guide helps traffic and transport practitioners identify and manage the impacts on the road arising from land use developments. The impacts being considered are those directly affecting road users of all classes, from large freight vehicles and buses to cyclists and pedestrians. It is a useful supplement to the NSW guide and Queensland GTIA publications discussed earlier.
Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (Austroads, 2017c)	This part of the Austroads guide, *Part 3: Traffic Studies and Analysis* outlines the importance of traffic data and its analysis for the purpose of 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.
Cycling Aspects of Austroads Guides (Austroads, 2014)	These guides contain information that relates to the planning, design and traffic management of cycling facilities. They provide: ▸ 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 bicycle 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.
Austroads Guide to Traffic Engineering Practice Part 2: Roadway Capacity (Austroads, 1988)	This guide provides information regarding roadway capacity for various road types. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments.
Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads, 2017b)	The guide provides road designers and other practitioners with guidance on the detailed geometric design of all at-grade intersections. It provides information regarding intersection design requirements to be used on occasions where permanent intersection upgrades may be required to accommodate proposal related construction or operational traffic.

Legislation, policy, strategy or guideline	Relevance to the proposal
NSW Sustainable Design Guidelines Version 4.0 (TfNSW, 2017)	The guidelines have been a key tool in helping to realise sustainable transport infrastructure outcomes. The proposal is generally consistent with the guidelines. The guidelines aim to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of transport infrastructure projects. The guidelines incorporate the following key objectives: ▸ Minimising impacts on the environment, whether through transport operations, infrastructure delivery or maintenance ▸ Procuring, delivering and promoting sustainable transport options that achieve value for money and reduced lifecycle costs ▸ Developing, expanding and managing the transport network that is sustainable and climate resilient.
Australian Level Crossing Assessment Model (ALCAM, 2016)	The assessment model is a 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 for both road and pedestrian level crossings and to help determine cost-effective treatments.
Railway Crossing Safety Series 2011 Plan: Establishing a Railway Crossing Safety Management Plan (RTA, 2011)	Railway crossings are an integral part of the state road network. This guideline provides planners and project managers with the process, procedures and tools to meet the RMS's legislative, occupational health and safety, project management and other requirements for the planning and management of safety risks, rail crossing safety management measures and rail crossing safety management plans. The guideline assists planners to: ▸ Understand and assess the safety risks, hazards and hazardous events at a rail crossing, particularly those that fall under the responsibility of the RMS ▸ Identify road and traffic management infrastructure assets that are under the control of the RMS at a rail crossing ▸ Evaluate existing safety management measures at a rail crossing and assess the need for additional safety management, so far as is reasonably practicable ▸ Develop a rail crossing safety management plan. This plan will support RMS objectives, policy and legal requirements and document the ongoing management practices of RMS infrastructure assets and systems that manage safety risks ▸ Administer, monitor and report on rail crossing safety management plans to ensure that they comply with legislative and business requirements.

20.3 Traffic, transport and access study area

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

- The extent of the proposed rail corridor for the proposal, including public roads intersecting the rail corridor (road–rail interface locations)
- The road network anticipated to be used for the transport of workforce, materials and equipment during the construction and operational phases of the proposal.

The traffic, transport and access study area establish the spatial limits for assessing impacts and determining applicable mitigation measures for the proposal. The proposal involves the design and construction of approximately 25 km of new dual-gauge track within the existing non-operational Boggabilla rail corridor between 900 m north of North Star towards Whalan Creek. The proposal then continues along a 5 km section of greenfield rail corridor towards the NSW/QLD border. It crosses two local government areas (LGA) of Gwydir Shire Council (GSC) and Moree Plains Shire Council (MPSC).

The proposal rail alignment and road–rail interface locations are illustrated in Figure 20.1. The road–rail interface locations included in the traffic, transport and access study area are all public road crossings which are envisaged to intersect the proposal alignment.

The assessment does not include the consideration of impacts to private roads. Any impacts to private roads are addressed directly with the impacted landowners as part of the proposal's wider consultation process. The use of any private roads during construction would require a specific agreement between the delivery contractor with the private road owners.

20.3.1 Primary construction transport routes

Transportation of materials, equipment and workforce for the construction of the proposal will be via existing SCRs and local government roads. For the purpose of the traffic, transport and access impact assessment, it has been assumed that all construction material deliveries are to laydown area delivery points along the proposal. Figure 20.2 illustrates the proposed primary construction transport routes which the construction contractor may use. Although other roads might also be used for the transport of construction activities, these roads would not be the primary construction routes and will have significantly fewer construction traffic volumes. Impacts associated with the construction of the proposal are explored in detail in Section 20.7.2.

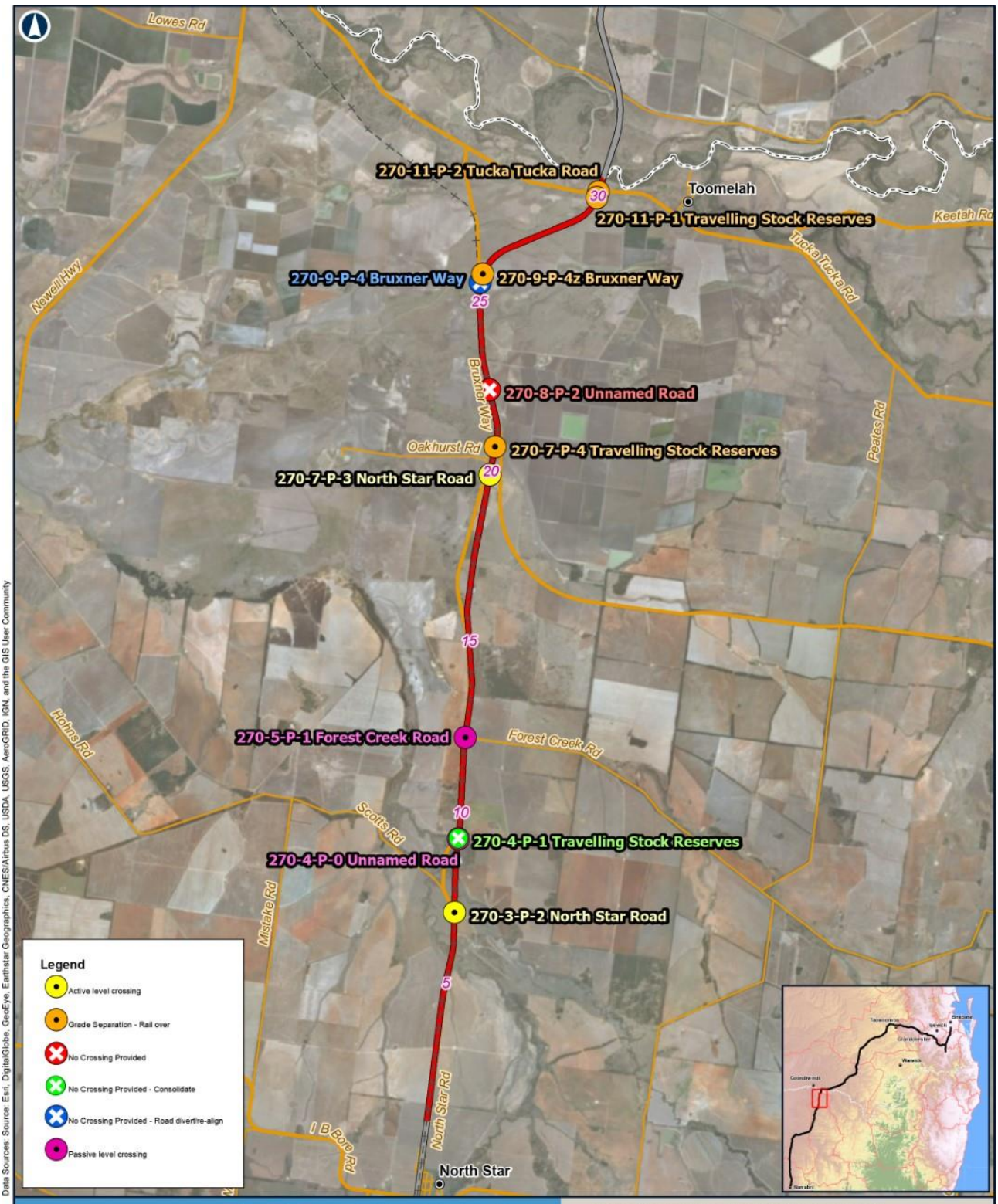

Figure 20.1: Proposed public road-rail interface locations

NORTH STAR TO NSW/QLD BORDER

4.5 km

Coordinate System: GDA 1994 MGA Zone 56

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Date: 14/02/2020 Paper: A4
Author: FFJV GIS Scale: 1:150,000

LEGEND

- 5 Chainage (km)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Adjoining alignments
- NSW/QLD border
- Major roads
- Minor roads

ARTC InlandRail

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

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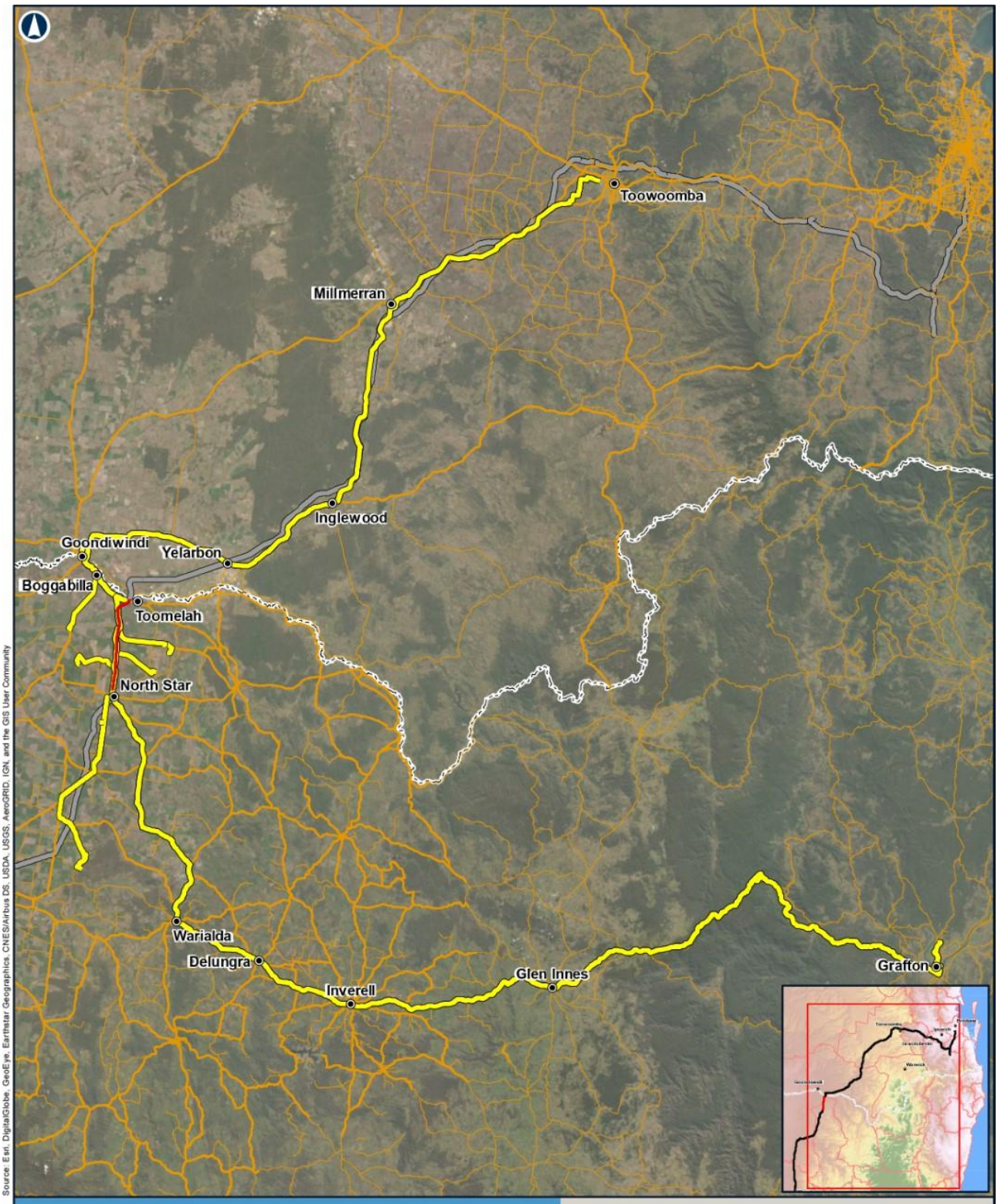

Figure 20.2: Proposed primary construction transport routes for the proposal

NORTH STAR TO NSW/QLD BORDER

40 km

Coordinate System: GDA 1994 MGA Zone 56

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Date: 09/10/2019 Paper: A4

Author: FFJV GIS Scale: 1:1,550,000

LEGEND

- North Star to NSW/QLD border alignment
- Adjoining alignments
- NSW/QLD border
- Overall construction routes
- Major roads
- Minor roads

ARTC InlandRail

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

Map by: NCW Z:\GIS\GIS_270_NS2B\Tasks\270-EAP-201910081333_Transport\NS2B_EIS_template_ARTC_Fig20.3_A4P_rev3.mxd Date: 16/10/2019 16:54

20.3.1.1 Workforce

The preliminary site workforce information is shown in Figure 20.3 as expected workforce onsite over program weeks.

This graph shows the expected full-time workforce and does not include delivery drivers for precast bridge elements or culverts, concrete deliveries or fuel deliveries. It does include delivery drivers for bulk materials including general and structural fill, capping material and ballast. The total site team is expected to peak at approximately 250 to 350 team members from week 50 through to week 80.

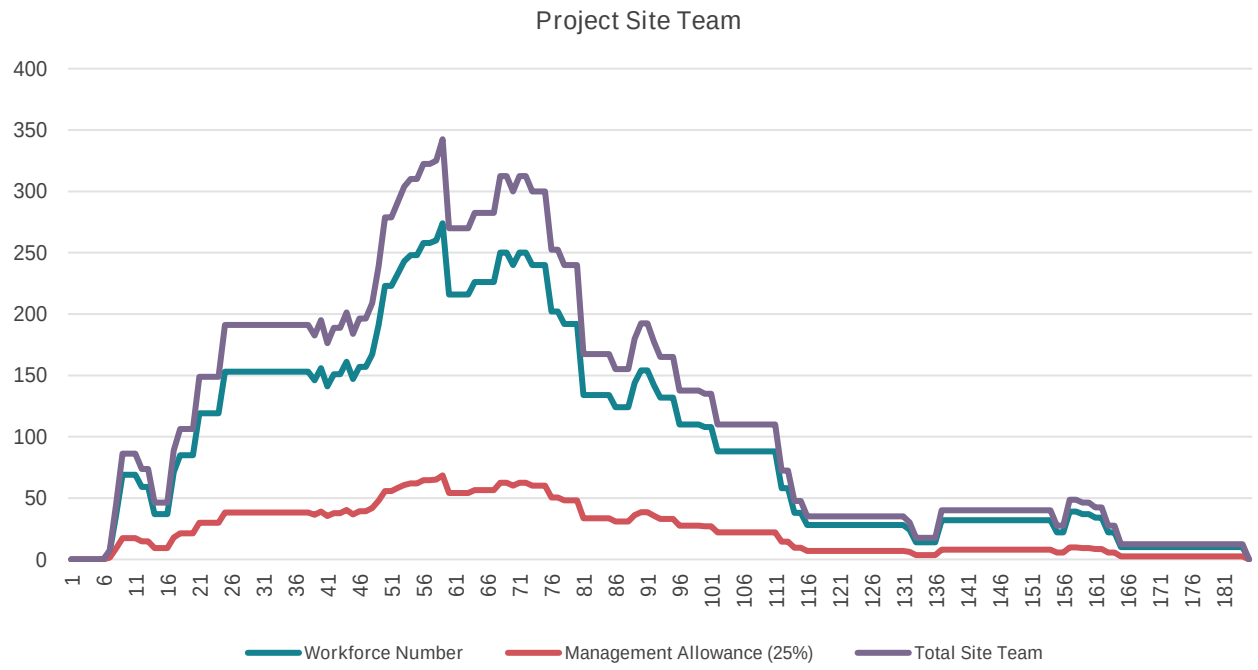


FIGURE 20.3 SITE WORKFORCE

The construction workforce would be housed in temporary camp accommodation at North Star. The temporary construction camp will be designed to provide accommodation to industry standards and will comply with all relevant legislation and regulations, including the required building codes and occupational health and safety guidelines.

20.3.1.2 Pre-cast concrete routes

It has been assumed that pre-cast concrete for the proposal will be delivered from established yards in Toowoomba, approximately 180 km northwest of the proposal alignment. All pre-cast concrete routes originate in Toowoomba and will be distributed directly to assigned bridge/culvert laydowns along the alignment. Routes are based on roads most likely to be used for the transportation of pre-cast concrete, considering input from the *National Heavy Vehicle Regulator* journey planner which provides guidance in identifying roads suitable for heavy vehicles. For the transportation of some of the larger pre-cast concrete girders, it is expected that police escorts will be required.

20.3.1.3 Quarry routes

For the purpose of the traffic, transport and access impact assessment, it has been assumed that all quarry materials for the proposal will be supplied from quarries south of North Star. These quarries are proposed to supply materials for bottom ballast, top ballast, capping and structural fill. These potential suppliers are shown in Table 20.3.

TABLE 20.3 PROPOSAL SCHEDULE OF QUARRIES

Quarry name	Location
Johnstone Concrete and Quarries	Pallamallawa, NSW
Tikitere Quarry	North Star, NSW
1000 Acres borrow pit (Site 2)	North Star, NSW
Site 1 borrow pit	North Star, NSW

20.3.1.4 Concrete routes

For the purpose of this assessment, it has been assumed that all concrete for the proposal will be supplied from Goondiwindi. Concrete will be distributed directly to the discharge point along the alignment. Concrete routes were based on the location of the concrete supplier and roads most likely to be used for the transportation of concrete based on distance and, where possible, staying on arterial roads.

20.3.1.5 Spoil disposal management

The proposal is predominantly an import project and is not expected to generate a significant amount of spoil. However, there are several likely sources of spoil material to be handled over the life of the proposal, including:

- Excess topsoil. If present, the current planning is to potentially use this:
  - To rehabilitate borrow locations
  - In localised landscaping within rail corridor or
  - In embankments with geotechnical treatments
- Unsuitable material. If the volume cannot be used within the permanent works corridor, then it will be disposed of in the borrow locations.
- Camp waste, both solid and wastewater is not subject to assessment under this EIS chapter.
- Waste construction materials, including but not limited to used formwork, empty containers, waste reinforcement, concrete wastage, office waste. These types of waste will be transported to the local waste disposal facilities and treated in accordance with their governing rules.

Because of the limited spoil task in the proposal, no trips have been added specifically to the traffic, transport and access impact assessment to account for these tasks. However, these trips are considered within the buffer and return trips as a part of the assessment.

20.3.1.6 Consolidated sleeper routes

For the purpose of this assessment, concrete sleepers are assumed to originate from Grafton and be distributed via the road network to various laydown areas along the proposal alignment.

20.3.1.7 Delivery of water

For the purpose of this assessment, water supply is assumed to be available from the Boggabilla Weir. Water will be supplied to various points along the alignment for activities including earthworks, trackwork and dust suppression. Other potential water supplies may include rivers, dams and bores; however, these have not been evaluated as part of this assessment.

20.3.2 Operational transport routes

Rail maintenance workforce movement and the transportation of maintenance materials are expected to be the major transport tasks during the operational stage of the proposal. Maintenance vehicles will use the access tracks that will be constructed for most of the inspection and maintenance activities. It is expected that operational traffic will be irregular and inconsequential, with no envisaged impacts to operational conditions of the surrounding road network. Impacts associated with the operation of the proposal are explored in detail in Section 20.7.3.

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

Similarly, the traffic, transport and access impact assessment does not consider changes to the network operations resulting from modal shift, such as the improvement to highway operations resulting from the shift of freight movements from heavy vehicles to trains. This has previously been undertaken as part of the business case for the proposal and has been considered across the program. Although not investigated in detail in this assessment, it can be reasonably assumed that the proposal will result in modal shift from heavy vehicle trips along the surrounding network being converted to train trips, therefore resulting in a positive long-term traffic benefit.

20.4 Methodology

Desktop studies were undertaken to establish the baseline conditions for the transport infrastructure within the traffic, transport and access study area. A compliance assessment (quantitative) approach was adopted to access potential traffic impacts and opportunities of the proposal. The SEARs for the proposal does not specify a guideline for the undertaking of the traffic, transport and access impact assessment. However, the DTMR *Guide to Traffic Impact Assessment 2017* (GTIA) has been agreed with and accepted by Roads and Maritime Services (RMS) (NSW) as the basis for this assessment.

It is noted that an updated version of the GTIA was released in December 2018. The update to this version is considered minor as the only change is a clarification to the payment of pavement contributions, which does not impact on the assessment undertaken in this traffic impact assessment (TIA). As a result, this assessment has been undertaken consistent with the 2017 version.

The performance criteria outlined by the GTIA are to determine the traffic generation related to the construction and operation of the proposal, and to assess the potential impacts on the transport infrastructure and facilities. Following the traffic analysis, proposed mitigation measures were identified to address specific issues and opportunities, address legislative requirements, accepted government plans, policy and practice. These are to be applied in the detailed design, pre-construction, construction and operational phases of the proposal. The compliance assessment methodology is presented in Chapter 10: Assessment Methodology.

An initial high-level summary of the expected transport task by mode was undertaken for the existing road, rail, port and airport facilities to establish the assessment requirements during the construction and operational phases of the proposal. While some workforce movements may use active transport, this is not expected to be significant given the remote locations of the worksites. Table 20.4 summarises the expected proposal transport tasks by mode. The transportation of materials and equipment will typically make use of the existing road and rail network and most of impacts were road and rail network based.

TABLE 20.4 SUMMARY OF TRANSPORT TASKS BY MODE

Proposal phase	Road	Rail	Port and airport	Active transport
Construction	Transport of construction material, plant and equipment. The transport of workforce to and from the site	Transport of construction material (i.e. rail)	No impact expected	No significant impact expected
	Impact of road closures and realignments on surrounding road network and road–rail interface locations			
	Impact of rail crossings on vehicle queues and nearby intersections.			
Operation	Rail maintenance materials 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			
	Rail maintenance workforce movements			
	Impact of rail crossings on vehicle queues along adjacent state-controlled roads (SCRs) and local government roads and impacts on nearby intersections.			

For the impact analysis, Figure 20.4 illustrates the methodology adopted to identify the background and the proposal-related traffic volumes. This methodology focused on establishing a background 'without development' traffic scenario for the identified study area and comparing this to the scenario including the proposal generated traffic, i.e. the 'with development' scenario.

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

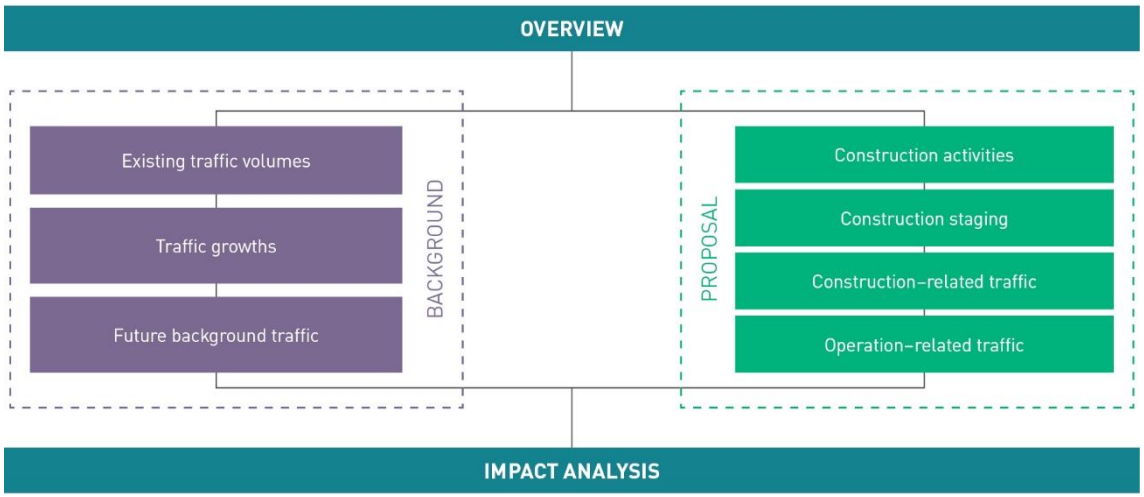


FIGURE 20.4 BACKGROUND AND PROPOSAL TRAFFIC VOLUMES

The key tasks for traffic and transport assessment include:

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

20.4.1 Desktop review and data collection

The key data and information inputs required to undertake the traffic, transport and access impact assessment are listed below:

- Local government/state policies and strategies potentially influencing the traffic and transport impact assessment for the proposal
- 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
- Designated freight and seasonal traffic routes
- Dangerous goods vehicle routes
- Bus and school bus routes
- Travelling Stock Reserves
- Emergency service access
- Multi-combination routes and zones
- Prevailing structural integrity issues, i.e. vulnerable structures
- Structural capacity/life of structures
- Crash data
- Tourist routes (where applicable).

20.4.1.1 Background traffic volumes

The following section describes the approach for obtaining background and proposal traffic volumes used in the traffic, transport and access impact assessment.

Existing traffic volumes

Existing traffic volumes (link and intersections) in the first instance were gathered from road controlling authorities. Traffic surveys were commissioned at key locations where traffic data was unavailable. Table 20.7 illustrates the approach that was proposed to determine the road segments within the traffic, transport and access study area where traffic surveys were recommended. It takes into consideration the increase in traffic volumes due to the proposal and the duration of construction. In instances where traffic data was both unavailable from road controlling authorities or traffic surveys, traffic volumes were estimated based on the *Austroads Part 2—Guide to Traffic Engineering Practice: Roadway Capacity* (Austroads, 1988) and stakeholder consultation.

Further details on existing traffic volume rates are included in Appendix M: Traffic Impact Assessment.

Traffic growth rates

Traffic growth rates on SCRs were derived based on historic permanent census traffic data where available. An evaluation of the traffic growth rates revealed an overall annual average daily traffic growth rate (AADT) of 2 per cent, which was adopted in the analyses. In the absence of data to determine traffic growth rates, an average annual growth rate of 2 per cent for SCRs and local government authority roads was assumed.

Further details on traffic growth rates are included in Appendix M: Traffic Impact Assessment.

Future background traffic

Traffic growth 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 proposal were accounted for in future year traffic estimates by means of manual reassignment of traffic demands on reasonably assumed diversions.

20.4.1.2 Proposal traffic

Traffic generators

Construction activities

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

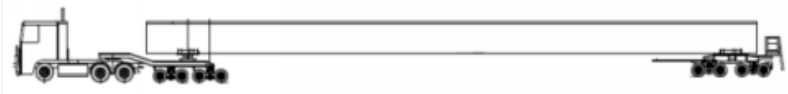
The total trips by construction activity and year of construction for the proposal have been summarised in Table 20.5.

TABLE 20.5 TOTAL TRIPS BY ACTIVITY PER YEAR

Material	2021	2022	2023	2024
Workers	37,510	40,920	40,920	40,920
In-situ concrete	709	3,837	1,051	0
Pre-cast concrete	93	322	15	0
Quarry	0	0	9,986	14,642
Fill	134,097	192,764	0	0
Sleepers	0	0	341	341
Water	9, 268	6,839	4	6

Table 20.6 shows the Austroads vehicle types by construction activity that have been adopted for the assessment.

TABLE 20.6 VEHICLES TYPES BY CONSTRUCTION ACTIVITY

Construction activity	Austroads vehicle class	Illustration (Indicative)
Workers/tools	Class 1–2 Short vehicle/towing	
In-situ concrete	Class 5 4-Axle Rigid Truck (27.5 t)	
Pre-cast concrete	Oversize Overmass (OSOM) for Pre-cast concrete bridges Uploaded Class 3 Rigid Truck with 4-Axle Dolly and 4-Axle Jinker (70 t payload)	
Quarry	Class 10 7-Axle B-Double (55.5 t)	
Fill	Class 10 7-Axle B-Double (55.5 t)	
Sleepers	Class 10 7-Axle B-Double (55.5 t)	
Water	Class 7 4-Axle Semitrailer (31.5 t)	

Construction staging

Staging relates to construction start and end dates of all construction-related activities within the envisaged construction period. The construction period of the proposal is expected to start in 2021 and end in 2024. The start and end dates of all associated construction were considered in order to determine the peak period for the proposal. Although some materials might be delivered before construction start and end dates, it was conservatively assumed that delivery and construction start and end dates would occur at the same time. Fluctuations may occur on-site because of the early delivery of materials. However, feasibility design does not require the design and detailing of the construction activities to be programmed to the day or to the hour, therefore this information is currently unavailable. This will be assessed as a part of the detailed design for the proposal when a construction contractor is appointed.

The construction staging plan developed for the EIS indicates that the peak construction traffic time across the impacted network will likely occur in 2022. It should be noted, however, that different roads within the impacted network will experience their peak period at differing stages throughout the Project construction phase (2021–2024). This will be dependent on when the construction activity that is proposed to travel along that road is scheduled to occur. Ongoing consultation with road authorities will continue throughout the life of the project to ensure peak periods are communicated and captured within the *Projects Traffic Management Plan*.

Construction-related traffic

The number of trips generated by each construction activity were 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 estimated peak construction traffic for each construction route and for separate road sections.

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

Operational traffic

Rail maintenance workforce movements and the delivery of maintenance materials are expected to be the major transport tasks during proposal operation. It is anticipated that operational traffic will be insignificant due to infrequent maintenance vehicle movements and transportation of maintenance material within the rail corridor. These movements are expected to be irregular and add an insignificant amount of traffic to the background road network. They are not expected to impact the operations of the road network.

Seasonal variation

Based on the dominant agricultural land uses of the traffic, transport and access study area, traffic volumes on the road network are likely to increase during harvesting season. During this time, heavy vehicle usage on the local and state roads 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. The impact of seasonal variation was considered as part of the analyses, especially at road–rail interface locations.

Cumulative impacts

Construction schedules relating to other Inland Rail projects and 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.

For further details, refer to Chapter 26: Cumulative Impacts, and Appendix M: Traffic Impact Assessment.

Data sources

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 within the impact area where data needed to be obtained from traffic surveys:

- Assign road details to each road segment within the traffic, transport and access study area
- Identify the duration each road segment will be used for construction transport. Times were estimated, with nominated assumed periods, i.e. short: <6 months; moderate 6–12 months; long: >12 months.
- Determine the road segments where traffic surveys were recommended, taking into consideration the increase in traffic volumes due to the proposal and the duration of construction (refer Table 20.7).

TABLE 20.7 PROPOSED SELECTION CRITERIA FOR TRAFFIC SURVEY LOCATIONS

Increase in traffic due to proposal	Long duration	Moderate duration	Short duration
High increase	Survey recommended	Survey recommended	No survey recommended
Moderate increase	Survey recommended	No survey recommended	No survey recommended
Low increase	No survey recommended	No survey recommended	No survey recommended

Traffic data obtained from road controlling authorities on road links that were considered appropriate for use in the traffic impact assessment did not require traffic surveys. The following methodology was developed to aid in the selection of intersections within the traffic, transport and access study area where data was gathered from traffic surveys:

- Undertake a 5 per cent comparison analysis for road segments, identify intersections where construction traffic is planned to undertake turn manoeuvres and where the traffic growth rate is either moderate or high
- Referring to the intersections identified above, it was recommended that surveys be undertaken based on the selection criteria presented in Table 20.7.

Road links envisaged to be impacted by construction routes which 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 within the traffic and transport 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 level of service (LOS) A with associated AADT of 2000 vehicles as depicted in RTA *Guide to Traffic Generating Developments, 2002* as adopted from *the Austroads Part 2—Guide to Traffic Engineering Practice: Roadway Capacity,* (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, 2002* as adopted from the *Austroads Part 2—Guide to Traffic Engineering Practice: 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 *Austroads Part 2—Guide to Traffic Engineering Practice: Roadway Capacity* (Austroads, 1988)
  - Rural local road: Volumes derived by assuming 400 AADT based on a review of nearby 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 *Austroads Part 2—Guide to Traffic Engineering Practice: Roadway Capacity* (Austroads, 1988).
- Peak-hour flow rates obtained from various sources will be converted to average daily traffic volumes.
- Undertake a 5 per cent comparison analysis to identify road segments where peak period proposal 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).

20.4.2 Impact assessment and mitigation

20.4.2.1 Traffic

The operational performance of the road network in the traffic, access and transport study area has been assessed to develop an understanding on the potential traffic impacts from the proposal according to the GTIA manual process shown in Figure 20.5. This chapter addresses the requirement of the SEARs Section 7–1 to 7–2 as shown in Table 20.1. A description of the proposal is available in Chapter 6: The Proposal and Chapter 7: Construction of the Proposal.

This process is for the impact assessment of development of the SCR network and has been extended to the local government road network. The process does not apply to private roads.

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 proposal on the local and regional transport network. As noted earlier the use of the GTIA manual has been agreed with RMS to be used as the traffic, transport and access impact assessment guideline document.

The extent of the impacts of the proposal traffic on other users and on infrastructure can range from being localised to quite dispersed. An analysis boundary has been defined within which to assess a reasonable level of impact of the additional proposal traffic. This boundary is the transport, traffic and access study area. The transport, traffic and access study area defines where impacts would most likely occur at intersections and on links in the network surrounding the transport, traffic and access study area.

GTIA indicates the conditions for determining the transport, traffic and access study area (see Table 20.8).

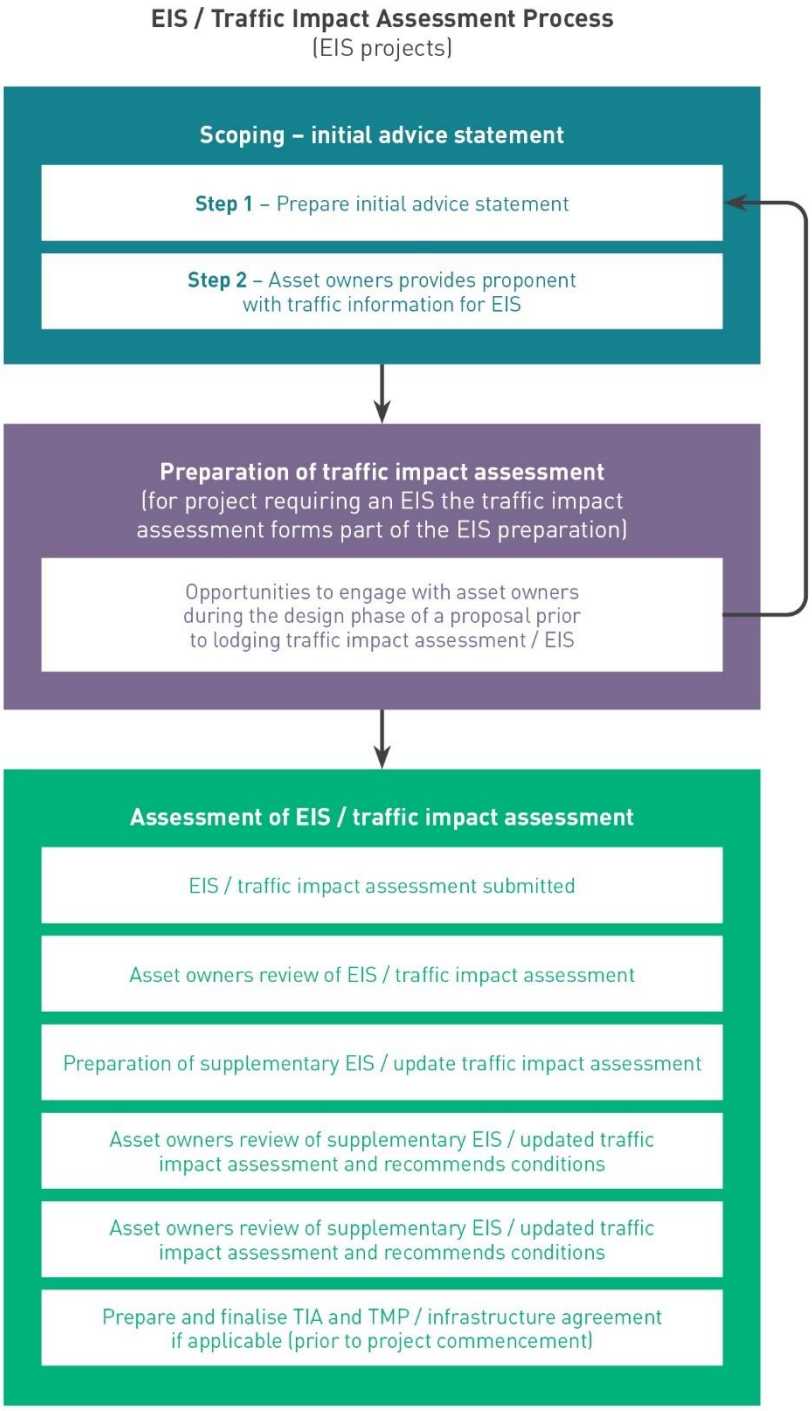


FIGURE 20.5 TRAFFIC IMPACT ASSESSMENT PROCESS

Source: Figure 4 Department of Transport and Main Roads Guide to Traffic Impact Assessment (GTIA) 2017

TABLE 20.8 STUDY AREA BY IMPACT TYPE

Impact type	Study area
Road safety	All intersections where the development 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 development 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.
Intersection delay	All intersections where the development 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 development 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.
Transport infrastructure	All road links where the development 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 20.9. The level of service criteria is as defined in the *Austroads Guide to Traffic Management: Part 3 Traffic Studies and Analysis* (Austroads, 2017c).

TABLE 20.9 PERFORMANCE CRITERIA

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

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 which are to be assessed were adopted from GTIA and summarised in Table 20.10.

TABLE 20.10 IMPACT ASSESSMENT YEARS

Impact type	Impact assessment years
Road safety	Years of construction + year of opening of each stage including the final stage.
Access and frontage	Years 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) Level crossings have been assessed at year of opening as well as at 2040 in order to align with the EIS timelines.
Intersection delay	Years of construction + year of opening of each stage including the final stage.
Road link capacity	Years of construction + year of opening of each stage including the final stage.
Transport infrastructure	Years 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 20.6.

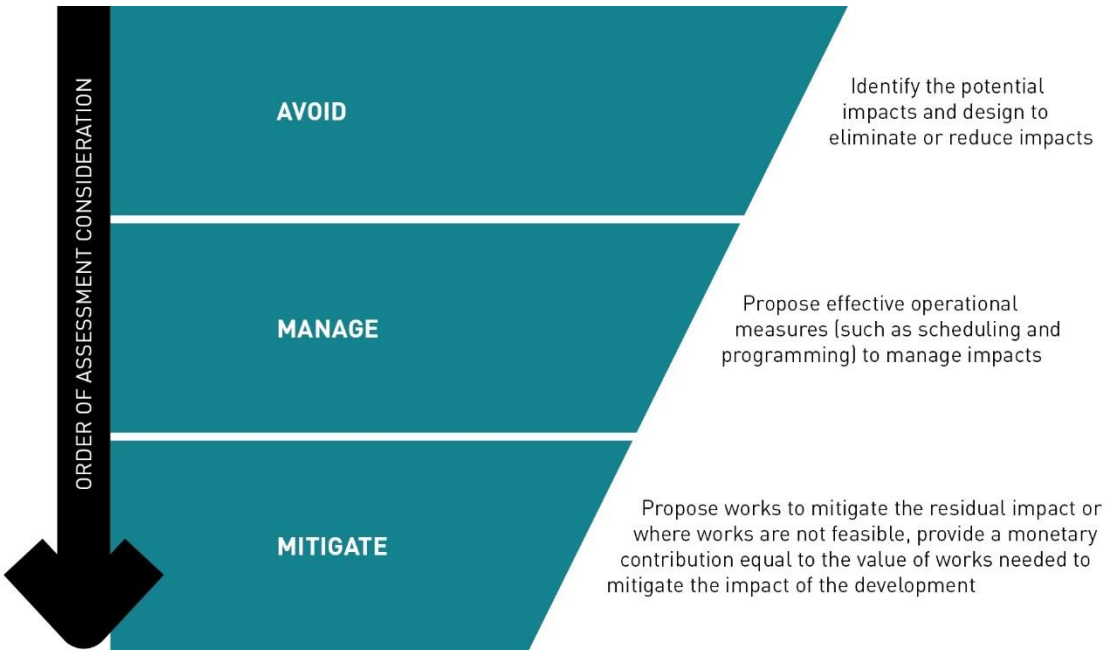


FIGURE 20.6 MITIGATION FRAMEWORK

Source: Figure 4 DTMR GTIA Sept 2017

20.4.2.2 Other impacts and mitigations

Strategic benefits of freight travelling by rail-over-road include that the proposal may remove a proportion of heavy freight trips from the road network, therefore improving safety for all road users. Further key strategic benefits of Inland Rail are that it will:

- Enable trains using the wider Inland Rail network to travel between North Star and the NSW/QLD border, linking with other sections of the wider Inland Rail network to the north and south
- Provide new rail infrastructure that meets the Inland Rail specifications, which includes improving the resilience of the rail corridor to flooding
- Minimise the potential for environmental and community impacts by maximising use of the existing non-operation Boggabilla rail corridor.

20.4.3 Rail crossing impact assessment

Level crossings can introduce dangerous points at which trains, cars and pedestrians can intersect. Most level crossing incidents are classified as 'near-miss' incidents between trains, road vehicles and pedestrians. While rare, actual collisions can occur at level crossings which can cause property damage, service disruptions, impact to adjacent infrastructure, injury and, in most traffic cases, death.

The rail crossing impact assessment focused on vehicle delay and queueing analysis of proposal traffic at rail crossings and at neighbouring closely spaced intersections. This analysis was undertaken at proposed rail crossings only as there are no existing operational rail crossings within the traffic, transport and access study area.

A safety-based risk assessment was undertaken for the road–rail interfaces recommended for the proposal, with a 'high' risk rating assigned to each level crossing location. Mitigation measures have been developed to reduce the risk associated with these crossings, with the measures informed by the key actions and areas of focus of the *Strategic Plan for NSW Level Crossings 2010–2020*. It also provides the basis for compliance to *National Rail Safety Law*, *National Safety Policies for Railway Crossings* and *Regional Level Crossing Safety Strategies*.

20.4.4 Impacts on ports and airports (other modes and intermodal terminals)

The transport of materials, workforce and equipment is likely to primarily use the road and rail transport networks. Thus, the projected impact from the development on ports and airports is not considered to be significant during construction and operation. For this reason, impacts on ports and airports are not further considered in this assessment.

20.4.5 Stakeholder consultation

Consultations with public road-controlling authorities were held throughout the traffic impact assessment process. The stakeholder engagement process included written correspondence in addition to formal meetings that addressed the proposed traffic impact assessment process, impacted assets, adopted manuals and procedures, assumptions (such as traffic growth rates, assumed base volumes etc.) and proposed mitigations. The stakeholders consulted were:

- Roads and Maritime Services (NSW)
- Department of Transport and Main Roads (Qld)
- Goondiwindi Regional Council
- Moree Plains Shire Council
- Gwydir Shire Council
- Inverell Shire Council
- Clarence Valley Council.

20.5 Description of the existing transport conditions

20.5.1 Rail infrastructure

The proposal interfaces with the existing Cumurra–North Star Railway Line at North Star in NSW. Twenty-five kilometres of the proposal is proposed to be located within the existing non-operational Boggabilla rail corridor which extends north from North Star and heads towards Boggabilla.

20.5.1.1 Existing road–rail interface locations

Five existing non-operational public road–rail interfaces exist along the Boggabilla railway line within the Project extents. Table 20.11 tabulates the existing crossing locations that are proposed to be reinstated as part of the Project. The proposed treatments reported in this table are tentative treatments and are subject to change following design refinements and stakeholder consultations.

TABLE 20.11 EXISTING NON-OPERATIONAL PUBLIC ROAD–RAIL INTERFACE AND ROAD CLOSURE LOCATIONS (FORMED ROADS ONLY)

ID reference	Road name	Owner	Proposed treatment
GSC			
270-3-P-2	North Star Road	GSC	Active level crossing
270-5-P-1	Forest Creek Road	GSC	Passive level crossing
MPSC			
270-7-P-3	North Star Road	MPSC	Active level crossing
270-8-P-2	Unnamed Road	MPSC	No crossing provided
270-9-P-4	Bruxner Way	MPSC	Road divert/realign

20.5.2 Existing road network

The study area encompasses several SCRs and local government roads that serve as main transport routes for the proposal. These SCRs are further described in the following sections.

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

20.5.2.1 State-controlled roads: New South Wales

There are no SCRs in NSW that intersect the proposed rail alignment. Impacts along NSW SCRs are limited to use as primary construction routes. SCRs which are proposed to be used to transport construction materials, equipment and workforce during construction of the proposal are included in Table 20.12 and shown in Figure 20.2.

TABLE 20.12 NEW SOUTH WALES STATE-CONTROLLED ROADS: PROPOSAL CONSTRUCTION ROUTES

Road name	Road section
State-controlled roads: Roads and Maritime Services	
Gwydir Highway	Between Bent Street and New England Highway
	Between New England Highway and Campbell Street
	Between Campbell Street and Stephen Street
Newell Highway	Between NSW/QLD border and Bruxner Way
	Between Bruxner Way and Letter Box Road
New England Highway	Between Gwydir Highway and Gwydir Highway
Summerland Way	Between Trenayr Road and Turf Street

20.5.2.2 State-controlled roads: Queensland

There are no SCRs in Queensland that intersect with the proposed rail alignment. Impacts along Queensland SCRs are limited to use as primary construction routes. While the proposal is wholly contained within NSW, Queensland SCRs are proposed to be used to transport construction materials, equipment and workforce during construction of the proposal. These SCRs are summarised in Table 20.13 and shown in Figure 20.2.

TABLE 20.13 QUEENSLAND STATE CONTROLLED ROADS: PROPOSAL CONSTRUCTION ROUTES

Road name	Road section
State-controlled roads: Department of Transport and Main Roads	
Cunningham Highway	Between NSW/QLD border and Leichhardt Highway
	Between Leichhardt Highway and Yelarbon–Keetah Road
	Between Yelarbon–Keetah Road and Millmerran–Inglewood Road
Gore Highway	Between Millmerran–Inglewood Road and Bunkers Hill School Road
Leichhardt Highway	Between Cunningham Highway and Hunt Street
Millmerran Inglewood Road	Between Cunningham Highway and Gore Highway
Toowoomba Cecil Plains Road	Between McDougall Street and Troys Road
	Between Troys Road and Hursley Road
	Between Hursley Road and Wellcamp Westbrook Road

20.5.2.3 Local government roads: New South Wales

Five local government roads within NSW directly intersect the proposal rail corridor, which intersect two local government roads twice. These roads fall within the jurisdiction of

- Moree Plains Shire Council (MPSC)
- Gwydir Shire Council (GSC).

These roads are summarised in Table 20.14.

TABLE 20.14 NEW SOUTH WALES LOCAL GOVERNMENT ROADS: INTERSECTING PROPOSAL RAIL CORRIDOR

ID reference	Road name	Owner	Proposed treatment
Local government roads: Moree Plains Shire Council			
270-7-P-3	North Star Road	MPSC	Active level crossing
270-8-P-2	Unnamed road	MPSC	No Crossing Provided
270-9-P-4	Bruxner Way	MPSC	No Crossing Provided—Road divert/realign
270-9-P-4z	Bruxner Way	MPSC	Grade Separation
270-11-P-2	Tucka Tucka Road	MPSC	Grade Separation
Local government roads: Gwydir Shire Council			
270-3-P-2	North Star Road	GSC	Active level crossing
270-5-P-1	Forest Creek Road	GSC	Passive level crossing

An additional seven proposed public road–rail interface locations are located along unformed roads. These locations are not required to be assessed as part of the traffic, transport and access impact assessment as these are 'paper roads', which do not currently facilitate vehicle movements. As a result, they have not been assessed.

There are several local government roads proposed to be used to transport construction materials, equipment and workforce during construction of the proposal as shown in Table 20.15. These fall within the jurisdiction of four local government authorities:

- Clarence Valley Council (CVC)
- Gwydir Shire Council (GSC)
- Inverell Shire Council (ISC)
- Moree Plains Shire Council (MPSC).

TABLE 20.15 NSW LOCAL GOVERNMENT ROADS: PRIMARY CONSTRUCTION ROUTES

Road name	Road section
Local government roads: Clarence Valley Council	
Bent Street	Between Craig Street and Gwydir Highway
Clark Road	Between Clark Road and Trenayr Road
Craig Street	Between Villiers Street and Clarence Street
	Between Clarence Street and Bent Street
Dobie Street	Between Villers Street and Summerland Way
Trenayr Road	Between Summerland Way and Clark Road
Villiers Street	Between Craig Street and Dobie Street
Local government roads: Gwydir Shire Council	
Bruxner Way	Between North Star Road and Borrow Pit Site 11 Access Road
Bush Access Road	Full extent
County Boundary Road	Between Croppa Moree Road and Gil Gil Creek Road
Croppa Creek Road	Between I B Bore Road and Croppa Moree Road
Croppa Moree Road	Between Croppa Creek Road and County Boundary Road
Edwards Street	Between North Star Road and I B Bore Road
Forest Creek Road	Between North Star Road and Forest Creek Road Borrow Pit
Gil Gil Creek Road	Between County Boundary Road and Johnston Borrow Pit Access
I B Bore Road	Between Edwards Street and Croppa Creek Road
North Star Road	Between MPSC Council Boundary and Edwards Street
	Between Edwards Street and Getta Getta Road
	Between Getta Getta Road and Warialda Road
Scotts Road	Between North Star Road and Hohns Road
Stephen Street	Between Long Street and Gwydir Highway
Warialda Road	Between North Star Road and Stephen Street
Local government roads: Inverell Shire Council	
Campbell Street	Between Byron Street and Otho Street
Local government roads: Moree Plains Shire Council	
Bruxner Way	Between Newell Highway and Tucka Tucka Road
	Between Tucka Tucka Road and North Star Road
Hohns Road	Between Hohns Road and Borrow Pit Site 5
Letter Box Road	Between Newell Highway and Borrow Pit Site 13 Access Road
North Star Road	Between Bruxner Way and GSC boundary
River Road	Full Extent
Tucka Tucka Road	Between Bruxner Way to GSC Boundary

20.5.3 Local government roads: Queensland

Within Queensland, several local government roads are proposed to be used to transport construction materials, equipment and workforce during construction of the proposal as indicated in Table 20.16. These roads fall within the jurisdiction of Goondiwindi Regional Council and Toowoomba Regional Council.

TABLE 20.16 QUEENSLAND LOCAL GOVERNMENT ROADS: PROPOSAL PRIMARY CONSTRUCTION ROUTES

Road name	Road section
Local government roads: Goondiwindi Regional Council	
Boodle Street	Between Boodle Street and Hunt Street
Hunt Street	Between Leichhardt Highway and Boodle Street
Local government roads: Toowoomba Regional Council	
Blackwell Road	Between Bunkers Hill School Road and Macaulay Road
Bunkers Hill School Road	Between Gore Highway and Blackwell Road
Macaulay Road	Between Blackwell Road and Wellcamp Westbrook Road
Wellcamp Westbrook Road	Between Macaulay Road and Toowoomba Cecil Plains Road

20.5.4 Public transport networks: New South Wales

The existing public transport routes within NSW that are likely to be impacted by construction traffic and/or existing and proposed road rail crossings have been identified using data sourced from TfNSW. Identified routes that may be impacted are in Table 20.17.

TABLE 20.17 POTENTIALLY IMPACTED PUBLIC TRANSPORT NETWORKS

Services	Weekday frequency	Impacted roads
Route 375C (private bus service)	1 per hour	Dobie Street, Grafton
Route 376 (private bus service)	1 per hour	Summerland Way, Grafton
Route 377 (private bus service)	1 per 2 hours	Turf Street, Grafton

20.5.5 Public transport networks: Queensland

Following a review of TransLink data, no existing public transport routes within Queensland were found likely to be impacted by construction traffic as a result of the proposal.

20.5.6 School bus routes

Existing school bus routes that are likely to be impacted by construction traffic and/or proposed and existing road/ rail crossings have been identified using data sourced from TfNSW and the Queensland Government. Identified routes that may be impacted are shown in Table 20.18.

TABLE 20.18 POTENTIALLY IMPACTED SCHOOL BUS ROUTES

Services	Weekday frequency	Impacted roads
New South Wales		
AM/PM services travelling to/from: ▸ Boggabilla Central School ▸ Border Rivers Christian College ▸ Clarence Valley Anglican School ▸ Delungra Public School ▸ Glen Innes Primary School ▸ Glen Inness Public School ▸ Glen Inness West Infants School ▸ Goondiwindi State High School ▸ Goondiwindi State Primary School ▸ Grafton High School ▸ Grafton Public School ▸ Holy Trinity School ▸ Inverell High School ▸ Inverell Public School ▸ North Star Public School ▸ South Grafton High School ▸ St Joseph's Primary School (Warialda) ▸ St Joseph's Primary School (Glen Innes) ▸ St Marys Goondiwindi ▸ St. Joseph's Primary School ▸ St. Mary's Primary School ▸ Warialda High School ▸ Warialda Public School ▸ Westlawn Public School	AM and PM services as per school requirements	Various
Queensland		
P450—Seven Mile to Inglewood State School	1 x AM, 1 x PM	Cunningham Highway
P451—Yelarbon to Yelarbon State School	1 x AM, 1 x PM	Cunningham Highway
P473—Yuraraba to Inglewood State School	1 x AM, 1 x PM	Cunningham Highway

20.5.7 Long-distance coach services: New South Wales

Existing long-distance coach services with potential to be impacted by construction traffic and/or proposed and existing road–rail crossings has been identified using data sourced from TfNSW. Identified routes that may be impacted are provided in Table 20.19.

TABLE 20.19 POTENTIALLY IMPACTED LONG-DISTANCE COACH SERVICES

Services	Weekday frequency	Impacted roads
Brisbane to Grafton (Private Coach Service)	4 per day	Summerland Way, Grafton
		Villiers Street, Grafton
		Dobie Street, Grafton
Route 141—Grafton to Moree Town (Transport for NSW Coach Service)	1 per hour	Gwydir Highway
Route 142—Moree Town to Grafton (Transport for NSW Coach Service)	1 per hour	Gwydir Highway

20.5.8 Long-distance coach services: Queensland

Existing long-distance coach services with potential to be impacted by construction traffic and/or proposed and existing road rail crossings were identified using data sourced from the Queensland Government. Following this review, no long-distance coach services within Queensland were found to likely be impacted by proposal traffic.

20.5.9 Travelling stock reserves

The New South Wales travelling stock reserves (TSRs) provide a key role in landscape connectivity and biodiversity conservation across NSW and are also used for moving or grazing stock around the state. TSRs are highly valued as critical access points for other recreational activities. TSRs are managed directly by local land services, pursuant to the *Local Land Services Act 2013*, as well as by the NSW Department of Industry.

Within NSW, three TSRs are identified that cross the proposal rail alignment. These TSRs have been outlined in Table 20.20.

TABLE 20.20 TRAVELLING STOCK RESERVES INTERFACING THE PROPOSAL: NEW SOUTH WALES

RRI[1] ID	TSR ID	Proposed treatment	LGA	TSR classification	TSR Conservation Value
270-4-P-0	Mobinbry	Passive level crossing	GSC	Category 2	Medium
270-4-P-1	Mobinbry	No crossing provided—consolidate	GSC	Category 2	Medium
270-7-P-4	Wearne	Grade separation—rail over	MPSC	Category 2	Medium
270-11-P-1	The Mission	Grade separation—rail over	MPSC	Category 2	Medium

Table note:
1. RRI: road–rail interface

There are also several TSRs within NSW that intersect with the proposed construction traffic routes.

20.5.10 Tourist routes: New South Wales

The following NSW tourist routes are proposed to be intersected by primary construction routes:

- Fossickers Way
- Coast to Country.

The increase in construction traffic, and heavy vehicles in particular, has the potential to impact these strategic touring routes. The impact of this will be considered in conjunction with the construction traffic link analysis and is explored in detail in Section 20.7.2.1.

20.5.11 State Strategic Touring Routes: Queensland

The following Queensland State Strategic Touring Routes and Tourist Routes exist near to the proposal and are recommended to be used or intersected by primary construction routes:

- Adventure Way
- Warrego Way
- Australia's Country Way
- New England Highway
- Pacific Coast Way
- Legendary Pacific Coast Drive.

The increase in construction traffic, and heavy vehicles in particular, has the potential to impact these strategic touring routes. The impact of this will be considered in conjunction with the construction traffic link analysis and is explored in detail in Section 20.7.2.1.

20.5.12 Cycling and pedestrian network

To identify existing on-road cycleways that may coincide with proposed construction routes for the proposal in Queensland, a review of the *Queensland Principal Cycle Network Plans* has been undertaken. The plans are a guide for future cycleway infrastructure, and it shows the core routes required to increase cycling among the population.

Similarly, to identify existing on-road cycle paths that may coincide with proposed construction routes for the proposal in NSW, an assessment of cycle networks in NSW was undertaken using the online *Cycleway Finder* tool provided by NSW Roads and Maritime Services.

Two cycling paths within the *Principal Cycle Network Plans* and two within NSW coincide with proposed construction traffic routes. These routes are summarised in Table 20.21.

TABLE 20.21 CYCLE ROUTES WITH POTENTIAL CONSTRUCTION IMPACTS

Queensland cycle routes	New South Wales cycle routes
Carrington Road	Gwydir Highway
Toowoomba Cecil Plains Road	New England Highway

There are no dedicated pedestrian level crossings with the proposal rail alignment.

20.5.13 Crash history

Road crash data is collected and maintained by road asset owners to provide statistics for accurate and timely analysis of road safety programs and for the development of new, effective road safety initiatives. A review of five-year crash data (between 2012 and 2017) provided by DTMR and RMS was undertaken to assess the relative safety of proposed construction traffic routes. A tabulated summary of crash history data is provided in Table 20.22.

TABLE 20.22 CRASH HISTORY

Road name	Length (km)	Background volume (AADT)	Peak construction volume (AADT)	Total five-year crashes
State-controlled roads: Roads and Maritime Services				
Gwydir Highway	316 km	739	16	121
Newell Highway	7.6 km	2003–2048	24–48	11
Summerland Way	4.8 km	1,676–1,677	16	14
Local government roads: Clarence Valley Council				
Bent Street	1.5 km	2,000	16	10
Craig Street	0.1 km	3,800	16	6
Dobie Street	1.7 km	3,800	16	4
Villiers Street	1.3 km	3,800	16	8
Local government roads: Gwydir Shire Council				
Bruxner Way	20 km	231–242	167	3
Croppa Creek Road	23 km	144–147	143	2
Croppa Moree Road	12 km	144–147	143	2
North Star Road	70 km	134–147	69–294	1
Warialda Road	24 km	739	16	4
Local government roads: Moree Plains Shire Council				
Bruxner Way	20 km	231–242	72–76	3

Road name	Length (km)	Background volume (AADT)	Peak construction volume (AADT)	Total five-year crashes
State-controlled roads: Department of Transport and Main Roads				
Cunningham Highway	3.2 km	705–1601	2–24	28
Gore Highway	65 km	1,398–1,429	2	42
Leichhardt Highway	2 km	1,251–1,400	22	3
Cunningham Highway	69 km	167	2	6
Toowoomba Cecil Plains Road	6.2 km	1,548–2,874	2	20
Local government roads: Toowoomba Regional Council				
Bunkers Hill School Road	1.5 km	261	2	1

Table note:
Only roads that have experienced crashes in the past five years have been included in this table.

20.6 Potential impacts

20.6.1 Construction

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, delivery of water, delivery/collection of plant, tools and other materials.

The construction hours for the construction stage are expected to be 6:30 am to 6:00 pm every Monday to Sunday, and public holidays. The haulage activity of construction equipment and material is anticipated to occur on weekdays. No deliveries planned on Sundays or public holidays.

20.6.1.1 Rail network

No level crossings that currently exist within the traffic, transport and access study area would be impacted. Therefore, no assessment is necessary for existing rail crossings.

20.6.1.2 Road network

It is expected that construction materials will be delivered to laydown area delivery points along the proposed rail corridor. These delivery points will have accessibility and safe manoeuvrability for transport and off-loading of vehicles and there will also be a centralised location for further construction laydown areas around the vicinity of the laydown area delivery points. Figure 20.2 illustrates the proposed construction routes.

20.6.1.3 Road realignment

The proposed public road alteration within the traffic, transport and access study area is summarised in Table 20.23.

TABLE 20.23 PROPOSED ROAD REALIGNMENTS, DIVERSIONS AND CLOSURES: NEW SOUTH WALES

ID reference	Road name	Owner	Alteration details
Local government roads: MPSC			
270-9-P-4	Bruxner Way	MPSC	Relocation required due to improved flood immunity and to facilitate good safe road design and comply to road design standards.

The alterations to the public road network near to Bruxner Way are unlikely to result in a significant change to existing traffic patterns and distributions. The proposed alteration at this location consists mainly of road realignments, with existing traffic patterns being maintained. Because of the minor nature of these alterations, no detailed operational capacity assessments were required.

20.6.1.4 Active transport

Construction of the proposal has the potential to result in the following impacts to existing active transport networks within the traffic, transport and access area:

- Temporary diversion of cycling routes or pedestrian access, resulting in modified routes and increased journey times.
- Increased vehicle movements on cycle network linkages that are co-located with construction traffic routes for the proposal, which may result in longer journey times and increased likelihood of interactions between cyclists and vehicles.

It is not expected that these cycle routes will be significantly impacted by proposal construction traffic because of the relatively short construction timeframes. Nonetheless, haulage contractors should be made aware of these areas of high pedestrian activity as a part of the traffic management plan. Mitigation measures to minimise the extent of impact to active transport networks during construction are discussed in Section 20.8.

20.6.1.5 Public transport services

The increase in construction traffic, particularly heavy vehicle traffic, has the potential to impact several public transport services (identified in Section 20.5.4 and Section 20.5.5). However, given the evaluation of existing public transport services, there would be minimal impacts to these services as a result of construction of the proposal rail corridor due to the number of construction vehicles on the routes.

20.6.1.6 School bus services

The increase in construction traffic volume could impact some existing school bus routes. Although not assessed in detail during this phase of the proposal, to mitigate the impacts on school bus operations TransLink and TfNSW will be consulted, who will in turn inform other bus operators. The contractors will be made aware of the presence of school bus routes, bus stops and their operational hours as part of the induction process.

20.6.1.7 Long-distance coach services

Given the low frequency of long-distance coach services it is expected that long-distance buses would not be impacted as a result of the construction of the proposal.

20.6.1.8 Travelling Stock Reserves

It is not expected that proposal construction traffic will have a significant impact on the ability of stock to move within the TSRs.

20.6.1.9 Access and egress

Construction vehicle access would be via the existing road network and proposed access tracks. These access points must be chosen so that adequate sight distance and a safe access/egress path are available. Further investigation of access locations will be required when additional detail around the planned construction methodology is known. This detail is expected to become available during the detailed design stages.

All construction access points will be designed in accordance with relevant Australian Road Standards with adequate sight lines to ensure they operate in a safe and efficient manner. In addition, where possible, access will be provided from secondary roads to minimise the potential disruptions to the nearby arterial road network.

Where the proposed rail line is near the arterials with limited alternative access routes, specific traffic management will be put in place reflecting the prevailing conditions. Where possible, access will be along the rail corridor from a nearby secondary road.

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

20.6.2 Operational impacts

This section summarises the potential impacts of the proposal on the existing transport network during operation.

20.6.2.1 Rail network

The proposed rail corridor intersects SCRs and local government roads at several locations. The proposed treatments/level of protection at road–rail interfaces are based on the outcome of the assessment undertaken by ARTC using the ALCAM which considers factors such as future road traffic numbers, vehicle types, train numbers, speeds and sighting distances. Table 20.24 tabulates the proposed public road–rail interface locations and road closures associated with the proposal rail corridor. It should be noted that the proposed treatments reported in this table are tentative treatments and are subject to change following design refinements and stakeholder consultations.

TABLE 20.24 PROPOSED PUBLIC ROAD–RAIL INTERFACE AND ROAD CLOSURE LOCATIONS

ID reference	Road name	Owner	Proposed treatment
GSC			
270-3-P-2	North Star Road	GSC	Active level crossing
270-5-P-1	Forest Creek Road	GSC	Passive level crossing
MPSC			
270-7-P-3	North Star Road	MPSC	Active level crossing
270-8-P-2	Unnamed Road	MPSC	No crossing provided
270-9-P-4	Bruxner Way	MPSC	Road divert/re-align
270-9-P-4z	Bruxner Way	MPSC	Grade separation—rail–over–road
270-11-P-2	Tucka Tucka Road	MPSC	Grade separation—rail–over–road

20.6.2.2 Road network

During operational stages it is assumed that the workforce will reside within local surrounding towns along the proposal alignment. While some workforce movements may use active transport, this is not expected to be significant given the remote locations of the worksite. A detailed analysis of the road network is therefore not required.

During the operational phase of the proposal, it is anticipated that occasional access to and from the rail corridor will be required to conduct routine inspection and maintenance works. Maintenance vehicles will use access tracks for most of the inspection and maintenance activities. However, these activities are likely to be infrequent and the related traffic volumes are likely to be minimal with no envisaged impact to operational conditions of the surrounding road network.

20.6.2.3 Active transport

Traffic volumes associated with operational activities are likely to be minimal with no envisaged impact to operational conditions of the surrounding road network and cycle paths.

20.6.2.4 Emergency service vehicles

The proposal is located outside the boundary of population centres including Goondiwindi, North Star, Boggabilla and Toomelah. The closest permanent emergency response facilities to the traffic, transport and access study area are based in Goondiwindi and include Fire and Rescue Services, Ambulance and Police. The catchment of Goondiwindi's emergency services extends beyond the NSW/QLD border as far south as North Star. Boggabilla has local police beat with up to five personnel, but Queensland Police Service based in Goondiwindi also attend callouts from south of the NSW/QLD border. Police and Rural Fire Services are also located in Boggabilla, with a Rural Fire Service also based in North Star.

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

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

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

20.7 Traffic impact assessment

20.7.1 Traffic analysis

The proposal-related traffic consists of traffic generated by both construction and operational activities. It is anticipated that the impacts would primarily be during construction of the proposal. Throughout the operational phase, the impacts from the proposal are expected to be low given the expected nature of operations, i.e. infrequent vehicle movements to/from depots, transportation of maintenance material within the rail corridor.

20.7.1.1 Traffic growth rates

Traffic growth rates obtained from road controlling authorities are adopted in the analysis. An evaluation of the traffic growth rates revealed an overall annual average AADT growth rate of 2 per cent, which was adopted in the analyses. In the absence of data to determine traffic growth rates, through consultation with road authorities, an average annual growth rate of 2 per cent for SCRs and local government roads was assumed. Traffic growth rates are presented in Appendix M: Traffic Impact Assessment.

20.7.1.2 Seasonal variation

Based on the dominant agricultural land uses of the traffic, transport and access 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 state roads in the traffic, transport and access study area increases as trucks transport grain and tractors and harvesters move between properties. Farming machinery is generally much larger and slower than other vehicles using the roads and may result in localised delays. The impact of seasonal variation was considered as part of the analyses, especially at road–rail interface locations.

The impact of seasonal variation was 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:

- Road–rail interface analysis adopted the 95th percentile output results from Sidra Intersection 8.0 modelling results instead of the industry-standard 85th percentile outputs. This is considered conservative as it accounts for additional vehicle queuing and delays, which might be induced through higher traffic volumes and slower moving vehicles.
- The LOS thresholds and associated K-values used within the analyses for each road type as derived from the *Austroads Part 2—Guide to Traffic Engineering Practice: Roadway Capacity* already accounts for the 30th highest hour traffic volumes of similar road types. This provides for upper LOS threshold limits, which accounts for any micro-fluctuations and peaks in traffic throughout the year.

20.7.2 Construction

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

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

20.7.2.1 Traffic comparison of road links

A 5 per cent traffic comparison analysis was undertaken and a list of road sections where proposal traffic will equate to or exceed 5 per cent is provided Table 20.25. According to GTIA, for the 5 per cent traffic comparison, the percentage traffic impact is calculated by expressing the traffic generated by the proposal (construction period) as a percentage of the background traffic. Note that some percentages appear high because of low volumes of existing background traffic.

TABLE 20.25 5 PER CENT TRAFFIC COMPARISON ANALYSIS ON ROAD LINKS

Road name	Road section	Maximum % of increase over 2021–2024
Local Government Roads: GSC		
Bruxner Way	Between North Star Road and Borrow Pit Site 11 Access Road	68.00%
Bush Access Road	Full extent	1319.80%
County Boundary Road	Between Croppa Moree Road and Gil Gil Creek Road	91.70%
Croppa Creek Road	Between I B Bore Road and Croppa Moree Road	91.70%
Croppa Moree Road	Between Croppa Creek Road and County Boundary Road	91.70%
Edwards Street	Between North Star Road and I B Bore Road	143.00%
Forest Creek Road	Between North Star Road and Forest Creek Road Borrow Pit	314.10%
Gil Gil Creek Road	Between County Boundary Road and Johnston Borrow Pit Access	91.70%
I B Bore Road	Between Edwards Street and Croppa Creek Road	91.70%
North Star Road	Between MPSC Council Boundary and Edwards Street	189.30%
North Star Road	Between Edwards Street and Getta Getta Road	143.00%
North Star Road	Between Getta Getta Road and Warialda Road	91.70%
Scotts Road	Between North Star Road and Hohns Road	31.20%
Local Government Roads: MPSC		
Bruxner Way	Between Newell Highway and Tucka Tucka Road	28.80%
Bruxner Way	Between Tucka Tucka Road and North Star Road	30.30%
Hohns Road	Between Hohns Road and Borrow Pit Site 5	31.20%
Letter Box Road	Between Newell Highway and Borrow Pit Site 13 Access Road	15.60%
North Star Road	Between Bruxner Way and GSC boundary	45.40%
River Road	Full Extent	301.50%
Tucka Tucka Road	Between Bruxner Way to GSC boundary	9.30%
Local government roads: GRC		
Boodle Street	Between Boodle Street and Hunt Street	5.10%
Hunt Street	Between Leichhardt Hwy and Boodle Street	5.10%

20.7.2.2 Intersection analysis

For the transportation of materials and workforce, as well as equipment, key transport routes have been identified. From the analysis of these transport corridors, intersections have been identified which are expected to cater to the movement of construction-related activities during the various construction stages.

An assessment of base traffic flows and construction flows was undertaken to determine intersections that are expected to require upgraded turning treatments. These are needed to accommodate construction traffic flows consistent with the warrants outlined in *Austroads Guide to Traffic Management Part 6*. These intersections are summarised in Table 20.26. Detailed discussion on the intersection analysis for each of the locations listed in Table 20.26 is provided in Appendix M: Traffic Impact Assessment.

These upgrades are required only temporarily for construction traffic. Therefore, discussions will be required with RMS, DTMR and councils during the next phase of the proposal to determine the permanence of such upgrades. Given the short duration of construction-related traffic, traffic management strategies may be introduced in order to ease construction-related traffic impacts at intersections.

TABLE 20.26 INTERSECTION WITH CONSTRUCTION TRAFFIC TURN MOVEMENTS

Name	Joint ownership
Local government roads: Road and Maritime Services	
Bruxner Way/Newell Highway	Not applicable
Newell Highway/Letter Box Road	MPSC
Newell Highway/River Road	MPSC
Gwydir Highway/Stephen Street	GSC
New England Highway/Gwydir Highway	Not applicable
Summerland Way/Dobie Street	CVC
Summerland Way/Trenayr Road	CVC
Local government roads: Clarence Valley Council	
Trenayr Road/Clark Road	Not applicable
Local government roads: Gwydir Shire Council	
Bruxner Way/North Star Road	Not applicable
North Star Road/Scotts Road	Not applicable
Bruxner Way/Borrow Pit Site 11 Access Road	Not applicable
Bruxner Way/Borrow Pit Site 9 Access Road	Not applicable
I B Bore Road/Edwards Street	Not applicable
I B Bore Road/Croppa Creek Road	Not applicable
Croppa Creek Road/Bush Access Road	Not applicable
Croppa Moree Road/Croppa Creek Road	Not applicable
Croppa Moree Road/County Boundary Road	Not applicable
County Boundary Road/Gil Gil Creek Road	Not applicable
Gil Gil Creek Road/Gil Gil Creek Road	Not applicable
Bruxner Way/Tucka Tucka Road	MPSC
North Star Road/North Star Road	Not applicable
North Star Road/Forest Creek Road	Not applicable
Forest Creek Road/Forest Creek Road	Not applicable
North Star Road/North Star Road	Not applicable
Warialda Road/North Star Road	Not applicable
Local government roads: Moree Plains Shire Council	
Letter Box Road/Borrow Pit Site 13 Access Road	Not applicable
Hohns Road/Hohns Road	Not applicable
River Road/River Road	Not applicable
Local government roads: Goondiwindi Regional Council	
Hunt Street/Boodle Street	Not applicable

Name	Joint ownership
State-controlled roads: Department of Transport and Main Roads	
Toowoomba Cecil Plains Road/Wellcamp Westbrook Road	TRC
Gore Highway/Bunkers Hill School Road	TRC
Gore Highway/Millmerran Inglewood Road	Not applicable
Cunningham Highway/Millmerran Inglewood Road	TRC
Gore Highway/Millmerran Inglewood Road	Not applicable
Cunningham Highway/Millmerran Inglewood Road	Not applicable
Cunningham Highway/Leichhardt Highway	Not applicable
Leichhardt Highway/Hunt Street	GRC
Local government roads: Toowoomba Regional Council	
Wellcamp Westbrook Road/Macaulay Road	Not applicable
Macaulay Road/Blackwell Road	Not applicable
Bunkers Hill School Road/Blackwell Road	Not applicable

20.7.2.3 Pavement impacts on road links

A preliminary desktop pavement impact assessment was undertaken as part of the traffic, transport and access assessment on all potentially affected DTMR and RMS SCRs based on the existing background traffic data available for the relevant road sections. The following is a brief 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.
- The development traffic volumes were converted into SARs based on the assumed number of SARs per vehicle.
- Undertake a 5 per cent comparison of the background SARs and proposal generated SARs for each link identified to be most likely impacted by the proposed development.

The key outcomes of this latter comparison are:

- All NSW proposal-generated SARs on SCRs are under 5 per cent when compared to existing.
- In Queensland, proposal-generated SARs on one SCR exceed 5 per cent when compared to existing SARs, namely on:
  - Millmerran Inglewood Road between Cunningham Highway and Gore Highway (5.7 per cent in 2022).

The findings show that only one SCR road is likely to cross the 5 per cent SAR threshold. This analysis is based on the assumption that fully loaded vehicles in each direction is conservative to ensure no underestimation of pavement impacts.

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

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

20.7.3 Operation

It is assumed that during the operational stages, the workforce will reside within local towns surrounding the proposal. It is expected that minimal 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.

It is also anticipated that occasional access to and from the corridor will be required to conduct routine inspection and maintenance works during the proposal operational stage. However, inspection and maintenance activities are likely to be periodical and the related traffic volumes are likely to be minimal, with no envisaged impact to operational conditions of the surrounding road networks.

20.7.3.1 Rail crossings

The operational performance of public level crossings in the traffic, transport and access study area was assessed to provide an understanding of the impacts on performance during operation stages. Any potential impact of diverted traffic created by road closures was also considered. The rail crossing impact assessment focuses on vehicle delay and queueing analysis, demonstrating how the development could cause vehicle delays and queuing issues at the rail crossing and at nearby closely spaced intersections.

The 'Future Years 2025 and 2040 AM and PM peak hour analysis of proposed crossings: Operational Railway Traffic with background road traffic + operational traffic + traffic diversions if any (only at locations where short stacking might be of impact' scenario was evaluated.

The following process was used from a traffic perspective for evaluating level crossing impacts and complying with the requirements of *Australian Standard 1742.7 Manual of Uniform Traffic Control Devices—Part 7: Railway crossings* (Australian Standards, 2007) and the *National Road Safety Strategy* (Office of Road Safety, 2011):

- Identify the expected traffic distribution on the road network as a result of the proposal
- Identify railway level crossing/s likely to be impacted by traffic generated by the proposal
- Agree the expected timeframe for the delivery of the proposal including the commencement of construction, each stage and the ultimate development
- Demonstrate how the traffic generated by the proposal will not worsen vehicle queuing issues (short stacking) over the impacted railway level crossing/s
- Determine the maximum size and type of vehicle anticipated over the railway level crossing/s as a result of the development during construction and at the commencement of each development stage
- Demonstrate that there is enough clearance from the railway crossing to allow the maximum size of vehicle used in the operation to queue at any intersection or proposed access point perpendicular to the railway crossing
- Evaluate safety conditions of the level crossing to inform the design.

The analysis indicated that acceptable LOS would prevail with minimal impact to vehicle queueing and delay should the proposed level crossings be implemented. The following rail crossing wait times were calculated:

- 270-3-P-2 North Star Road: 102 seconds
- 270-5-P-1 Forest Creek Road: 102 seconds
- 270-7-P-3 North Star Road: 122 seconds.

Table 20.27 outlines the analysis results, which show the additional waiting time and estimated queue length associated with the proposed level crossings for the two future year scenarios.

TABLE 20.27 RAIL CROSSING OPERATIONAL PERFORMANCE

			Year 2025 (1,800m train length)				Year 2040 (1,800m train length)			
			With proposal				With proposal			
Road–rail interface location			Volume* (vehicles/h)	Queue (m)	Average delay (Seconds)	LOS	Volume* (vehicles/h)	Queue (m)	Average delay (Seconds)	LOS
270-3-P-2: North Star Road										
AM	North Star Road (S)	T	19	8.3	3.3	A	24	11.2	3.3	A
	North Star Road (N)	T	17	7.4	3.3	A	21	10.0	3.3	A
PM	North Star Road (S)	T	18	7.7	3.3	A	22	10.5	3.3	A
	North Star Road (N)	T	18	8.0	3.3	A	22	10.8	3.3	A
270-5-P-1: Forest Creek Road										
AM	Forest Creek Road (E)	T	4	*Negligible***	3.3	A	4	*Negligible***	3.3	A
	Forest Creek Road (W)	T	2	*Negligible***	3.3	A	3	*Negligible***	3.3	A
PM	Forest Creek Road (E)	T	2	*Negligible***	3.3	A	3	*Negligible***	3.3	A
	Forest Creek Road (W)	T	2	*Negligible***	3.3	A	3	*Negligible***	3.3	A
270-7-P-3: North Star Road										
AM	North Star Road (E)	T	22	11.0	4.7	A	27	14.9	4.7	A
	North Star Road (W)	T	19	9.5	4.6	A	24	12.9	4.7	A
PM	North Star Road (E)	T	22	11.0	4.7	A	27	14.9	4.7	A
	North Star Road (W)	T	24	11.9	4.7	A	29	16.1	4.7	A

Table notes:
* Sidra Intersection 8.0 modelled volumes may differ slightly from inputs due to rounding.
** Queue length less than one vehicle length (6m).

20.8 Mitigation measures

This section outlines the traffic mitigation measures included as part of the proposal design and the mitigation measures recommended for the proposal to manage predicted environmental 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 10: Assessment Methodology.

20.8.1 Design considerations

The mitigation measures and controls presented in Table 20.28 have been factored into the reference design for the proposal. These design considerations are proposed to minimise the environmental impacts of the proposal and therefore contribute to a lowering of the initial impact risk rating for each potential impact.

TABLE 20.28 INITIAL MITIGATIONS OF RELEVANCE TO TRAFFIC

Aspect	Initial mitigations
Traffic	▸ The proposal has been aligned to be 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 proposal 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 is possible. By minimising the material deficit for construction of the proposal, the volume of material required to be imported has been reduced. Less imported material equates to fewer construction phase truck movements and fewer vehicle emissions. ▸ Where practical, traffic will be constrained to the constructed access tracks/construction footprint identified as providing the shortest journey time between origin and destination, thereby restricting fuel consumption and vehicle emissions. These routes have been assessed as part of the traffic impact assessment. The temporary footprint for the Project has been defined to provide sufficient space, including road modifications, for it to be safely and efficiently constructed, with a need for temporary side-tracks.

Road–rail interfaces	▸ Grade-separated crossings of existing roads have been adopted instead of level crossings so far as is reasonably practicable.
	▸ Where interfaces were not automatically grade-separated, a consistent methodology which aligns with the Office of the National Rail Safety Regulator (ONRSR) guidelines was used to develop proposed level crossing treatments. This approach involves applying the ALCAM model to determine the 'risk score', and then undertaking cost-benefit analysis to assess whether higher levels of protection are justified (e.g. upgrade passive protection to active, active to grade separation).
	▸ The specific design treatment at each road-rail interface has been selected based on a combination of factors, which include:
	  ▸ Road–rail geometry
	  ▸ Sighting distances
	  ▸ Road and rail traffic volumes and speeds
	  ▸ Design vehicle types
	  ▸ Community and stakeholder feedback through consultation.
	▸ Level crossings will be provided with warning signage, line marking, and other relevant controls, in accordance with the relevant ARTC and national standards.
	▸ Consistent with the requirements of the NSW Governments Construction of New Level Crossings Policy, level crossings have been subject to safe design studies and risk assessments in accordance with the *Australian Level Crossing Assessment Model* to identify and reduce, so far as is reasonably practicable, the potential risks associated with these crossings.

Aspect	Initial mitigations
Road–rail interfaces	▸ The feasibility design for the proposal has, in all instances, maintained access for private properties. This has been provided through either: ▸ Provision of a crossing point of the rail alignment in the location of the existing private access, or ▸ Provision of an alternative means of accessing a dwelling or place of work from the public road network.
TSRs	▸ The feasibility design for the proposal has, in all instances, maintained access for stock route users. This has been provided through either: ▸ Provision of a crossing point of the rail alignment in the location of the existing stock route, or ▸ Provision of an alternative means of moving stock.
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. RMS, local governments and private landowners. ▸ No public pedestrian access is provided on road-over-rail bridges.
Access	▸ The feasibility design for the proposal has, in all instances, maintained connectivity across the proposal footprint for public roads. The design also provides maintained access to private and state land. This has been provided through either: ▸ Provision of a crossing point of the rail alignment in the location of the existing access, or ▸ Provision of continued means of access, via an alternative location, with interconnectivity provided.

20.8.2 Proposed mitigation measures

To further manage proposal risks, a number of mitigation measures have been proposed for implementation in future phases of proposal delivery, as presented in Table 20.29. These proposed mitigation measures have been identified to be applied in the detailed design, pre-construction, construction and operational phases of the proposal to address specific issues and opportunities, address legislative requirements, accepted government plans, policy and practice.

Table 20.29 identifies the relevant proposal phase, the aspect to be managed and the proposed mitigation measure, which is then factored into the assessment of residual risk/significance in Table 20.30.

Chapter 27: Environmental Management Plan provides further context and the framework for implementation of these proposed mitigation measures.

TABLE 20.29 TRAFFIC MITIGATION MEASURES

Delivery phase	Aspect	Proposed mitigation measures
Design/ pre-construction	Road safety	▸ Road safety audits will be undertaken at pre-construction stage at level crossings in accordance with the Austroads guidelines to confirm: ▸ The level of protection is appropriate ▸ The infrastructure is appropriate for the traffic conditions ▸ The crossing is designed to provide suitable stacking and sight distance. ▸ Ongoing consultation with local government/RMS and asset owners will be undertaken to ensure safety concerns and issues are assessed. ▸ Relevant emergency services should be notified of changes to the road network and of construction activities prior to construction commencing.
	Road network	▸ Traffic management plan prepared in consultation with the construction contractor, TfNSW, councils and an accredited road safety auditor. This plan will identify the impacts that construction traffic is likely to have on the transport infrastructure and detail measures required to mitigate any all identified impacts of the proposal.

Delivery phase	Aspect	Proposed mitigation measures
Design/ pre-construction	Road–rail Interface	▸ Consult with stakeholders (level crossings) for public roads and private landowners before detailed design phase.
	Intersection	▸ Traffic management plans, traffic control plans and temporary road works including diversion and signage should be prepared prior to construction in accordance with the latest edition of the Traffic control at work sites: *Technical Manual, 2018* and *Australian Standard 1742.3, Manual of uniform traffic control devices—Traffic control for works on roads*. Traffic management plans should consider construction activity delivery timeframes which avoid peak hour travel conditions.
	Access	▸ Ongoing consultation with RMS/local governments and asset owners will be undertaken to ensure proposed access arrangements are suitable.
Construction	Road safety	▸ Road safety measures to be implemented taking into consideration speed restrictions, construction worker driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, interaction with public transport, transport of hazardous and dangerous goods, and emergency response and disaster management. ▸ Relevant emergency services should be notified before movement of all hazardous/dangerous or oversize construction material and equipment. ▸ 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. ▸ Where deemed necessary in consultation with local road authorities and relevant stakeholders, traffic-calming devices to be installed along road segments where surrounding land uses include vulnerable road users (e.g. schools).
	Road network	▸ Construction traffic management plan to be implemented and reviewed periodically for effectiveness by stakeholders. ▸ Ongoing consultation with relevant Councils, police, emergency services and affected landowners/occupiers to inform of proposal status and likely traffic disruptions and temporary road closures. ▸ Relevant emergency services should be notified before the movement of all hazardous/dangerous or oversize construction material and equipment ▸ Secondary alternative construction route activities should be determined as part of the traffic management plans, in the event of the primary route is blocked off by an emergency/accident.

	Road/rail interface	▸ Road safety audits will be undertaken at the level crossings post construction in accordance with the Austroads guidelines. Level crossings will be reviewed to confirm:
		  ▸ The level of protection continues to be appropriate
		  ▸ The infrastructure is appropriate for the traffic conditions

	Intersection	▸ Traffic management plans, traffic control plans and temporary road works to be implemented and reviewed to ensure effectiveness. ▸ Construction traffic management plan to be implemented and reviewed periodically by stakeholders to ensure intersection operations are effective.
	Access	▸ The *Rail Maintenance Access Road Strategy* to be reviewed and updated to ensure it remains effective.

Delivery phase	Aspect	Proposed mitigation measures
Operation	Road network	▸ Develop a protocol between ARTC and emergency service providers, defining appropriate and co-ordinated responses and communication in the event of emergencies during operations (e.g. access to real time information about crossing times and access to alternate crossing points).
	Road–rail interface	▸ Road safety audits will be undertaken at the level crossings after opening, in accordance with the relevant legislation and guidelines. Level crossings will be reviewed to confirm: ▸ The level of protection continues to be appropriate ▸ The infrastructure is appropriate for future traffic conditions.

20.9 Impact assessment

Potential impacts to traffic impacts associated with the proposal in the construction, operation and decommissioning phases are outlined in Table 20.30. These impacts have been subjected to a risk assessment as per methodology outlined in the GTIA.

The initial risk assessment was undertaken on the basis that the design measures (or initial mitigations) have been incorporated into the proposal design. Proposed mitigation measures in Table 20.29 were then applied as appropriate to the phase of the proposal 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. These levels were compared to the initial risk levels to assess the effectiveness of the mitigation measures. The resulting residual risk levels are shown in Table 20.30 and summarised in Appendix M: Traffic Impact Assessment. In all instances, the residual risk levels were lower than the initial levels.

TABLE 20.30 IMPACT ASSESSMENT FOR POTENTIAL TRAFFIC IMPACTS ASSOCIATED WITH THE PROPOSAL

	Description of impact					
Value/ element	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)	Summary of key mitigation measures	Residual risk
Traffic impacts from construction activities						

Intersections
Road–Rail Interface
	Operational efficiency	Moderate
		Traffic impacts at the key intersections impacting operations. Adequacy of intersection configuration to cater for haulage vehicles.
			Possible
			It is reasonable to say that some traffic impacts at key intersections will probably occur during the construction period.
				Moderate	In consultation with RMS, DTMR and Regional Councils to develop cost effective solutions to alleviate additional traffic impacts from the construction related activities. These may include but are not limited to:
					▸ Traffic Management Plans should be prepared prior to construction in accordance with the latest edition of:
					  ▸ Traffic control at work sites—Technical Manual, 2018 and Australian Standard 1742.3, Manual of uniform traffic control devices—Traffic control for works on roads
					  ▸ Manual of Uniform Traffic Control Devices: Part 3—Works on Roads
					  ▸ Roads and Maritime Supplement to Australian Standard 1742 Manual for Uniform Traffic Control Devices.
					▸ Road safety measures at intersections should take into consideration speed restrictions, driver fatigue, in-vehicle communications, heavy vehicle turning signage, demarcations, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.
					▸ Traffic Management Plans should consider construction activity delivery timeframes which avoid peak hour travel conditions.
					▸ Level crossings should be provided with warning signage, line marking, and other relevant controls; in accordance with the relevant national and ARTC standards, Traffic Management procedures to accommodate traffic and operational efficiency during construction.
						Low

	Description of impact					
Value/ element	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)	Summary of key mitigation measures	Residual risk
Road Links	Operational efficiency	Moderate Traffic impacts along primary construction routes affecting traffic operations along key routes.	Possible It is reasonable to say that some traffic impacts along primary construction routes will probably occur over the construction period.	Moderate	In consultation with RMS, DTMR and regional councils, employ traffic management strategies in order to mitigate impacts along road links. These may include but are not limited to: ▸ Construction traffic management plans according to RMS and DTMR specifications. ▸ Travel demand management campaigns. ▸ Directional signage and line marking around construction sites and the surrounding network. ▸ Specific traffic management plans for special events developed in conjunction with the relevant stakeholders. ▸ Relevant emergency services to be notified before the movement of all hazardous/dangerous or oversize construction material and equipment. ▸ Secondary alternative construction route activities should be determined as part of the TMPs, in the event the primary route is blocked off by an emergency/accident. ▸ Travel demand management (TDM) campaign to inform the public on works and its effect on network operations.	Low
Pavements	Operational efficiency	Moderate Increased percentage of heavy vehicles along SCR's from Project construction traffic, resulting in pavement degradation.	Possible It is reasonable to assume that some pavement degradation as a result of Project construction traffic will probably occur over the construction period.	Moderate	Mitigation measures may include but are not limited to: ▸ Undertaking visual assessments before, during and post construction activities, with the impacted road improved to a similar condition to the initial visual pavement condition. ▸ Installation of wheel washers on all Project vehicles travelling from unsealed to sealed roads. ▸ Installation of shaker grids or rumble pads at site exit points from construction activities.	Low

	Description of impact					
Value/ element	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)	Summary of key mitigation measures	Residual risk
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 but are not limited to: ▸ Fatigue management measures to be introduced and enforced for all workers. ▸ Any required works to be identified in ongoing TMPs prepared to support the Project. ▸ Heavy vehicles may be associated with the construction activities. Therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts. ▸ Consideration to be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days. Alternatively, appropriate school bus infrastructure could be installed. ▸ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits.	Low
Traffic impacts from operational activities						
Road–Rail Interface	Operational efficiency	Moderate Additional delay to through traffic with reduced operational efficiency as a result of construction activities.	Possible	Moderate	Traffic modelling assessments at the proposed level crossings indicate that delays to vehicles at these locations are predicted to be minor and will not significantly impact LOS. No significant queues are expected to develop at the proposed level crossings at the year of opening (2025) or in 2040 the design horizon, if traffic patterns at the proposed crossings do not significantly differ from what is currently observed. Changes in future traffic patterns may require revision of the traffic modelling assessment to ensure the level crossing continues to provide a reasonable level of operational efficiency. Direct and guide active mode users at road–rail interface locations improves safety and reduces the likelihood of any significant traffic delays resulting from incidents.	Low

	Description of impact					
Value/ element	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)	Summary of key mitigation measures	Residual risk

Road Safety—Road–Rail Interface	Safety	Extreme
		Introduction of open level crossings on the road network may result in high severity crashes between traffic and trains.
			Possible
			Without appropriate mitigation strategies, the likelihood of an incident occurring at a rail crossing is probable.
				High	▸ Level crossings should be provided with warning signage, line marking, and other relevant controls in accordance with the relevant national and ARTC standards.
					▸ Public level crossings should be designed to provide for safe design standards where sufficient stacking and sight distances, lane-marking and signage prevail for a design vehicle.
					▸ Road safety audits will be undertaken at the level crossings during design, pre- and post-opening in accordance with the Austroads guidelines. After commissioning, the level crossing will be managed as a part of business as usual for the relevant road and rail manager under the terms of the signed interface agreement. Level crossings will be reviewed to confirm:
					  ▸ That the level of protection continues to be appropriate
					  ▸ That the infrastructure is appropriate for the traffic conditions
					▸ Undertaking road safety audits at level crossings and the intervals at which these are undertaken are to be agreed at the program level. These discussions are to be driven by ARTC with the relevant parties.
					▸ In accordance with national and state rail safety law requirements, public road crossings will be subject to an Interface Agreement with the relevant road manager in order to ensure that safety risks are identified and minimised, so far as is reasonably practicable, during the operations phase of the Project.
						Low/Moderate

20.10 Stakeholder consultation

Extensive consultation has been undertaken with key stakeholders, including Queensland Rail, RMS, DTMR and relevant local governments. Full details of the stakeholder consultation are in Chapter 8: Consultation.

20.11 Conclusions

The North Star to NSW/Queensland Border proposal is one of 13 separate projects that complete Inland Rail. This section of Inland Rail involves the design and construction of approximately 25 km of new standard gauge track. This connection completes one of the key missing rail links between Melbourne and Brisbane and provides a new, efficient connection between regional farms in the area to export markets. The traffic, transport and access impact assessment has focused on the proposal's traffic impact on the existing road and rail transport infrastructure in NSW and Queensland. The key findings are summarised below:

- Existing operational conditions:
  - The transport, traffic and access study area encompasses several SCRs and local government roads that serve as main transport corridors for the proposal. The traffic analysis result indicated that:
    - No SCRs in NSW or Queensland will interface with the proposed rail alignment.
    - 22 local government roads have been identified as expecting 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 low existing traffic volumes.
    - 4 cycle routes have been identified in Queensland and NSW that might be impacted by construction traffic. However, it is not expected that these cycle routes will be significantly impacted by proposal construction traffic owing to the relatively short construction timeframes.
    - 3 existing public transport services within NSW that might be impacted by construction traffic and/or proposed and existing road/rail crossings. Given the low frequency of school bus services, it is considered that there would be minimal impacts to the existing public transport services during construction and operation phases.
    - 11 existing school bus routes that are likely to be impacted by construction traffic have been identified using data sourced from TransLink and TfNSW. Given the low frequency of school bus services, it is expected that there will be minimal impact to services as a result of the construction of the proposal.
    - 3 existing long-distance coach services that might 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.
- Construction tasks, routes and resultant traffic:
  - The major construction activities for the proposal consist of transporting quarry materials (ballast, capping materials), pre-cast concrete, ready-mix concrete, rail, consolidated sleepers, earthworks materials, workforce, delivery of water, delivery/collection of plant, tools and other materials.
  - Construction transport for the proposal will primarily be by road
  - Construction hours for the construction stage are expected to be 6.30 am to 6.00 pm every Monday to Sunday
  - The haulage activity of construction equipment and material is anticipated to occur seven days a week.
- Rail operational traffic and maintenance processes:
  - Rail operational traffic volumes are likely to be negligible with no envisaged impact to operational conditions of the surrounding road networks.
- Traffic impact assessments:
  - The proposal 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 proposal.
  - Certain roads will generate construction related traffic volumes in excess of 5 per cent of the background traffic during the construction phase. The results of the LOS comparison between the 'with' and 'without' development scenarios indicated that the proposal 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 proposal would generate the need to upgrade the road network for such a short duration of impact, but that adequate traffic and road use management strategies and mitigation measures could be implemented.

- Mitigation measures:
  - The chapter documented traffic mitigation measures included as part of the proposal design and the mitigation measures that are proposed for the proposal to manage predicted environmental impacts. These measures and controls have been factored into the reference designs for the proposal. These design considerations are proposed to minimise the environmental impacts of the proposal and therefore contribute to a lowering of the initial impact risk rating for each potential impact.
  - To further manage proposal risks, several mitigation measures have been proposed for implementation in future phases of proposal delivery. These proposed mitigation measures have been identified to be applied in the detailed design, pre-construction, construction and operational phases of the proposal to address specific issues and opportunities, address legislative requirements, accepted government plans, policy and practice.
  - The residual risk level of the potential impacts was then reassessed after the proposed mitigation measures were applied. These levels were compared to the initial risk levels in order to assess the effectiveness of the mitigation measures. In all instances, the residual risk levels were lower than the initial levels.

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