APPENDIX

U

Traffic Impact Assessment

Part 1 of 2

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

INLAND RAIL

ARTC

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

IR_1536

APPENDIX U

Traffic Impact Assessment

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

IR_1536

Inland Rail Gowrie to Helidon

Appendix U - Traffic Impact Assessment

Australian Rail Track Corporation

Reference: 3200

Document Number
2-0001-320-EAP-10-RP-0220-3

Contents

Appendices

Figures

Tables

Glossary

Abbreviation	Definition
AADT	Average Annual Daily Traffic
ADT	Average Daily Traffic
ALCAM	Australian Level Crossing Assessment Model
ARTC	Australian Rail Track Corporation
AUL	Auxiliary Left Turn
AUL (s)	Auxiliary Left Turn (short)
B2G	Inland Rail Border to Gowrie Project
BAL	Basic left turn
BAR	Basic right turn
Bcm	Billion cubic metres
CEMP	Construction Environmental Management Plan
Ch	Chainage along the Project (in kilometres)
CHR	Channelised Right Turn
CHR(s)	Channelised Right Turn (short)
CVC	Clarence Valley Council
DCA	Definition for Coding Accidents
DTMR	Queensland Department of Transport Main Roads
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
FFJV	Future Freight Joint Venture
G2H	Inland Rail Gowrie to Helidon project (the Project)
GTIA	Queensland Department of Transport and Main Road's Guidelines to Traffic Impact Assessment
H2C	Helidon to Calvert
HV	Heavy Vehicle
HVAG	Heavy Vehicle Axle Group
ICC	Ipswich City Council
kg/m	kilograms per metre
km	kilometre
kN	kilo-newtons
L/m^3	Litres per cubic metre
LGA	Local Government Authority
LGIP	Local Government Infrastructure Plan
LGR	Local Government Roads
LOS	Level of Service
LVRC	Lockyer Valley Regional Council
LWR	Long welded rail
m	metre
m^2	Square meres
m^3	Cubic metres

Abbreviation	Definition
mm	millimetres
mm/hr	millimetres per hour
ML	megalitres
mtpa	million tonnes per annum
MUTCD	Manual of Uniform Traffic Control Devices
NAASRA	National Association of Australian State Road Authorities
NHVR	National Heavy Vehicle Regulator
NLCSS	National Railway Level Crossing Safety Strategy
NSW	New South Wales
NTC	National Transport Commission
OSOM	Oversize, over-mass vehicles
ONRSR	Office of the National Rail Safety Regulator
OTR	Other than rock
pc/hr	Passenger cars per hour
pc/hr/ln	Passenger cars per hour per lane
PCNP	Queensland Principal Cycle Network Plans
The Project	Inland Rail Gowrie to Helidon project
QLCSS	Queensland Level Crossing Safety Strategy
QLD	Queensland
QLUMP	Queensland Land Use Mapping Program
QPS	Queensland Police Service
QR	Queensland Rail
RAV	Restricted access vehicles
RFI	Requests for Information
RMAR	Rail maintenance access road
RMS	Roads and Maritime Services
RPEQ	Registered Professional Engineer of Queensland
RSNL Act	*Rail Safety National Law Act 2017* (Qld)
RTA	Roads and Traffic Authority
RUMP (RMP)	Road Use Management Plans
SAR	Standard Axle Repetitions
SAR/HV	Standard axle repetitions per heavy vehicle
SAR/HVAG	Standard axle repetitions per heavy vehicle axle group
SCR	State Controlled Roads
SEQ	South East Queensland
SIDRA	Signalised & Unsignalised Intersection Design and Research Aid
SPP	State Planning Policy
TAL	Tonne axle load
TCPs	Traffic Control Plans
TDM	Travel demand management
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment

Abbreviation	Definition
TI Act	*Transport Infrastructure Act 1994* (Qld)
TMP	Traffic Management Plan
ToR	Terms of Reference
TP&C Act	*Transport Planning and Coordination Act 1994* (Qld)
TRC	Toowoomba Regional Council
Veh/day	Vehicles per day
VMS	Variable Message Signs
WIM	Weigh-In-Motion

Executive summary

The Gowrie to Helidon section of Inland Rail (the Project) will be constructed as an approximately 28 km long single-track dual-gauge railway with three crossing loops to accommodate double stack freight trains up to 1,800 m long. The Project will also include land provision for 3,600 m trains and a 6,240 m tunnel through the Toowoomba Range.

Future Freight Joint Venture (FFJV) has been commissioned by Australian Rail Track Corporation (ARTC) to carry out a construction and operational traffic impact assessment in accordance with the Project Terms of Reference (ToR).

As part of the overall assessments carried out for the Project, the traffic impact assessment evaluates a range of issues encompassing potential traffic impacts of the construction and operational phase of the Project on the surrounding roads and transport infrastructure based on the Projects' current design and construction assumptions. The report also summarises the potential road and pavement impacts from the movement of materials, workforce and equipment during the construction phase of the Project on the surrounding road network. The traffic impact assessment has been carried out under relevant legislation including the *Transport Infrastructure Act 1994* (Qld) (TI Act).

The traffic impact assessment was undertaken taking into consideration Queensland (QLD) State Controlled Roads and where applicable New South Wales (NSW) State Roads (i.e. some material is to be sourced from Graton, NSW) and (together referred to as SCR) and Local Government Roads (LGR). The transport of materials, workforce and equipment during construction is expected to primarily utilise the existing road and rail transport networks. The Guidelines to Traffic Impact Assessment (Department of Transport and Main Roads, 2017) has been used as a point of reference for the traffic impact assessment, as it relates to roads and intersections affected by the construction and operation of the Project. In line with this, inputs to the traffic impact assessment include:

- Existing conditions and operations of the road network, including baseline traffic volumes
- Project details, including construction timeframe
- Volume of construction materials
- Haul vehicles and their capacities
- The number of new or additional Project-related trips likely to use the network.

The overall transport task from the Project is calculated for each of the construction years, for each of the construction activities. This has been derived using material requirements and delivery schedules developed for the Project, proportionate to the current phase of the Project. These total trips have been summarised in Table 1 by activity and year of construction for the Project.

Table 1 Total construction vehicle trips by activity per construction year

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

The major transport tasks during the operational phase of the Project are expected to be rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will be irregular and insignificant due to the expected nature of maintenance tasks.

The calculated Project related construction vehicle trips have been utilised to determine the Project impact to the existing roads, pavement and road network. Baseline traffic volumes were used to determine the resulting impacts from the generated construction traffic. In line with the GTIA, a '5% assessment' was undertaken to determine if construction and operational traffic generated by the Project equals or exceeds 5% of the existing AADT on each of the road sections. Out of all the roads utilised in the Project, 13 of these roads were calculated to exceed 5% of base AADT and 30 roads were calculated to exceed 10% of base AADT, based on the identified construction trips. These roads were then assessed to determine the project related 'LOS', to assess the level of impact the Project generated traffic has on the road network. Of the 120 road segments utilised in the Project, the results indicate that only 1 road segment has the potential to exhibit a change in LOS during the various construction years. Despite this change, the expected operation of the road segment is considered acceptable given the short duration of the construction activities. Overall, the operational LOS of the overall road network will be no worse as a result of the Project. In addition, the operational performance of the road would also return to base conditions after construction is complete.

A preliminary desktop pavement impact assessment was undertaken on all DTMR and RMS SCR currently expected to be impacted, based on the existing background traffic data available for the relevant road sections. The analysis included a 5 per cent comparison of the background traffic SAR. The analysis indicates that the majority of SCR road sections would have a minimal pavement impact given the duration of construction activities and pavement loading. It was found that ten SCR roads would exceed the 5 per cent threshold.

It is recommended that a more detailed pavement impact assessment should be carried out prior to construction and in consultation with road controlling authorities. This should form part of the RUMP to be developed prior to construction. This will assist with further discussions with DTMR to identify potential contribution towards the maintenance costs for the affected road sections which should be dealt with post EIS.

As there are no public level crossings proposed in the Project, delays to road vehicles have been removed, and the safety risks associated with train/vehicle conflict have been avoided. Therefore, no specific traffic management strategies are required. To mitigate traffic impacts upon the road network, specific traffic management and mitigation measures are incorporated in the Traffic Management Plan (TMP) and will form part of the Construction Environmental Management Plan (CEMP). Mitigation measures within the TMP will detail measures to:

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

And will also consider:

- Final construction routes
- Approaches to seasonality and stock routes
- Areas of significant pedestrian and cyclist activity
- Standard hours of work and deliveries
- Specific hours of deliveries impacted by local land uses (e.g. school zones)

- Bus service operators (e.g. public transport, school buses, long distance services)
- Emergency services
- Staff transport
- Staff parking, with the provision of on-site tool storage where practicable.

Based on the traffic impact assessment and proposed mitigation, construction traffic impacts at are not predicted to generate the need to upgrade the road network for such a short duration of impact, but adequate traffic and road use management strategies will be required. Management of residual impacts will be undertaken in consultation with road controlling authorities and local government agencies.

1 Introduction and approach

1.1 Project overview

Australian Rail Track Corporation (ARTC) proposes to construct and operate the Gowrie to Helidon (G2H) section of Inland Rail. The Project is located in South East Queensland (SEQ) and consists of approximately 28 km of new track, including a new tunnel of approximately 6.24 km to create an efficient route through the steep terrain of the Toowoomba Range. The Project will be constructed within a predominantly greenfield corridor, with approximately 5.5 km of brownfield development at either end of the Project alignment. The Project is one of the “missing links” within the Inland Rail Program and incorporates the Gowrie to Grandchester future State transport corridor protected by the State Government.

1.2 Scope and context of report

The Traffic Impact Assessment (TIA) partly addresses the Project specific transport matters outlined in Part B, Section 11 of the final Terms of Reference (ToR). This report assesses the traffic and transport impacts of the construction and operation of the Project on the surrounding transport infrastructure based on the Projects’ current design. The report also summarises the potential road impacts from the movement of materials, workforce and equipment during the construction and operational phases of the Project on the surrounding road network. The TIA was undertaken taking into consideration public New South Wales (NSW) State Roads and Queensland (QLD) State-controlled Roads (together referred to as SCR) and Local Government Roads (LGR).

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

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

The construction routes assumed as a part of this assessment are routes which the construction contractor may use to transport materials from the assumed suppliers to the Project laydown areas. However, the determination of the final construction and heavy vehicle (HV) routes will be subject to consultation between Department of Transport and Main Roads (DTMR), the relevant Local Government Authority (LGA), the construction contractor and, where relevant, Queensland Rail (QR) during the next phase of the Project. This is consistent with Section 7.5 of DTMR’s Guidelines to Traffic Impact Assessment (GTIA) which states that the TIA “may be finalised when project contractors are appointed, and final traffic generation is clearer.” Consistent with this, Registered Professional Engineer of QLD certification of the Project TIA will be undertaken as per the requirement of the GTIA at a time when a construction contractor is engaged and final traffic volumes, turning movements, routes and vehicle types are known and, if required, DTMR have completed their final review of such information. Until such time as DTMR have completed their final review of such information provided by the construction contractor and provided confirmation of their satisfaction of such, this information will be deemed incomplete and should not be solely relied upon.

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

- Provide an overview of existing transport network conditions, including existing road, active transport and rail traffic
- Describe the proposed Project
- Provide an overview of baseline operations associated with intersections, road links, pavements, existing road rail interface locations and existing road safety
- Provide a summary of construction tasks, routes and resulting traffic generated by the Project
- Conduct traffic impact assessments associated with intersections, road links, road rail interface locations, pavements, road safety and access and frontage based on existing traffic assumptions
- Describe potential impacts and measures to be undertaken to mitigate the identified impacts
- Provide a summary of potential traffic impact risks identified along the Project alignment
- Provide consideration of the cumulative impacts of the Project alongside other proximate major projects.

1.3 Relevant legislation, policy, standards and guidelines

Table 1.1 identifies the relevant policies, standards and guidelines that apply to the assessment of traffic and transport for the Project. Legislation that applies to the Project is discussed in EIS Chapter 3: Legislation and project approvals process.

Although the Project is solely located in QLD, construction traffic is generated in NSW as well as QLD. For this reason, NSW legislation has been included in Table 1.1.

Table 1.1 Summary of legislation, standards, policies and guidelines

Legislation, policy/standard or guideline	Relevance to the Project
Legislation	
Transport Planning and Coordination Act 1994 (Qld) (TP&C Act)	The objectives of the TP&C Act are to improve the economic, trade and regional development performance of QLD and the quality of life of Queenslanders by achieving overall transport effectiveness and efficiency through strategic planning and management of transport resources. The Project also predominantly aligns with the Gowrie to Grandchester rail corridor, a 'Future State Transport Corridor' as per the Public Transport Guideline pursuant to section 8E of the TP&C Act.
Transport Infrastructure Act 1994 (Qld) (TI Act)	The overall objective of the TI Act is to provide a regime that allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure. This is consistent with the objectives of the TP&C Act. Any crossings of existing rail lines or works within existing rail corridor will trigger S255-*Interfering with railway* and will require the approval of the railway manager. Any works within SCR or access to SCR (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*/s66-*Road access works within State Controlled Road*.
Transport Coordination Plan 2017-2027 (Qld) (DTMR 2017)	The Transport Coordination Plan provides a framework for the coordinated planning and management of transport in QLD over the next decade. The plan is consistent with – and seeks to provide a transport-specific response to – the QLD Government's overall strategic planning for QLD, including the government's objectives for the community and the State Infrastructure Plan. The overall objective of is to encourage effective integrated planning and efficient management of transport infrastructure.

Legislation, policy/standard or guideline	Relevance to the Project
Land Act 1994 (Qld) (Land Act)	The Land Act prescribes the framework for the allocation of non-freehold land tenure and its subsequent management. Under Chapter 4, Part 4 of the *Land Act 1994,* permits are required for the occupation of unallocated state land, a reserve or a road. A permit to occupy will also be required for any underground infrastructure that is proposed beneath land governed by State held tenure. Chapter 3, Part 2, Division 2 of the Land Act contains the provisions relating to the temporary or permanent closure of a road, including SCR and LGR, and declared stock routes.
Rail Safety National Law Act 2017 (Qld) (RSNL Act)	The purpose of the RSNL Act is to provide for safe railway operations in Australia. One objective of the RSNL Act is to establish the Office of the National Rail Safety Regulator (ONRSR) as the rail safety regulator in Queensland. The RSNL Act was created following an agreement of the Council of Australian Governments to deliver a consistent approach to rail safety policy and regulations (and to remove the inconsistencies) between the previous state and territory rail safety regimes. The RSNL Act governs the safe operation of the rail system in Queensland. The ongoing operation of the Project will need to comply with all areas of the RSNL Act, covering rail industry work practices and protocols for safe working in rail corridors and associated accreditation, signalling and control, the ongoing management of structures and civil works, interfaces with public roads and highways and other activities impacting on rail safety.
Local Government Act 2009 (Qld) (Local Government Act)	The Local Government Act sets out the responsibilities of local government authorities with regard to the construction, improvement, control and management of traffic on local roads (excluding SCR). A local government authority may temporarily or permanently close a local road to traffic in accordance with the Local Government Act. An adjoining landholder must apply under the Land Act to temporarily or permanently close a local road. ARTC will seek approval under the act for the temporary and permanent closure of local roads, including Morris Road and Cattos Road.
Stock Route Management Act 2002 (Qld)	The QLD stock route network is a network of stock routes and reserves for travelling stock in the State. The *Stock Route Management Act 2002 (Qld)* provides for managing the stock route network, recognising that the network has multiple uses with the primary purpose being for travelling stock (refer Section 98 (2) (a)). All stock routes are classified as roads under the Land Act. As outlined in Section 2.2.6 the Project does not intersect any declared stock routes under the act.
Transport Administration Act 1988 (NSW)	The objectives of the *Transport Administration Act 1988 (NSW)* relate to administering the transport services provided to the people of NSW and include: ▪ Providing an efficient and accountable framework for the governance of the delivery of transport services ▪ Promoting the integration of the transport system ▪ Enabling effective planning and delivery of transport infrastructure and services ▪ Facilitating the mobilisation and prioritisation of key resources across the transport sector ▪ Coordinating the activities of those engaged in the delivery of transport services ▪ Maintaining independent regulatory arrangements for ensuring the safety of transport services. This act is relevant to the movement of construction materials on NSW roads associated with the Project.
Road Transport Act 2013 (NSW)	The elements of the *Road Transport Act of 2013 (NSW)* relevant to the Project are to govern the application of traffic control devices, electrical equipment or other facilities on roads or road shoulders, footpaths, structures under or over the Project and control of vehicles (other than vehicles used on the railway itself) and animals along construction routes within NSW.
Heavy Vehicle (Mass, Dimension and Loading) National Regulation (QLD Government 2013)	The Heavy Vehicle (Mass, Dimension and Loading) National Regulation is a law of QLD under the Heavy Vehicle National Law (Qld). If required and necessary for the Project, all restricted access vehicles (RAV) and oversize over mass (OSOM) vehicles required to transport special equipment will apply for the necessary permits from DTMR and other relevant authorities and should comply with this law.

Legislation, policy/standard or guideline	Relevance to the Project
State Planning Policy (SPP) 2017	The SPP is a key component of the Queensland land use planning system which articulates the Queensland Government's 17 state interests in land use planning and development across the following five key themes: ▪ Liveable communities and housing ▪ Economic growth ▪ Environment and heritage ▪ Safety and resilience to hazards ▪ Infrastructure. The SPP is a statutory instrument and requires that State interests be integrated into local government planning schemes. Some State interests in the SPP include assessment benchmarks that apply to certain types of development where a local government planning scheme does not appropriately integrate the relevant state interest. State interests relevant to the Project include: ▪ Infrastructure integration - The Project supports this State interest through the expansion of existing infrastructure associated with the introduction of a heavy freight rail between Melbourne and Brisbane. The Project will also improve efficiencies and performance of rail infrastructure through the Toowoomba Range and interoperability between the ARTC and QR networks. The Project also is open access so passenger services can utilise the rail corridor, while the design does not preclude a fast rail passenger service within the Gowrie to Grandchester future State transport corridor at a future date (e.g. the design avoids proposed passenger stations) ▪ Transport infrastructure - The Project supports this State interest by utilising the existing West Moreton System rail corridor and the Gowrie to Grandchester future State transport corridor where possible. Furthermore, the Project has considered and assessed potential impacts to surrounding transport networks and land uses. ▪ Strategic airports and aviation facilities – The Project will not create incompatible intrusions or compromise the safety or function of the Toowoomba Airport. There is also the potential for the better linkage between Inland Rail and the airports in the future.
Local government plans/strategies	
South East Queensland Regional Plan (QLD Government 2009-2031)	The purpose of the South East Queensland Regional Plan 2009–2031 is to manage regional growth and change in the most sustainable way to protect and enhance quality of life in the region.
Ipswich City Planning Scheme (Ipswich City Council (ICC) 2006)	The purpose of the Ipswich City Planning Scheme is to act as a framework for managing development in a way that advances previous planning documents. It will identify assessable and self-assessable development and identify anticipated outcomes in the local government area as the context for assessing development. Part of this scheme includes the Local Government Infrastructure Plan. This plan provides desired standards of service for the transport network, plans for trunk infrastructure and a schedule of works for planned infrastructure in Ipswich City. In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation, provisions of this local government planning scheme do not apply to the Project.
City of Ipswich Transport Plan (ICC 2016)	The City of Ipswich Transport Plan outlines the Council's high-level aspirations to advance the transport system in Ipswich by identifying current key transport challenges, setting a vision and objective for the transport system and identifying appropriate policy focuses and actions.
Lockyer Valley Regional Council Planning Scheme (Lockyer Valley Regional Council (LVRC) 2018)	The planning schemes currently in force and effect around the LVRC area are those of the former Gatton and Laidley Shires which were in place when these shires were amalgamated in 2008. The purposes of these documents are to act as a framework for managing development by identifying assessable and self-assessable development and identifying the outcomes to be achieved in the area as the context for assessing developments. The relevant Planning Scheme also sets out both the Shire's desired outcomes for environment, landscape quality, cultural heritage and safety. In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation, provisions of this local government planning scheme do not apply to the Project.

Legislation, policy/standard or guideline	Relevance to the Project
Lockyer Valley Regional Council Local Government Infrastructure Plan (LVRC 2018)	On 27 June 2018, LVRC adopted amendments to the Gatton and Laidley planning schemes to insert a LGIP into both schemes. The Purpose of this plan include to integrate infrastructure planning with the land use planning identified in the planning scheme and provide transparency regarding a local government's intentions for the provision of trunk infrastructure. This local planning scheme identifies haul routes to be used for extractive industries. These routes will be used where applicable in this assessment.
Draft Lockyer Valley Regional Council Planning Scheme – Priority Infrastructure Plan 2018	The LVRC has developed a Draft Priority Infrastructure Plan. This Plan identifies the infrastructure the Lockyer Valley will need between 2014 and 2024 to service the expected population and employment growth over the road network, as well as for community facilities, water supply and sewerage.
Lockyer Valley Adopted Infrastructure Charges Resolution (LVRC 2019)	The purpose of the Lockyer Valley Adopted Infrastructure Charges Resolution is to provide the adopted charges for providing the local government trunk infrastructure networks and distributor-retailer trunk infrastructure networks for development purposes. It also states the levied charges to be levied by the LVRC for the demand placed on the local trunk infrastructure due to development, and also provides a method of calculation for an offset and refund.
Clarence Valley Council Community Strategic Plan (Clarence Valley Council (CVC) 2018a)	The Clarence Valley Contributions Plan was developed after immense consultation of the community and identifies plans for the community over the next 10 years. The document sets the broad parameters that guide the decision making for the region, meaning that all council decisions should be consistent with the direction set out in the plan. The Project primary construction routes proposed in this assessment include routes located in the local government area of CVC. For this reason, this plan has been included in this report.
Clarence River Way Masterplan (CVC 2018b)	The purpose of the Clarence River Way Masterplan is to provide guidance in the development of the area. It provides recommendations on how planning schemes can be developed in order to achieve the aims of the master plan, particularly focussing on the area of five core themes. Products, infrastructure, attractions, investment and marketing will be linked to these themes, ensuring that the region is developed in accordance with the masterplan. The Project primary construction routes proposed in this assessment include routes located in the local government area of CVC. For this reason, this plan has been included in this report.
Toowoomba Regional Planning Scheme (Toowoomba Regional Council (TRC) 2012)	The Toowoomba Regional Planning Scheme was prepared in accordance with the Sustainable Planning Act 2009 as a framework for managing development in a way that advances the purpose of the Act. The scheme seeks to advance state and regional policies through more detailed local responses, taking into account the local context. It applies to the area of Toowoomba Regional Council (TRC) including all premises, roads internal waterways and interrelates with the surrounding local government areas. In accordance with Schedule 6, Part 5, Section 26(2) of the Planning Regulation, provisions of this local government planning scheme do not apply to the Project.
Toowoomba Region 'City Centre Master Plan' (TRC 2010)	The Toowoomba Region 'City centre master plan' aims to guide land use planning and transport, as well as identify key projects that will support the overall strategy outlined in the Plan. It provides recommendations on how planning schemes can be developed in order to achieve the aims of the master plan and also consists of an implementation plan which comprises of a series of action plans which support the overall Master Plan vision in the short, medium and long term.
Toowoomba Road Safety Strategy (TRC 2019)	TRC's Road Safety Strategy 2019-2023 provides a local framework to enable Council, key road safety stakeholders and the community to actively participate in improving road safety within the region. The strategy is underpinned by the 'Safe System' approach to road safety, whereby all elements of a transport system (user, mode and infrastructure) interact appropriately to create a safe and forgiving environment. Consistent with the Road Safety Strategy, road safety audits undertaken during the Project design will comply with the Safe System approach.

Legislation, policy/standard or guideline	Relevance to the Project
Toowoomba Region Sustainable Transport Strategy (TRC 2014)	The purpose of the Toowoomba Region 'Strategy' is to guide transport policy, integrated land use and transport planning, and future transport investment decisions to ensure sustainable economic growth of the region. The Strategy aims to set out the TRC's policy directions and actions around transport elements such as land use integration, public transport, active transport, freight and air travel and sets out key plans and projects to implement this policy direction.
Toowoomba Region Local Government Infrastructure Plan (TRC 2017a)	On 31 May 2017 the TRC adopted Toowoomba Regional Planning Scheme, replacing the Priority Infrastructure Plan with a LGIP.
Toowoomba Regional Council Charges Resolution No. 2 (2017) and No. 3 (TRC 2018)	The purpose of the TRC Charges Resolutions are to assist with the implementation of the local planning scheme. They contain the adopted charges by development types, the method of calculation for the charge to be levied, as well as the method of calculation for the cost of infrastructure for offset of refund.
West Toowoomba Local Plan/Land Use Investigation (TRC 2017b)	The West Toowoomba land use investigation study is part of the Imagine tomorrow series of local planning investigations to accommodate the anticipated growth in the area over the coming years. These investigations guide where and how to grow Toowoomba as a regional centre and how to sustainably manage this growth. The Project aims to deliver leading urban design and is based on contemporary planning, urban design and placemaking principles.
Guidelines	
Queensland Level Crossing Safety Strategy 2012-2021 (DTMR 2012)	This strategy complements the National Railway Level Crossing Safety Strategy (NLCSS) 2010-2020, which was released by the Australian Transport Council in 2009 to promote national consistency in addressing level crossing safety. (Note: the NLCSS has subsequently been superseded by the NLCSS (2017-2020. However, the Queensland Level Crossing Safety Strategy (QLCSS) refers to the 2010-2020 version). A reliable state transport network is vital for connecting people, places, goods and services. It is in everyone's interests that road and rail users work together to make this network as safe and efficient as possible. The strategy focuses on all users of level crossings, including train crew and passengers, road vehicle drivers, riders, passengers and pedestrians. These crossings, including any which may be accessible to the public, are considered to be a workplace health and safety matter and are managed under separate arrangements. This strategy will be used with its associated key performance indicators in order to ensure that mitigation measures determined for all public road//rail interface locations (level crossings) through the analysis process focus on safety, risk and operational efficiency.
Guideline to Traffic Impact Assessment, September 2017 (Qld) (DTMR 2017)	The Guidelines to Traffic Impact Assessment (GTIA) has been used as a point of reference for the traffic and transport assessment, as it relates to roads and intersections affected by the construction and operation of the Project. GTIA provides information about the processes involved to assess road impacts triggered by a proposed development. While it is not mandatory, the GTIA provides a basis for the assessment of road impacts and has been adopted for the preliminary assessment on traffic and pavement impacts by the Project. Although the Guidelines only apply to the SCR, Local Government Authorities may choose to adopt or use this as a reference. In general, the DTMR will consider a development's road impacts to be 'insignificant' if the development generates an increase in traffic on SCR of less than 5 per cent over existing levels, either measured in terms of Average Annual Daily Traffic (AADT) or Standard Axle Repetitions. Inputs to the GTIA process typically include the existing traffic levels, the Project construction timeframe, and that of other projects, volume of construction materials, haul vehicles and their capacities, and therefore the number of new or additional Project-related trips likely to use the network. The use of the assessment process recommended in the GTIA will provide the Project with clarification on likely traffic impacts on nominated haulage routes, intersections and other affected roads. It is noted that an updated version of the GTIA was released in December 2018, after the Terms of Reference (ToR) for the Project were released. This assessment has been undertaken consistent with the 2017 GTIA consistent with the ToR. As per the GTIA, the TIA will need to be finalised when Project contractors are appointed, and the final traffic generation is clearer. It is recommended that any future TIA be prepared consistent with the December 2018 version of the GTIA.

Legislation, policy/standard or guideline	Relevance to the Project
Roads and Traffic Authority Guide to Traffic Generating Developments (Roads and Traffic Authority, NSW 2002)	The Roads and Traffic Authority (RTA) Guide to Traffic Generating Developments Version 2.2 (2002) (NSW) (the guide) outlines all aspects of traffic generation considerations relating to developments. The guide provides information regarding traffic issues for those submitting Development Applications, and for those involved in the assessment of these applications. The overall objective is all parties impacted have access to common information relevant to the development approval process. The information provided gives background into the likely impacts of traffic from various types of developments and associated mitigation measures, thereby illustrating the importance of accurate development assessment. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments. The GTIA is used as overarching guideline document. This was consulted with RMS where RMS was in agreement of using the GTIA as the main guideline document for the TIA (RMS email dated 20 September 2018).
Manual of Uniform Traffic Control Devices (MUTCD) Part 7: Railway Crossings (DTMR 2019a)	The MUTCD series covers all mandatory road and rail related traffic control devices likely to be required for the Project. The use of signs, markings and other devices at railway level crossings and affected roads, based on uniform standards and practices, is essential in the interests of safety for both rail traffic and road users. This part of the MUTCD sets out the various controls used at railway, cane railway and combined railway/cane railway level crossings and describes the devices and assemblies, their use and location to achieve these controls.
Guide to Development in a Transport Environment: Rail (DTMR 2015)	The DTMR Guide to development in a transport environment: rail provides important information for the planning, design or delivery of development in the vicinity of railways in QLD. It is intended for use as a technical reference document. The guide provides specific technical guidance to assist development proponents to achieve compliance with the performance outcomes and acceptable outcomes in the QLD state development assessment provisions in relation to managing impacts of development on railway safety, structural integrity and operation. The guide also provides useful information in relation to the operational constraints and requirements when undertaking construction work within the railway environment.
Austroads Guide to Traffic Management Part 12: Traffic Impact Assessments (Austroads 2019b)	This Guide helps traffic and transport practitioners identify and manage the impacts on the road arising from land use developments. The impacts being considered are those directly affecting road users of all classes, from large freight vehicles and buses to cyclists and pedestrians. It is a useful supplement to the NSW Guide and QLD GTIA publications discussed earlier.
Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (Austroads 2017a)	In the context of the Austroads Guide, Part 3: Traffic Studies and Analysis outlines the importance of traffic data and its analysis for traffic management and traffic control within a network. It serves to ensure some degree of consistency in conducting traffic studies and surveys. It provides guidance on the different types of traffic studies and surveys that can be undertaken, their use and application, and methods for traffic data collection and analysis.
Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2017b)	The guide provides information regarding intersections, both signalised and unsignalised. Guidance is provided on intersection sight distances, as well as left and right turn treatments, including the incorporation of auxiliary lanes at intersections and the use and size of traffic islands.
Austroads Guide to Road Design Part 6: Intersections, Interchanges and Crossing Management. (Austroads 2019a)	The guide is concerned with traffic management at all types of intersections where road users must join or cross another stream of traffic. It focuses on traffic management issues and treatments related to intersections, interchanges and crossings.
Austroads Guide to Traffic Engineering Practice Part 2: Roadway Capacity (Austroads 1988)	The guide provides information regarding roadway capacity for various road types. The guide is used to provide guidance on the assessment approach for mid-block capacity assessments.

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

1.4 Terms of reference requirements

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

Table 1.2 Terms of reference requirements

Terms of reference requirements	Addressed in report
Existing environment	
11.104. Describe and map the existing transport infrastructure and corridors. Provide data on existing road, active transport and rail traffic in the Project area.	Figure 1.2, Figure 1.3, Figure 1.4, Sections 2.2, 2.3 and 2.6 EIS Chapter 19: Traffic, transport and access, Section 19.6.2.2.
11.106. Describe how the Project complies with the Queensland Level Crossing Safety Strategy 2012–2021 for new road rail interfaces and the impacts on existing road rail interfaces.	Sections 3.2, 4.4 6.4.3 and 9.2.5 EIS Chapter 19: Traffic, transport and access, Section 19.6 and 19.7.
Impact assessment	
11.107. Assess the impacts of the Project on individual road rail interfaces and any cumulative impacts on the wider transport network in the context of the Queensland level crossing safety strategy.	Sections 3.2, 4.4, 6.4.3 and 9.2.5 EIS Chapter 19: Traffic, transport and access, Sections 19.6.3 and Sections 19.7.1.2 and19.7.9.1.
11.108. The EIS should include a clear summary of the total transport task for the Project, including workforce, haulage routes, inputs and outputs during the construction and operational phases.	Table 5.1, Figure 1.3, Figure 1.4, and Appendix G to Appendix N EIS Chapter 19: Traffic, transport and access, Section 19.6.
11.109. Present the transport assessment in separate sections for each Project affected mode (road, active transport and rail) as appropriate for each phase of the Project.	Section 5.9 EIS Chapter 19: Traffic, transport and access, Sections 19.8, 19.10.
11.110. Provide sufficient information to allow an independent assessment of how existing and proposed transport infrastructure will be affected by Project transport at the local and regional level (for example, local roads and State Controlled Roads). Discussion should also refer to emergency service access.	Sections 5.9 and 6.6.1 EIS Chapter 19: Traffic, transport and access, Sections 19.8 and 19.10.
11.111. Include details of the adopted assessment methodology for impacts on roads within the road impact assessment report in accordance with the DTMR Guide to Traffic Impact Assessment.	Section 1.6 EIS Chapter 19: Traffic, transport and access, Section 19.6 and 19.10.

Terms of reference requirements	Addressed in report
Mitigation measures	
11.113. Discuss and recommend how identified impacts will be mitigated. Mitigation strategies are to be prepared in close consultation with relevant transport authorities (including Local Government).	Section 9 EIS Chapter 19: Traffic, transport and access, Section 19.9

1.5 TIA study area

The study area defined for the TIA consists of:

- The extent of the Project alignment, including public roads intersecting the Project alignment
- Public roads impacted by the Project alignment, including changes to the local road network
- The road network envisaged for the transport of workforce, materials and equipment during the construction and operation phases of the Project.

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

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

1.5.1 Proposed rail corridor

The preferred Project alignment is generally consistent with that of the Gowrie to Grandchester Future State transport corridor protected under the *TP&C Act*. The Project connects the adjacent Inland Rail projects, Border to Gowrie (B2G) project, to the west and Helidon to Calvert (H2C) project, to the east. The Project departs from the existing West Moreton System rail corridor east of Gowrie and ends by tying into the existing rail corridor west of Helidon. The Project alignment is illustrated in Figure 1.1 and also displays the alignment in relation to the Gowrie to Grandchester future State transport corridor. Figure 1.3 illustrates a detailed view of the proposed connection between the Project alignment and the Gowrie to Grandchester future State transport corridor at the western tunnel portal.

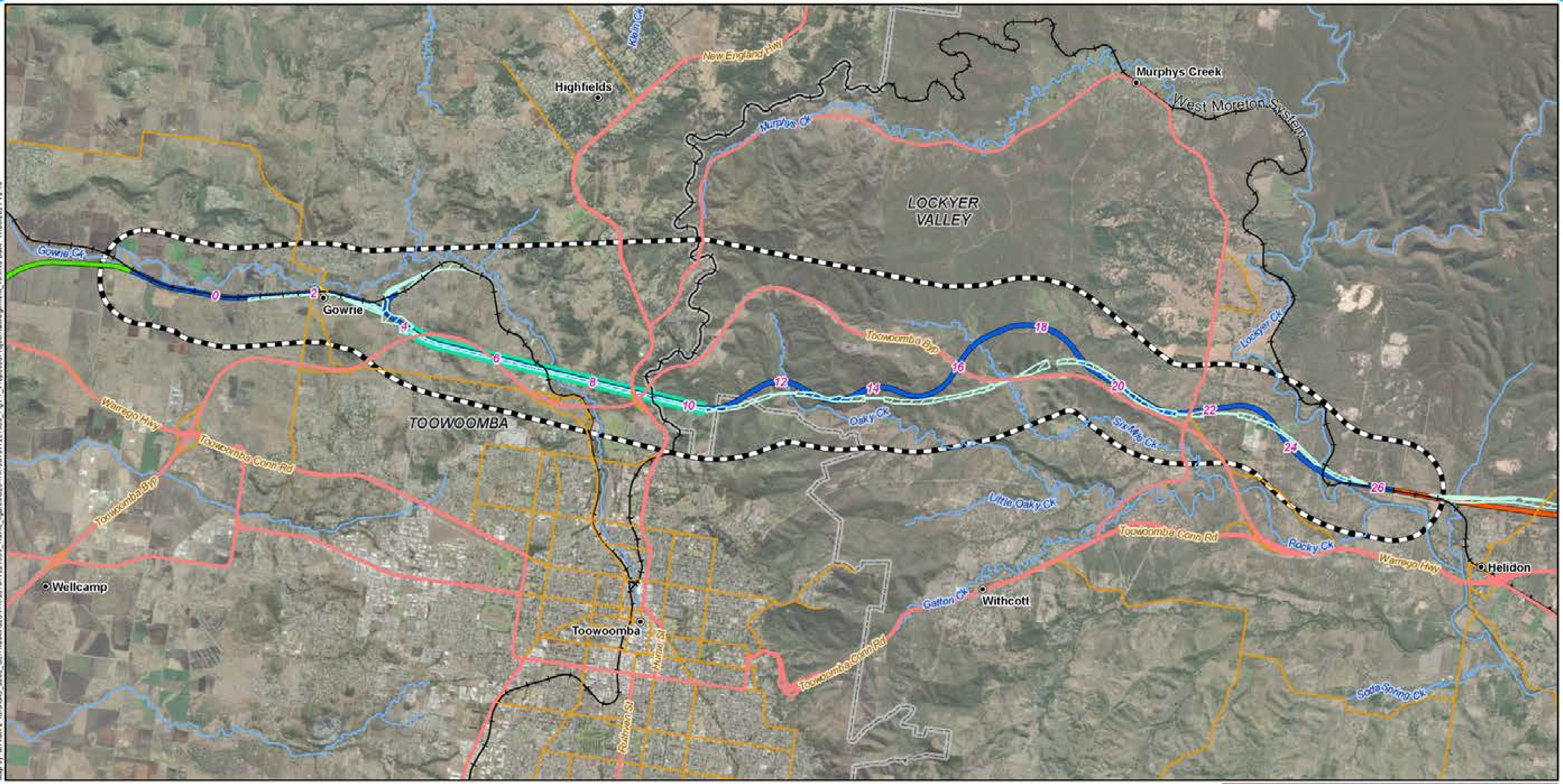
The proposed road rail interface locations that form part of the TIA study area are indicated in Figure 1.2. The road rail interface locations comprise public formed roads only. The road rail interface locations included in this TIA study area are all public road crossings which are envisaged to intersect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

1.5.2 Primary construction transport routes

The proposed primary road-based construction transport routes that form part of the TIA study area are indicated in Figure 1.4. The construction routes proposed as a part of this assessment may be used by workforce or in the transportation of quarry materials (ballast, capping materials), other bulk materials, precast concrete, ready-mix concrete, rail, sleepers, earthworks materials, spoil, water, plant, tools and other materials. However, the determination of the final construction and heavy vehicle routes will be subject to consultation between DTMR, the relevant LGA, the construction contractor and, where relevant, QR.

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

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



Legend

5	Chainage (km)		Watercourses
	Localities		State controlled roads
	B2G project alignment		Local government roads
	G2H project alignment		EIS investigation corridor
	H2C project alignment		Gowrie to Grandchester corridor
	Existing rail		Local Government Areas
	Tunnel		

A3 scale: 1:85,000

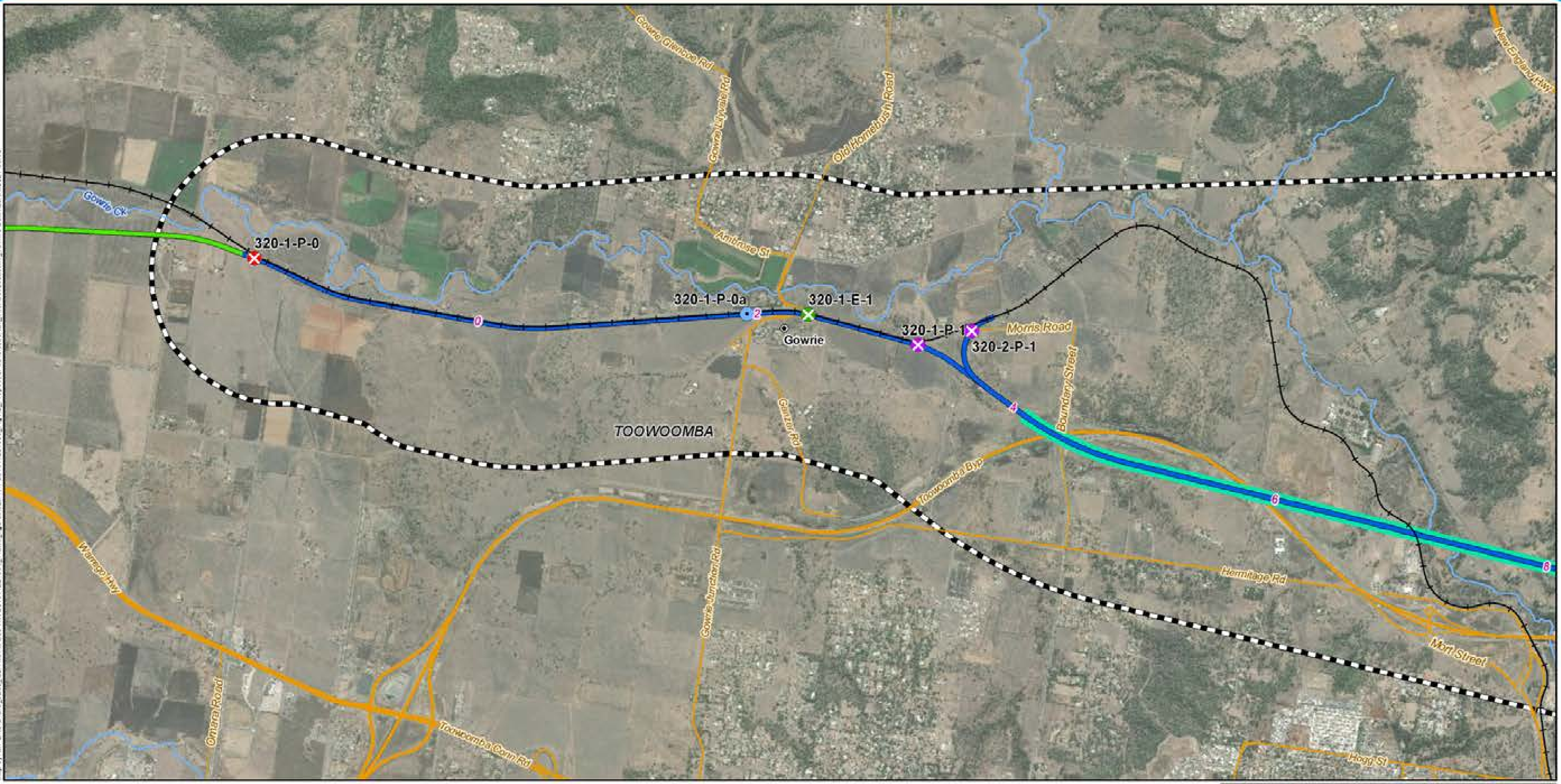
0 1 2 3 4 5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 11/06/2021 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Figure 1.1:
Proposed Project Rail Alignment

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



Legend

- 5 Chainage (km)
- Localities
- Grade separation - rail over road
- Grade separation - road over rail
- No crossing provided
- No crossing provided - consolidate
- No crossing provided - divert/re-align road
- No crossing provided - relocate
- B2G project alignment
- G2H project alignment
- Existing rail
- Tunnel
- Watercourses
- Major local roads
- Minor local roads
- EIS investigation corridor
- Local Government Areas

A3 scale: 1:30,000

0 0.25 0.5 0.75 1 km

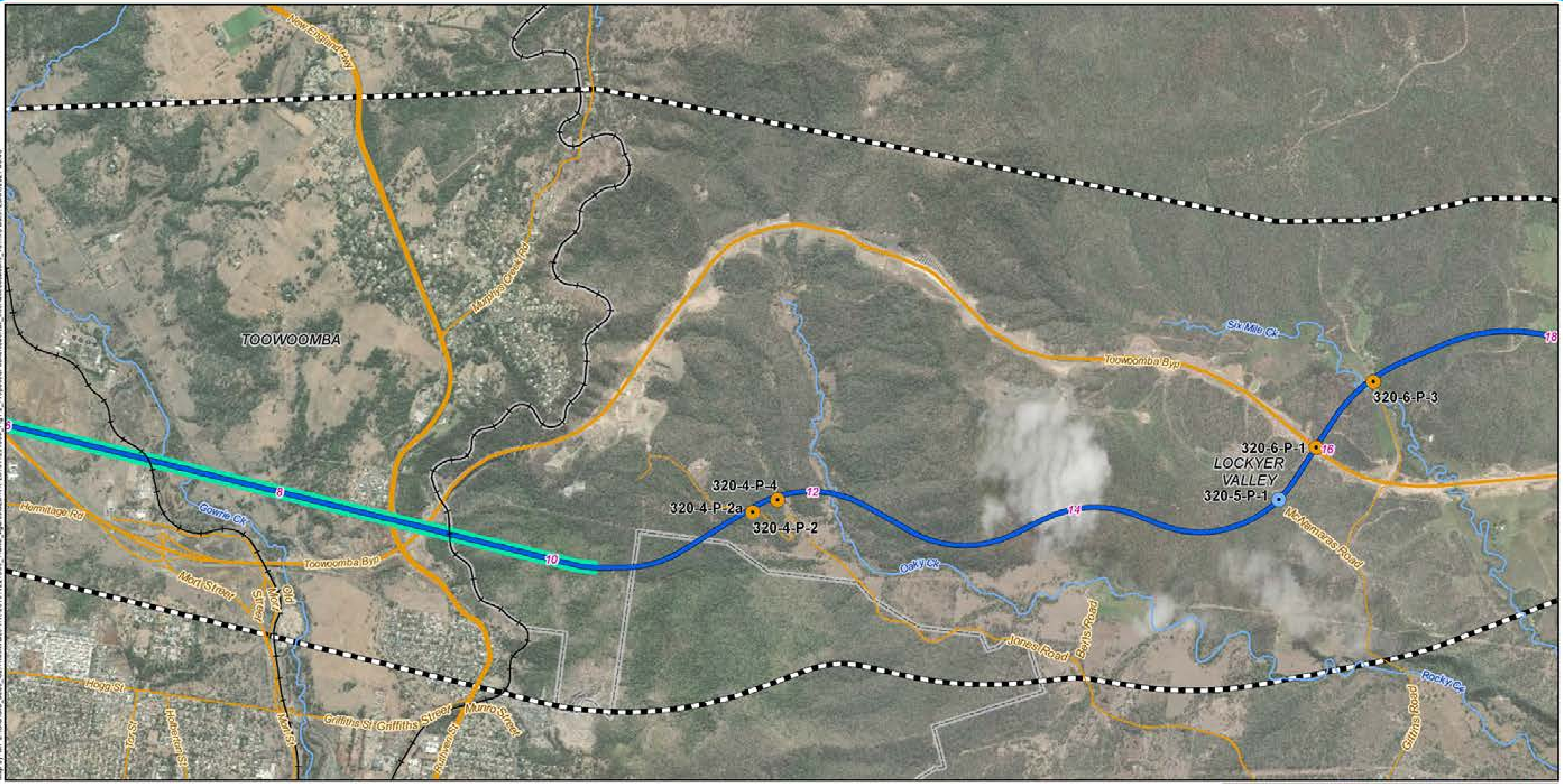
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.2a:
Proposed Public Road/Rail Interface Locations

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



Legend

- 5 Chainage (km)
- Localities
- Grade separation - rail over road
- Grade separation - road over rail
- No crossing provided
- No crossing provided - consolidate
- No crossing provided - divert/re-align road
- No crossing provided - relocate
- G2H project alignment
- Existing rail
- Tunnel
- Watercourses
- Major local roads
- Minor local roads
- EIS investigation corridor
- Local Government Areas

A3 scale: 1:30,000

0 0.25 0.5 0.75 1 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.2b:
Proposed Public Road/Rail Interface Locations

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

Legend

- 5 Chainage (km)
- Localities
- Grade separation - rail over road
- Grade separation - road over rail
- No crossing provided
- No crossing provided - consolidate
- No crossing provided - divert/re-align road
- No crossing provided - relocate
- G2H project alignment
- H2C project alignment
- Existing rail
- Watercourses
- Major local roads
- Minor local roads
- EIS investigation corridor
- Local Government Areas

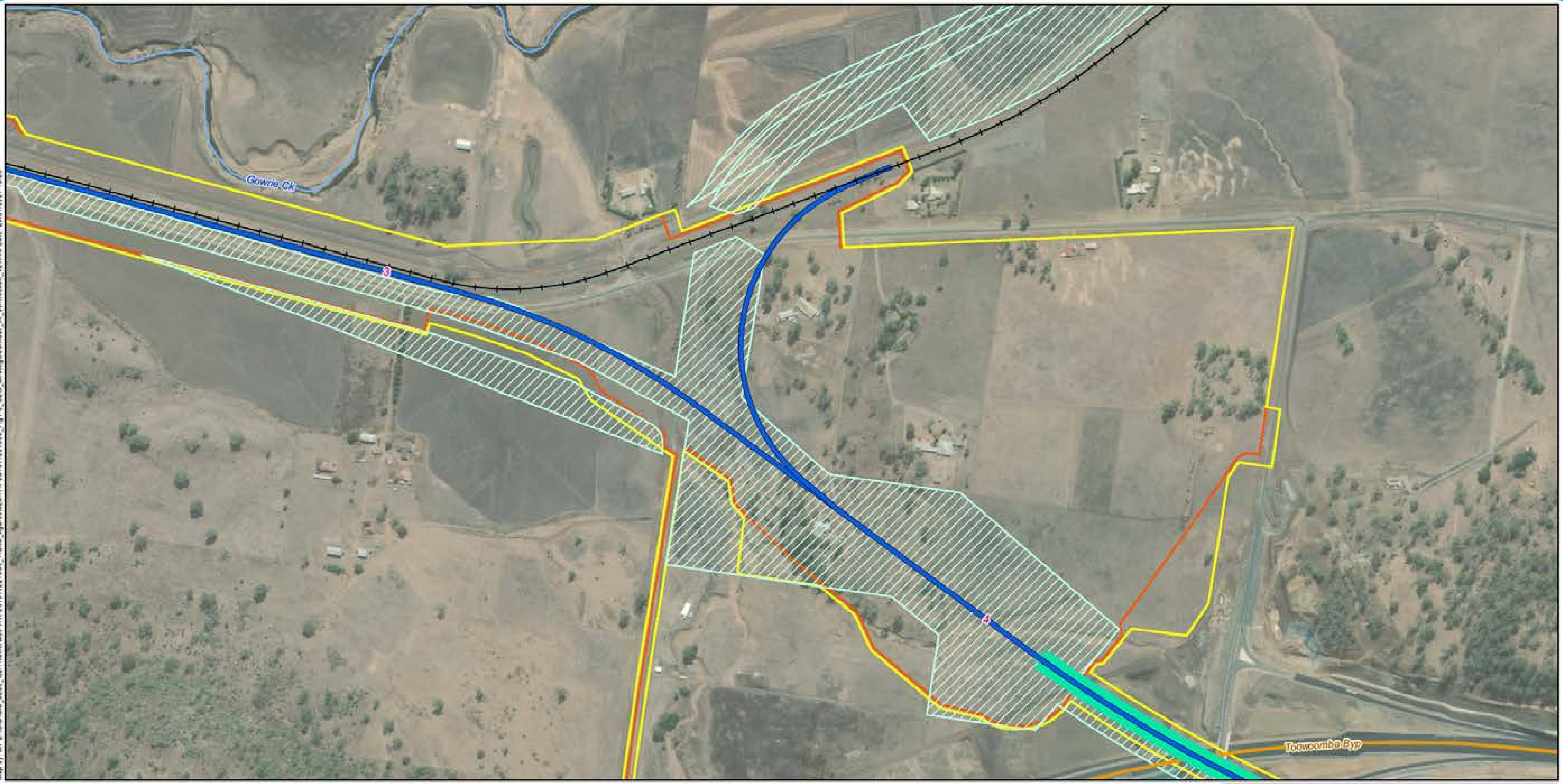
A3 scale: 1:30,000
0 0.25 0.5 0.75 1 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.2c: Proposed Public Road/Rail Interface Locations



Legend

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

A3 scale: 1:6,000

0 50 100 150 200 250m

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.3: Gowrie to Grandchester Strategic corridor and Inland Rail alignment connection

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

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

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

The proposed primary road-based construction transport routes presented in Figure 1.4 have been further assessed in the following sections of the report, including required road alterations and construction activities proposed as part of these works. Where there are haul routes proposed through land that is not an existing public road, further consultation and investigation will be required with stakeholders to ensure use of the proposed road or laydown area are mitigated adequately. The Project's primary construction routes are described in more detail in Section 5. The proposed construction route map for all road-based transport materials is also provided in Appendix G through Appendix N.

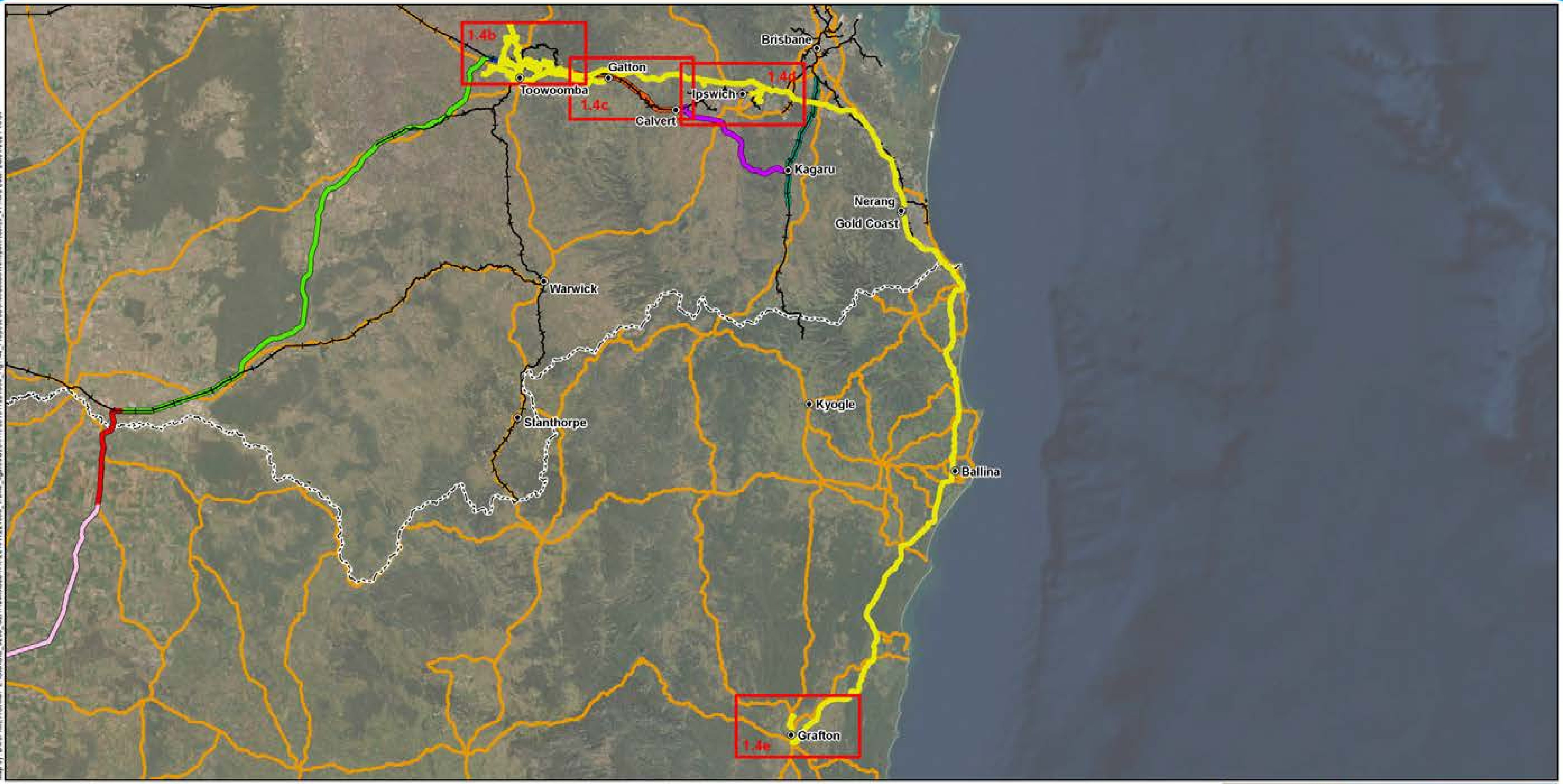
1.5.3 Operational transport routes

The Project transport task during the operational phase of the Project is expected to be limited to rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will consist of low vehicle movements to/from depots and transportation of maintenance material within the rail corridor. Therefore, it is expected to be irregular and insignificant.

Further transport impacts may be realised with the introduction of potential intermodal freight facilities or industrial developments facilitated by Inland Rail. However, the scope and the scale of such developments is unknown at this stage and have not been assesses as a part of this TIA. Further, the development application for such land uses will require the preparation of a separate site-specific TIA where the impacts will be considered.

Similarly, this TIA 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. Further discussion is provided in EIS Chapter 2: Project rationale.

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



Legend

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

A3 scale: 1:1,500,000

0 10 20 30 40 50km

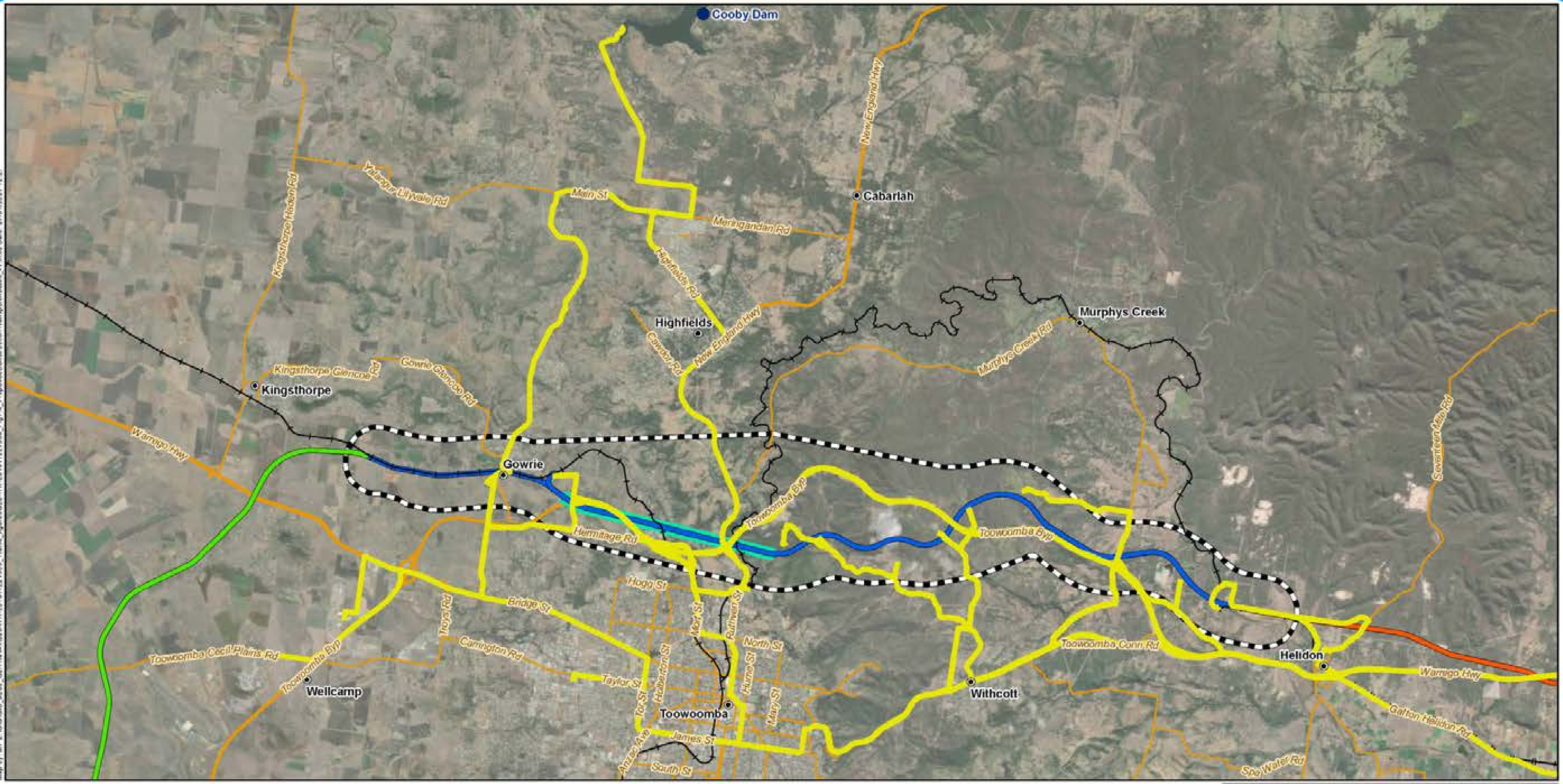
Future Freight
Integrating Community, Environment and Engineering

Issue date: 28/01/2021 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.4a:
Proposed construction transport routes for the Project

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



Legend

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

A3 scale: 1:120,000

0 1 2 3 4 5km

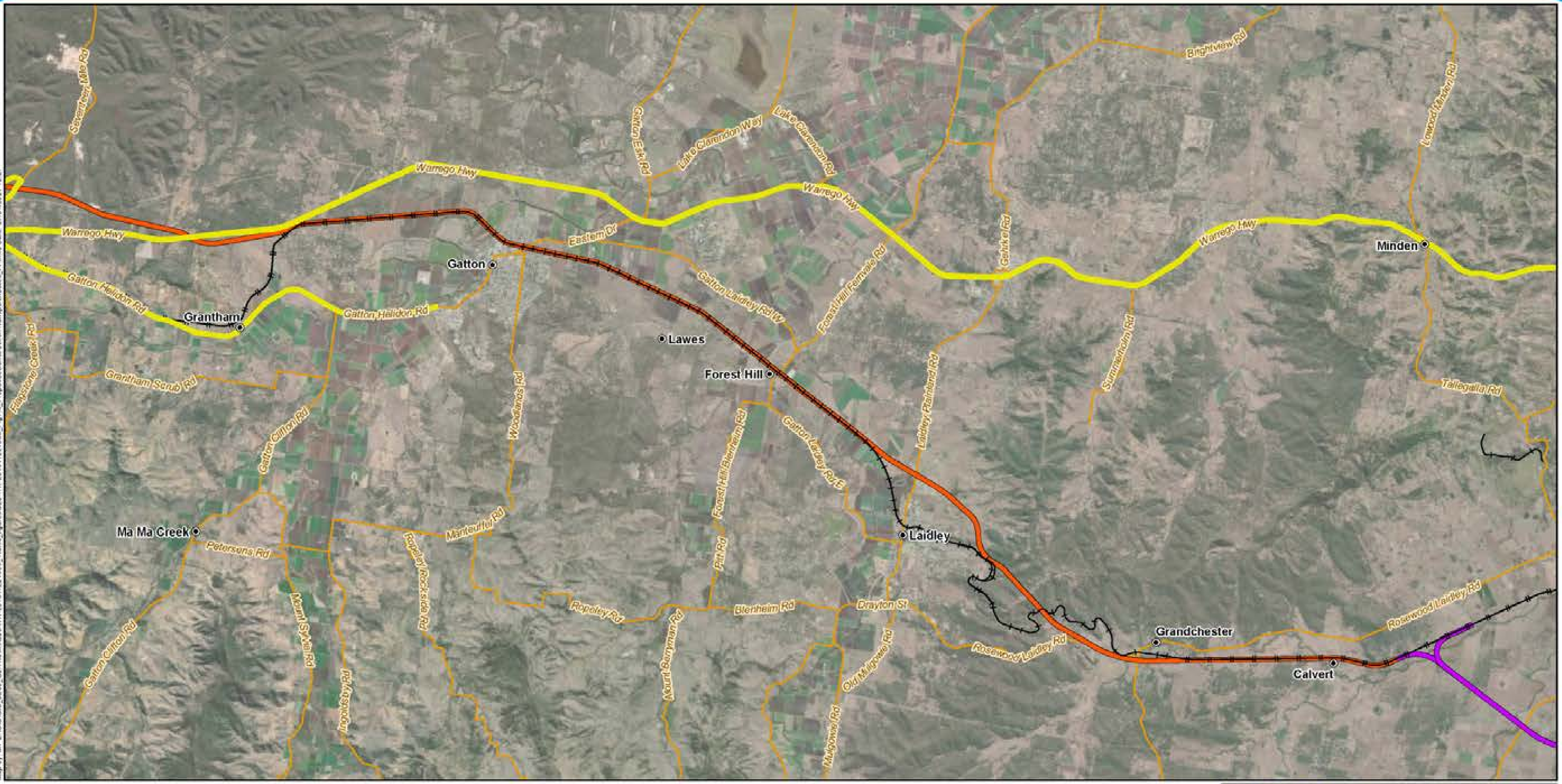
Future Freight
Integrating Community, Environment and Engineering

Issue date: 27/01/2021 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.4b:
Proposed construction transport routes for the Project

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



Legend

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

A3 scale: 1:120,000

0 1 2 3 4 5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 27/01/2021 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.4c:
Proposed construction transport routes for the Project

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

Legend

- Localities
- C2K project alignment
- Existing rail
- Major roads
- Minor roads
- Construction routes

A3 scale: 1:100,000

0 0.9 1.8 2.7 3.6 4.5km

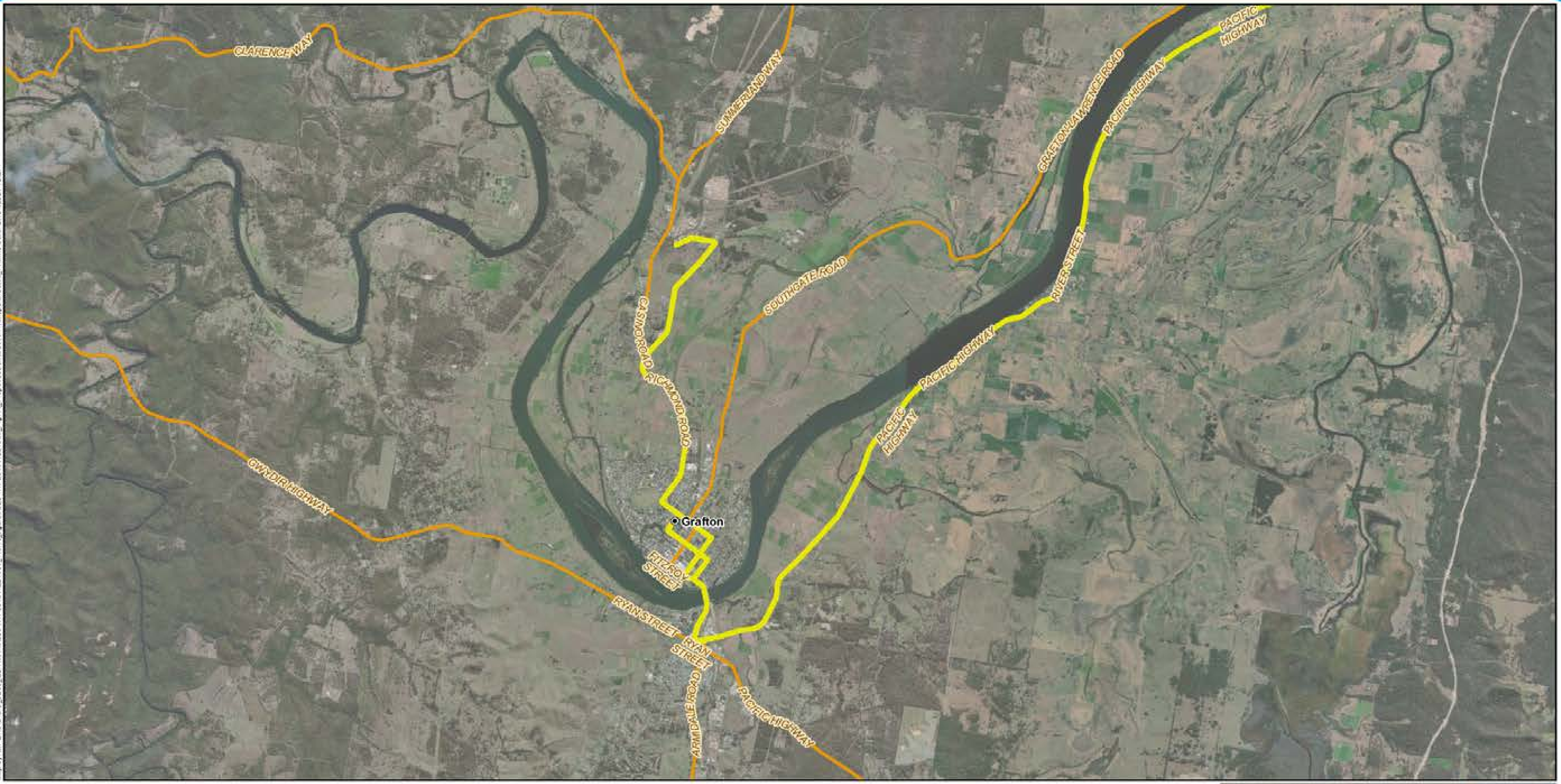
Future Freight
Integrating Community, Environment and Engineering

Issue date: 27/01/2021 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.4d:
Proposed construction transport routes for the Project

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



Legend

- Localities
- Major roads
- Minor roads
- Construction routes

A3 scale: 1:100,000

0 0.9 1.8 2.7 3.6 4.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 27/01/2021 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 1.4e:
Proposed construction transport routes for the Project

1.6 Methodology

The ToR requires the TIA be undertaken in accordance with the DTMR GTIA (2017). Where applicable in NSW, the use of the GTIA has been agreed with and accepted by RMS as the applicable guideline. The methodology followed within this TIA is generally consistent with the methodology outlined in the GTIA and consists of:

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

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

An initial high-level summary of the expected transport task by mode was undertaken for the existing road, rail, port and airport facilities to establish the assessment requirements during the construction and operational phases of the Project. Table 1.3 summarises the expected Project transport tasks by mode. As shown, the transportation of materials and equipment will typically make use of the existing road and rail networks. Therefore, the majority of impacts were considered to be road and rail network based.

The construction program includes the transport of construction materials, plant and equipment, and the impacts that this transportation will have on the surrounding road network. The construction program includes the establishment of internal haul roads and laydown areas, and a nominal timeframe from contract award to the commencement of work on site for access upgrade works. The design and detailing of these required works are not yet at a level to be programmed and will need to be agreed upon by the construction contractor and the relevant authorities.

Table 1.3 Summary of transport tasks by mode

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

Table note:

* *Impacts expected to the Gowrie Junction area. These have been assessed in an additional technical note. For further details refer to Appendix U and Appendix T.*

A brief overview of the methodology adopted to identify the background and Project related traffic volumes is summarised in Figure 1.5. This centred on establishing a background, “without Project” traffic scenario for the identified TIA study area and comparing this to the scenario including the Project generated traffic, i.e. the ‘with Project’ scenario. The process allowed for the assessment of the traffic impacts of the Project in terms of road safety, access and frontage, intersections, road links, pavement, road rail interfaces, active travel, stock routes and school routes. Following the impact assessment, if required, potential mitigation and management measures were formulated to address the potential traffic impacts caused by the proposed Project.

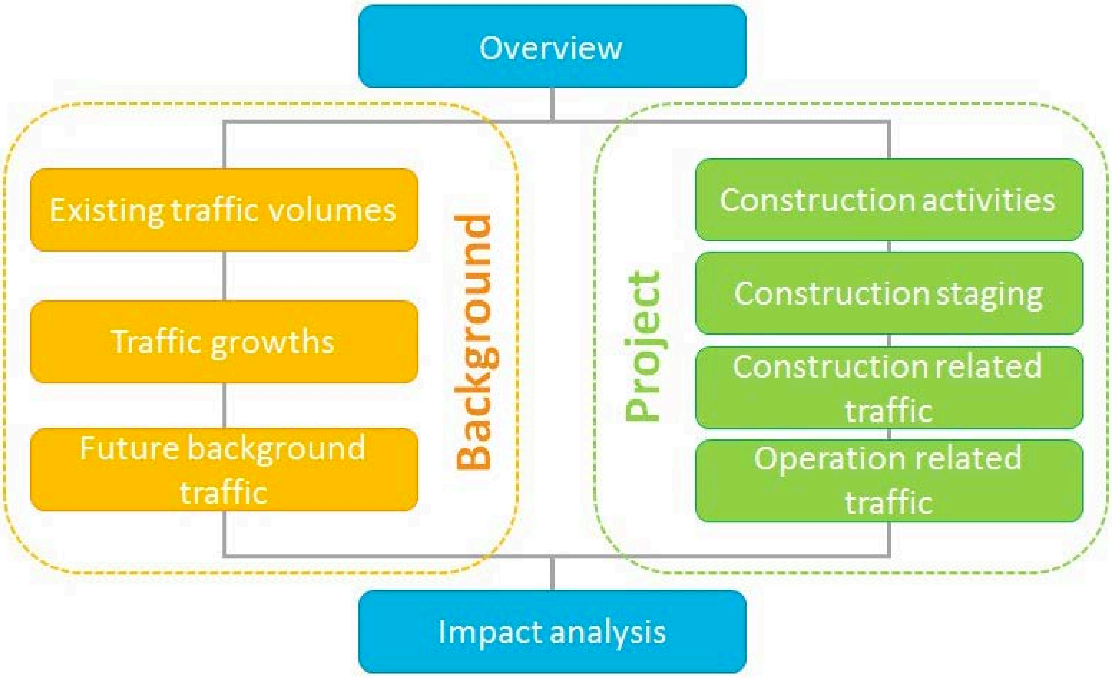


Figure 1.5 **Background and Project traffic volumes**

1.6.1 Desktop review and data collection

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

- Local government/state policies and strategies potentially influencing the TIA for the Project
- Road configurations and access policies (existing and proposed)
- Road network and hierarchy maps
- Road link capacity thresholds
- Road classification details, including typical cross sections
- Existing traffic data
- Traffic growth
- Programmed road works and upgrades
- Future planned road network
- Approved and future development plans
- Road use management plans (RUMP)
- Designated freight and seasonal traffic routes
- Dangerous goods vehicle routes

- Bus and school bus routes
- Stock routes and travelling stock routes
- Multi-combination routes and zones
- Standard axle loads and existing pavement condition
- Prevailing structural integrity issues (i.e. vulnerable structures)
- Structural capacity/life of structures
- Crash data.

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

The following section describes the approach for obtaining background and project traffic volumes used in the impact assessment.

- Background traffic:
  - Existing traffic volumes

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

    In instances where traffic data was not available from road controlling authorities or traffic surveys conducted, traffic volumes were estimated based on the guidance provided by Austroads Part 2 – Guide to Traffic Engineering Practice: Roadway Capacity (1988) (which provided base Average Annual Daily Traffic Volumes (AADT) by road type, respective Level of Service (LOS) and K-value. The K-value represents the ratio between the 30th highest hourly peak volume and AADT. The proposed assumed volumes were subsequently provided to the relevant road controlling authorities for review.

  - Traffic growth rates
    - Traffic growth rates on SCR were derived based on historic permanent census traffic data where available, in order to justify an average value to utilise for road links. The traffic growth data is provided in Appendix A for DTMR roads and Appendix B of this report for RMS roads. An evaluation of the traffic growth rates within this traffic data revealed an overall annual average AADT growth rate of 2 per cent. As shown in Appendix A and Appendix B, a majority of the calculated growth rates are in line with this assumption regardless. The proportion of this growth which was heavy vehicles varied by link but was generally consistent with the AADT growth and has been assumed as such. This is considered reasonable for current design. Traffic growth rates were requested from all asset owners impacted by construction traffic. However, in the absence of available historical count data or forecast models, the 2 per cent growth rate calculated from the SCR was adopted in the analyses for all SCR and LGR for all vehicle types. This was the most conservative and accurate assumption as there is not sufficient historical data to determine growth rates for council roads. This approach is considered reasonable for current design given the observed growth on roads evaluated.
  - Future background traffic

    Traffic growth was applied to existing traffic volumes to estimate the future background traffic. This was done by means of a compound traffic growth estimation procedure which can be equated as:

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

Where:

AADTy1 = AADT in the first year of evaluation

AADTx = AADT in year x

GR = growth rate

y1 = first year (1)

x = year of calculation

- Project traffic:
  - Construction activities

    The major construction activities consist of: transportation of quarry materials (ballast, capping materials), other bulk materials, precast concrete, ready-mix concrete, rail, consolidated sleepers, earthworks materials, workforce, spoil removal, delivery of water, delivery/collection of plant, tools and other materials. These activities are detailed in Section 5.10.

  - Construction staging

    Staging will relate to construction start and end dates of all construction related activities within the envisaged construction period. The start and end dates of all associated construction was taken into account in order to determine the peak period for the Project along each construction route section. The construction schedule with anticipated road section based peak loads/volumes are described in more detail in Section 5.

  - Construction related traffic

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

  - Operational traffic

    The major transport tasks during the operational phase of the Project are expected to be rail maintenance workforce movements and the delivery of maintenance materials. It is anticipated that operational traffic will consist of low vehicle movements to/from depots and the 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 and are not expected to impact on the operations of the road network.

- Cumulative Impacts:
  - Construction Schedules

    Construction schedules relating to the adjacent Inland Rail projects and major developments in the region were taken into account in order to establish schedule overlaps (i.e. where primary construction routes are used for several Inland Rail projects during the peak period). This process was used as part of a cumulative impact assessment process. Results from this assessment are included in Section 11.

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

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

- The anticipated duration of construction activities.

Regardless of duration and increase in traffic, it has been assumed that traffic surveys for local roads will not be undertaken. As local roads are not generally designed for regular heavy vehicle use, the use of these roads has been avoided unless no practicable alternative route was available. Traffic data provided by road controlling authorities was used at locations where available. In all instances where local roads are used for construction, agreement will be made with the asset owner prior to commencing.

In November 2019, a number of traffic surveys were commissioned around the Gowrie Junction area in order to assess the impacts to the area (refer Appendix U and Appendix T). This survey data was included within the TIA assessment.

Data for road links which were expected to be impacted by primary construction routes and did not have available background traffic information either sourced or collected by means of traffic surveys were assumed. These road links are detailed in Table 4.6. In these situations, the local government authority was consulted. The flow volumes were assumed by adopting the following process:

- Classify each road section within the TIA study area based on the following assumed classification (road sections used in the Project are classified in Table 4.6):
  - Urban Local Road
  - Urban Collector Road
  - Urban Arterial Road
  - Rural Local Road
  - Rural Collector Road
  - Rural Arterial Road
  - Urban Motorway *(no volumes assumed for motorways)*
  - Rural Motorway *(no volumes assumed for motorways)*
- Flow rates were estimated based on the following:
  - Urban Local Road: Volumes derived by assuming LOS A with associated AADT of 2,000 vehicles as depicted in Roads and Traffic Authority (RTA) Guide to Traffic Generating Developments (2002) as adopted from the Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)
  - Urban Collector Road: Volumes derived by assuming LOS B with associated AADT of 3,800 vehicles as depicted in RTA Guide to Traffic Generating Developments (2002) as adopted from the Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)
  - Urban Arterial Road: Volumes derived by assuming LOS B with K-value of 0.12 with associated AADT of , vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)
  - Rural Local Road: Volumes derived by assuming 400 AADT based on a review of proximate rural local roads
  - Rural Collector Road: Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)
  - Rural Arterial Road: Volumes derived by assuming LOS A with K-value of 0.15 with associated AADT of 1,600 vehicles as depicted in Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)
- Peak hour flow rates obtained from the various sources were converted to Average Daily Traffic Volumes (ADT) by adopting industry suited conversion factors for road segments where data was not available.

- The 7-day 24-hour counts provided by the traffic surveys were assumed to be representative of yearly AADT as there were no additional data sources available for factorisation. This is considered to be suitable for the purposes of this TIA relevant to the current phase of the Project.

1.6.2 Impact assessment and mitigation

1.6.2.1 Road network impact assessment

The operational performance of the road network in the TIA study area was assessed to develop an understanding on the potential traffic impacts from the Project. The TIA study area primarily consists of impacted roads located in QLD. However, it also extends to some parts of NSW with sleepers to be transported between Grafton (NSW) and QLD. This report provides a summary of the findings from the road impact assessment and will identify potential mitigation measures and transport management strategies.

Consistent with GTIA, the process as indicated in Figure 1.6 was used for the purpose of the TIA and Environmental Impact Statement (EIS). This process is for the impact assessment of the Project on the SCR network and this has been extended to the LGR network (subject to further discussion with local governments). It does not apply to private roads. While use of the guideline is not mandatory, it provides a basis for assessing potential impacts from the construction and operational phases of the Project on the local and regional transport network. All road sections within this TIA follow the same assessment process.

Figure 1.6 details the preparation of an “RMP” which is referred to in this report as RUMP.

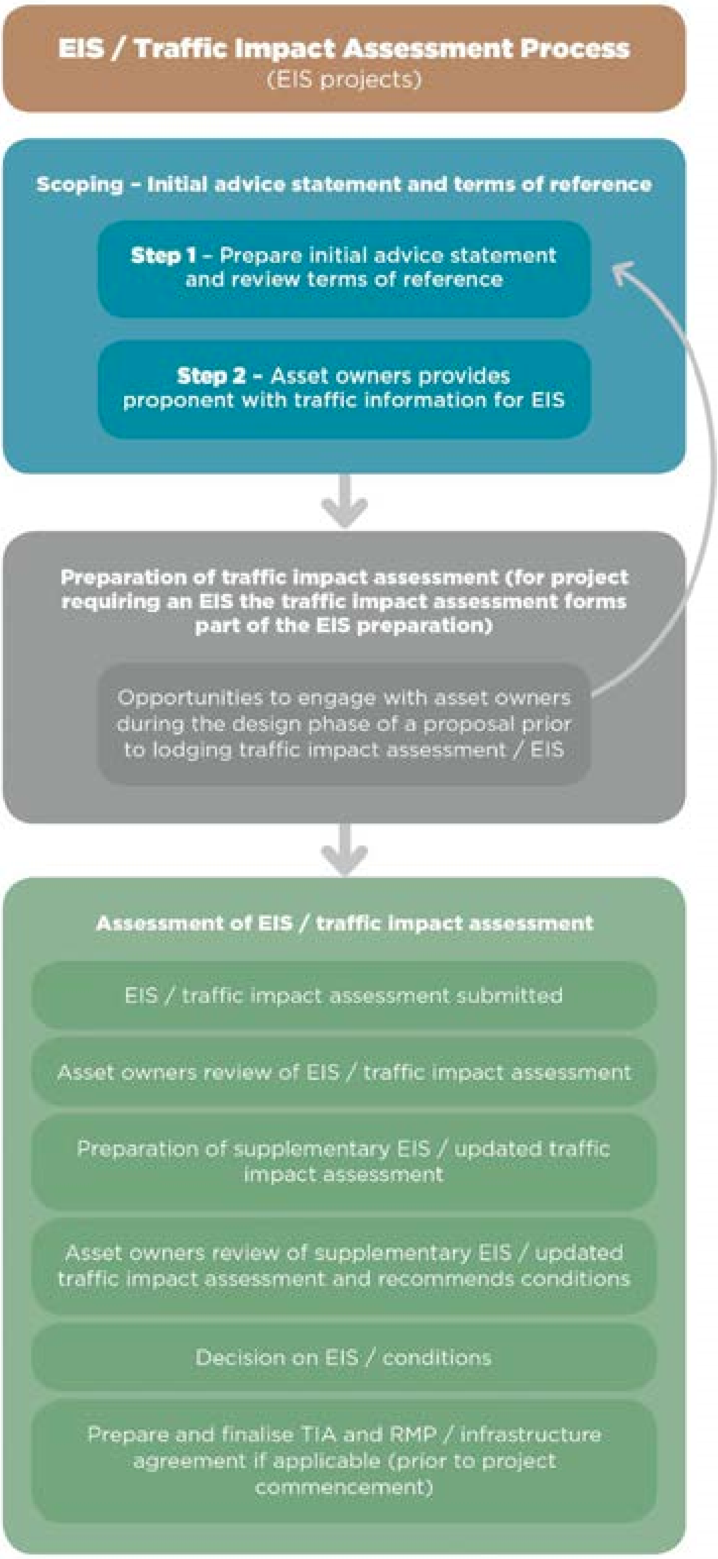


Figure 1.6 **Traffic impact assessment process**

Source: GTIA Sept 2017

The extent of the impacts of Project traffic on other users and on infrastructure can range from being localised to quite disperse. An analysis boundary has been defined within which to assess a reasonable level of impact of the additional Project traffic. This boundary is shown in Figure 1.1. However, for the TIA, impacts have been assessed wider than this area based on the construction routes assumed to be used for the Project. The GTIA indicates the criteria for determining the area where mitigation measures are required, which is provided in Table 1.4 (updated to also reference RMS).

Table 1.4 Mitigation criteria

Impact type	Required mitigation
Road safety	All intersections where the Project traffic exceeds 5 per cent of the base traffic for any movement in the design peak periods in the year of opening of each stage. All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link in the design peak periods in the year of opening of each stage.
Access and frontage	The SCR corridor for the extent of the geometric frontage of the site includes works on both the frontage side and potentially on the opposite side of the road. [Potential construction accesses/ laydown areas on Limited Access Roads in the DTMR and RMS network.]
Intersection delay	All intersections where the Project traffic exceeds 5 per cent of the base traffic for any movement in the design peak periods in the year of opening of each stage.
Road link capacity	All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link's AADT in the year of opening of each stage.
Pavement	All road links where the Project standard axle repetitions (SAR) exceed 5 per cent of the base traffic in either direction on the link's SAR in the year of opening of each stage.
Transport infrastructure	All road links where the Project traffic exceeds 5 per cent of the base traffic in either direction on the link's AADT in the year of opening of each stage, or where DTMR [or RMS] identifies prevailing structural integrity issues of transport infrastructure (for example, bridges or culverts).

Source: Adopted from GTIA Sept 2017

Table 1.5 outlines the performance criteria for assessment of traffic impact developed from Austroads Guide to Traffic Management - Part 3 Traffic Studies and Analysis (2017a), GTIA and DTMR Guidelines for Assessment of Road Impacts of Development (2017).

Table 1.5 Performance criteria

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

The LOS criteria are as defined in the Austroads Guide to Traffic Management: Part 3 Traffic Studies and Analysis (2017).

The impact assessment year is the year in which the impacts of the Project are assessed. The impact assessment year varies by impact type because the effects of the Project can be quite different on infrastructure than they are on other users. The impact years which are to be assessed were adopted from GTIA and summarised in Table 1.6.

Table 1.6 Impact assessment years

Impact type	Impact assessment year
Road safety	Year of construction + year of opening of each stage including the final stage
Access and frontage	Year of construction + year of opening of each stage including the final stage and 10 years after the year of opening of the final stage for access intersections (includes both new and amended accesses)
Intersection delay	Year of construction + year of opening of each stage including the final stage
Road link capacity	Year of construction + year of opening of each stage including the final stage
Pavement	Year of construction + year of opening of each stage including the final stage over a 20-year design period
Transport infrastructure	Year of construction + year of opening of each stage including the final stage.

The impact assessment and mitigation process contained in GTIA was adopted to determine appropriate mitigation measures on road impacts. The mitigation framework is provided in Figure 1.7.

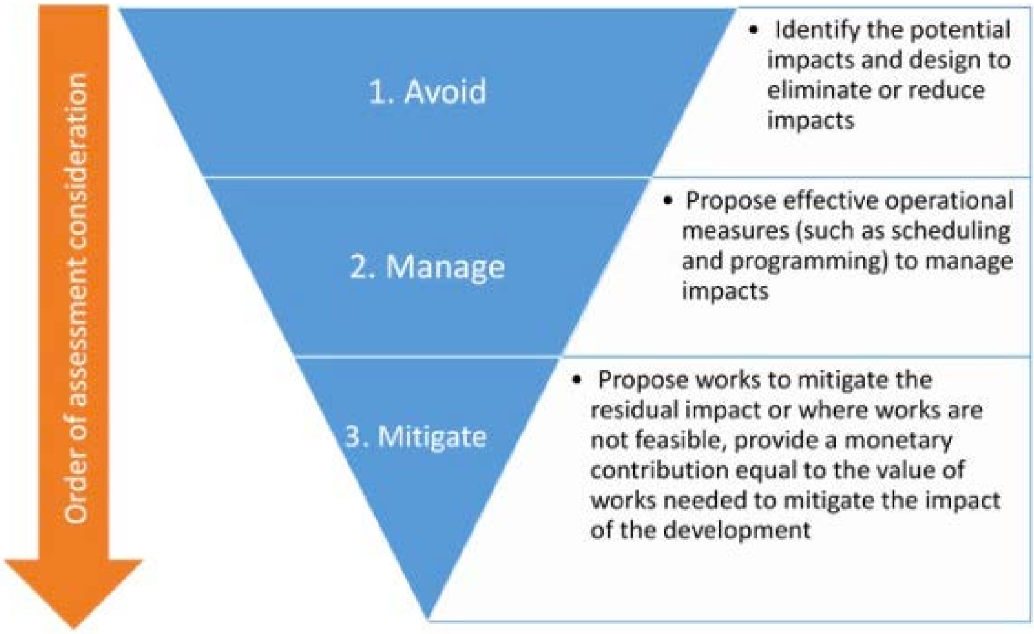


Figure 1.7 Mitigation framework

Source: Figure 1 GTIA Sept 2017

1.6.2.2 Rail crossing impact assessment

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

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

1.6.2.3 Rail network impact assessment

A portion of the Project is to be constructed in the vicinity of the QR West Moreton System rail corridor. Generally, scope exists within the disturbance footprint to erect safety barriers and construct the Project parallel to sections of existing operational railway without impacting operations. However, some works will likely require rail possessions and speed restrictions, which are to be confirmed during the next phase of the Project. It is expected that these possessions can occur during routine maintenance periods, however these requirements will need to be planned and agreed with QR during the next phase to quantify and minimise impact to operations and external stakeholders. Impacts to the existing rail facilities are summarised in Section 6.6.3.

The operational performance of the existing rail network in the TIA study area is not anticipated to be significantly impacted as a result of the Project construction. Similarly, during operation of the Project, the existing rail network is not expected to be impacted as a result of the Project, with interface agreements between ARTC, QR and relevant rail operators still to be executed.

1.6.2.4 Port and airports impact assessment

During the construction and operational phases, the expected impact from the Project on ports and airports is not considered to be significant as the transport of materials, workforce and equipment is expected to primarily utilise the existing road and rail transport networks. Impacts from the Project on the operation and throughputs at ports (freight containers) is subject to assessment for those particular facilities.

Whilst the Inland Rail Program proposes to utilise the existing freight line from Acacia Ridge to the Port of Brisbane, this particular Project (G2H) is not located within close proximity to the Port. The Project will not impact on the safety or efficient operation of any strategic ports.

No strategic airports or aviation facilities are located within the TIA study area. The closest facility is the Toowoomba Airport located more than 2.5 km to the south of the Project. The Project will not create incompatible intrusions or compromise the safety of the Toowoomba Airport. Consultation with Toowoomba Airport will be undertaken during later phases of the Project. For further details refer EIS Chapter 8: Land Use and Tenure. Therefore, the Project will not impact on the safety or efficient operation of any strategic airports.

1.6.2.5 Road safety impact assessment

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

1.6.2.6 Cumulative impact assessment

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

1.6.3 Stakeholder consultation

Consultation has been undertaken with stakeholders throughout the development of the TIA. Formal RFI meetings and correspondence have been used to consult with affected public road controlling authorities on the following issues:

- To gain an understanding of the existing road assets
- To outline the proposed traffic impact assessment process
- To outline the adopted manuals and procedures
- To inform the road controlling authorities of the impacted assets
- To outline the adopted assumptions (such as traffic growth rates and assumed base volumes)
- To outline the proposed mitigation measures.

The consulted stakeholders are listed in Table 1.7.

Details of discussions with council's and road agencies are included in Appendix D: Community Consultation of the EIS.

Table 1.7 Consulted stakeholders

Stakeholder	Consultation methods
TRC	RFI, meetings
LVRC	RFI, meetings
DTMR (QLD)	RFI, meetings, email
QR	RFI, meetings
RMS (NSW)	RFI, telephone, email
CVC	RFI
ICC	RFI

In development of the TIA, ARTC held regular design meetings with Lockyer Valley Regional Council (LVRC) and Toowoomba Regional Council (TRC). Following from this, LVRC, TRC as well as TMR were given the draft TIA to review and comment on. Where appropriate the TIA was updated to address these comments. Comments were provided on the TIA by the following authorities and councils on the following dates:

- TRC: October 2019
- TRC: November 2019
- TRC: July 2020.

In 2019, the comments received from TRC on the 70% submission centred around a lack of actual traffic counts within the TRC area, and the impacts to the Gowrie Junction traffic network as a result of the Project. As a result of these queries, FFJV and ARTC commissioned locations for additional traffic surveys, which have been incorporated into this report. Additionally, a study into the traffic impacts of Gowrie Junction was undertaken and is presented in Appendix T of this report. No comments were received from LVRC regarding their review of the TIA.

Consultation with DTMR, LVRC and TRC will be ongoing to ensure Project delivery minimises the impacts on the local road networks, along with resolving matters such as legislative requirements, interface agreements, approvals, traffic management plans and mitigation measures.

There are also ongoing technical meetings between ARTC and QR at program level regarding potential interfaces between the Inland Project and the existing QR network. This includes spacing between tracks, relocation of existing infrastructure, signally, interoperability between the networks, track possessions etc. The discussions will also inform construction activities (e.g. track possessions or delivery of material by rail) to minimise disruptions to the supply chain, noting that the South Western System is a critical link in agricultural exports supply chain vehicles. Noting that ARTC have consulted all public utility providers with known assets intersected by the Project, including in relation to the protection of assets from construction traffic (e.g. APA Group regarding the temporary and permanent protection of the Roma Brisbane Gas Pipeline). Further consultation will also be warranted along the proposed construction routes to identify potential access restrictions.

There is no plan to discuss the construction routes with ICC or RMS until the construction contractor is appointed and the construction routes confirmed. This will also provide ICC with a realistic volume of traffic associated with the four Inland Rail Projects in the area (G2H, H2C, Calvert to Kagaru and Kagaru to Acacia Ridge and Bromelton), noting that for three of the Projects the impact is associated with the use of Mount Marrow Quarry.

Further consultation will be required, including but not be limited to, all public transport operators particularly TransLink (QLD), relevant councils and Transport for NSW (TfNSW) and all relevant utility operators.

2 Existing conditions

2.1 Existing land uses

The existing land uses which occur along the Project corridor are shown in Figure 2.1. Land Use information was obtained from Queensland Land Use Mapping Program (QLUMP).

Figure 2.1 shows that grazing land is the predominant land use within the TIA study area. The next most common land use is land classified as other minimal use, consisting of areas of land that are largely vacant, for example, residual native cover where the Project traverses the Toowoomba Range. Other land uses within the TIA study area include residential, waste treatment and disposal, cropping, irrigated cropping and irrigated seasonal horticulture.

The Project alignment passes through residential and service areas of Gowrie Junction, and Toowoomba (via the tunnel). Traffic volumes on the surrounding road network are likely higher through these areas. The predominantly rural nature of the rest of surrounding land uses indicates that the surrounding road network would generally consist of low traffic volumes, with potential seasonal variations during harvesting seasons for the area of Withcott.

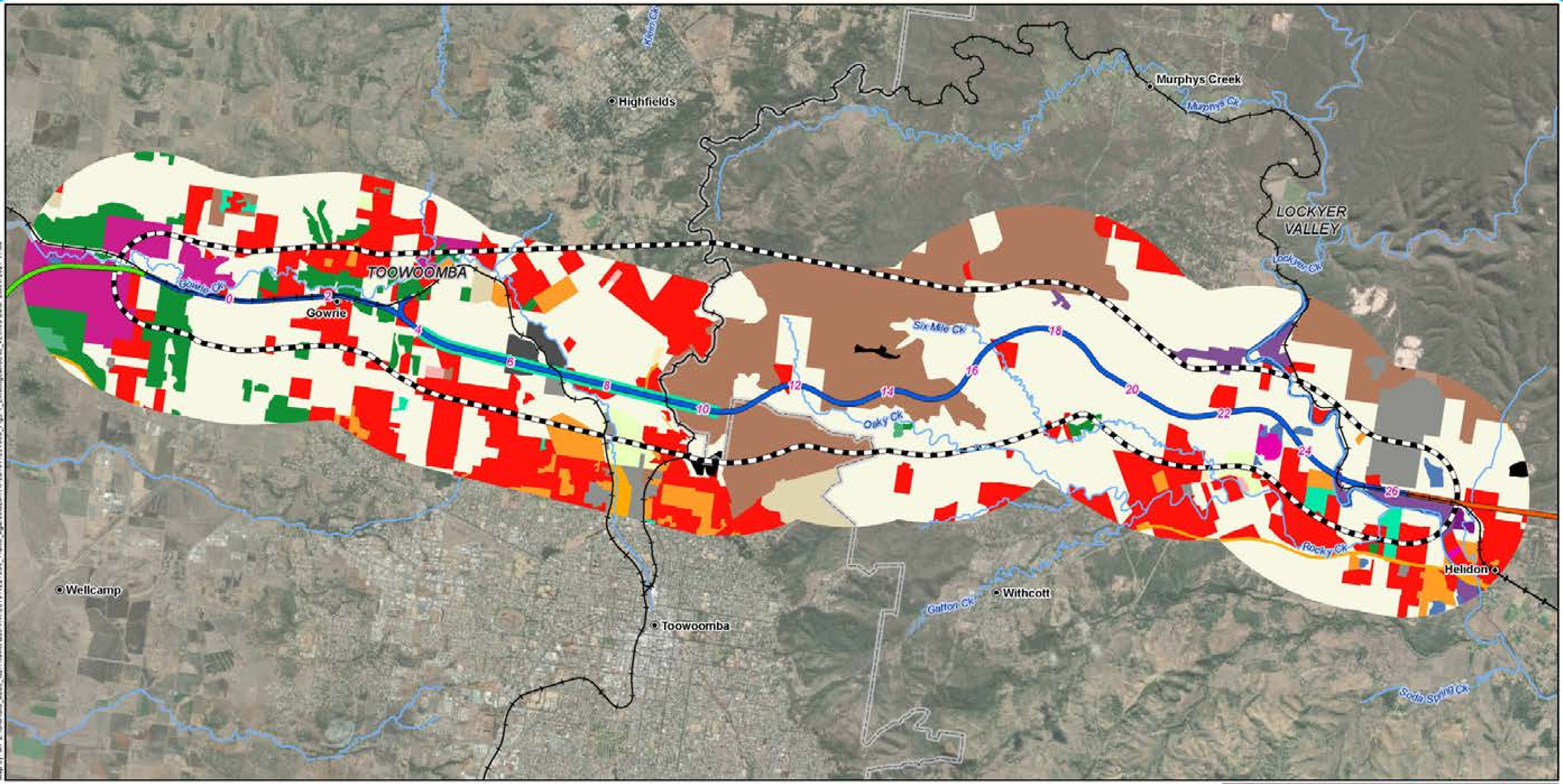
It is noted that the Toowoomba Bypass was opened in September 2019, which has altered the local land use and potential traffic patterns.

2.2 Existing road network

The TIA study area encompasses several SCR and LGR that are proposed to be used as main transport routes for the Project. These roads are further described in the following sections, including required road alterations in order to utilise the proposed construction routes, and construction activities. Appendix C provides a road hierarchy map based on the classification categories shown in Section 1.6.

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

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



Legend

- 5 Chainage (km)
- Localities
- B2G project alignment
- G2H project alignment
- H2C project alignment
- Existing rail
- Tunnel
- Watercourses
- EIS investigation corridor
- Local Government Areas
- Nature conservation
- Managed resource protection
- Other minimal use
- Grazing native vegetation
- Grazing modified pastures
- Cropping
- Perennial horticulture
- Land in transition
- Irrigated perennial horticulture
- Irrigated seasonal horticulture
- Intensive horticulture
- Intensive animal husbandry
- Manufacturing and industrial
- Residential
- Services
- Utilities
- Transport and communication
- Mining
- Reservoir/dam
- River

A3 scale: 1:85,000

0 1 2 3 4 5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 2.1: Existing land use

2.2.1 Local government roads

There are several LGR which intersect directly with the Project rail corridor. These road rail interfaces are summarised in Table 2.1 and are displayed in Figure 1.2.

Table 2.1 Local government roads intersecting the Project

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

The closure of Morris Road proposed in this assessment and the associated traffic impacts to the Gowrie Junction area have been assessed in an additional technical note. For further details refer Appendix T.

There are several LGR in addition to the direct road rail interfaces that will be impacted by the Project due to road upgrades and realignments. These roads are summarised in Table 2.2. Details of the changes to these roads is detailed in Section 3.3. For further details of these impacts, including images, refer to Appendix U and Appendix T.

Table 2.2 Local government roads impacted by the Project

Road	Extent of impact
LGR: TRC	
Gowrie Junction Road	Ganzer Road to Morris Road
Old Homebush Road	Gowrie Creek to Gowrie Birnam Road
East Paulsens Road	Along the road, from Old Homebush Road to approximately 1,100 m east of the intersection
Morris Road	Gowrie Junction Road to Road Rail Interface 320-2-P-1
Krienke Road	From intersection with Gowrie Junction Road south west for approximately 400 m
McMahon Road	From intersection Gowrie Junction Road east for approximately 80 m
LGR: LVRC	
Wallens Road	Each side of Road Rail Interface for approximately 350 m
McNamaras Road	Approximately 400 m south east and 200 m north west of Road Rail Interface
Cattos Road	From intersection with Air Force Road west for approximately 400 m

There are several LGR that will intersect the Toowoomba Range tunnel. These roads are summarised in Table 2.3.

Table 2.3 Local government roads intersecting the Toowoomba Range tunnel portion of the Project

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

There are several LGR which are proposed to be used to transport construction materials, equipment and workforce during construction of the Project as indicated in Table 2.4. These construction routes are displayed in Figure 1.4, and construction routes by activity are provided in Appendix G through Appendix N.

Table 2.4 Local government roads: Project construction routes

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

Road name	Road section
Omara Road	Between Warrego Highway and Witmack Road
Paulsens Road	Between Morris Road and Old Homebush Road
Pipe Street	Full Extent
Pipeline Road*	Full Extent
Witmack Road	Between Omara Road and Pipe Street
LGR: LVRC	
Airforce Road	Between William Street and Lockyer Siding Road
	Between Lockyer Sliding Road and Cattos Road
	Between Laidley Street and Airforce Road
Arthur Street	Between Georges Street and Mary McKillop Street
	Between Mary McKillop Street and William Street
Ashlands Drive	Full Extent
Bells Road	Full Extent
Cattos Road	Between Unnamed Road and Airforce Road
George Street	Between Lawlers Road and Arthur Street
Gittins Road	Between Jones Road and McNamaras Road
	Between McNamaras Road and Stevens Road
Howmans Road	Full Extent
Jones Road	Between Warrego Highway and Little Oaky Creek Road
	Between Little Oaky Creek Road and Wallens Road
Laidley Street	Between Station Street and Seventeen Mile Road
Lawlers Road	Between Warrego Highway and George Street
Little Oaky Creek Road	Between Roches Road and Jones Road
Mary McKillop Street	Between Turner Street and Arthur Street
McNamaras Road	Between Gittins Road and Unnamed Road
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway
Roches Road	Between Warrego Highway and Little Oaky Creek Road
Seventeen Mile Road	Between Airforce Road and Laidley Street
Station Street	Between Arthur Street and Laidley Street
Turner Street	Between Warrego Highway and Mary MacKillop Street
Unnamed Road	Between Airforce Road and Cattos Road
Wallens Road	Between Jones Road and Council Boundary
William Street	Between Arthur Street and Airforce Road
LGR: CVC	
Bent Street	Between Craig Street and Gwydir Highway
Charles Street	Between Bent Street and Pacific Highway
Clarence Street	Between Oliver Street and Craig Street
Clark Road	Full Extent
Craig Street	Between Villiers Street and Clarence Street
	Between Clarence Street and Bent Street
Dobie Street	Between Villers Street and Summerland Way

Road name	Road section
Fry Street	Between Mary Street and Alice Street
Mary Street	Between Fry Street and Oliver Street
Oliver Street	Between Mary Street and Clarence Street
Trenayr Road	Between Summerland Way and Clark Road
Villers Street	Between Craig Street and Dobie Street
LGR: ICC	
Fairbank Place	Full Extent
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty
Newhill Drive	Full Extent
Noblevale Way	Between Rob Roy Way and Fairbank Place
Redbank Plains Road	Between Cunningham Highway and Newhill Drive
Rob Roy Way	Full Extent

Table note:

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

2.2.2 State Controlled Roads

Two SCR directly intersect the Project rail alignment. These road rail interfaces are summarised in Table 2.5 and are displayed in Figure 1.2.

Table 2.5 State Controlled Roads intersecting the Project

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

There are several SCR that will intersect the Toowoomba Range tunnel portion of the Project. These roads are summarised in Table 2.6.

Table 2.6 State Controlled Roads intersecting the Toowoomba Range tunnel portion of the Project

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

Several SCR are proposed to be used to transport construction materials, equipment and workforce during construction of the Project. These are summarised in Table 2.7. The NSW SCR outlined in Table 2.7 are solely used to transport sleepers for the Project. Details on these routes are outlined in Section 5.6.2. It is noted that some roads are designed to a higher standard and are better suited to accommodate construction traffic. These roads have been utilised in this assessment over others where possible.

The construction routes detailed in Table 2.7 are displayed in Figure 1.4, and construction routes by activity are provided in Appendix G through Appendix N.

Table 2.7 State Controlled Roads: Project construction routes

Road name	Road ID - road section
SCR: DTMR	
Cunningham Highway	17B – Between River Road and Redbank Plains Road
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place
	4104 – Between Brookside Place and Toowoomba Bypass
	4104 – Between Toowoomba Bypass and Howmans Road
New England Highway	22A – Between Highfields Road and Murphys Creek Road
	22A – Between Murphys Creek Road and Munro Street
	22A – Between Munro Street and North Street
	22A – Between North Street and Warrego Highway
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway
	319 – Between Boundary Street and New England Highway
	319 – Between New England Highway and Warrego Highway
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass
	324 – Between McDougall Street and Tor Street
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road
	315 – Between Roches Road and Murphys Creek Road
	315 – Between Murphys Creek Road and Toowoomba Bypass
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road
	18A – Between Gowrie Junction Road and McDougall Street
	18A – Between McDougall Street and Tor Street
	18A – Between Tor Street and Rob Street
	18A – Between Rob Street and Toowoomba Athol Road
	18A – Between Toowoomba Athol Road and New England Highway
	18A – Between New England Highway and James Street
	18A – Between James Street and Tourist Road
	18A – Between Tourist Road and Toowoomba Connection Road
	18A – Between Toowoomba Bypass and Gatton Helidon Road
	18A – Between Gatton Helidon Road and Gatton Esk Road
	18A – Between Gatton Esk Road and Laidley Plainland Road

Road name	Road ID - road section
	18A – Between Laidley Plainland Road and Haigslea Amberley Road
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway
	18A – Between Brisbane Valley Highway and Mount Crosby Road
	18A – Between Mount Crosby Road and Cunningham Highway
SCR: RMS	
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway
Summerland Way	Between Trenayr Road and Turf Street

2.2.3 Public transport networks

Existing public transport routes within QLD and NSW that share routes with potential construction traffic have been identified using data sourced from TransLink in QLD and TfNSW. There are no existing or proposed road rail interface locations that have been identified as impacted by any of the public transport networks. Identified routes that may be impacted (i.e. overlap proposed construction routes) are provided in Table 2.8.

It should be noted that there may be additional routes that are not publicly available and have therefore not been captured in Table 2.8. Consultation with relevant LGA and public transport operators (including QR) should be undertaken prior to the construction phase of the Project once construction routes have been finalised to ensure that all public transport routes that may be impacted by construction traffic have been accounted for. Additionally, it is recommended that public transport operators be involved in the mitigation discussions. This will involve public transport, school bus and long-distance service operators.

Table 2.8 Impacted public transport networks

Services	Weekday frequency	Impacted roads
KGT	10/day	Warrego Highway Toowoomba Connection Road New England Highway
300	-	New England Highway Highfields Road
301	-	New England Highway Highfields Road
314	-	New England Highway Highfields Road
315	-	New England Highway Highfields Road
500	20/day	River Road Ipswich-Cunningham Highway Connection Road
502	20/day	Ipswich-Cunningham Highway Connection Road
514	13/day	Ipswich-Cunningham Highway Connection Road
529	3/day	Warrego Highway Toowoomba Connection Road
539	10/day	Gatton Helidon Road
901	18/day	Warrego Highway Toowoomba Connection Road New England Highway North Street Griffiths Street

Services	Weekday frequency	Impacted roads
902	10/day	Warrego Highway Toowoomba Connection Road New England Highway
904	11/day	New England Highway
905	12/day	Warrego Highway Toowoomba Connection Road New England Highway
906	12/day	New England Highway Warrego Highway Toowoomba Connection Road North Street
907	9/day	Warrego Highway Toowoomba Connection Road New England Highway North Street
950	10/day	New England Highway Highfields Road
Route 373	7/day	Bent Road Craig Street
Route 374	19/day, hourly off-peak, 30 mins peak	Bent Street Craig Street
Route 375A	7/day	Oliver Street Turf Street
Route 375C	10/day	Oliver Street Turf Street Dobie Street
Route 376	10/day	Oliver Street Mary Street Dobie Street Turf Street Summerland Way
Route 377	1 per 2 hrs	Turf Street, Grafton
Route 378	1/day	Bent Street Craig Street
Route 379	1/day	Bent Street Craig Street
Route 380	8/day	Bent Street Craig Street Charles Street Pacific Motorway (Grafton to Yamba)
Route 386	3/day	Pacific Motorway

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

Public transport maps are provided in Appendix Q.

2.2.4 School bus routes

Existing school bus routes that are likely to be impacted by construction traffic and/or proposed and existing road rail interfaces has been identified using data sourced from TfNSW and the QLD Government. Identified routes that may be impacted are provided in Table 2.9.

It should be noted that there may be additional school bus routes that are not publicly available and have therefore not been captured in Table 2.9. Consultation with relevant council authorities should be undertaken prior to the construction phase of the Project once construction routes have been finalised to ensure that all public transport routes that may be impacted by construction traffic have been accounted for.

Table 2.9 Impacted school bus routes

Services	Weekday frequency	Impacted roads	Road rail interfaces
QLD School Bus Routes			
IP1502 AM and PM Hatton Vale, Lowood, Fernvale, Ironbark Area to Ipswich Special School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
IP1503 AM and PM Hatton Vale/Marburg Area to Ipswich Special School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
P1732 AM and PM Hatton Vale Area, Hatton Vale State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
P1751 AM and PM Iredale-Postmans Ridge to Helidon State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
308 (AM and PM): Gowrie State School – Toowoomba	1/AM 1/PM	Gowrie Junction Road Morris Road Paulsens Road Old Homebush Road	320-1-E-1
310 (AM and PM): Gowrie State School – Toowoomba	1/AM 1/PM	Gowrie Junction Road Morris Road Paulsens Road Old Homebush Road	320-1-E-1
316 (AM and PM): Highfields Secondary College, Highfields State School and Toowoomba Christian College – Highfields – Meringandan	1/AM 1/PM	Old Homebush Road Meringandan Road Highfields Road New England Highway	No interface noted
322(AM and PM): Toowoomba Grammar School, Toowoomba East State School, Toowoomba State High School (Mount Lofty Campus), Downlands College, Toowoomba State High School (Wilsonton Campus) and Our Lady of Lourdes – Toowoomba – East Toowoomba – Withcott – Helidon	1/AM 1/PM	Warrego Highway North Street	No interface noted
P623 AM and PM Summerholm Area, Hatton Vale State School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface noted
S178 Kingsthorpe Secondary to Harristown State High School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road	No interface note
S577 Kingsthorpe/Wellcamp to Harristown State High School	1/AM 1/PM	Warrego Highway Toowoomba Connection Road Toowoomba Cecil Plains Road	No interface noted
S789 Gowrie Mountain – Charlton – Wellcamp to Harristown State High School	1/AM 1/PM	Omara Road Toowoomba Cecil Plains Road	No interface noted

Services	Weekday frequency	Impacted roads	Road rail interfaces
P821 AM and PM Primary and Secondary Services - Glencoe to Gowrie State School		Old Homebush Road	No interface noted
P1751 Iredale-Postmans Ridge to Helidon State School		Warrego Highway Toowoomba Connection Road	No interface noted
61A		Warrego Highway Toowoomba Connection Road	No interface noted
90		Munro Street Warrego Highway	No interface noted
92A	1/day	North Street	No interface noted
92P	1/day	North Street	No interface noted
94A	1/day	North Street New England Highway Griffiths Street	No interface noted
94P	1/day	North Street New England Highway Griffiths Street	No interface noted
NSW School Bus Routes			
AM/PM services travelling to/from Grafton High School, Grafton Public School, South Grafton High School, South Grafton Public School, St Mary's Primary School, St Joseph's Primary School, Clarence Valley Anglican School, Westlawn Public School	AM and PM services as per school requirements	Bent Street, Grafton	No interface noted

The increase in construction traffic, particularly heavy vehicle traffic, has the potential to impact these school bus routes. Although not assessed in detail during this phase of the Project, in order to mitigate the impacts upon school bus operations, the bus operators should be consulted as part of the Project and made aware of the various construction activities. The construction contractor should also be made aware of the presence of school bus routes and their operational hours as part of the Project induction process.

2.2.5 Long distance coach services

Existing long-distance coach services that potentially share roads used by construction traffic have been identified using data sourced from TfNSW and the QLD Government. There are no existing or proposed road rail interface locations that have been identified as impacted by any of the long distance coach services. Identified routes that may be impacted are provided in Table 2.10.

Table 2.10 Impacted long-distance coach services

Services	Impacted roads
Toowoomba to Lightning Ridge	New England Highway
Toowoomba to Rockhampton	New England Highway
Toowoomba to Rockhampton	New England Highway
	Warrego Highway
	Toowoomba Connection Road
Toowoomba to Cunnamulla	New England Highway
	Margaret Street
	Toowoomba Cecil Plains Road
	Hursley Road

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

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

2.2.6 Stock routes

No declared stock routes under the *Stock Route Management Act 2002* will be directly impacted by the Project. The nearest stock route to the Project is located on the Warrego Highway, approximately 2.35 km south of the Project alignment (Ch 0.0 km). There are no Project related activities proposed on this road. This open stock route follows the existing Warrego Highway and is classified as minor and unused.

Consultation is ongoing with landholders to identify impacts, if any, to informal stock routes. Any routes that intersect construction routes will be mitigated as per Section 9.

2.2.7 Strategic tourist routes

The following state strategic touring routes and tourist routes exist proximate to the Project and are proposed to be used or intersected by primary construction routes:

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

The increase in construction traffic and, particularly heavy vehicles, has the potential to impact these strategic touring routes. The impact of this will be considered in conjunction with the construction traffic link analysis within this TIA.

2.3 Existing rail facilities

QR owns and manages Queensland's regional freight network and operates both suburban and long-distance passenger services for the QLD Government. QR's regional freight network comprises seven different systems in the State, with the Project alignment predominantly following the West Moreton System rail corridor and the Gowrie to Grandchester future State transport corridor. Products hauled on the QR regional network is primarily thermo-coal.

The Project alignment begins approximately 3.7 km west of Gowrie, at Charlton where it connects with the eastern end of NSW/QLD Border to Gowrie (B2G) Inland Rail project, it then runs east, parallel to the existing QR West Moreton System rail corridor (Western Line) on the southern side, for approximately 4.8 km before diverging from the West Moreton System rail corridor and passing into the proposed western tunnel portal within the vicinity of Boundary Street and the Toowoomba Bypass interchange at Gowrie Junction.

The Project alignment then continues through the Toowoomba Range via an approximately 6.24 km long tunnel which crosses under the West Moreton System rail corridor twice, with an intermediate ventilation shaft (and associated infrastructure) at Cranley. On the eastern side of the Toowoomba Range tunnel, the Project alignment exits the range through the eastern tunnel portal and continues down the Toowoomba Range via a series of viaducts, embankments and cuttings, past Postmans Ridge, after which, it again runs parallel for 800 m to the existing West Moreton System rail corridor (Main Line) on the northern side to connect with the Helidon to Calvert (H2C) Inland Rail project, to the north-west of Helidon.

Key interfaces with existing QR network are required as part of the Project and scope. Of the total 28 km of the Project alignment, approximately 5.5 km of the Project alignment runs adjacent to the existing QR West Moreton System rail corridor. The staging of the works and associated impacts will be the subject of an interface agreement between the Inland Rail Program and QR. Coordination with QR will be necessary to maintain access to existing assets for maintenance. Table 2.11 details the existing railway interfaces that are present along the Project alignment.

Table 2.11 Existing railway interfaces

Description of connection	Owner/manager of network	Chainage
Connection between ARTC G2H and B2G Project	ARTC	Ch -1.76 km
Alignment runs adjacent to QR 'Western Line' with a minimum of 6.5 m between track centres as per Rail Industry Safety and Standards Board	QR	Ch -1.76 km to Ch 3.00 km
Upgrade of QR 'Western Line'	QR	
Connection to QR 'Western Line'	QR	Ch 1.00 km
Connection to QR 'Western Line'	QR	Ch 1.41 km
InterLinkSQ Design		
Stage 1 Connection		Ch -0.66 km
Angle connection to QR 'Western Line'	ARTC	Ch 3.76 km
Connection to QR 'Main Line'	QR	Ch 24.85 km
Adjacent with existing QR 'Main Line' with a minimum of 6.5m between track centres as per Rail Industry Safety and Standards Board	QR	Ch 25.30 km to Ch 26.29 km
Connection to QR 'Main Line'	QR	Ch 26.29 km
Connection between ARTC G2H and H2C Project.	ARTC	Ch 26.29 km

2.3.1 West Moreton System rail corridor

The West Moreton System rail corridor runs over 314 km between Rosewood and Miles. The system runs between SEQ in the east at Rosewood and connects to the Western System at Miles in the west. The system links rail services from Brisbane to the west and the south west of the State and is a major artery to the Darling Downs via the Toowoomba Range. Traffic to and from the Western and South Western systems, including the Westlander long distance passenger service, travels along the West Moreton System rail corridor.

The West Moreton System rail corridor is broken down into multiple sections, with the Project integrating with two of these sections. The Project alignment connects to the eastern end of the B2G Project, then runs east, parallel to the Toowoomba to Dalby section of the West Moreton System rail corridor for approximately 4.8 km. On the eastern side of the Toowoomba Range tunnel, past Postmans Ridge, the Project alignment runs parallel to the Rosewood to Toowoomba section of the West Moreton System rail corridor. These two sections of the West Moreton System rail corridor are detailed below.

ARTC has engaged and will continue to engage with the rail manager for the West Moreton System (i.e. QR), regarding potential interfaces between the Project during construction and operations. This includes but is not limited to the proposed connections at the western and eastern extents of the Project, the Gowrie spur line, grade separations, track spacing within the rail corridor, final configuration of the railway corridor, relocation and reinstatement of existing rail infrastructure, track possessions and disruptions to supply chains..

2.3.1.1 West Moreton System – Rosewood to Toowoomba

Key components of this portion of the West Moreton System rail corridor (i.e. Main Line) are:

- Rosewood is the boundary between the Western and the Metropolitan Systems and is the termination station for QR’s electrified network
- There are six crossing loops on this section namely Grandchester, Lockyer, Murphys Creek, Holmes, Spring Bluff and Rangeview
- The track structure is 41 kg/m long welded rail (LWR) on timber sleepers with some 60/50 kg/m rail on concrete sleepers, with a with a maximum allowable axle load of 15.75 tonne axle load (TAL)
- The line has a maximum allowable gross tonnage of 7 million tonnes per annum (mtpa)
- The maximum allowable speed on this line is 80 km/hr, while the slowest speed is 15 km/hr through some of the tunnel sections
- This line is 105.1 km in length with the number of tracks varying from single to dual
- There are 45 level crossings along this line, comprising public, occupation, flood lights and boom gate types
- There are 11 tunnels along this line, that stretch over a total length of 1.616 km
- Fencing along this corridor complements adjacent land usage and is maintained to its current standard.

2.3.1.2 West Moreton System – Toowoomba to Dalby

Key components of this portion of the West Moreton System rail corridor (i.e. Western Line) are:

- After leaving Toowoomba, the system follows a single-track railway along the Darling Downs, gradually dropping until reaching Dalby
- Oakey, between Dalby and Toowoomba is the junction station, and there are nine crossing loops on this section namely Willowburn, Gowrie, Kingsthorpe, Oaky, Mau, Bowenville, Koomi, Blaxland and Dalby
- The track structure is 50 and 41 kilograms per metre (kg/m) long and short welded rail on both steel and timber sleepers at a rate of 1 steel in 4

- The line has a maximum allowable gross tonnage of 7 million tonnes per annum (Mtpa)
- The maximum allowable speed on this line is 80 km/hr, while block trains are restricted to a maximum speed of 60 km/hr
- This line is 83.9 km in length, single track the whole length
- There are 61 level crossings along this line, comprising public, occupation, flood lights and boom gate types
- There are no tunnels along this line
- Fencing along this corridor complements adjacent land usage and is maintained to its current standard.

2.3.2 Gowrie to Grandchester Rail Corridor

The Gowrie to Grandchester Rail Corridor Study investigated a rail corridor that aimed to mitigate the constraints on rail operations caused by the Toowoomba and Little Liverpool Range Crossings. The study which was competed in 2003, examined a number of options across the Toowoomba Range with due consideration of the design brief (e.g. 200 km/hr passenger service), along with technical environmental and cultural heritage aspects.

The study identified a preferred route, which was protected as a future public passenger rail corridor (now referred to as a future State transport corridor) under Schedule 9 of the TP&C Act in 2005. A detailed description of the Gowrie to Grandchester rail corridor Study, including the different alignment options considered as part of the study is provided in EIS Chapter 2: Project rationale.

The Inland Rail Implementation Group recommended this corridor as the preferred route in 2015, with ARTC refining this route further to meet the Inland Rail Service Offering. The preferred Project alignment is generally consistent with the Gowrie to Grandchester future State transport corridor.

Figure 1.1 illustrates the whole Project alignment and its interaction with the Gowrie to Grandchester future State transport corridor whilst Figure 1.3 illustrates this relationship specifically at the connection point of the western tunnel portal, in order to show a more detailed view of this section of the alignment. A discussion on the differences between the two alignments and the key factors for the differences is provided in EIS Chapter 2: Project rationale and EIS Chapter 2: Project description.

2.4 Existing strategic airports and aviation facilities

No strategic airports or aviation facilities are located within the TIA study area. The closest facility is the Toowoomba Wellcamp Airport located more than 8.6 km to the south of the Project alignment.

2.5 Existing port facilities

Whilst the Inland Rail Program proposes to utilise the existing freight line from Acacia Ridge to the Port of Brisbane, this particular Project (G2H) is not located within close proximity to the Port. The Project will not impact on the safety or efficient operation of any strategic ports.

2.6 Existing active transport networks

2.6.1 Cycling and Pedestrian Network

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

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

TRC

- Omara Road, between Witmack Road and Warrego Highway
- Gowrie Junction Road, between Gowrie Birnam Road and Warrego Highway. This road is also being directly impacted by the Project.
- North Street, between Greenwattle Street and Ruthven Street
- Mort Street, between Hermitage Road and West Street
- Hermitage Road, between Mort Street and Hermitage Road East
- McDougall Street, between Rocla Court and Taylor Street
- Highfields Road, between O'Brien Road and New England Highway

SCR: DTMR

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

A review of cycle networks within NSW was undertaken using RMS' 'Cycleway Finder' tool to identify existing on-road cycle paths that may be impacted by proposed construction routes. This review showed that the following cycle routes may be impacted by construction traffic:

- Oliver Street, between Clarence Street and Mary Street
- Clarence Street, between Bent Street and Bacon Street
- Mary Street, between Oliver Street and Fry Street
- Fry Street, between Mary Street and Alice Street.

A number of the proposed construction routes currently traverse through areas of moderate to high pedestrian activity through Toowoomba, Withcott, Helidon and Grafton. While increased heavy vehicle movements through these locations may adversely impact pedestrian movements, the majority of these routes currently facilitate a high proportion of heavy vehicle movements regardless. The Toowoomba Bypass (previously known as the Toowoomba Second Range Crossing) was opened in September 2019. Although this may alter the traffic pattern of heavy vehicles in the area, this is not known at this stage and considerations of these movements will be further refined in the detailed design phase.

It should be noted that while increased heavy vehicle movements through these locations may adversely impact pedestrian movements, the majority of these routes currently facilitate a high proportion of heavy vehicle movements regardless. Haulage contractors should be made aware of these areas of high pedestrian activity as a part of the TMP, discussed in Section 9.

Owing to the isolated location of the works and low volume of construction traffic traversing through impacted active travel networks in LVRC and ICC, pedestrian or cyclist movements are not expected to be affected by the construction traffic. This is because there are no construction routes within these LGAs that coincide with the PCNP.

There are no active dedicated pedestrian level crossings along the existing corridor, nor along the Project alignment.

Relevant PCNP maps are detailed in Appendix Q.

3 Proposed works

3.1 Rail alignment

As mentioned in Section 1.1, the proposed Project rail corridor is one of 13 projects that complete Inland Rail. The proposed works for the Project includes:

- 28 km of single-track dual gauge rail line
- Both dual gauge railway (standard (1,435 mm) and narrow (1,067 mm) gauge)
- Three crossing loops
- Tie-ins to the existing West Moreton System rail corridor at Gowrie and Helidon
- A 6.24 km long tunnel through the Toowoomba Range

The preferred Project alignment is generally consistent with that of the Gowrie to Grandchester future public passenger transport corridor protected under the *TP&C Act*. The Project connects the adjacent Inland Rail projects. B2G and H2C are coordinated projects, currently being assessed through an EIS process by the Coordinator General under the *State Development and Public Works Organisation Act 1971* (Qld).

The Project requires 13 new bridge and viaduct structures comprising 10 viaducts and 3 bridges. Viaducts are a certain type of bridge that are made up of multiple spans that cross waterways, terrain, roads and rail lines. They contain spans in a series and all spans are approximately the same length. Bridges, within the context of this Project, are shorter structures with a simpler design that span waterways or roads and rail, but not terrain. Each of the waterway crossings for the Project are bridge structures and each have been designed to accommodate fauna crossings for terrestrial fauna. The 13 new bridge and viaduct structures include:

- One watercourse crossing – Rail bridge
- Two waterway crossings – Rail viaduct
- One terrain and watercourse crossing – Rail viaduct
- Two terrain and waterway crossings – Rail viaduct
- Four terrain, road and watercourse crossings – Rail viaduct
- One road, rail and watercourse crossing – Rail viaduct
- One rail crossing – Road bridge
- One road, rail and waterway crossing – Road bridge

These structures are summarised in the following tables, with new rail bridges in Table 3.1 and new road over rail bridges summarised in Table 3.2.

Table 3.1 Summary of rail bridges

Chainage	Bridge name	Type	Crossing type	Length (m)
Ch 3.40 km	UT1 Gowrie Creek Rail Bridge	Rail bridge	Watercourse	56
Ch 11.63 km	Oaky Creek viaduct	Rail viaduct	Terrain, road and watercourse	736
Ch 12.83 km	Withcott viaduct 1	Rail viaduct	Waterway	261
Ch 13.64 km	Withcott viaduct 2	Rail viaduct	Terrain and waterway	322
Ch 14.12 km	Withcott viaduct 3	Rail viaduct	Terrain and waterway	174
Ch 15.15 km	Withcott viaduct 4	Rail viaduct	Waterway	145
Ch 15.89 km	TSRC and Six Mile Creek viaduct	Rail viaduct	Terrain, road and watercourse	966
Ch 18.44 km	Postmans Ridge viaduct	Rail viaduct	Terrain, road and watercourse	644
Ch 20.98 km	Murphys Creek Road viaduct	Rail viaduct	Terrain, road and watercourse	690

Chainage	Bridge name	Type	Crossing type	Length (m)
Ch 21.84 km	Withcott Seedlings viaduct	Rail viaduct	Terrain and watercourse	1,794
Ch 24.45 km	Lockyer Creek viaduct	Rail viaduct	Road, rail and watercourse	506

Table notes:

Watercourse: A river, creek or other stream in the form of an anabranch or a tributary, in which water flors permanently or intermittently, regardless of the frequency of flow events (as per the *Water Act 2000* (Qld))
Waterway: Typically defines drainage pathways through the impact assessment area that are not defined as watercourses under the *Water Act 2000* (Qld).

Table 3.2 Summary of road bridges

Chainage	Bridge name	Type	Crossing type	Length (m)
Ch 1.93 km	Gowrie Junction Road Bridge	Road bridge	Road, rail and waterway	311
Ch 15.54 km	McNamaras Road Bridge	Road bridge	Rail	74

The Project comprises sections of predominantly greenfield track and sections of new track adjacent to existing railway lines (brownfield). ARTC have developed a Basis of Design to provide a consistent set of design requirements and parameters to be applied across the Inland Rail Program, including:

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

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

The Project will be fenced in accordance with ARTC fencing strategy. The proposed fencing is reflective of the largely agricultural land use of this section of the Project and seeks to ensure that stock and people do not enter the rail corridor. It will be consistent with fencing used in other sections of the railway line.

3.2 Road rail interface locations

The Project rail corridor intersects SCR and LGR at several locations. Consistent with the QLCSS, all public road rail interfaces within the Project are proposed to be grade separated. This outcome is based on the assessment undertaken by ARTC using the Australian Level Crossing Assessment Model (ALCAM) which considers factors such as future road traffic numbers, vehicle types, train numbers, speeds and sighting distances. This ALCAM assessment is carried out separate to this TIA and any identified changes to road rail interfaces subsequent to what has been identified in this report will be incorporated through an updated TIA in the detailed design phase. Although there are existing private road rail interfaces, these are not assessed in the TIA. All private road rail interfaces are either being closed or treated with grade separation due to the terrain driving viaducts and bridge structures for significant sections of the Project alignment.

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

3.2.1 Existing road rail interface locations

Table 3.3 shows the existing QR public formed road rail interface locations and closures associated with the Project.

There is an existing under track crossing located to the east of road rail interface 320-1-P-1 which connects Morris Road and East Paulsens Road. Note that this interface is not on the Project rail alignment and is therefore not included in Table 3.3. This crossing is proposed to be closed for public access due to the Morris Road closures (320-2-P-1 and 320-2-P-1). However, access will remain for ARTC, QR and services owners that require access to the area between the QR Western Line, Inland Rail and the connection from Inland Rail towards Toowoomba.

Table 3.3 Existing public formed road rail interface locations

Interface ID	Road name	Proposed treatment
TRC		
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)	No Crossing Provided - Relocate

3.2.2 Proposed road rail interface locations

Table 3.4 tabulates the proposed public road rail interface locations and road closures along public formed roads that are associated with the Project. The selection of treatment has been undertaken consistent with the infrastructure strategies contained within the QLCSS through the minimisation of level crossings where appropriate.

In addition to the roads listed in Table 3.4, the tunnel section of the Project alignment will intersect a number of roads at a grade separated level. These roads are detailed previously in Table 2.3 and Table 2.6.

Table 3.4 Proposed public formed road rail interface locations

Interface ID	Road name	Proposed treatment	Reasoning
TRC			
320-1-P-0	Draper Road	No Crossing Provided - Closure	Draper Road interface is not required for property access or to maintain reasonable network connectivity.
320-1-P-0a	Gowrie Junction Road	Grade Separation - Road over rail	Relocated crossing from 320-1-E-1
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)	No Crossing Provided - Relocate	Existing QR Active LX (ID2394). Level crossing is within the proposed rail crossing loop. Relocate interface to the proposed Gowrie Junction Road grade separation at 320-1-P-0a.
320-1-P-1	Morris Road	No Crossing Provided - Closure	A level crossing is not possible on Morris Road due to the proposed rail crossing loop.
320-2-P-1	Morris Road	No Crossing Provided - Closure	As through access is already closed from 320-1-P-1 no benefit for providing crossing.
LVRC			
320-4-P-2	Wallens Road	No Crossing Provided - Road divert/re-align	Wallens Road to be realigned to the north, under the nearby rail bridge at 320-4-P-2a
320-4-P-2a	Wallens Road	Grade Separation - Rail over road	Relocated crossing from 320-4-P-2.
320-4-P-4	Jones Road	Grade Separation - Rail over road	Grade separation due to topography
320-5-P-1	McNamaras Road	Grade Separation - Road over rail	Grade separation due to topography
320-6-P-3	Gittins Road	Grade Separation - Rail over road	Grade separation due to topography
320-8-P-4	Cattos Road	Grade Separation - Rail over road	Relocated crossing from 320-9-P-1.

Interface ID	Road name	Proposed treatment	Reasoning
320-9-P-1	Cattos Road	No Crossing Provided - Relocate	Cattos Road is primarily used to access private lot 13/CH31259 and the QR corridor. Alternative access provided by 320-8-P-4.
DTMR			
320-6-P-1	Toowoomba Bypass (previously Toowoomba Second Range Crossing)	Grade Separation - Rail over road	Grade separation due to topography and 4 lane highway.
320-7-P-2	Murphys Creek Road	Grade Separation - Rail over road	Grade separation due to topography.

Table 3.4 indicates that no at-grade road rail interfaces are proposed as a part of the Project, therefore no short stacking issues will occur from the Project through the grade separation at all road rail interfaces.

3.3 Road alterations

This section discusses potential alterations to the local road network by the Project due to the road rail interfaces detailed in Section 3.2. These proposed alterations may include both temporary and permanent alterations to the road network to facilitate the construction of the Project and road closures and diversions along the Project rail corridor (i.e. in the vicinity of road rail interface locations).

Except for the closure of Morris Road, while these alterations to the public road network will create permanent diversions, they are not expected to create a significant change to existing traffic patterns and distributions. The alterations to the public road network are not expected to be significant at most of these sites as:

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

As a result, a detailed operational capacity assessment was only required due to the Morris Road closure.

The closure of Morris Road proposed in this assessment and the associated traffic impacts to the Gowrie Junction area have been assessed in an additional technical note. For further details refer Appendix U and Appendix T.

In addition to the road realignments proposed in this section, other works such as driveways and accesses will be required to the rail corridor and laydown areas as part of the Project works. These have not been considered as part of this assessment, however will likely require assessment during the next phase of the Project when the design and detailed construction methodology is confirmed.

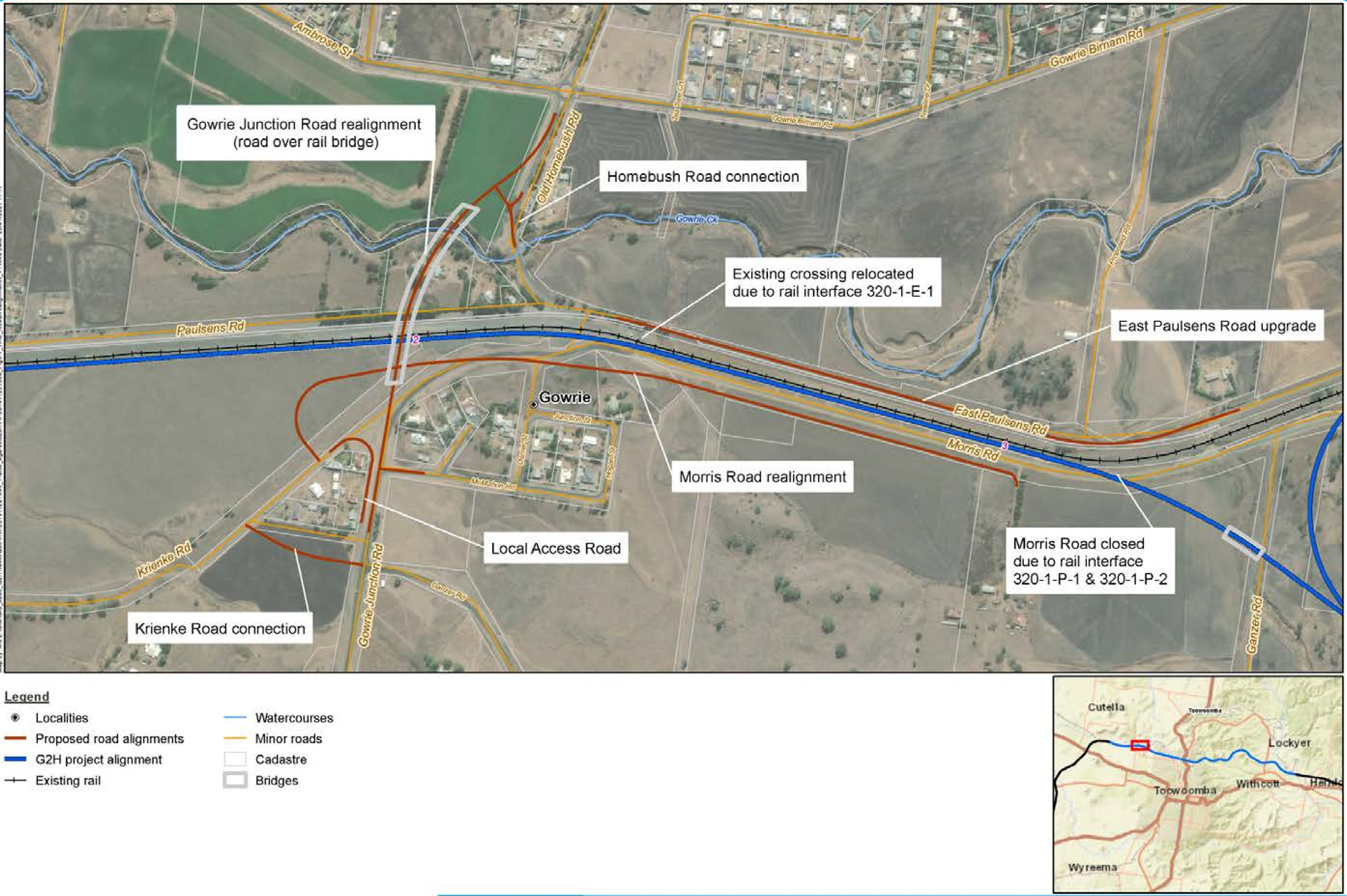
3.3.1 Toowoomba Regional Council road alterations

TRC road upgrades/realignments are shown in Figure 3.1.

3.3.1.1 Draper Road

Draper Road will be closed west of the road rail interface 320-1-P-0 as it is not required for property access or to maintain reasonable network connectivity.

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



A3 scale: 1:6,000

0 0.04 0.08 0.12 0.16 0.2 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 3.1:
Toowoomba Regional Council Road Upgrades/Realignments

3.3.1.2 Gowrie Junction Road

Gowrie Junction Road is being realigned north of Ganzer Road to provide a grade separated crossing (road over rail) of the QR and Inland Rail alignments. The realignment will tie back into Homebush Road just south of the roundabout with Gowrie Birnam Road. This grade separation replaces the existing Paulsens Road level crossing 320-1-E-1, and will provide for better flood immunity compared to the existing road bridge over Gowrie Creek. As a part of this realignment, Morris Road (see 3.3.1.3) is also being realigned.

3.3.1.3 Morris Road

Morris Road is being realigned on the southern side of the rail corridor and extended west to pass under the new Gowrie Junction Road bridge and connect with Krienke Road. The realigned Morris Road that is passing under the overpass will have sufficient clearance between the structure and the existing road (vertical clearances designed in accordance with *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2017a) and relevant local council guidelines*)*.

Morris Road is also being closed between Boundary Street and Gowrie Junction Road (320-1-P-1 and 320-2-P-1) due to the proposed Inland Rail crossing loop. This will require all traffic that was using Morris Road for travel between Toowoomba and Gowrie Junction to find an alternative route. To assess impacts from the road closure the surrounding road network was assessed both before and after the Project becomes operational.

The assessment found that the closure of Morris Road will impact the surrounding network in a variety of ways, however, for the most part, these impacts are minimal and do not change the traffic operation of the network. Refer to Appendix T for the full assessment.

3.3.1.4 East Paulsens Road

East Paulsens Road will be upgraded from the intersection with Old Homebush Road for approximately 1,100 m east. The properties along this section of road previously had access from an existing rail over road grade separation on the QR alignment between 320-1-P-1 and 320-2-P-1. This grade separation will be closed to the public (but remain open for maintenance) due to the Morris Road closures at 320-1-P-1 and 320-2-P-1.

3.3.1.5 Old Homebush Road

Old Homebush road will no longer provide direct access between Gowrie Junction and Toowoomba due to the closure of 320-1-E-1 and the new Gowrie Junction Road realignment and grade separation. A new connection will be provided to Old Homebush Road from the Gowrie Junction Road realignment which will provide access to Paulsens Road, East Paulsens Road and the properties along Old Homebush Road.

3.3.1.6 Krienke Road

Properties on the western side of Gowrie Junction Road north of the Ganzer Road intersection will now have a new local access road from Krienke Road. This is required due to the height difference (due to the grade separation) between the Gowrie Junction Road realignment and the properties.

The existing intersection between Krienke Road and Gowrie Junction Road will be replaced with a new road between Gowrie Junction Road and Krienke Road opposite Ganzer Road. This is due to the height difference between the realigned Gowrie Junction Road and existing Krienke Road. This new road will provide access to Krienke Road, the realigned Morris Road and the local property access road discussed above.

The associated traffic impacts with the proposed new intersection at Gowrie Junction Road and Ganzer Road have been assessed. For further details refer to Appendix U.

3.3.1.7 McMahon Road

McMahon Road will have a new intersection with Gowrie Junction Road due to the Gowrie Junction Road realignment and grade separation. These works will impact the road but will not change the location or functionality.

3.3.2 Lockyer Regional Council road alterations

The following LVRC road upgrades/realignments are shown in Figure 3.2

3.3.2.1 Wallens Road

Wallens Road will be realigned to use the adjacent rail bridge to provide a grade separated crossing (road under rail), located approximately 55 m to the north-east of the current road crossing, with no significant increase in vehicle travel distance.

3.3.2.2 McNamaras Road

McNamaras Road will be realigned slightly to provide a grade separated crossing of the Project alignment (road over rail), with the road moved only slightly (21 m) to the east with no increase in vehicle travel distance.

3.3.2.3 Cattos Road

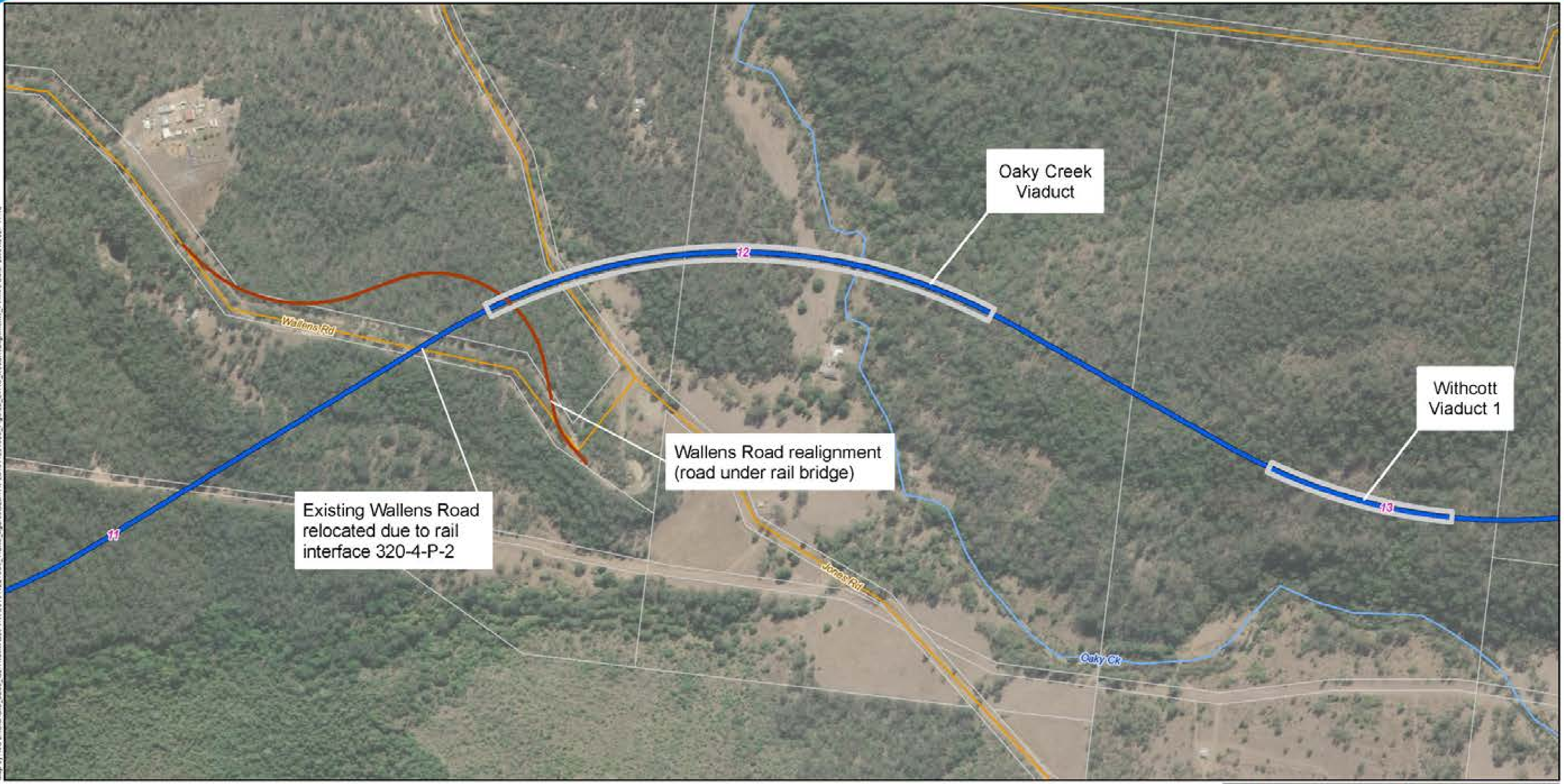
Cattos Road will be realigned along an existing road corridor and passes under the Lockyer Creek viaduct to provide access to the existing QR level crossing and properties. The realignment results in an approximate diversion for vehicles of, at most, 1.8 km. The location and height of the Project alignment did not allow a level crossing or road under rail crossing to the required standards.

The existing occupational crossing on the Main Line will not be impacted by the Project.

3.4 Construction activities

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

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



Legend

- Proposed road alignments
- G2H project alignment
- Watercourses
- Minor roads
- Cadastre
- Bridges

A3 scale: 1:6,000

0 0.04 0.08 0.12 0.16 0.2 km

Future Freight
Integrating Community, Environment and Engineering

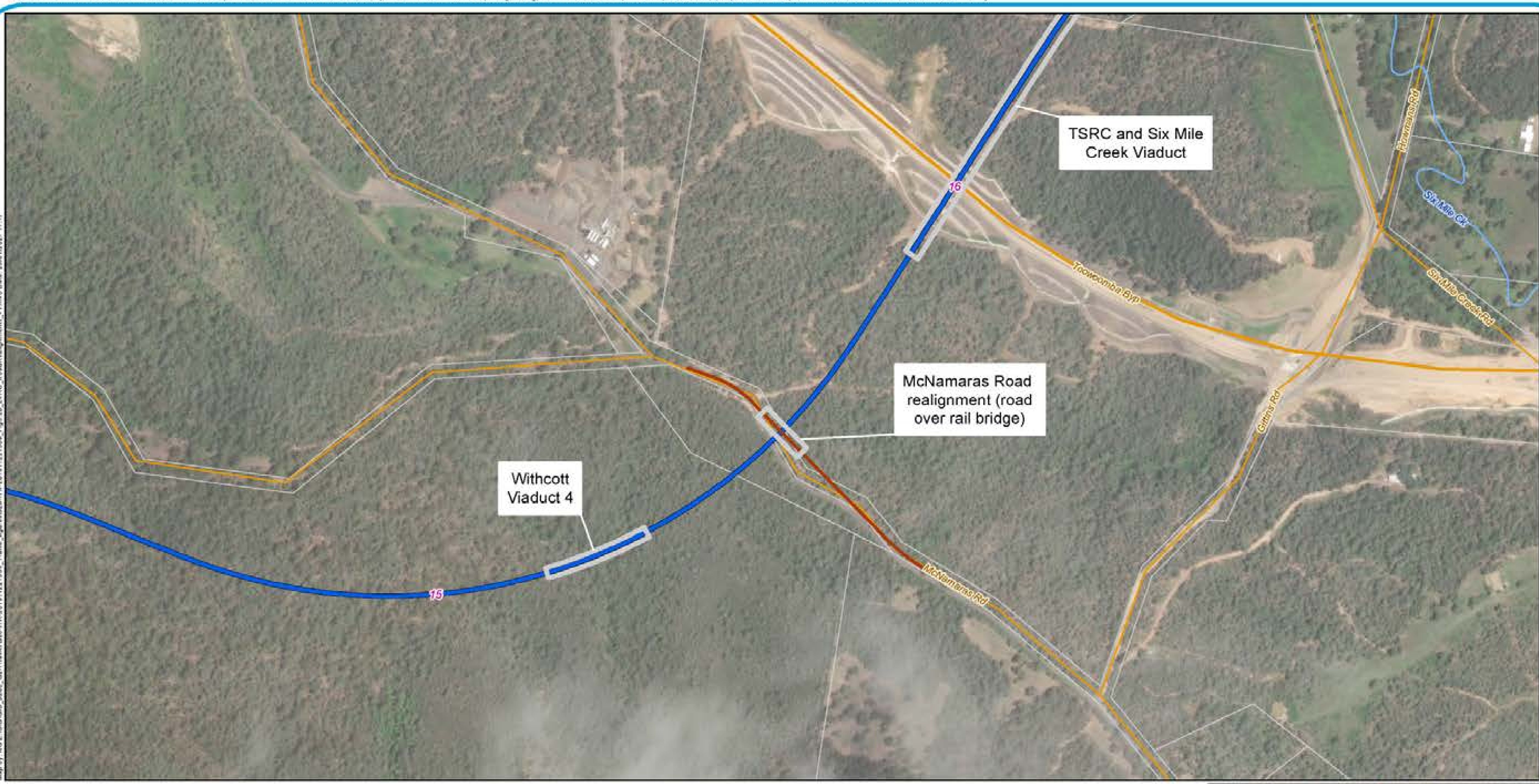
Issue date: 25/01/2021 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 3.2a:

Lockyer Valley Regional Council Road Upgrades/Realignments

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



Legend

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

A3 scale: 1:6,000

0 0.04 0.08 0.12 0.16 0.2 km

Future Freight
Integrating Community, Environment and Engineering

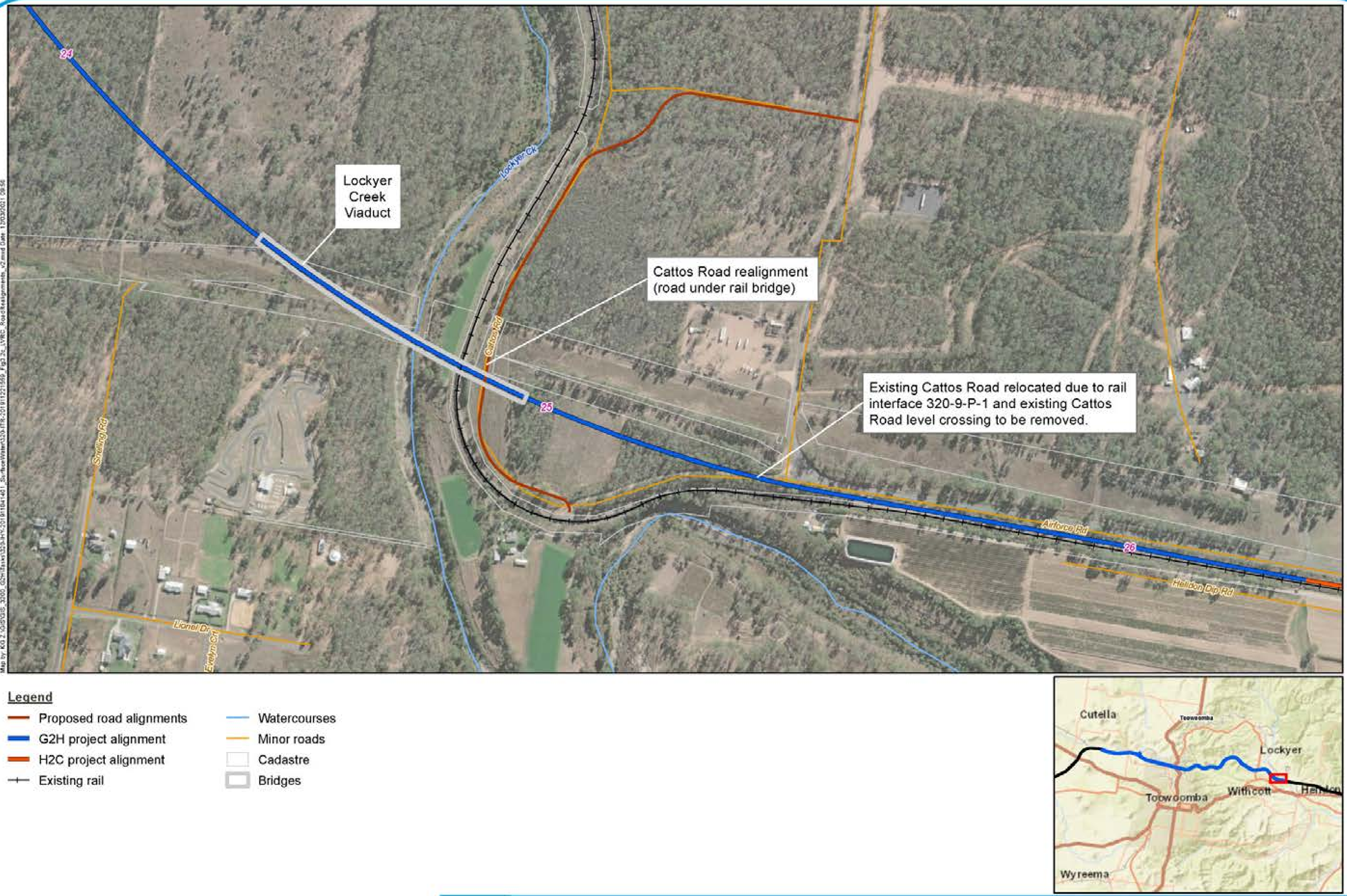
Issue date: 25/01/2021 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 3.2b:

Lockyer Valley Regional Council Road Upgrades/Realignments

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



A3 scale: 1:6,000

0 0.04 0.08 0.12 0.16 0.2 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 12/03/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 3.2c:
Lockyer Valley Regional Council Road Upgrades/Realignments

4 Baseline operations

This section discusses the existing operational conditions for the impacted SCR and LGR.

4.1 Existing road links

4.1.1 Level of service definition

Level of service (LOS) is a qualitative measure describing the operational conditions within a traffic stream. This will be determined for both the existing road links as well as during the various construction phases where the Project's construction activities could potentially have an impact on the operational performance of the surrounding road network. The findings from the analysis will lead to the formulation of potential mitigation measures to address the identified impacts.

LOS is defined in terms of service measures such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience. The practical application of LOS to different road environments takes into account factors such as road hierarchy, volume/capacity ratios, terrain types, proportion of heavy vehicles and road gradients. The methodology and LOS criteria have been obtained from the *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2017a) and the *Highway Capacity Manual 2017* (Transportation research board 2016).

There are six LOS, each of which represents a range of operating conditions and the driver's perception of those conditions, and can generally be described as:

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

Road authorities generally prefer to design new rural road projects for LOS A or B at opening and LOS C to D in the design year. However, some rural projects and most urban projects will have practical and financial limits on the extent of work that can be achieved and consequently the performance criteria will have to be negotiated throughout the traffic analysis process. In this regard, an analysis of the existing level of service on the road network provides a useful benchmark by which to assess changes as a result of the Project. The colours adopted to represent the various LOS are as shown in Table 4.1.

Table 4.1 Level of service

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

4.1.2 Link analysis criteria

The LOS criteria are based on the design hour volume to AADT ratio with respective saturation flows per terrain type as obtained from Austroads *Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity* (1988) and is provided in Table 4.2 and Table 4.3. The thresholds outlined in these tables were adopted for all two-way two-lane roads. The LOS criteria adopted are for the purpose of identifying any changes to the network performance in the future scenarios by comparing the scenarios with and without the additional traffic generated by the Project. Table 4.4 outlines the criteria adopted for multi-lane highway sections.

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

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

Source: *Austroads Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity (1988)*

Table note: Values rounded to the nearest 100

Table 4.3 Saturation flow rate: Uninterrupted two-lane-two-way rural roads (passenger cars/hour/lane) (pc/hr/ln)

Design hour volume to AADT ratio (K-value)	Level of service				
	A	B	C	D	E
	Level terrain				
0.1	250	500	800	1,350	2,300
0.11	250	500	800	1,350	2,300
0.12	250	500	800	1,350	2,300
0.13	250	500	800	1,350	2,300
0.14	250	500	800	1,350	2,300
0.15	250	500	800	1,350	2,300
	Rolling terrain				
0.1	100	300	500	800	1,500
0.11	100	300	500	800	1,500
0.12	100	300	500	800	1,500
0.13	100	300	500	800	1,500
0.14	100	300	500	800	1,500
0.15	100	300	500	800	1,500
	Mountainous terrain				
0.1	50	150	250	350	800
0.11	50	150	250	350	800
0.12	50	150	250	350	800
0.13	50	150	250	350	800
0.14	50	150	250	350	800
0.15	50	150	250	350	800

Source: Austroads *Part 2 - Guide to Traffic Engineering Practice: Roadway Capacity* (1988).

Table note: Values rounded to the nearest 50

Table 4.4 Saturation flow rate - Multi-lane highways (pc/hr)

Number of lanes	Level of service (LOS)				
	A	B	C	D	E
One lane	200	380	600	900	1,400
Two lanes	900	1,400	1,800	2,200	2,800
Three lanes	1,350	2,100	2,700	3,300	4,200

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

4.1.3 Baseline traffic volumes

Baseline AADT volumes and heavy vehicle percentages by direction have been provided in Table 4.6, for each road section along the Project construction traffic routes. Table 4.6 also provides the road hierarchy and data source for each of these road sections. The data sources used in the assessment have been provided in Table 4.5. Where temporal factors were not available, the traffic count data available was used as a surrogate for AADT.

Further detail on traffic volumes, including k-values and their application to the assessment, are provided in Appendix P.

Table 4.5 Traffic data sources

Source ID	Traffic data source
A	Volumes obtained from DTMR detailed segment and weekly reports
B	Volumes adopted from adjacent DTMR road section
C	Volumes obtained from RMS opensource Traffic Viewer. Adjacent road link volumes were adopted on links where traffic information is not available.
D	Urban Local Road - Volumes derived by assuming LOS A with associated AADT of 2,000 vehicles per day (veh/day)
	Urban Collector Road - Volumes derived by assuming LOS B with associated AADT of 3,800 veh/day
	Rural Local Road - Volumes derived by assuming AADT of 400 veh/day
	Rural Collector Road - Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 veh/day
E	Rural Arterial Road - Volumes derived by assuming LOS A with K-value of 0.15 with associated AADT of 1,600 veh/day
	Urban Arterial Road - Volumes derived by assuming LOS A with K-value of 0.12 with associated AADT of 2,000 veh/day
F	Volumes obtained through 7-day 24-hour traffic surveys
G	Volumes adopted from adjacent surveyed link road or adjacent DTMR detailed segment and weekly reports
H	Volumes obtained from ‘Queensland Globe – State of Queensland 2020’
I	Volumes obtained from relevant authority.

Table 4.6 Baseline traffic volumes

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
LGR: TRC								
Boundary Street	Between Hermitage Road and Toowoomba Bypass	Rural Arterial	F	2019*	995	31	894	34
	Between Toowoomba Bypass and Morris Road	Rural Arterial	F	2019*	488	6	410	13
Cooby Dam Road	Between Klein Road and Pipeline Road	Rural Local	I (TRC)	2018	76	17	76	17
Gowrie Junction Road	Between Warrego Highway and Ganzer Road RTA	Urban Arterial	F	2019*	1,941	7	2,214	12
	Between Ganzer Road and Morris Road	Urban Arterial	F	2019*	2,566	13	2,717	15
Griffiths Street	Between New England Highway and Mort Street	Urban Collector	F	2018	3,170	4	2,760	11
Hermitage Road	Between Gowrie Junction Road and Boundary Street	Rural Arterial	F	2019*	639	9	758	9
	Between Boundary Road and Mort Street	Rural Arterial	F	2019*	692	22	831	25
	Between Mort Street and Private Access	Rural Local	I (TRC)	2015	93	15	93	15
Highfields Road	Between Klein Road and New England Highway	Urban Arterial	I (TRC)	2013	1,454	3	1,454	3
Klein Road	Between Kleinton School Road and Cooby Dam Road	Rural Collector	I (TRC)	2017	143	25	143	25
Kleinton School Road	Between Meringandan Road and Klein Road	Rural Collector	I (TRC)	2018	670	18	670	18
Krienke Road	Between Gowrie Junction Road and Morris Road	Rural Local	D	2019*	20	0	20	33
Larcombe Street	Between North Street and Railway Line	Urban Local	D	2019	2,000	15	2,000	15
Main Street	Between Meringandan Shirley Road and Klein Road	Rural Local	I (TRC)	2017	151	8	151	8
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	Urban Collector	I (TRC)	2015	24	25	24	25
Meringandan Road	Between Highfields Road and Kleinton School Road	Urban Collector	I TRC)	2013	612	7	612	7
Meringandan Shirley Road	Between Main Street and Woolmer Road	Rural Arterial	I (TRC)	2013	1,224	12	1,224	12
Morris Road	Between Gowrie Junction Road and Paulsens Road	Rural Local	F	2018	234	17	306	35
	Between Paulsens Road and Boundary Street	Rural Local	F	2020*	1,115	18	1,084	12

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Mort Street	Between Hermitage Road and Old Mort Street	Rural Local	F	2019*	2,040	21	2,448	18
	Between Old Mort Street and Mort Street	Rural Arterial	F	2019*	2,040	21	2,448	18
	Between Toowoomba Bypass and North Street	Rural Arterial	F	2019	2,040	21	2,448	18
Munro Street	Between New England Highway and Harlaxton Quarry	Urban Local	F	2018	1,550	4	200	35
North Street	Between Mort Street and New England Highway	Urban Collector	F	2018	4,130	1	3,580	1
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	Rural Arterial	I (TRC)	2013	467	6	467	6
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	Rural Collector	I (TRC)	2013	348	13	348	13
	Between Gowrie Birnam Road and Paulsens Road	Rural Collector	I (TRC)	2013	348	13	348	13
Old Mort Street	Between Mort Street and Mort Street	Urban Local	I (TRC)	2013	93	11	93	11
Omara Road	Between Warrego Highway and Witmack Road	Rural Arterial	I (TRC)	2018	1695	25	1695	25
Paulsens Road	Between Morris Road and Old Homebush Road	Rural Collector	I (TRC)	2013	2,103	14	2,103	14
Pipe Street	Full extent	Rural Local	G	2015	270	39	270	39
Pipeline Road	Full extent	Rural Local	I (TRC)	2014	26	33	26	33
Witmack Road	Between Omara Road and Pipe Street	Rural Collector	I (TRC)	2015	270	39	270	39
LGR: LVRC								
Airforce Road	Between William Street and Lockyer Siding Road	Rural Local	F	2015	269	13	272	20
	Between Lockyer Sliding Road and Cattos Road	Rural Local	G	2015	269	13	272	20
	Between Laidley Street and Airforce Road	Rural Collector	G	2015	269	13	272	20
Arthur Street	Between Georges Street and Mary McKillop Street	Urban Local	F	2018	420	14	1,340	13
	Between Mary McKillop Street and William Street	Urban Local	G	2018	420	14	1,340	13
Ashlands Drive	Full extent	Rural Local	D	2019	400	15	400	15
Bells Road	Full extent	Rural Local	D	2019	400	15	400	15
Cattos Road	Between Unnamed Road and Airforce Road	Rural Collector	G	2015	269	13	272	20
George Street	Between Lawlers Road and Arthur Street	Urban Local	F	2018	1,680	11	690	9

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Gittins Road	Between Jones Road and McNamaras Road	Rural Collector	F	2018	253	53	333	40
	Between McNamaras Road and Stevens Road	Rural Collector	G	2018	253	53	333	40
Howmans Road	Full extent	Rural Local	D	2019	400	15	400	15
Jones Road	Between Warrego Highway and Little Oaky Creek Road	Rural Collector	F	2018	620	1	540	0
	Between Little Oaky Creek Road and Wallens Road	Rural Collector	F	2018	200	43	80	42
Laidley Street	Between Station Street and Seventeen Mile Road	Urban Local	D	2019	400	15	400	15
Lawlers Road	Between Warrego Highway and George Street	Urban Collector	G	2018	1,680	11	690	9
Little Oaky Creek Road	Between Roches Road and Jones Road	Rural Collector	F	2018	233	49	560	29
Mary McKillop Street	Between Turner Street and Arthur Street	Rural Local	D	2019	400	15	400	15
McNamaras Road	Between Gittins Road and Unnamed Road	Rural Local	D	2019	400	15	400	15
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	Rural Arterial	F	2018	353	42	93	57
Roches Road	Between Warrego Highway and Little Oaky Creek Road	Rural Collector	F	2018	320	46	660	27
Seventeen Mile Road	Between Airforce Road and Laidley Street	Rural Collector	F	2018	93	14	207	6
Station Street	Between Arthur Street and Laidley Street	Urban Local	D	2019	2,000	15	2,000	15
Turner Street	Between Warrego Highway and Mary MacKillop Street	Rural Collector	D	2019	2,000	15	2,000	15
Unnamed Road	Between Airforce Road and Cattos Road	Rural Local	D	2019	400	15	400	15
Wallens Road	Between Jones Road and Council Boundary	Rural Local	D	2019	400	15	400	15
William Street	Between Arthur Street and Airforce Road	Rural Local	D	2019	400	15	400	15
SCR: DTMR								
Cunningham Highway	17B – Between River Road and Redbank Plains Road	Urban Motorway	A (DTMR)	2017	22,117	17	20,050	16
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	Rural Arterial	A (DTMR)	2017	2619	13	2,441	13
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	Urban Motorway	A (DTMR)	2017	54,594	5	54,247	3

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	Urban Arterial	H	2018	13,794	7	13,794	7
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	Urban Motorway	B (DTMR)	2017	54,594	5	54,247	5
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	Rural Arterial	A (DTMR)	2017	1,051	10	1,099	10
	4104 – Between Brookside Place and Toowoomba Bypass	Rural Arterial	A (DTMR)	2017	1,051	10	1,099	10
	4104 – Between Toowoomba Bypass and Howmans Road	Rural Arterial	A (DTMR)	2017	1,051	10	1,099	10
New England Highway	22A – Between Highfields Road and Murphys Creek Road	Urban Arterial	A (DTMR)	2017	7,498	7	7,426	8
	22A – Between Murphys Creek Road and Munro Street	Urban Arterial	A (DTMR)	2017	10,155	6	10,248	5
	22A – Between Munro Street and North Street	Urban Arterial	A (DTMR)	2017	8,961	8	8,574	9
	22A – Between North Street and Warrego Highway	Urban Arterial	A (DTMR)	2017	6,528	6	7,178	6
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	Urban Motorway	A (DTMR)	2017	78,160	8	78,858	8
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	Urban Collector	H	2018	3,731	15	3,731	15
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	Rural Arterial	I (DTMR)	2019	1,459	46	1,459	46
	319 – Between Boundary Street and New England Highway	Rural Arterial	I (DTMR)	2019	1,459	46	1,459	46
	319 – Between New England Highway and Warrego Highway	Rural Arterial	I (DTMR)	2019	1,459	46	1,459	46
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	Rural Arterial	A (DTMR)	2017	1,569	18	1,548	18
	324 – Between McDougall Street and Tor Street	Urban Arterial	A (DTMR)	2018	12,361	23	12,361	23

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	Rural Arterial	A (DTMR)	2017	12,499	19	12,106	17
	315 – Between Roches Road and Murphys Creek Road	Rural Motorway	A (DTMR)	2017	12,499	19	12,106	17
	315 – Between Murphys Creek Road and Toowoomba Bypass	Rural Motorway	A (DTMR)	2017	10,238	17	9,821	18
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	Rural Motorway	A (DTMR)	2017	6,947	12	7,750	11
	18A – Between Gowrie Junction Road and McDougall Street	Urban Arterial	A (DTMR)	2017	6,947	12	7,750	11
	18A – Between McDougall Street and Tor Street	Urban Arterial	A (DTMR)	2017	9,854	7	10,321	8
	18A – Between Tor Street and Rob Street	Urban Arterial	A (DTMR)	2018	14,161	19	14,161	19
	18A – Between Rob Street and Toowoomba Athol Road	Urban Arterial	A (DTMR)	2017	7,162	19	7,306	19
	18A – Between Toowoomba Athol Road and New England Highway	Urban Arterial	A (DTMR)	2017	11,086	10	10,819	16
	18A – Between New England Highway and James Street	Urban Arterial	A (DTMR)	2017	8,707	22	8,931	19
	18A – Between James Street and Tourist Road	Urban Arterial	A (DTMR)	2017	7,867	27	8,946	20
	18A – Between Tourist Road and Toowoomba Connection Road	Rural Arterial	A (DTMR)	2017	12,499	19	12,106	17
	18A – Between Toowoomba Bypass and Gatton Helidon Road	Rural Motorway	A (DTMR)	2017	10,238	17	9,821	18
	18A – Between Gatton Helidon Road and Gatton Esk Road	Rural Motorway	A (DTMR)	2017	7,329	19	8,402	21
	18A – Between Gatton Esk Road and Laidley Plainland Road	Rural Motorway	A (DTMR)	2017	11,410	19	11,297	20
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	Rural Motorway	A (DTMR)	2017	15,252	21	14,884	18
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	Rural Motorway	A (DTMR)	2017	17,087	15	15,819	15

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
	18A – Between Brisbane Valley Highway and Mount Crosby Road	Urban Motorway	A (DTMR)	2017	23,696	14	21,237	17
	18A – Between Mount Crosby Road and Cunningham Highway	Urban Motorway	A (DTMR)	2017	29,392	14	28,468	15
SCR: RMS								
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	Urban Motorway	C (RMS)	2017	7,242	24	8,982	23
Summerland Way	Between Trenayr Road and Turf Street	Rural Arterial	C (RMS)	2017	1,677	15	1,676	17
LGR: CVC								
Bent Street	Between Craig Street and Gwydir Highway	Urban Collector	G	2019	12,102	15	12,023	15
Charles Street	Between Bent Street and Pacific Highway	Urban Arterial	E	2019	2,000	15	2,000	15
Clarence Street	Between Oliver Street and Craig Street	Urban Collector	D	2019	3,800	15	3,800	15
Clark Road	Full extent	Rural Local	D	2019	400	15	400	15
Craig Street	Between Villiers Street and Clarence Street	Urban Collector	C	2019	12,102	15	12,023	15
	Between Clarence Street and Bent Street	Urban Collector	C	2019	12,102	15	12,023	15
Dobie Street	Between Villers Street and Summerland Way	Urban Collector	D	2019	3,800	15	3,800	15
Fry Street	Between Mary Street and Alice Street	Urban Collector	D	2019	3,800	1%	3,800	15
Mary Street	Between Fry Street and Oliver Street	Urban Collector	D	2019	3,800	15	3,800	15
Oliver Street	Between Mary Street and Clarence Street	Urban Collector	D	2019	3,800	15	3,800	15
Trenayr Road	Between Summerland Way and Clark Road	Rural Collector	D	2019	2,000	15	2,000	15
Villers Street	Between Craig Street and Dobie Street	Urban Collector	D	2019	3,800	15	3,800	15
LGR: ICC								
Fairbank Place	Full extent	Urban Local	F	2019	148	33	127	25
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	Rural Collector	G	2018	202	47	205	44
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	Rural Collector	F	2018	202	47	205	44
Newhill Drive	Full extent	Urban Collector	F	2019	606	45	659	36

Road name	Road section	Road hierarchy	Data source (refer Table 4.5)	Traffic volume base year	Gazettal/northbound/ eastbound		Anti-Gazettal/ southbound/westbound	
					AADT	% HV	AADT	% HV
Noblevale Way	Between Rob Roy Way and Fairbank Place	Urban Local	F	2019	223	35	229	39
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	Urban Arterial	I (ICC)	2010	7,856	15	7,856	15
Rob Roy Way	Full extent	Urban Local	F	2019	430	43	411	37

Table note:

* These traffic counts were obtained from TRC post the completion of the Morris Road upgrade (i.e. sealed in third quarter of 2020)

4.2 Existing intersection performance

4.2.1 Delay based intersection analysis criteria

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

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

The delay-based analysis criteria adopted for the purposes of the TIA are provided in Table 4.7. The table indicates the LOS per intersection control type associated with a respective delay per vehicle measured in seconds.

Table 4.7 Level of service definitions based on vehicle delay in seconds

Control delay per vehicle in seconds (d)			
Level of service	**Signals**	**Roundabout**	**Sign control**
A	d ≤ 10	d ≤ 10	d ≤ 10
B	10 < d ≤ 20	10 < d ≤ 20	10 < d ≤ 15
C	20 < d ≤ 35	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ 55	35 < d ≤ 50	25 < d ≤ 35
E	55 < d ≤ 80	50 < d ≤ 70	35 < d ≤ 50
F	80 < d	70 < d	50 < d

Source: SIDRA Intersection 8 User Guide

In the absence of traffic count data at intersections, an assessment has been undertaken to highlight intersections which are more likely to experience impacts resulting from the addition of construction traffic flows consistent with the warrants outlined in Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a). This assessment is provided in Section 6.3

4.3 Existing pavement load (standard axle repetitions)

A preliminary desktop pavement impact assessment has been undertaken based on the existing background traffic data available for State Controlled Road sections impacted by proposed construction traffic. These traffic volumes have been converted into SAR based on the heavy vehicle classes provided by relevant road controlling authorities. A SAR is a unit measurement which converts the wheel loads of traffic to an equivalent number of standard loads and is usually expressed in terms of the equivalent number of 80 kilo-Newtons (kN) single axle load.

4.3.1 Equivalent axle load per heavy vehicle type: Queensland

Detailed road segment reports with 12 bin vehicle breakdown details were used to calculate Standard axle repetitions per heavy vehicle (SAR/HV) along the DTMR road network. The SAR/HV was calculated by means of the methodologies set out in Austroads *Guide to Pavement Technology Part 2: Pavement Structural Design* (2012), as referenced in the GTIA. It is noted that a more recent version of this guide is available and should be used for pavement design. The SAR/HV along the road network with associated primary construction routes are provided in Table 4.8, with these routes illustrated in Figure 1.4. In the calculation of SAR/HV for the existing road network, SAR per heavy vehicle axle group (SAR/HVAG) values were used as per DTMR's *Class-Specific Traffic Load Distributions Spreadsheet* (July 2018).

Table 4.8 Standard axle repetitions/heavy vehicles on primary construction routes along Department of Transport and Main Roads: State Controlled Roads

Road name	Road ID - road section	Source	SAR/HV	
			Gazettal	Anti-Gazettal
SCR: DTMR				
Cunningham Highway	17B – Between River Road and Redbank Plains Road	Calculated	2.22	2.29
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands	Calculated	1.68	1.59
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	Calculated	2.06	1.82
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	Assumed	2.22	2.29
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	Calculated	2.06	1.82
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	Calculated	1.24	1.32
	4104 – Between Brookside Place and Toowoomba Bypass	Calculated	1.24	1.32
	4104 – Between Toowoomba Bypass and Howmans Road	Calculated	1.24	1.32
New England Highway	22A – Between Highfields Road and Murphys Creek Road	Calculated	1.01	1.26
	22A – Between Murphys Creek Road and Munro Street	Calculated	1.28	0.90
	22A – Between Munro Street and North Street	Calculated	1.01	1.24
	22A – Between North Street and Warrego Highway	Calculated	1.29	1.24
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	Calculated	1.47	1.21
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	Assumed	2.22	2.29
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	Assumed	4.57	3.79
	319 – Between Boundary Street and New England Highway	Assumed	4.57	3.79
	319 – Between New England Highway and Warrego Highway	Assumed	4.57	3.79

Road name	Road ID - road section	Source	SAR/HV	
			Gazettal	Anti-Gazettal
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	Calculated	2.48	2.43
	324 – Between McDougall Street and Tor Street	Calculated	2.30	2.23
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	Calculated	2.46	2.52
	315 – Between Roches Road and Murphys Creek Road	Calculated	2.46	2.52
	315 – Between Murphys Creek Road and Toowoomba Bypass	Calculated	4.57	3.79
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	Calculated	1.60	1.33
	18A – Between Gowrie Junction Road and McDougall Street	Calculated	1.60	1.33
	18A – Between McDougall Street and Tor Street	Calculated	1.46	1.42
	18A – Between Tor Street and Rob Street	Calculated	2.74	
	18A – Between Rob Street and Toowoomba Athol Road	Calculated	2.74	2.39
	18A – Between Toowoomba Athol Road and New England Highway	Calculated	2.13	1.84
	18A – Between New England Highway and James Street	Calculated	1.90	2.74
	18A – Between James Street and Tourist Road	Calculated	2.41	1.73
	18A – Between Tourist Road and Toowoomba Connection Road	Calculated	2.46	2.52
	18A – Between Toowoomba Bypass and Gatton Helidon Road	Calculated	4.57	3.79
	18A – Between Gatton Helidon Road and Gatton Esk Road	Calculated	4.66	3.67
	18A – Between Gatton Esk Road and Laidley Plainland Road	Calculated	4.19	3.69
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	Calculated	4.31	3.45
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	Calculated	3.59	3.84
	18A – Between Brisbane Valley Highway and Mount Crosby Road	Calculated	2.13	2.17
	18A – Between Mount Crosby Road and Cunningham Highway	Calculated	2.06	1.99

Table note:

HVAG = Heavy Vehicle Axle Group

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

SAR/HV values were also used as part of the pavement impact analyses for the primary construction routes along RMS SCR. As annual 12-bin vehicle breakdown information was not available for RMS roads, SAR/HV information provided within Austroads *Guide to Pavement Technology Part 2: Pavement Structural Design* (2012) was used based on Weigh-In-Motion (WIM) sites across NSW. As with QLD SCR, in the calculation of SAR/HV for the existing road network, SAR per heavy vehicle axle group (SAR/HVAG) values were used. As not all roads were represented in the guide, SAR/HV values were assumed based on similar, proximate roads.

Table 4.9 outlines the road name and the assumed WIM site(s), corresponding SAR/HVAG values and resultant SAR/HV used for the purpose of the analysis.

Table 4.9 Standard axle repetitions/heavy vehicles on all weigh-in-motion sites across New South Wales

Project road assessed	WIM site road name	WIM ID	Location	%HV	SAR/HVAG	SAR/HV
Pacific Motorway	Pacific Highway	283	Brunswick Heads	14.2	0.807	2.30
Summerland Way	New England Highway	700	Branxton	14.4	0.803	2.19
	New England Highway	AR	Armidale	18.7	0.714	1.97
	Average			16.55	0.7585	2.08

4.3.3 Existing standard axle repetitions over 20-year design life

Standard axle repetitions (SAR) for the background heavy vehicle component were calculated based on the heavy vehicle splits for the relevant road sections. It must be noted that all base pavement loading SAR were calculated as granular pavement with thin bituminous surfacing with a load damage unit equivalent to SAR4, which is the SAR calculated with a load damage exponent of 4 (or ESA, as ESA = 1 SAR4), irrespective of pavements containing one or more boundary layers for both DTMR and RMS roads. This is because raw road asset data from DTMR does not capture loaded and unloaded heavy vehicle movements which do not make it feasible to calculate SAR5s and SAR12s (load damage units applicable to pavements with one or more boundary layers). This was completed in accordance with the following process:

- The existing background traffic data (AADT) for the relevant road sections, where available, were obtained from DTMR and RMS
- Relevant SAR rates were applied to existing heavy vehicle proportions for each direction of travel
- The existing SAR4 for each construction route section on all affected SCR was determined in accordance with Section 6.4 of the GTIA
- A 2 per cent heavy vehicle compound growth rate was applied to determine future projected yearly SAR over a 20-year design life
- Existing SAR4 and associated capacities were graphically represented for each link over a 20-year design life.

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

4.4 Existing rail crossings

Table 3.3 indicates one public formed level crossing exists within the Project alignment (320-1-E-1). This existing level crossing is a passive level crossing with flashing lights. It is proposed to close and relocate this crossing as a part of the Project. Therefore, there will be no operational impacts of a level crossing at this location. This interface is proposed to be relocated to the proposed Gowrie Junction Road grade separation at (320-1-P-0a).

There is an existing under track crossing located to the east of road rail interface 320-1-P-1 which connects Morris Road and Paulsens Road. Note that this interface is not on the Project alignment however is discussed in Section 6.4.4.

4.5 Existing road safety issues (crash data)

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

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

It should be noted that DTMR and RMS apply different categorisations for crash severity. As a result, crash data has been summarised separately for each of these regions. Additionally, DTMR does not report on non-injury (i.e. uncategorised) crashes as of 2010, therefore, non-injury crashes have been removed from the RMS dataset in this analysis. The crashes are classified using DTMR *Guide to Road Safety Part 8: Treatment of Crash Locations* Definition for Coding Accidents (DCA) code groups, with Table 4.10 demonstrating the DCA code group descriptions. These code groups have been used to determine the type of crash that occurs most frequently (highest prevalence out of total accidents by magnitude based on the data provided).

The Toowoomba Bypass (previously known as the Toowoomba Second Range Crossing) was opened in September 2019. As this road was not in operation when this assessment was conducted, any crash data is not considered to be in scope for this assessment.

The closure of Morris Road proposed in this assessment and the associated traffic impacts to the Gowrie Junction area have been assessed in an additional technical note. For further details refer Appendix T and Appendix U.

Table 4.10 DCA Code Group Descriptions

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

Source: DTMR Guide to Road Safety Part 8: Treatment of Crash Locations

4.5.1 Crash analysis: Construction routes

Based on the provided DTMR and RMS data, a breakdown of reported incidents by crash severity within the TIA study area has been provided in Table 4.11. The data in this table shows the crash events within the extent of the road sections proposed to be used as primary construction routes for the Project. The TIA study area for this analysis has been defined as road sections along which construction traffic travels. Figures illustrating proposed construction traffic routes and crashes occurring along these routes within the nominated 5-year period have been provided in Appendix E.

In order to provide additional context into crash activity along construction traffic routes, Table 4.11 also provides the road section lengths, existing background volumes (AADT) and expected average daily traffic volumes (ADT) from the construction traffic, within the identified peak construction period. This table also identifies the DCA Code Group (refer Table 4.10 for DCA Code Group descriptions) that occurs most frequently (highest prevalence out of total accidents by magnitude based on the data provided).

Table 4.11 Construction traffic route crash data summary for nominated five year period

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total crashes	Crash severity				Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	DCA Code Group	DCA %
LGR: TRC										
Boundary Street	No Crashes									
Cooby Dam Road	No Crashes									
Gowrie Junction Road	3.95	4,201	165	3	0	2	1	0	2	33
Griffiths Street	1.43	5,930	91	8	0	4	3	1	4	63
Hermitage Road	3.47	185	52	2	0	2	0	0	1	50
Highfields Road	4.36	2,907	45	12	0	4	5	3	1	42
Klein Road	No Crashes									
Kleinton School Road	No Crashes									
Krienke Road	No Crashes									
Larcombe Street	No Crashes									
Main Street	No Crashes									
McDougall Street	0.62	47	1	7	0	3	3	1	1	29
Meringandan Road	No Crashes									
Meringandan Shirley Road	2.56	2,448	28	1	0	1	0	0	1	50
Morris Road	0.7	2,199	134	3	0	2	1	0	16	33
Mort Street	2.81	185	105	28	0	12	14	2	1	43
Munro Street	No Crashes									
North Street	3.42	7,710	9	18	1	2	14	1	4	33
Old Goombungee Road	1.54	934	28	2	0	0	2	0	1	50
Old Homebush Road	No Crashes									
Old Mort Street	No Crashes									
Omara Road	1.65	28	1	3	0	2	1	0	1	67
Paulsens Road	No Crashes									

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total crashes	Crash severity				Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	DCA Code Group	DCA %
Pipe Street	0.27	520	1	1	0	1	0	0	15	100
Pipeline Road	No Crashes									
Witmack Road	No Crashes									
LGR: LVRC										
Airforce Road	No Crashes									
Arthur Street	No Crashes									
Ashlands Drive	No Crashes									
Bells Road	No Crashes									
Cattos Road	No Crashes									
George Street	No Crashes									
Gittins Road	No Crashes									
Howmans Road	No Crashes									
Jones Road	8.8	1,160	246	2	0	1	1	0	1	50
Laidley Street	No Crashes									
Lawlers Road	0.55	2,370	55	1	0	1	0	0	19	100
Little Oaky Creek Road	0.45	793	191	1	0	1	0	0	19	100
Mary McKillop Street	No Crashes									
McNamaras Road	No Crashes									
Postmans Ridge Road	2.65	447	226	7	1	1	2	3	21	40
Roches Road	No Crashes									
Seventeen Mile Road	No Crashes									
Station Street	No Crashes									
Turner Street	No Crashes									
Unnamed Road	No Crashes									
William Street	No Crashes									

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total crashes	Crash severity				Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	DCA Code Group	DCA %
SCR: DTMR										
17B - Cunningham Highway	4.3	42,167	11	18	0	10	6	2	3	28
314 - Gatton Helidon Road	14.3	5,060	4	27	1	14	9	3	1	26
17A - Ipswich Motorway	8.2	108,841	34	109	0	42	51	16	4	39
301 - Ipswich-Cunningham Highway Connection Road	4.7	27,588	166	78	1	24	40	13	4	50
Logan Motorway	30.2	108,841	34	211	2	82	105	22	4	35
4104 - Murphys Creek Road	24.5	1,859-2,150	133	28	1	17	8	2	4	33
22A - New England Highway	13.5	20,403	29	93	3	39	40	11	4	32
12A - Pacific Motorway	66.6	157,018	34	1104	12	403	558	131	4	54
309 - River Road	0.7	7461	176	3	0	1	1	1	1	33
319 - Toowoomba Bypass	No data (new road – opened in September 2019)									
324 - Toowoomba Cecil Plains Road	1.8	3,117	118	1	0	1	0	0	4	100
315 – Toowoomba Connection Road (section of Warrego Highway)	11.7	24,605	424	544	10	216	260	58	4	27
18A - Warrego Highway	105.7	57,860	424	544	10	216	260	58	4	27
State Controlled Roads: RMS										
Pacific Arterial	216	16,224	34	496	26	181	205	84	16	19
Summerland Way	4.8	3,353	20	16	0	6	8	2	1	56
LGR: CVC										
Bent Street	1.67	24,125	34	11	0	2	9	0	4	36
Charles Street	No Crashes									
Clarence Street	0.58	7,600	14	10	0	0	8	2	1	70
Clark Road	No Crashes									
Craig Street	0.25	24,125	34	10	0	3	4	3	4	20
Dobie Street	1.45	7,600	20	4	0	0	4	0	1	100

Road name	Length (km)	Background volume (AADT)	Peak construction volume (ADT)	Total crashes	Crash severity				Most frequent DCA group	
					Fatal	Hospitalisation	Medical treatment	Minor injury	DCA Code Group	DCA %
Fry Street	No Crashes									
Mary Street	0.23	7,600	14	2	0	0	2	0	1	100
Oliver Street	1.18	7,600	14	13	0	1	9	3	1	85
Trenayr Road	No Crashes									
Villers Street	No Crashes									
LGR: ICC										
Fairbank Place	No Crashes									
Haigslea Malabar Road	1.7	407	41	7	0	3	3	1	1	57
Mount Marrow Quarry Road	1.7	407	41	1	0	1	0	0	3	100
Newhill Drive	No Crashes									
Noblevale Way	No Crashes									
Redbank Plains Road	1.5	15,711	11	8	0	3	4	1	4	38
Rob Roy Way	No Crashes									

4.5.2 Crash analysis: road rail interface locations

Crashes by crash severity and type which have occurred within a 200 m radius from existing and proposed public road rail interface locations (formed roads only) have been evaluated. A summary of these findings has been provided in Table 4.12, and a figure showing the proposed road rail interface and 200 m buffer has been provided in Appendix F.

The findings show that crashes have occurred within 200 m of two public road rail interfaces, one existing and one proposed, in the past five years:

- 320-1-E-1 Paulsens Road (referenced as Gowrie Junction Road by QR)
- 320-2-P-1 Morris Road.

As per Table 3.4, no level crossing is proposed to be provided at these locations with the introduction of the Project, removing the risk of crashes at interfaces with the Project at these locations.

Table 4.12 Crash analysis: Proposed public road rail interface (formed roads only, within 200 m radius)

Interface ID	Road name	Recorded Crashes (200 m radius)
TRC		
320-1-P-0	Draper Road	No crashes were recorded
320-1-P-0a	Gowrie Junction Road	No crashes were recorded
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)	One crash was recorded (crash intensity- medical treatment)
320-1-P-1	Morris Road	No crashes were recorded
320-2-P-1	Morris Road	Two crashes were recorded (crash intensity- 1 medical treatment, 1 hospitalisation)
LVRC		
320-4-P-2	Wallens Road	No crashes were recorded
320-4-P-2a	Wallens Road	No crashes were recorded
320-4-P-4	Jones Road	No crashes were recorded
320-5-P-1	McNamaras Road	No crashes were recorded
320-6-P-3	Gittins Road	No crashes were recorded
320-8-P-4	Cattos Road	No crashes were recorded
320-9-P-1	Cattos Road	No crashes were recorded
DTMR		
320-6-P-1	Toowoomba Bypass (previously Toowoomba Second Range Crossing)	No data (new road)
320-7-P-2	Murphys Creek Road	No crashes were recorded

4.6 Other proposed developments

Construction schedules from other major developments will be considered as part of a cumulative assessment process. The cumulative impact evaluation is provided in Section 11. This will include adjacent Inland Rail sections as well as other committed major projects of significance (e.g. InterLinkSQ).

5 Construction traffic generation and assignment

5.1 Construction transport modes

The construction traffic impact assessment contained within this report has been undertaken based on the construction task, material sources, quantities, modes, routes and durations identified in the Project constructability review outlined within this section. However, the ultimate determination of the final construction and heavy vehicle routes will be subject to detailed design and consultation between DTMR, the relevant LGA, the construction contractor and, where relevant, QR. The TIA will need to be updated at that stage, in line with the GTIA. Existing multi-combination heavy vehicle routes for the TIA study area have been provided in Appendix O.

Construction transport will primarily be by road, other than part of the fill task which will be transported via haul routes within the Project corridor. Additionally, it is intended that the rail task will be delivered to the nominated sites by rail. These nominated sites include one at each end of the proposed rail alignment. Distribution from this point across the Project will then be carried out by a combination of truck and work train when that option becomes available. The flexibility to move rail along the Project alignment by truck will be required. Table 5.1 lists the major construction activities, anticipated delivery method, estimated quantities used for this assessment and indicative dates. The dates provided in Table 5.1 reflect anticipated time periods that the tasks will be operating along the public road network, and do not necessarily reflect all movement of materials.

For the purposes of this assessment, it has been conservatively assumed that plant tools and other materials would follow the same proposed routes as the workforce routes and have been included in these trips. The exact schedule of delivery is unknown at this stage of the Project; therefore, a uniform delivery schedule has been utilised as an indicative schedule. Further information on the construction delivery schedule will be required to be developed by the appointed construction contractor once delivery materials and routes are determined.

Table 5.1 Construction activities contributing to traffic generation and transport mode

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

Material	Delivery method	Quantity/volume	Start date*	End date*
Culverts	Road	items (various sizes)	April 2022	August 2023
Construction water	Road	Approximately 700 megalitres (ML)	March 2022	September 2025

Table note:

* Start and end dates are indicative only

m^3 = Cubic metres

t = tonnes

bcm = Bank cubic metres

5.2 Construction staging

Staging relates to construction start and end dates of all construction related activities within the envisaged construction period, as displayed in Table 5.1. The start and end dates of all associated construction are taken into account in order to determine the peak period for the Project. Although there may be materials delivered prior to the analysis construction start and end dates, for the purposes of this assessment it was conservatively assumed that delivery and construction would begin at the same time. Fluctuations may occur on site due to the early delivery of materials. However, reference 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 Project when a construction contractor is appointed. Likewise, consideration of micro fluctuations will need to be taken into account at that stage. Nonetheless, the mitigation measures provided as a part of this assessment acknowledge these possibilities and the requirement for a TMP to ensure that the impact on the road network is managed.

Construction schedules relating to other committed projects of significance were taken into account in the Section 11 in order to determine potential construction schedule overlapping of the Project's peak period and to account for cumulative impacts.

5.3 Estimated material requirements

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

5.3.1 Borrow material

The Project alignment does not require borrow materials for general fill from outside of the nominated footprint. The estimated earthworks quantities per kilometre of chainage are illustrated in Figure 5.1. No borrow pits have been proposed for the Project.

It is anticipated that structural fill will be either processed from the Project excavated material out of the large cutting at the western tunnel portal or sourced from existing quarries. Similarly, it is anticipated that capping material will also be sourced from nearby existing quarries. For further details on quarry locations refer Section 5.3.2.

5.3.2 Quarry material

The expected volumes of capping and rail ballast and allocated source quarries for the Project are shown in Table 5.2. Total amounts for ballast are based on the following:

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

Quarry materials for road construction have not been included in this assessment. They will be included in the detailed design phase of the Project once the final road realignments are confirmed. It is noted that the volumes required for the road realignments are minor when compared the volume of quarry material required for the Project alignment.

Proposed primary construction routes for quarry material can be found in Appendix K.

Table 5.2 Quarry materials

Material type	Quarry site	Supply chainage		Quantity (t)	Laydown	Comment
		From	To			
Bottom ballast	Boral Wellcamp Downs	-1.76	4.14	16,206	G2H-LDN001.7	Including crossing loop
	Harlaxton Quarry	10.33	13.70	11,134	G2H-LDN011.9	Including crossing loop
	Harlaxton Quarry	13.70	16.70	6,000	G2H-LDN015.5	
	Harlaxton Quarry	16.70	19.55	5,700	G2H-LDN017.9	
	Harlaxton Quarry	19.55	23.10	11,500	G2H-LDN021.2	Including crossing loop
	Mount Marrow Blue Metal Quarry	23.10	26.30	6,398	G2H-LDN025.0	
Top ballast	Boral Wellcamp Downs	-1.76	4.14	8,103	G2H-LDN001.7	Including crossing loop
	Harlaxton Quarry	10.33	13.70	5,567	G2H-LDN011.9	Including crossing loop
	Harlaxton Quarry	13.70	16.70	3,000	G2H-LDN015.5	
	Harlaxton Quarry	16.70	19.55	2,850	G2H-LDN017.9	
	Harlaxton Quarry	19.55	23.10	5,750	G2H-LDN021.2	Including crossing loop
	Mount Marrow Blue Metal Quarry	23.10	26.30	3,199	G2H-LDN025.0	
Capping	Boral Wellcamp Downs	-1.76	4.14	34,287	G2H-LDN001.7	Including crossing loop
	Harlaxton Quarry	10.33	13.70	15,360	G2H-LDN011.9	Including crossing loop
	Harlaxton Quarry	13.70	16.70	7,439	G2H-LDN015.5	
	Harlaxton Quarry	16.70	19.55	7,727	G2H-LDN017.9	
	Harlaxton Quarry	19.55	23.10	14,447	G2H-LDN021.2	Including crossing loop
	Mount Marrow Blue Metal Quarry	23.10	26.30	10,525	G2H-LDN025.0	

5.3.3 Mass-haul

The estimated earthworks quantities per kilometre of chainage are illustrated in Figure 5.1. The current data suggests that the Toowoomba Range tunnel will produce material to be spoiled but the Project alignment earthworks will need to borrow a small amount of material on the eastern end in order to balance quantities. Opportunities available for the storage/spoiling of tunnel materials are:

- Tunnel boring machine excavated material will be spoiled on the land adjacent to the western tunnel portal
- Intermediate ventilation shaft excavation material will be spoiled on the land adjacent to the western tunnel portal
- Intermediate ventilation shaft excavation material may also be able to be spoiled at the TRC landfill site west of the Intermediate ventilation shaft location.

Proposed primary construction routes for mass haul material can be found in Appendix G.

5.3.4 Precast and bulk concrete

The type and number of precast concrete elements and estimates of bulk concrete requirements for bridges and culverts has been provided in Table 5.3 and Table 5.4.

Proposed primary construction routes for precast concrete for both bridge and culvert construction can be found in Appendix I and Appendix J respectively. Proposed primary construction routes for bulk concrete, for both bridge and culvert construction collectively, can be found in Appendix H.

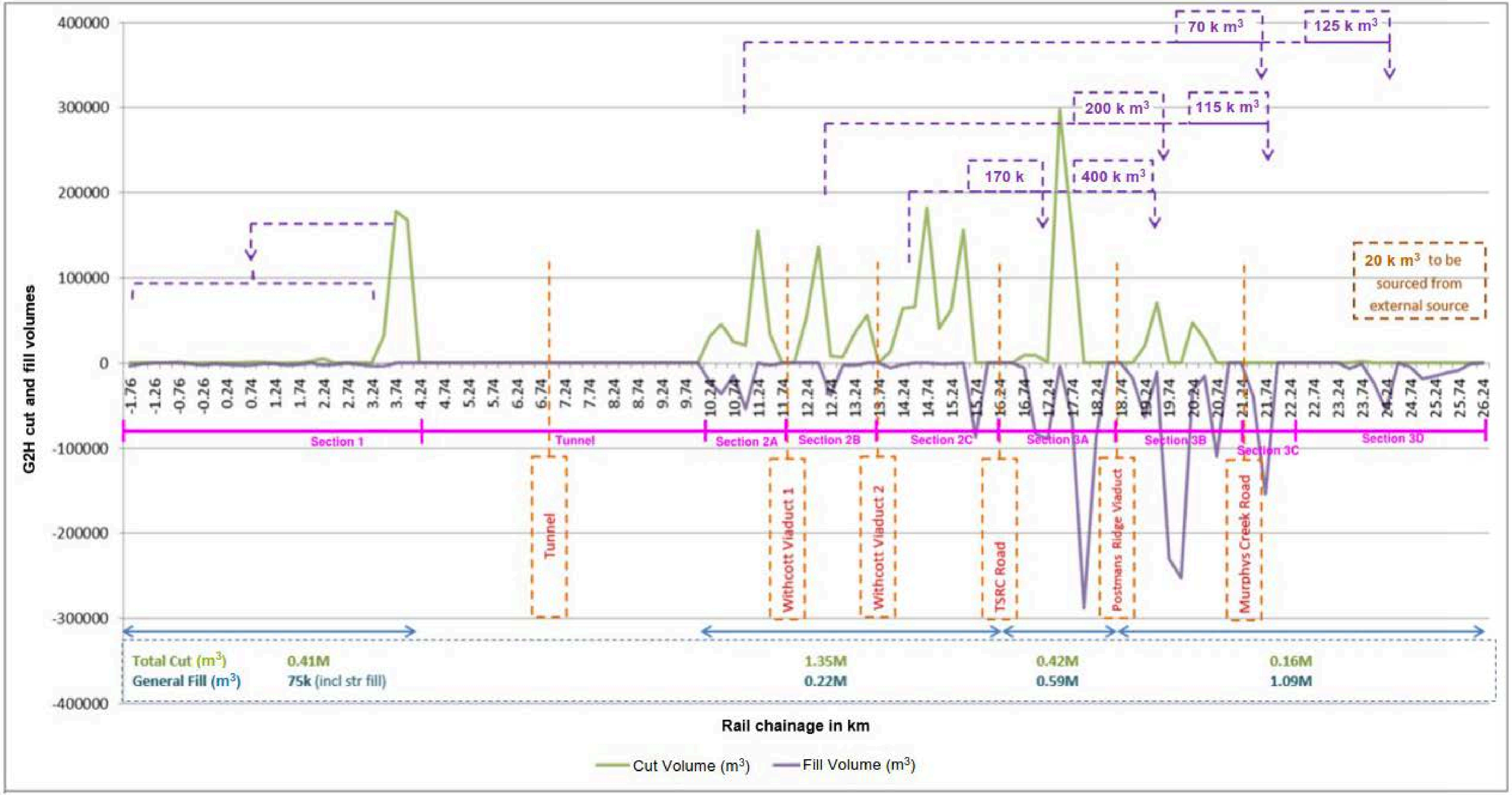


Figure 5.1 Estimated earthworks quantities

Figure notes:

TSRC = Toowoomba Bypass
M = million, k = thousand

Table 5.3 Concrete logistics for bridge construction

ID	Bridge name	Laydown	Bridge length (m)	Bridge type	Bridge width (m)	Concrete trucks
320-BR01	Gowrie Junction Road Bridge	G2H-LDN001.8 G2H-LDN002.1	311	Road	13	886
320-BR02	UT1 Gowrie Creek Rail Bridge	G2H-LDN003.7	56	Rail	8.47	39
320-BR04	Oaky Creek viaduct	G2H-LDN011.9 G2H-LDN012.0	736	Rail	12.41	914
320-BR05	Withcott viaduct 1	G2H-LDN012.8	261	Rail	3.97	236
320-BR06	Withcott viaduct 2	G2H-LDN013.8	322	Rail	6.41	321
320-BR07	Withcott viaduct 3	G2H-LDN014.2	174	Rail	3.97	285
320-BR08	Withcott viaduct 4	G2H-LDN015.2 G2H-LDN015.4	145	Rail	3.97	205
320-BR09	McNamaras Road Bridge	G2H-LDN015.5	73.9	Road	10.50	124
320-BR10	Six Mile Creek viaduct	G2H-LDN015.5 G2H-LDN016.4	966	Rail	6.41	959
320-BR11	Postmans Ridge viaduct	G2H-LDN018.4 G2H-LDN018.8	644	Rail	6.41	613
320-BR12	Murphys Creek Road viaduct	G2H-LDN021.2	690	Rail	12.41	846
320-BR13	Withcott Seedlings viaduct	G2H-LDN022.5	1794	Rail	6.41	1778
320-BR14	Lockyer Creek viaduct	G2H-LDN024.8 G2H-LDN025.0	506	Rail	6.41	535

Table 5.4 Concrete logistics for culvert construction

ID	Chainage (m)	Type	No of structures	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C-1.42	-1421	RCP	6	0.90		11.6	69.636	8	29	2	3
C-0.25	-252	RCP	1	1.65		8.5	8.464	4	4	1	1
C-0.25	-248	RCP	2	1.65		16.8	33.518	8	14	2	2
C0.11	106	RCBC	1	1.20	0.9	7.1	7.137	5	6	1	1
C0.21	208	RCBC	6	3.00	2.7	10.0	60.258	105	51	18	6
C1.03	1029	RCBC	3	3.00	2.1	14.8	44.418	60	38	10	4
C1.46	1455	RCBC	2	1.20	0.6	14.7	29.322	13	25	3	3
C2.41	2408	RCBC	6	1.80	1.8	18.8	112.644	81	94	14	10
C3.14	3144	RCBC	1	0.90	0.9	18.2	18.223	7	16	2	2
C10.5	10500	RCP	7	2.70		106.6	746.41	60	306	10	31
C10.98	10980	RCP	2	1.20		72.7	145.322	4	60	1	6
C11.1	11101	RCP	2	1.50		118.2	236.484	6	97	1	10
C11.43	11432	RCBC	2	1.20	0.9	16.1	32.162	16	27	3	3
C13.46	13461	RCP	1	1.20		17.7	17.745	2	8	1	1
C14.07	14066	RCP	1	0.90		32.3	32.305	2	14	1	2
C14.68	14683	RCBC	4	1.20	0.9	7.1	28.376	17	24	3	3
C15.05	15052	RCBC	1	1.20	0.9	7.5	7.492	5	7	1	1
C15.77	15766	RCP	1	1.20		56.7	56.698	2	24	1	3
C17.08	17077	RCP	1	1.20		104.1	104.085	2	43	1	5
C17.35	17346	RCP	1	1.20		64.9	64.889	2	27	1	3
C17.42	17421	RCP	1	0.90		45.1	45.114	2	19	1	2
C17.52	17523	RCP	1	1.65		27.9	27.941	4	12	1	2
C17.99	17991	RCP	1	1.65		92.8	92.81	4	39	1	4
C18.16	18159	RCP	1	1.65		116.5	116.481	4	48	1	5
C18.28	18276	RCP	1	1.35		94.3	94.323	4	39	1	4

ID	Chainage (m)	Type	No of structures	Diameter/ width (m)	Height	Length (m)	Total barrel length (m)	Total concrete volume (m^3)	No. drainage elements	No. concrete delivery trucks	No. precast delivery trucks
C19.33	19328	RCP	2	1.20		69.2	138.376	4	57	1	6
C19.78	19777	RCP	1	1.65		95.9	95.893	4	40	1	4
C19.93	19925	RCP	1	1.35		112.8	112.756	4	47	1	5
C20.08	20083	RCP	2	1.35		116.0	232.054	6	96	1	10
C20.53	20525	RCP	1	0.90		26.8	26.815	2	11	1	2
C20.78	20783	RCP	1	1.35		92.3	92.313	4	38	1	4
C25.31	25309	RCP	1	1.20		42.9	42.902	2	18	1	2
C25.94	25939	RCBC	3	3.00	1.2	12.8	38.466	47	33	8	4
C3.12	3124	RCBC	4	1.20	0.9	7.4	29.764	17	25	3	3
C3.51	3513	RCBC	5	1.20	0.9	12.1	60.38	28	51	5	6

5.3.5 Construction water requirements

Overall an allowance of approximately 700 ML of water has been made for the Project. The main construction elements requiring water including quantity, quality and flow rate are detailed in the Table 5.5. Any work on potential admixtures for water for earthworks or concrete production may impact the quantity and quality of water required.

Table 5.5 Construction water requirements

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

TRC operates three dams north of Toowoomba, Lake Perseverance, Cressbrook Dam and Cooby Dam. Figure 5.2 shows the location of the dams in the vicinity of the Project alignment. The combined storage capacity of the three dams is 125,500 ML.

For the purpose of the traffic impact assessment it has been assumed that all construction water will be supplied from Cooby Dam.

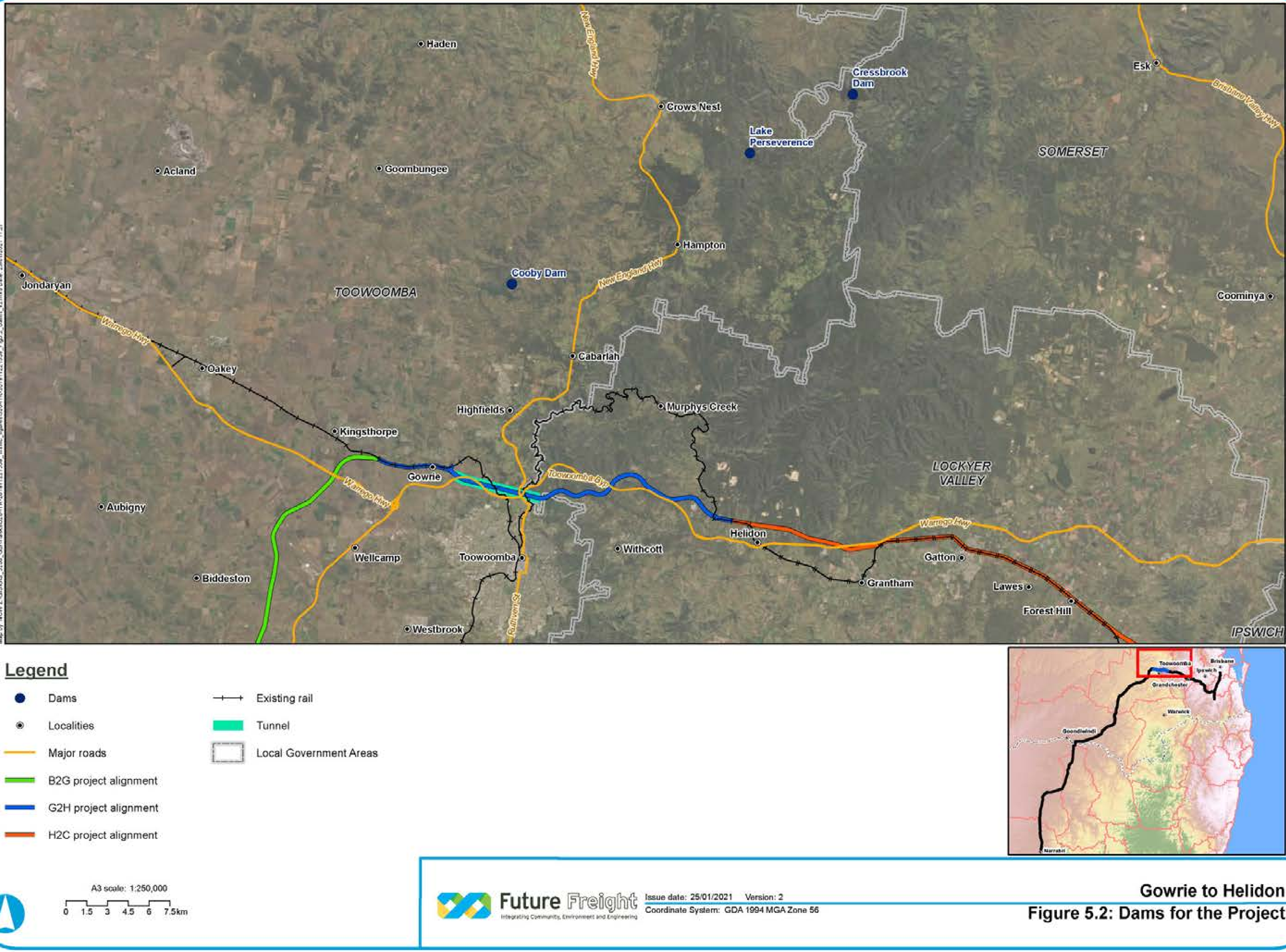
Construction water will be supplied to various points (e.g. laydown areas) along the Project alignment for activities including earthworks, haul road maintenance, dust suppression, track works and for the proposed concrete batch plant. These proposed routes for water can be found in Appendix M.

An allowance of 190 L/m^3 of earthworks has been made in building up the estimated water demand requirements during earthworks. This is a conservative estimate based upon actual requirements recorded on the Toowoomba Second Range Crossing project.

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

The total water requirements along the Project alignment (ML vs Chainage) are provided in Figure 5.3. Proposed primary construction routes for water can be found in Appendix M.

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



Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 5.2: Dams for the Project

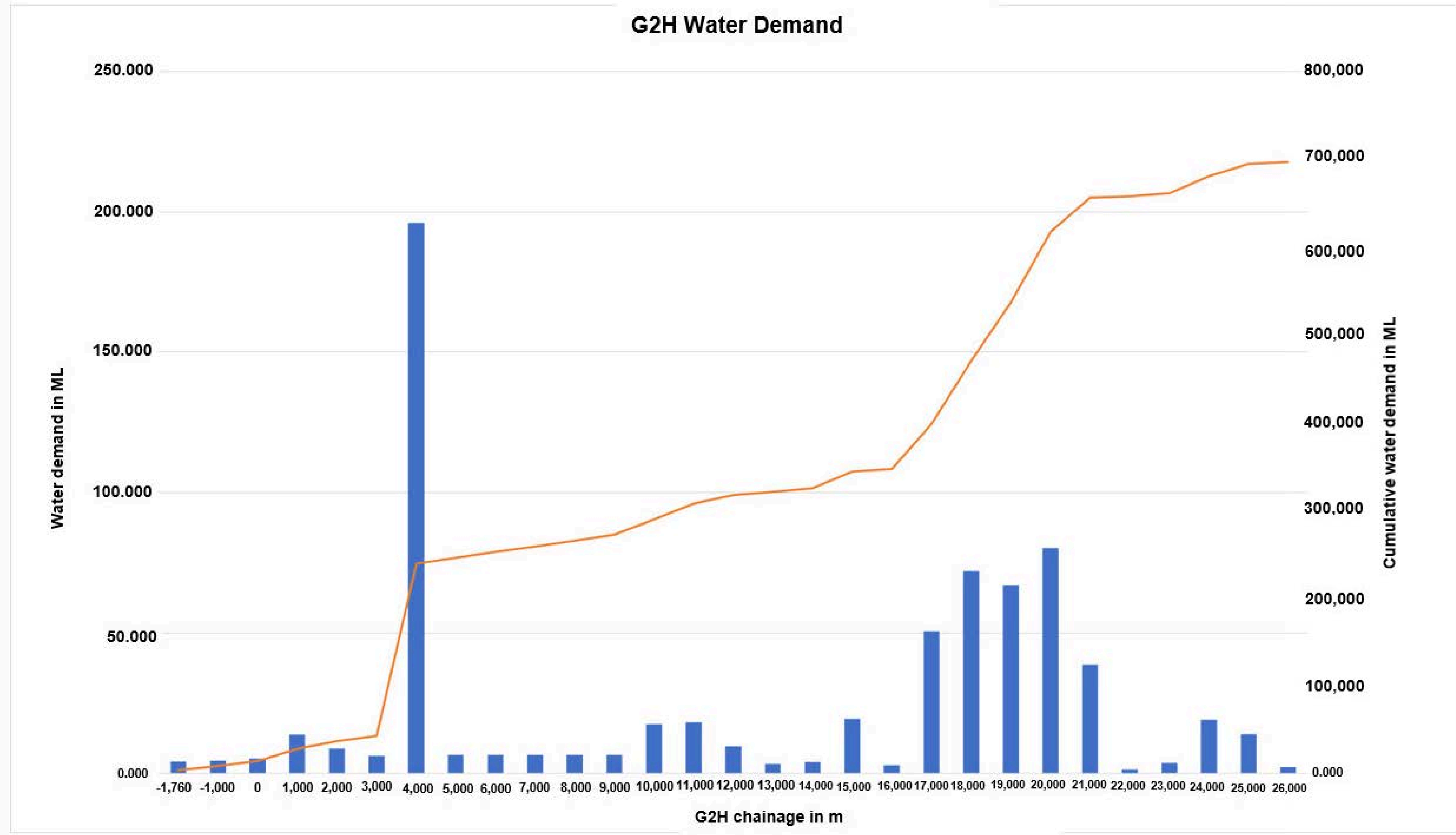


Figure 5.3 **Water demand along Project**

Further, the current intention is to utilise the expected groundwater inflow during construction to support the operation of the tunnel boring machine, along with dust control, rehabilitation works and the for compaction of spoil at the western tunnel portal. The water (treated or untreated) will also be redirected into a tributary of Gowrie Creek and Oaky Creek at the western and eastern tunnel portals respectively.

This would reduce the number of trips between Lake Cooby and the Project, and will also mitigate the need for trips to disposed of the groundwater inflow (up to 1,700 ML during construction).

The EIS has also identified a number of alternative water sources to Lake Cooby including the opportunity to draw water from the areas within the Project disturbance footprint, including from the water pipelines from the Wetalla Water Treatment Plant which provides recycled water to Millmerran Power Station and New Acland Mine. A water pipeline linking the western tunnel portal into the TRC water network may also supply construction water especially for concrete batching.

The source of construction water, spatially and temporally, across the Project alignment will confirmed during detailed design by the construction contractors, with this information to inform a revised TIA.

5.4 Workforce

A preliminary estimate of the workforce required to undertake the Project works to the nominated Program is shown in Figure 5.4. Workforce on site for the Project is estimated to peak at 596 full time equivalents (FTE) at week 60, and maintain a high staff load of approximately 465 FTE between weeks 40 and 122. Throughout the course of the construction period, the average number of workers required is approximately 264 FTE.

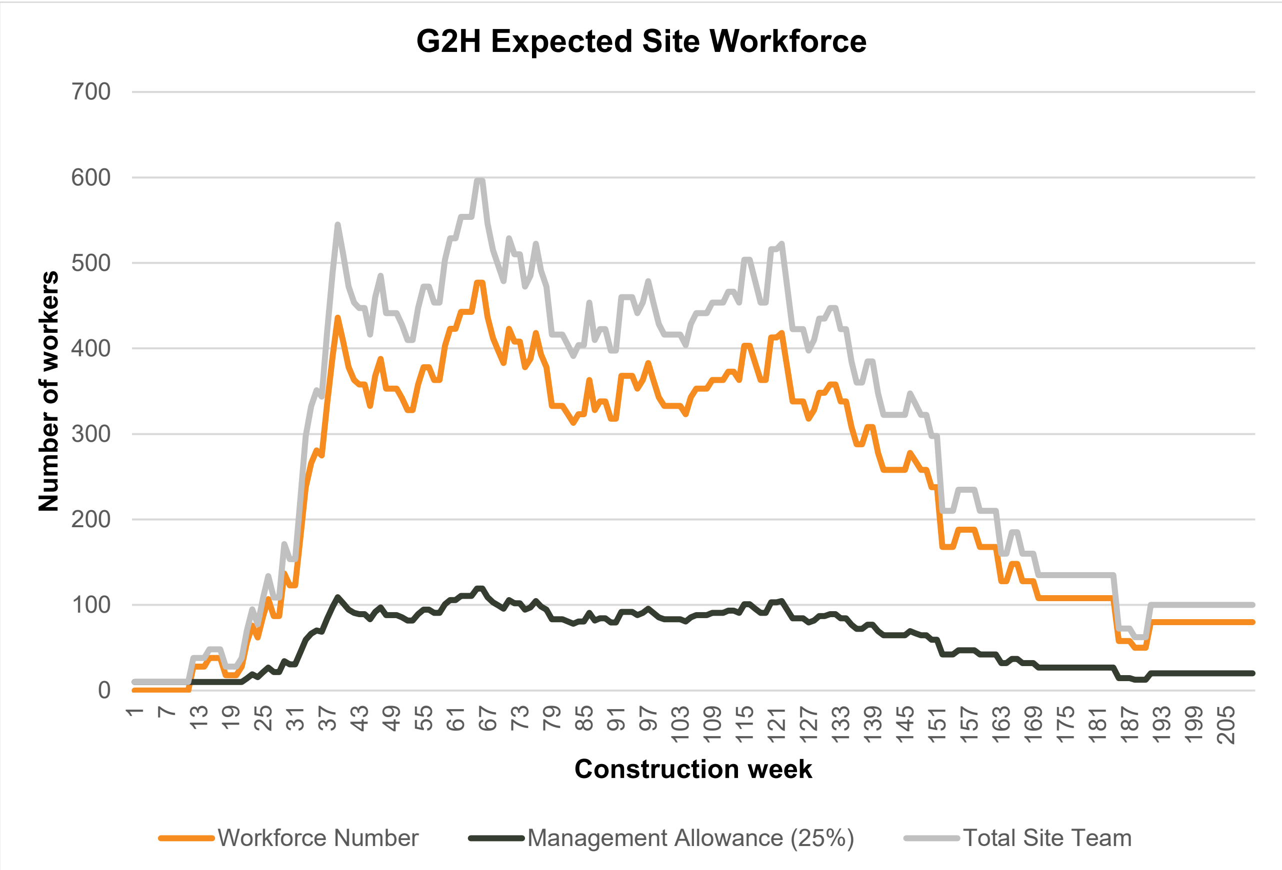


Figure 5.4 Estimated site workforce

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

Despite this number of people on site, an accommodation camp is not considered necessary due to the reasonably close proximity of population centres that will offer both workforce and accommodation options.

Population centres in the vicinity of the Project alignment large enough to offer both workforce and accommodation are listed in Table 5.6.

Table 5.6 Available accommodation

Town/city	Population	No. of hotels/motels[1]	No. of available rentals (as of March 2019)[2]
Toowoomba	100,000	100	500
Gatton	7000	5	50
Ipswich	200,000	30	500

Table notes:

1 Based on available, published data. Rounded estimates

2 Rounded estimates to the nearest 1000th

5.5 Hours of work

The construction program will be based on the following worksite hours (unless approved otherwise):

- General construction activities:
  - Monday to Friday – 6.30 am to 6.00 pm
  - Saturday – 6.30 am to 1.00 pm
- No work planned on Sundays or public holiday
- Tunnel construction activities (underground and surface)
  - 24 hours a day, 7 days a week.
- Track possessions will proceed on a 7-day/24-hour calendar basis.

QR and ARTC track possessions will generally be allocated over weekend periods, with extended track possessions occurring over holiday or non-seasonal periods (i.e. outside of grain movement periods). Works outside of standard construction hours will occur throughout the duration of the construction program and will involve:

- Track works including tamping, ballast profiling, earthworks and formation works
- Delivery of concrete, steel, and other construction materials delivered to site by heavy vehicles
- Movements of heavy plant and materials. Arrival and departure of construction staff during shift changeovers.
- Roadworks to arterial roads
- Traffic control crews, including large truck mounted crash attenuator vehicles, medium rigid vehicles, and lighting towers
- Incident response including tow-trucks for light, medium, and heavy vehicles
- Alternative construction rosters to suit delivery and industrial relations issues may be investigated by the construction contractor
- Various low intensity activities.

5.6 Construction transport routes

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

All routes generally follow roads that are proposed to be used for the transport of each material type, taking into account distance, load limits, height and weight limits (where known) and where possible staying on arterial roads and avoiding populated areas such as town centres. All routes passing through or originating in Toowoomba have been formed using Nexus Toowoomba Bypass predetermined haulage routes as a guide. The NHVR journey planner was also used to identify roads suitable for heavy vehicles.

5.6.1 Access tracks and haul routes

Several access tracks, outlined in Table 5.7, have to be developed to facilitate access to the laydown and construction sites located along the length of the Project alignment. These access tracks must be constructed with a proposed pavement treatment suitable for the vehicle type required to access the location. Consideration should also be given to the final surface of these access tracks (exposed gravel or sprayed bituminous surfacing) in order to maintain and improve access during wet conditions and as an opportunity to reduce water usage for dust suppression.

Haul routes should be developed considering several factors such as separation requirements, one-way or two-way vehicle movements, overtaking requirements and vehicle weights to use the road. Haul routes have been located to adopt the future RMAR footprint or the formation prior to creating new tracks that will require future restoration once the construction work has been completed. The RMAR runs parallel to the proposed rail corridor and will be used as a haul route during construction and then as a maintenance track once construction is completed.

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

Due to the topography along the Project alignment, a number of access tracks have been nominated to access each of the pier and abutment locations of the viaducts with the intention to minimise the grade of the tracks (i.e. access roads/RMAR were designed based on a max grade of 10%). A full list of proposed access tracks is given in Table 5.7.

During the next phase of the Project, investigations will determine how these access tracks will connect to the existing road network. This will include determining if the intersections leading to these access tracks and laydown areas will be able to accommodate the predicted construction traffic.

Table 5.7 Temporary access track

ID	Location	Chainage (km)	Length (m)	Note
G2H-TRK002.00	Paulsens Road	2	152	Bridge access off Paulsens Road
G2H-TRK003.70	Western tunnel portal	3.7	380	Tunnel Portal access off Gowrie Junction Road
G2H-TRK006.80	Intermediate ventilation shaft	6.8	440	Intermediate ventilation shaft access utilising future RMAR
G2H-TRK010.40	Eastern tunnel portal	10.4	306	Tunnel portal access
G2H-TRK010.60	Eastern tunnel portal	10.6	305	Laydown access off Jones Road
G2H-TRK011.63	Oaky Creek viaduct Abutment A access	11.63	150	Abutment A access utilising future RMAR
G2H-TRK011.68	Oaky Creek viaduct Pier 1 access	11.68	200	Access through laydown area
G2H-TRK011.73	Oaky Creek viaduct Pier 2 access	11.73	100	Access off Jones Road
G2H-TRK011.80	Oaky Creek viaduct Pier 3, 4 access	11.8	140	Access off Jones Road
G2H-TRK011.90	Oaky Creek viaduct Pier 6, 7, 8 access	11.9	210	Access off Jones Road

ID	Location	Chainage (km)	Length (m)	Note
G2H-TRK012.00	Oaky Creek viaduct Pier 5, 9 access	12	1430	Access off Jones Road, existing dirt track will require upgrade
G2H-TRK012.10	Oaky Creek viaduct Pier 10, 11 access	12.1	500	Access from Jones Road along existing dirt track, upgrade required.
G2H-TRK012.25	Oaky Creek viaduct Pier 12, 13, 14 access	12.25	575	Access off Jones Road to avoid gas main, creek upgrade required.
G2H-TRK012.30	Oaky Creek viaduct Pier 15 access	12.3	200	Access off Jones Road to avoid gas main, creek upgrade required.
G2H-TRK012.35	Oaky Creek viaduct Abutment B access	12.35	250	Access off Jones Road to avoid gas main, creek upgrade required.
G2H-TRK013.55	Withcott viaduct 2 Abutment A access	13.55	160	Utilising future RMAR
G2H-TRK013.60	Withcott viaduct 1,2,3,4 access	13.6	4700	Utilising future RMAR
G2H-TRK013.70	Withcott viaduct 2 Pier 2,3 access	13.7	270	Utilising future RMAR
G2H-TRK013.80	Withcott viaduct 2 Pier 4 to 11 access Withcott viaduct 3 Pier 2,3,4 access	13.8	1240	Utilising future RMAR
G2H-TRK014.00	Withcott viaduct 2 Abutment B access	14	100	Utilising future RMAR
G2H-TRK014.20	Withcott viaduct 3 Pier 1 access	14.2	100	Utilising future RMAR
G2H-TRK014.30	Withcott viaduct 3 Abutment A, B and Pier 5 access	14.3	683	Access off Bells Road
G2H-TRK015.20	Withcott viaduct 4 Abutment A, Pier 1, 2 access	15.2	45	Utilising future RMAR
G2H-TRK015.30	Withcott viaduct 4 Pier 3, 4 access	15.3	71	Utilising future RMAR
G2H-TRK015.40	Withcott viaduct 4 Abutment B access	15.4	118	Utilising future RMAR
G2H-TRK015.70	Six Mile Creek viaduct Abutment A access	15.7	694	Utilising future RMAR
G2H-TRK015.90	Six Mile Creek viaduct Pier 1, 2 access	15.9	105	Utilising future RMAR
G2H-TRK016.10	Six Mile Creek viaduct Pier 3,4,5,6 access	16.1	686	Access off Gittins Road, existing track may require upgrading
G2H-TRK016.4	Six Mile Creek viaduct Pier 7 to 14 access	16.4	441	Access off Gittins Road, existing track may require upgrading
G2H-TRK016.60	Six Mile Creek viaduct Pier 15,16 access	16.6	70	Access off Gittins Road, existing track may require upgrading
G2H-TRK016.70	Six Mile Creek viaduct Pier 17,18,19, 20 access	16.7	419	Access off Gittins Road, existing track may require upgrading
G2H-TRK016.80	Six Mile Creek viaduct Abutment B access	16.8	131	Access off Gittins Road, existing track may require upgrading
G2H-TRK017.00	Hodges Road	17	1584	Access off Gittins Road
G2H-TRK018.00	Howmans Road	18	600	Utilising future RMAR
G2H-TRK018.30	Postmans Ridge viaduct Abutment A access	18.3	1036	Access off Howmans Road
G2H-TRK018.40	Postmans Ridge viaduct Pier 1 access	18.4	189	Access off Howmans Road

ID	Location	Chainage (km)	Length (m)	Note
G2H-TRK018.50	Postmans Ridge viaduct Pier 2 to 6 access	18.5	523	Access off Howmans Road
G2H-TRK018.70	Postmans Ridge viaduct Pier 7 access	18.7	461	Access off Howmans Road
G2H-TRK018.80	Postmans Ridge viaduct Pier 8,9,10 access	18.8	574	Access off Howmans Road
G2H-TRK019.00	Postmans Ridge viaduct Pier 11,12,13 and Abutment B access	19	395	Access off Howmans Road
G2H-TRK021.30	Murphys Creek viaduct Abutment A and Piers 1 to 11 access	21.3	659	Access off Murphys Creek Road utilising future RMAR
G2H-TRK021.60	Murphys Creek viaduct Pier 12, 13 access	21.6	120	Access off Murphys Creek Road utilising future RMAR
G2H-TRK021.70	Murphys Creek viaduct Pier 14 and Abutment B access	21.7	444	Utilising future RMAR
G2H-TRK022.00	Withcott Seedlings viaduct Abutment A and Pier 1 to 2 access	22	120	Utilising future RMAR
G2H-TRK022.60	Withcott Seedlings viaduct Pier 3 to 39 and Abutment B access	22.6	2323	Utilising future RMAR
G2H-TRK024.40	Lockyer Creek viaduct Abutment A and Piers 1 to 6 access	24.4	1060	Access off Ashlands Drive utilising future RMAR
G2H-TRK024.70	Lockyer Creek viaduct Abutment Piers 7,8 access	24.7	506	Access off Cattos Road
G2H-TRK024.80	Lockyer Creek viaduct Piers 9, 10 access	24.8	331	Access off Cattos Road
G2H-TRK024.90	Lockyer Creek viaduct Abutment B access	24.9	85	Access off Cattos Road

5.6.2 Consolidated sleeper routes

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

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

Two options exist for the delivery and installation of sleepers. The preferred option would be potentially selected through the direction of track construction or if using a track laying machine.

Sleepers could either be:

- Delivered by road to a number of temporary stockpile locations situated along the length of the corridor. Deliveries will be staged to suit the construction programme and minimise disruption on roads and to the travelling public. An excavator would place the sleepers using an ‘Octopus’ sleeper grab, which can pick up to six sleepers at a time and spread them to the correct spacing. Labourers will assist this activity by placing spacers over the last couple of sleepers that have been laid and the first couple that are being placed by the Octopus, to ensure that the correct spacing is maintained between the packs of sleepers.
- Delivered to the construction depot to be loaded onto the material train for direct discharge onto the formation by the track laying machine.

5.6.3 Quarry routes

For the purpose of this assessment, it has been assumed that the existing quarries along and in the vicinity of the construction corridor will be used to provide capping and ballast. Quarry construction routes have been based on the location of the quarries and routes most likely to be used for the transportation of material to the various laydown areas. For the purpose of this assessment it has been assumed that all ballast and capping deliveries will be made by road.

Quarries identified for supply of quarry materials for the Project are currently commercially operated quarries. These existing quarries, and any new proposed quarries, will be required to have all necessary planning approvals in place prior to supplying materials. Quarry routes for the Project are shown in Appendix K.

5.6.4 Delivery and collection of plant, tools and materials

It is envisaged that the delivery and collection of plant, tools and materials to the construction areas will be cascaded across the road network and occur irregularly. It is considered that the spreading of the trips of this construction activity across the external road network would have a minimal impact and be of an irregular pattern to model. It has therefore been conservatively assumed that these activities would follow the same proposed routes as the workforce routes and have been included in these trips.

5.6.5 Spoil disposal routes

It has been assumed that tunnel spoil from the construction of the tunnel via the tunnel boring machine (west to east) will be stockpiled at the western tunnel portal laydown area and therefore no spoil routes are required.

Spoil retrieved at the intermediate ventilation shaft will be hauled to the western tunnel portal spoil location by road. Tunnel spoil retrieved at the eastern tunnel portal will be either hauled to the spoil disposal site at the western tunnel portal or spoilt along the Project alignment. Spoil routes requiring public road use are accounted for in this assessment.

An opportunity exists for the tunnel spoil from the eastern tunnel portal to be disposed of at an existing TSRC stockpile site north of the eastern tunnel portal (no routes on public roads required). And spoil from the excavation of the intermediate ventilation shaft to be disposed of at the existing TRC landfill site directly west of the proposed intermediate ventilation shaft location which again will require no routes on public roads.

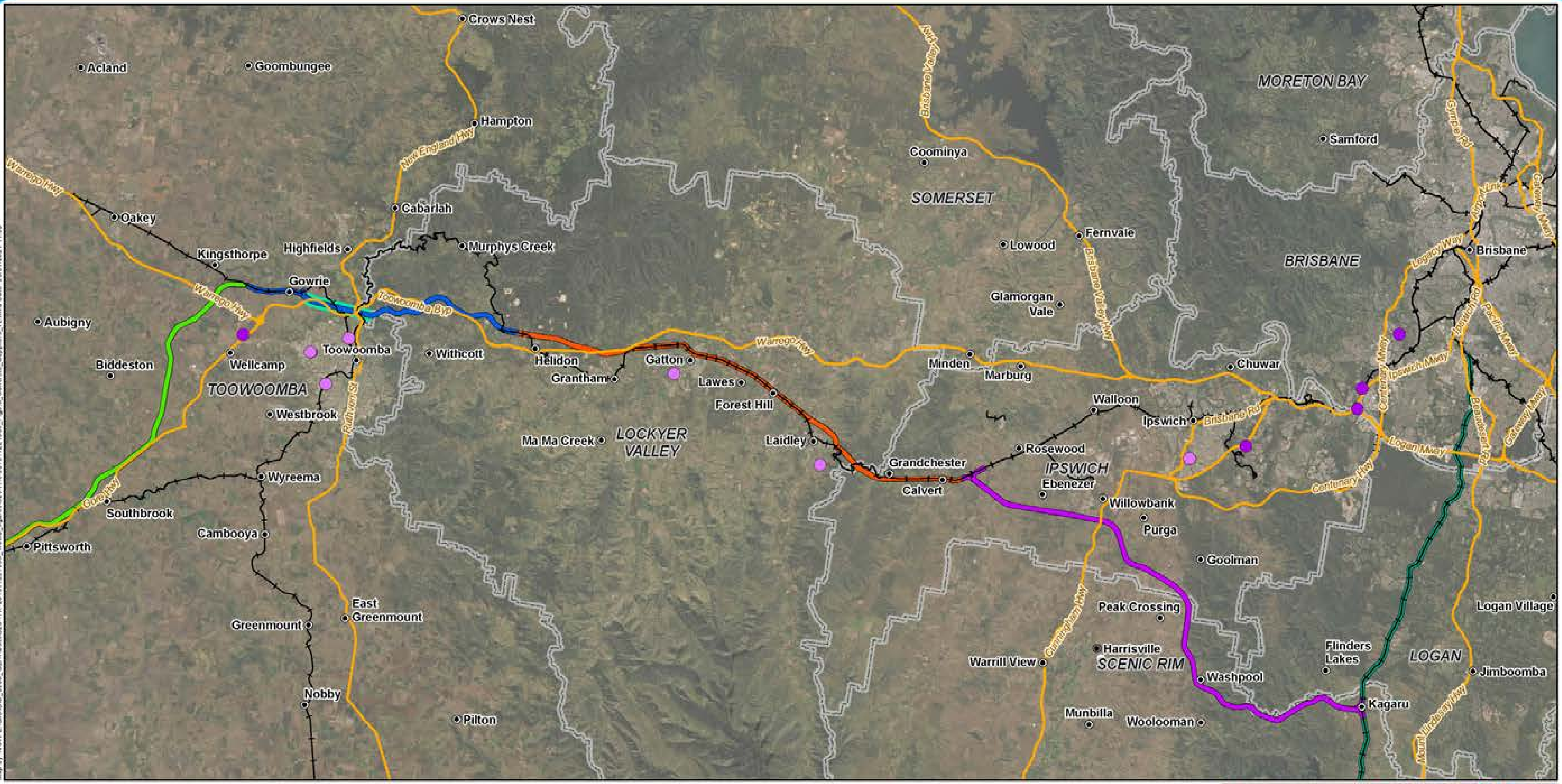
5.7 Construction activity

5.7.1 Precast concrete

A Concrete Batch Plant and Precast Facility has been proposed at the western tunnel portal. For the purpose of the traffic impact assessment it is assumed that all precast material and insitu concrete for the Toowoomba Range tunnel including both portals and the intermediate ventilation shaft will be supplied from the proposed Concrete Batch Plant and Precast Facility. Concrete used for the construction of the intermediate ventilation shaft and the eastern tunnel portal is assumed to come from existing suppliers in Toowoomba. The remaining insitu concrete required along the Project alignment will be sourced from existing concrete suppliers within supply.

For the purpose of this assessment, it has been assumed that all precast bridge girders, piers and headstocks required for bridges along the Project alignment will be delivered from suppliers in Brisbane. Precast drainage structures, such as reinforced concrete pipes (RCP) and reinforced concrete box culverts (RCBC), have been assumed to be delivered from suppliers in Toowoomba. Figure 5.5 displays the concrete suppliers, both bulk and precast, used in the assessment.

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



Legend

- Bulk concrete supplier
- Precast concrete supplier
- Localities
- B2G project alignment
- G2H project alignment
- H2C project alignment
- C2K project alignment
- K2ARB project alignment
- Major roads
- Existing rail
- Tunnel
- Local Government Areas

A3 scale: 1:400,000

0 3 6 9 12 15km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Figure 5.5: Concrete suppliers

The transportation of precast bridge girders by road most likely require police escort due the size of the individual girders. To reduce traffic impact transportation will most likely have to occur outside busy daytime hours and will be subject to further approvals. For further details on Project approvals refer Table 1.1 and EIS Chapter 3: Project approvals.

5.7.2 Quarry activity

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

Other types of quarry materials in addition to ballast and capping may be required for the Project, including cement, aggregate, road formation and drainage materials. These have been not included in this assessment, and the requirements may need to be assessed as a part of the detailed design for the Project when a construction contractor is appointed.

For the purpose of this assessment, it has been assumed that the existing quarries along and in the vicinity of the construction corridor will be used to provide capping and ballast. This means that out of the potential quarry sites summarised in Table 5.8, the first three (Harlaxton Quarry, Mount Marrow Blue Metal Quarry, Boral Wellcamp Downs) have been used in this assessment.

Quarry construction routes will be based on the location of the quarries and routes most likely to be used for the transportation of material to the various laydown areas. For the purpose of the traffic impact assessment it has been assumed that all ballast and capping deliveries will be made by road.

All potential quarry sites in the vicinity of Project are shown in Table 5.8. Plans illustrating the approximate locations of the quarries relative to the Project are illustrated in Figure 5.6, and quarry construction routes are shown in Appendix K.

Table 5.8 Schedule of quarries

Quarry Name	Location
Harlaxton Quarry	Harlaxton, QLD 4350
Mount Marrow Blue Metal Quarry	Mount Marrow, QLD 4306
Boral Wellcamp Downs	Wellcamp, QLD 4350
Wagner Airport Quarry Wellcamp	Wellcamp, QLD 4350
Holcim Australia Toowoomba Quarry	Toowoomba, QLD 4350
Boral Quarry Malu	Malu, QLD 4403
Jondaryan Quarry	Jondaryan, QLD 4403

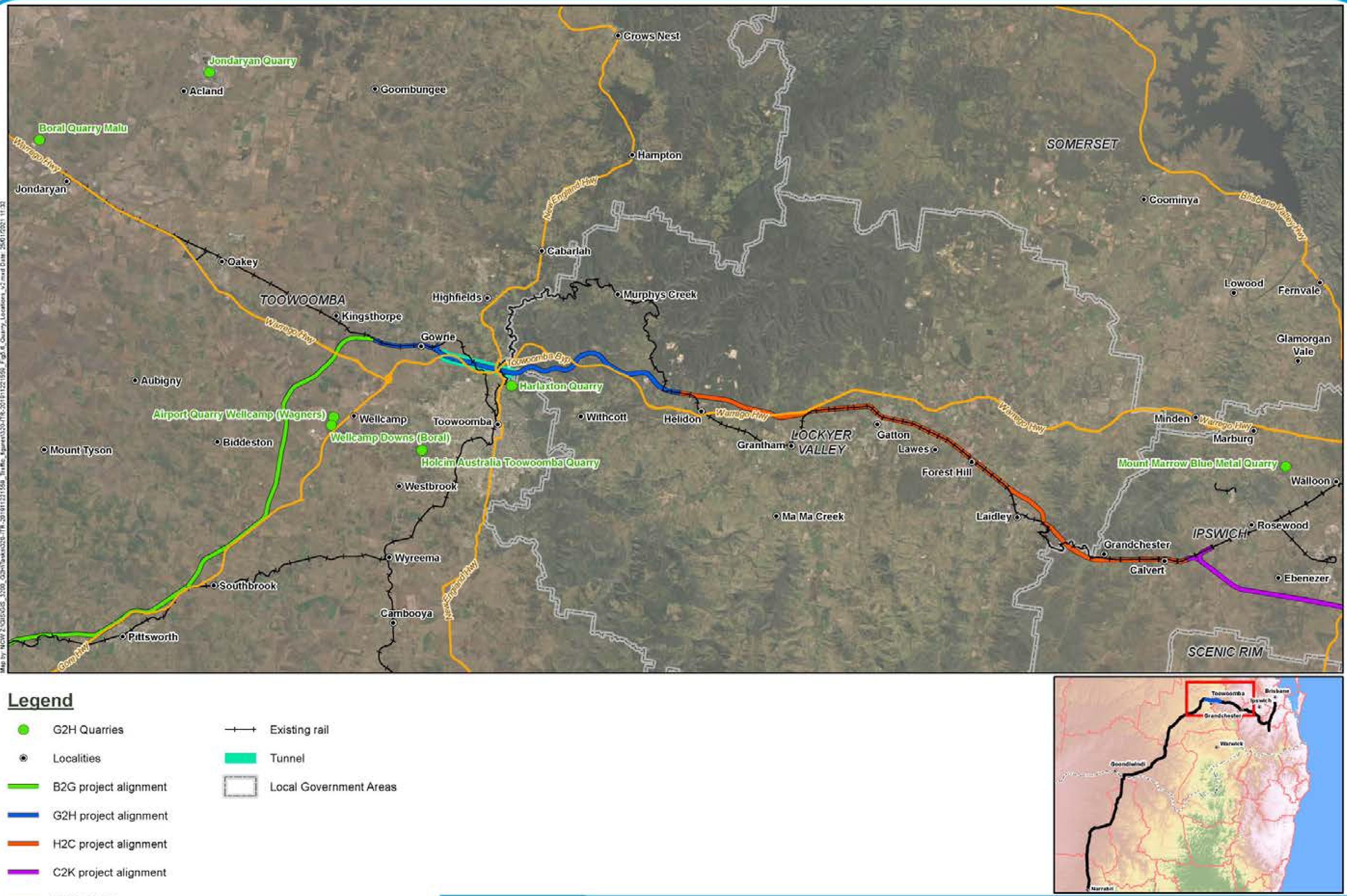
As outlined in Section 5.3.2 the TIA has not considered traffic impacts from transportation of road base material. The above-mentioned quarries may be used for road base materials, along with the identified haulage routes, to support the proposed civil works associated with the changes to the road network however this will be confirmed by the construction contractor during detailed design.

5.7.3 Rail activity

For the purpose of this assessment, it has been assumed that rail will be supplied by a single source and will be distributed from the closest existing QR rail network (likely the Western Moreton System). Road networks have been identified to achieve this in the case where further rail transportation is required.

The Project footprint has made allowances for the positioning of a temporary Flash Butt Welding/Rail support facility at one location along the corridor (refer Section 5.7.10).

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



Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 2
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 5.6: Quarry locations in the vicinity of the Project

The area for the facility is, approximately 13 ha in size near Nass Road at Charlton. The facility will support rail construction from the western end of the G2H alignment. It is assumed that rail will be delivered via the closest rail network (QR network). The rail from this point can be:

- Welded up into LWR (<400 m) within the nominated facility before then being transported down the rail corridor using rail roller, or
- Positioned along the Project alignment in short rail lengths (<28 m) via trucks utilising the local road network or running along the Project alignment where possible. The rail can then be welded trackside due to program constraints with the linear completion of the track formation, structures and drainage elements.

The construction methodology will allow flexibility for delivery and welding options. The delivery of the rail in full lengths via the QR network will require further investigation and consultation with QR during the detail design phase.

5.7.4 Water activity

Water will be supplied to various points along the Project alignment by water trucks for activities including earthworks, haul road maintenance, dust suppression, track work and concrete batching. Water construction routes are displayed in Appendix M.

5.7.5 Ready-mix concrete

The western tunnel portal has been identified as a location for a concrete batch plant (with a minimum capacity of 70 m^3/hr) and precast facility for the Project alignment. This facility will support the tunnel construction only. Further information on the location can be found in Table 5.9 and is illustrated in Figure 5.7.

Table 5.9 Potential concrete batch plants

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

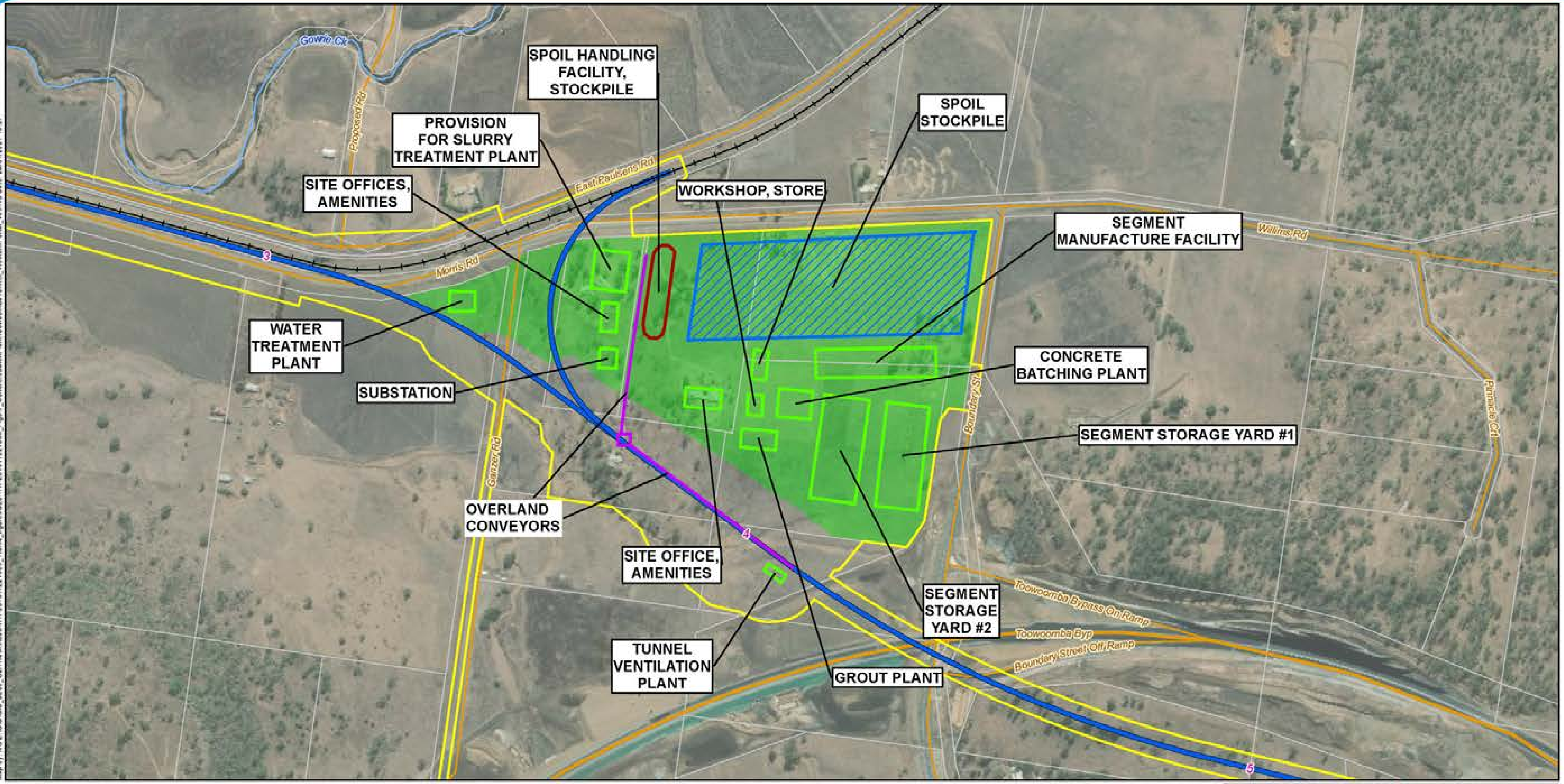
5.7.6 Spoil disposal

Cuts and embankments are required across multiple sections of the Project corridor. The total volume of cuttings across the Project, excluding the Toowoomba Range tunnel, has been estimated to be approximately 2,380,000 m^3. It is anticipated that sufficient usable material will be generated through cut (2,380,000 m^3) to meet the necessary fill (2,120,000 m^3) requirements for the Project. Thirteen cuts along the EIS investigation corridor are required to maintain the required track elevations for the proposed rail line. A combination of heavy ripping, rock hammering, drilling and blasting will be required during this scope of works. Material will be transported by dump trucks or truck and dog trailers.

The Project is anticipated to generate an excess of 1,000,000 m^3 of spoil during the construction phase, which needs to be managed. The majority of the material will result from the construction of the tunnel, approximately 730,000 m^3, which will be managed within the Project disturbance footprint (i.e. permanent stockpile at the western tunnel portal). This minimises potential impacts on the existing road network as it would remove the need for approximately 36,000 truck movements (truck and dog) on trucks to access the local road network.

A number of opportunities also exist for the reuse of this material, with further information on spoil management provided in EIS Appendix T: Spoil management strategy. Spoil generated from the construction of the Project is expected to be managed under a Spoil Management Plan as a sub-plan to the CEMP.

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



Legend

- Overland conveyors
- Proposed infrastructure
- Temporary spoil handling facility, stockpile
- Permanent spoil stockpile
- EIS disturbance footprint
- Proposed laydown areas
- G2H project alignment
- Existing rail
- Watercourses
- Major roads
- Minor roads
- Cadastre

A3 scale: 1:7,500

0 0.055 0.11 0.165 0.22 0.275km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 28/01/2021 Version: 0
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 5.7:
Toowoomba Tunnel - Western Portal – Temporary Construction Layout

Error! Not a valid bookmark self-reference. details options for management of spoil generated by the Project and how this TIA has considered the transport of this material along the road network. The options are presented in order of preference.

Table 5.10 Spoil management hierarchy

Rank	Options	Example	Consideration in TIA
1	Avoid and reduce spoil	Reduce the amount of spoil generated by the Project, through reducing the extent and scale of cut where an immediate reuse opportunity in proximity to the source location does not exist, e.g. sections of the Project where a surplus of material will be generated	The quantity of spoil generated is proposed to be reduced by: ▪ Refining the horizontal and vertical design and alignments to minimise the cut and fill quantities ▪ Selecting construction methods that comparatively reduce the production of excess material ▪ Optimising the shape and size of batters to achieve a cut/fill balance within the Project footprint ▪ Quantifying and characterising the material expected to be generated during construction and treating/blending the material to render it suitable for a beneficial use.
2	Reuse within the rail corridor	Reuse within the Project, subject to the material complying with the ARTC Earthworks Material Specification, to establish formation, fill embankments and mounds within short haulage distance of the source location	The majority of the excavated cut material generated by the Project will be reused within the Project as fill, both general and structural fill. Additional structural fill and capping material may be imported if required to conform with the Project design specifications. The quantities of the excavated material produced will be monitored during excavation to identify the potential reuse of material within the Project. Further details are provided in EIS Chapter 21: Water and resource management.
3	Reuse for environmental works and land restoration	Examples include: ▪ Reuse in the rehabilitation of native vegetation ▪ Reuse for landscaping ▪ Reuse for land reinstatement, including end-of-life mines and quarries, subject to satisfying closure and operational requirements ▪ Reuse for landfill covers (day and interim covers) and final capping (where deemed suitable).	▪ Rehabilitation of the existing quarries around Helidon, as identified through discussions with operators ▪ Daily cover for waste management facilities (e.g. Toowoomba Waste Management Centre)
4	Reuse on other development	Reuse for fill embankments and mounds on projects within a reasonable haulage distance from the site, prioritising other components of the Inland Rail Program	▪ The material may potentially be used as fill material for other projects including the Inland Rail B2G and H2C projects ▪ Profile and capping soils (subject to demonstration of compliance with material specifications) for waste management facilities that are anticipating closure in the near future
5	Dispose offsite as waste	Disposal of excess spoil as waste at an approved facility licenced to receive the material. Offsite disposal to landfill should only occur if the material is considered unsuitable without treatment for other uses, e.g. due to contamination.	Not considered in the TIA

5.7.7 Structural fill and capping

For the purposes of this assessment, it is currently assumed that capping material is transported by truck from commercial quarries along the Project alignment. If there is a lack of suitable structural fill material from cuts, it is expected that structural fill will be sourced from the same quarries the capping material is sourced from. The current planning anticipates using structural fill from cuttings on the Gowrie end of the Project alignment for all needs with this material transported back to other sections of the alignment as required.

It is envisaged that:

- Suitable material will be transported to the corridor and delivered directly to the Project alignment or stockpiled within the nominated laydown areas of the corridor
- The materials will be moisture conditioned and tipped directly on the formation in suitable volumes to deliver the required thicknesses for compaction
- Spreading and compaction. Trials shall be conducted to ensure that the construction processes deliver the required consistency and density.
- Trimming and profiling.

5.7.8 Laydown areas

Laydown areas are indicative for current design. Actual locations will be confirmed when a construction contractor is appointed, along with the uses at each laydown area. Once confirmed, the required accesses will need:

- Appropriate site distances in both the vertical and horizontal
- Deceleration lanes for the trucks to slow down in
- Acceleration lanes for re-entering construction traffic
- Appropriate signage and line marking.

Details on laydown areas for materials, bridges and tunnel have been provided in the following sections. Section 5.6.1 details proposed access tracks needed to facilitate the laydown areas.

5.7.8.1 Material laydown areas

Several laydown areas have been highlighted throughout the length of the Project alignment. These laydown areas are situated next to the Project alignment to facilitate direct access to/from the laydown to the Project alignment. The laydown areas will act as a centralised point for all material storage. Some laydowns will also consist of fuel storage areas and site office compounds.

5.7.8.2 Bridge and viaduct laydown/work areas

Each bridge location along the Project alignment will have a dedicated laydown/work area. The area may also include crane pads for the lifting of the bridge members. These areas are primarily for the bridge works; however, larger areas have been provided for locations requiring the storage of other materials that are not associated with the construction of the bridge.

5.7.9 Access restrictions

Table 5.11 lists identified potential construction traffic access restrictions within the vicinity (50 km) of the Project and does not include OSOM restrictions associated with the Warrego Highway (Bremer River) and the Pacific Highway (Coomera River). As this list is based on a desktop study it may not be exhaustive, with access restrictions to be confirmed during detailed design.

Table 5.11 Potential construction traffic restrictions relevant to the Project

Description	Issue	Solution
TRC		
Intersection Gowrie Junction Road – Boundary Street powerline interfaces	▪ Powerline crosses intersection at two locations ▪ Potential height restriction	▪ Height restriction indicators and markings for powerlines
Picnic Street	▪ Bridge & Culvert Restrictions for Category 2 Special Purpose Vehicles	▪ Height restriction indicators
LVRC		
Gittins Road (Toowoomba Bypass Underpass)	▪ Current height restriction of 4.8 m	▪ Box girder segment height is 3.225 m with a 0.75 m clearance requires a max height of flatbed trailer to be 1.5 m
Roches Road/Warrego Highway	▪ No right turn allowed	▪ Temporary intersection upgrade required
Postmans Ridge Road/Warrego Highway	▪ No right turn allowed	▪ Routes coming from Brisbane altered to avoid this intersection ▪ Potential to undertake an intersection upgrade to allow right turns.
Murphys Creek Road/Rocky Creek 1st Crossing	▪ Single Lane Bridge	▪ Bridge may require upgrading ▪ Alternative route via Postmans Ridge Road (refer issues above)
Gas pipeline/powerline easement	▪ Construction tracks and public roads used for construction traffic cross this pipeline/powerline easement in various locations ▪ Potential height restrictions	▪ Temporary protection of Roma Brisbane Gas Pipeline required ▪ Height restriction indicators and markings for powerlines (e.g. Powerlink Queensland Middle Ridge to Tarong Transmission Line)
Intersection Gittins Road – Hodges Road powerline interfaces	▪ Powerline crosses intersection at two locations ▪ Potential height restriction	▪ Height restriction indicators and markings for powerlines
Murphys Creek Road (section Warrego Highway to Postmans Ridge Road) various powerline interfaces	▪ Various powerlines/private electrical connections crossing road ▪ Potential height restriction	▪ Road currently used for construction access ▪ Alternative route via Postmans Ridge Road (refer issues above) ▪ Height restriction indicators and markings for powerlines
Wallens Road/Jones Road	▪ Potential access restrictions during construction of Jones Road realignment	▪ Sequence construction phases to minimise impact

5.7.10 Road network and restrictions on vehicle size

The transport corridors identified have taken into consideration the restrictions on vehicle sizes through the NHVR journey planner tool. However, if required and necessary for the Project, all RAV (restricted access vehicles) and OSOM vehicles required to transport special equipment will apply for the necessary permits from DTMR, QR and other relevant authorities as well as the Heavy Vehicle (Mass, Dimension and Loading) National Regulation 2013 (the Regulation) including all applicable legislative requirements from RMS.

At this stage, oversize vehicles are only assumed to be required for the transportation of 29 m Super-T precast concrete girders. As stated, this requirement may change during detailed design phase. Similarly, at this stage, the performance based standard level 3B (PBS3B) vehicles are not nominated as the design vehicle for construction traffic, while the majority of the construction routes are not suitable for this vehicle type. The construction contractor may stipulate the use of these vehicles but will be required to prepare route assessments accordingly. Swept path analysis will be undertaken by the construction contractor once the appropriate design vehicle has been chosen to determine any temporary changes to the existing layout which may be required to accommodate construction traffic movements, such as localised widening or removal of signage and lighting.

Where applicable, the permits and approvals will be sought by the appointed construction contractor once delivery materials and routes are determined. While vehicle tracking has been considered in the development of construction routes, the development of final construction routes should include an assessment of above and underground services that may be affected by OSOM vehicles. Noting that ARTC have consulted all public utility providers with known assets intersected by the Project, including in relation to the protection of assets from construction traffic (e.g. APA Group regarding the temporary and permanent protection of the Roma Brisbane Gas Pipeline).

The relevant routes being utilised to transport 29 m Super-T precast concrete girders trips are shown in and Appendix I and Appendix J, with the potentially impacted links listed below:

- TRC
  - Boundary Street - Between Hermitage Road and Toowoomba Bypass
  - Boundary Street - Between Toowoomba Bypass and Morris Road
  - Gowrie Junction Road - Between Toowoomba Connection Road and Ganzer Road
  - Hermitage Road - Between Gowrie Junction Road and Boundary Street
  - Krienke Road - Between Gowrie Junction Road and Morris Road
  - McDougall Street - Between Rocla Court and Hursley Road
  - Morris Road - Between Paulsens Road and Boundary Street
  - Omara Road - Between Warrego Highway and Witmack Road
  - Pipe Street - Full Extent
  - Witmack Road - Between Omara Road and Pipe Street
- LVRC
  - Airforce Road - Between Laidley Street and Airforce Road
  - Airforce Road - Between Lockyer Sliding Road and Cattos Road
  - Arthur Street - Between Mary McKillop Street and William Street
  - Ashlands Drive - Full Extent
  - Gittins Road - Between Jones Road and McNamaras Road
  - Gittins Road - Between McNamaras Road and Stevens Road
  - Howmans Road - Full Extent
  - Jones Road - Between Little Oaky Creek Road and Wallens Road
  - Laidley Street - Between Station Street and Seventeen Mile Road
  - Little Oaky Creek Road - Between Roches Road and Jones Road
  - Mary McKillop Street - Between Turner Street and Arthur Street
  - McNamaras Road - Between Gittins Road and Unnamed Road

- Postmans Ridge Road - Between Murphys Creek Road and Warrego Highway
- Roches Road - Between Warrego Highway and Little Oaky Creek Road
- Seventeen Mile Road - Between Airforce Road and Laidley Street
- Station Street - Between Arthur Street and Laidley Street
- Turner Street - Between Warrego Highway and Mary MacKillop Street
- Wallens Road - Between Jones Road and Council Boundary

- DTMR
  - Cunningham Highway - Between River Road and Redbank Plains Road
  - Murphys Creek Road - Between Warrego Highway and Brookside Place
  - Murphys Creek Road - Between Brookside Place and Toowoomba Bypass
  - Murphys Creek Road - Between Toowoomba Bypass and Howmans Road
  - River Road - Between Warrego Highway and Ipswich-Cunningham Highway Connection Road
  - Toowoomba Bypass - Between New England Highway and Warrego Highway
  - Toowoomba Bypass - Between Boundary Street and New England Highway
  - Toowoomba Cecil Plains Road - Between McDougall Street and Tor Street
  - Toowoomba Connection Road - Between Warrego Highway and Roches Road
  - Toowoomba Connection Road - Between Roches Road and Murphys Creek Road
  - Toowoomba Connection Road – Between Murphys Creek Road and Toowoomba Bypass
  - Warrego Highway - Between Mount Crosby Road and Cunningham Highway
  - Warrego Highway - Between Brisbane Valley Highway and Mount Crosby Road
  - Warrego Highway - Between Haigslea Amberley Road and Brisbane Valley Highway
  - Warrego Highway - Between Laidley Plainland Road and Haigslea Amberley Road
  - Warrego Highway - Between Gatton Esk Road and Laidley Plainland Road
  - Warrego Highway - Between Gatton Helidon Road and Gatton Esk Road
  - Warrego Highway - Between Toowoomba Bypass and Gatton Helidon Road
  - Warrego Highway - Between Omara Road and Gowrie Junction Road
  - Warrego Highway - Between James Street and Tourist Road
  - Warrego Highway - Between Tourist Road and Toowoomba Connection Road
  - Warrego Highway - Between New England Highway and James Street
  - Warrego Highway - Between Toowoomba Athol Road and New England Highway
  - Warrego Highway - Between Rob Street and Toowoomba Athol Road
  - Warrego Highway - Between Tor Street and Rob Street
- ICC
  - Fairbank Place - Full Extent
  - Newhill Drive - Full Extent
  - Noblevale Way - Between Rob Roy Way and Fairbank Place

– Redbank Plains Road - Between Cunningham Highway and Newhill Drive

– Rob Roy Way - Full Extent.

Maps highlighting precast concrete routes are provided in Appendix I and Appendix J. Maps indicating the multi-combination heavy vehicle routes are provided in Appendix O.

5.7.11 Flash butt welding facility

The Project footprint has made allowances for the positioning of a temporary flash butt welding/rail support facility at one location along the corridor, identified in Table 5.12 and displayed in Figure 5.8.

Table 5.12 Project flash butt welding sites

ID	Adjoining Road	Chainage (km)	Description
G2H-FBW000.0	Nass Road	0.0	Access to rail supply via QR network

The area for the facility is approximately 13 hectares in size and is to support rail construction from the western end of the Project alignment. It is assumed that rail will be delivered via the QR network. The rail from this point can be:

- Welded up into LWR (<400 m) within the nominated facility before then being transported down the rail corridor using rail roller, or
- Positioned along the Project alignment in short rail lengths (<28 m) via trucks utilising the local road network or running along the Project alignment where possible. The rail can then be welded trackside due to program constraints with the linear completion of the track formation, structures and drainage elements.

The construction methodology utilised in this assessment will allow flexibility for delivery and welding options. The delivery of the rail in full lengths via the QR network will require further investigation and consultation with QR.

5.8 Mass haul specific requirements

5.8.1 Mass haul on Gittins Road

Gittins Road and the underpass under Toowoomba Bypass, presents a logistics pinch point that will have to be investigated further in the detailed design phase and in consultation with DTMR, the construction contractor and the relevant council. Investigations into the clearance of this underpass shows a 4.8 m clear envelope (refer Figure 5.9). The following provisions will be required:

- Traffic management arrangements will have to be in place during movement of bulk earthworks and materials for bridge construction.
- Earthworks vehicles will have to be appropriately sized to use this clearance envelope. A 30 t Moxy or road legal truck and dogs should not present an issue.
- The delivery of segmental box girders will have to be controlled and deliveries undertaken using low-loaders. The height of a box girder is 3,225 mm. The low-loader height (and cribbing) will have to be less than 1,500 mm to fit.

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

Legend

- EIS disturbance footprint
- Proposed laydown areas
- G2H project alignment
- Existing rail
- Watercourses
- Minor roads
- Cadastre

A3 scale: 1:6,000

0 0.04 0.08 0.12 0.16 0.2 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 27/01/2021 Version: 1
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Figure 5.8: Flash Butt Welding Facility

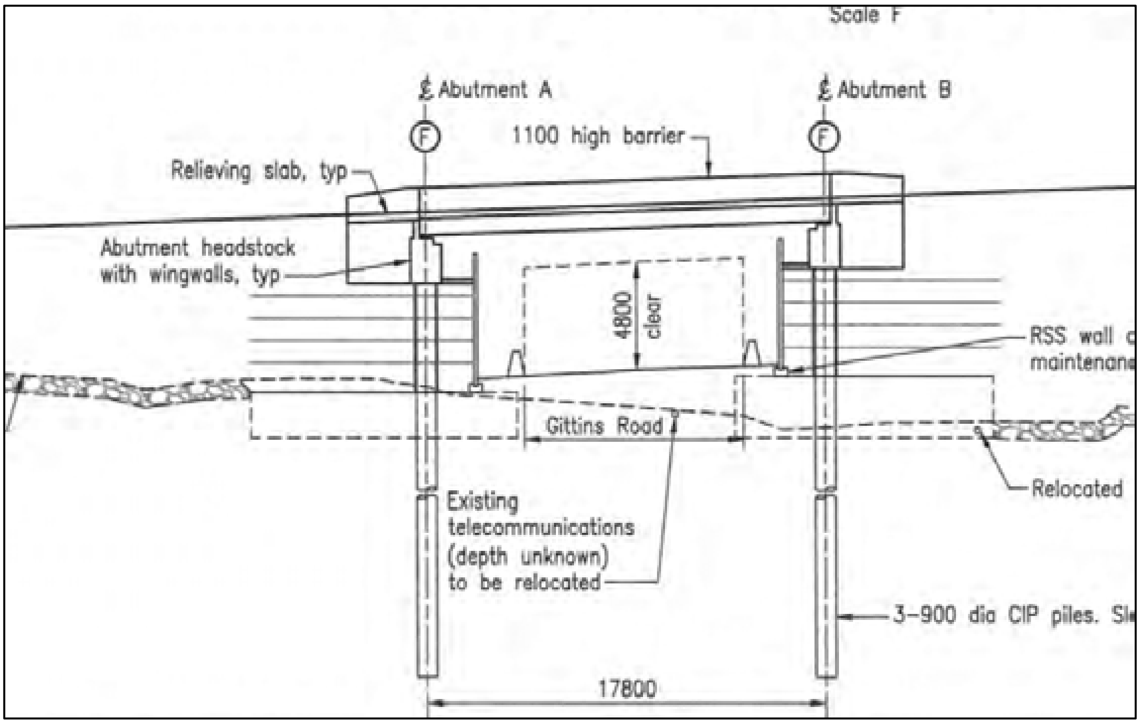


Figure 5.9 **Gittins Road Underpass**

5.8.2 Mass haul across Murphys Creek Road

Due to the nature of the required earthworks mass haul for the Project, a large volume of material is required to be moved from the west to the east of Murphys Creek Road. Any impacts to intersections in the vicinity due to construction traffic movements have been assessed in Section 6.3. The most efficient way to do this will be to utilise off road vehicles directly from the point of cut and transport it along the Project alignment across Murphys Creek Road. The interface and temporary traffic management arrangements at Murphys Creek Road will have to fully designed and agreed with DTMR and LVRC. It is anticipated that a boom gate or temporary traffic light configuration will be required, example provided in Figure 5.10.

Figure 5.10 **Example haul road crossing arrangement**

5.8.3 Biosecurity

Under the *Biosecurity Act 2014* (Qld), all Queenslanders have a general biosecurity obligation to manage biosecurity risks and threats that are under their control, they know about or they are expected to know about. Whilst the Project corridor is not in a currently identified Fire Ant area, the Interstate Plant Quarantine Zone (Red Imported Fire Ant) for SEQ occurs to the east of the Project alignment and action should be taken to limit its impact by reducing, controlling or containing it. It is anticipated that the Project will encounter restricted matter (e.g. weeds) along the Project alignment that requires management in accordance with the relevant categories of restricted matter under the *Biosecurity Act 2014* (Qld). Precautions should be implemented as a biosecurity risk exists when dealing with materials, equipment and vehicles that are relevant to the Project that the pests and weeds can be carried in, including:

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

Individuals and organisations moving weed, and pest carriers can fulfil their general biosecurity obligation by:

- Understanding what weeds and pests look like and what materials they may be moved in
- Being aware if you are working within a potential infected site
- Being aware of movement controls relevant to the weeds and pest carrier you intend to move
- Cleaning down machinery and equipment used when dealing with fire ant carriers before moving the equipment off site
- Conducting inspections of material that can carry weeds and pests.

The spread of noxious weeds during the import and export of these materials to the Project needs to be tightly controlled by the construction contractor. Appropriate checks and controls will have to put in place including, but not limited to, identification of weed risk areas, surveillance and audit compliance and vehicle wash-downs.

During the detailed design phase of the Project, once a construction contractor has been appointed, it is anticipated that a biosecurity management plan will be necessary in order to mitigate any potential issues.

5.9 Construction program

A construction program has been developed for the Project providing an indicative construction schedule. The construction program, developed for current design, provides indicative peak days for the Project. Therefore, scheduling on a day-to-day or hourly basis level is not available. This level of detail will be prepared when a construction contractor is appointed and will be refined as part of the detailed design phase.

The construction program for current design is based upon:

- Eight geographic areas of bulk earthworks (refer Table 5.13)
- Assumes up to eight bridge structure crews are utilised
- Assumes two separate drainage crews, over seven areas, to install the required volume of stormwater drainage
- Assumes tunnel construction progresses from west to east
- Intermediate ventilation shaft construction proceeds on a timeline to allow optimal interaction with the TBM tunnel

- Eastern tunnel portal works to be completed by the time the TBM arrives
- Assumes a single work crew carrying out capping and track works as areas become available. This area will contain opportunity if the program is to be delivered earlier than currently shown.
- Assumes road civil works crews to construct roadworks along the Project alignment as required
- It is acknowledged that there are multiple options available for dividing the works into suitable work fronts.

Table 5.13 Geographic areas of bulk earthworks

Activity name	Quantity in billion cubic metres (bcm)	Comment
Section 1 (-1.7 to 4.20 km)		
Cut to general fill	28,351	Truck and excavator crew
Cut to structural fill	48,458	Truck and excavator crew
Cut to spoil (tunnel spoil site)	289,570	Truck and excavator crew
Cut to structural fill to be delivered to Areas 3A, 3B, 3C and 3D	44,306	Truck and excavator crew
Section 2A (Ch10.25 to 12 km)		
Cut to general fill	140,187	Truck and excavator crew
Cut to structural fill	8,361	Truck and excavator crew
Cut to general fill to be delivered Area 3C	69,282	Truck and excavator crew
Cut to general fill to be delivered Area 3D	124,716	Truck and excavator crew
Cut to structural fill to be delivered to Area 2B	4,397	Truck and excavator crew
Section 2B (Ch12 to 13.75 km)		
Cut to general fill	7,126	Scraper crew
Cut to spoil	13,154	Truck and excavator crew
Import structural fill from Area 2A	4,397	
Cut to general fill to be delivered Area 3B	199,012	Truck and excavator crew
Cut to fill (rock) to be delivered Area 3C	33,395	Truck and excavator crew
Cut to fill other than rock (OTR) to be delivered Area 3C	81,349	Truck and excavator crew
Section 2C (Ch13.75 to 16 km)		
Cut to general fill (OTR)	71,379	Scraper crew
Cut to spoil (OTR)	2,500	Truck and excavator crew
Cut to structural fill	2,781	Scraper crew
Cut to fill to be delivered Area 3A	170,546	Truck and excavator crew
Cut to fill to be delivered Area 3B	404,539	Truck and excavator crew
Section 3A (Ch16 to 18.7 km)		
Cut to general fill (OTR)	337,541	Scraper crew
Cut to general fill (rock)	78,535	Truck and excavator crew
Import general fill from Area 2C	170,546	
Import structural fill from Area 1	8,294	
Section 3B (Ch18.7 to 21.5 km)		
Cut to general fill (OTR)	154,973	Scraper crew
Cut to general fill (rock)	9,633	Truck and excavator crew
Import general fill from Area 2C	404,539	
Import general fill from Area 2B	199,012	

Activity name	Quantity in billion cubic metres (bcm)	Comment
Import structural fill from Area 1	15,131	
Section 3C (Ch21.5 to 22.5 km)		
Import general fill (OTR) from Area 2B	81,349	
Import general fill (rock) from Area 2B	33,395	
Import general fill (OTR) from Area 2A	69,282	
Import structural fill from Area 1	1,782	
Section 3D (Ch22.5 to 26.5 km)		
Import general fill (OTR) from Area 2A	124,716	From Section 2A
Cut widening or Borrow to General fill (OTR)	19,535	Widen the cuts between 19.3 to 20.6 km by 10 m (or) borrow from nearby source
Import structural fill from Area 1	19,099	

Table note:

OTR = Other than rock

It is acknowledged that there are multiple options available for dividing the works into suitable work fronts.

5.10 Traffic generation by activity

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

In order to take into account additional trips generated by factors such as quality compliance and breakages during construction, buffer factors have been applied to each construction activity. These also cater for potential minor changes to material volumes resulting from design and Project alignment updates (horizontal or vertical). The proposed buffers are considered conservative. It is also envisaged that these factors would cover any peak delivery times. The adjustment/buffer factors are provided in Table 5.14.

Table 5.14 Estimated buffers

Material	Delivery method	Estimated buffer for traffic assessment
Workforce	Road	0%
General fill/Spoil	Road	5% (there is no import of general fill)
Structural fill	Road	10%.
Capping	Road	10%.
Top ballast	Road	7.5%
Bottom ballast	Road	7.5%
Sleepers	Road	2.5%
Precast concrete – bridge	Road	2.5% (to allow for a few broken beams)
Precast concrete – culverts	Road	2.5% (to allow for a few broken beams)
Insitu Concrete – bridge and culverts	Road	5% (over-excavation, wastage)
Culverts	Road	2.5% (Quality compliance)
Water (earthworks)	Road	10%
Water (dust suppression)	Road	10%
Water (haul road and laydown maintenance	Road	10%

Total trips by construction activity for each road section have been derived using material requirements and delivery schedules developed for the Project. These total trips have been summarised in Table 5.15 by activity and year of construction for the Project and include all trips generated by the construction traffic both loaded and unloaded. All vehicle trips except for workforce are heavy vehicle movements, whilst workforce trips will be made via light vehicle movements. In Table 5.15, "Tunnel" works encompasses earthworks related to the construction of the Toowoomba Range tunnel, including all spoil related activity using public roads. Further details on the vehicle type adopted for each route type are provided in Section 7.1.

Table 5.15 Total trips by activity per year

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

Table 5.16 and Table 5.17 shows the total construction trips for each road section in each of the construction years. Table 5.16 displays the total heavy vehicle construction trips by road section for each year of construction and Table 5.17 displays the total light vehicle trips. Table 5.16 includes all route types, excluding workforce, which is solely displayed in Table 5.17 as this is the only route type that utilises light vehicles.

The workforce trips in Table 5.16 and Table 5.17 are one-way trips. These trips have been applied in the analysis for gazettal and anti-gazettal directions.

For Table 5.17, while total workforce and a general profile may be known at this stage, the distribution of these trips by laydown area by construction task is not currently known. The distribution of workforce trips across the year is considered suitable for feasibility design assessment.

Consistent with the GTIA, the TIA prepared for the EIS will require an estimation of traffic generation as the final traffic generation will not be clear until a construction contractor is appointed. Likewise, consideration of peaks within peaks need to be taken into account at that stage. Nonetheless, the mitigation measures provided as a part of this assessment acknowledge these possibilities and the requirement for a Construction Traffic Management Plan to ensure that the impact on the road network is managed.

It is noted that both Table 5.16 and Table 5.17 include loaded volumes only.

Table 5.16 Total heavy vehicle loads per year

Road name	Road section	2022	2023	2024	2025	2026
LGR: TRC						
Boundary Street	Between Hermitage Road and Toowoomba Bypass	0	6,160	6,049	305	0
	Between Toowoomba Bypass and Morris Road	0	15,470	9,222	0	0
Cooby Dam Road	Between Klein Road and Pipeline Road	12,565	19,244	6,049	14	0
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	2,895	6,810	6,049	1,240	0
	Between Ganzer Road and Morris Road	2,605	0	0	934	0
Griffiths Street	Between New England Highway and Mort Street	246	6,476	3,173	993	0
Hermitage Road	Between Gowrie Junction Road and Boundary Street	253	6,810	6,049	305	0
	Between Boundary Road and Mort Street	253	728	0	0	0
	Between Mort Street and Private Access	69	2,858	275	160	0
Highfields Road	Between Klein Road and New England Highway	12,565	19,244	6,049	14	0
Klein Road	Between Kleinton School Road and Cooby Dam Road	12,565	19,244	6,049	14	0
Kleinton School Road	Between Meringandan Road and Klein Road	12,565	19,244	6,049	14	0
Krienke Road	Between Gowrie Junction Road and Morris Road	2,506	1,571	0	309	0
Larcombe Street	Between North Street and Railway Line	1,018	4,112	3,850	997	0
Main Street	Between Meringandan Shirley Road and Klein Road	2,216	6,860	6,049	3	0
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	89	31	0	0	0
Meringandan Road	Between Highfields Road and Kleinton School Road	12,565	19,244	6,049	14	0
Meringandan Shirley Road	Between Main Street and Woolmer Road	2,216	6,860	6,049	3	0
Morris Road	Between Gowrie Junction Road and Paulsens Road	2,216	6,860	6,049	3	0
	Between Paulsens Road and Boundary Street	0	15,470	9,222	0	0
Mort Street	Between Hermitage Road and Old Mort Street	0	2,583	0	0	0
	Between Old Mort Street and Mort Street	69	2,858	275	160	0
	Between Toowoomba Bypass and North Street	568	10,062	3,447	1,154	0
Munro Street	Between New England Highway and Harlaxton Quarry	1,763	1,593	0	1,981	0

Road name	Road section	2022	2023	2024	2025	2026
North Street	Between Mort Street and New England Highway	976	3,652	3,735	997	0
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	2,216	6,860	6,049	3	0
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	2,216	6,860	6,049	3	0
	Between Gowrie Birnam Road and Paulsens Road	2,216	6,860	6,049	3	0
Old Mort Street	Between Mort Street and Mort Street	0	0	0	0	0
Omara Road	Between Warrego Highway and Witmack Road	37	0	0	0	0
Paulsens Road	Between Morris Road and Old Homebush Road	2,216	6,860	6,049	3	0
Pipe Street	Full Extent	37	0	0	0	0
Pipeline Road	Full Extent	12,565	19,244	6,049	14	0
Witmack Road	Between Omara Road and Pipe Street	37	0	0	0	0
LGR: LVRC						
Airforce Road	Between William Street and Lockyer Siding Road	246	13,244	0	371	0
	Between Lockyer Sliding Road and Cattos Road	0	15	0	69	0
	Between Laidley Street and Airforce Road	0	15	0	0	0
Arthur Street	Between Georges Street and Mary McKillop Street	0	909	0	438	0
	Between Mary McKillop Street and William Street	246	13,250	0	440	0
Ashlands Drive	Full Extent	0	0	426	225	0
Bells Road	Full Extent	4	0	559	48	0
Cattos Road	Between Unnamed Road and Airforce Road	0	909	0	438	0
George Street	Between Lawlers Road and Arthur Street	0	909	0	438	0
Gittins Road	Between Jones Road and McNamaras Road	1,282	899	757	525	0
	Between McNamaras Road and Stevens Road	32,400	45,568	655	0	0
Howmans Road	Full Extent	2,712	5,670	164	393	0
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0	0	0	183	0
	Between Little Oaky Creek Road and Wallens Road	4,196	20,205	6,685	1,505	0
Laidley Street	Between Station Street and Seventeen Mile Road	0	15	0	69	0

Road name	Road section	2022	2023	2024	2025	2026
Lawlers Road	Between Warrego Highway and George Street	0	909	0	438	0
Little Oaky Creek Road	Between Roches Road and Jones Road	4,964	7,247	7,443	1,847	0
Mary McKillop Street	Between Turner Street and Arthur Street	246	12,349	0	1	0
McNamaras Road	Between Gittins Road and Unnamed Road	33,515	45,395	102	525	0
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	0	10,305	426	225	0
Roches Road	Between Warrego Highway and Little Oaky Creek Road	4,964	7,247	7,443	1,847	0
Seventeen Mile Road	Between Airforce Road and Laidley Street	0	15	0	69	0
Station Street	Between Arthur Street and Laidley Street	0	15	0	69	0
Turner Street	Between Warrego Highway and Mary MacKillop Street	246	12,349	0	1	0
Unnamed Road	Between Airforce Road and Cattos Road	0	909	0	438	0
Wallens Road	Between Jones Road and Council Boundary	1,130	19,134	4,823	688	0
William Street	Between Arthur Street and Airforce Road	246	13,244	0	371	0
SCR: DTMR						
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0	244	1,868	77	0
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	185	1,538	1,902	165	0
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0	0	0	742	0
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	0	0	0	0	0
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0	0	0	742	0
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	7,830	15,865	2,961	1,407	0
	4104 – Between Brookside Place and Toowoomba Bypass	7,830	15,865	2,961	1,407	0
	4104 – Between Toowoomba Bypass and Howmans Road	7,830	15,865	2,961	1,407	0
New England Highway	22A – Between Highfields Road and Murphys Creek Road	10,349	12,384	0	11	0
	22A – Between Murphys Creek Road and Munro Street	10,349	12,384	0	11	0
	22A – Between Munro Street and North Street	11,866	15,939	3,173	999	0
	22A – Between North Street and Warrego Highway	12,520	18,589	6,634	1,836	0

Road name	Road section	2022	2023	2024	2025	2026
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0	0	0	742	0
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	0	244	1,868	77	0
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	2,605	0	0	934	0
	319 – Between Boundary Street and New England Highway	246	11,711	3173	1,299	0
	319 – Between New England Highway and Warrego Highway	246	4,908	0	1,299	0
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	2,605	0	0	934	0
	324 – Between McDougall Street and Tor Street	89	31	0	0	0
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	12,609	18,620	6,634	1,836	0
	315 – Between Roches Road and Murphys Creek Road	12,609	18,620	6,634	1,836	0
	315 – Between Murphys Creek Road and Toowoomba Bypass	431	16,915	3,770	1,908	0
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	2,642	0	0	934	0
	18A – Between Gowrie Junction Road and McDougall Street	0	0	0	0	0
	18A – Between McDougall Street and Tor Street	0	0	0	0	0
	18A – Between Tor Street and Rob Street	89	31	0	0	0
	18A – Between Rob Street and Toowoomba Athol Road	89	31	0	0	0
	18A – Between Toowoomba Athol Road and New England Highway	89	31	0	0	0
	18A – Between New England Highway and James Street	12,609	18,620	6,634	1,836	0
	18A – Between James Street and Tourist Road	12,609	18,620	6,634	1,836	0
	18A – Between Tourist Road and Toowoomba Connection Road	12,609	18,620	6,634	1,836	0
	18A – Between Toowoomba Bypass and Gatton Helidon Road	431	16,915	3,770	1,908	0
	18A – Between Gatton Helidon Road and Gatton Esk Road	0	1,154	1,868	1,188	0
	18A – Between Gatton Esk Road and Laidley Plainland Road	0	1,154	1,868	1,188	0
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	0	1,154	1,868	1,188	0
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	0	244	1,868	819	0
	18A – Between Brisbane Valley Highway and Mount Crosby Road	0	244	1,868	819	0
	18A – Between Mount Crosby Road and Cunningham Highway	0	244	1,868	819	0

Road name	Road section	2022	2023	2024	2025	2026
SCR: RMS						
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0	0	0	742	0
Summerland Way	Between Trenayr Road and Turf Street	0	0	0	437	0
LGR: CVC						
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	742	0
Charles Street	Between Bent Street and Pacific Highway	0	0	0	742	0
Clarence Street	Between Oliver Street and Craig Street	0	0	0	305	0
Clark Road	Full Extent	0	0	0	437	0
Craig Street	Between Villiers Street and Clarence Street	0	0	0	437	0
	Between Clarence Street and Bent Street	0	0	0	742	0
Dobie Street	Between Villers Street and Summerland Way	0	0	0	437	0
Fry Street	Between Mary Street and Alice Street	0	0	0	305	0
Mary Street	Between Fry Street and Oliver Street	0	0	0	305	0
Oliver Street	Between Mary Street and Clarence Street	0	0	0	305	0
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	437	0
Villers Street	Between Craig Street and Dobie Street	0	0	0	437	0
LGR: ICC						
Fairbank Place	Full Extent	0	244	1,868	77	0
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0	909	0	370	0
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0	909	0	370	0
Newhill Drive	Full Extent	0	244	1,868	77	0
Noblevale Way	Between Rob Roy Way and Fairbank Place	0	244	1,868	77	0
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	244	1,868	77	0
Rob Roy Way	Full Extent	0	244	1,868	77	0

Table 5.17 Total light vehicle loads per year

Road name	Road section	2022	2023	2024	2025	2026
LGR: TRC						
Boundary Street	Between Hermitage Road and Toowoomba Bypass	9105	9105	9105	9105	4553
	Between Toowoomba Bypass and Morris Road	7241	7241	7241	7241	3620
Cooby Dam Road	Between Klein Road and Pipeline Road	0	0	0	0	0
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	10969	10969	10969	10969	5485
	Between Ganzer Road and Morris Road	3656	3656	3656	3656	1828
Griffiths Street	Between New England Highway and Mort Street	7241	7241	7241	7241	3620
Hermitage Road	Between Gowrie Junction Road and Boundary Street	5485	5485	5485	5485	2742
	Between Boundary Road and Mort Street	3620	3620	3620	3620	1810
	Between Mort Street and Private Access	7241	7241	7241	7241	3620
Highfields Road	Between Klein Road and New England Highway	0	0	0	0	0
Klein Road	Between Kleinton School Road and Cooby Dam Road	0	0	0	0	0
Kleinton School Road	Between Meringandan Road and Klein Road	0	0	0	0	0
Krienke Road	Between Gowrie Junction Road and Morris Road	7313	7313	7313	7313	3656
Larcombe Street	Between North Street and Railway Line	0	0	0	0	0
Main Street	Between Meringandan Shirley Road and Klein Road	0	0	0	0	0
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	0	0	0	0	0
Meringandan Road	Between Highfields Road and Kleinton School Road	0	0	0	0	0
Meringandan Shirley Road	Between Main Street and Woolmer Road	0	0	0	0	0
Morris Road	Between Gowrie Junction Road and Paulsens Road	3656	3656	3656	3656	1828
	Between Paulsens Road and Boundary Street	3620	3620	3620	3620	1810
Mort Street	Between Hermitage Road and Old Mort Street	3620	3620	3620	3620	1810
	Between Old Mort Street and Mort Street	3620	3620	3620	3620	1810
	Between Toowoomba Bypass and North Street	10861	10861	10861	10861	5431
Munro Street	Between New England Highway and Harlaxton Quarry	0	0	0	0	0

Road name	Road section	2022	2023	2024	2025	2026
North Street	Between Mort Street and New England Highway	0	0	0	0	0
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	0	0	0	0	0
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	0	0	0	0	0
	Between Gowrie Birnam Road and Paulsens Road	3656	3656	3656	3656	1828
Old Mort Street	Between Mort Street and Mort Street	3620	3620	3620	3620	1810
Omara Road	Between Warrego Highway and Witmack Road	0	0	0	0	0
Paulsens Road	Between Morris Road and Old Homebush Road	3656	3656	3656	3656	1828
Pipe Street	Full Extent	0	0	0	0	0
Pipeline Road	Full Extent	0	0	0	0	0
Witmack Road	Between Omara Road and Pipe Street	0	0	0	0	0
LGR: LVRC						
Airforce Road	Between William Street and Lockyer Siding Road	7241	7241	7241	7241	3620
	Between Lockyer Sliding Road and Cattos Road	0	0	0	0	0
	Between Laidley Street and Airforce Road	0	0	0	0	0
Arthur Street	Between Georges Street and Mary McKillop Street	3584	3584	3584	3584	1792
	Between Mary McKillop Street and William Street	7241	7241	7241	7241	3620
Ashlands Drive	Full Extent	7312	7312	7312	7312	3656
Bells Road	Full Extent	7312	7312	7312	7312	3656
Cattos Road	Between Unnamed Road and Airforce Road	0	0	0	0	0
George Street	Between Lawlers Road and Arthur Street	3584	3584	3584	3584	1792
Gittins Road	Between Jones Road and McNamaras Road	10969	10969	10969	10969	5484
	Between McNamaras Road and Stevens Road	3656	3656	3656	3656	1828
Howmans Road	Full Extent	7312	7312	7312	7312	3656
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0	0	0	0	0
	Between Little Oaky Creek Road and Wallens Road	21938	21938	21938	21938	10969
Laidley Street	Between Station Street and Seventeen Mile Road	0	0	0	0	0

Road name	Road section	2022	2023	2024	2025	2026
Lawlers Road	Between Warrego Highway and George Street	3584	3584	3584	3584	1792
Little Oaky Creek Road	Between Roches Road and Jones Road	32907	32907	32907	32907	16453
Mary McKillop Street	Between Turner Street and Arthur Street	3656	3656	3656	3656	1828
McNamaras Road	Between Gittins Road and Unnamed Road	7312	7312	7312	7312	3656
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	7312	7312	7312	7312	3656
Roches Road	Between Warrego Highway and Little Oaky Creek Road	32907	32907	32907	32907	16453
Seventeen Mile Road	Between Airforce Road and Laidley Street	0	0	0	0	0
Station Street	Between Arthur Street and Laidley Street	0	0	0	0	0
Turner Street	Between Warrego Highway and Mary MacKillop Street	3656	3656	3656	3656	1828
Unnamed Road	Between Airforce Road and Cattos Road	0	0	0	0	0
Wallens Road	Between Jones Road and Council Boundary	3656	3656	3656	3656	1828
William Street	Between Arthur Street and Airforce Road	7241	7241	7241	7241	3620
SCR: DTMR						
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0	0	0	0	0
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	0	0	0	0	0
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0	0	0	0	0
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	43732	43732	43732	43732	21866
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0	0	0	0	0
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	18281	18281	18281	18281	9141
	4104 – Between Brookside Place and Toowoomba Bypass	18281	18281	18281	18281	9141
	4104 – Between Toowoomba Bypass and Howmans Road	18281	18281	18281	18281	9141
New England Highway	22A – Between Highfields Road and Murphys Creek Road	0	0	0	0	0
	22A – Between Murphys Creek Road and Munro Street	0	0	0	0	0
	22A – Between Munro Street and North Street	7241	7241	7241	7241	3620
	22A – Between North Street and Warrego Highway	7241	7241	7241	7241	3620

Road name	Road section	2022	2023	2024	2025	2026
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0	0	0	0	0
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	43732	43732	43732	43732	21866
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	0	0	0	0	0
	319 – Between Boundary Street and New England Highway	12726	12726	12726	12726	6363
	319 – Between New England Highway and Warrego Highway	12726	12726	12726	12726	6363
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	0	0	0	0	0
	324 – Between McDougall Street and Tor Street	0	0	0	0	0
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	31078	31078	31078	31078	15539
	315 – Between Roches Road and Murphys Creek Road	31078	31078	31078	31078	15539
	315 – Between Murphys Creek Road and Toowoomba Bypass	47460	47460	47460	47460	23730
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	0	0	0	0	0
	18A – Between Gowrie Junction Road and McDougall Street	5485	5485	5485	5485	2742
	18A – Between McDougall Street and Tor Street	5485	5485	5485	5485	2742
	18A – Between Tor Street and Rob Street	5485	5485	5485	5485	2742
	18A – Between Rob Street and Toowoomba Athol Road	5485	5485	5485	5485	2742
	18A – Between Toowoomba Athol Road and New England Highway	16382	16382	16382	16382	8191
	18A – Between New England Highway and James Street	31078	31078	31078	31078	15539
	18A – Between James Street and Tourist Road	31078	31078	31078	31078	15539
	18A – Between Tourist Road and Toowoomba Connection Road	31078	31078	31078	31078	15539
	18A – Between Toowoomba Bypass and Gatton Helidon Road	47460	47460	47460	47460	23730
	18A – Between Gatton Helidon Road and Gatton Esk Road	43732	43732	43732	43732	21866
	18A – Between Gatton Esk Road and Laidley Plainland Road	43732	43732	43732	43732	21866
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	43732	43732	43732	43732	21866
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	43732	43732	43732	43732	21866
	18A – Between Brisbane Valley Highway and Mount Crosby Road	43732	43732	43732	43732	21866
	18A – Between Mount Crosby Road and Cunningham Highway	43732	43732	43732	43732	21866

Road name	Road section	2022	2023	2024	2025	2026
SCR: RMS						
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0	0	0	0	0
Summerland Way	Between Trenayr Road and Turf Street	0	0	0	0	0
LGR: CVC						
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	0	0
Charles Street	Between Bent Street and Pacific Highway	0	0	0	0	0
Clarence Street	Between Oliver Street and Craig Street	0	0	0	0	0
Clark Road	Full Extent	0	0	0	0	0
Craig Street	Between Villiers Street and Clarence Street	0	0	0	0	0
	Between Clarence Street and Bent Street	0	0	0	0	0
Dobie Street	Between Villers Street and Summerland Way	0	0	0	0	0
Fry Street	Between Mary Street and Alice Street	0	0	0	0	0
Mary Street	Between Fry Street and Oliver Street	0	0	0	0	0
Oliver Street	Between Mary Street and Clarence Street	0	0	0	0	0
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	0	0
Villers Street	Between Craig Street and Dobie Street	0	0	0	0	0
LGR: ICC						
Fairbank Place	Full Extent	0	0	0	0	0
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0	0	0	0	0
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0	0	0	0	0
Newhill Drive	Full Extent	0	0	0	0	0
Noblevale Way	Between Rob Roy Way and Fairbank Place	0	0	0	0	0
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	0	0	0	0
Rob Roy Way	Full Extent	0	0	0	0	0

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

- 261 working days per year, resulting in an average of 22 working days per month. This is a conservative assumption as it does not take into account potential deliveries occurring on Saturdays or Sundays. This approach is in line with the GTIA and provides a conservative approach to the number of vehicles per day despite the actual duration of the Project being more than 261 working days per year.
- Equal distribution of loads throughout the delivery period:
  - Buffer factors provided in Table 5.14 are to cover any potential 'peak' delivery times within this period
  - Peak delivery movements for different construction activities will likely not coincide with each other as the start date of construction activities are typically reliant on the end date of others.

While buffer factors have been included in the analysis to cover potential 'peak' delivery times, fluctuations may occur on site to coincide with the appointed contractor's delivery schedule. The adopted buffer values are generally considered acceptable for the feasibility phase of the Project. The construction start dates, end dates and distribution of trips was undertaken consistent with the constructability assessment and is considered suitable for feasibility design assessment.

Current design does not require the design and detailing of the construction activities to be programmed to the day or to the hour, therefore, potential fluctuations in peak deliveries will be assessed as a part of the detailed design for the Project when a construction contractor is appointed. This assessment will inform the TMP discussed in Section 9, which will ensure that the transport task is managed to reduce overlapping peak periods and impacts on the wider road network, such as peak school hours.

Table 5.18 and Table 5.19 summarise the peak daily traffic volumes of heavy vehicles which would occur along each road section of the proposed primary construction routes for each year of construction. Heavy vehicle volumes are displayed in Table 5.18 and light vehicles only are displayed in Table 5.19. Both tables also identify the peak month of construction where these vehicle volumes are currently scheduled to occur. Plots of the full construction impact by month on the road sections are provided in Appendix R.

The transport of precast bridge girders may require the use of oversize vehicles. If any need arises for an oversize vehicle movement (excess mass or over-dimensional loads), DTMR and other relevant authorities will be notified, and permissions will be obtained as required under *the Transport Operations (Road Use Management) Act 1995* (Qld). Obtaining vehicle permits is beyond the scope of this assessment.

Table 5.18 Peak daily trips per road section by years (heavy vehicles only)

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
LGR: TRC							
Boundary Street	Between Hermitage Road and Toowoomba Bypass	0	27	25	7	0	June 2023 to July 2023
	Between Toowoomba Bypass and Morris Road	0	119	46	0	0	August 2023 to August 2023
Cooby Dam Road	Between Klein Road and Pipeline Road	88	94	25	0	0	July 2023 to July 2023
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	64	31	25	21	0	November 2022 to December 2022
	Between Ganzer Road and Morris Road	59	0	0	14	0	November 2022 to December 2022
Griffiths Street	Between New England Highway and Mort Street	1	67	21	15	0	September 2023 to September 2023
Hermitage Road	Between Gowrie Junction Road and Boundary Street	4	31	25	7	0	May 2023 to July 2023
	Between Boundary Road and Mort Street	4	5	0	0	0	June 2023 to July 2023
	Between Mort Street and Private Access	1	25	1	1	0	April 2023 to August 2023
Highfields Road	Between Klein Road and New England Highway	88	94	25	0	0	July 2023 to July 2023
Klein Road	Between Kleinton School Road and Cooby Dam Road	88	94	25	0	0	July 2023 to July 2023
Kleinton School Road	Between Meringandan Road and Klein Road	88	94	25	0	0	July 2023 to July 2023
Krienke Road	Between Gowrie Junction Road and Morris Road	17	9	0	7	0	November 2022 to November 2022
Larcombe Street	Between North Street and Railway Line	15	18	16	11	0	July 2023 to July 2023
Main Street	Between Meringandan Shirley Road and Klein Road	13	28	25	0	0	February 2023 to November 2023
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	1	0	0	0	0	April 2022 to June 2022
Meringandan Road	Between Highfields Road and Kleinton School Road	88	94	25	0	0	July 2023 to July 2023
Meringandan Shirley Road	Between Main Street and Woolmer Road	13	28	25	0	0	February 2023 to November 2023
Morris Road	Between Gowrie Junction Road and Paulsens Road	13	28	25	0	0	February 2023 to November 2023
	Between Paulsens Road and Boundary Street	0	119	46	0	0	August 2023 to August 2023

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Mort Street	Between Hermitage Road and Old Mort Street	0	23	0	0	0	April 2023 to August 2023
	Between Old Mort Street and Mort Street	1	25	1	1	0	April 2023 to August 2023
	Between Toowoomba Bypass and North Street	7	68	22	16	0	September 2023 to September 2023
Munro Street	Between New England Highway and Harlaxton Quarry	50	41	0	30	0	October 2022 to October 2022
North Street	Between Mort Street and New England Highway	14	17	16	11	0	July 2023 to July 2023
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	13	28	25	0	0	February 2023 to November 2023
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	13	28	25	0	0	February 2023 to November 2023
	Between Gowrie Birnam Road and Paulsens Road	13	28	25	0	0	February 2023 to November 2023
Old Mort Street	Between Mort Street and Mort Street	0	0	0	0	0	N/A
Omara Road	Between Warrego Highway and Witmack Road	1	0	0	0	0	May 2022 to July 2022
Paulsens Road	Between Morris Road and Old Homebush Road	13	28	25	0	0	February 2023 to November 2023
Pipe Street	Full Extent	1	0	0	0	0	May 2022 to July 2022
Pipeline Road	Full Extent	88	94	25	0	0	July 2023 to July 2023
Witmack Road	Between Omara Road and Pipe Street	1	0	0	0	0	May 2022 to July 2022
LGR: LVRC							
Airforce Road	Between William Street and Lockyer Siding Road	1	203	0	6	0	September 2023 to September 2023
	Between Lockyer Sliding Road and Cattos Road	0	1	0	2	0	May 2025 to June 2025
	Between Laidley Street and Airforce Road	0	1	0	0	0	July 2023 to July 2023
Arthur Street	Between Georges Street and Mary McKillop Street	0	41	0	7	0	November 2023 to November 2023
	Between Mary McKillop Street and William Street	1	203	0	7	0	September 2023 to September 2023
Ashlands Drive	Full Extent	0	0	4	3	0	December 2024 to December 2024
Bells Road	Full Extent	0	0	4	2	0	August 2024 to October 2024
Cattos Road	Between Unnamed Road and Airforce Road	0	41	0	7	0	November 2023 to November 2023
George Street	Between Lawlers Road and Arthur Street	0	41	0	7	0	November 2023 to November 2023

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Gittins Road	Between Jones Road and McNamaras Road	31	4	4	7	0	October 2022 to October 2022
	Between McNamaras Road and Stevens Road	401	375	4	0	0	November 2022 to November 2022
Howmans Road	Full Extent	21	48	2	6	0	March 2023 to March 2023
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0	0	0	4	0	May 2025 to June 2025
	Between Little Oaky Creek Road and Wallens Road	56	167	37	19	0	July 2023 to September 2023
Laidley Street	Between Station Street and Seventeen Mile Road	0	1	0	2	0	May 2025 to June 2025
Lawlers Road	Between Warrego Highway and George Street	0	41	0	7	0	November 2023 to November 2023
Little Oaky Creek Road	Between Roches Road and Jones Road	73	38	40	21	0	October 2022 to October 2022
Mary McKillop Street	Between Turner Street and Arthur Street	1	203	0	0	0	September 2023 to September 2023
McNamaras Road	Between Gittins Road and Unnamed Road	405	374	2	7	0	November 2022 to November 2022
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	0	198	4	3	0	September 2023 to September 2023
Roches Road	Between Warrego Highway and Little Oaky Creek Road	73	38	40	21	0	October 2022 to October 2022
Seventeen Mile Road	Between Airforce Road and Laidley Street	0	1	0	2	0	May 2025 to June 2025
Station Street	Between Arthur Street and Laidley Street	0	1	0	2	0	May 2025 to June 2025
Turner Street	Between Warrego Highway and Mary MacKillop Street	1	203	0	0	0	September 2023 to September 2023
Unnamed Road	Between Airforce Road and Cattos Road	0	41	0	7	0	November 2023 to November 2023
Wallens Road	Between Jones Road and Council Boundary	21	162	27	6	0	July 2023 to September 2023
William Street	Between Arthur Street and Airforce Road	1	203	0	6	0	September 2023 to September 2023
SCR: DTMR							
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0	2	13	1	0	July 2024 to July 2024
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	5	7	8	2	0	April 2024 to November 2024
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0	0	0	17	0	May 2025 to June 2025
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	0	0	0	0	0	January 2022 to April 27
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0	0	0	17	0	May 2025 to June 2025

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	62	90	15	19	0	August 2023 to August 2023
	4104 – Between Brookside Place and Toowoomba Bypass	62	90	15	19	0	August 2023 to August 2023
	4104 – Between Toowoomba Bypass and Howmans Road	62	90	15	19	0	August 2023 to August 2023
New England Highway	22A – Between Highfields Road and Murphys Creek Road	75	66	0	0	0	September 2022 to October 2022
	22A – Between Murphys Creek Road and Munro Street	75	66	0	0	0	September 2022 to October 2022
	22A – Between Munro Street and North Street	124	88	21	15	0	October 2022 to October 2022
	22A – Between North Street and Warrego Highway	130	96	34	21	0	October 2022 to October 2022
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0	0	0	17	0	May 2025 to June 2025
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	0	2	13	1	0	July 2024 to July 2024
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	59	0	0	14	0	November 2022 to December 2022
	319 – Between Boundary Street and New England Highway	1	102	21	22	0	August 2023 to August 2023
	319 – Between New England Highway and Warrego Highway	1	58	0	22	0	August 2023 to August 2023
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	59	0	0	14	0	November 2022 to December 2022
	324 – Between McDougall Street and Tor Street	1	0	0	0	0	April 2022 to June 2022
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	130	96	34	21	0	October 2022 to October 2022
	315 – Between Warrego Highway and Murphys Creek Road	130	96	34	21	0	October 2022 to October 2022
	315 – Between Murphys Creek Road and Toowoomba Bypass	6	254	21	30	0	September 2023 to September 2023
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	59	0	0	14	0	November 2022 to December 2022
	18A – Between Gowrie Junction Road and McDougall Street	0	0	0	0	0	N/A
	18A – Between McDougall Street and Tor Street	0	0	0	0	0	N/A
	18A – Between Tor Street and Rob Street	1	0	0	0	0	April 2022 to June 2022
	18A – Between Rob Street and Toowoomba Athol Road	1	0	0	0	0	April 2022 to June 2022

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
	18A – Between Toowoomba Athol Road and New England Highway	1	0	0	0	0	April 2022 to June 2022
	18A – Between New England Highway and James Street	130	96	34	21	0	October 2022 to October 2022
	18A – Between James Street and Tourist Road	130	96	34	21	0	October 2022 to October 2022
	18A – Between Tourist Road and Toowoomba Connection Road	130	96	34	21	0	October 2022 to October 2022
	18A – Between Toowoomba Bypass and Gatton Helidon Road	6	254	21	30	0	September 2023 to September 2023
	18A – Between Gatton Helidon Road and Gatton Esk Road	0	42	13	22	0	November 2023 to November 2023
	18A – Between Gatton Esk Road and Laidley Plainland Road	0	42	13	22	0	November 2023 to November 2023
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	0	42	13	22	0	November 2023 to November 2023
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	0	2	13	17	0	May 2025 to June 2025
	18A – Between Brisbane Valley Highway and Mount Crosby Road	0	2	13	17	0	May 2025 to June 2025
	18A – Between Mount Crosby Road and Cunningham Highway	0	2	13	17	0	May 2025 to June 2025
SCR: RMS							
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0	0	0	17	0	May 2025 to June 2025
Summerland Way	Between Trenayr Road and Turf Street	0	0	0	10	0	May 2025 to June 2025
LGR: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	17	0	May 2025 to June 2025
Charles Street	Between Bent Street and Pacific Highway	0	0	0	17	0	May 2025 to June 2025
Clarence Street	Between Oliver Street and Craig Street	0	0	0	7	0	May 2025 to June 2025
Clark Road	Full Extent	0	0	0	10	0	May 2025 to June 2025

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Craig Street	Between Villiers Street and Clarence Street	0	0	0	10	0	May 2025 to June 2025
	Between Clarence Street and Bent Street	0	0	0	17	0	May 2025 to June 2025
Dobie Street	Between Villers Street and Summerland Way	0	0	0	10	0	May 2025 to June 2025
Fry Street	Between Mary Street and Alice Street	0	0	0	7	0	May 2025 to June 2025
Mary Street	Between Fry Street and Oliver Street	0	0	0	7	0	May 2025 to June 2025
Oliver Street	Between Mary Street and Clarence Street	0	0	0	7	0	May 2025 to June 2025
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	10	0	May 2025 to June 2025
Villers Street	Between Craig Street and Dobie Street	0	0	0	10	0	May 2025 to June 2025
LGR: ICC							
Fairbank Place	Full Extent	0	2	13	1	0	July 2024 to July 2024
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0	41	0	6	0	November 2023 to November 2023
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0	41	0	6	0	November 2023 to November 2023
Newhill Drive	Full Extent	0	2	13	1	0	July 2024 to July 2024
Noblevale Way	Between Rob Roy Way and Fairbank Place	0	2	13	1	0	July 2024 to July 2024
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	2	13	1	0	July 2024 to July 2024
Rob Roy Way	Full Extent	0	2	13	1	0	July 2024 to July 2024

Table 5.19 Peak daily trips per road section by years (light vehicles only)

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
LGR: TRC							
Boundary Street	Between Hermitage Road and Toowoomba Bypass	34	34	34	34	34	January 2022 to June 2026
	Between Toowoomba Bypass and Morris Road	27	27	27	27	27	January 2022 to June 2026
Cooby Dam Road	Between Klein Road and Pipeline Road	0	0	0	0	0	N/A
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	42	42	42	42	42	January 2022 to June 2026
	Between Ganzer Road and Morris Road	14	14	14	14	14	January 2022 to June 2026
Griffiths Street	Between New England Highway and Mort Street	27	27	27	27	27	January 2022 to June 2026
Hermitage Road	Between Gowrie Junction Road and Boundary Street	21	21	21	21	21	January 2022 to June 2026
	Between Boundary Road and Mort Street	14	14	14	14	14	January 2022 to June 2026
	Between Mort Street and Private Access	27	27	27	27	27	January 2022 to June 2026
Highfields Road	Between Klein Road and New England Highway	0	0	0	0	0	N/A
Klein Road	Between Kleinton School Road and Cooby Dam Road	0	0	0	0	0	N/A
Kleinton School Road	Between Meringandan Road and Klein Road	0	0	0	0	0	N/A
Krienke Road	Between Gowrie Junction Road and Morris Road	28	28	28	28	28	January 2022 to June 2026
Larcombe Street	Between North Street and Railway Line	0	0	0	0	0	N/A
Main Street	Between Meringandan Shirley Road and Klein Road	0	0	0	0	0	N/A
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	0	0	0	0	0	N/A
Meringandan Road	Between Highfields Road and Kleinton School Road	0	0	0	0	0	N/A
Meringandan Shirley Road	Between Main Street and Woolmer Road	0	0	0	0	0	N/A
Morris Road	Between Gowrie Junction Road and Paulsens Road	14	14	14	14	14	January 2022 to June 2026
	Between Paulsens Road and Boundary Street	14	14	14	14	14	January 2022 to June 2026
Mort Street	Between Hermitage Road and Old Mort Street	14	14	14	14	14	January 2022 to June 2026
	Between Old Mort Street and Mort Street	14	14	14	14	14	January 2022 to June 2026
	Between Toowoomba Bypass and North Street	41	41	41	41	41	January 2022 to June 2026

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Munro Street	Between New England Highway and Harlaxton Quarry	0	0	0	0	0	N/A
North Street	Between Mort Street and New England Highway	0	0	0	0	0	N/A
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	0	0	0	0	0	N/A
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	0	0	0	0	0	N/A
	Between Gowrie Birnam Road and Paulsens Road	14	14	14	14	14	January 2022 to June 2026
Old Mort Street	Between Mort Street and Mort Street	14	14	14	14	14	January 2022 to June 2026
Omara Road	Between Warrego Highway and Witmack Road	0	0	0	0	0	N/A
Paulsens Road	Between Morris Road and Old Homebush Road	14	14	14	14	14	January 2022 to June 2026
Pipe Street	Full Extent	0	0	0	0	0	N/A
Pipeline Road	Full Extent	0	0	0	0	0	N/A
Witmack Road	Between Omara Road and Pipe Street	0	0	0	0	0	N/A
LGR: LVRC							
Airforce Road	Between William Street and Lockyer Siding Road	27	27	27	27	27	January 2022 to June 2026
	Between Lockyer Sliding Road and Cattos Road	0	0	0	0	0	N/A
	Between Laidley Street and Airforce Road	0	0	0	0	0	N/A
Arthur Street	Between Georges Street and Mary McKillop Street	14	14	14	14	14	January 2022 to June 2026
	Between Mary McKillop Street and William Street	27	27	27	27	27	January 2022 to June 2026
Ashlands Drive	Full Extent	28	28	28	28	28	January 2022 to June 2026
Bells Road	Full Extent	28	28	28	28	28	January 2022 to June 2026
Cattos Road	Between Unnamed Road and Airforce Road	0	0	0	0	0	N/A
George Street	Between Lawlers Road and Arthur Street	14	14	14	14	14	January 2022 to June 2026
Gittins Road	Between Jones Road and McNamaras Road	42	42	42	42	42	January 2022 to June 2026
	Between McNamaras Road and Stevens Road	14	14	14	14	14	January 2022 to June 2026
Howmans Road	Full Extent	28	28	28	28	28	January 2022 to June 2026

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0	0	0	0	0	N/A
	Between Little Oaky Creek Road and Wallens Road	83	83	83	83	83	January 2022 to June 2026
Laidley Street	Between Station Street and Seventeen Mile Road	0	0	0	0	0	N/A
Lawlers Road	Between Warrego Highway and George Street	14	14	14	14	14	January 2022 to June 2026
Little Oaky Creek Road	Between Roches Road and Jones Road	125	125	125	125	125	January 2022 to June 2026
Mary McKillop Street	Between Turner Street and Arthur Street	14	14	14	14	14	January 2022 to June 2026
McNamaras Road	Between Gittins Road and Unnamed Road	28	28	28	28	28	January 2022 to June 2026
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	28	28	28	28	28	January 2022 to June 2026
Roches Road	Between Warrego Highway and Little Oaky Creek Road	125	125	125	125	125	January 2022 to June 2026
Seventeen Mile Road	Between Airforce Road and Laidley Street	0	0	0	0	0	N/A
Station Street	Between Arthur Street and Laidley Street	0	0	0	0	0	N/A
Turner Street	Between Warrego Highway and Mary MacKillop Street	14	14	14	14	14	January 2022 to June 2026
Unnamed Road	Between Airforce Road and Cattos Road	14	14	14	14	14	January 2022 to June 2026
Wallens Road	Between Jones Road and Council Boundary	0	0	0	0	0	N/A
William Street	Between Arthur Street and Airforce Road	27	27	27	27	27	January 2022 to June 2026
SCR: DTMR							
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0	0	0	0	0	January 2022 to April 27
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	0	0	0	0	0	January 2022 to April 27
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0	0	0	0	0	January 2022 to April 27
Ipswich-Cunningham Highway Connection Road	301 – Between River Road and South Station Road	166	166	166	166	166	January 2022 to June 2026
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0	0	0	0	0	January 2022 to April 27
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	69	69	69	69	69	January 2022 to June 2026
	4104 – Between Brookside Place and Toowoomba Bypass	69	69	69	69	69	January 2022 to June 2026
	4104 – Between Toowoomba Bypass and Howmans Road	69	69	69	69	69	January 2022 to June 2026

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
New England Highway	22A – Between Highfields Road and Murphys Creek Road	0	0	0	0	0	January 2022 to April 27
	22A – Between Murphys Creek Road and Munro Street	0	0	0	0	0	January 2022 to April 27
	22A – Between Munro Street and North Street	27	27	27	27	27	January 2022 to June 2026
	22A – Between North Street and Warrego Highway	27	27	27	27	27	January 2022 to June 2026
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0	0	0	0	0	January 2022 to April 27
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	166	166	166	166	166	January 2022 to June 2026
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	0	0	0	0	0	January 2022 to April 27
	319 – Between Boundary Street and New England Highway	48	48	48	48	48	January 2022 to June 2026
	319 – Between New England Highway and Warrego Highway	48	48	48	48	48	January 2022 to June 2026
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	0	0	0	0	0	January 2022 to April 27
	324 – Between McDougall Street and Tor Street	0	0	0	0	0	January 2022 to April 27
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	118	118	118	118	118	January 2022 to June 2026
	315 – Between Roches Road and Murphys Creek Road	118	118	118	118	118	January 2022 to June 2026
	315 – Between Murphys Creek Road and Toowoomba Bypass	180	180	180	180	180	January 2022 to June 2026
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	0	0	0	0	0	N/A
	18A – Between Gowrie Junction Road and McDougall Street	21	21	21	21	21	January 2022 to April 27
	18A – Between McDougall Street and Tor Street	21	21	21	21	21	January 2022 to June 2026
	18A – Between Tor Street and Rob Street	21	21	21	21	21	January 2022 to June 2026
	18A – Between Rob Street and Toowoomba Athol Road	21	21	21	21	21	January 2022 to June 2026
	18A – Between Toowoomba Athol Road and New England Highway	62	62	62	62	62	January 2022 to June 2026
	18A – Between New England Highway and James Street	118	118	118	118	118	January 2022 to June 2026
	18A – Between James Street and Tourist Road	118	118	118	118	118	January 2022 to June 2026

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
	18A – Between Tourist Road and Toowoomba Connection Road	118	118	118	118	118	January 2022 to June 2026
	18A – Between Toowoomba Bypass and Gatton Helidon Road	180	180	180	180	180	January 2022 to April 27
	18A – Between Gatton Helidon Road and Gatton Esk Road	166	166	166	166	166	January 2022 to June 2026
	18A – Between Gatton Esk Road and Laidley Plainland Road	166	166	166	166	166	January 2022 to June 2026
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	166	166	166	166	166	January 2022 to June 2026
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	166	166	166	166	166	January 2022 to June 2026
	18A – Between Brisbane Valley Highway and Mount Crosby Road	166	166	166	166	166	January 2022 to June 2026
	18A – Between Mount Crosby Road and Cunningham Highway	166	166	166	166	166	January 2022 to June 2026
SCR: RMS							
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0	0	0	0	0	N/A
Summerland Way	Between Trenayr Road and Turf Street	0	0	0	0	0	N/A
LGR: CVC							
Bent Street	Between Craig Street and Gwydir Highway	0	0	0	0	0	N/A
Charles Street	Between Bent Street and Pacific Highway	0	0	0	0	0	N/A
Clarence Street	Between Oliver Street and Craig Street	0	0	0	0	0	N/A
Clark Road	Full Extent	0	0	0	0	0	N/A
Craig Street	Between Villiers Street and Clarence Street	0	0	0	0	0	N/A
	Between Clarence Street and Bent Street	0	0	0	0	0	N/A
Dobie Street	Between Villers Street and Summerland Way	0	0	0	0	0	N/A
Fry Street	Between Mary Street and Alice Street	0	0	0	0	0	N/A
Mary Street	Between Fry Street and Oliver Street	0	0	0	0	0	N/A

Road name	Road section	Year of construction					Peak construction months
		2022	2023	2024	2025	2026	
Oliver Street	Between Mary Street and Clarence Street	0	0	0	0	0	N/A
Trenayr Road	Between Summerland Way and Clark Road	0	0	0	0	0	N/A
Villers Street	Between Craig Street and Dobie Street	0	0	0	0	0	N/A
LGR: ICC							
Fairbank Place	Full Extent	0	0	0	0	0	N/A
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0	0	0	0	0	N/A
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0	0	0	0	0	N/A
Newhill Drive	Full Extent	0	0	0	0	0	N/A
Noblevale Way	Between Rob Roy Way and Fairbank Place	0	0	0	0	0	N/A
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0	0	0	0	0	N/A
Rob Roy Way	Full Extent	0	0	0	0	0	N/A

6 Traffic impact assessment

6.1 Traffic analysis

This section examines the impact of the Project on the road network. The Project related traffic consists of traffic generated by both construction and operational activities. However, it is anticipated that the impacts would primarily be during the construction phase of the Project. Throughout the operational phase, the impacts from the Project are expected to be low given the expected nature of operations (i.e. low vehicle movements to/from depots, transportation of maintenance material within the rail corridor). Therefore, the associated Project traffic volumes during the operational phase are not expected to trigger the 5 per cent threshold outlined in GTIA (refer Table 1.4).

6.1.1 Traffic growth rates

Traffic growth rates on SCR were derived based on historic permanent census traffic data where available. An evaluation of the traffic growth rates within this traffic data revealed an overall AADT growth rate of 2 per cent. The proportion of this growth which was heavy vehicles varied by link but was generally consistent with the AADT growth and has been assumed as such. This is considered reasonable for current design. The data and evaluation are provided in Appendix A for DTMR roads and Appendix B for RMS. Traffic growth rates were requested from all asset owners impacted by construction traffic. However, in the absence of available historical count data or forecast models, the 2 per cent growth rate calculated from the SCR was adopted in the analyses for all SCR and LGR for all vehicle types. This is considered reasonable for current design given the observed growth on roads evaluated.

6.1.2 Seasonal variation

Based on the presence of some rural/agricultural land uses in the TIA study area, traffic volumes on the road network may increase during harvesting season in some areas. Key crops in the TIA study area include vegetables, wheat, barley, oats and cereal rye. During this time of year, heavy vehicle usage on local and main roads in the TIA study area may increase as trucks transport grain and tractors and harvesters move between properties. Farming machinery is generally much larger and slower than other vehicles using the roads and may result in localised delays.

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

- Road rail interface analysis: It was considered to adopt 95th percentile output results from SIDRA modelling results instead of industry standard 85th percentile output. This is considered conservative as it accounts for additional vehicle queue and delay which might be induced through higher traffic volumes and slower moving vehicles.
- The LOS thresholds and associated K-values used within the analysis per road type as derived from the Austroads *Part 2 – Guide to Traffic Engineering Practice: Roadway Capacity* (1988) already accounts for the 30th highest hour traffic volumes of similar road types. This provides for upper LOS threshold limits which accounts for any micro fluctuations and peaks in traffic throughout the year.

Seasonality is to be considered further in the development of the TMP discussed in Section 9.2.2.

6.2 Construction phase

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

- Comparison of the Project traffic to the existing (baseline) background traffic to determine if the 5 per cent threshold is breached (road links)
- LOS analysis
- Preliminary assessment of assumed construction turning volumes to highlight potential temporary turning treatment requirements during construction.

6.2.1 5 per cent traffic comparison on links

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

Table 6.1 Percentage of background traffic impact parameter

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

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

Road name	Road section	2022	2023	2024	2025	2026
LGR: TRC						
Boundary Street	Between Hermitage Road and Toowoomba Bypass	3.3%	5.7%	5.4%	3.7%	3.0%
	Between Toowoomba Bypass and Morris Road	5.3%	27.7%	13.6%	5.0%	4.9%
Cooby Dam Road	Between Klein Road and Pipeline Road	106.8%	112.2%	29.3%	0.1%	0.0%
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	5.1%	3.4%	3.1%	2.9%	1.9%
	Between Ganzer Road and Morris Road	2.7%	0.5%	0.5%	1.0%	0.5%
Griffiths Street	Between New England Highway and Mort Street	0.8%	2.7%	1.3%	1.2%	0.7%
Hermitage Road	Between Gowrie Junction Road and Boundary Street	3.7%	7.4%	6.5%	3.9%	2.8%
	Between Boundary Road and Mort Street	2.5%	2.5%	1.8%	1.8%	1.7%
	Between Mort Street and Private Access	26.8%	47.9%	25.8%	25.2%	23.8%
Highfields Road	Between Klein Road and New England Highway	5.0%	5.3%	1.4%	0.0%	0.0%
Klein Road	Between Kleinton School Road and Cooby Dam Road	55.5%	58.3%	15.2%	0.1%	0.0%
Kleinton School Road	Between Meringandan Road and Klein Road	12.1%	12.7%	3.3%	0.0%	0.0%
Krienke Road	Between Gowrie Junction Road and Morris Road	212.6%	169.1%	125.4%	153.9%	120.6%

Road name	Road section	2022	2023	2024	2025	2026
Larcombe Street	Between North Street and Railway Line	0.7%	0.9%	0.7%	0.5%	0.0%
Main Street	Between Meringandan Shirley Road and Klein Road	7.8%	16.6%	14.4%	0.0%	0.0%
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	2.9%	1.4%	0.0%	0.0%	0.0%
Meringandan Road	Between Highfields Road and Kleinton School Road	12.0%	12.6%	3.3%	0.0%	0.0%
Meringandan Shirley Road	Between Main Street and Woolmer Road	0.9%	1.9%	1.6%	0.0%	0.0%
Morris Road	Between Gowrie Junction Road and Paulsens Road	10.6%	16.3%	14.7%	5.2%	5.1%
	Between Paulsens Road and Boundary Street	1.2%	11.2%	4.9%	1.1%	1.1%
Mort Street	Between Hermitage Road and Old Mort Street	0.6%	1.7%	0.6%	0.6%	0.6%
	Between Old Mort Street and Mort Street	0.7%	1.7%	0.7%	0.6%	0.6%
	Between Toowoomba Bypass and North Street	2.2%	4.9%	2.8%	2.5%	1.8%
Munro Street	Between New England Highway and Harlaxton Quarry	3.0%	2.4%	0.0%	1.7%	0.0%
North Street	Between Mort Street and New England Highway	0.3%	0.4%	0.3%	0.2%	0.0%
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	2.3%	5.0%	4.3%	0.0%	0.0%
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	3.1%	6.7%	5.8%	0.0%	0.0%
	Between Gowrie Birnam Road and Paulsens Road	6.4%	9.9%	9.0%	3.1%	3.1%
Old Mort Street	Between Mort Street and Mort Street	12.4%	12.2%	11.9%	11.7%	11.5%
Omara Road	Between Warrego Highway and Witmack Road	0.0%	0.0%	0.0%	0.0%	0.0%
Paulsens Road	Between Morris Road and Old Homebush Road	1.1%	1.6%	1.5%	0.5%	0.5%
Pipe Street	Full Extent	0.2%	0.0%	0.0%	0.0%	0.0%
Pipeline Road	Full Extent	289.9%	304.7%	79.5%	0.4%	0.0%
Witmack Road	Between Omara Road and Pipe Street	0.2%	0.0%	0.0%	0.0%	0.0%
LGR: LVRC						
Airforce Road	Between William Street and Lockyer Siding Road	9.2%	73.2%	8.5%	10.1%	8.2%
	Between Lockyer Sliding Road and Cattos Road	0.0%	0.2%	0.0%	0.5%	0.0%
	Between Laidley Street and Airforce Road	0.0%	0.2%	0.0%	0.0%	0.0%
Arthur Street	Between Georges Street and Mary McKillop Street	3.0%	11.8%	2.9%	4.3%	2.8%
	Between Mary McKillop Street and William Street	6.3%	49.7%	5.8%	7.2%	5.6%
Ashlands Drive	Full Extent	6.5%	6.4%	7.1%	6.7%	6.0%
Bells Road	Full Extent	6.6%	6.4%	7.2%	6.6%	6.0%
Cattos Road	Between Unnamed Road and Airforce Road	0.0%	13.1%	0.0%	2.2%	0.0%

Road name	Road section	2022	2023	2024	2025	2026
George Street	Between Lawlers Road and Arthur Street	0.7%	3.0%	0.7%	1.1%	0.7%
Gittins Road	Between Jones Road and McNamaras Road	26.5%	16.4%	16.1%	16.6%	14.0%
	Between McNamaras Road and Stevens Road	151.3%	139.0%	6.4%	4.8%	4.7%
Howmans Road	Full Extent	11.5%	17.5%	6.8%	7.6%	6.0%
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0.0%	0.0%	0.0%	0.6%	0.0%
	Between Little Oaky Creek Road and Wallens Road	64.2%	113.3%	53.4%	44.3%	35.5%
Laidley Street	Between Station Street and Seventeen Mile Road	0.0%	0.2%	0.0%	0.3%	0.0%
Lawlers Road	Between Warrego Highway and George Street	0.7%	3.0%	0.7%	1.1%	0.7%
Little Oaky Creek Road	Between Roches Road and Jones Road	78.2%	63.0%	62.6%	54.4%	45.6%
Mary McKillop Street	Between Turner Street and Arthur Street	3.5%	50.1%	3.1%	3.1%	3.0%
McNamaras Road	Between Gittins Road and Unnamed Road	101.9%	92.8%	6.6%	7.6%	6.0%
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	7.2%	58.0%	7.9%	7.5%	6.7%
Roches Road	Between Warrego Highway and Little Oaky Creek Road	57.0%	46.0%	45.7%	39.7%	33.2%
Seventeen Mile Road	Between Airforce Road and Laidley Street	0.0%	0.7%	0.0%	1.5%	0.0%
Station Street	Between Arthur Street and Laidley Street	0.0%	0.0%	0.0%	0.1%	0.0%
Turner Street	Between Warrego Highway and Mary MacKillop Street	0.7%	10.0%	0.6%	0.6%	0.6%
Unnamed Road	Between Airforce Road and Cattos Road	0.0%	9.5%	0.0%	1.6%	0.0%
Wallens Road	Between Jones Road and Council Boundary	8.1%	40.6%	9.2%	4.5%	3.0%
William Street	Between Arthur Street and Airforce Road	6.7%	53.3%	6.2%	7.3%	6.0%
SCR: DTMR						
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0.0%	0.0%	0.1%	0.0%	0.0%
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	0.2%	0.3%	0.2%	0.1%	0.0%
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.0%	0.0%
Ipswich-Cunningham Highway Connection Road	301 – River Road and South Station Road	1.1%	1.1%	1.1%	1.0%	1.0%
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.0%	0.0%

Road name	Road section	2022	2023	2024	2025	2026
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	11.3%	13.5%	7.0%	7.2%	5.5%
	4104 – Between Brookside Place and Toowoomba Bypass	11.3%	13.5%	7.0%	7.2%	5.5%
	4104 – Between Toowoomba Bypass and Howmans Road	11.3%	13.5%	7.0%	7.2%	5.5%
New England Highway	22A – Between Highfields Road and Murphys Creek Road	0.9%	0.8%	0.0%	0.0%	0.0%
	22A – Between Murphys Creek Road and Munro Street	0.7%	0.6%	0.0%	0.0%	0.0%
	22A – Between Munro Street and North Street	1.5%	1.1%	0.5%	0.4%	0.3%
	22A – Between North Street and Warrego Highway	2.2%	1.7%	0.8%	0.6%	0.4%
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0.0%	0.0%	0.0%	0.0%	0.0%
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	4.1%	4.1%	4.3%	3.9%	3.8%
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	3.8%	0.0%	0.0%	0.9%	0.0%
	319 – Between Boundary Street and New England Highway	3.2%	9.5%	4.3%	4.3%	2.9%
	319 – Between New England Highway and Warrego Highway	3.2%	6.7%	3.0%	4.3%	2.9%
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	3.4%	0.0%	0.0%	0.8%	0.0%
	324 – Between McDougall Street and Tor Street	0.0%	0.0%	0.0%	0.0%	0.0%
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	1.8%	1.5%	1.1%	0.9%	0.8%
	315 – Between Roches Road and Murphys Creek Road	1.8%	1.5%	1.1%	0.9%	0.8%
	315 – Between Murphys Creek Road and Toowoomba Bypass	1.6%	3.8%	1.7%	1.8%	1.5%
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	0.8%	0.0%	0.0%	0.2%	0.0%
	18A – Between Gowrie Junction Road and McDougall Street	0.3%	0.3%	0.3%	0.3%	0.3%
	18A – Between McDougall Street and Tor Street	0.2%	0.2%	0.2%	0.2%	0.2%
	18A – Between Tor Street and Rob Street	0.1%	0.1%	0.1%	0.1%	0.1%
	18A – Between Rob Street and Toowoomba Athol Road	0.3%	0.3%	0.3%	0.2%	0.2%
	18A – Between Toowoomba Athol Road and New England Highway	0.5%	0.5%	0.5%	0.5%	0.5%
	18A – Between New England Highway and James Street	2.6%	2.2%	1.5%	1.4%	1.1%
	18A – Between James Street and Tourist Road	2.9%	2.4%	1.7%	1.5%	1.3%

Road name	Road section	2022	2023	2024	2025	2026
	18A – Between Tourist Road and Toowoomba Connection Road	1.8%	1.5%	1.1%	0.9%	0.8%
	18A – Between Toowoomba Bypass and Gatton Helidon Road	1.6%	3.8%	1.7%	1.8%	1.5%
	18A – Between Gatton Helidon Road and Gatton Esk Road	2.0%	2.5%	2.1%	2.2%	1.9%
	18A – Between Gatton Esk Road and Laidley Plainland Road	1.3%	1.6%	1.4%	1.4%	1.2%
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	1.0%	1.2%	1.0%	1.1%	0.9%
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	0.9%	0.9%	0.9%	0.9%	0.8%
	18A – Between Brisbane Valley Highway and Mount Crosby Road	0.6%	0.6%	0.7%	0.7%	0.6%
	18A – Between Mount Crosby Road and Cunningham Highway	0.5%	0.5%	0.5%	0.5%	0.5%
SCR: RMS						
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0.0%	0.0%	0.0%	0.2%	0.0%
Summerland Way	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	0.5%	0.0%
LGR: CVC						
Bent Street	Between Craig Street and Gwydir Highway	0.0%	0.0%	0.0%	0.1%	0.0%
Charles Street	Between Bent Street and Pacific Highway	0.0%	0.0%	0.0%	0.7%	0.0%
Clarence Street	Between Oliver Street and Craig Street	0.0%	0.0%	0.0%	0.2%	0.0%
Clark Road	Full Extent	0.0%	0.0%	0.0%	2.2%	0.0%
Craig Street	Between Villiers Street and Clarence Street	0.0%	0.0%	0.0%	0.1%	0.0%
	Between Clarence Street and Bent Street	0.0%	0.0%	0.0%	0.1%	0.0%
Dobie Street	Between Villers Street and Summerland Way	0.0%	0.0%	0.0%	0.2%	0.0%
Fry Street	Between Mary Street and Alice Street	0.0%	0.0%	0.0%	0.2%	0.0%
Mary Street	Between Fry Street and Oliver Street	0.0%	0.0%	0.0%	0.2%	0.0%
Oliver Street	Between Mary Street and Clarence Street	0.0%	0.0%	0.0%	0.2%	0.0%
Trenayr Road	Between Summerland Way and Clark Road	0.0%	0.0%	0.0%	0.4%	0.0%
Villers Street	Between Craig Street and Dobie Street	0.0%	0.0%	0.0%	0.2%	0.0%
LGR: ICC						
Fairbank Place	Full Extent	0.0%	1.5%	8.3%	0.6%	0.0%
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0.0%	18.5%	0.0%	2.4%	0.0%
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0.0%	18.5%	0.0%	2.4%	0.0%
Newhill Drive	Full Extent	0.0%	0.4%	2.0%	0.1%	0.0%
Noblevale Way	Between Rob Roy Way and Fairbank Place	0.0%	1.0%	5.5%	0.4%	0.0%
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0.0%	0.0%	0.1%	0.0%	0.0%
Rob Roy Way	Full Extent	0.0%	0.5%	2.8%	0.2%	0.0%

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

Road name	Road section	2022	2023	2024	2025	2026
LGR: TRC						
Boundary Street	Between Hermitage Road and Toowoomba Bypass	3.6%	6.3%	6.0%	4.1%	3.4%
	Between Toowoomba Bypass and Morris Road	6.3%	33.0%	16.1%	5.9%	5.8%
Cooby Dam Road	Between Klein Road and Pipeline Road	106.8%	112.2%	29.3%	0.1%	0.0%
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	4.5%	3.0%	2.7%	2.5%	1.6%
	Between Ganzer Road and Morris Road	2.5%	0.5%	0.5%	0.9%	0.4%
Griffiths Street	Between New England Highway and Mort Street	1.0%	3.1%	1.5%	1.3%	0.8%
Hermitage Road	Between Gowrie Junction Road and Boundary Street	3.1%	6.3%	5.5%	3.2%	2.4%
	Between Boundary Road and Mort Street	2.1%	2.1%	1.5%	1.5%	1.4%
	Between Mort Street and Private Access	26.8%	47.9%	25.8%	25.2%	23.8%
Highfields Road	Between Klein Road and New England Highway	5.0%	5.3%	1.4%	0.0%	0.0%
Klein Road	Between Kleinton School Road and Cooby Dam Road	55.5%	58.3%	15.2%	0.1%	0.0%
Kleinton School Road	Between Meringandan Road and Klein Road	12.1%	12.7%	3.3%	0.0%	0.0%
Krienke Road	Between Gowrie Junction Road and Morris Road	212.6%	169.1%	125.4%	153.9%	120.6%
Larcombe Street	Between North Street and Railway Line	0.7%	0.9%	0.7%	0.5%	0.0%
Main Street	Between Meringandan Shirley Road and Klein Road	7.8%	16.6%	14.4%	0.0%	0.0%
McDougall Street	Between Rocla Court and Toowoomba Cecil Plains Road	2.9%	1.4%	0.0%	0.0%	0.0%
Meringandan Road	Between Highfields Road and Kleinton School Road	12.0%	12.6%	3.3%	0.0%	0.0%
Meringandan Shirley Road	Between Main Street and Woolmer Road	0.9%	1.9%	1.6%	0.0%	0.0%
Morris Road	Between Gowrie Junction Road and Paulsens Road	8.1%	12.5%	11.3%	3.9%	3.9%
	Between Paulsens Road and Boundary Street	1.2%	11.5%	5.1%	1.1%	1.1%
Mort Street	Between Hermitage Road and Old Mort Street	0.5%	1.4%	0.5%	0.5%	0.5%
	Between Old Mort Street and Mort Street	0.6%	1.4%	0.5%	0.5%	0.5%
	Between Toowoomba Bypass and North Street	1.8%	4.1%	2.3%	2.1%	1.5%
Munro Street	Between New England Highway and Harlaxton Quarry	23.1%	18.8%	0.0%	13.1%	0.0%
North Street	Between Mort Street and New England Highway	0.4%	0.4%	0.4%	0.3%	0.0%
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	2.3%	5.0%	4.3%	0.0%	0.0%

Road name	Road section	2022	2023	2024	2025	2026
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	3.1%	6.7%	5.8%	0.0%	0.0%
	Between Gowrie Birnam Road and Paulsens Road	6.4%	9.9%	9.0%	3.1%	3.1%
Old Mort Street	Between Mort Street and Mort Street	12.4%	12.2%	11.9%	11.7%	11.5%
Omara Road	Between Warrego Highway and Witmack Road	0.0%	0.0%	0.0%	0.0%	0.0%
Paulsens Road	Between Morris Road and Old Homebush Road	1.1%	1.6%	1.5%	0.5%	0.5%
Pipe Street	Full Extent	0.2%	0.0%	0.0%	0.0%	0.0%
Pipeline Road	Full Extent	289.9%	304.7%	79.5%	0.4%	0.0%
Witmack Road	Between Omara Road and Pipe Street	0.2%	0.0%	0.0%	0.0%	0.0%
LGR: LVRC						
Airforce Road	Between William Street and Lockyer Siding Road	9.1%	72.4%	8.4%	10.0%	8.1%
	Between Lockyer Sliding Road and Cattos Road	0.0%	0.2%	0.0%	0.5%	0.0%
	Between Laidley Street and Airforce Road	0.0%	0.2%	0.0%	0.0%	0.0%
Arthur Street	Between Georges Street and Mary McKillop Street	0.9%	3.7%	0.9%	1.3%	0.9%
	Between Mary McKillop Street and William Street	2.0%	15.6%	1.8%	2.2%	1.7%
Ashlands Drive	Full Extent	6.5%	6.4%	7.1%	6.7%	6.0%
Bells Road	Full Extent	6.6%	6.4%	7.2%	6.6%	6.0%
Cattos Road	Between Unnamed Road and Airforce Road	0.0%	13.0%	0.0%	2.2%	0.0%
George Street	Between Lawlers Road and Arthur Street	1.8%	7.2%	1.7%	2.6%	1.7%
Gittins Road	Between Jones Road and McNamaras Road	20.2%	12.5%	12.2%	12.6%	10.6%
	Between McNamaras Road and Stevens Road	115.0%	105.6%	4.9%	3.6%	3.5%
Howmans Road	Full Extent	11.5%	17.5%	6.8%	7.6%	6.0%
Jones Road	Between Warrego Highway and Little Oaky Creek Road	0.0%	0.0%	0.0%	0.7%	0.0%
	Between Little Oaky Creek Road and Wallens Road	160.5%	283.3%	133.5%	110.8%	88.7%
Laidley Street	Between Station Street and Seventeen Mile Road	0.0%	0.2%	0.0%	0.3%	0.0%
Lawlers Road	Between Warrego Highway and George Street	1.8%	7.2%	1.7%	2.6%	1.7%
Little Oaky Creek Road	Between Roches Road and Jones Road	32.6%	26.3%	26.1%	22.7%	19.0%
Mary McKillop Street	Between Turner Street and Arthur Street	3.5%	50.1%	3.1%	3.1%	3.0%
McNamaras Road	Between Gittins Road and Unnamed Road	101.9%	92.8%	6.6%	7.6%	6.0%
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	27.4%	219.5%	29.9%	28.2%	25.3%

Road name	Road section	2022	2023	2024	2025	2026
Roches Road	Between Warrego Highway and Little Oaky Creek Road	27.6%	22.3%	22.1%	19.2%	16.1%
Seventeen Mile Road	Between Airforce Road and Laidley Street	0.0%	0.3%	0.0%	0.7%	0.0%
Station Street	Between Arthur Street and Laidley Street	0.0%	0.0%	0.0%	0.1%	0.0%
Turner Street	Between Warrego Highway and Mary MacKillop Street	0.7%	10.0%	0.6%	0.6%	0.6%
Unnamed Road	Between Airforce Road and Cattos Road	0.0%	9.5%	0.0%	1.6%	0.0%
Wallens Road	Between Jones Road and Council Boundary	8.1%	40.6	9.2%	4.5%	3.0%
William Street	Between Arthur Street and Airforce Road	6.7%	53.3%	6.2%	7.3%	6.0%
SCR: DTMR						
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0.0%	0.0%	0.1%	0.0%	0.0%
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	0.2%	0.3%	0.3%	0.1%	0.0%
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.0%	0.0%
Ipswich-Cunningham Highway Connection Road	301 – River Road and South Station Road	1.1%	1.1%	1.1%	1.0%	1.0%
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.0%	0.0%
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	10.8%	12.9%	6.7%	6.9%	5.3%
	4104 – Between Brookside Place and Toowoomba Bypass	10.8%	12.9%	6.7%	6.9%	5.3%
	4104 – Between Toowoomba Bypass and Howmans Road	10.8%	12.9%	6.7%	6.9%	5.3%
New England Highway	22A – Between Highfields Road and Murphys Creek Road	0.9%	0.8%	0.0%	0.0%	0.0%
	22A – Between Murphys Creek Road and Munro Street	0.7%	0.6%	0.0%	0.0%	0.0%
	22A – Between Munro Street and North Street	1.6%	1.2%	0.5%	0.4%	0.3%
	22A – Between North Street and Warrego Highway	2.0%	1.5%	0.7%	0.6%	0.3%
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0.0%	0.0%	0.0%	0.0%	0.0%
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	4.1%	4.1%	4.3%	3.9%	3.8%
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains	3.8%	0.0%	0.0%	0.9%	0.0%
	319 – Between Boundary Street and New England Highway	3.2%	9.5%	4.3%	4.3%	2.9%
	319 – Between New England Highway and Warrego Highway	3.2%	6.7%	3.0%	4.3%	2.9%

Road name	Road section	2022	2023	2024	2025	2026
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	3.5%	0.0%	0.0%	0.8%	0.0%
	324 – Between McDougall Street and Tor Street	0.0%	0.0%	0.0%	0.0%	0.0%
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	1.9%	1.6%	1.1%	1.0%	0.8%
	315 – Between Roches Road and Murphys Creek Road	1.9%	1.6%	1.1%	1.0%	0.8%
	315 – Between Murphys Creek Road and Toowoomba Bypass	1.7%	3.9%	1.8%	1.8%	1.5%
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	0.7%	0.0%	0.0%	0.2%	0.0%
	18A – Between Gowrie Junction Road and McDougall Street	0.2%	0.2%	0.2%	0.2%	0.2%
	18A – Between McDougall Street and Tor Street	0.2%	0.2%	0.2%	0.2%	0.2%
	18A – Between Tor Street and Rob Street	0.1%	0.1%	0.1%	0.1%	0.1%
	18A – Between Rob Street and Toowoomba Athol Road	0.3%	0.3%	0.2%	0.2%	0.2%
	18A – Between Toowoomba Athol Road and New England Highway	0.5%	0.5%	0.5%	0.5%	0.5%
	18A – Between New England Highway and James Street	2.5%	2.1%	1.5%	1.3%	1.1%
	18A – Between James Street and Tourist Road	2.5%	2.1%	1.5%	1.3%	1.1%
	18A – Between Tourist Road and Toowoomba Connection Road	1.9%	1.6%	1.1%	1.0%	0.8%
	18A – Between Toowoomba Bypass and Gatton Helidon Road	1.7%	3.9%	1.8%	1.8%	1.5%
	18A – Between Gatton Helidon Road and Gatton Esk Road	1.8%	2.2%	1.9%	1.9%	1.6%
	18A – Between Gatton Esk Road and Laidley Plainland Road	1.3%	1.6%	1.4%	1.4%	1.2%
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	1.0%	1.2%	1.0%	1.1%	0.9%
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	0.9%	0.9%	1.0%	1.0%	0.9%
	18A – Between Brisbane Valley Highway and Mount Crosby Road	0.7%	0.7%	0.7%	0.7%	0.7%
	18A – Between Mount Crosby Road and Cunningham Highway	0.5%	0.5%	0.5%	0.5%	0.5%
SCR: RMS						
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0.0%	0.0%	0.0%	0.2%	0.0%
Summerland Way	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	0.5%	0.0%
LGR: CVC						
Bent Street	Between Craig Street and Gwydir Highway	0.0%	0.0%	0.0%	0.1%	0.0%
Charles Street	Between Bent Street and Pacific Highway	0.0%	0.0%	0.0%	0.7%	0.0%
Clarence Street	Between Oliver Street and Craig Street	0.0%	0.0%	0.0%	0.2%	0.0%

Road name	Road section	2022	2023	2024	2025	2026
Clark Road	Full Extent	0.0%	0.0%	0.0%	2.2%	0.0%
Craig Street	Between Villiers Street and Clarence Street	0.0%	0.0%	0.0%	0.1%	0.0%
	Between Clarence Street and Bent Street	0.0%	0.0%	0.0%	0.1%	0.0%
Dobie Street	Between Villers Street and Summerland Way	0.0%	0.0%	0.0%	0.2%	0.0%
Fry Street	Between Mary Street and Alice Street	0.0%	0.0%	0.0%	0.2%	0.0%
Mary Street	Between Fry Street and Oliver Street	0.0%	0.0%	0.0%	0.2%	0.0%
Oliver Street	Between Mary Street and Clarence Street	0.0%	0.0%	0.0%	0.2%	0.0%
Trenayr Road	Between Summerland Way and Clark Road	0.0%	0.0%	0.0%	0.4%	0.0%
Villers Street	Between Craig Street and Dobie Street	0.0%	0.0%	0.0%	0.2%	0.0%
LGR: ICC						
Fairbank Place	Full Extent	0.0%	1.7%	9.6%	0.7%	0.0%
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	0.0%	18.3%	0.0%	2.4%	0.0%
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	0.0%	18.3%	0.0%	2.4%	0.0%
Newhill Drive	Full Extent	0.0%	0.3%	1.9%	0.1%	0.0%
Noblevale Way	Between Rob Roy Way and Fairbank Place	0.0%	1.0%	5.3%	0.4%	0.0%
Redbank Plains Road	Between Cunningham Highway and Newhill Drive	0.0%	0.0%	0.1%	0.0%	0.0%
Rob Roy Way	Full Extent	0.0%	0.5%	3.0%	0.2%	0.0%

Table 6.2 and Table 6.3 show that that significant construction impacts are expected in all years of construction. From the tables, it is clear that the years 2022 to 2025 of the construction phase generate the highest construction related traffic volumes on the surrounding road network, with some exceedances occurring in 2026. The tables indicate that some road sections experience a significant amount of construction generated traffic over all construction years, for example Postmans Ridge Road, which is managed by LVRC.

During these years, some routes contain sections that are exceeding 5 per cent or 10 per cent of the background traffic. It was noted that some of the sections exceeded 10 per cent of the background traffic by significant margins; however, this is primarily due to the low background traffic volumes along these sections.

Table 6.4 shows a summary for each road authority of the number of roads with construction traffic that exceeds 5 per cent of base AADT. Certain sections of these routes will generate construction related traffic volumes in excess of 5 per cent or 10 per cent of the background traffic during the construction phase.

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

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

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

Road Authority	Number of roads	
	5–10% of base AADT	>10% base AADT
TRC	4	12
LVRC	4	15
DTMR	2	1
RMS	0	0
CVC	0	0
ICC	1	2

6.2.2 Level of service comparison on links

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

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

- Material delivery movements will be evenly distributed across the standard 12 hours of construction
- It has been assumed that there will be two shifts per day with 50 per cent of total staff working each shift. Staff shift changeovers have been assumed to occur simultaneously with background traffic peak hour. This results in a conservative assumption of all staff vehicles utilising the roads during the peak hour.

As per the Guidelines for Assessment of Road Impacts of Development, LOS C is considered to be the minimum standard on rural roads, although a LOS D may be acceptable during some circumstances. Therefore, all road sections currently operating at or above LOS D are considered to be operating above the acceptable standard. The LOS analysis was undertaken for the construction route sections which exceeds the 5 per cent threshold in Table 6.2 and Table 6.3, as well as all construction route sections of which traffic volumes were assumed. All road sections have been analysed based on their operations, using thresholds defined in section 4.1.2 for all road types. Although a number of the assessed road sections are physically a single lane bitumen road, they have been analysed by direction as a two-way road as traffic is able to travel in both directions. The LOS "with" and "without" the Project related traffic has been summarised in Table 6.5 and Table 6.6.

The results of the LOS comparison indicate that the Project construction traffic may cause a change to LOS along the following construction route section in each direction:

- LVRC:
  - Turner Street – Between Warrego Highway and Mary McKillop Street (LOS A to LOS B, due to the addition of up to 18 vehicles per hour (veh/hr) during the peak construction hour between 2022 and 2026).

Although there is a change in operational LOS for the road section above, the expected operational LOS B is considered acceptable given the short duration of the construction activities. Therefore, during the construction phase, apart from the identified road sections and the explanations provided above; the operational LOS of the overall road network will be no worse as a result of the Project. In addition, the operational performance of the road would also return to base conditions after construction is complete.

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

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Boundary Street	Between Hermitage Road and Toowoomba Bypass	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Toowoomba Bypass and Morris Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Cooby Dam Road	Between Klein Road and Pipeline Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	Two Lane Two Way	B	B	B	B	B	B	B	B	B	B
Hermitage Road	Between Gowrie Junction Road and Boundary Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Hermitage Road	Between Mort Street and Private Access	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Highfields Road	Between Klein Road and New England Highway	Midblock Analysis (1 lane)	B	B	B	B	B	B	B	B	B	B
Klein Road	Between Kleinton School Road and Cooby Dam Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Kleinton School Road	Between Meringandan Road and Klein Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Krienke Road	Between Gowrie Junction Road and Morris Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Main Street	Between Meringandan Shirley Road and Klein Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Meringandan Road	Between Highfields Road and Kleinton School Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Morris Road	Between Gowrie Junction Road and Paulsens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Paulsens Road and Boundary Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Munro Street	Between New England Highway and Harlaxton Quarry	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Gowrie Birnam Road and Paulsens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Old Mort Street	Between Mort Street and Mort Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Pipeline Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Airforce Road	Between William Street and Lockyer Siding Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Arthur Street	Between George Street and Mary McKillop Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Arthur Street	Between Mary McKillop Street and William Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Ashlands Drive	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Bells Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Cattos Road	Between Unnamed Road and Airforce Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
George Street	Between Lawlers Road and Arthur Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Gittins Road	Between Jones Road and McNamaras Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between McNamaras Road and Stevens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Howmans Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Jones Road	Between Little Oaky Creek Road and Wallens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Lawlers Road	Between Warrego Highway and George Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Little Oaky Creek Road	Between Roches Road and Jones Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Mary McKillop Street	Between Turner Street and Arthur Street	Midblock Analysis (1 lane)	A	A	A	A	A	A	A	A	A	A
McNamaras Road	Between Gittins Road and Unnamed Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Roches Road	Between Warrego Highway and Little Oaky Creek Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Turner Street	Between Warrego Highway and Mary MacKillop Street	Two Lane Two Way	A	A	A	A	A	A	B	A	B	B
Unnamed Road	Between Airforce Road and Cattos Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Wallens Road	Between Jones Road and Council Boundary	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
William Street	Between Arthur Street and Airforce Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Murphys Creek Road	4104 - Between Warrego Highway and Brookside Place	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	4104 - Between Brookside Place and Toowoomba Bypass	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	4104 - Between Toowoomba Bypass and Howmans Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Toowoomba Bypass	319 - Between Boundary Street and New England Highway	Four Lane Two Way	A	A	A	A	A	A	A	A	A	A
	319 - Between New England Highway and Warrego Highway	Four Lane Two Way	A	A	A	A	A	A	A	A	A	A
Fairbank Place	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Noblevale Way	Between Rob Roy way and Fairbank Place	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

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

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Boundary Street	Between Hermitage Road and Toowoomba Bypass	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Toowoomba Bypass and Morris Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Cooby Dam Road	Between Klein Road and Pipeline Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Gowrie Junction Road	Between Warrego Highway and Ganzer Road	Two Lane Two Way	B	B	B	B	B	B	B	B	B	B
Hermitage Road	Between Gowrie Junction Road and Boundary Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Hermitage Road	Between Mort Street and Private Access	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Highfields Road	Between Klein Road and New England Highway	Midblock Analysis (1 lane)	B	B	B	B	B	B	B	B	B	B
Klein Road	Between Kleinton School Road and Cooby Dam Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Kleinton School Road	Between Meringandan Road and Klein Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Krienke Road	Between Gowrie Junction Road and Morris Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Main Street	Between Meringandan Shirley Road and Klein Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Meringandan Road	Between Highfields Road and Kleinton School Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Morris Road	Between Gowrie Junction Road and Paulsens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Paulsens Road and Boundary Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Munro Street	Between New England Highway and Harlaxton Quarry	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Old Goombungee Road	Between Woolmer Road and Old Homebush Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Old Homebush Road	Between Old Goombungee Road and Gowrie Birnam Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between Gowrie Birnam Road and Paulsens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Old Mort Street	Between Mort Street and Mort Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Pipeline Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Airforce Road	Between William Street and Lockyer Siding Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Arthur Street	Between George Street and Mary McKillop Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Arthur Street	Between Mary McKillop Street and William Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Ashlands Drive	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Bells Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Cattos Road	Between Unnamed Road and Airforce Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
George Street	Between Lawlers Road and Arthur Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Gittins Road	Between Jones Road and McNamaras Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	Between McNamaras Road and Stevens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Howmans Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Jones Road	Between Little Oaky Creek Road and Wallens Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Lawlers Road	Between Warrego Highway and George Street	Midblock Analysis (1 lane)	A	A	A	A	A	A	A	A	A	A
Little Oaky Creek Road	Between Roches Road and Jones Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Mary McKillop Street	Between Turner Street and Arthur Street	Midblock Analysis (1 lane)	A	A	A	A	A	A	A	A	A	A
McNamaras Road	Between Gittins Road and Unnamed Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
Postmans Ridge Road	Between Murphys Creek Road and Warrego Highway	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Roches Road	Between Warrego Highway and Little Oaky Creek Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Turner Street	Between Warrego Highway and Mary MacKillop Street	Two Lane Two Way	A	A	A	A	A	A	B	A	A	B
Unnamed Road	Between Airforce Road and Cattos Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Wallens Road	Between Jones Road and Council Boundary	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
William Street	Between Arthur Street and Airforce Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	4104 – Between Brookside Place and Toowoomba Bypass	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
	4104 – Between Toowoomba Bypass and Howmans Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Toowoomba Bypass	319 - Between Boundary Street and New England Highway	Four Lane Two Way	A	A	A	A	A	A	A	A	A	A
	319 - Between New England Highway and Warrego Highway	Four Lane Two Way	A	A	A	A	A	A	A	A	A	A
Fairbank Place	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Haigslea Malabar Road	Between Warrego Highway and Mount Marrow Quarry Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Mount Marrow Quarry Road	Between Haigslea Malabar Road and Mount Marrow Blue Metal Quarries Pty	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Noblevale Way	Between Rob Roy way and Fairbank Place	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A

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

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

LOS analyses were undertaken for links where no base traffic volumes were available (i.e. assumed volumes). This excluded links which exceeded the 5 per cent comparison as they were accounted for in Section 6.2.2. Peak hour volumes were calculated using the same assumptions in Section 6.2.2.

Table 6.7 and Table 6.8 summarises the LOS results of the 'without' and 'with' Project traffic LOS. The results of the LOS comparison indicate that the Project construction traffic is not likely to cause changes to the LOS on any road links.

The volumes assumed are generally much higher than those which would be observed on the assessed links. Therefore, the LOS analysis undertaken for these links is likely to represent a "worst case" scenario.

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

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

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
LGR: TRC												
Larcombe Street	Between North Street and Railway Line	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
LGR: LVRC												
Laidley Street	Between Station Street and Seventeen Mile Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Station Street	Between Arthur Street and Laidley Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
LGR: CVC												
Charles Street	Between Bent Street and Pacific Highway	Midblock Analysis (1 lane)	B	B	B	B	B	B	B	B	B	B
Clarence Street	Between Oliver Street and Craig Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Clark Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Dobie Street	Between Villers Street and Summerland Way	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Fry Street	Between Mary Street and Alice Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Mary Street	Between Fry Street and Oliver Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Oliver Street	Between Mary Street and Clarence Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Trenayr Road	Between Summerland Way and Clark Road	Two Lane Two Way	B	B	B	B	B	B	B	B	B	B
Villers Street	Between Craig Street and Dobie Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C

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

Road name	Road ID - Road section	Analysis type	Without Project traffic					With Project traffic				
			2022	2023	2024	2025	2026	2022	2023	2024	2025	2026
LGR: TRC												
Larcombe Street	Between North Street and Railway Line	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
LGR: LVRC												
Laidley Street	Between Station Street and Seventeen Mile Road	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Station Street	Between Arthur Street and Laidley Street	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
LGR: CVC												
Charles Street	Between Bent Street and Pacific Highway	Midblock Analysis (1 lane)	B	B	B	B	B	B	B	B	B	B
Clarence Street	Between Oliver Street and Craig Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Clark Road	Full Extent	Two Lane Two Way	A	A	A	A	A	A	A	A	A	A
Dobie Street	Between Villers Street and Summerland Way	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Fry Street	Between Mary Street and Alice Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Mary Street	Between Fry Street and Oliver Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Oliver Street	Between Mary Street and Clarence Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C
Trenayr Road	Between Summerland Way and Clark Road	Two Lane Two Way	B	B	B	B	B	B	B	B	B	B
Villers Street	Between Craig Street and Dobie Street	Midblock Analysis (1 lane)	C	C	C	C	C	C	C	C	C	C

6.3 Construction intersection impact assessment

Based on the assessment, transportation of materials, workforce and equipment, key transport routes have been identified. From the analysis of these transport routes, all intersections have been identified which are expected to cater to the movement of construction related activities during the various construction phases. The intersections where turning movements along assumed construction routes would occur are provided in Table 6.9.

Table 6.9 Intersections with construction traffic turn movements

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

Name	Joint ownership
Seventeen Mile Road/Laidley Street	
Laidley Street/Station Street	
DTMR	
New England Highway/Highfields Road	TRC
New England Highway/Griffiths Street	TRC
New England Highway/Munro Street	TRC
New England Highway/North Street	TRC
New England Highway/New England Highway	
Toowoomba Connection Road/New England Highway	
Warrego Highway/Toowoomba Cecil Plains Road	
Warrego Highway/Warrego Highway	
Warrego Highway/Gowrie Junction Road	TRC
Warrego Highway/Toowoomba Bypass Off Ramp	
Warrego Highway/Omara Road	TRC
Toowoomba Cecil Plains Road/Toowoomba Bypass On Ramp	
Toowoomba Cecil Plains Road/McDougall Street	TRC
Toowoomba Connection Road/Roches Road	LVRC
Toowoomba Connection Road/Jones Road	LVRC
Toowoomba Connection Road/Murphys Creek Road	
Murphys Creek Road/Murphys Creek Road	
Murphys Creek Road/Postmans Ridge Road	LVRC
Murphys Creek Road/Howmans Road	LVRC
Warrego Highway/Postmans Ridge Road	LVRC
Warrego Highway Off Ramp/Gatton Helidon Road	
Warrego Highway Off Ramp/Lawlers Road	LVRC
Warrego Highway/Haigslea Malabar Road	ICC
Ipswich Cunningham Highway Connection Road/River Road	
Cunningham Highway/Cunningham Highway	
Cunningham Highway Off Ramp/Redbank Plains Road	ICC
New England Highway/New England Highway	
RMS	
Pacific Motorway/Charles Street	CVC
Summerland Way/Dobie Street	CVC
Summerland Way/Trenayr Road	CVC
CVC	
Craig Street/Clarence Street	
Oliver Street/Clarence Street	
Villiers Street/Oliver Street	
Turf Street/Dobie Street	
Fry Street/Mary Street	
Trenayr Road/Clark Road	

Name	Joint ownership
ICC	
Haigslea Malabar Road/Mount Marrow Quarry Road	
Haigslea Malabar Road/Haigslea Malabar Road	
Rob Roy Way/Noblevale Way	
Noblevale Way/Fairbank Place	
Rob Roy Way/Newhill Drive	

In addition to the intersections provided in Table 6.9, there is a new intersection proposed as part of the Project, Gowrie Junction Road and Ganzer Road as well as realignments to Krienke Road. This intersection, the related traffic impacts and alignments are discussed in Appendix U.

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

Table 6.9 highlights the intersections which are expected to experience any number of turning movements during construction. The absence of traffic counts at these intersections prohibits the 5 per cent comparison at these intersections, or the SIDRA analysis of those exceeding 5 per cent increases. It is recommended that this assessment be undertaken in an updated TIA to be prepared once the construction traffic routes are finalised by the construction contractor.

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

This assessment compares assumed intersection turning movements imputed from available data (based on 50:50 directionality) with construction flows to determine intersections which may require upgraded turning treatments to accommodate temporary construction traffic flows consistent with the warrants outlined in Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a). As the Project is not expected to generate further operational road traffic, no turn warrant assessments were conducted post opening and operational stage. The assessments were undertaken based on peak construction volumes at the intersection, therefore these are likely to represent the worst-case construction scenarios at these locations.

The assumptions used are discussed below. As these turning movements are assumed, this analysis should be updated as part of an updated TIA once the construction traffic routes are finalised by the construction contractor.

Figure 6.1 indicates the left turn volume (Q_L) and right turn volume (Q_R), as well as the volumes representing Q_{T1} and Q_{T2}. The value of the major road volume (Q_M) is calculated as outlined in Table 6.10.

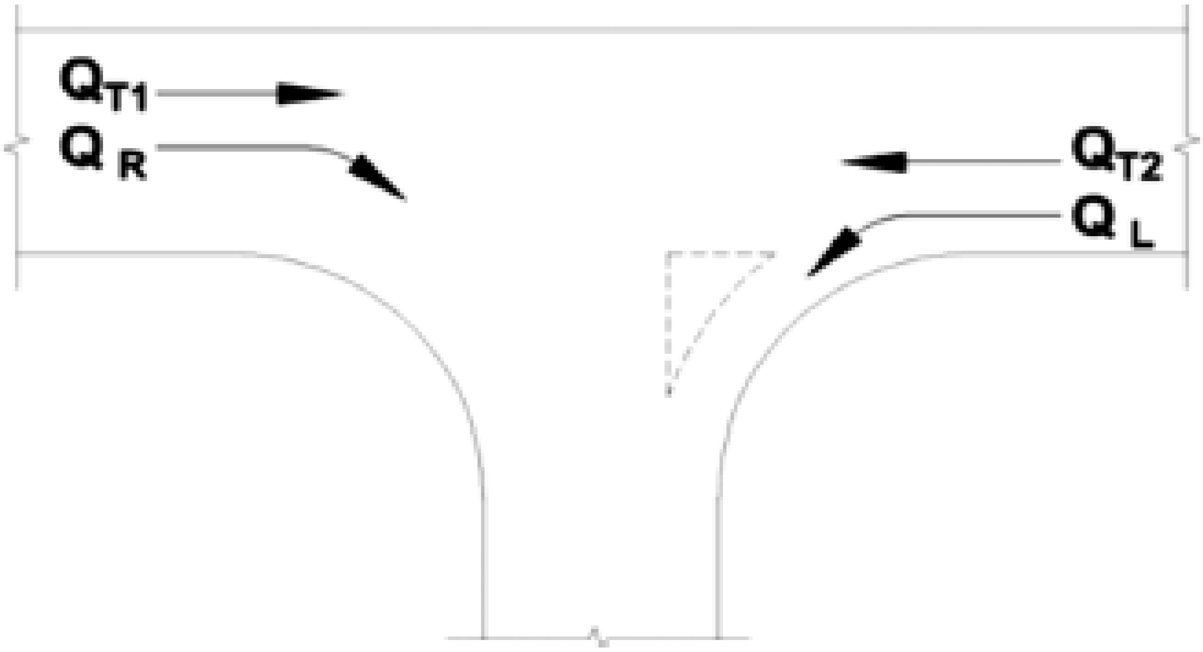


Figure 6.1 **Calculation of the major road traffic volume (Q_M)**

Source: Austroads 2017

As no turning count information was available, the following assumptions were used to calculate the values of Q_L and Q_R:

- For intersections with construction traffic only turning left (or only turning right) from the major road into the minor road, it was assumed that 100 per cent of development traffic volumes turned from the major road into the minor road
- For intersections with development traffic movements turning both left and right from the major road into the minor road, it was assumed that 50 per cent of these vehicles turn right and 50 per cent turn left.

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

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

Source: Austroads 2017

The potential upgraded turning treatments outlined in this methodology are warranted only temporarily for construction traffic based on the current assumed traffic routes. For the suggested treatments, consultation with DTMR and relevant council's will be required during the detailed design phase to determine the permanence of such upgrades. Given the typical duration of peak construction activities over road sections generally being less than a year, road-use management strategies may be introduced in the RUMP and/or the TMP in order to reduce the need for physical turning treatment upgrades at these intersections.

All priority-controlled intersections in Table 6.9 were assessed to determine the number of (veh/hr) that would perform a turn movement. The intersections that would experience a development traffic turning volume of more than five veh/hr were plotted on the turn warrant graphs from Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a). These intersections are summarised in Table 6.11 with the turn warrant graphs for each intersection provided in Appendix S.

Table 6.11 Intersections with potential turn warrant requirements (development turning volume of more than 5 veh/hr)

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

Those intersections which indicated that the existing layout was not sufficient to accommodate expected development traffic are summarised in Table 6.12, highlighting the upgrades required in the sections below. It is noted that when an upgrade to an intersection is warranted under existing conditions, ARTC would be required to mitigate Project related impacts, regardless of the intersection design or age. Intersections for which the existing layout was sufficient to safely accommodate development traffic are included in Appendix S.

Where Q_M was greater than 1,600 (veh/hr) (for road speeds less than 100 km/h) or 1,200 (veh/hr) (for road speeds greater than or equal to 100 km/h), Q_L or Q_R was greater than 120 km/h (for road speeds less than 100 km/h) or 80 km/h (for roads with speeds greater than or equal to 100 km/h) (veh/hr) this maximum value was adopted in order to plot the relevant point on the graph.

Table 6.12 Intersections requiring turn warrant treatments

Intersection with potential operational impacts
LGA: TRC
Gowrie Junction Road/Krienke Road
Meringandan Road/Highfields Road
Krienke Road/Morris Road
Meringandan Road/Kleinton School Road
Mort Street/Old Mort Street
LGA: LVRC
Arthur Street/Mary McKillop Street
George Street/Arthur Street
Jones Road/Little Oaky Creek Road
Murphys Creek Road/Murphys Creek Road
Murphys Creek Road/Howmans Road
Turner Street/Mary McKillop Street

6.3.1 Krienke Road/Morris Road

The Project construction methodology proposes to utilise the proposed intersection at Krienke Road/Morris Road intersection, located within TRC LGA. Construction vehicles transporting workers, concrete, sleepers and water are expected to access the realigned Morris Road by turning left and right from Krienke Road into the proposed Morris Road. The proposed realignment of this intersection and the surrounding area is shown in Figure 3.1 and the associated impacts from the related road realignments have been assessed in Appendix T. Overall, these realignments were found to impact the surrounding network in a variety of ways, however, for the most part, these impacts are minimal and do not change the traffic operation of the network. Refer to Appendix T for the full assessment.

In 2019, there were predicted flows along Morris Road of approximately 540 vehicles per day, two-way. As this segment of the road does not currently exist, these flows were adopted from the adjacent road section. It is assumed that this equates to 20 vehicles turning left and right into Morris Road from Krienke Road during the peak hour.

The TIA demonstrates that the turning movements into the proposed Morris Road are expected to peak in 2023, with up to 9 veh/hr expected to turn left and right into the proposed extension of Morris Road from Krienke Road. These turning volumes, along with the through movement volumes on Krienke Road, are summarised in Table 6.13 and Table 6.14. To determine if a turning treatment will be required at this proposed intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.2.

Table 6.13 Krienke Road/Morris Road left turning treatment volumes

Scenario	Krienke Road peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Morris Road (Q_L)
Existing volumes	3	20
Forecast volumes without Project (2023)	3	22
Project traffic	15	9
Volumes for treatment assessment	19	32

Table note:

1 Numbers may not sum due to rounding.

Table 6.14 Krienke Road/Morris Road right turning treatment volumes

Scenario	Krienke Road peak hour volume (Q_M for right turn movement)	Peak hour left turn volume into Morris Road (Q_R)
Existing volumes	6	20
Forecast volumes without Project (2023)	6	22
Project traffic	15	9
Volumes for treatment assessment	22	32

Table note:

1 Numbers may not sum due to rounding.

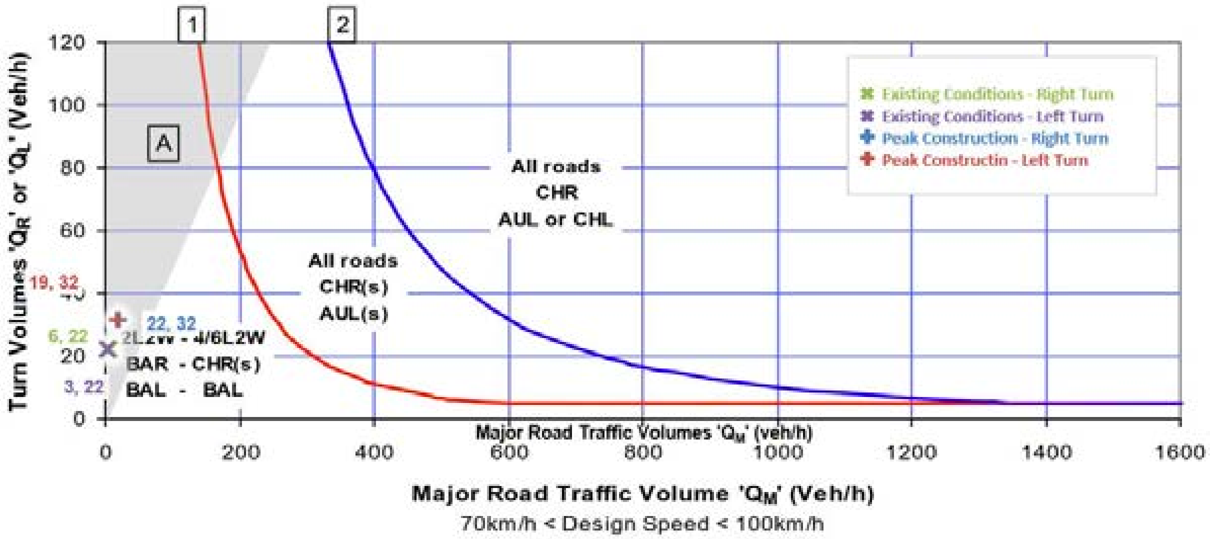


Figure 6.2 Krienke Road/Proposed Morris Road turning treatment assessment (2023)

Figure 6.2 demonstrates that as a minimum, a basic left turn lane (BAL) turning treatment and a basic right turn lane (BAR) turning treatment are required to accommodate the turning volumes at the proposed Krienke Road/Morris Road intersection during construction. The required BAR and BAL would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, which will be confirmed with the construction contractor).

As this intersection is proposed under the proposed realignments for the Project, it is noted that there are no existing conditions to compare the turning volumes to. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and TRC to determine the responsibility for ensuring this intersection is designed to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.2 Gowrie Junction Road/Krienke Road

The Project construction methodology proposes to utilise the Gowrie Junction Road/Krienke Road intersection, located within TRC LGA. Construction vehicles transporting water are expected to access Krienke Road by turning left from Gowrie Junction Road into Krienke Road. No construction traffic is proposed to access the proposed Krienke Road from the north. The proposed realignments associated with this intersection and the surrounding area are demonstrated in Figure 3.1 and the associated impacts from the related road realignments have been assessed in Appendix T. Overall, these realignments were found to impact the surrounding network in a variety of ways, however, for the most part, these impacts are minimal and do not change the traffic operation of the network. Refer to Appendix T for the full assessment.

For the purposes of this assessment, it was assumed that flows along Krienke Road would be approximately 40 vehicles per day, two-way. It is assumed this equates to 2 vehicles turning right into Krienke Road from Gowrie Junction Road during the peak hour. No existing turn treatment is currently provided at this intersection, as shown in Figure 6.3.

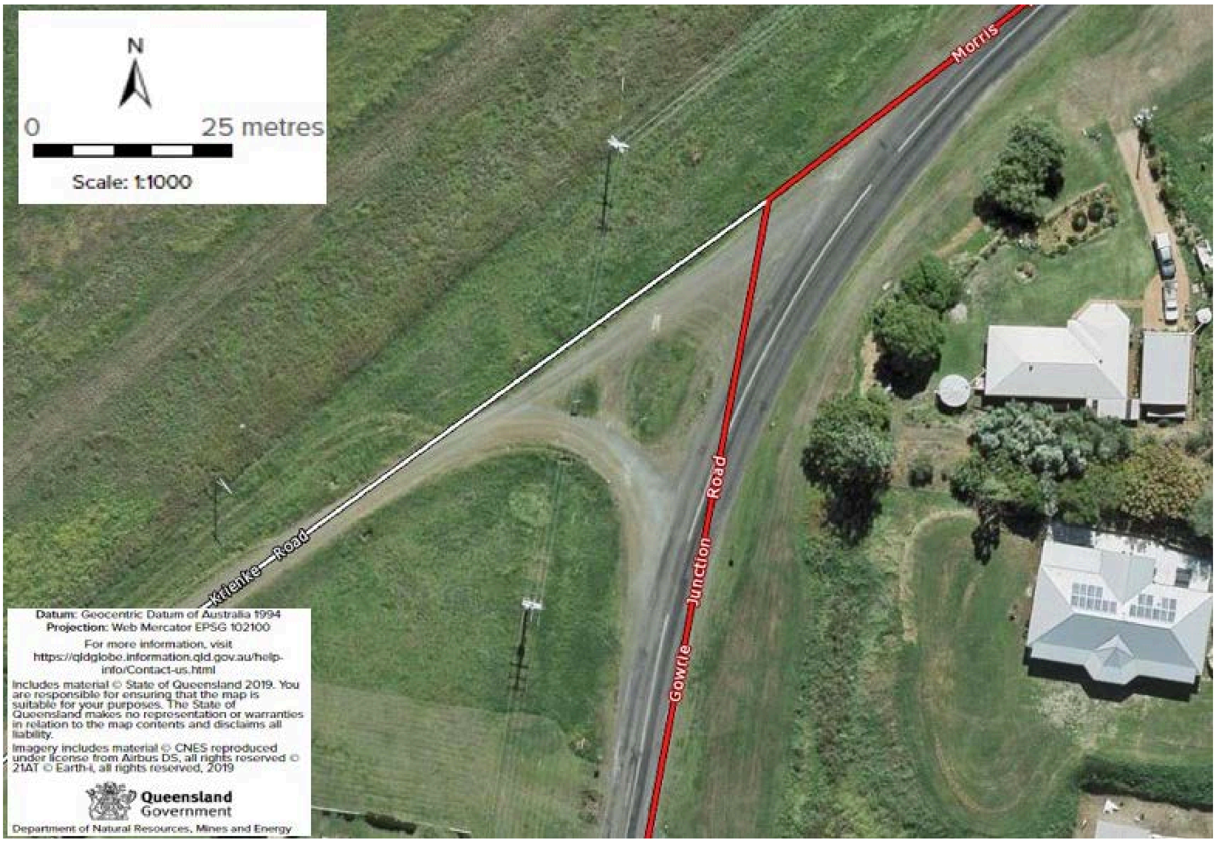


Figure 6.3 Gowrie Junction Road/Krienke Road existing layout

The Project traffic assessment demonstrates that the turning movements into Krienke Road are expected to peak in 2022, with up to 15 veh/hr expected to turn left into Krienke Road from Gowrie Junction Road. These turning volumes, along with the through movement volumes on Gowrie Junction Road, are summarised in Table 6.15. To determine if a turning treatment will be required at this proposed intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.4.

Table 6.15 Gowrie Junction Road/Krienke Road left turning treatment volumes

Scenario	Gowrie Junction Road peak hour volume (QM for right turn movement)	Peak hour right turn volume into Krienke Road (QR)
Existing volumes	623	2
Forecast volumes without Project (2022)	661	2
Project traffic	26	15

Scenario	Gowrie Junction Road peak hour volume (QM for right turn movement)	Peak hour right turn volume into Krienke Road (QR)
Volumes for treatment assessment	687	17

Table note:

1 Numbers may not sum due to rounding.

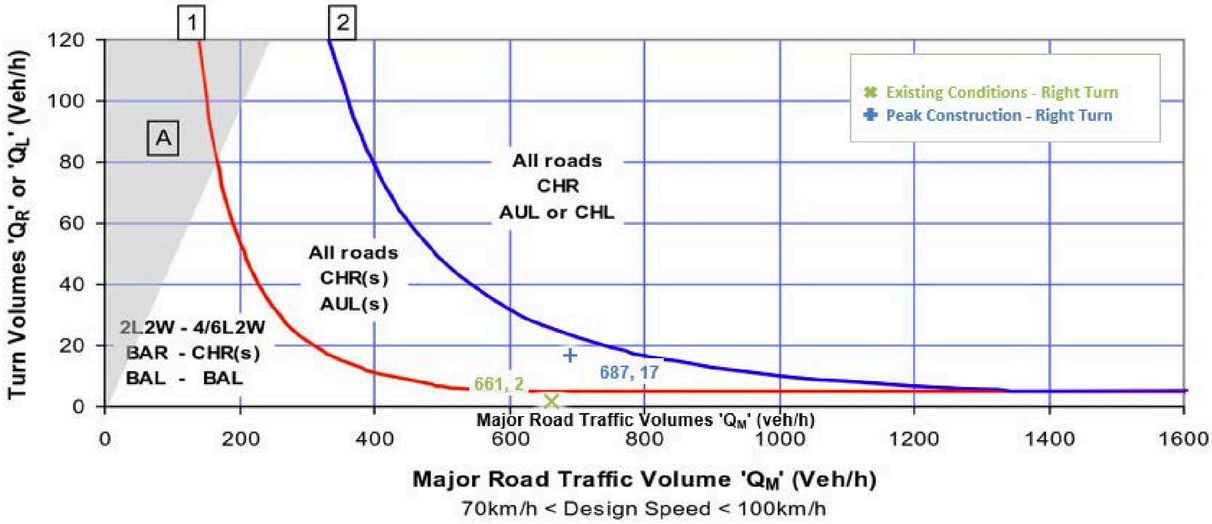


Figure 6.4 **Gowrie Junction Road/Proposed Krienke Road turning treatment assessment (2022)**

Figure 6.4 demonstrates that as a minimum, a channelised right turn lane (short) (CHR(s)) turning treatment is required to accommodate the turning volumes at the Gowrie Junction Road/Krienke Road intersection during construction. The required CHR(s) should be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and signalised intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is only required during construction, with the requirement no longer necessary post-construction. Any potential intersection upgrades will be developed in consultation with DTMR and TRC. This discussion would be undertaken during the development of the TMP once construction routes are finalised by the construction contractor and agreed with the relevant asset owners.

6.3.3 Meringandan Road/Kleinton School Road

The Project construction methodology proposes to utilise the Meringandan Road/Kleinton School Road intersection located within TRC LGA. Construction vehicles transporting water are expected to access Kleinton School Road by turning left from Meringandan Road into Kleinton School Road. No construction traffic is proposed to access Kleinton School Road from the east.

Currently, there are flows along Kleinton School Road of approximately 1,340 vehicles per day, two-way. It is assumed that this equates to 25 vehicles turning left into Kleinton School Road from Meringandan Road during the peak hour. No construction traffic is expected to enter Kleinton School Road from the east. No turning treatment is currently provided at this intersection, as shown in Figure 6.5.

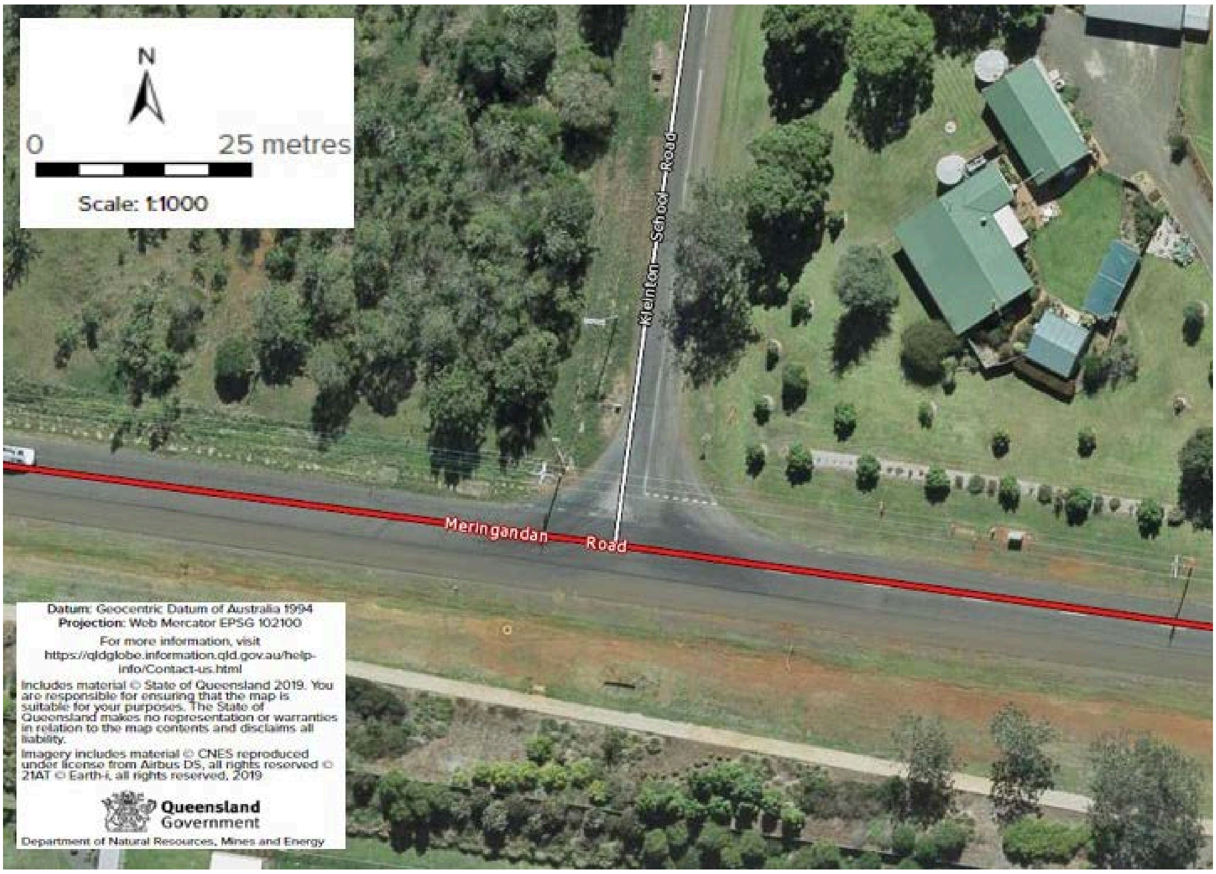


Figure 6.5 Meringandan Road/Kleinton School Road existing layout

The TIA demonstrates that the turning movements into Kleinton School Road are expected to peak in 2023, with up to 8 veh/hr expected to turn into Kleinton School Road from Meringandan Road. These turning volumes, along with the through movement volumes on Meringandan Road are summarised in Table 6.16. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.6.

Table 6.16 Meringandan Road/Kleinton School Road left turning treatment volumes

Scenario	Meringandan Road peak hour volume (QM for left turn movement)	Peak hour left turn volume into Kleinton School Road (QL)
Existing volumes	92	25
Forecast volumes without Project (2023)	112	55
Project traffic	8	8
Volumes for treatment assessment	120	63

Table note:

1 Numbers may not sum due to rounding.

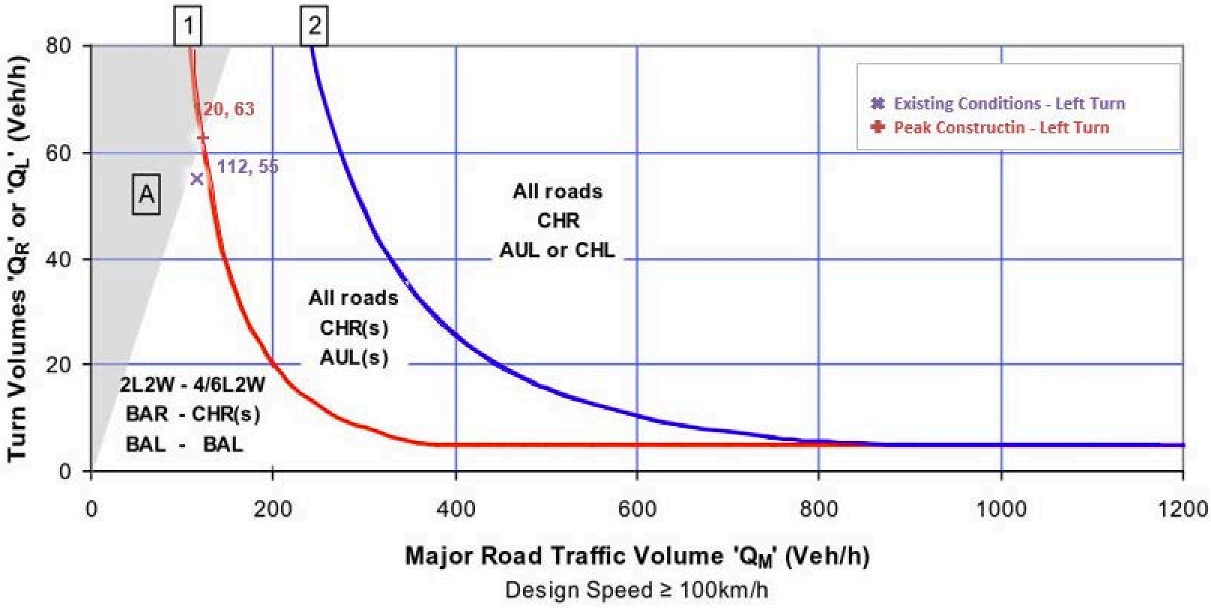


Figure 6.6 Meringandan Road/Kleinton School Road turning treatment assessment (2023)

Figure 6.6 demonstrates that as a minimum, an auxiliary lane (short) AUL(s) turning treatment is required to accommodate the turning volumes at the Meringandan Road/Kleinton School Road intersection during construction. The required AUL(s) would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is only required during construction, with the requirement no longer necessary post-construction. Any potential intersection upgrades will be developed in consultation with DTMR and TRC. This discussion would be undertaken during the development of the TMP once construction routes are finalised by the construction contractor and agreed with the relevant asset owners.

6.3.4 Mort Street/Old Mort Street

The Project construction methodology proposes to utilise the Mort Street/Old Mort Street intersection located within TRC LGA. Construction vehicles transporting water and workers are expected to access Old Mort Street by turning left from Mort Street into Old Mort Street. No construction traffic is proposed to access Old Mort Street from the south.

Currently, there are flows along Old Mort Street of approximately 185 vehicles per day, two-way. It is assumed that this equates to 7 vehicles turning left into Old Mort Street from Mort Street during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.7.

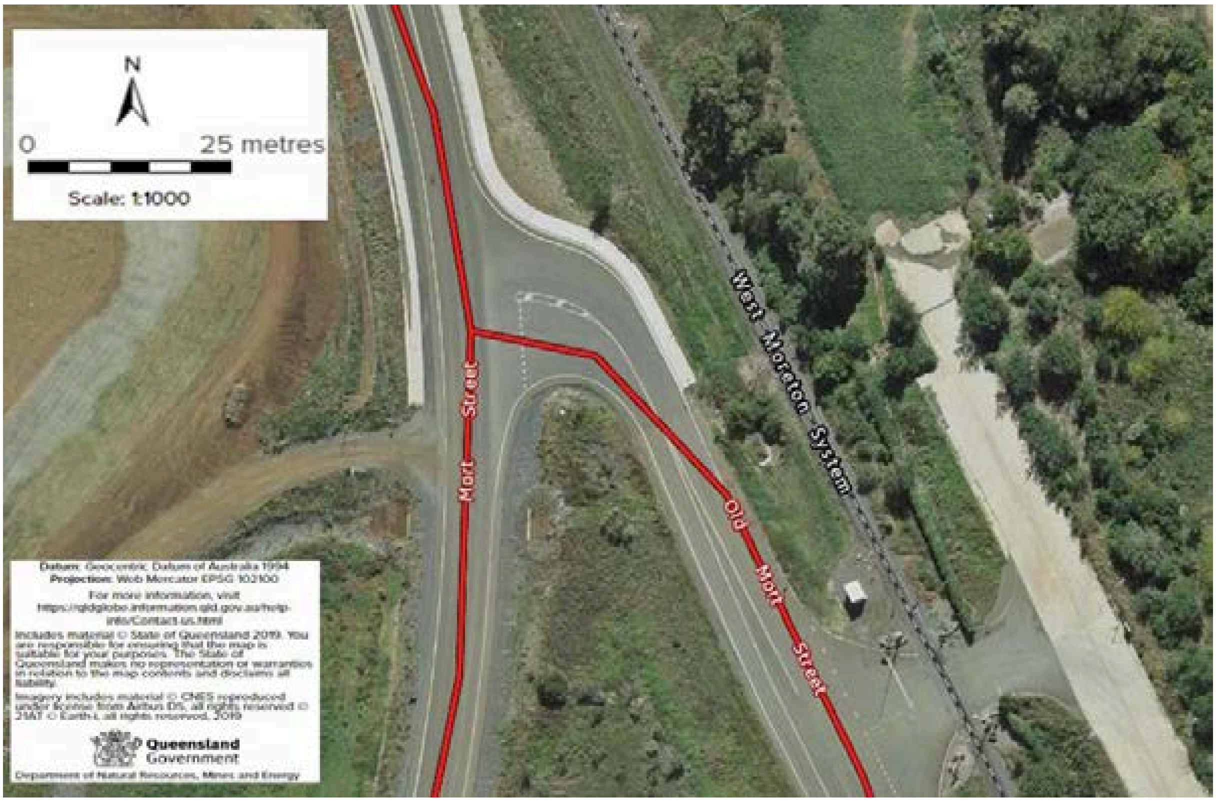


Figure 6.7 Mort Street/Old Mort Street existing layout

The Project traffic assessment demonstrates that the turning movements into Old Mort Street are expected to peak in 2022, with up to 7 veh/hr expected to turn into Old Mort Street from Mort Street. These turning volumes, along with the through movement volumes on Mort Street are summarised in Table 6.17. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.8.

Table 6.17 Mort Street/Old Mort Street left turning treatment volumes

Scenario	Mort Street peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Old Mort Street (Q_L)
Existing volumes	337	7
Forecast volumes without Project (2022)	357	8
Project traffic	9	7
Volumes for treatment assessment	366	15

Table note:

1 Numbers may not sum due to rounding.

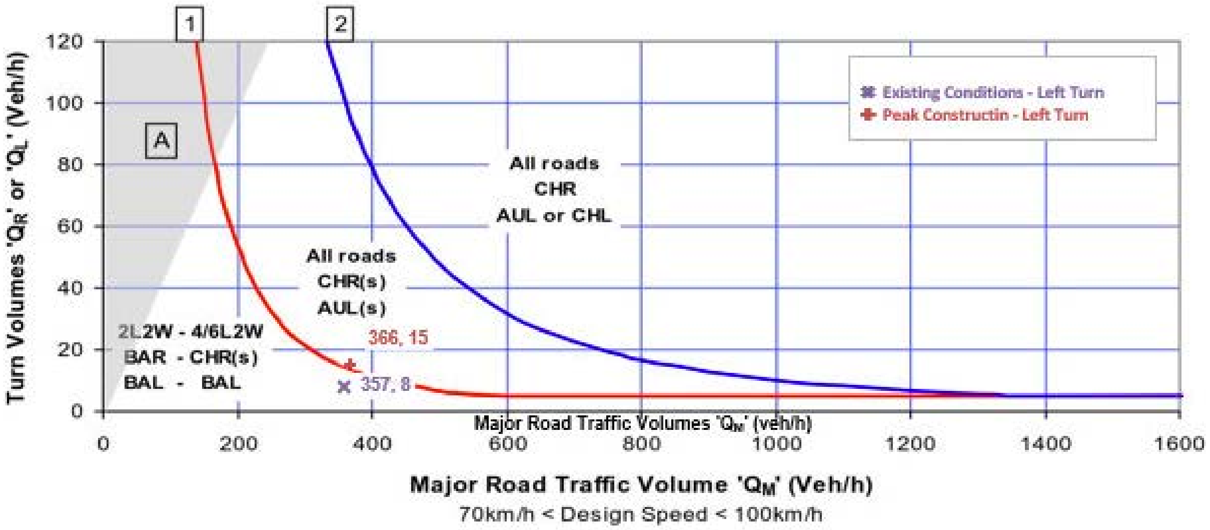


Figure 6.8 **Mort Street/Old Mort Street turning treatment assessment (2022)**

Figure 6.8 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the Mort Street/Old Mort Street intersection during construction. The required AUL(s) should be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is only required during construction, with the requirement no longer necessary post-construction. Any potential intersection upgrades will be developed in consultation with DTMR and TRC. This discussion would be undertaken during the development of the TMP once construction routes are finalised by the construction contractor and agreed with the relevant asset owners.

6.3.5 Meringandan Road/Highfields Road

The Project construction methodology proposes to utilise the Meringandan Road/Highfields Road intersection located within TRC LGA. Construction vehicles transporting water are expected to access Highfields Road by turning left from Meringandan Road into Highfields Road. No construction traffic is proposed to access Highfields Road from the west.

Currently, there are flows along Highfields Road of approximately 2,907 vehicles per day, two-way. It is assumed that this equates to 55 vehicles turning left into Highfields Road from Meringandan Road during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.9.

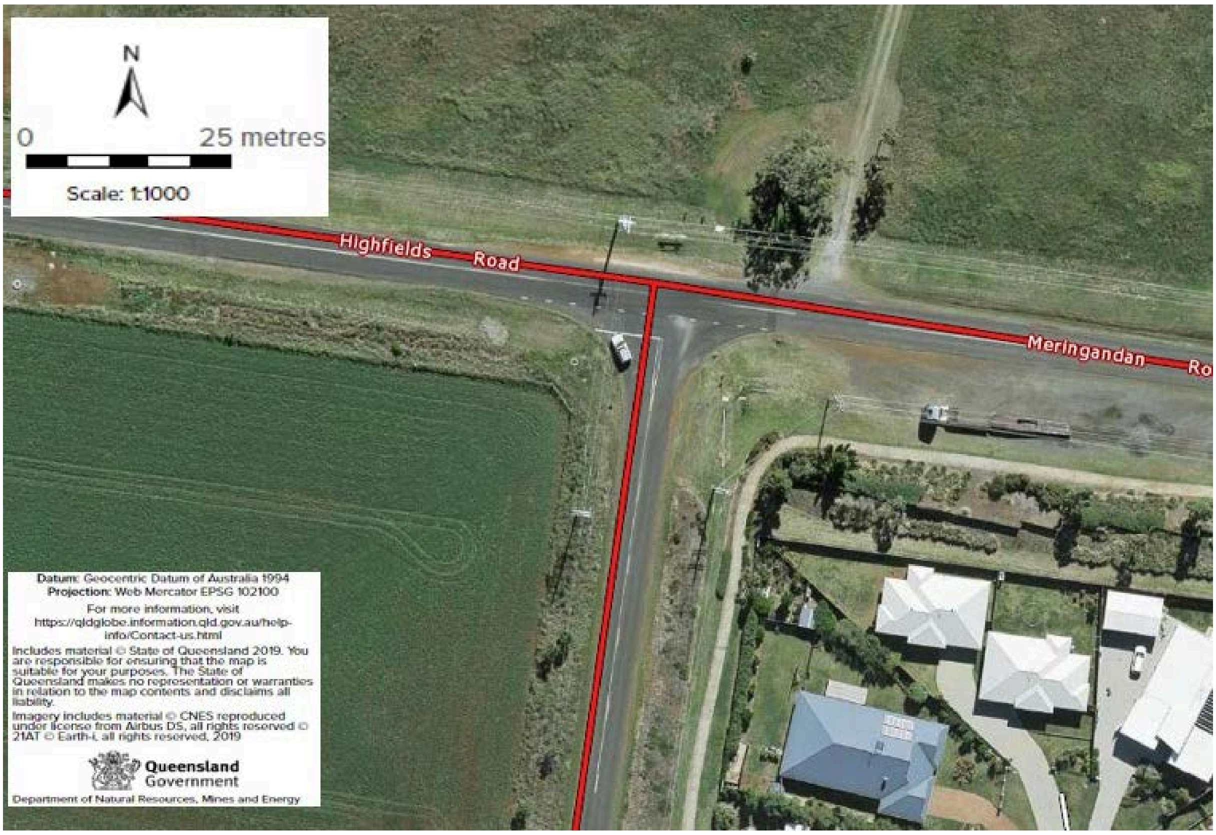


Figure 6.9 Meringandan Road/Highfields Road existing layout

The TIA demonstrates that the turning movements into Highfields Road are expected to peak in 2023, with up to 8 veh/hr expected to turn into Highfields Road from Meringandan Road. These turning volumes, along with the through movement volumes on Highfields Road are summarised in Table 6.19. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.10.

Table 6.18 Meringandan Road/Highfields Road left turning treatment volumes

Scenario	Meringandan Road peak hour volume (QM for left turn movement)	Peak hour left turn volume into Highfields Road (QL)
Existing volumes	92	55
Forecast volumes without Project (2023)	112	133
Project traffic	8	8
Volumes for treatment assessment	120	141

Table note:

1 Numbers may not sum due to rounding.

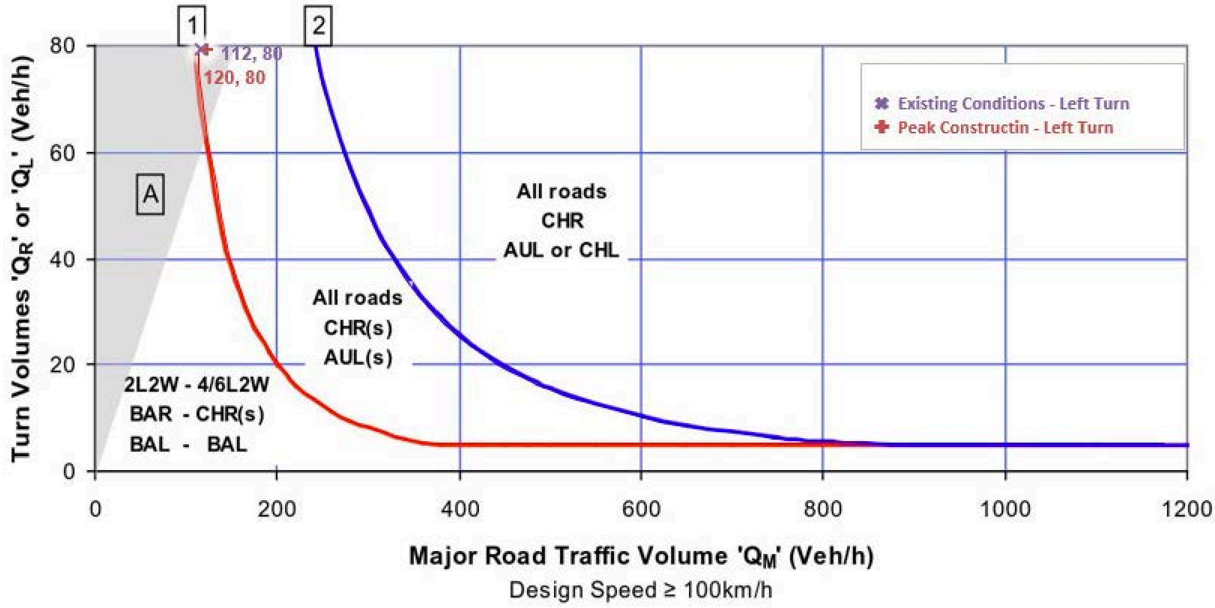


Figure 6.10 Meringandan Road/Highfields Road turning treatment assessment (2023)

Figure 6.10 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the Meringandan Road/Highfields Road intersection during construction. The required AUL(s) should be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and TRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.6 Arthur Street/Mary McKillop Street

The Project construction methodology proposes to utilise the Arthur Street/Mary McKillop Street intersection located within Lockyer Valley LGA. Construction vehicles transporting precast concrete, water, mass haul material and workers are expected to access Mary McKillop Street by turning right from Arthur Street into Mary McKillop Street. No construction traffic is proposed to access Mary McKillop Street from the east.

Currently, there are flows along Mary McKillop Street of approximately 800 vehicles per day, two-way (assumed volume). It is assumed that this equates to 30 vehicles turning right into Mary McKillop Street from Arthur Street during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.11. It is noted that this intersection is identified in the LVRC LGIP as a haul route to be used by extractive industries.

Figure 6.11 Arthur Street/Mary McKillop Street existing layout

The Project traffic assessment demonstrates that the turning movements into Mary McKillop Street are expected to peak in 2023, with up to 24 veh/hr expected to turn into Mary McKillop Street from Arthur Street. These turning volumes, along with the through movement volumes on Arthur Street are summarised in Table 6.19. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.12.

Table 6.19 Arthur Street/Mary McKillop Street right turning treatment volumes

Scenario	Arthur Street peak hour volume (Q_M for right turn movement)	Peak hour right turn volume into Mary McKillop Street (Q_R)
Existing volumes	264	30
Forecast volumes without Project (2023)	291	32
Project traffic	10	24
Volumes for treatment assessment	302	56

Table note:

1 Numbers may not sum due to rounding.

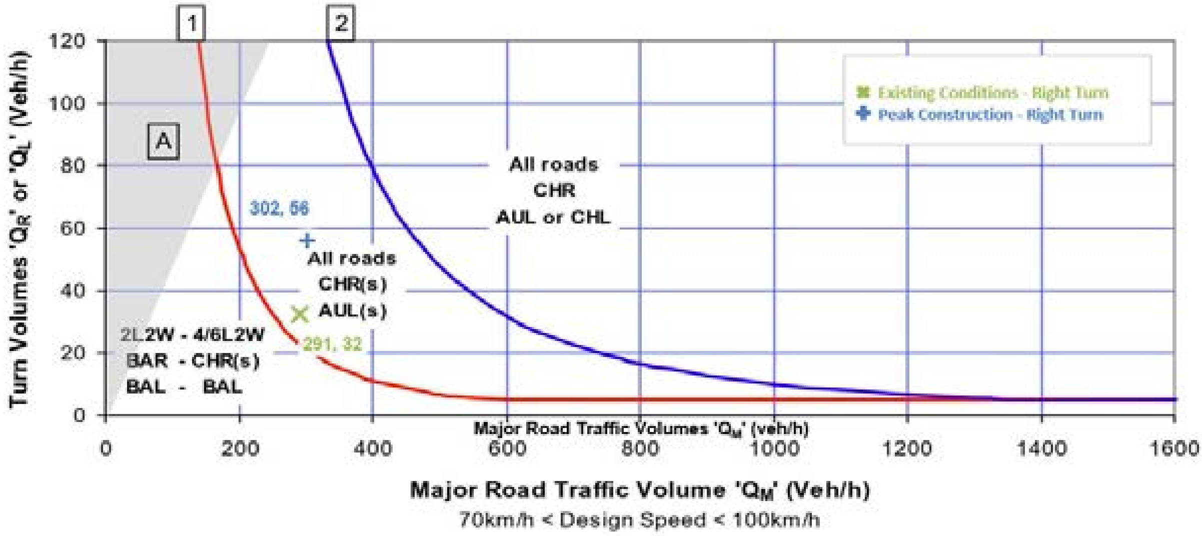


Figure 6.12 Arthur Street/Mary McKillop Street turning treatment assessment (2022)

Figure 6.12 demonstrates that as a minimum, a CHR(s) turning treatment is required to accommodate the turning volumes at the Arthur Street/Mary McKillop Street intersection during construction. The required CHR(s) would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and LVRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.7 George Street/Arthur Street

The Project construction methodology proposes to utilise the George Street/Arthur Street intersection located within LVRC LGA. Construction vehicles transporting concrete, quarry materials, sleepers, water, mass haul material and workers are expected to access Arthur Street by turning left from George Street into Arthur Street. No construction traffic is proposed to access Arthur Street from the north.

Currently, there are flows along Arthur Street of approximately 1,760 vehicles per day, two-way. It is assumed that this equates to 66 vehicles turning left into Arthur Street from George Street during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.13. It is noted that this intersection is identified in the LVRC LGIP as a haul route to be used by extractive industries.

Figure 6.13 George Street/Arthur Street existing layout

The Project traffic assessment demonstrates that the turning movements into Arthur Street are expected to peak in 2023, with up to 10 veh/hr expected to turn into Arthur Street from George Street. These turning volumes, along with the through movement volumes on George Street are summarised in Table 6.20. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.14.

Table 6.20 George Street/Arthur Street left turning treatment volumes

Scenario	George Street peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Arthur Street (Q_L)
Existing volumes	178	66
Forecast volumes without Project (2023)	196	73
Project traffic	10	10
Volumes for treatment assessment	206	83

Table note:

1 Numbers may not sum due to rounding.

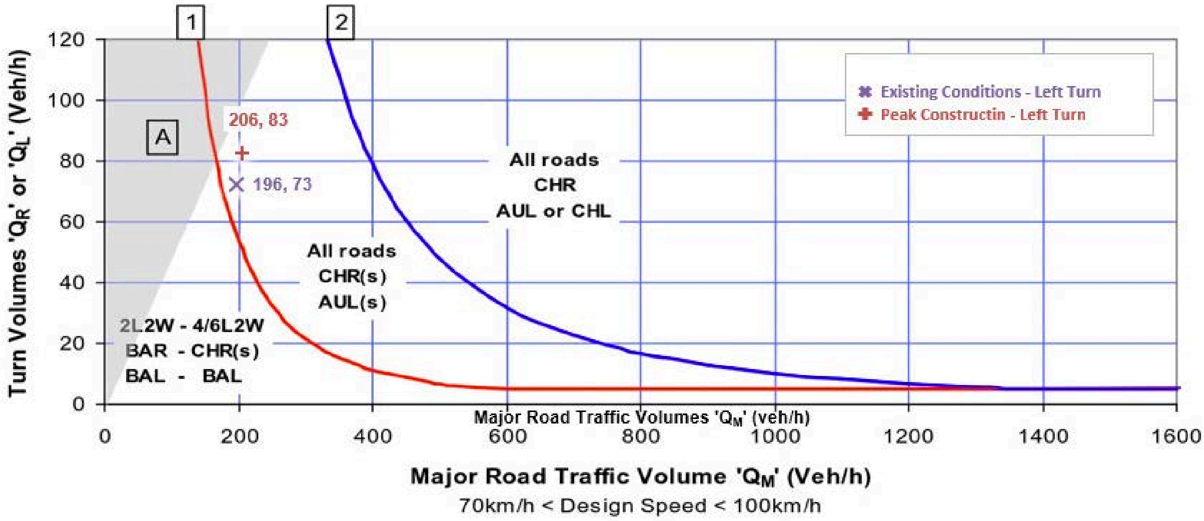


Figure 6.14 **George Street/Arthur Street turning treatment assessment (2023)**

Figure 6.14 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the George Street/Arthur Street intersection during construction. The required AUL(s) would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and LVRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.8 Jones Road/Little Oaky Creek Road

The Project construction methodology proposes to utilise the Jones Road/Little Oaky Creek Road intersection located within LVRC LGA. Construction vehicles transporting quarry materials, concrete, workers, water and mass haul material are expected to access Little Oaky Creek Road by turning left and right from Jones Road into Little Oaky Creek Road.

Currently there are flows along Little Oaky Creek Road of approximately 793 vehicles per day, two-way. It is assumed this equates to 30 vehicles turning left and right into Little Oaky Creek Road from Jones Road during the peak hour. No turning treatments are currently provided at this intersection, as shown in Figure 6.15.

Figure 6.15 Jones Road/Little Oaky Creek Road existing layout

The TIA demonstrates that the turning movements into Little Oaky Creek Road are expected to peak in 2022, with up to 68 veh/hr expected to turn into Little Oaky Creek Road from Jones Road. These turning volumes, along with the through movement volumes on Jones Road, are summarised in Table 6.21 and Table 6.22. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.16.

Table 6.21 Jones Road/Little Oaky Creek Road left turning treatment volumes

Scenario	Jones Road peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Little Oaky Creek Road (Q_L)
Existing volumes	87	30
Forecast volumes without Project (2022)	94	32
Project traffic	55	68
Volumes for treatment assessment	150	101

Table note:

1 Numbers may not sum due to rounding.

Table 6.22 Jones Road/Little Oaky Creek Road right turning treatment volumes

Scenario	Jones Road peak hour volume (Q_M for right turn movement)	Peak hour right turn volume into Little Oaky Creek Road (Q_R)
Existing volumes	174	30
Forecast volumes without Project (2022)	188	32
Project traffic	55	68
Volumes for treatment assessment	244	101

Table note:

1 Numbers may not sum due to rounding.

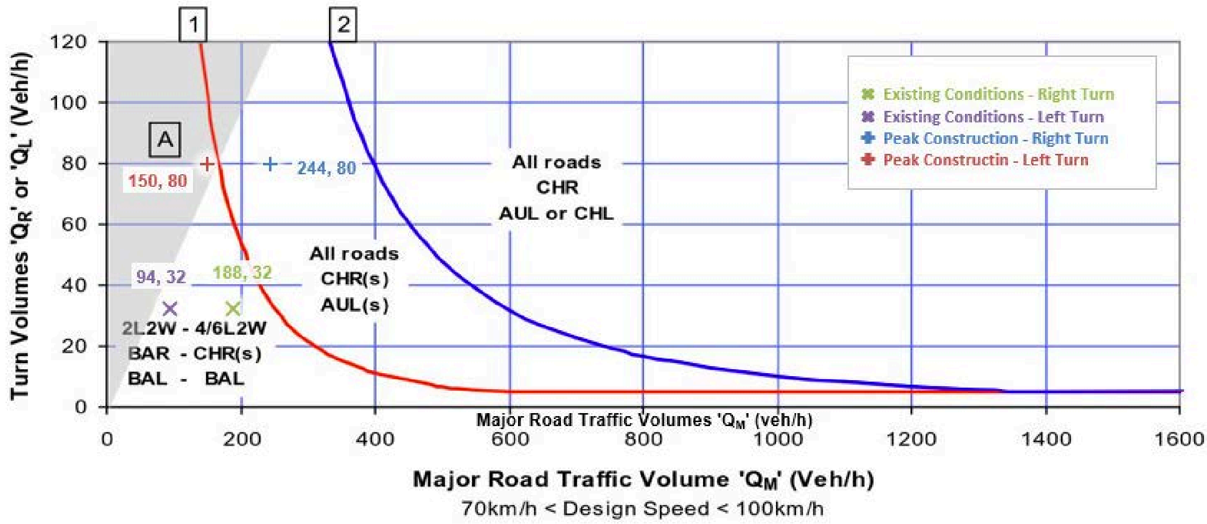


Figure 6.16 Jones Road/Little Oaky Creek Road turning treatment assessment (2022)

Figure 6.16 demonstrates that as a minimum, a BAL and a CHR(s) turning treatment are required to accommodate the turning volumes at the Jones Road/Little Oaky Creek Road intersection during construction. The required turn treatments should be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that the CHR(s) treatment is only required during construction, with the requirement no longer necessary post-construction. Any potential intersection upgrades will be developed in consultation with DTMR and LVRC. This discussion would be undertaken during the development of the TMP once construction routes are finalised by construction contractor and agreed with the relevant asset owners.

It is noted that the BAL treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and LVRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.9 Murphys Creek Road (north)/Murphys Creek Road (west)

The Project construction methodology proposes to utilise Murphys Creek Road (north) to access laydown areas in LVRC LGA, resulting in frequent use of the Murphys Creek Road (north)//Murphys Creek Road (west) intersection. Construction vehicles transporting sleepers, concrete, quarry materials and workers are expected to utilise this route by turning left into Murphys Creek Road (north) from the western section of Murphys Creek Road. No Project traffic is proposed to access Murphys Creek Road (north) from the east.

Currently there are flows along Murphys Creek Road (west) of approximately 2,150 vehicles per day, two-way. It is assumed this equates to 81 vehicles turning left into Murphys Creek Road (north) from Murphys Creek Road (west) during the peak hour. A BAL treatment is currently provided at this intersection, as shown in Figure 6.17. It is noted that this intersection is identified in the LVRC Local LGIP as a haul route to be used by extractive industries.

It is noted that since the construction of the Toowoomba Bypass, Postmans Ridge Road has been closed at the Toowoomba Bypass and relocated to the north of the Murphys Creek Road flyover. There is likely to be a minimal number of trips generated from a small number of residential properties to the east of the Murphys Creek Road (north)/Murphys Creek Road (west) intersection. These vehicles would come from Brookside Place (to the east of Murphys Creek Road intersection) and travel through this intersection. These vehicles have not been included in the analysis, however the conservative assumptions adopted are sufficient to account for this.

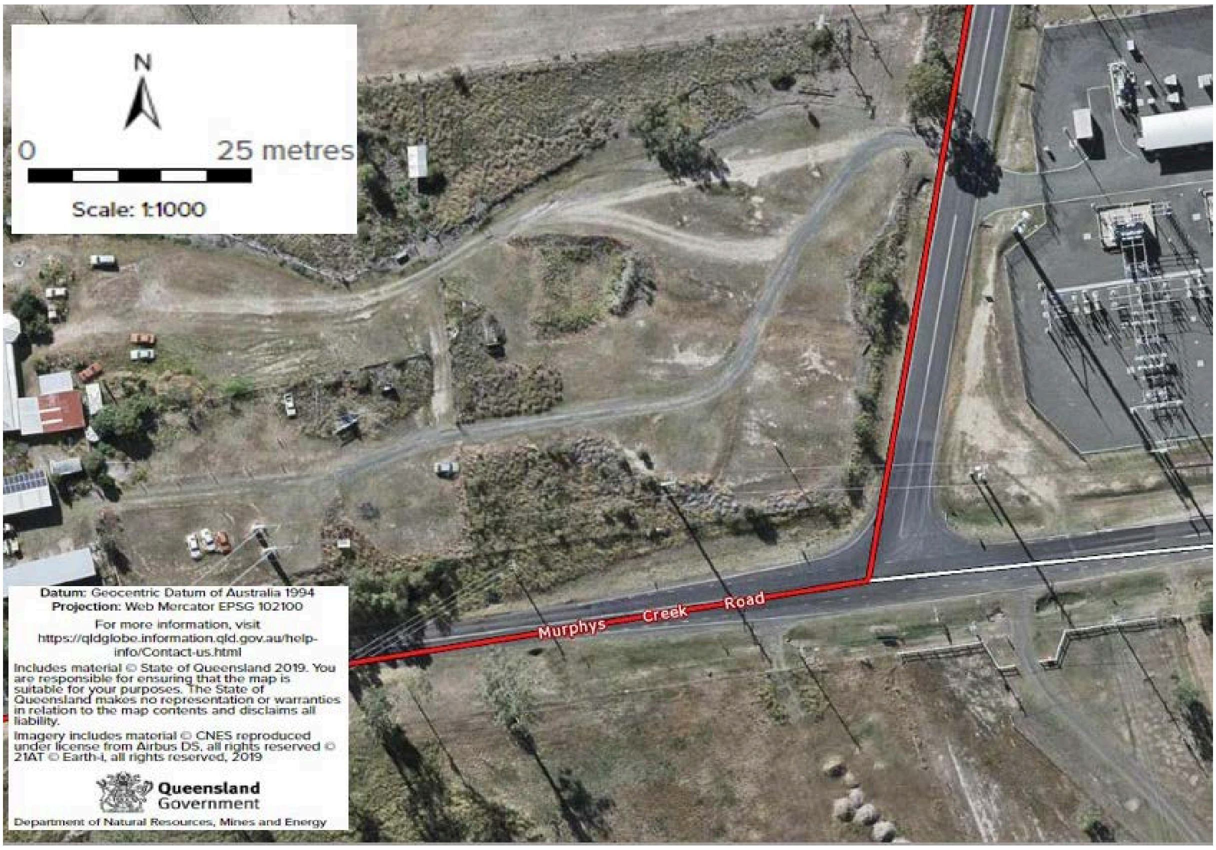


Figure 6.17 Murphys Creek Road (west)/Murphys Creek Road (north) existing layout

The TIA demonstrates that the turning movements into Murphys Creek Road (north) are expected to peak in 2023, with up to 42 veh/hr expected to turn into Murphys Creek Road (north) from Murphys Creek Road (west). These turning volumes, along with the through movement volumes on Murphys Creek Road (west) are summarised in Table 6.23. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.18.

Table 6.23 Murphys Creek Road (west)/Murphys Creek Road (north) left turning treatment volumes

Scenario	Murphys Creek Road peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Murphys Creek Road (Q_L)
Existing volumes	161	81
Forecast volumes without Project (2023)	182	91
Project traffic	42	42
Volumes for treatment assessment	224	133

Table note:

1 Numbers may not sum due to rounding.

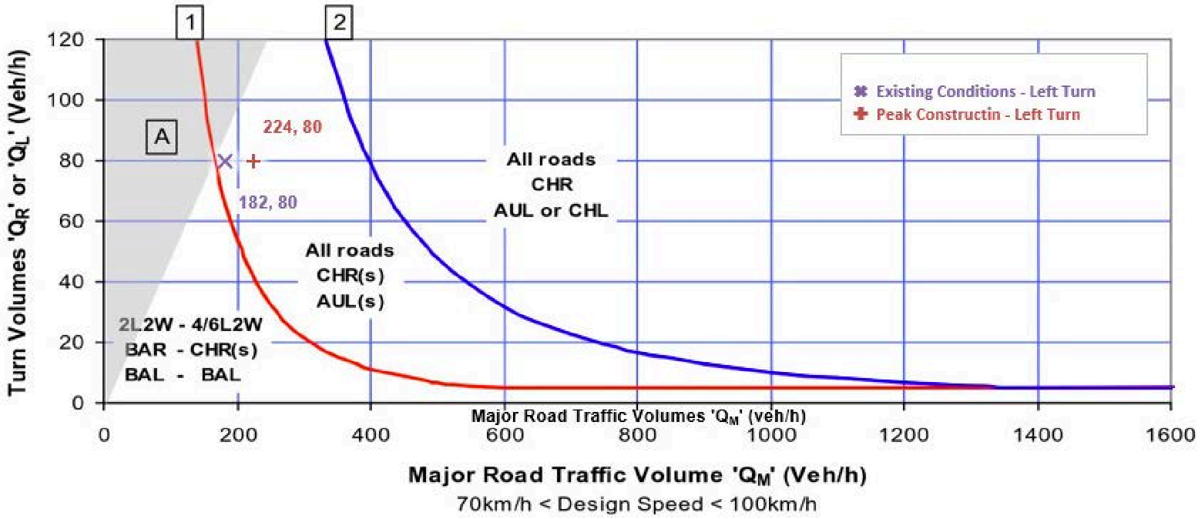


Figure 6.18 Murphys Creek Road/Murphys Creek Road turning treatment assessment (2023)

Figure 6.18 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the Murphys Creek Road (north)/Murphys Creek Road (west) intersection during construction. The required AUL(s) would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and LVRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.3.10 Murphys Creek Road/Howmans Road

The Project construction methodology proposes to utilise the Murphys Creek Road/Howmans Road intersection located within LVRC LGA. Construction vehicles transporting quarry materials, workers, concrete, sleepers, water and mass haul materials are expected to access Howmans Road by turning left from the Murphys Creek Road into Howmans Road. No construction traffic is proposed to access Howmans Road from the north.

Currently there are flows along Howmans Road of approximately 800 vehicles per day, two-way (assumed volume). It is assumed this equates to 30 vehicles turning left into Howmans Road from Murphys Creek Road during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.19. It is noted that this intersection is identified in the LVRC LGIP as a haul route to be used for extractive industries.

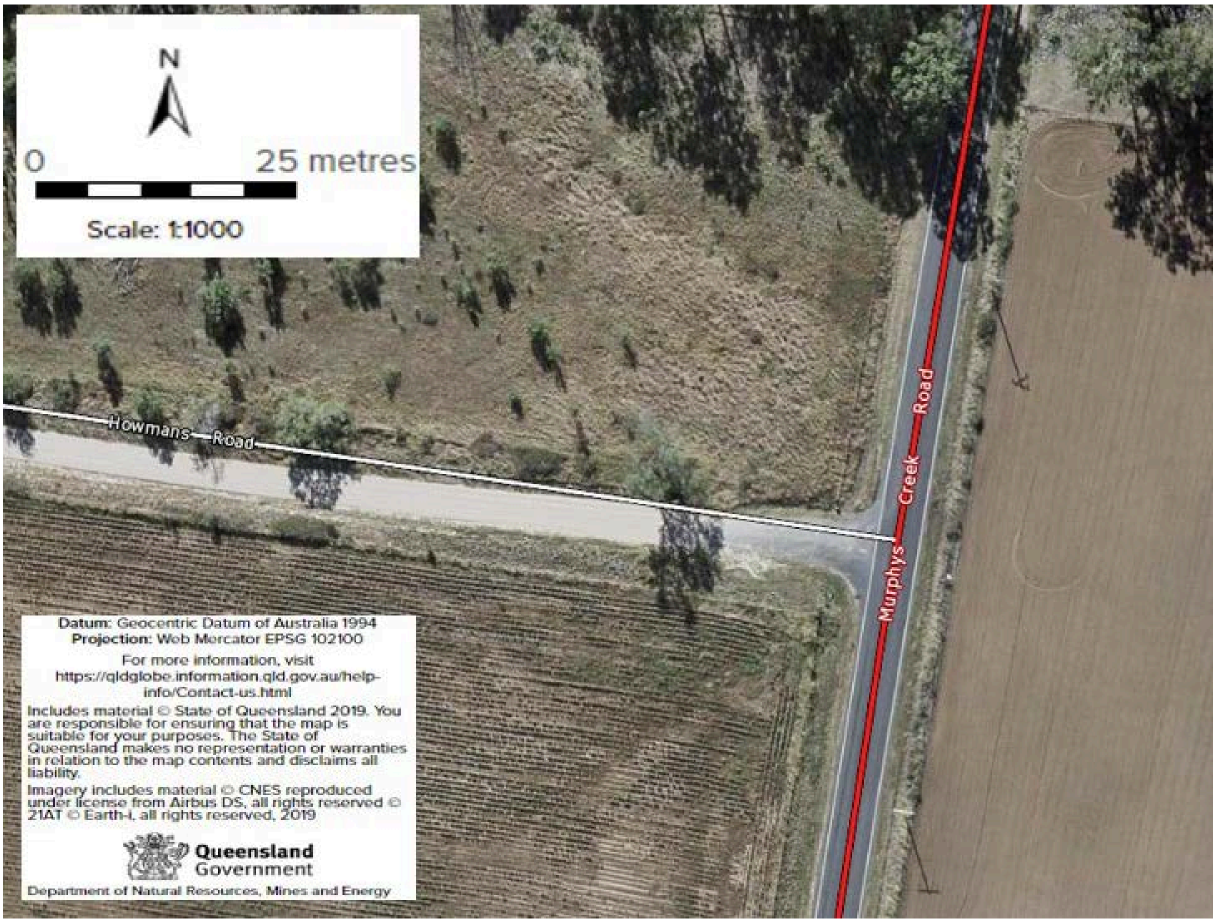


Figure 6.19 Murphys Creek Road/Howmans Road existing layout

The TIA demonstrates that the turning movements into Howmans Road are expected to peak in 2023, with up to 18 veh/hr expected to turn into Howmans Road from Murphys Creek Road. These turning volumes, along with the through movement volumes on Murphys Creek Road are summarised in Table 6.24. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.20.

Table 6.24 Murphys Creek Road/Howmans Road left turning treatment volumes

Scenario	Murphys Creek Road peak hour volume (Q_M for left turn movement)	Peak hour left turn volume into Howmans Road (Q_L)
Existing volumes	161	30
Forecast volumes without Project (2023)	182	32
Project traffic	42	18
Volumes for treatment assessment	224	50

Table note:

1 Numbers may not sum due to rounding.

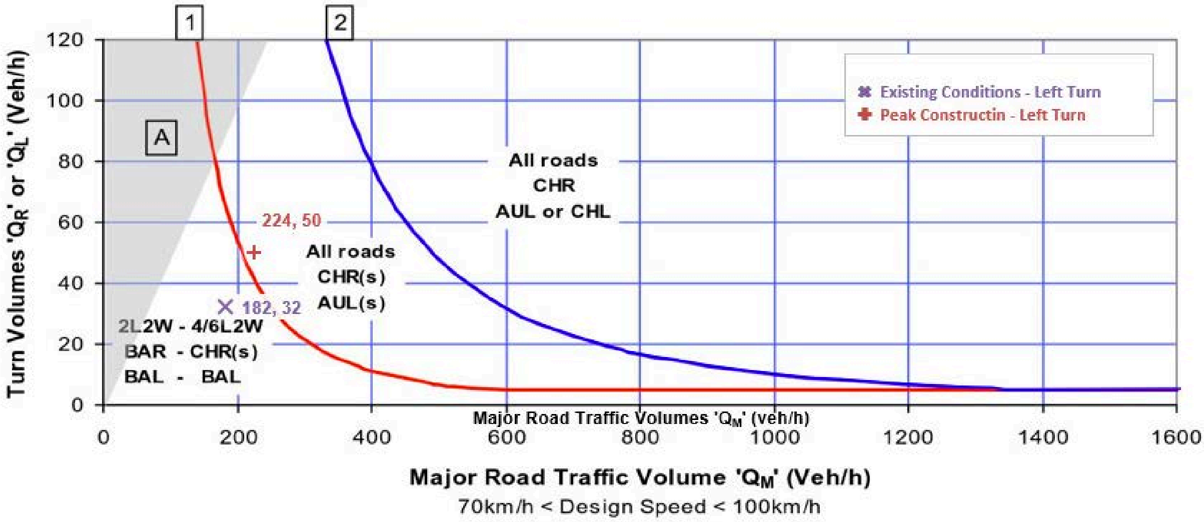


Figure 6.20 Murphys Creek Road/Howmans Road turning treatment assessment (2023)

Figure 6.20 demonstrates that as a minimum, an AUL(s) turning treatment is required to accommodate the turning volumes at the Murphys Creek Road/Howmans Road intersection during construction. The required AUL(s) would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is only required during construction, with the requirement no longer necessary post-construction. Any potential intersection upgrades will be developed in consultation with DTMR and LVRC. This discussion would be undertaken during the development of the TMP once construction routes are finalised by construction contractor and agreed with the relevant asset owners.

6.3.11 Turner Street/Mary McKillop Street

Construction vehicles transporting precast concrete, insitu concrete and workers are expected to utilise the Turner Street/Mary McKillop Street intersection to access a laydown area located adjacent to Cattos Road in LVRC LGA. These vehicles are expected to access this laydown by turning right from Turner Street into Mary McKillop Street. No Project traffic is proposed to enter Mary McKillop Street from the west.

Currently, there are flows along Mary McKillop Street of approximately 800 vehicles per day, two-way (assumed volume). It is assumed that this equates to 30 vehicles turning right into Mary McKillop Street from Turner Street during the peak hour. No turning treatment is currently provided at this intersection, as shown in Figure 6.21. It is noted that this intersection is identified in the LVRC LGIP as a haul route to be used by extractive industries.

As seen in Figure 6.21, there is an existing level crossing located at Mary MacKillop Street, which is not on the proposed Project alignment. Consultation with QR will be required during the construction planning process (detailed design phase) in order to mitigate any safety issues with this level crossing (e.g. plan vehicles movements around the train schedule to avoid short stacking)..

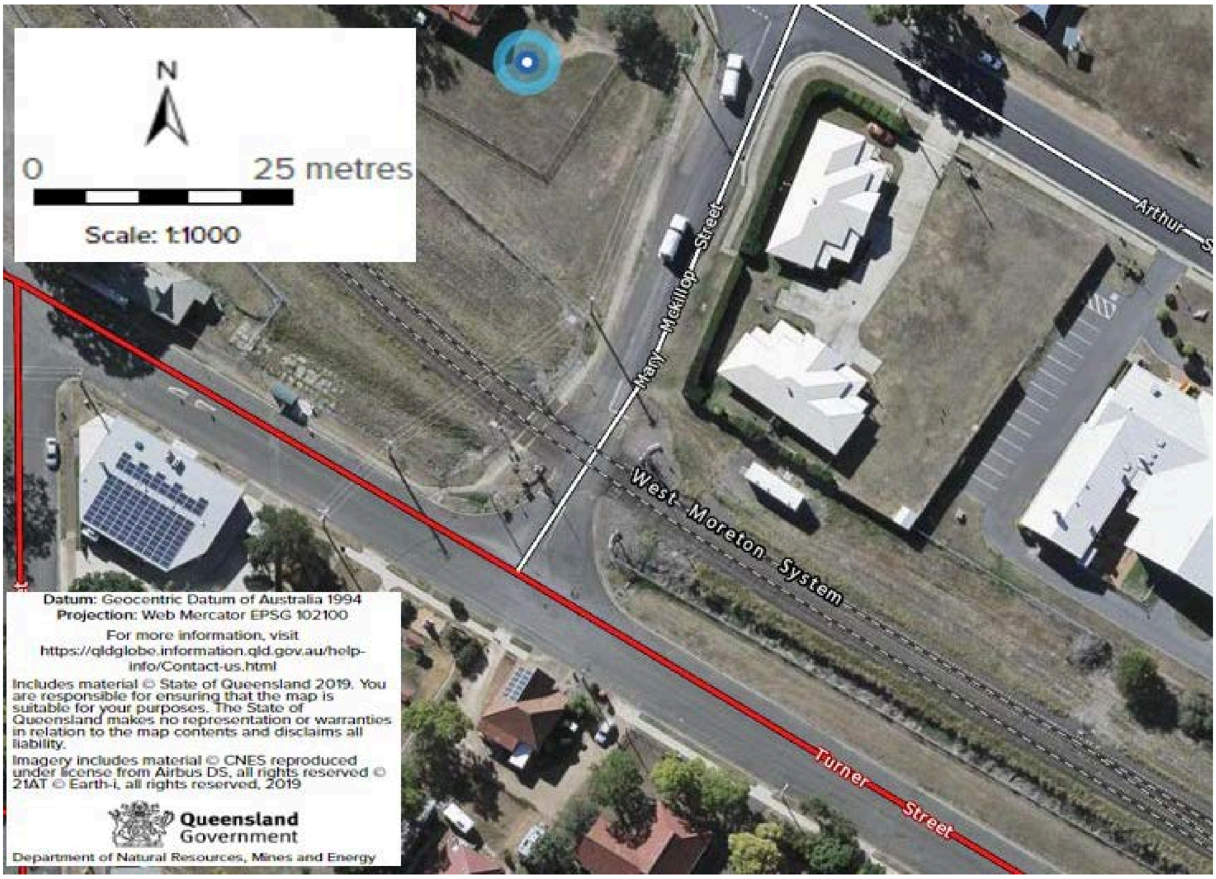


Figure 6.21 Turner Street//Mary McKillop Street existing layout

The TIA demonstrates that the turning movements into Mary McKillop Street are expected to peak in 2023, with up to 24 veh/hr expected to turn right into Mary McKillop Street from Turner Street. These turning volumes, along with the through movement volumes on the Turner Street are summarised in Table 6.25. To determine if a turning treatment is required at the intersection, a turning treatment assessment consistent with the requirements of Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2019a) is demonstrated in Figure 6.22.

Table 6.25 Turner Street/Mary McKillop Street right turning treatment volumes

Scenario	Turner Street peak hour volume (Q_M for right turn movement)	Peak hour left turn volume into Mary McKillop Street (Q_R)
Existing volumes	600	30
Forecast volumes without Project (2023)	649	32
Project traffic	24	24
Volumes for treatment assessment	673	56

Table note:

1 Numbers may not sum due to rounding.

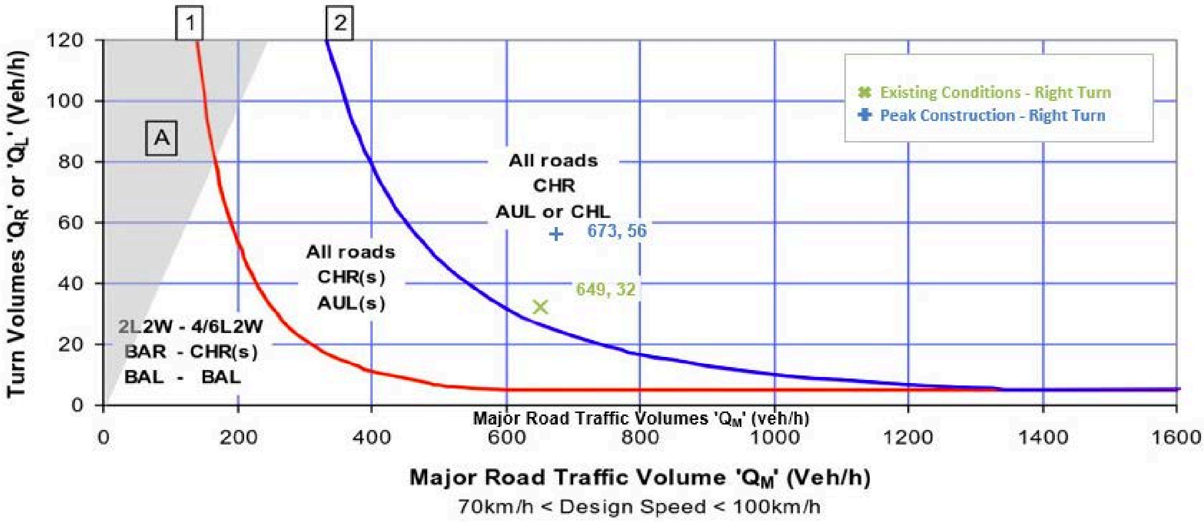


Figure 6.22 Turner Street/Mary McKillop Street turning treatment assessment (2023)

Figure 6.22 demonstrates that as a minimum, a channelised right turn (CHR) turning treatment is required to accommodate the turning volumes at the Turner Street/Mary McKillop Street intersection during construction. The required CHR would be designed consistent with the requirements of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (2017b) and accommodate sufficient storage for the largest proposed construction vehicle (currently listed as a 26.0 m B-double, to be confirmed with the construction contractor).

It is noted that this treatment is warranted under existing conditions based on assumed traffic flows utilised for this proposed road section, through the intersection. Therefore, detailed assessment is required as part of an updated TIA to confirm requirement and agreement is required between the construction contractor, DTMR and LVRC to determine the responsibility for upgrading this intersection to accommodate the construction traffic. This discussion would be undertaken during the development of the TMP once construction routes are finalised and agreed between the construction contractor and the relevant asset owners.

6.4 Operational phase

6.4.1 Workforce

Workforce during operational stages is assumed to reside within local surrounding towns along the Project corridor and be made up of local resident employees. It is anticipated that a workforce of approximately 15 to 20 will be required during operation. It is assumed that a negligible number of new trips will be generated as existing trips would be accounted for and the dispersed nature of these trips across the road network would have a minimal impact on road network operational performance. Therefore, a detailed analysis was not considered necessary as part of the TIA.

6.4.2 Maintenance

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

6.4.3 Rail crossings

Once the Project construction is completed, it is likely that existing rail traffic which currently utilises the QR network between Gowrie and Helidon will utilise the Project rail line. This will reduce the rail traffic along the existing system between Gowrie and Helidon, though there is a connection allowing for traffic to move between the ARTC line and Toowoomba. In line with the QLCSS and the Toowoomba Road Safety Strategy 2019-2023 this could reduce the number of near miss incidents at level crossings and minimise the impact of any incidents that occur. While the Project will result in the elimination of an existing level crossing, with all other road rail interfaces grade separated.

As there are no public level crossings proposed in the Project, there was no analysis required to determine the operational performance as all interfaces have been treated with either grade separation or closure. For this reason, no scenarios were evaluated.

6.4.4 Proposed road alteration impacts

Impacts to the road network during the operational stage of the Project are expected to be negligible, with the expectation of only minimal maintenance being required to inspect and maintain the track (RMAR), within the rail corridor.

The Project alignment results in several road realignments, diversions and closure as discussed in Section 3.4. These alterations are consistent with the intent of the QLCSS and the Toowoomba Road Safety Strategy, with no new at grade crossings proposed.

While these alterations to the external public road network will create permanent diversions, these are not expected to create a significant change to existing traffic patterns and distributions. Associated impacts from road alterations are provided in Table 6.26.

The alterations to the public road network are not expected to be significant at most of these sites as:

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

Table 6.26 Proposed road alterations and associated impacts

Interface ID	Road name	Proposed treatment	Impact
TRC			
320-1-P-0	Draper Road	No Crossing Provided	Draper Road interface is not required for property access or to maintain reasonable network connectivity. Road network alterations to the public road network are not expected to create a significant change to existing traffic patterns and distributions.
320-1-E-1	Paulsens Road (referenced as Gowrie Junction Road by QR)	No Crossing Provided - Relocate	Movements using this existing level crossing can use the grade separated crossing connecting Gowrie Junction Road to Old Homebush Road (320-1-P-0a). This allows for a safe crossing, being grade separated, consistent with stakeholder consultation feedback received, and also maintains connectivity with surrounding road network.
320-1-P-1	Morris Road	No Crossing Provided - Consolidate	Morris Road will be realigned on the southern side of the Project alignment, extend west to pass under the new Gowrie Junction Road bridge and connect with Krienke Road. The existing rail over road grade separation on the QR alignment between 320-1-P-1 and 320-2-P-1 which will be closed due to the Morris Road closure (320-2-P-1). A level crossing is not possible on Morris Road due to the proposed crossing loop.

Interface ID	Road name	Proposed treatment	Impact
			Road network alterations to the public road network are not expected to create a significant change to existing traffic patterns and distributions as movements to and from Gowrie Junction which previously used the Morris Road/East Paulsens Road underpass can access the proposed grade separated crossing (320-1-P-0a) via Hermitage Road, with a travel distance difference of approximately 500 m when the grade separated structure is implemented. The existing section of Hermitage Road west of Boundary Street is in poor condition, therefore as additional traffic will use be redistributed to use this section of Hermitage Road it is recommended that the road is upgraded to accommodate a two-way two-lane cross section consistent with TRC standards. These associated traffic impacts to the Gowrie Junction area have been assessed in an additional technical note. For further details, refer Appendix T and Appendix U. Note that there is an existing grade separated crossing to the east of this interface (320-1-P-1). It is proposed to close this crossing as part of the Project, and vehicles will now utilise the proposed grade separated crossing 320-1-P-0a via Paulsens Road and Old Homebush Road via.
320-2-P-1	Morris Road	No Crossing Provided - Consolidate	No crossing to be provided at Morris Road interface (320-2-P-1) due to the proposed crossing loop. Road network alterations to the public road network are not expected to create a significant change to existing traffic patterns and distributions.
LVRC			
320-4-P-2	Wallens Road	Grade separation provided at 320-4-P-2a but 320-4-P-2 being consolidated	Wallens Road to be realigned to the north, under the nearby rail bridge at 320-4-P-2a. Road network alterations to the public road network are not expected to create a significant change to existing traffic patterns and distributions due to the low traffic numbers and minimal change in diversion of approximately 60 m.
320-9-P-1	Cattos Road	No Crossing Provided - Consolidate	Alternative access provided by the proposed realigned Cattos Road which runs under the Lockyer Creek viaduct rail bridge (320-8-P-4). This road only serves one property, and will result in a diversion of approximately 1.3 km.

6.5 Active transport impacts

6.5.1 Pedestrian and cycle network

A number of existing cycle networks have been identified to be coincident with propose construction traffic routes. These impacted cycle networks have been provided in Section 2.6.1.

A review of the PCNP was undertaken in order to identify any existing on-road cycle paths that may coincide with proposed road rail interfaces within QLD. The existing road rail interface at Paulsens Road (referenced as Gowrie Junction Road by QR) (320-1-E-1) is located along the PCNP, however the proposed grade separated crossing replacing this (320-1-P-0a) will incorporate pedestrian and cycle movements in order to account for this. These have been assessed in further detail in Appendix U and Appendix T. Temporary measures will also be needed during construction to ensure that the PCNP is maintained within this area or that the disruption is minimised.

It should be noted that several of the proposed construction routes currently traverse through areas of moderate to high pedestrian activity through the localities of Toowoomba, Withcott and Helidon. While increased heavy vehicle movements through these locations may adversely impact pedestrian movements, the majority of these routes currently facilitate a high proportion of heavy vehicle movements regardless.

During construction within areas where there is potential for higher pedestrian volumes (e.g. Toowoomba, Withcott, Helidon), specific pedestrian management measures should be put in place. These will be subject to site specific planning and reflect the nature of the works underway and the impacts on the existing pedestrian and cycle network.

6.6 Other road impacts

As part of the traffic impact assessment, Project impacts other than those affecting the existing road network were considered. These other impacts include impacts on stock routes, public transport networks, accesses and operation of emergency services.

6.6.1 Impacts on emergency services

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

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

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

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

Rail corridor access during construction and operation, response times for emergency services may be delayed if they encounter significant roadworks or passing trains at level crossings. ARTC will work with the relevant emergency services agencies (e.g. QFES, QAS and QPS) to develop protocols and joint working arrangements to address potential impacts on emergency services and service response times during construction and operation and ensure that access is retained as required.

The QFES, QAS and QPS will all be consulted in order to identify suitable emergency access points to the rail corridor.

6.6.2 Impacts on stock routes

There are no stock routes evident which would be impacted by the Project, as stated within Section 2.2.6.

6.6.3 Impacts on existing rail facilities

6.6.3.1 Works in existing rail corridor

QR owns and manages QLD’s regional freight network and operates both suburban and long-distance passenger services for the QLD Government. QR’s regional freight network comprises seven different systems in the State, with the Project alignment predominantly following the West Moreton System rail corridor and the Gowrie to Grandchester future State transport corridor. Product hauled on the QR regional network is primarily thermo-coal.

The Project alignment begins approximately 3.7 km west of Gowrie, at Charlton where it connects with the eastern end of the B2G project, it then runs east, parallel to the existing QR West Moreton System rail corridor (Western Line) on the southern side, for approximately 4.8 km before diverging from the West Moreton System rail corridor and passing into the proposed western tunnel portal within the vicinity of Boundary Street and the Toowoomba Bypass interchange at Gowrie Junction.

The West Moreton System rail corridor is a critical link in agricultural export supply chains, supporting the movement of significant volumes of commodities to the Port of Brisbane. Planning of exports to international markets involves significant lead times to coordinate landside logistics, shipping schedules and client demand. Supply chain stakeholders will need sufficient time to develop contingencies to mitigate potential disruption.

Furthermore, there are six existing road rail interfaces located along the proposed primary construction routes. These include level crossing within the Toowoomba area. These interfaces are not expected to be impacted significantly by construction traffic, however QR will be required to be consulted prior to final construction routes being determined in order to mitigate impacts to these existing interfaces.

Poorly timed track closures and inadequate consultation and communication could have significant adverse impacts (cost and potentially reputational) for QLD stakeholders in international supply chains currently reliant on the West Moreton System rail corridor.

Online construction of the new railway, being a direct replacement of the existing rail infrastructure, is the preferred construction approach for sections of the Project within existing rail corridor. This approach would require agreement with QR, in the form of an interface agreement, and would result in short to medium-term possession of the rail corridor to enable construction. This online construction approach would result in the existing railway being non-operational to rail movements for the duration of the possession. Consequently, alternative means of transportation will be required during these periods for freight that would otherwise be transported via rail.

Offline construction is the alternative method within existing rail corridors. This approach would involve the new railway being constructed immediately adjacent to the existing rail infrastructure. The benefit of this approach being that the existing railway could remain operational during the construction period. However, this construction approach would introduce safety and logistical challenges that would be preferable to avoid.

The staging of the works within existing rail corridors, and their associated impacts, will be the subject of an interface agreement between ARTC and QR. The timing of works within existing rail corridors will need to be determined in consultation with QR and key supply chain stakeholders in order to identify periods of minimum disruption.

In accordance with Section 255 of the TI Act, works cannot commence within the existing rail corridor without QR's written approval. If the construction of Project components within the existing rail corridor is completed during a temporary possession of the rail corridor, then works will be completed in accordance with the conditions of the temporary possession and/or wayleave agreement granted to ARTC by QR.

ARTC should commit to early consultation with stakeholders which currently utilise the West Moreton System rail corridor to inform:

- The programming of construction activities requiring track possessions,
- Effective communication strategies, and
- Impact mitigation strategies.

Consultation with AgForce (Queensland's peak organisation representing rural producers) and local councils will assist in identifying the necessary stakeholders in export agriculture supply chains and beef processing supply chains which utilise the West Moreton System rail corridor. Likely stakeholders will include producers, exporters, the Port of Brisbane, transport operators, logistics managers, processors and road network managers.

ARTC will continue to consult with QR and other stakeholders as the Project progresses through detail design and construction planning regarding the identification of an acceptable construction method within existing rail corridor.

6.6.3.2 Rail deliveries

Approximately 6,240 tonnes of rail are required for the Project. It is assumed that rail will be supplied by a single source and will be distributed via the existing QR rail network to designated laydown areas along the Project alignment. Where further transportation is required to distribute rail to designated areas along the Project alignment, road networks will be utilised to achieve this.

Based on train movements on existing rail lines (refer Section 2.3), it is anticipated that if rail deliveries to site are via existing rail network, that the additional rail movements would be within the operational capacity of the networks utilised and would not result in network impacts.

The delivery of the rail in full lengths via the QR network will require further investigation and consultation with QR during the construction planning process (detailed design). The objective of this consultation will be to agree on routes to be used, size and frequency of locomotives and the scheduling of deliveries with consideration for monthly variances in background network usage.

6.6.3.3 Existing level crossings along construction routes

There are 7 existing level crossings that are located along the proposed construction transport routes. These level crossings are provided in Table 6.27, along with their associated LGA and proposed peak construction vehicles per day.

Table 6.27 Existing level crossings along construction routes

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

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

Of the level crossings provided in Table 6.27, Griffiths Street and North Street (West) level crossing are incorporated into the signalised intersections at their respective locations, therefore it is not considered that these level crossings will have any significant issues with the additional construction vehicles.

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

The level crossing located at Paulsens Road is proposed to be closed as a part of the Project (refer Section 3.2.1), however engagement and consultation with QR will be required prior and during construction in order to access this level crossing. Access to the existing underpass to the east of this level crossing (Paulsens Road underpass) will need to be managed in consultation with QR and the relevant LGA during construction, with the intent to close this underpass for public access (as discussed in Section 3.2.1).

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

6.6.4 Public transport impacts

The evaluation of existing public transport services (provided in Section 2.2.3) indicates that there would be minimal impact to existing public transport services as a result of construction of the proposed rail corridor due to the number of construction vehicles on the public transport routes. Similarly, no existing public transport routes will likely be affected by proposed road rail interfaces. This is largely due to the fact that all proposed public road rail interfaces are being treated with grade separation, particularly Gowrie Junction Road (320-1-P-0a).

Regardless, public transport operators should be consulted as part of the Project and made aware of the various construction activities. Section 9.2 outlines requirements to mitigate potential impacts.

Construction routes are expected to interact with public transport routes on the following roads:

QLD:

- New England Highway
- Warrego Highway
- Toowoomba Connection Road
- Highfields Road
- River Road
- Ipswich-Cunningham Highway Connection Road
- Gatton Helidon Road
- North Street
- Griffiths Street.

NSW:

- Pacific Motorway
- Summerland Way
- Bent Street
- Craig Street
- Turf Street
- Oliver Street
- Dobie Street
- Mary Street
- Charles Street.

6.6.5 School bus service impacts

Table 6.28 shows the school bus routes that may be affected by proposed road rail interfaces in this Project. All of the proposed road rail interfaces identified are proposed to be grade separated, with the only existing crossing 320-1-E-1 being proposed to be relocated. This is expected to impact bus routes 308 and 310 in Gowrie, however, due to the low frequency of these services, it is not expected to significantly impact these school bus routes.

Prior to the construction phase of the Project, a suitable detour route for all of the affected services should be identified if required. Both prior to and during the construction phase of the Project, bus operators, TRC Gowrie State School and where applicable the local community should be consulted as part of the Project and made aware of the proposed changes to the school bus routes. The construction contractor will also be made aware of the presence of school bus routes and their operational hours as part of the Project induction process.

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

Table 6.28 School bus routes affected by proposed road rail interfaces

Services	Weekday frequency	Road rail	Proposed treatment
308 (AM and PM): Gowrie State School - Toowoomba	1/AM 1/PM	320-1-E-1	No Crossing Provided - Relocate
310 (AM and PM): Gowrie State School - Toowoomba	1/AM 1/PM	320-1-E-1	No Crossing Provided - Relocate

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

QLD:

- New England Highway
- Warrego Highway
- Toowoomba Connection Road
- Old Homebush Road
- Toowoomba Cecil Plains Road
- Omara Road
- Hursley Road
- Munro Street
- North Street
- Hursley Road
- Hampton Road
- Griffiths Street
- Paulsens Road
- Morris Road
- Gowrie Junction Road
- Roches Road
- Cunningham Highway
- Pacific Motorway.

NSW:

- Pacific Motorway
- Summerland Way
- Bent Street
- Craig Street
- Turf Street
- Oliver Street
- Dobie Street
- Mary Street
- Charles Street.

It is expected that school bus services would not be substantially impacted from an operational and service reliability perspective as a result of the Project generated traffic during the Project construction. The presence of bus routes will be considered in the preparation of the CEMP, as discussed in Section 9.

6.6.6 Strategic touring routes

Given the evaluation of construction traffic on the road network, it is considered that although some strategic touring routes are coincident with proposed primary construction routes, the short-term nature of the construction phase would result in only temporary impacts to these routes.

6.6.7 Access and egress

Construction vehicle access to the proposed rail corridor is proposed to be via the existing road network in conjunction with proposed access tracks. These access points must be chosen such that adequate sight distance and safe access/egress path are available. Further investigation of access locations is required once detail around the planned construction methodology is known which would occur during the detailed design phase. All access and egress points, once finalised by the construction contractor, should be communicated to the relevant stakeholders including all emergency service operators. This is expected to become available during the detailed design phase.

All construction access points should be designed in accordance with all relevant standards, with adequate sight lines to ensure they operate in a safe and efficient manner. In addition, where possible, access will be provided from secondary roads to minimise the potential disruptions to the arterial road network and to minimise conflicting turning traffic with higher volume through traffic.

Where the proposed rail line is in close proximity to arterial roads with limited alternative access routes, specific traffic management will be put in place. Where possible, access will be provided along the rail corridor from a nearby secondary road. All new accesses formed as a part of the Project will comply with the TI Act and relevant approvals from DTMR or the local road authority.

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

7 Pavement impact assessment

A preliminary desktop pavement impact assessment was undertaken on all envisaged affected DTMR and RMS SCR based on the existing background traffic data available for the relevant road sections. The heavy vehicle component of the AADT was calculated for the construction period by adopting the background heavy vehicle percentages from the traffic data. These are displayed in Table 4.6.

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

The SAR for the background heavy vehicle component was calculated based on the heavy vehicle splits for the relevant road sections. Where the number of SAR of the additional Project related traffic equals or exceeds the existing pavement life, the pavement is considered to be impacted and further assessment (detailed design) separate to the TIA is required.

Pavement impact assessments were not conducted for affected LGR as the GTIA applies to SCR. Alternative mitigation measures will be developed such as road visual condition assessments prior, during and post construction and returning the road to original condition once construction is finished. Such mitigation measures will be developed through consultation with relevant councils and road authorities prior to the construction phase.

The pavement impact assessment is for use in this report only and is not proposed to be used for pavement design. It is based on assumed current design construction routes and should be revised with an updated TIA when construction routes are finalised.

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

7.1 Methodology

The pavement assessment as part of the TIA process will be undertaken for SCR road links where the Project generated traffic SAR exceed 5 per cent of the base traffic SAR in either direction on the link in the year of analysis. The impacts on pavements will be identified and measures implemented to avoid, reduce or mitigate the effects on pavement life from Project traffic. Construction activities are likely to involve intensive, short-term haulage and the pavement impacts of this haulage over the construction period were also assessed. The following section provides a brief summary of the approach and methodology adopted for the preliminary desktop pavement impact assessment for envisaged affected SCR:

- Determine the assumed number and types of vehicles that will be generated by the Project in the construction phase (demonstrated in Table 5.16), and determine the sections of the network where pavement assessment is most likely required for each year of construction
- Convert the Project traffic volumes into SAR4 based on the assumed number of SAR per vehicle
- Conduct a 5 per cent comparison of the background traffic SAR4 (as calculated in Section 4.3) and Project generated SAR4 for each link identified to be most likely impacted by the proposed Project.

The construction routes assumed as a part of this assessment are routes which the construction contractor may use. However, ultimately, the determination of the final construction and heavy vehicle routes will be subject to consultation between DTMR or RMS, the relevant local government authority and the construction contractor prior to construction phase. The following analysis should be undertaken as a part of an updated TIA when the final construction routes are finalised by the construction contractor. However, this analysis will be subject to consultation with RMS for NSW SCR, as the GTIA was developed by DTMR:

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

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

Where:

i	is each road section triggered
C	is construction period SAR
O	is operational period SAR for the impact mitigation period
MC	is the relevant marginal cost (per SAR-km) prescribed in the department's database for each road section
L	is the length of road section in km
n	is the number of road sections triggered in the TIA study area.

This marginal contributions process within the GTIA calculates development contributions in dollar values for each 100 m road section of a particular SCR used by construction vehicles, on road sections that generated loading units that exceed 5% of the background loading units. The sum of all 100 m segments contributions is combined to determine the total amount that the development would be required to contribute per years of operations to offset road impacts on the said road.

The specific contribution amounts are not calculated in this stage of the Project, as these are not in scope for the feasibility phase of the Project. In the following phases, the marginal cost calculation will be required to be undertaken consistent with the methodology within the latest version of the GTIA, including Practice Note: Pavement Impact Assessment December 2018.

The process undertaken in the detailed design phase of the Project will be agreed upon by the relevant road controlling authority.

7.2 Assumptions

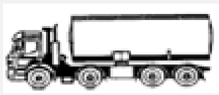
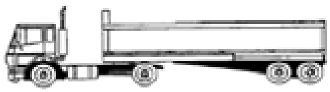
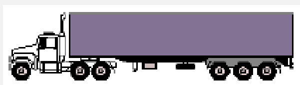
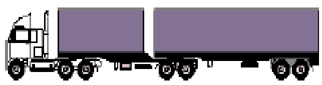
Assumptions regarding the construction design vehicles to be used are provided in the following sections. Table 7.1 indicates the Austroads vehicle types by construction activity that have been adopted for the assessment.

Table 7.1 Vehicle types by construction activity

Construction activity	Vehicle class
Workers	Austroads Class 1
Spoil	Austroads Class 10
Tunnel Spoil	Austroads Class 10
Quarry	Austroads Class 10
Sleepers	Austroads Class 10
Precast Concrete – bridges	OSOM vehicle
Precast Concrete - culverts	Austroads Class 9
Insitu Concrete	Austroads Class 5
Water	Austroads Class 7

The SAR parameters used for the construction vehicles are provided in Table 7.2. To ensure no underestimation of SAR in any direction, fully loaded vehicles have been assumed in both directions. While it is expected that this may be true for a small percentage of trips, this assumption is considered conservative and would be confirmed by the construction contractor.

Table 7.2 Project Traffic SAR Parameters (SAR per HV (heavy vehicle))

Vehicle classes		Total fully loaded SAR/HV
Class 1 Short Vehicle		N/A
Class 5 4 Axle Rigid Truck (27.5 t)		4.087
Class 7 4 Axle Semitrailer (31.5 t)		5.019
Class 9 6 Axle Semitrailer (42.5 t)		4.93
Class 10 7 Axle B-Double (55.5 t)		7.72
Assumed OSOM for Precast concrete bridges Unloaded Class 3 Rigid Truck with 4 Axle Dolly and 4 Axle Jinker (70t payload)		12.21

The SAR/HV values in Table 7.2 were sourced from DTMR's GTIA *Practice Note: Pavement Impact Assessment* (2018). The SAR/HV for the OSOM vehicle to transport the 29 m Super-T precast concrete bridge elements was calculated consistent with Austroads *Guide to Pavement Technology Part 2: Pavement Structural Design* (2012).

7.3 Analysis and findings

The pavement analysis provides a 5 per cent comparison of the background traffic SAR and Project generated SAR for each SCR construction route section identified for the Project have been provided in Table 7.3.

Table 7.3 5 per cent Standard Axle Repetitions Comparison

Road name	Road ID - road section	Year of construction				
		2022	2023	2024	2025	2026
SCR: DTMR						
Cunningham Highway	17B – Between River Road and Redbank Plains Road	0.0%	0.1%	0.7%	0.0%	0.0%
Gatton Helidon Road	314 – Between Warrego Highway and Woodlands Road	0.3%	2.8%	3.5%	0.3%	0.0%
Ipswich Motorway	17A – Between Cunningham Highway and Logan Motorway	0.0%	0.0%	0.0%	0.3%	0.0%
Ipswich-Cunningham Highway Connection Road	301 – River Road and South Station Road	0.0%	0.0%	0.0%	0.0%	0.0%
Logan Motorway (operated by Transurban)	Between Ipswich Motorway and Pacific Motorway	0.0%	0.0%	0.0%	0.3%	0.0%
Murphys Creek Road	4104 – Between Warrego Highway and Brookside Place	71.9%	158.6 %	36.4%	18.1%	0.0%
	4104 – Between Brookside Place and Toowoomba Bypass	71.9%	158.6 %	36.4%	18.1%	0.0%
	4104 – Between Toowoomba Bypass and Howmans Road	71.9%	158.6 %	36.4%	18.1%	0.0%
New England Highway	22A – Between Highfields Road and Murphys Creek Road	20.0%	23.4%	0.0%	0.0%	0.0%
	22A – Between Murphys Creek Road and Munro Street	20.9%	24.5%	0.0%	0.0%	0.0%
	22A – Between Munro Street and North Street	19.5%	27.2%	7.2%	2.2%	0.0%
	22A – Between North Street and Warrego Highway	31.9%	47.7%	17.7%	5.0%	0.0%
Pacific Motorway	12A – Between Logan Highway and NSW/QLD Border	0.0%	0.0%	0.0%	0.2%	0.0%
River Road	309 – Between Warrego Highway and Ipswich-Cunningham Highway Connection Road	0.0%	0.6%	4.4%	0.2%	0.0%
Toowoomba Bypass	319 – Between Toowoomba Cecil Plains Road and Warrego Highway	1.8%	0.0%	0.0%	0.6%	0.0%
	319 – Between Boundary Street and New England Highway	0.1%	8.0%	2.2%	0.9%	0.0%
	319 – Between New England Highway and Warrego Highway	0.1%	3.3%	0.0%	0.9%	0.0%
Toowoomba Cecil Plains Road	324 – Between Boral Quarries and Toowoomba Bypass	7.1%	0.0%	0.0%	2.4%	0.0%
	324 – Between McDougall Street and Tor Street	0.0%	0.0%	0.0%	0.0%	0.0%
Toowoomba Connection Road	315 – Between Warrego Highway and Roches Road	1.7%	2.6%	0.4%	0.1%	0.0%
	315 – Between Roches Road and Murphys Creek Road	1.7%	2.6%	0.4%	0.1%	0.0%
	315 – Between Murphys Creek Road and Toowoomba Bypass	0.1%	4.1%	1.0%	0.5%	0.0%

Road name	Road ID - road section	Year of construction				
		2022	2023	2024	2025	2026
Warrego Highway	18A – Between Omara Road and Gowrie Junction Road	4.0%	0.0%	0.0%	1.3%	0.0%
	18A – Between Gowrie Junction Road and McDougall Street	0.0%	0.0%	0.0%	0.0%	0.0%
	18A – Between McDougall Street and Tor Street	0.0%	0.0%	0.0%	0.0%	0.0%
	18A – Between Tor Street and Rob Street	0.0%	0.0%	0.0%	0.0%	0.0%
	18A – Between Rob Street and Toowoomba Athol Road	0.1%	0.0%	0.0%	0.0%	0.0%
	18A – Between Toowoomba Athol Road and New England Highway	0.1%	0.0%	0.0%	0.0%	0.0%
	18A – Between New England Highway and James Street	4.1%	6.1%	2.2%	0.6%	0.0%
	18A – Between James Street and Tourist Road	4.1%	6.1%	2.2%	0.6%	0.0%
	18A – Between Tourist Road and Toowoomba Connection Road	3.1%	4.5%	1.7%	0.5%	0.0%
	18A – Between Toowoomba Bypass and Gatton Helidon Road	0.1%	4.1%	1.0%	0.5%	0.0%
	18A – Between Gatton Helidon Road and Gatton Esk Road	0.0%	0.4%	0.8%	0.3%	0.0%
	18A – Between Gatton Esk Road and Laidley Plainland Road	0.0%	0.3%	0.6%	0.3%	0.0%
	18A – Between Laidley Plainland Road and Haigslea Amberley Road	0.0%	0.2%	0.5%	0.2%	0.0%
	18A – Between Haigslea Amberley Road and Brisbane Valley Highway	0.0%	0.1%	0.6%	0.2%	0.0%
	18A – Between Brisbane Valley Highway and Mount Crosby Road	0.0%	0.1%	0.7%	0.2%	0.0%
	18A – Between Mount Crosby Road and Cunningham Highway	0.0%	0.1%	0.7%	0.2%	0.0%
SCR: RMS						
Pacific Motorway	Between NSW/QLD Border and Gwydir Highway	0.0%	0.0%	0.0%	0.3%	0.0%
Summerland Way	Between Trenayr Road and Turf Street	0.0%	0.0%	0.0%	1.4%	0.0%

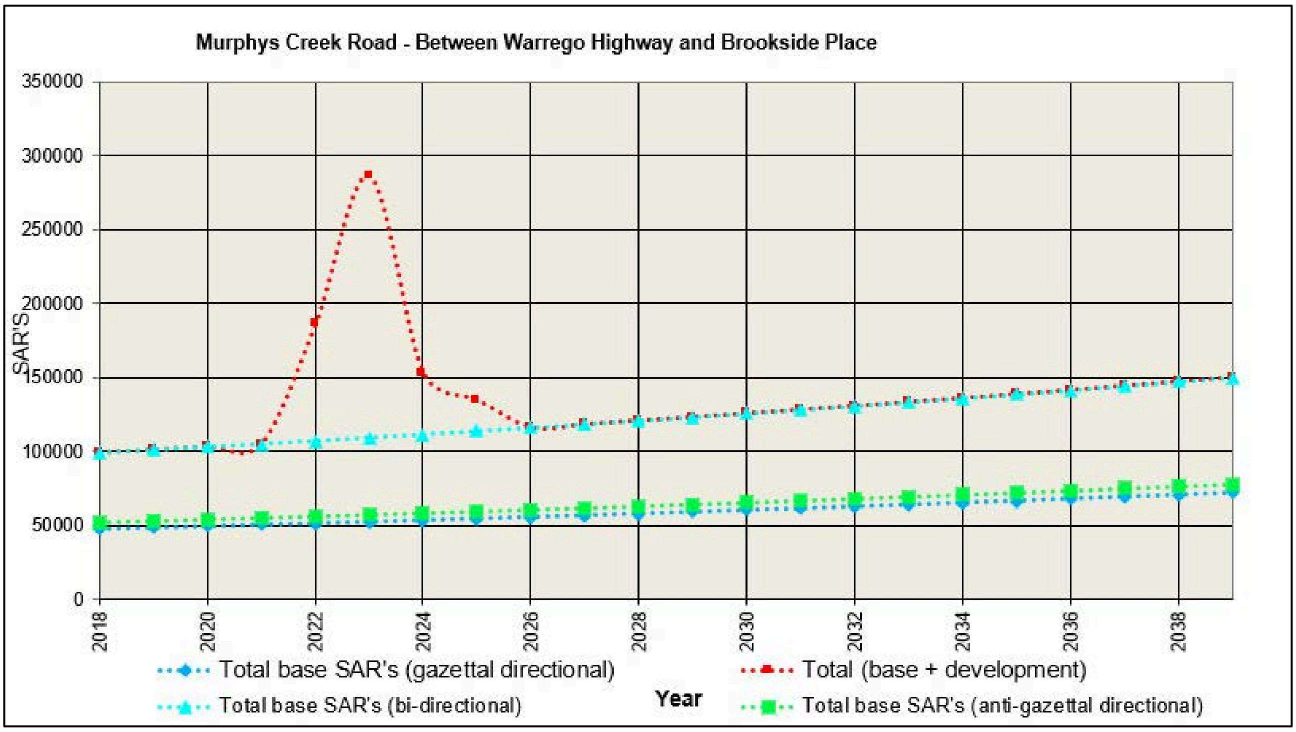
The analysis indicates that 11 SCR road sections are likely to exceed the 5 per cent SAR threshold, with some road sections exceeding this threshold by a significant margin. It should however be noted that the assumption of fully loaded vehicles in each direction is conservative to ensure no underestimation of pavement impacts. The following SCR road sections exceed the 5 per cent threshold:

- Murphys Creek Road – Between Warrego Highway and Brookside Place
- Murphys Creek Road – Between Brookside Place and Toowoomba Bypass
- Murphys Creek Road – Between Toowoomba Bypass and Howmans Road
- New England Highway – Between Highfields Road and Murphys Creek Road
- New England Highway – Between Murphys Creek Road and Munro Street
- New England Highway – Between Munro Street and North Street

- New England Highway – Between North Street and Warrego Highway
- Toowoomba Bypass – Between Boundary Street and New England Highway
- Toowoomba Cecil Plains Road – Between Boral Quarries and Toowoomba Bypass
- Warrego Highway – Between New England Highway and James Street
- Warrego Highway – Between James Street and Tourist Road.

Figure 7.1 to Figure 7.11 show the SAR assessment results for these road sections. The analysis indicates that the SCR road sections would have a minimal pavement impact given the duration of the construction activities and pavement loading.

It is proposed that a more detailed pavement impact assessment will be carried out prior to construction and in consultation with DTMR once specific construction routes are agreed. This will form part of the draft Outline Environmental Management Plan (OEMP) and subsequent EMPs to be developed prior to construction. This will assist further discussions with DTMR to identify if contributions may be required towards the maintenance costs for the affected road sections as a result of additional pavement loading.



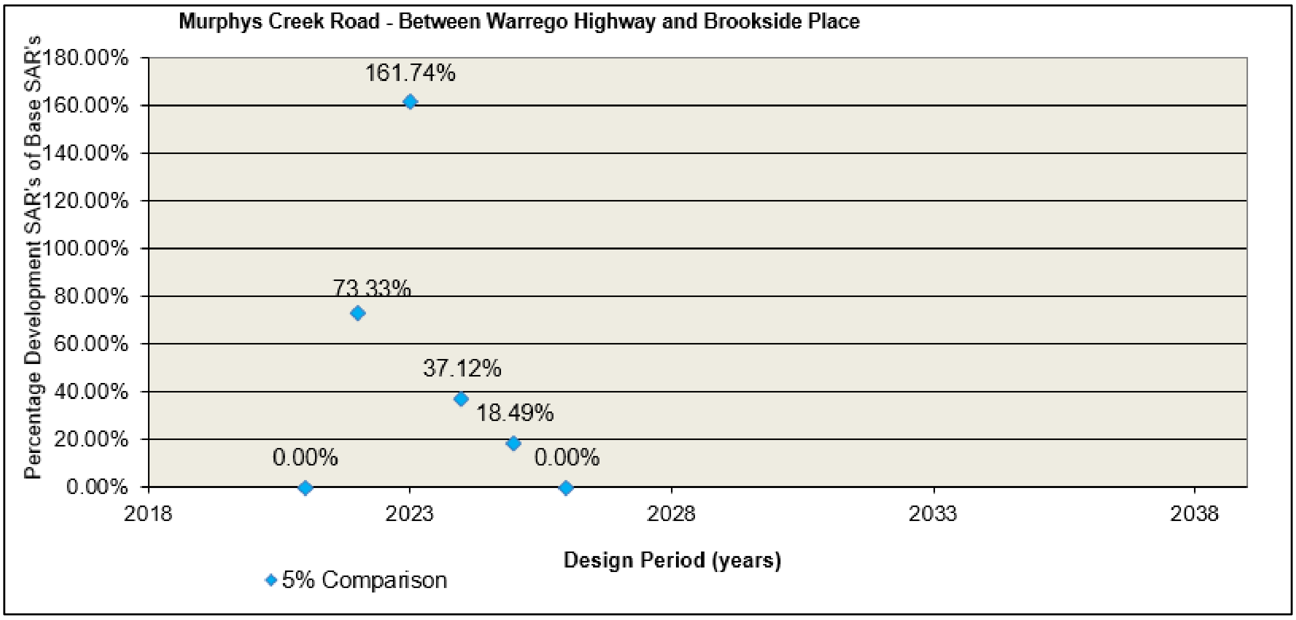
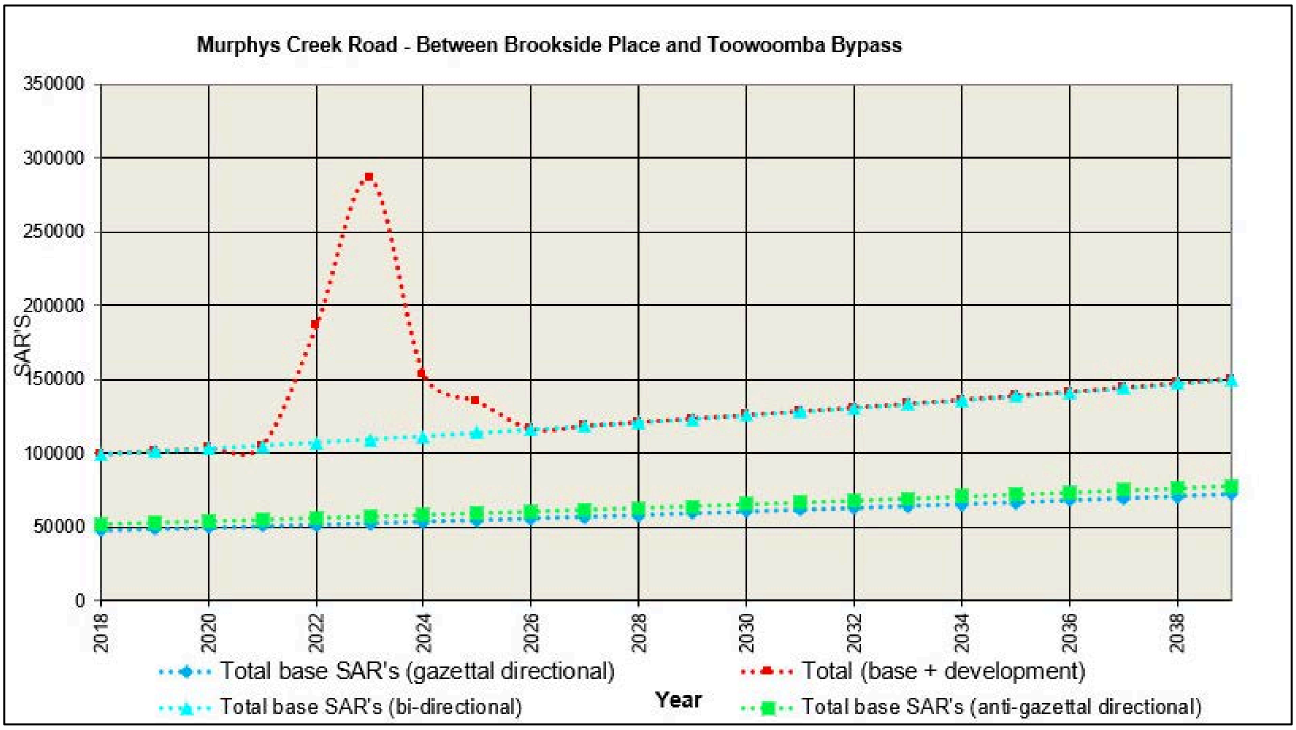


Figure 7.1 **Standard Axle Repetitions Results: Murphys Creek Road: Between Warrego Highway and Brookside Place**



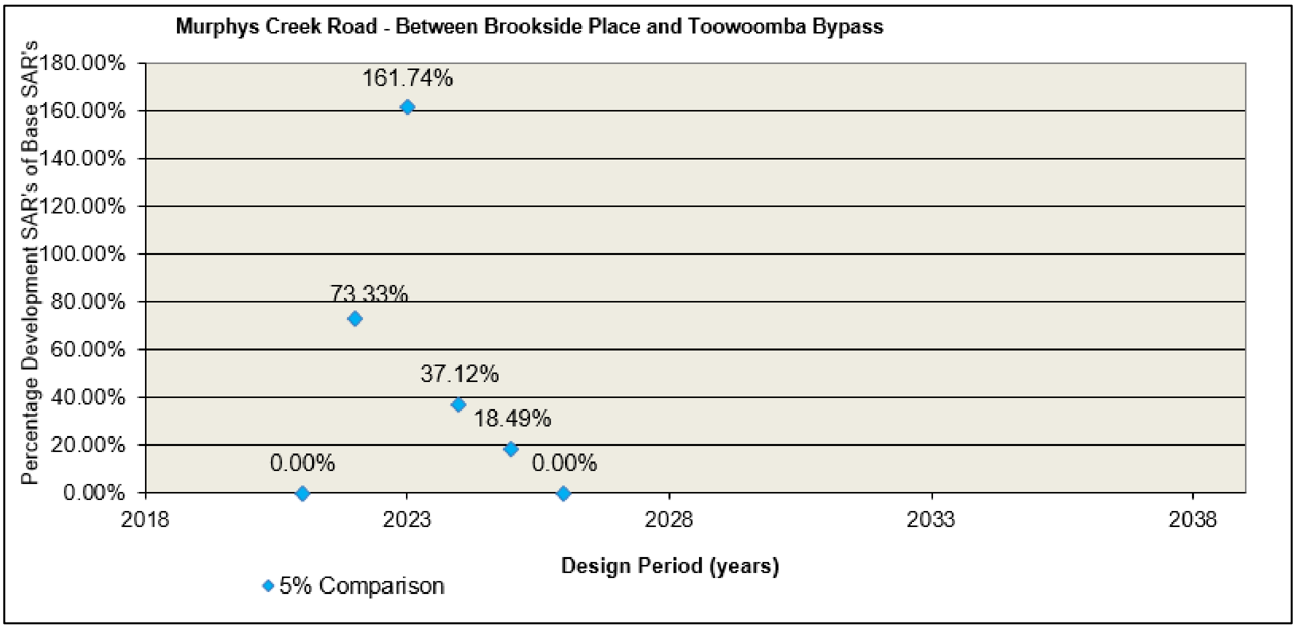
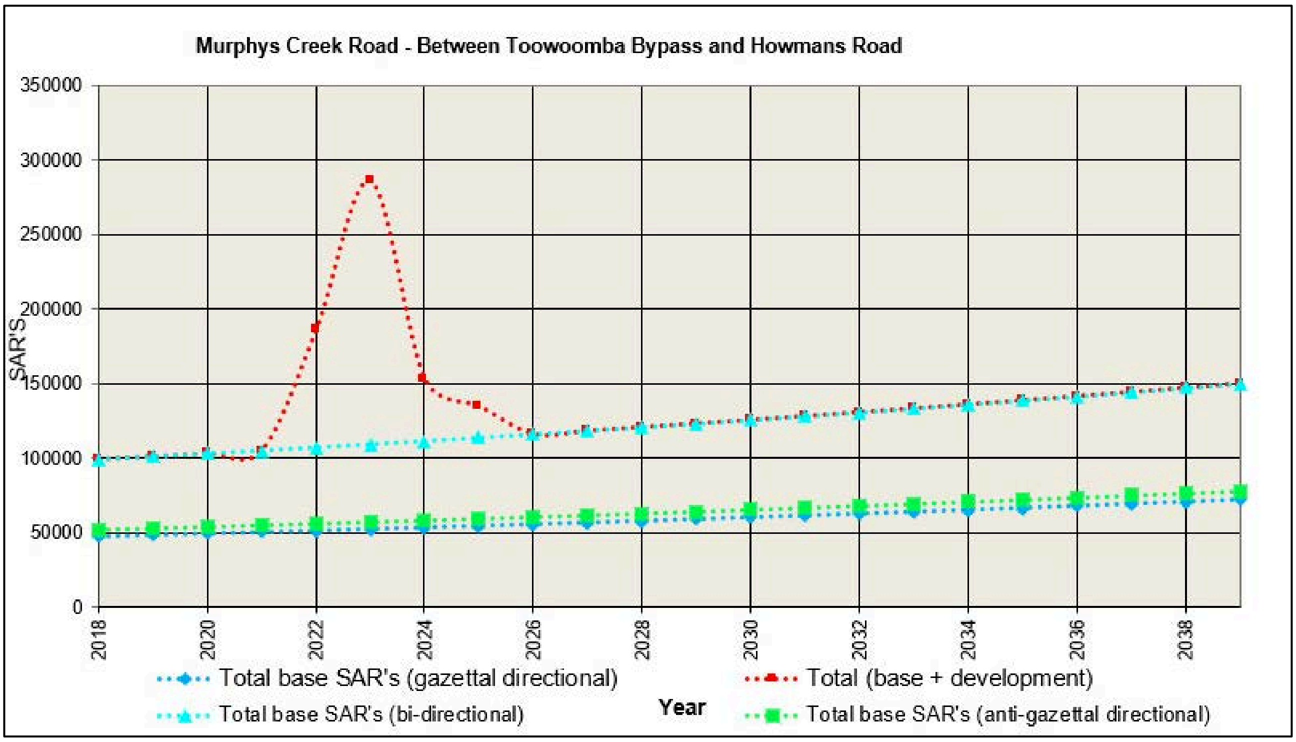


Figure 7.2 **Standard Axle Repetitions Results: Murphys Creek Road: Between Brookside Place and Toowoomba Bypass**



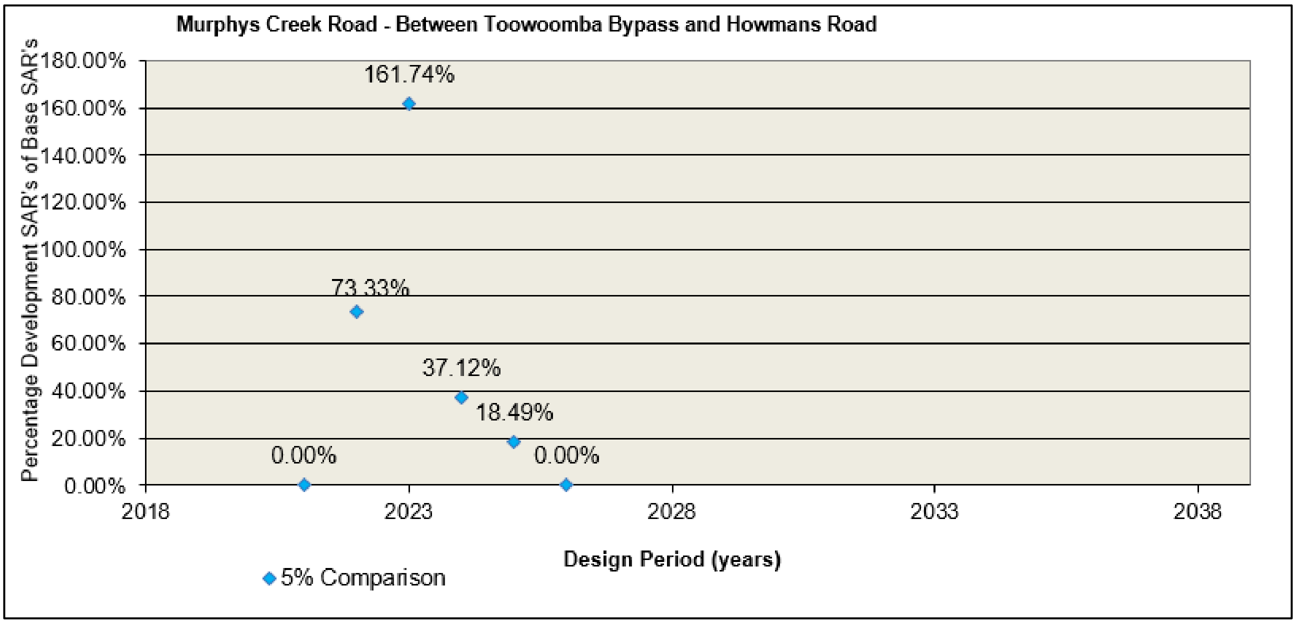
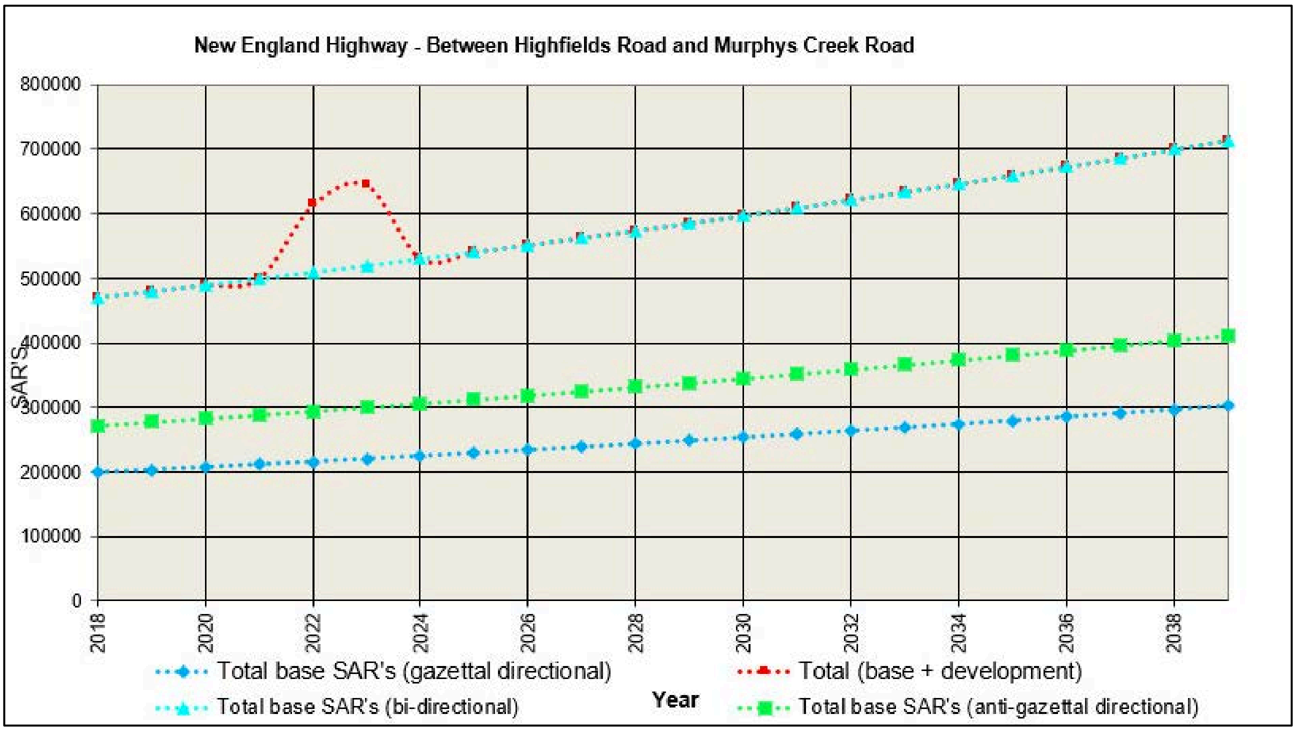


Figure 7.3 **Standard Axle Repetitions Results: Murphys Creek Road: Between Toowoomba Bypass and Howmans Road**



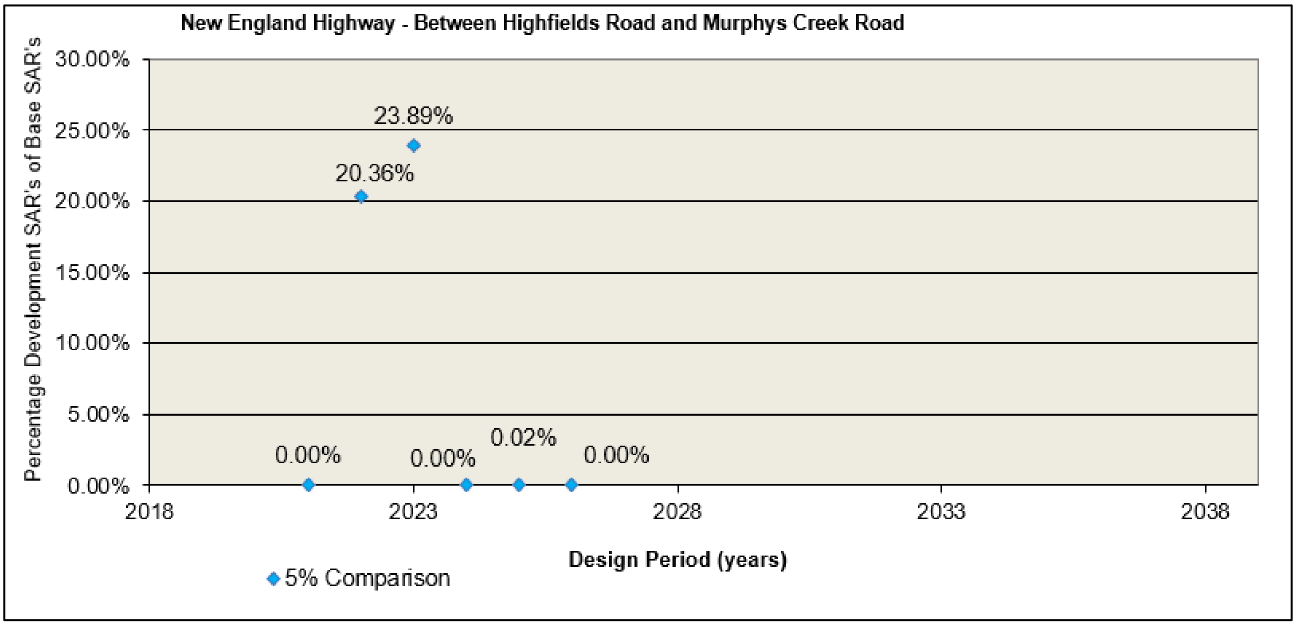
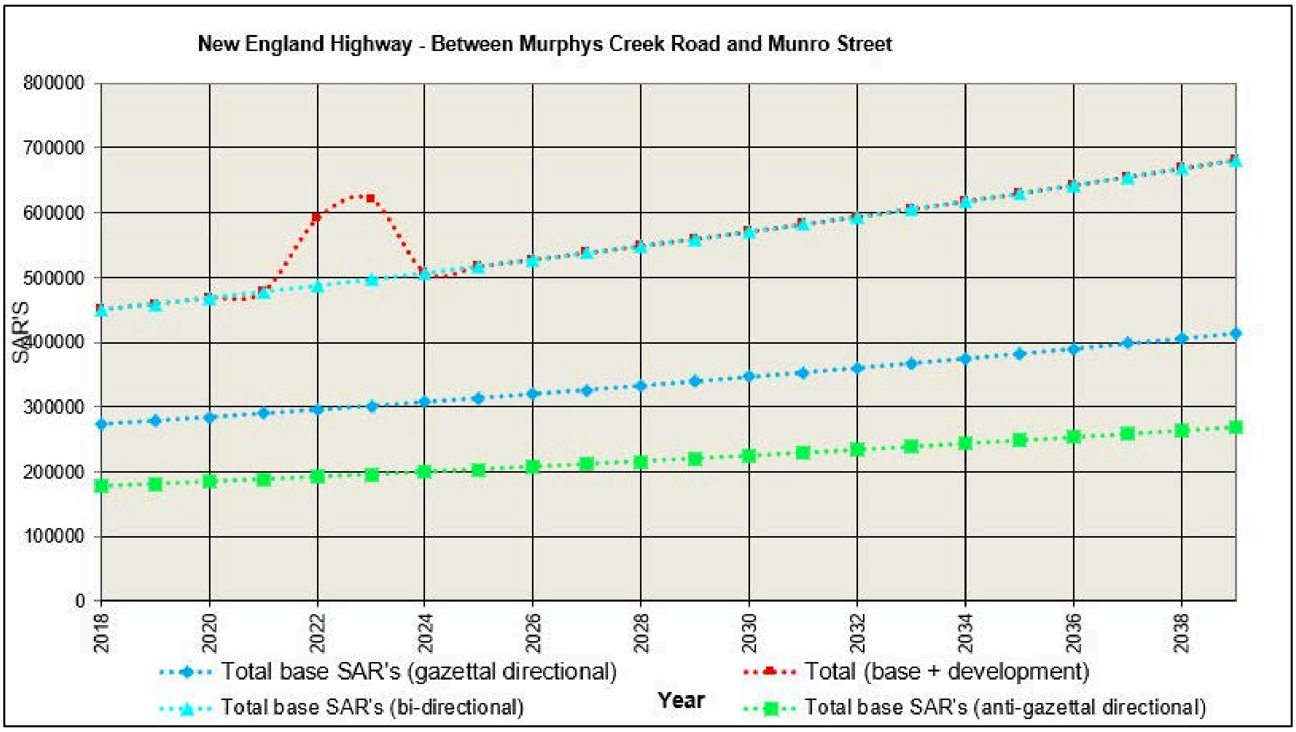


Figure 7.4 **Standard Axle Repetitions Results: New England Highway: Between Highfields Road and Murphys Creek Road**



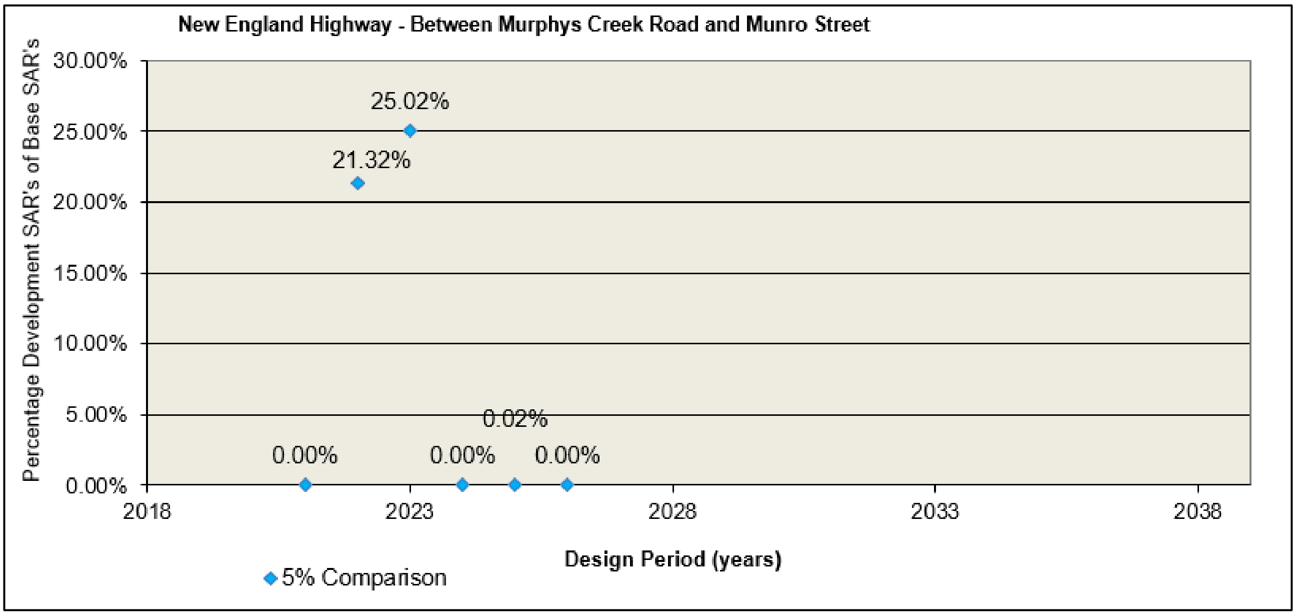
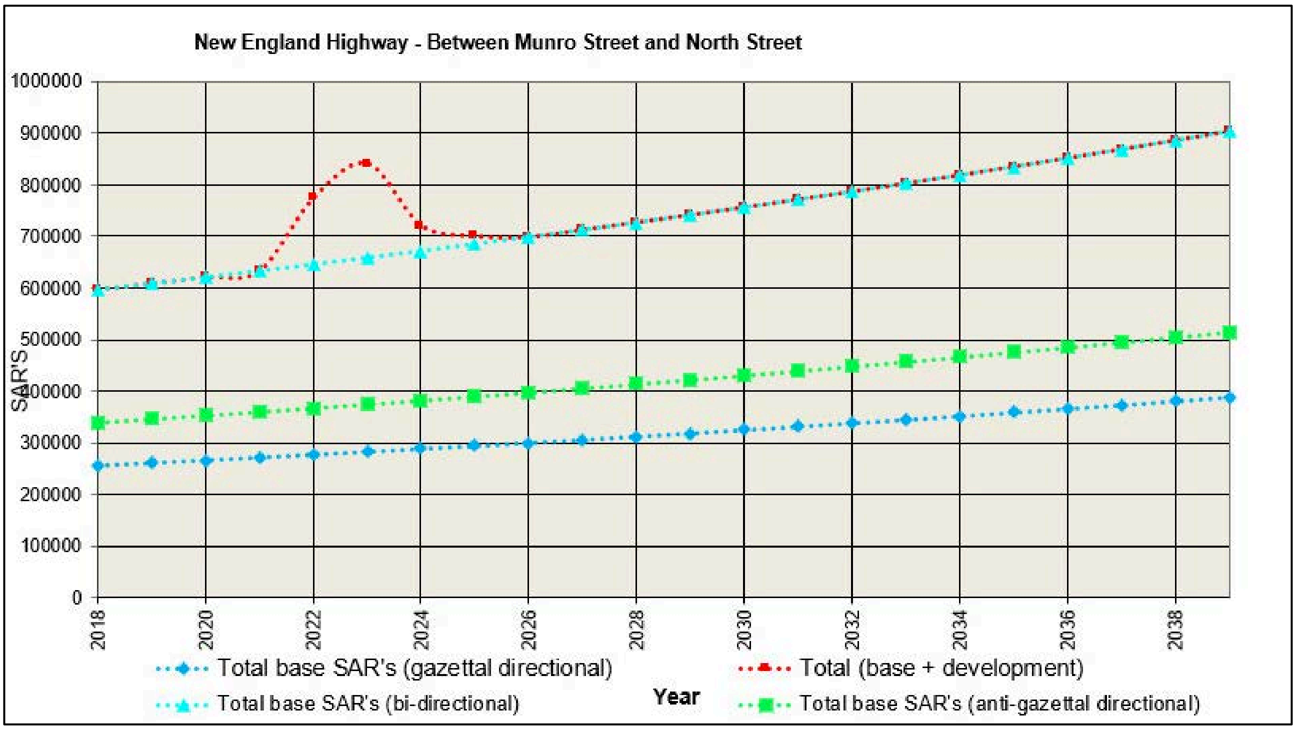


Figure 7.5 **Standard Axle Repetitions Results: New England Highway: Between Murphys Creek Road and Munro Street**



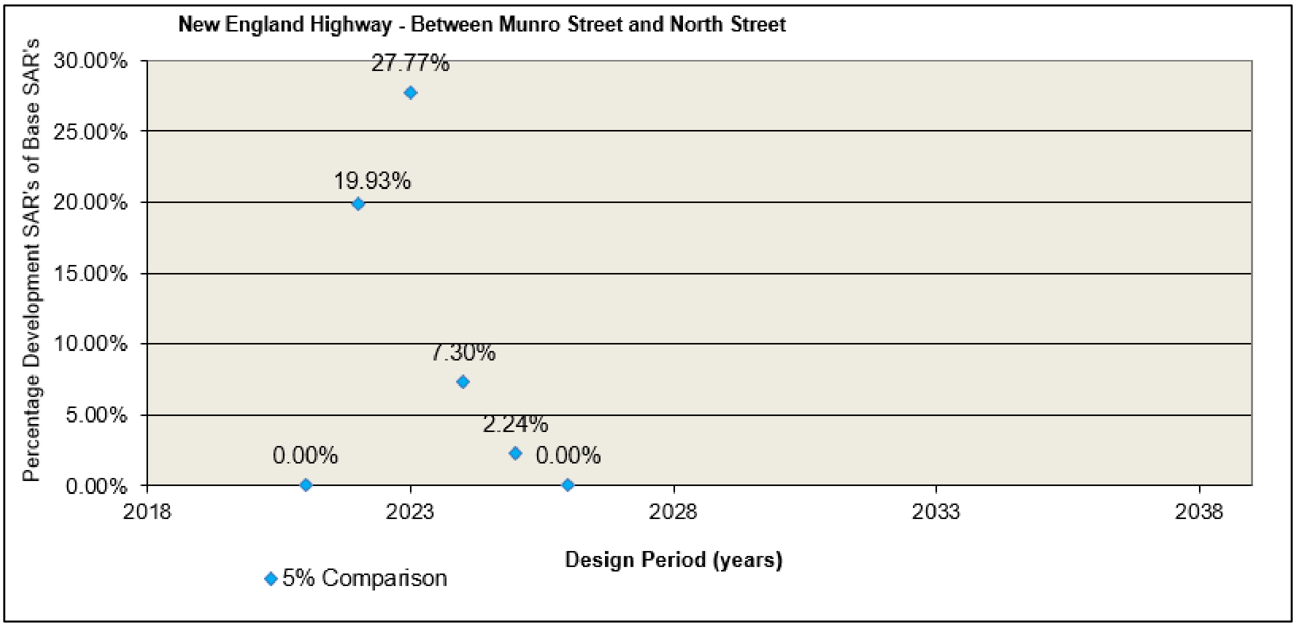
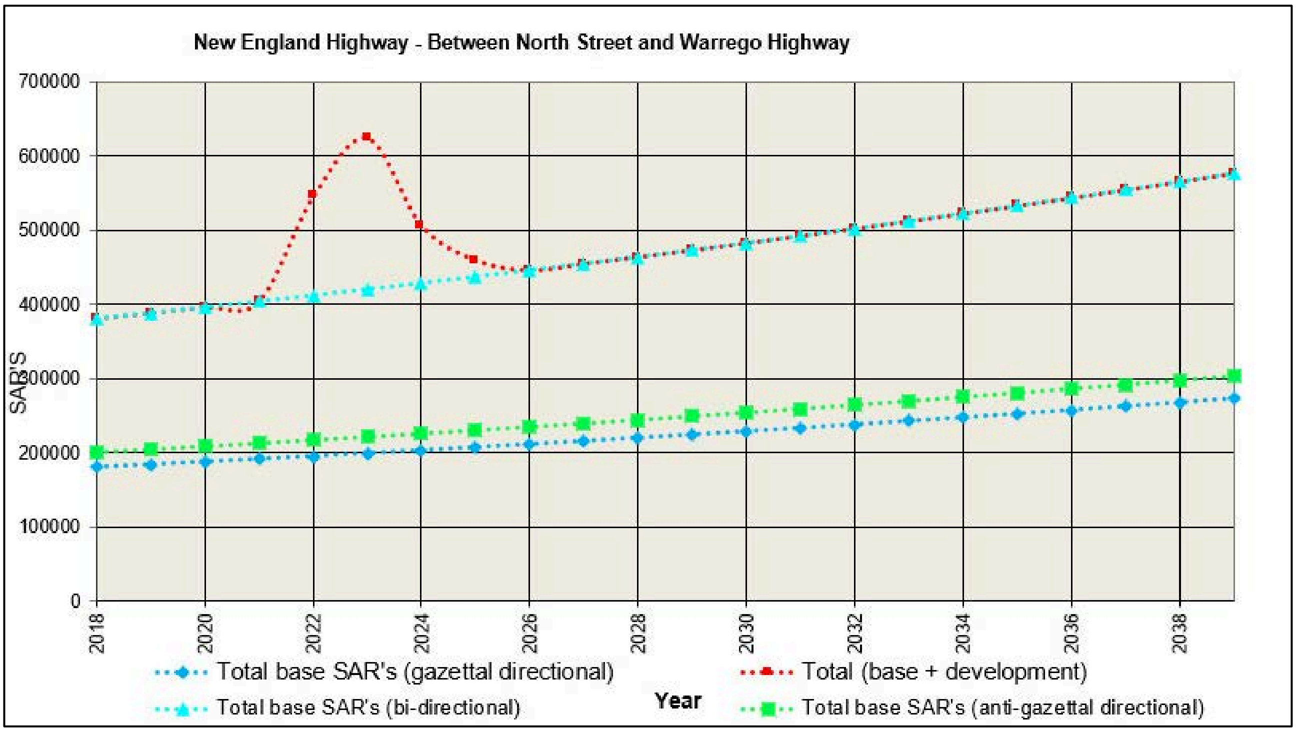


Figure 7.6 **Standard Axle Repetitions Results: New England Highway: Between Munro Street and North Street**



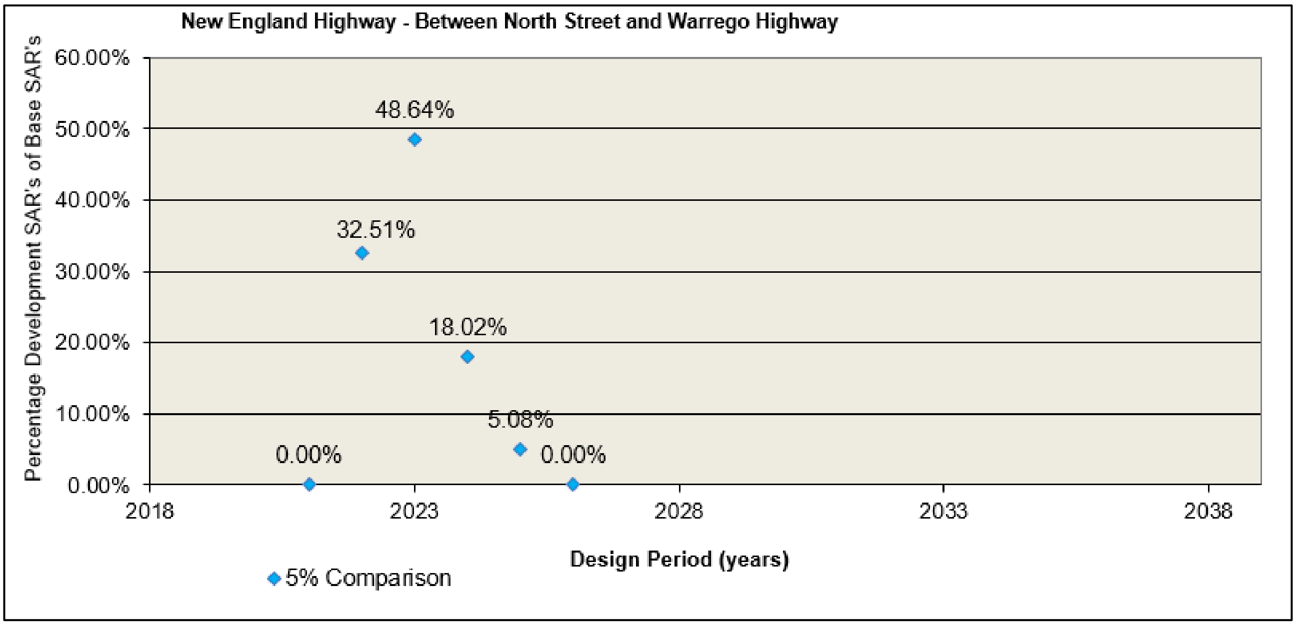
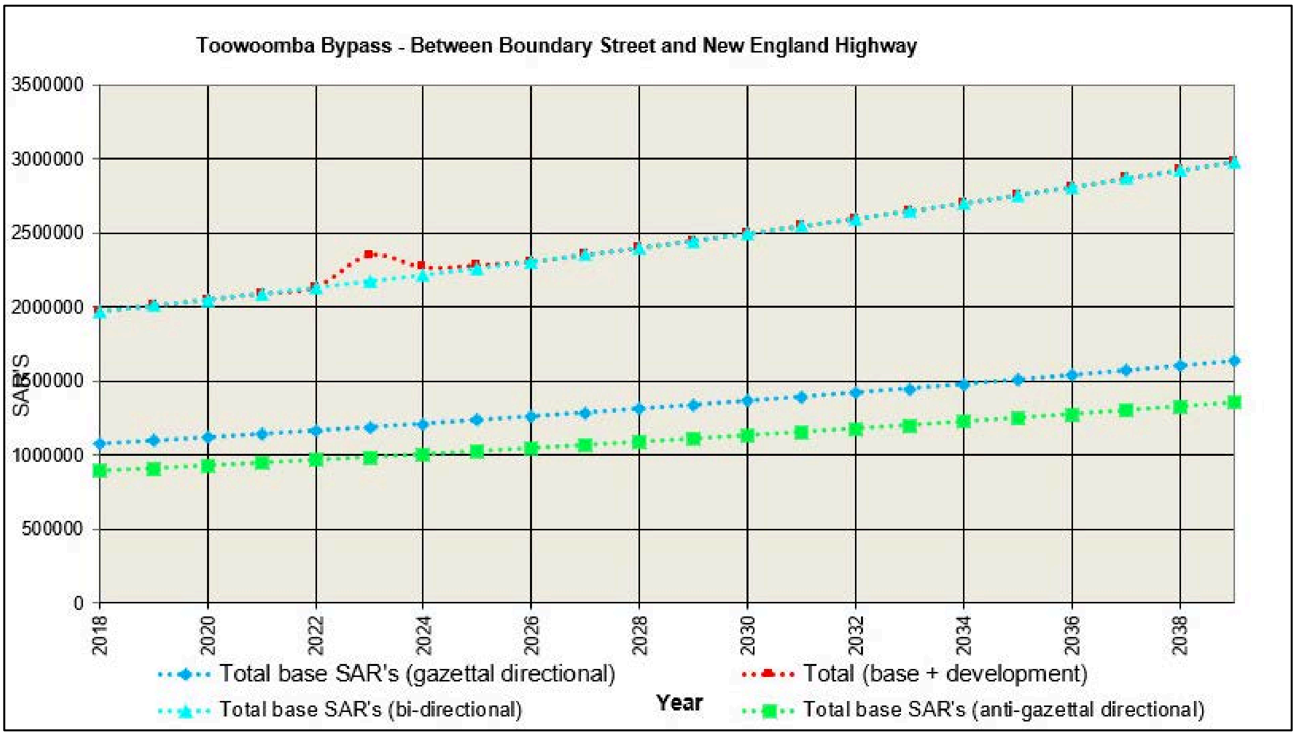


Figure 7.7 **Standard Axle Repetitions Results: New England Highway: Between North Street and Warrego Highway**



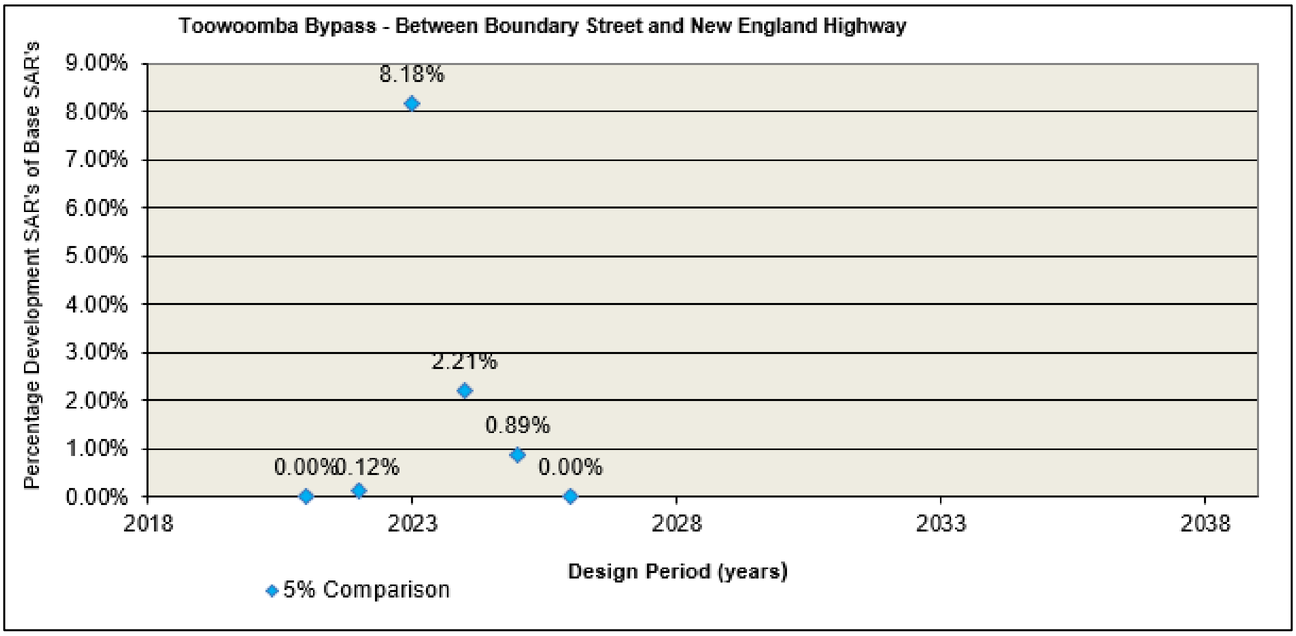
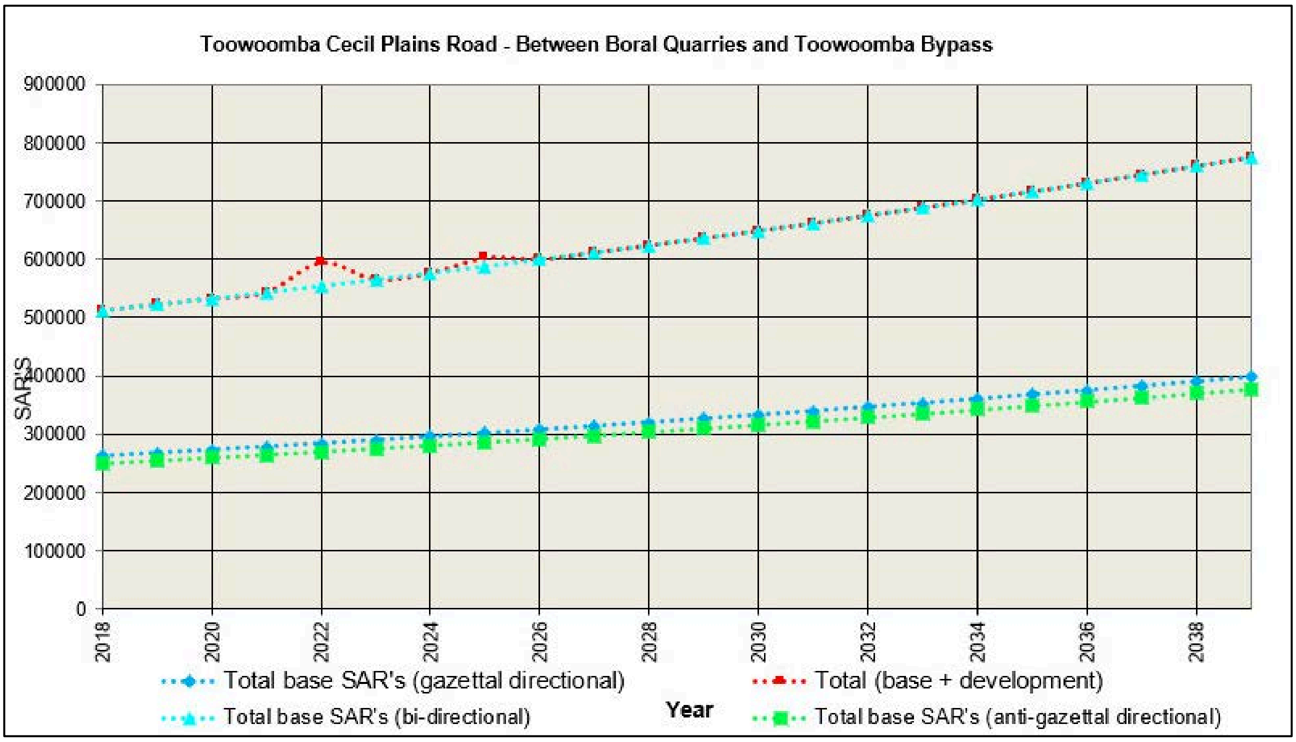


Figure 7.8 **Standard Axle Repetitions Results: Toowoomba Bypass: Between Boundary Street and New England Highway**



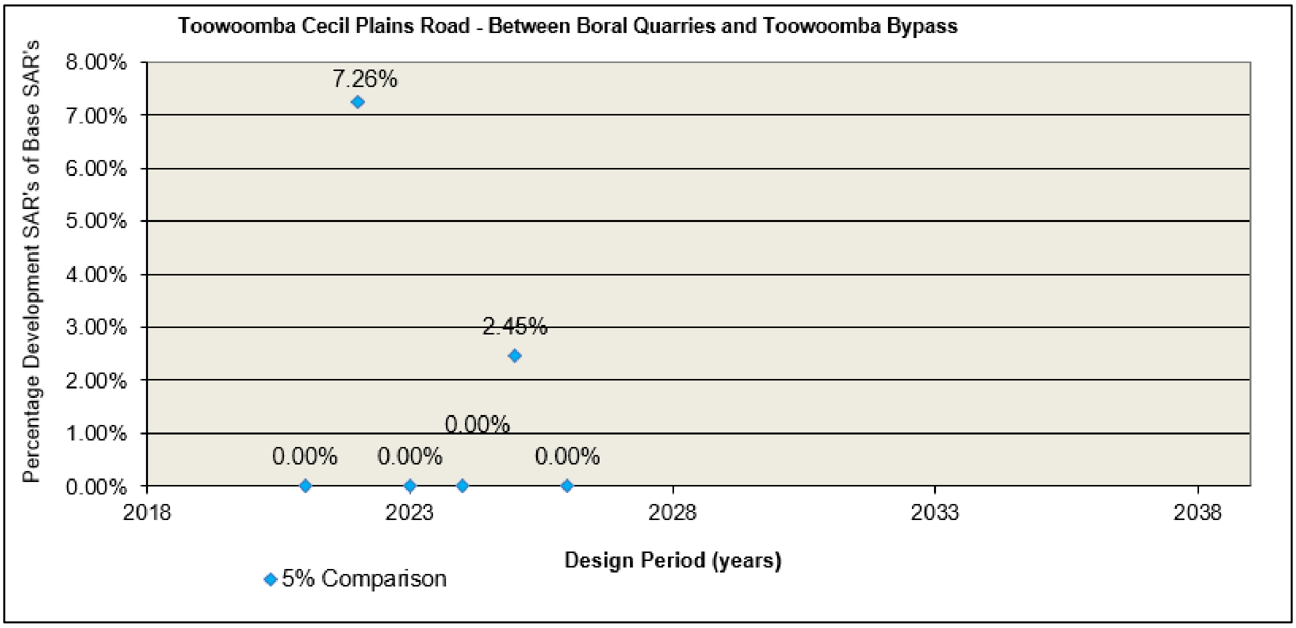
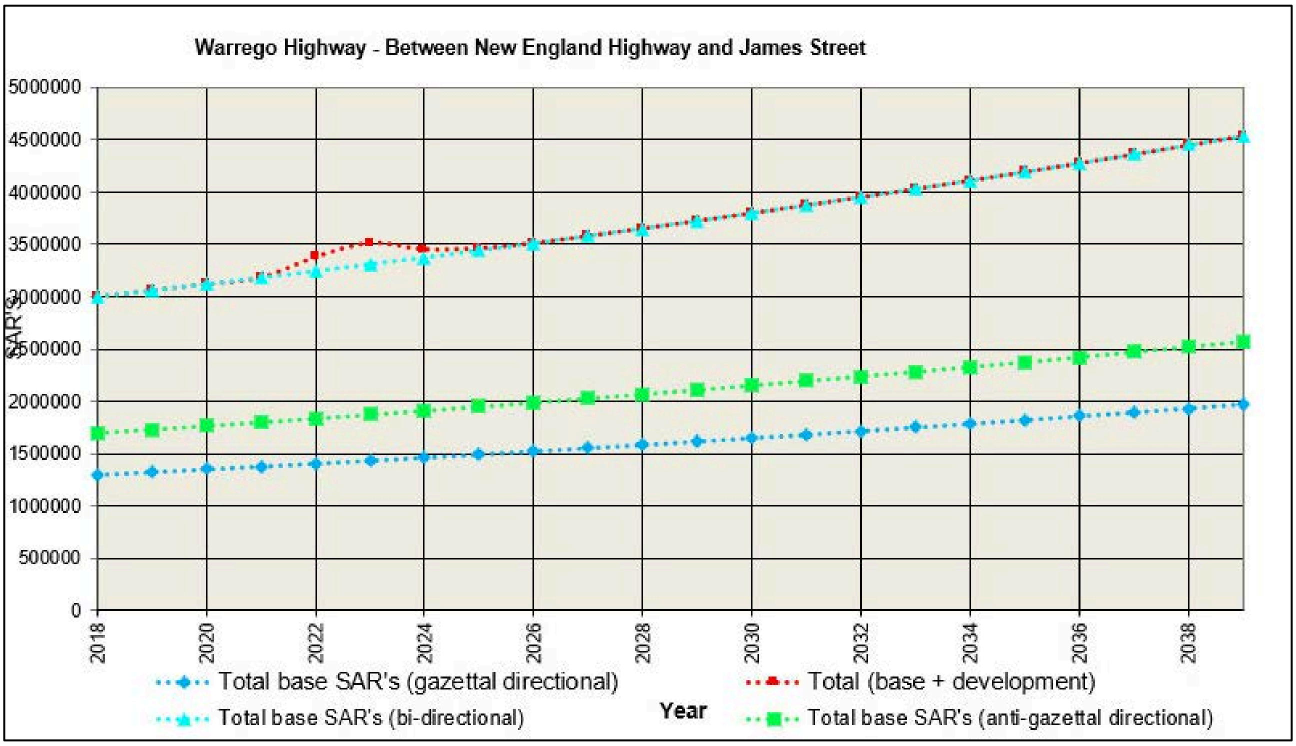


Figure 7.9 **Standard Axle Repetitions Results: Toowoomba Cecil Plains Road: Between Boral Quarries and Toowoomba Bypass**



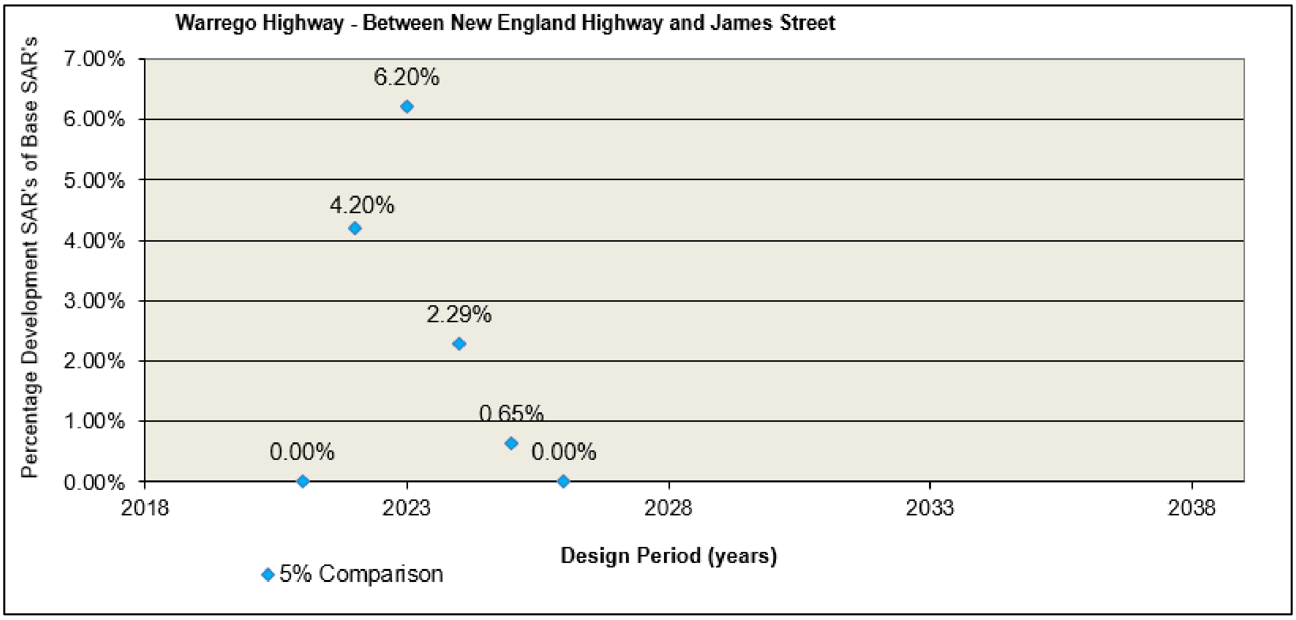
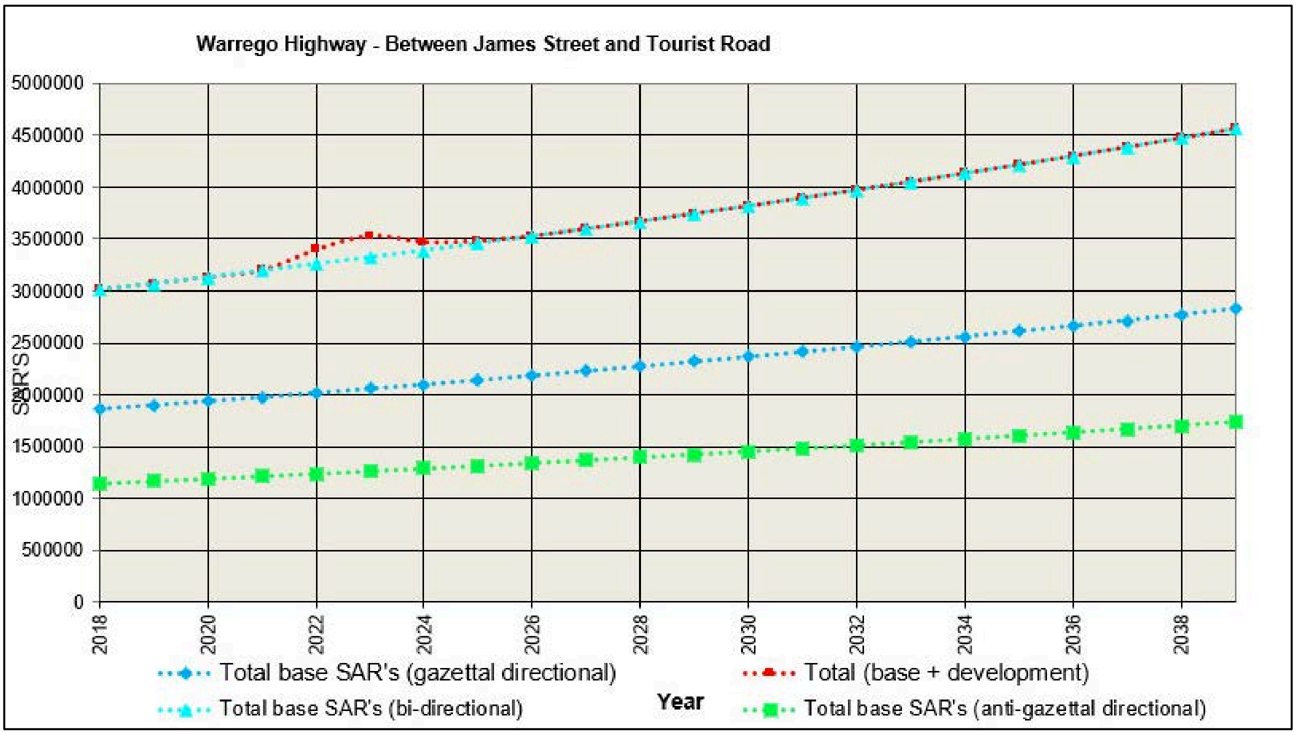


Figure 7.10 **Standard Axle Repetitions Results: Warrego Highway: Between New England Highway and James Street**



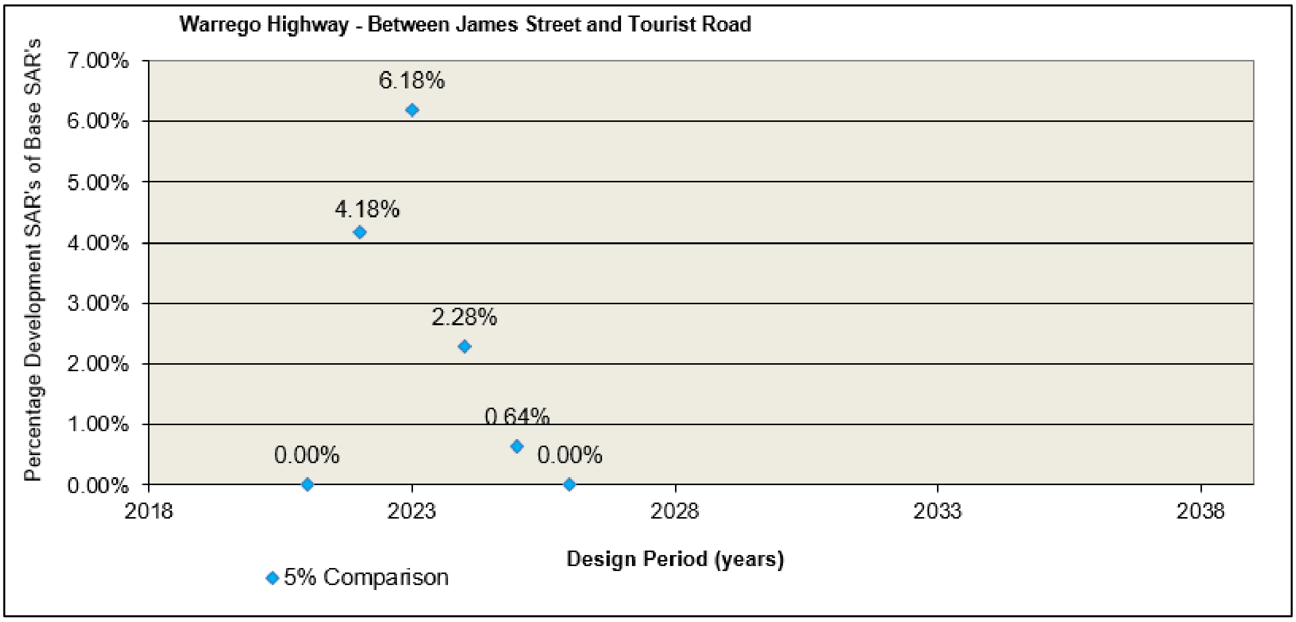


Figure 7.11 Standard Axle Repetitions Results: Warrego Highway: Between James Street and Tourist Road

8 Safety assessment

8.1 Methodology

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

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

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

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

8.2 Existing safety issues

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

8.3 Risk assessment

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

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

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

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

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

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

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

Table 8.2 Risk likelihood description

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

Table 8.3 Risk rating

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

8.3.1 Risk assessment results

8.3.1.1 Construction traffic

The resulting identified risks for the 'with' and 'without Project' scenarios associated with construction traffic have been provided in Table 8.4. The consequence for the 'without Project' scenario has been based on the highest reported crash severity for each construction traffic route, and the likelihood has been based on the frequency at which this crash severity occurred over the relevant five-year period.

The consequence in the 'with Project' scenario has been taken to be the same as in the 'without Project', and the likelihood of occurrence has been determined based on the likely changes to road safety as a result of construction related traffic. The likelihood of an event occurring has been increased to 'Possible' in the 'with Project' scenario in order to provide a conservative assessment and ensure mitigation measures are implemented effectively. Because of this, several road sections have been assigned a risk rating of 'High' in the 'with Project' scenario. This change in risk rating is regarded as conservative, as mitigation is therefore required for the road section.

Table 8.4 identifies the following construction traffic routes which may require safety mitigation measures:

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

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

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

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
LGR: TRC							
Boundary Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Cooby Dam Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Gowrie Junction Road	Major	Unlikely	Medium	Major	Possible	Medium	
Griffiths Street	Major	Possible	Medium	Major	Possible	Medium	
Hermitage Road	Major	Unlikely	Medium	Major	Possible	Medium	
Highfields Road	Major	Possible	Medium	Major	Possible	Medium	
Klein Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Kleinton School Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Krienke Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Larcombe Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Main Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
McDougall Street	Major	Unlikely	Medium	Major	Possible	Medium	
Meringandan Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Meringandan Shirley Road	Major	Unlikely	Medium	Major	Possible	Medium	
Morris Road	Major	Unlikely	Medium	Major	Possible	Medium	
Mort Street	Major	Possible	Medium	Major	Possible	Medium	
Munro Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
North Street	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Old Goombungee Road	Moderate	Unlikely	Medium	Moderate	Possible	Medium	
Old Homebush Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Old Mort Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Omara Road	Major	Unlikely	Medium	Major	Possible	Medium	
Paulsens Road	Not Significant	Rare	Low	Not Significant	Possible	Low	

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
Pipe Street	Major	Unlikely	Medium	Major	Possible	Medium	
Pipeline Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Witmack Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
LGR: LVRC							
Airforce Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Arthur Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Ashlands Drive	Not Significant	Rare	Low	Not Significant	Possible	Low	
Bells Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Cattos Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
George Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Gittins Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Howmans Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Jones Road	Major	Unlikely	Medium	Major	Possible	Medium	
Laidley Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Lawlers Road	Major	Unlikely	Medium	Major	Possible	Medium	
Little Oaky Creek Road	Major	Unlikely	Medium	Major	Possible	Medium	
Mary McKillop Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
McNamaras Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Postmans Ridge Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Roches Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Seventeen Mile Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Station Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Turner Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Unnamed Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Wallens Road	Not Significant	Rare	Low	Not Significant	Possible	Low	

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
William Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
SCR: DTMR							
Cunningham Highway	Major	Possible	Medium	Major	Possible	Medium	
Gatton Helidon Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Ipswich Motorway	Major	Likely	High	Major	Likely	High	**Required**
Ipswich-Cunningham Highway Connection Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Logan Motorway	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Murphys Creek Road	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
New England Highway	Extreme	Unlikely	Medium	Extreme	Possible	High	**Required**
Pacific Motorway	Extreme	Possible	High	Extreme	Possible	High	**Required**
River Road	Major	Unlikely	Medium	Major	Possible	Medium	
Toowoomba Bypass (no data)	Not Significant	Rare	Low	Not Significant	Possible	Low	
Toowoomba Cecil Plains Road	Major	Unlikely	Medium	Major	Possible	Medium	
Toowoomba Connection Road	Extreme	Possible	High	Extreme	Possible	High	**Required**
Warrego Highway	Extreme	Possible	High	Extreme	Possible	High	**Required**
SCR: RMS							
Pacific Motorway	Extreme	Likely	High	Extreme	Likely	High	**Required**
Summerland Way	Major	Possible	Medium	Major	Possible	Medium	
LGR: CVC							
Bent Street	Major	Unlikely	Medium	Major	Possible	Medium	
Charles Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Clarence Street	Moderate	Possible	Medium	Moderate	Possible	Medium	
Clark Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Craig Street	Major	Unlikely	Medium	Major	Possible	Medium	
Dobie Street	Moderate	Possible	Medium	Moderate	Possible	Medium	

Road name	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
Fry Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
Mary Street	Moderate	Unlikely	Medium	Moderate	Possible	Medium	
Oliver Street	Major	Unlikely	Medium	Major	Possible	Medium	
Trenayr Road	Not Significant	Rare	Low	Not Significant	Possible	Low	
Villers Street	Not Significant	Rare	Low	Not Significant	Possible	Low	
LGR: ICC							
Fairbank Place	Not Significant	Rare	Low	Not Significant	Possible	Low	
Haigslea Malabar Road	Major	Unlikely	Medium	Major	Possible	Medium	
Mount Marrow Quarry Road	Major	Unlikely	Medium	Major	Possible	Medium	
Newhill Drive	Not Significant	Rare	Low	Not Significant	Possible	Low	
Noblevale Way	Not Significant	Rare	Low	Not Significant	Possible	Low	
Redbank Plains Road	Major	Unlikely	Medium	Major	Possible	Medium	
Rob Roy Way	Not Significant	Rare	Low	Not Significant	Possible	Low	

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

Road name	With Project			Proposed mitigation measures	With Project - Mitigation		
	Consequence	Likelihood	Risk rating		Consequence	Likelihood	Risk rating
LGR: TRC							
North Street	Extreme	Possible	High	*As per DTMR Roads, below*	Extreme	Unlikely	Medium
LGR: LVRC							
Postmans Ridge Road	Extreme	Possible	High	*As per DTMR Roads, below*	Extreme	Unlikely	Medium
SCR: DTMR							
Gatton Helidon Road	Extreme	Possible	High	Mitigation measures may include but are not limited to: ▪ Fatigue management measures should be introduced and enforced for all workers ▪ Pre and post construction inspections of routes to ensure suitability, including a road safety analysis ▪ ARTC contractor to identify any damage to road from construction traffic. Any damage or decreased asset life resulting from construction traffic to be addressed through consultation process with the road authority ▪ Heavy vehicles may be associated with the construction activities and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts ▪ Consideration should be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed ▪ Workers should be made aware of school bus routes as well as typical pick-up and drop-off times in the vicinity of the Project ▪ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits ▪ Road closures (if required) to be performed by police escorts (should it be required) with closure times limited to a maximum of 15 minutes ▪ All OSOM and RAV vehicles will comply with all relevant safety regulations and guidelines set out by DTMR and the NHVR.	Extreme	Unlikely	Medium
Ipswich Motorway	Major	Likely	High		Major	Possible	Medium
Ipswich-Cunningham Highway Connection Road	Extreme	Possible	High		Extreme	Unlikely	Medium
Logan Motorway	Extreme	Possible	High		Extreme	Unlikely	Medium
Murphys Creek Road	Extreme	Possible	High		Extreme	Unlikely	Medium
New England Highway	Extreme	Possible	High		Extreme	Unlikely	Medium
Pacific Motorway	Extreme	Possible	High		Extreme	Unlikely	Medium
Toowoomba Connection Road	Extreme	Possible	High		Extreme	Unlikely	Medium
Warrego Highway	Extreme	Possible	High		Extreme	Unlikely	Medium
SCR: RMS							
Pacific Arterial	Extreme	Likely	High	*As per DTMR Roads, above*	Extreme	Possible	High

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

8.3.1.2 Road rail interfaces

Identified safety risks for the 'with' and 'without Project' scenarios associated with the relevant road rail interface locations have been provided in Table 8.6. The only safety issue applicable to the Project is related to the existing road rail interface, 320-1-E-1 'Paulsens Road', as indicated in Table 8.6. As detailed in Section 3.3.1.2 the Project is closing this crossing and replacing it with a grade separated crossing. The 'with Project' scenario for this interface is not applicable, as the proposed grade separation treatment removes all associated safety issues.

As indicated in Section 3.2, all road rail interface locations along the Project alignment are being closed, relocated or grade separated effectively removing potential road rail safety interactions. As a result, the road rail interfaces have not been further assessed and do not require any further specific mitigation measures.

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

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

Road Rail Interface ID	Without Project			With Project			Mitigation required?
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating	
TRC							
320-1-E-1	Moderate	Unlikely	Medium	*There is no risk 'with Project' as the proposed treatment is to close the interface, removing all safety risk.*			No

Despite this, there are safety mitigation measures that are relevant for all road rail interface locations throughout the Project, regardless of the interface assessment. This includes:

- Grade separated road rail interfaces with warning signage, line marking, and other relevant controls; in accordance with the relevant national and ARTC standards
- Similarly, designed in order to provide for safe design standards for sight distances, lane marking, and signage prevail for a design vehicle consisting of a low loader
- Threshold and ALCAM assessment to be undertaken to determine the appropriate protection type for the proposed crossing (if required). Additionally, these assessments would be undertaken again during detailed design, including all ALCAM considerations, where applicable, as agreed upon between ARTC, the construction contractor, QR and the relevant LGA.
- Road safety audits by a third party at the request of ARTC will be undertaken at the road rail interfaces during design, pre and post opening in accordance with the Austroads guidelines. Road rail interfaces will be reviewed to confirm:
  - That the level of protection continues to be appropriate
  - That the infrastructure is appropriate for the traffic conditions
  - That the interface is designed to provide suitable stacking and sight distance.

9 Mitigation and management

9.1 Design considerations

Design development of the Project has progressed in parallel with the impact assessment process. As a consequence, design solutions for avoiding, minimising or mitigating impacts have been incorporated into the Project as appropriate and where possible.

Mitigation measures that have been factored into the Project design are summarised in Table 9.1.

Table 9.1 Initial mitigation measures of relevance to traffic

Aspect	Initial mitigation measures
Traffic	▪ The Project has been co-located with existing rail and road infrastructure where possible, minimising the need to develop land that has not previously been subject to disturbance for transport infrastructure purposes. ▪ The Project has been generally aligned with the Gowrie to Grandchester future State transport corridor, a future railway corridor under TP&C Act and the SPP ▪ The Project has been designed to minimise the potential for alterations to the public road network or create a permanent change to existing traffic patterns and distributions. ▪ The horizontal and vertical alignment has been established to optimise the earthworks required and achieve as close to a net-balance as is possible. By minimising the material deficit for construction of the Project, the volume of material required to be imported has been reduced. Less imported material equates to fewer construction phase truck movements and less vehicular emissions. ▪ The design does not impinge on Airforce Road, with a retaining wall to be constructed at this location between the Projects' main lines and the road for safety. ▪ The Project construction routes are aligned with the corridor. Where practical, traffic will be constrained to constructed access tracks/construction footprint, which has been identified to provide the shortest journey time between origin and destination, thereby restricting fuel consumption and vehicular emissions. These routes have been assessed as part of the traffic impact assessment. The construction footprint for the Project has been defined to provide sufficient space for the Project, including road modifications, to be safely and efficiently constructed, with a need for temporary side-tracks to be provided. ▪ The laydown areas include parking facilities, with the design also including parking facilities with sufficient capacity to meet the requirements requested by the Queensland Fire and Emergency Service.
Rail incidents as a result of development of the Project	▪ The Project alignment has been designed to minimise the likelihood of rail incidents for the types of trains projected to use the Inland Rail network. This has been achieved by adhering to the minimum design requirements of the Basis of Design (refer Chapter 5: Project description), which are: – Design speed of 115 km/h – Maximum grade of 1:50 – Minimum curve radius of 800 m, with 1,200 m target – Initial train lengths of 1,800 m, with potential to increase up to 3,600 m ▪ The design includes mixed gauge turnouts at locations where the Project interfaces with existing rail networks or infrastructure, to enable QR rollingstock to join and exit the Inland Rail network.
Road rail interfaces	▪ The western tunnel portal and supporting infrastructure layout design has ensured sufficient spacing for the future construction of the Boundary Street off and on ramps. This was done in consultation with DTMR and TRC and was checked against concept plans provided by DTMR. Grade separated crossings of existing roads have been adopted instead of level crossings (all locations for the Project). ▪ No level crossings are proposed in the design, with the Project also eliminating an existing level crossing at Gowrie. This will effectively remove any issues safety and short stacking issues ▪ The reference design for the Project has been developed to remove any short stacking issues from the Project alignment through the diversion of the Project alignment or adjacent roads to accommodate the required design vehicle.

Aspect	Initial mitigation measures
	▪ The design for the Project has, in all instances, maintained access for private properties. This has been provided through either: – The provision of a crossing point of the Project alignment in the location of the existing private access; or – The provision of an alternative means of accessing a dwelling or place of work from the public road network
Bridges	▪ Maintenance access to the deck level of all new bridge structures has been incorporated into the design ▪ Bridge clearances have been established in consultation with the owners of existing assets over which the bridge structures span, i.e. DTMR, local governments and private landholders ▪ Public pedestrian access is provided on the Gowrie Junction Road grade separated road-over-rail bridge (320-1-P-0a).
Airport operation and infrastructure	▪ The Project alignment is approximately 8.6 km from the northern end of the runway for the Toowoomba Wellcamp Airport. The Project has been positioned to ensure that double-stacked freight trains will not extend vertically into the obstacle limitation surface for this airport.
Access	▪ ARTC have consulted with TRC, LVRC and QLD Fire and Emergency Services (QFES)the through the impact assessment and design development process, and considered potential impacts to other stakeholders (e.g. public utility providers and Bicentennial National Tail Ltd) and local residents. As a result, the design for the Project has, in all instances, maintained connectivity across the Project footprint for public roads. The design also provides maintained access to private and State land. This has been provided through either: – The provision of a crossing point of the Project alignment in the location of the existing access; or – The provision of continued means of access, via an alternative location, with interconnectivity provided.
Rail/rail interfaces	▪ The inclusion of the Toowoomba Range tunnel in the Project eliminates all interfaces between the proposed rail and the existing rail line at Cranley (Western Line) and Ballard (Main Line). ▪ A rail over rail grade separation is proposed over the Main Line at Lockyer Creek, Helidon ▪ Sufficient spacing has been provided between the QR railway track and the ARTC track to ensure maintenance activities can be undertaken during construction and operation ▪ The Project allows for the relocation and reinstatement of RMARs (and other rail infrastructure) associated with the QR network

9.2 Proposed mitigation measures

9.2.1 Preliminary road use management during construction

9.2.1.1 Preliminary road use management plan

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

The purpose of this TIA is to support the delivery and assessment of the Project. The construction routes assumed as a part of this assessment are routes which the construction contractor may use. However, the determination of the final construction and heavy vehicle routes will be confirmed during detailed design in consultation DTMR, the relevant local government authority and the construction contractor.

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

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

The RUMP will be developed in consultation with DTMR, emergency services including QLD Police Service, the relevant LGA and, where relevant, QR.

9.2.1.2 Construction Environmental Management Plan and Traffic Management Plan

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

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

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

The TMP will detail measures to:

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

The TMP will take into consideration:

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

The TMP will detail the most effective methods for truck vehicle movements to and from the site to ensure efficiency, safety and limited disruption to all road users. It will be prepared prior to construction in accordance with the latest edition of the *Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads* (DTMR 2019b) and *Technical Standard MRTS02 - Provision for traffic* (DTMR 2019c) prior to the commencement of construction

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

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

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

Temporary road works, including diversion and signage, will be in accordance with relevant council standards, *Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads* (DTMR 2019b) and the *Traffic and Road Use Management Manual: Volume 7 Road Works* (DTMR 2012).

9.2.2 Road link mitigation measures

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

Out of these roads, only one section was determined to exhibit a decrease in the LOS experienced by road users. This road section is currently administered by LVRC.

The road details are outlined in Table 9.2, along with the potential mitigation measures and their outcomes detailed in Table 9.3. Although this is the only road currently identified as decreasing LOS, other roads may be identified upon determination of the final construction and heavy vehicle routes.

Table 9.2 Road sections with change in LOS

Road name	Road section	Change of LOS
LVRC		
Turner Street	Between Warrego Highway and Mary McKillop Street	LOS A to LOS B

The mitigation measures outlined in Table 9.3 are applicable to SCR and LGR are impacted by Project construction traffic, irrespective of whether they have demonstrated a decrease in the LOS.

Table 9.3 Road link mitigation measures

Phase	Mitigation	Mitigation outcome
Construction	Travel demand management (TDM) campaign to inform the public on works and its effect on network operations	Relieve congestion by encouraging travel outside of peaks or mode shift by the public, and increase awareness of construction works
	TMP developed by the proponent in consultation with DTMR, relevant council, an accredited road safety auditor and, where relevant, QR. This plan will identify the impacts that construction traffic is likely to have on the transport infrastructure and detail ameliorative measures required to mitigate all identified impacts of the Project. The TMP will include condition assessment of the road pavement for all construction traffic routes. This will be required to occur before the commencement of any operations and ongoing throughout construction at intervals developed in consultation with the contractor and the asset owner. The contractor will be responsible for all works required to mitigate the impacts of construction traffic. The plans will take into account: ▪ Final construction routes ▪ Approaches to seasonality and stock routes, ▪ Areas of significant pedestrian and cyclist activity ▪ Standard hours of work and deliveries, ▪ Specific hours of deliveries impacted by local land uses (e.g. school zones) ▪ Bus service operators (e.g. public transport, school buses, long distance services) ▪ Emergency services ▪ Staff transport ▪ Staff parking, with the provision of on-site tool storage where practicable.	Limit impact to the public and asset owners by managing construction movements and deliveries during peak hours, and minimising construction staff traffic by the use of shuttles and public transport
	Ongoing consultation with relevant councils, RMS, DTMR, emergency services, QR and affected landholders and where applicable the wider community in the next phases of the Project to inform of the Project's status and likely disruptions. Consultation with QR will be required prior to use of existing level crossings. During construction, mitigations for existing level crossings along the construction routes may be required depending on the specific activity and the locations. The construction contractor will be required to consult QR to determine appropriate controls at existing level crossings.	Minimise traffic and transport impacts during construction
	Directional signage and line marking around construction sites and the surrounding network, including using Variable Message Signs (VMS) if appropriate	Direct and guide drivers and pedestrians past construction sites, and advice of potential delays, traffic diversions, speed restrictions or alternate routes.

Phase	Mitigation	Mitigation outcome
	Specific TMP for special events developed in conjunction with the relevant stakeholders	Bespoke plans to provide safe and efficient pedestrian, cycle, public transport and traffic flows during occasional events to minimise disruption to the community throughout construction.
	Relevant emergency services should be notified in advance and any required approvals sought prior to the movement of all hazardous/dangerous or oversize construction material and equipment.	Discussions will identify any pre-identified emergency response routes which may be impacted by the transport corridors as well as possible solutions to minimise any potential impacts.
	Physical upgrade works at critical intersections or links where mitigation measures cannot be managed by traffic or construction management.	Additional capacity and resilience within the network to minimise network impacts.
	Secondary alternative construction route activities should be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency/accident.	Secondary construction routes will facilitate the continued construction activities and thus managing costs and schedule.
Operational	Develop a protocol between ARTC and emergency service providers, defining appropriate and co-ordinated responses and communication in the event of emergencies during operations, (e.g. access to real time information about crossing times and access to alternate crossing points)	Protocol will minimise any impact to emergency services due to potential changes to the road network and Project operation.

9.2.2.1 Traffic management strategies on links

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

- TDM campaign to inform the public on works and its effect on network operations
- TMP to be prepared and in consultation with the construction contractor, DTMR, relevant council and an accredited road safety auditor. TMP would address managing hours of work and deliveries, staff transport and staff parking, with the provision of on-site tool storage where practicable.
- Ongoing consultation with relevant local government councils, state authorities, police, emergency services and affected property owners/occupiers
- Directional signage and line marking around construction sites and the surrounding network, including using Variable Message Signs (VMS)
- All OSOM and RAV vehicles will comply with relevant guidelines as set out by DTMR and the NHVR in terms of transport safety
- Specific TMP for special events developed in conjunction with the relevant stakeholders
- Relevant emergency services will be notified in advance prior to before the movement of all hazardous/dangerous or oversize construction material and equipment
- Secondary alternative construction route activities will be determined as part of the TMP, in the event of the primary route is blocked off by an emergency.
- Logistic pinch points will be investigated further into the next phase, particularly mass haul routes on Gittins Road, as discussed in Section 5.8.1.

9.2.3 Intersection mitigation measures

As outlined in Section 6.3, due to the construction duration of activities and associated low to moderate increase in traffic, intersection upgrades may be required in order to accommodate the vehicles during the construction period. Road-use management strategies outlined within the RUMP may be deemed sufficient to manage intersection impacts, including the use of variable message signs, travel demand management and avoiding peak hour periods (especially near schools our during key harvest periods). However, these measures are to be confirmed through discussions with asset owners once an updated TIA is prepared following the confirmation of final construction routes.

There are a number of existing level crossings owned and operated by QR at a number of the intersections with turn movements from construction traffic. In order to mitigate any scheduling and safety issues with these existing level crossings, consultation with QR will be required during the construction planning process (detailed design phase).

The following sections outline the intersections which may potentially experience operational impacts during the construction period and will need to be considered within the TMP for mitigation. In addition to the intersections outlined in the following sections, all intersections highlighted within Table 6.9 will be considered in the development of the TMP as well as those identified in future variations to these routes.

9.2.3.1 Toowoomba Regional Council

Intersections within TRC LGA where potential temporary turning treatments are required include:

- Gowrie Junction Road/Krienke Road
- Meringandan Road/Highfields Road
- Krienke Road/Morris Road
- Meringandan Road/Kleinton School Road
- Mort Street/Old Mort Street.

Given the typical peak construction duration at any laydown area of generally less than a year and associated low to moderate increase in traffic, discussions will be held with DTMR and TRC during the Project design phase to determine the requirement and permanence of any potential upgrades, or whether these can be managed through the use of road-use management strategies. Intersection traffic mitigation measures would be prepared within the TMP, highlighting the necessary intersection geometry, capacity and safety improvements.

The accredited road safety auditor present during the visual inspections of the construction routes will highlight whether safety issues may arise through the movement of construction vehicles through these intersections. Road safety measures will take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

All intersections highlighted within Table 6.9 will be considered in the development of the TMP as well as those identified in future variations to these routes.

9.2.3.2 Lockyer Valley Regional Council

Intersections within Lockyer Valley LGA where potential temporary turning treatments are required include:

- Arthur Street/Mary McKillop Street
- George Street/Arthur Street
- Jones Road/Little Oaky Creek Road
- Murphys Creek Road/Murphys Creek Road
- Murphys Creek Road/Howmans Road

- Turner Street/Mary McKillop Street
- Roches Road/Toowoomba Connection Road intersection.

The Roches Road/Toowoomba Connection Road intersection currently operates with a left-in/left-out arrangement, with CHR facilities provided on Toowoomba Connection Road allowing for U-turn manoeuvres in both the eastbound and westbound directions, as shown in Figure 9.1. As a part of the primary construction routes proposed, construction vehicles transporting precast concrete are required to access laydown areas at the northern ends of Jones Road, McNamaras Road and Gittins Road. To facilitate access to these laydown areas, it has been assumed that construction vehicles will turn right into Roches Road from Toowoomba Connection Road. This has been assumed in order to minimise impact from construction vehicles on the residential areas along Jones Road (i.e. between Toowoomba Connection Road and Gittins Road).

It is proposed that right turn movements will utilise the existing CHR turn lane. However, swept path analysis should be undertaken by the construction contractor once the appropriate design vehicle has been chosen to determine any temporary changes to the existing layout which may be required to accommodate this movement, such as localised widening or removal of signage and lighting. Regardless, it is expected that traffic management will be required at this location when right turn movements are being undertaken into Roches Road to ensure safe movement.

Figure 9.1 Roches Road/Toowoomba Connection Road existing layout

Given the typical peak construction duration at any laydown area of generally less than a year and associated low to moderate increase in traffic, discussions will be required with DTMR and LVRC during the Project design phase to determine the requirement and permanence of any potential upgrades, or whether these can be managed through the use of road-use management strategies. Intersection traffic mitigation would be prepared within the TMP, highlighting the necessary intersection geometry, capacity and safety improvements.

The accredited road safety auditor present during the visual inspections of the construction routes will highlight whether safety issues may arise through the movement of construction vehicles through these intersections. Road safety measures should take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.

All intersections highlighted within Table 6.9 will be considered.

9.2.3.3 Traffic management strategies at intersections

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

- Traffic Management Plans prepared prior to construction in accordance with the current edition of the *Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads* (DTMR 2019b) and *Technical Standard MRTS02 - Provision for traffic prior to the commencement of construction* (DTMR 2019c). Road safety measures will take into consideration speed restrictions, driver fatigue, in-vehicle communications, signage, demarcations, maintenance, safety checks, and interaction with public transport, transport of hazardous and dangerous goods and emergency response and disaster management.
- Temporary road works, including diversion and signage, in accordance with the *Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads* (DTMR 2019b) and the *Traffic and Road Use Management Manual: Volume 7 Road Works* (DTMR 2012)
- Fatigue management measures introduced and enforced for all workers
- Any required works to be identified in ongoing RUMPs prepared to support the Project
- All OSOM and RAV vehicles will comply with relevant guidelines as set out by DTMR and the NHVR with regard to transport safety.

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

9.2.4 Road safety mitigation measures

Relevant mitigation measures based on the safety analyses findings are provided within this section. The following mitigation measures are proposed, which align with the wider document:

- Fatigue management measures will be introduced and enforced for all workers
- Any required works to be identified in ongoing RUMP prepared to support the Project
- TMP to address the possibility of physical works required at critical intersections, high pedestrian activity zones and around high impact construction zones
- Heavy vehicles may be associated with the construction activities and therefore use of school bus routes will be avoided if possible, or carefully managed to avoid conflicts
- Consideration will be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed
- Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits
- Consultation with all relevant stakeholders will be undertaken, including obtaining approvals where necessary
- Fencing will be provided along the rail corridor as required to ensure people and stock do not cross the Project alignment
- Access and egress locations will be required to be investigated once detail around the planned construction methodology is known which would occur the during detailed design phase. This will include:
  - Communicating these points to the relevant stakeholders, including all emergency service operators
  - Ensuring all points are designed in accordance with Australian Standards with adequate sight lines to ensure they operate in a safe and efficient manner
  - Where possible, access will be provided along the rail corridor from a nearby secondary road

- A RMAR is required to facilitate maintenance for critical infrastructure (e.g. turnouts), and to provide access for emergency recovery.

- In order to further mitigate impacts on the local road network and community measures including the consolidation of parking and use of buses to reduce construction traffic will be explored during detailed design in consultation with relevant local councils.

In addition to the above risk assumed, a safety assessment will be undertaken of the proposed design, including the proposed access locations, upgraded intersections, road rail interface locations, consistent with the GTIA. This may include road safety assessments and/or road safety audits.

9.2.5 Road rail interface mitigation measures

As there are no level crossings located along the Project alignment, relevant mitigation measures around level crossings have not been included in this report. With all road rail interfaces being grade separated, there are limited mitigation measures required as the highest level of safety has been implemented at all locations.

Consultation with the relevant road controlling authority and QR will be required during the detailed design phase and throughout construction as applicable to ensure that existing level crossings along the project construction routes are considered and mitigated appropriately.

9.2.5.1 Traffic management strategies at level crossings

As there are no public level crossings proposed in the Project, delays to road vehicles have been removed, and the safety risks associated with train/vehicle conflict have been avoided. Therefore, no specific traffic management strategies are required. The strategies outlined in Section 9.2.5 will be applicable to grade separated links, specifically QLCSS and the Toowoomba Strategy. In the event that level crossings are introduced into the Project during detailed design, the following mitigation measures will be applied:

- Any required works to be identified in ongoing RUMP prepared to support the Project
- If applicable, level crossings should be designed in order to provide for safe design standards where sufficient stacking and sight distances prevail
- During construction, options for impact mitigation will depend on the specific activity being undertaken, and the location where it is occurring. It will be up to the construction contractor to select and implement appropriate controls.

9.2.6 Pavement mitigation measures

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

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

Table 9.4 Pavement mitigation measures

Phase	Mitigation	Mitigation outcome
Construction	All vehicles, machinery and mobile construction equipment will be required to carry a clean-down record. Mobile weed clean-down facilities will be provided at construction areas accessed by public roads and of high-risk weed infestation depending on construction staging and methodology	Will prevent track-out and deterioration of the pavement surface
	A rock bed may be installed as appropriate at vehicle/equipment site exit points	
	Install shaker grids or rumble pads at site exit points from construction activities	Reduce the potential for soil spill onto transport corridors and the deterioration of the pavement surface
	SCR: Undertake a pavement impact assessment consistent with the process detailed in the GTIA and identify measures to avoid, reduce or mitigate effects on the pavement life of the SCR. Typical measures include: ▪ Provide a payment contribution for future pavement works (for marginal SAR impacts) ▪ Provide extra pavement width (for example, to prevent edge degradation) ▪ Provide additional pavement thickness ▪ Seal an unsealed pavement ▪ Provide maintenance during construction ▪ Undertake pavement rehabilitation. ▪ Pre and post construction rutting surveys	Mitigation measures identified and implemented to avoid, reduce or mitigate the effects of the construction traffic on the pavement life of the SCR and ensure no worsening to SCR pavements as a result of increased vehicle traffic from the Project. Based on the reference design, the SCR which will require this mitigation are: ▪ Murphys Creek Road – Between Warrego Highway and Brookside Place ▪ Murphys Creek Road – Between Brookside Place and Toowoomba Bypass ▪ Murphys Creek Road – Between Toowoomba Bypass and Howmans Road ▪ New England Highway – Between Highfields Road and Murphys Creek Road ▪ New England Highway – Between Murphys Creek Road and Munro Street ▪ New England Highway – Between Munro Street and North Street ▪ New England Highway – Between North Street and Warrego Highway ▪ Toowoomba Bypass – Between Boundary Street and New England Highway. ▪ Toowoomba Cecil Plains Road – Between Boral Quarries and Toowoomba Bypass ▪ Warrego Highway – Between New England Highway and James Street ▪ Warrego Highway – Between James Street and Tourist Road
	LGR - unsealed roads: Undertake visual pavement condition assessments (either manual or vehicle mounted high speed condition survey) prior to and post construction activities. The pavement assessment for unsealed LGR roads should be agreed with Council before construction commences.	A visual condition assessment is advised in order to mitigate for the construction related traffic impacts so that the impacted road is taken back to a similar condition to what it was in the pre-construction visual pavement condition assessment.

Phase	Mitigation	Mitigation outcome
	LGR - sealed and asphalt roads: Undertake a condition assessment (e.g. National Association of Australian State Road Authorities (NAASRA) roughness count) prior and post construction activities, as well as at ongoing intervals during construction. These intervals should be agreed with Council before construction commences.	The current condition of the pavements will be classified based on *Austroads Guide to Pavement Terminology 05-11 2019* Table 4.1. The degradation of the pavements based on NAASRA roughness count will be calculated, enabling the impact of construction traffic and the works required to restore the pavement to the pre-construction condition to be quantified. Where the level of roughness measured prior to construction exceeds the maximum desirable level for the class of road, the road has already exceeded its design life. In these cases, the intervention required will be agreed on a case by case basis with the road controlling authority.
	The use of a LGR and SCR owner approved maintenance contractor to maintain the envisaged impacted road for the duration of the construction period. This may entail works such as crack sealing, pothole patching, edge repairs, resealing and grading (of gravel roads) etc	To ensure that pavement deterioration as a result of construction related traffic is mitigated during and post construction.

9.2.6.1 Traffic management strategies for pavement impacts

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

- Undertake a pavement impact assessment consistent with the process detailed in the GTIA and identify measures to avoid, reduce or mitigate effects on the pavement life of the SCR. Typical measures include:
  - Provide a payment contribution for future pavement works (for marginal SAR impacts)
  - Provide extra pavement width (for example, to prevent edge degradation)
  - Provide additional pavement thickness
  - Seal an unsealed pavement
  - Provide maintenance during construction
  - Undertake pavement rehabilitation.
- Undertake a pavement condition assessment prior to and post construction activities as well as at ongoing intervals during construction (e.g. rutting surveys)
- All vehicles, machinery and mobile construction equipment will be required to carry a clean-down record. Mobile weed clean-down facilities will be provided at construction areas accessed by public roads and of high-risk weed infestation depending on construction staging and methodology
- Install shaker grids or rumble pads at site exit points from construction activities
- Provide a payment contribution for future pavement works (for marginal SAR impacts) – this process will be determined during detailed design, with the marginal cost calculated consistent with the December 2018 version of the GTIA (including Practice Note: Pavement Impact Assessment).

9.2.7 Additional considerations

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

No detailed assessment has currently been undertaken with regards to load limited bridges and should heavy vehicles be required to use them; an assessment will need to be undertaken and further investigation and inspections will need to take place – the outcomes of which may lead to upgrading these bridges for construction and operational purposes. It must be noted that there are several other bridges that may require load limiting but have not been assessed and may need to be if heavy vehicles are to use them.

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

10 Risk assessment summary

This section provides a brief summary of the potential traffic impacts associated with the construction phase of the Project which has been identified in Section 6.2 as the key traffic generator. An assessment of the risk associated with the impacts identified was also undertaken in Section 8.3. The risk assessment has considered the following:

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

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

Table 10.1 Probability analysis

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

Source: GTIA Sept 2017

Table 10.2 Consequence analysis

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

Source: GTIA Sept 2017

Table 10.3 summarises the Risk Matrix used to identify the risks associated with the traffic impacts related to the Project.

Table 10.3 Risk matrix

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

Table 10.4 summarises the key traffic impacts identified with the Project during construction, and also includes the proposed mitigation measures required to reduce the level of risks and to maintain an overall high level of operational efficiency for the road network during construction.

Table 10.4 Impact assessment summary

Value/element	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)		
Traffic impacts from construction activities						
Intersections	Operational efficiency	**Moderate** Traffic impacts at the key intersections impacting operations. Adequacy of intersection configuration to cater for haulage vehicles.	**Probably** It is reasonable to say that some traffic impacts at key intersections will probably occur during the construction period.	**Moderate**	In consultation with DTMR, RMS and relevant councils develop cost effective solutions to alleviate additional traffic impacts from the construction related activities. These may include but are not limited to: ▪ TMP 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: QLD Manual of uniform traffic control devices - Traffic control for works on roads (DTMR) – Austroads: Manual of Uniform Traffic Control Devices: Part 3 - Works on Roads (DTMR 2019b) and the Traffic and Road Use Management Manual: Volume 7 Road Works (DTMR 2012) – Roads and Maritime Services: Roads and Maritime Supplement to Australian Standard 1742.10-2009: Manual of Uniform Traffic Control Devices (RMS) ▪ 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 ▪ TMP should consider construction activity delivery timeframes which avoid peak hour travel conditions.	**Low**

Value/element	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**		
Road Sections	Operational efficiency	**Moderate** Traffic impacts along primary construction routes affecting traffic operations along key routes.	**Probably** It is reasonable to say that some traffic impacts along primary construction routes will probably occur over the construction period.	**Moderate**	In consultation with DTMR and relevant councils, employ traffic management strategies in order to mitigate impacts along road sections. These may include but are not limited to: ▪ TMP according to DTMR and RMS specifications ▪ Travel demand management campaigns ▪ Directional signage and line marking around construction sites and the surrounding network ▪ Specific TMP for school routes developed in conjunction with the relevant stakeholders ▪ Specific TMP for special events developed in conjunction with the relevant stakeholders ▪ Relevant emergency services should be notified in advance prior to changes to the road network, and of the movement of all construction activity commencing, particularly hazardous/dangerous or oversize construction material and equipment ▪ Road closures (temporary and permanent) to be discussed with DTMR, local councils and emergency services. With alternative solutions provided to ensure minimal impact on existing and future traffic ▪ Secondary alternative construction route activities should be determined as part of the TMPs, in the event of the primary route is blocked off by an emergency/accident ▪ TDM campaign to inform the public on works and its effect on network operations ▪ Ongoing consultation will be undertaken with relevant local councils, DTMR, emergency services, affected landholders and where applicable the wider community to inform of the Project's status and likely traffic disruptions and temporary road closures.	**Low**

Value/element	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	**Magnitude of impact**	**Likelihood of impact**	**Risk rating (before mitigation)**		
Pavements	Operational efficiency	**Moderate** Increased percentage of heavy vehicles along SCR from Project construction traffic, resulting in pavement degradation.	**Probably** It is reasonable to assume that some pavement degradation as a result of Project construction traffic will probably occur over the construction period.	**Moderate**	Mitigation measures may include but are not limited to: ▪ Undertaking visual assessments prior to, during and post construction activities on LGR, with the impacted road improved to a similar condition to the initial visual pavement condition ▪ All vehicles, machinery and mobile construction equipment will be required to carry a clean-down record. Mobile weed clean-down facilities will be provided at construction areas accessed by public roads and of high-risk weed infestation depending on construction staging and methodology ▪ Installation of shaker grids or rumble pads at site exit points from construction activities.	**Low**
Road Safety – Primary Construction Routes	Safety	**Moderate** Decreased road safety along construction traffic routes as a result of increased traffic, changes in heavy vehicle mix, or fatigue for long distance trips.	**Possible** It is reasonable to assume that an incident involving a Project construction vehicle is possible over the construction period.	**Moderate**	Mitigation measures may include but are not limited to: ▪ Fatigue management measures should be introduced and enforced for all workers ▪ Any required works to be identified in ongoing RUMP prepared to support the Project ▪ Heavy vehicles may be associated with the construction activities and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts ▪ Consideration should be given to limiting construction traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed ▪ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits	**Low**

Value/element	Description of impact				Summary of key mitigation measures	Residual risk
	Primary impacting process	Magnitude of impact	Likelihood of impact	Risk rating (before mitigation)		
Traffic impacts from operational activities						
Road Rail Interface	Operational efficiency	**Moderate** Additional delay to through traffic with reduced operational efficiency as a result of construction activities.	**Probably**	**Moderate**	Direct and guide active mode users at road /rail interface locations, improving safety and reduces the likelihood of any significant traffic delays due to incidents. A protocol will be developed between ARTC and emergency service providers, defining appropriate and co-ordinated responses and communication in the event of emergencies during operations.	**Low**
Road Safety – Road Rail Interface	Safety	**Extreme** If possible, the introduction of open level crossings on the road network may result in high severity crashes between traffic and trains.	**Unlikely** As there are no level crossings proposed for the Project, the likelihood of an incident occurring at a road rail interface is unlikely.	**Moderate**	The Project does not propose to include any level crossings along the Project alignment, with the removal of the sole existing level crossing (320-1-E-1) aligning with the QLCSS strategy. During the operational stage, the diversion of existing traffic onto the Project alignment will likely reduce the overall interaction at level crossings within the vicinity of the Project.	**Low/ Moderate**

11 Cumulative impacts

11.1 Regionally significant projects overview

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

The projects listed in Table 11.1 were identified within EIS Chapter 21: Cumulative Impacts, as projects within the cumulative impact area of interest for the Project, which are either currently underway, expected to undergo future expansion or are going through an approval process.

Table 11.1 Projects considered in cumulative assessment

Project and proponent	Location	Description	Project status	Construction dates
Border to Gowrie (B2G (ARTC)	Rail alignment from NSW/QLD Border to Gowrie	Approximately 146 km of new dual gauge track and 78 km of upgraded track from the NSW/QLD border, near Yelarbon, to Gowrie Junction, north west of Toowoomba in QLD.	Draft EIS being prepared by ARTC	2022 – 2026
Helidon to Calvert (H2C) (ARTC)	Rail alignment from Helidon to Calvert	The H2C project will include the following: ▪ 47 km single-track dual-gauge freight rail line to accommodate double stack freight trains up to 1,800 m long ▪ Tunnel through the Little Liverpool Range	Draft EIS being prepared by ARTC	2022 – 2026
InterLinkSQ	13 km west of Toowoomba	200 ha of new transport, logistics and business hubs. Located on the narrow-gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways.	Under construction	2017-2037
Wellcamp Business Park (Wagners)	Wellcamp QLD	The Wellcamp Business Park is a 500 ha industrial and commercial park that forms part of the Toowoomba Enterprise Hub. The Business Park is located in close proximity to the Toowoomba Wellcamp Airport and other major transportation infrastructure.	Operational – subject to continuing construction and expansion	Ongoing

Project and proponent	Location	Description	Project status	Construction dates
Witmack Industry Park and Charlton Logistics Park	Wellcamp QLD	The Witmack Industry Park is a large industrial land development that offers large size industrial land parcels. Businesses situated within the Witmack Industrial Park include the Toowoomba Pulse Data Centre. The Charlton Logistics Park is part of the Toowoomba Enterprise Hub and provides fully serviced 2 ha sites and is well situated for potential transport and logistics operators due to its proximity to transport infrastructure.	Operational – subject to continuing construction and expansion	Ongoing
Gatton West Industrial Zone (GWIZ) (LVRC)	3 km north west Gatton	Industrial development including a transport and logistics hub on the Warrego Highway	N/A	2019-2024
Defence Housing Authority Mount Lofty Development (DHA)	Toowoomba, suburb of Mount Lofty	Former rifle range redeveloped into a master-planned residential community comprising of 342 lots. Some lots will be retained by DHA on which homes will be built for Defence members and their families with remaining lots available for public purchase	Development application lodged in June 2018. Development in no longer in process as rejected.	TBC
New Acland Mine Stage 3 Expansion (New Hope)	35 km northwest of Toowoomba	Expansion of the existing New Acland open-cut coal mine to up to 7.5 Mtpa.	EIS approved with conditions in 2014.	Ongoing
TRC/Waste Management (non-sewerage)/Lot 7 SP203236/ **QLD**/ Waste Management Facility, 379 Love Road, Wyreema, QLD **(TRC)**	Wyreema, QLD	A new waste transfer facility that caters for the Toowoomba Region's Northern and Southern Growth Corridors. Will replace the existing Greenmount landfill and was previously a sewage treatment plant.	Design is currently underway with development assessment application lodged in July/August 2019	Expected to be completed in 2022
Cross River Rail (QLD Government)	Brisbane City	A new north–south rail line connecting Dutton Park to Bowen Hills under the Brisbane River and CBD.	EIS Complete New lapsed date for the Coordinator-General's EIA evaluation report on 31 December 2025 at the time of writing.	Expected to be completed in 2024

Project and proponent	Location	Description	Project status	Construction dates
Bromelton State Development Area (SDA) (Queensland Government)	Bromelton, Qld	Delivery of critical infrastructure within the Bromelton SDA will support future development and economic growth. This includes a trunk water main and the Beaudesert Town Centre Bypass. This infrastructure provides opportunities to build on the momentum of current development activities by major landowners in the SDA.	The current version of the Bromelton SDA Development Scheme was approved by Governor in Council, December 2017	2016 – 2031

11.2 Qualitative assessment

Following the identification of potential cumulative impacts, a relevance factor score of Low, Medium and High has been determined in consideration of the impacts, in accordance with the assessment matrix given in Table 11.2.

The significance of the impact has been determined by using professional judgement to select the most appropriate relevance factor for each aspect in Table 11.3 and summing the relevance factors. The sum of the relevance factors determines the impact significance and consequence which are summarised in Table 11.3. For example, if a specific matter such as traffic was considered to have a probability of impact of 2, duration of impact of 3, magnitude/intensity of impact of 1 and a sensitivity of receiving environment of 1, then the significance of impact would be (2+3+1+1 = 7) = Medium. Further details on this assessment can be found in EIS Chapter 22: Cumulative Impacts.

Table 11.2 Relevance Factor

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

Table 11.3 Impact Significance

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

Out of the projects listed in Table 11.1, those with residual cumulative impacts pertaining to the traffic assessment are assessed in Table 11.4. Residual impacts are considered after the consideration of standard and project-specific mitigation measures and identifies the potential necessity for mitigation measures to be applied to the other projects identified in Table 11.1.

The projects summarised in Table 11.4 may have overlapping construction dates with the Project, with impacts dependant on the timing and location of the works. These projects will have cumulative impacts on traffic volumes, congestion and potentially lead to delays during the construction period.

Table 11.4 Qualitative cumulative impacts assessment

Potential cumulative impacts	Residual impact significance	Recommended mitigation measures
Border to Gowrie	Medium	As part of the Project impact assessment of traffic and transport, a large range of mitigation measures have been proposed at local and state levels for construction and operation of the Project. To further mitigate potential cumulative impacts, the other assessable projects will also have to successfully implement similar mitigation measures. Mitigation measures proposed for the Project relating to safety, intersection impacts, link road impacts, pavement impacts, and road rail interface impacts would suffice in order to mitigate the cumulative impacts as a result of these projects. It is noted that during the detailed design phase of the Project, it may be feasible to consolidate routes between the Project and other Inland Rail packages. This will be required to be reassessed by the construction contractor in consultation with DTMR and the relevant LGA at the detailed design phase of the Project.
Helidon to Calvert	Medium	
InterLinkSQ	Medium	
Wellcamp Business Park	Low	
Witmack Industry Park and Charlton Logistics Park	Low	
Gatton West Industrial Zone (GWIZ)	Low	
Defence housing Australia Mount Lofty Development	Low	
New Acland Coal Mine Stage 3	Low	
TRC /Waste Management Facility	Low	
Cross river rail	Low	
Bromelton State Development Area	Low	

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

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

However, the Project may have an overlap of construction schedules and proposed construction routes which, in combination with construction traffic volumes generated by the Project might result in increased construction traffic volumes across the external road network. The mitigation measures relating to safety, intersection impacts, link road impacts, pavement impacts and road rail interface impacts as described in Section 9 are likely sufficient in order to mitigate for the cumulative impacts as a result of the Project.

It will be required to assess the overlap, along with the potential to consolidate and optimise construction routes and delivery of materials between the other Inland Rail packages, particularly with respect to the Helidon area between the Project and the H2C project, and the Gowrie area between the Project and the B2G Project. These will be required to be further assessed during detailed design.

12 Conclusion and recommendations

The Project aligns with the objectives of the State Planning Policy through the colocation of rail infrastructure with the existing West Moreton System and that the Project alignment generally follows the Gowrie to Grandchester future State transport corridor. The Project will also improve efficiencies and performance of rail infrastructure through the Toowoomba Range and interoperability between the ARTC and QR networks. Furthermore, the Project has considered and assessed potential impacts to surrounding transport networks and land uses.

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

12.1 Transport network changes

The Project proposed rail alignment results in several road realignments, diversions and closure. These alterations are consistent with the intent of the QLCSS and the Toowoomba Road Safety Strategy, with no new at grade crossings proposed.

The changes that are proposed to the road network in order to facilitate the proposed rail alignment, particularly through the Gowrie area, are also not expected to have significant impacts on existing traffic movements, with north south connectivity provided in the new alignment and maintained across existing rail lines.

The proposed Project alignment has also considered existing and future operations associated with the QR network in order to minimise the impacts to these operations, including grade separation and track spacing.

Consultation with the local road authorities (DTMR, TRC and LVRC) and the rail manager (QR) will continue through Project delivery.

12.2 Transport task

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

Table 12.1 Total trips by activity per year

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

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

12.3 Traffic impacts – link roads

The results of the LOS comparison between the "with" and "without" Project scenarios indicated that the Project may potentially cause a minor change in LOS for some road sections during various years of construction. Road sections considered to have a moderate change in LOS for the duration of construction are:

- LVRC:
  - Turner Street – Between Warrego Highway and Mary McKillop Street (change from LOS A to LOS B during the peak construction hour between 2022 and 2026).

Although there is a change in operational LOS, the expected operational LOS B is considered acceptable given the short duration of the construction activities. Therefore, during the construction phase, apart from the identified road sections and the explanations provided above; the operational LOS of the overall road network will be no worse as a result of the Project. In addition, the operational performance of the road would also return to base conditions after construction is complete.

Hence, based on the LOS comparison, it is not expected that the Project would generate the need to upgrade the road network for such a short duration of impact, but adequate traffic and road use management strategies would be required.

12.4 Traffic impacts – intersections

Intersections which may potentially experience operational impacts during the construction period have been outlined in Section 6.3, with mitigation measures provided in Section 9.2.3.

The intersections within Toowoomba LGA include:

- Gowrie Junction Road/Krienke Road
- Meringandan Road/Highfields Road
- Krienke Road/Morris Road
- Meringandan Road/Kleinton School Road
- Mort Street/Old Mort Street.

The intersections within Lockyer Valley LGA include:

- Arthur Street/Mary McKillop Street
- George Street/Arthur Street
- Jones Road/Little Oaky Creek Road
- Murphys Creek Road/Murphys Creek Road
- Murphys Creek Road/Howmans Road
- Turner Street/Mary McKillop Street
- Roches Road/Toowoomba Connection Road intersection.

All intersections impacted by construction traffic should be considered through the development of the TMP.

In addition to the construction impacts to the above intersections, there are a number of intersections proposed to be realigned within Toowoomba and Locker Valley LGAs, as discussed in Section 3.3. These alternations include upgrades to the above mentioned Krienke Road/Morris Road intersection as well as realignments of Gowrie Junction Road and Morris Road. These impacts have been assessed in Appendix T and Appendix U. Overall, these realignments were found to impact the surrounding network in a variety of ways, however, for the most part, these impacts are minimal and do not change the traffic operation of the network. Refer to Appendix T and Appendix U for the full assessments.

12.5 Traffic impacts – pavements

A preliminary desktop pavement impact assessment was undertaken on all envisaged affected DTMR and RMS SCR based on the existing background traffic data available for the relevant road sections. The analysis included a 5 per cent comparison of the background traffic SAR (as calculated in Section 7.3) and Project generated SAR for each link identified to be most likely impacted by the Project.

The analysis indicates that the majority of SCR road sections would have a minimal pavement impact given the duration of construction activities and pavement loading. It was found that ten SCR roads would exceed the 5 per cent threshold. These road sections were all DTMR roads and are outlined in Table 12.2.

Table 12.2 State Controlled Roads with construction traffic exceeding 5 per cent of base Standard Axle Repetitions

Road name	Road section
SCR: DTMR	
Murphys Creek Road	Between Warrego Highway and Brookside Place
	Between Brookside Place and Toowoomba Bypass
	Between Toowoomba Bypass and Howmans Road
New England Highway	Between Highfields Road and Murphys Creek Road
	Between Murphys Creek Road and Munro Street
	Between Munro Street and North Street
	Between North Street and Warrego Highway
Toowoomba Bypass	Between Boundary Street and New England Highway
Toowoomba Cecil Plains Road	Between Boral Quarries and Toowoomba Bypass
Warrego Highway	Between New England Highway and James Street
	Between James Street and Tourist Road

No RMS road sections were found to have any pavement impacts given the duration of construction activities and pavement loading.

A more detailed pavement impact assessment will be carried out prior to construction and in consultation with DTMR and where applicable RMS. This should form part of the RUMP to be developed prior to construction. This will assist with further discussions with DTMR and where applicable RMS to identify potential contribution towards the maintenance costs for the affected road sections which should be dealt with post EIS.

A pavement impact assessment was not conducted for envisaged affected LGR as the GTIA applies to SCR. Appropriate mitigation measures were developed and provided in Section 9.2.5.1 to be applied to both SCR and LGR. Such mitigation measures will be finalised through consultation with the relevant councils in the next phase of the Project.

12.6 Traffic impacts – road rail interface

As there are no public level crossings proposed in the Project, delays to road vehicles have been removed, and the safety risks associated with train/vehicle conflict have been avoided. Therefore, no specific traffic management strategies are required.

There are no public level crossings proposed in the Project, with all proposed public road rail interfaces to be treated with either grade separation or closure. In line with the QLCSS and the Toowoomba Road Safety Strategy 2019-2023 the Project is looking to eliminate an existing crossing on the West Moreton System at Gowrie, while the use of the Project alignment during operations has the potential reduce rail traffic through Toowoomba and Murphys Creek, reducing impacts and maximising safety. Once construction routes are confirmed, further consideration of the risk of short stacking at either or both the level crossing and/or the road intersection where a level crossing is known will be undertaken.

The changes that are proposed to the road network in order to facilitate the proposed rail alignment, particularly through the Gowrie area, are not expected to have significant impacts on existing traffic movements, with north south connectivity provided in the new alignment and maintained across existing rail lines.

13 References

ALCAM (2016) *Australian Level Crossing Assessment Model.* National ALCAM Committee. Available: http://alcam.com.au/media/1013/alcam-in-detail-update-august-2016.pdf

Austroads (1988) *Guide to Traffic Engineering Practice Part 2: Roadway Capacity*

Austroads (2012) *Guide to Pavement Technology Part 2: Pavement Structural Design*. Available: https://austroads.com.au/publications/pavement/agpt02-12

Austroads (2015) *Guide to Road Safety Part 8: Treatment of Crash Locations*. Available: https://austroads.com.au/publications/road-safety/agrs08

Austroads (2017a). *Guide to Traffic Management Part 3: Traffic Studies and Analysis*. Available: https://austroads.com.au/publications/traffic-management/agtm03

Austroads (2017b) *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*. Available: https://austroads.com.au/publications/road-design/agrd04a

Austroads (2017c). *Cycling Aspects of Austroads Guides.* Available: https://austroads.com.au/publications/road-design/ap-g88-17

Austroads (2019a). *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*. Available: https://austroads.com.au/publications/traffic-management/agtm06

Austroads (2019b). *Guide to Traffic Management Part 12: Traffic Impacts of Developments.* Available: https://austroads.com.au/publications/traffic-management/agtm12

Data Request Form: Department of Transport and Main Roads: Data Analysis, Engineering and Technology, Infrastructure Management and Delivery (2018). Available: https://www.tmr.qld.gov.au/-/media/Safety/Transport-and-road-statistics/statistics_data_request_form.pdf?la=en

Department of Transport and Main Roads (2012a). *Queensland Level Crossing Safety Strategy*. Available: https://www.tmr.qld.gov.au/-/media/Safety/railsafety/QueenslandLevelCrossingSafetyStrategy2012to2021.pdf

Department of Transport and Main Roads (2012). *Traffic and Road Use Management Manual: Volume 7 – Road Works.* Available: http://www.aapaqtmr.org/SAR20131211/Ref_docs/08-TRUM-volume_7_complete_Nov2013.pdf

Department of Transport and Main Roads (2014) *Road Planning and Design Manual: Supplement to Austroads guide to Road Design Part 4A*. Available: http://www.tmr.qld.gov.au/~/media/busind/techstdpubs/Road%20planning%20and%20design/Road%20Planning%20and%20Design%202nd%20edition/RPDMSuppVol3Part4A.pdf

Department of Transport and Main Roads (2015). *Guide to Development in a Transport Environment: Rail.* Available: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-to-development-in-a-transport-environment-rail.aspx

Department of Transport and Main Roads (2017). *Guide to Traffic Impact Assessment.* Available: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-to-Traffic-Impact-Assessment

Department of Transport and Main Roads (2018). *GTIA Practice Note: Pavement Impact Assessment.* Available: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-to-Traffic-Impact-Assessment

Department of Transport and Main Roads (2019a) *Queensland Manual of Uniform Traffic Control Devices Part 7: Railway Crossings.* Available: https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Traffic-management/Manual-of-Uniform-Traffic-Control-Devices/MUTCD-Pt-7-Railway-Crossings.pdf?la=en

Department of Transport and Main Roads (2019b) *Queensland Manual of Uniform Traffic Control Devices Part 3: Traffic Control for Works on Roads*. Available: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Manual-of-uniform-traffic-control-devices.aspx

Department of Transport and Main Roads (2019c) *Technical Standard MRTS02 – Provision for traffic prior to the commencement of construction.* Available: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Specifications/1-Overarching-Specifications.aspx#MRTS02

Department of Transport and Main Roads (2019d). *Long Distance Coach Services.* Available: https://www.tmr.qld.gov.au/Travel-and-transport/Long-distance-coach-services.aspx

Ipswich City Council (2006). *Ipswich City Council Planning Scheme*. Available: https://www.ipswichplanning.com.au/planning-documents/planning-scheme

Ipswich City Council (2016). *iGO City of Ipswich Transport Plan*. Available: https://www.ipswich.qld.gov.au/about_council/corporate_publications/igo

Lockyer Valley Regional Council (2018). Lockyer Valley Regional Council Planning Scheme. Available: https://www.lockyervalley.qld.gov.au/our-services/strategic-planning/Pages/Planning-Schemes.aspx

Lockyer Valley Regional Council (2018). Lockyer Valley Regional Council Local Government Infrastructure Plan. Available: https://www.lockyervalley.qld.gov.au/our-services/strategic-planning/Pages/Planning-Schemes.aspx

Lockyer Valley Regional Council (2018). Draft Lockyer Valley Regional Council Planning Scheme – Priority Infrastructure Plan. Available: https://www.lockyervalley.qld.gov.au/our-services/strategic-planning/Pages/Planning-Schemes.aspx

Lockyer Valley Regional Council (2019). Lockyer Valley Adopted Infrastructure Charges Resolution. Available: https://www.lockyervalley.qld.gov.au/our-services/strategic-planning/Pages/Planning-Schemes.aspx

Clarence Valley Council (2018). Clarence Valley Council Community Strategic Plan. Available: https://www.clarence.nsw.gov.au/page.asp?f=RES-LBP-33-26-88

Clarence Valley Council (2018). Clarence River Way Masterplan. Available: https://www.clarence.nsw.gov.au/cp_themes/metro/res.asp?id=4359

Toowoomba Regional Council (2010). Toowoomba Region 'City Centre Master Plan. Available: http://www.tr.qld.gov.au/about-council/council-governance/plans-strategy-reports/10958-city-centre-master-plan

Toowoomba Regional Council (2012). Toowoomba Regional Planning Scheme. Available: http://www.tr.qld.gov.au/planning-building/planning-scheme-strategies-tools/planning-scheme-new

Toowoomba Regional Council (2014). Toowoomba Region Sustainable Transport Strategy. Available: http://www.tr.qld.gov.au/about-council/council-governance/plans-strategy-reports/various-documents/11025-toowoomba-region-sustainable-transport-strategy-december-2014

Toowoomba Regional Council (2017). Toowoomba Region Local Government Infrastructure Plan. Available: http://www.tr.qld.gov.au/planning-building/planning-scheme-strategies-tools/planning-scheme-new/14063-lgip

Toowoomba Regional Council (2017). West Toowoomba Local Plan/Land Use Investigation. Available: http://www.tr.qld.gov.au/planning-building/planning-scheme-strategies-tools/strategies-and-guides/11399-local-land-use-plans

Toowoomba Regional Council (2018). Toowoomba Regional Council Charges Resolution No. 2 and No. 3. Available: http://www.tr.qld.gov.au/testcat/planbuild/planningdevelop/311-planningscheme

Toowoomba Regional Council (2019). Toowoomba Road Safety Strategy. Available: http://www.tr.qld.gov.au/about-council/council-governance/plans-strategy-reports/various-documents/13756-road-safety-strategy

Queensland Government (2009). South East Queensland Regional Plan 2009-2031. Available: https://cabinet.qld.gov.au/documents/2009/Jul/SEQ%20Regional%20Plan%202009-31/Attachments/SEQ%20regional%20plan%202009-31.pdf

Queensland Government (2017). State Planning Policy – Strategic Airports and Aviation Facilities. Available: **https://cabinet.qld.gov.au/documents/2017/May/SPP/Attachments/Policy.pdf**

Queensland Government (2019). *Open Data Portal.* Available: **https://www.data.qld.gov.au/dataset**

SIDRA Intersection Software (2018) *SIDRA Intersection User Guide for Version 8*

Translink (2019). *Bus Route Timetables.* Available: **https://jp.translink.com.au/plan-your-journey/timetables**

Transport for New South Wales (2018). *Traffic Control at work sites – Technical Manual.* Available: **https://www.rms.nsw.gov.au/business-industry/partners-suppliers/document-types/guides-manuals/traffic-control-worksites.html**

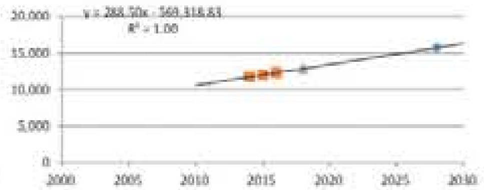
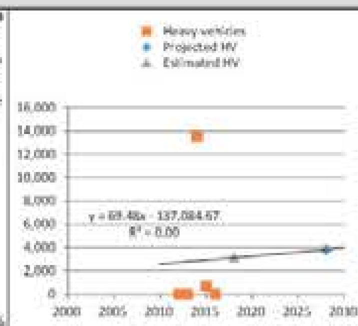
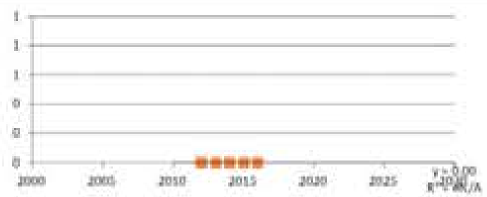
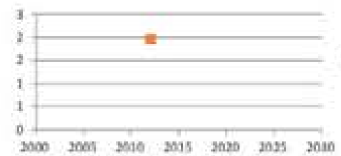
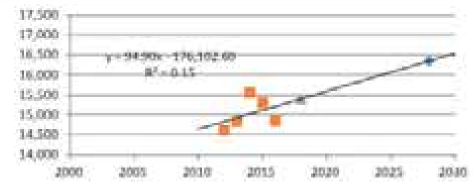
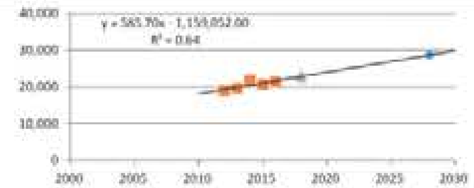
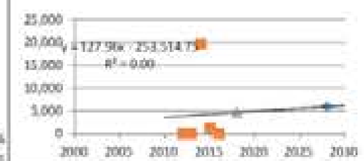
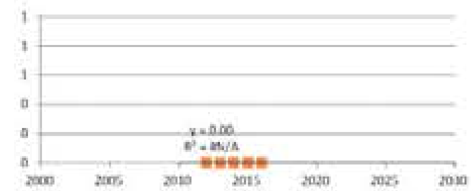
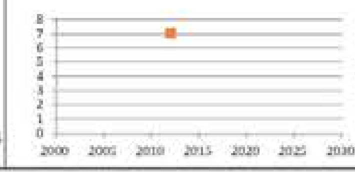
Transport for New South Wales (2019). *Routes and timetables.* Available: **https://transportnsw.info/routes/bus**

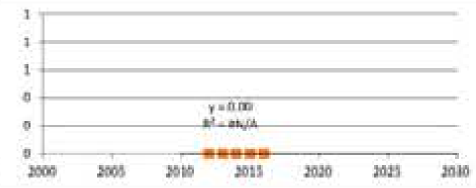
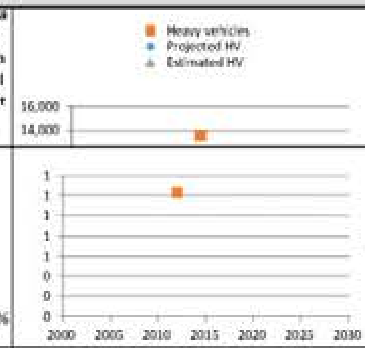
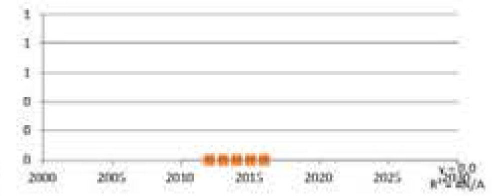
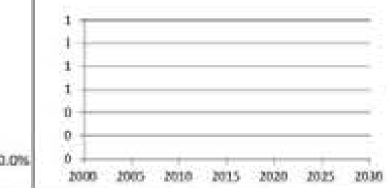
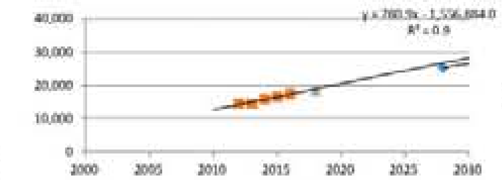
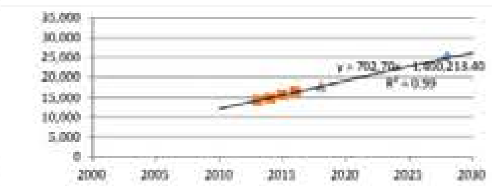
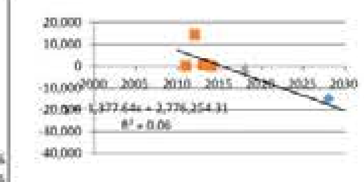
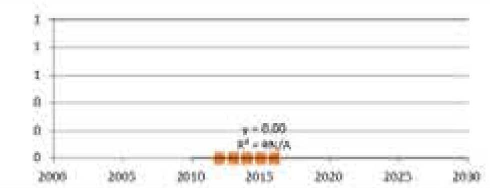
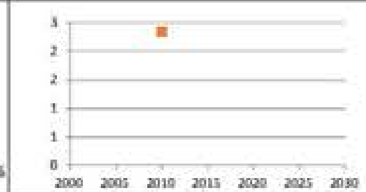
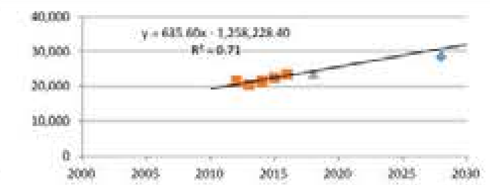
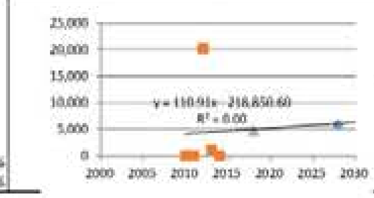
Transportation Research Board (2016) *Highway Capacity Manual 6th edition: A guide for multimodal mobility analysis.* Washington D.C.

APPENDIX U

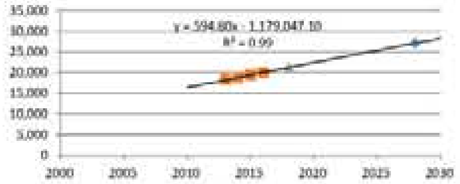
Traffic Impact Assessment

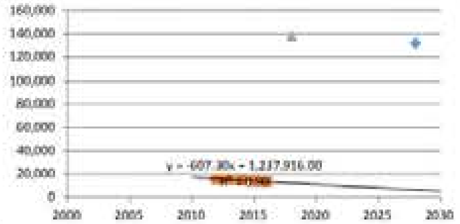
Appendix A Department of Transport and Main Roads traffic growth rates

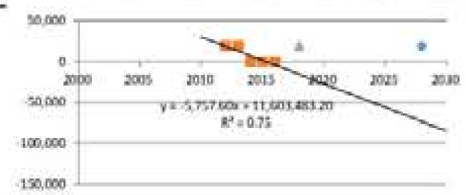
Location & Year			Annual Average Daily Traffic (AADT) growth rates								Heavy Vehicles (HV) percent projections												
Segment	Station Lanes	Year	Annual Average Daily Traffic	Projected AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b)			Equivalent Exponential Growth Rate per year		Final Growth Rate	Total (all lanes) by vehicle type			Projected HV	Linear Growth Rate per year and equation used for projections (y=a*x+b)			Equivalent Exponential Growt		Final Growth Rate	Projected HV	Percent of HV	Final Percent of HV
			Historic AADT	Estimated AADT	%	a	b	%		%	Historic AADT	Light vehicles	Heavy vehicles	Estimated HV	%	a	b	%		%	Estimated HV	%	Average %
Toowoomba Cecil Plains Road	32078	2010									-	-									-		
	100m West of Ey	2011									-	-									-		
		2012			#DIV/0!						-	-1	1		11725.0%						1	#DIV/0!	#DIV/0!
		2013			#DIV/0!						-	-20	20		344.1%						20	#DIV/0!	
		2014	11,716		2.46%					2.04%	11,716	-1,824	13,540		0.5%					2.0%	13,540	115.57%	
		2015	12,017		2.40%						12,017	11,346	671								671	5.58%	
		2016	12,293		2.35%						12,293	12,270	23								23	0.19%	
		2018		12,874		288.5	-569,318.83				12,874			3,129		69.5	-137,084.67				3,129	24.30%	
		2028		15,759				2.04%			15,759			3,824				2.0%			3,824	24.26%	24.27%
		2038		18,644							18,644			4,518				1.9%			4,518	24.23%	
Warrego Highway	31178	2010									-										-		
	Tor St to Bridge S	2011									-										-		
		2012	-								-	#VALUE!	2								2	#VALUE!	
		2013	-								-										-	#VALUE!	
		2014									-									0.0%	-	#VALUE!	
		2015	-								-										-	#VALUE!	
		2016									-											#VALUE!	
		2018									-										-	#DIV/0!	
		2028									-							0.0%			-	#DIV/0!	
		2038									-										-	#DIV/0!	
Warrego Highway	2011)/37608(2012	2010									-										-		
	S of Hunsley Rd I	2011																			-		
		2012	14,610		0.65%						14,610	14,609	1		7439.2%						1	0.01%	
		2013	14,821		0.64%						14,821	14,802	19		415.5%						19	0.13%	20.12%
		2014	15,551		0.61%					0.58%	15,551	730	14,821		0.5%					2.1%	14,821	95.31%	
		2015	15,306		0.62%						15,306	14,532	774								774	5.06%	
		2016	14,842		0.64%						14,842	14,824	18								18	0.12%	
		2018		15,406		94.0	-176,102.60				15,406			3,442		78.9	-155,793.15				3,442	22.34%	
		2028		16,355				0.60%			16,355			4,231				2.1%			4,231	25.87%	26.09%
		2038		17,304				0.58%			17,304			5,020				1.9%			5,201	30.06%	
Warrego Highway	2011)/30071(2012	2010									-										-		
	James St To Wes	2011																			-		
		2012	19,003		3.08%						19,003	19,001	2		7832.5%						2	0.01%	
		2013	19,726		2.97%						19,726	19,709	17		737.5%						17	0.09%	19.36%
		2014	21,784		2.69%					2.09%	21,784	2,058	19,726		0.6%					2.4%	19,726	90.55%	
		2015	20,863		2.81%						20,863	19,590	1,273								1,273	6.10%	
		2016	21,363		2.74%						21,363	21,349	14								14	0.06%	
		2018		22,891		585.7	-1,159,052.00				22,891			4,718		128.0	-253,514.75				4,718	20.61%	
		2028		28,748				2.30%			28,748			5,998				2.4%			5,998	20.86%	21.17%
		2038		34,605				2.09%			34,605			7,277				2.2%			7,625	22.03%	
Warrego Highway	31228	2010									-										-		
	James St To Ruth	2011									-										-		
		2012	-								-	#VALUE!	7								7		
		2013	-								-										-		
		2014	-								-									0.0%	-		
		2015	-								-										-		
		2016	-								-										-		
		2018									-										-		
		2028						0.00%			-							0.0%			-		
		2038									-										-		

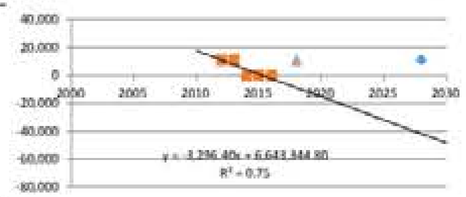
Location & Year				Annual Average Daily Traffic (AADT) growth rates								Heavy Vehicles (HV) percent projections												
Segment	Station	Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %		Final Growth Rate: %	Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth: %		Final Growth Rate: %	Projected HV: Estimated HV	Percent of HV: %	Final Percent of HV: Average %
Warrego Highway	31145 18A Hume St to I		2010																					
			2011																					
			2012	-									#VALUE!	1								1	#VALUE!	
			2013	-																				
			2014	-																	0.0%			
			2015	-																				
			2016	-																				
			2018																					
			2028						0.00%										0.0%					
			2038																					
Warrego Highway	31147 James St To Neil		2010																					
			2011																					
			2012	-																				
			2013	-																				
			2014	-																				
			2015	-																	0.0%			
			2016	-																				
			2018																					
			2028						0.00%										0.0%					
			2038																					
Warrego Highway	32686 Approx 50m We	2	2010																					
			2011																					
			2012	14,624								14,624												
			2013	14,624		4.70%						14,624	14,603	21		-6595.3%						21	0.14%	24.09%
			2014	15,911		4.32%					2.82%	15,911	1,287	14,624		9.5%					18.10%	14,624	91.91%	
			2015	16,487		4.17%						16,487	15,795	692		-201.4%						692	4.20%	
			2016	17,597		3.91%						17,597	17,577	20		-7027.6%						20	0.11%	
			2018		18,506		687.6	-1,369,071.10				18,506			-1,038		-1,393.6	2,811,206.87				-1,038	-5.61%	
			2028		25,382				3.21%			25,382			-14,974				30.6%			-14,974	-59.00%	-244.70%
			2038		32,258				2.82%			32,258			-28,910				18.1%			-215,959	-669.48%	
Warrego Highway	37610 Approx 100m Ea		2010																					
			2011																					
			2012			#DIV/0!																		
			2013	14,363		5.05%						14,363	14,340	23		6031.7%						23	0.16%	25.07%
			2014	14,919		4.86%					3.01%	14,919	556	14,363		-9.6%					30.1%	14,363	96.27%	
			2015	15,814		4.59%						15,814	15,228	586		-235.0%						586	3.71%	
			2016	16,407		4.42%						16,407	16,384	23		-6002.8%						23	0.14%	
			2018		17,934		725.5	-1,446,125.00				17,934			-1,073		-1,377.6	2,779,009.60				-1,073	-5.98%	
			2028		25,189				3.46%			25,189			-14,849				30.1%			-14,849	-58.95%	-232.78%
			2038		32,444				3.01%			32,444			-28,626				17.8%			-205,505	-633.42%	
Warrego Highway	30001 Top of Range Per		2010																					
			2011																					
			2012	-									#VALUE!	2								2	#VALUE!	
			2013	-																				#VALUE!
			2014	-																				
			2015	-																	0.0%			
			2016	-																				
			2018																					
			2028																0.0%					
			2038																					
Warrego Highway	32636 Approx 300m W		2010																					
			2011																					
			2012	21,401		2.26%						21,401	21,400	1		9244.5%						1	0.01%	
			2013	20,386		2.37%						20,386	20,369	17		638.5%						17	0.09%	19.99%
			2014	21,465		2.25%					1.73%	21,465	1,079	20,386		0.5%					2.1%	20,386	94.97%	
			2015	22,652		2.13%						22,652	21,557	1,095		10.1%						1,095	4.83%	
			2016	23,446		2.06%						23,446	23,429	17		651.7%						17	0.07%	
			2018		23,650		483.2	-951,447.20				23,650			4,747		110.9	-219,072.42				4,747	20.07%	
			2028		28,482				1.88%			28,482			5,856				2.1%			5,856	20.56%	20.77%
			2038		33,314				1.73%			33,314			6,965				1.9%			7,224	21.69%	

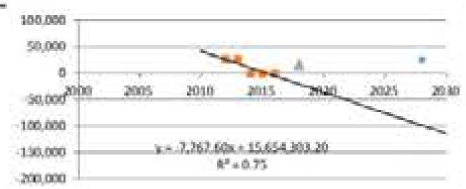
Location & Year			Annual Average Daily Traffic (AADT) growth rates						
Segment	Station Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %	Final Growth Rate: %
Warrego Highway	30070	2010							
	Approx 1.1km W	2011							
		2012			#DIV/0!				
		2013	18,335						
		2014	18,770		3.17%				
		2015	19,546		3.04%				2.25%
		2016	20,059		2.97%				
		2018		21,259		594.8	-1,179,047.10		
		2028		27,207				2.50%	
		2038		33,155				2.25%	
New England Highway	31148	2010							
	Hume St To Herr	2011							
		2012	17,180		0.00%				
		2013	17,180		0.00%				
		2014	-						
		2015	-						
		2016	-						
		2018		17,180		-	17,180.00		
		2028		17,180				0.00%	
		2038		17,180				0.00%	
New England Highway	2013)/37798(201	2010							
	N of Herries St In	2011							
		2012	15,886		-3.82%				
		2013	15,886						
		2014	14,436		-4.21%				
		2015	14,137		-4.30%				
		2016	13,724						
		2018		137,996		-607.3	1,363,527.20		
		2028		131,923				-0.45%	
		2038		125,850					
New England Highway	31136	2010							
	N of Margaret St	2011							
		2012	19,192						
		2013	19,192		0.00%				
		2014	-						
		2015	-						
		2016	-						
		2018		19,192			19,192.00		
		2028		19,192				0.00%	
		2038		19,192					
New England Highway	31257	2010							
	W of Hume and (	2011							
		2012	10,988		0.00%				
		2013	10,988		0.00%				
		2014	-						
		2015	-						
		2016	-						
		2018		10,988		-	10,988.00		
		2028		10,988				0.00%	
		2038		10,988				0.00%	
New England Highway	31248	2010							
	N of Chalk Dr Int	2011							
		2012	25,892		0.00%				
		2013	25,892		0.00%				
		2014	-						
		2015	-						
		2016	-						
		2018		25,892		-	25,892.00		
		2028		25,892				0.00%	
		2038		25,892				0.00%	



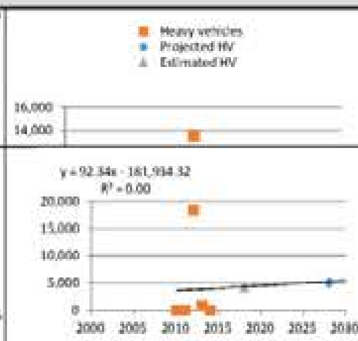


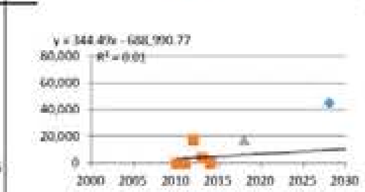


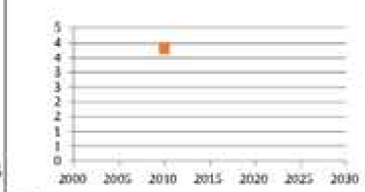
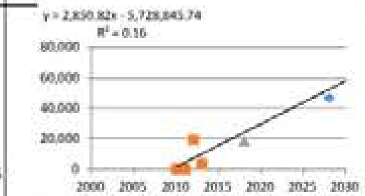


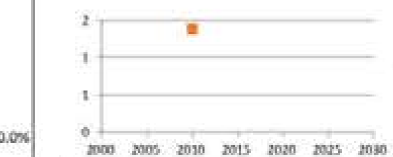
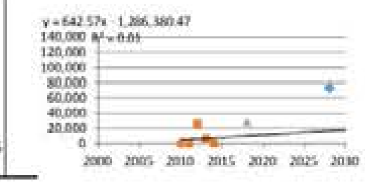


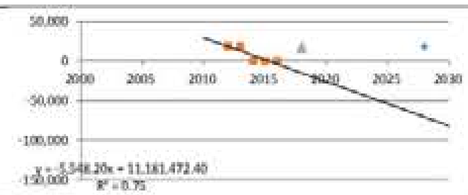
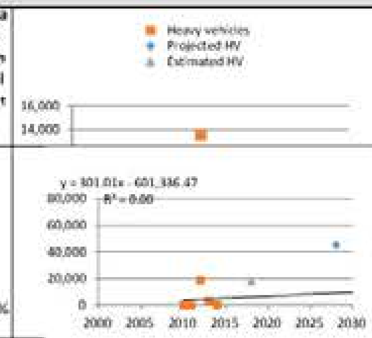
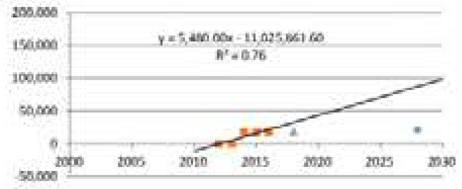
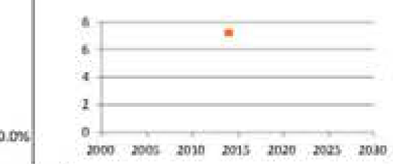
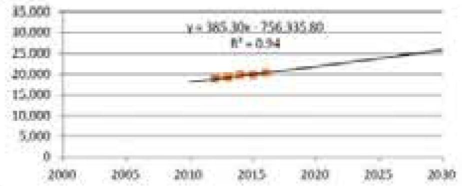
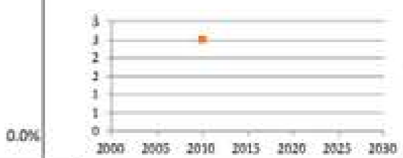
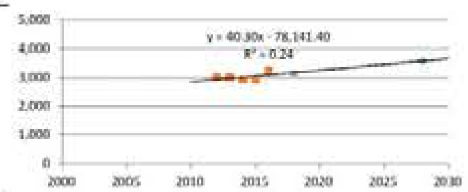
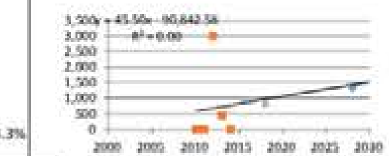
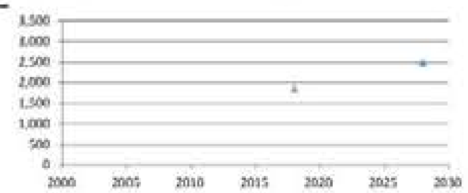
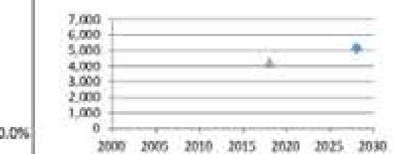
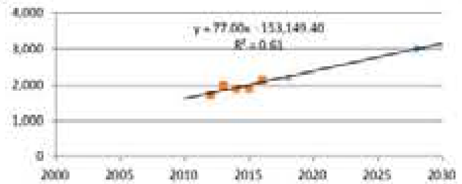
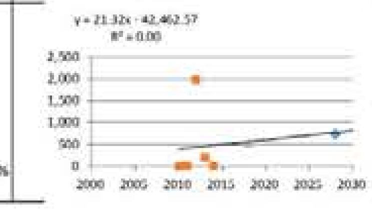
Segment	Year	Heavy Vehicles (HV) percent projections											
		Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth: %	Final Growth Rate: %	Projected HV: Estimated HV	Percent of HV: %	Final Percent of HV: Average %
Warrego Highway	2010	-									-		
	2011	-									-		
	2012	-	-1	1		9023.7%					1	#DIV/0!	
	2013	18,335	18,318	17		547.7%					17	0.09%	-
	2014	18,770	435	18,335		0.5%				2.0%	18,335	97.68%	
	2015	19,546	18,644	902		10.2%					902	4.62%	
	2016	20,059	20,039	20		461.7%					20	0.10%	
	2018	21,259			4,224		92.3	-182,119.00			4,224	19.87%	
	2028	27,207			5,148				2.0%		5,148	18.92%	19.24%
	2038	33,155			6,071						6,273	18.92%	
New England Highway	2010	-									-		
	2011	-									-		
	2012	17,180	17,177	3		80499.4%					3	0.02%	
	2013	17,180	17,175	5		55402.4%					5		#VALUE!
	2014	-	#VALUE!	17,180		16.0%					17,180	#VALUE!	
	2015	-	#VALUE!	3,457		79.7%				9.9%	3,457	#VALUE!	
	2016	-	#VALUE!	-		#VALUE!					-		
	2018	17,180			17,552		2,753.5	-5,539,008.91			17,552	102.17%	
	2028	17,180			45,087				9.9%		45,087	262.44%	346.25%
	2038	17,180			72,622						115,818	674.14%	
New England Highway	2010	-									-		
	2011	-									-		
	2012	15,886	15,882	4		0.0%					4	0.02%	0.02%
	2013										-		
	2014									0.0%	-		
	2015										-		
	2016										-		
	2018										-		
	2028								0.0%		-		0.02%
	2038										-		
New England Highway	2010	-									-		
	2011	-									-		
	2012	19,192	19,189	3		92576.6%					3	0.02%	
	2013	19,192	19,186	6		46204.5%					6	0.03%	#VALUE!
	2014	-	#VALUE!	19,192		14.9%					19,192	#VALUE!	
	2015	-	#VALUE!	3,111		91.7%				9.8%	3,111	#VALUE!	
	2016												
	2018	19,192			18,407		2,850.8	-5,734,547.38			18,407	95.91%	
	2028	19,192			46,915				9.8%		46,915	244.45%	321.14%
	2038	19,192			75,423						119,577	623.09%	
New England Highway	2010	-									-		
	2011	-									-		
	2012	10,988	10,987	1		0.0%					1	0.01%	
	2013	10,988									-		0.01%
	2014	-									-		
	2015	-								0.0%	-		
	2016	-									-		
	2018	10,988									-		
	2028	10,988							0.0%		-		0.01%
	2038	10,988									-		
New England Highway	2010	-									-		
	2011	-									-		
	2012	25,892	25,886	6		81537.0%					6	0.02%	
	2013	25,892	25,888	4		112422.2%					4		#VALUE!
	2014	-	#VALUE!	25,892		17.5%					25,892	#VALUE!	
	2015	-	#VALUE!	6,441		70.2%				10.0%	6,441	#VALUE!	
	2016	-		-							-		
	2018	25,892			28,423		4,519.4	-9,091,673.94			28,423	109.77%	
	2028	25,892			73,617				10.0%		73,617	284.32%	376.83%
	2038	25,892			118,810						190,671	736.41%	



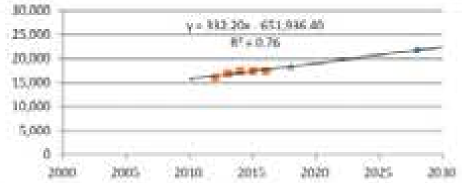


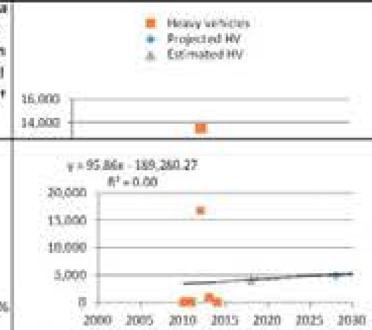



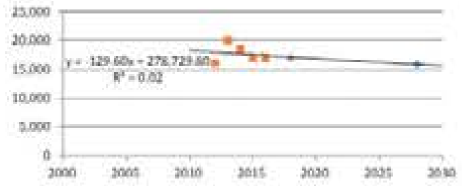



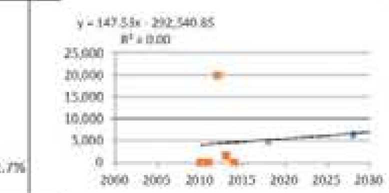
Segment	Station / Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %		Final Growth Rate: %	Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth: %		Final Growth Rate: %	Projected HV: Estimated HV	Percent of HV: %	Final Percent of HV: Average %
New England Highway	31138	2010									-										-		
	N of Bridge St Int	2011									-										-		
		2012	18,494		0.00%						18,494	18,491	3		97866.2%						3	0.02%	
		2013	18,494		0.00%						18,494	18,488	6		45008.4%						6	0.03%	#VALUE!
		2014	-								-	#VALUE!	18,494		14.9%					9.8%	18,494	#VALUE!	
		2015	-								-	#VALUE!	3,022		91.2%						3,022	#VALUE!	
		2016	-								-											#VALUE!	
		2018		18,494		-	18,494.00				18,494			17,777		2,754.5	-5,540,829.22				17,777	96.12%	
		2028		18,494				0.00%			18,494			45,322				9.8%			45,322	245.06%	321.99%
		2038		18,494							18,494			72,867							115,549	624.79%	
New England Highway	37799	2010									-										-		
	Approx 200m No	2011									-										-		
		2012	-								-										-		
		2013	-								-										-		0.04%
		2014	17,913		0.00%						17,913										-		
		2015	17,958		0.00%					1.27%	17,958									0.0%	-		
		2016	18,421		0.00%						18,421	18,414	7								7	0.04%	
		2018		18,859		254.0	-493,712.67				18,859										-		
		2028		21,399				1.27%			21,399							0.0%			-		-
		2038									-										-		
New England Highway	30003	2010									-										-		
	200m South of H	2011									-										-		
		2012	18,767		2.05%						18,767	18,764	3		0.0%						3	0.01%	
		2013	19,321		1.99%																-		0.01%
		2014	19,899																		-		
		2015	19,902							2%										0.0%	-		
		2016	20,403																		-		
		2018		21,200		385.3	-756,335.80														-		
		2028		25,053				1.68%										0.0%			-		0.01%
		2038																			-		
Murphy's Creek Road	32655	2010									-										-		
	Approx 300m Ea	2011									-										-		
		2012	3,005		1.34%						3,005	3,005	0		22914.3%						0	0.01%	
		2013	3,005		1.34%						3,005	2,998	7		679.0%						7	0.22%	23.66%
		2014	2,930		1.38%						2,930	-75	3,005		1.5%						3,005	102.56%	
		2015	2,930		1.38%					1%	2,930	2,481	449		10.1%					4.3%	449	15.31%	
		2016	3,244		1.24%						3,244	3,237	7		672.0%						7	0.21%	
		2018		3,184		40.3	-78,141.40				3,184			875		45.5	-90,933.57				875	27.49%	
		2028		3,587				1.20%			3,587			1,330				4.3%			1,330	37.09%	38.42%
		2038		3,990				1.13%			3,990			1,785							2,022	50.67%	
Murphy's Creek Road	32147	2010									-		6								6		
	750m West of M	2011									-		1								1		
		2012	1,543		2.61%																-		
		2013	1,543		2.61%																-		-
		2014	1,532		2.63%																-		
		2015	1,532		2.63%					3%										0.0%	-		
		2016	1,859		2.17%																-		
		2018		1,850		62.1	-123,467.60														-		
		2028		2,471				2.94%										0.0%			-		-
		2038		3,092				2.60%													-		
Murphy's Creek Road	32055	2010									-										-		
	150m South of H	2011									-										-		
		2012	1,722		4.47%						1,722	1,722	0		21195.8%						0	0.01%	
		2013	1,981		3.89%						1,981	1,972	9		229.0%						9	0.47%	23.25%
		2014	1,895		4.06%						1,895	-86	1,981		1.1%						1,981	104.54%	
		2015	1,895		4.06%					3.00%	1,895	1,690	205		10.4%					3.5%	205	10.80%	
		2016	2,150		3.58%						2,150	2,141	9		235.6%						9	0.42%	
		2018		2,237		77.0	-153,149.40				2,237			526		21.3	-42,505.22				526	23.52%	
		2028		3,007				3.00%			3,007			739				3.5%			739	24.59%	25.21%
		2038		3,777				2.65%			3,777			953							1,039	27.51%	

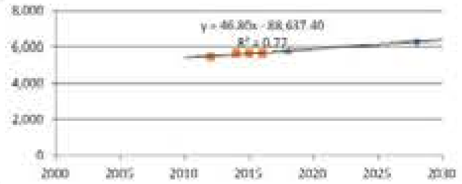
Location & Year			Annual Average Daily Traffic (AADT) growth rates							Heavy Vehicles (HV) percent projections											
Segment	Station Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %	Final Growth Rate: %	Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth: %	Final Growth Rate: %	Projected HV: Estimated HV	Percent of HV: %	Final Percent of HV: Average %
Cunningham Highway	135782	2010								-									-		
	0.8k West of Ripl	2011								-									-		
		2012	16,130		2.06%					16,130	16,129	1		9373.3%					1	0.01%	
		2013	16,930		1.96%					16,930	16,915	15		632.3%					15	0.09%	20.46%
		2014	17,504		1.90%				1.67%	17,504	574	16,930		0.6%				2.2%	16,930	96.72%	
		2015	17,504		1.90%					17,504	16,560	944		10.2%					944	5.39%	
		2016	17,504		1.90%					17,504	17,488	16		598.0%					16	0.09%	
		2018		18,443		332.2	-651,936.40			18,443			3,965		95.9	-189,471.98			3,965	21.50%	
		2028		21,765				1.67%		21,765			4,923				2.2%		4,923	22.62%	22.83%
		2038		25,087				1.55%		25,087			5,882						6,113	24.37%	
Cunningham Highway	135773	2010								-									-		
	At Warrill Ck	2011								-									-		
		2012	16,096		-0.81%					16,096	16,096	1		11848.8%					1	0.01%	
		2013	19,981		-0.65%					19,981	19,966	15		967.4%					15	0.08%	23.27%
		2014	18,582		-0.70%				-0.78%	18,582	-1,399	19,981		0.7%				2.7%	19,981	107.53%	
		2015	16,959		-0.76%					16,959	15,490	1,469		10.0%					1,469	8.66%	
		2016	16,959		-0.76%					16,959	16,947	12		1235.6%					12	0.07%	
		2018		17,197		-129.6	278,729.80			17,197			4,886		147.5	-292,835.92			4,886	28.41%	
		2028		15,901				-0.78%		15,901			6,361				2.7%		6,361	40.00%	41.71%
		2038		14,605				-0.81%		14,605			7,837						8,282	56.71%	
Cunningham Highway	131819	2010								-									-		
	west of Champio	2011								-									-		
		2012	5,493		0.85%					5,493	5,493	0		12156.7%					0	0.00%	
		2013								-	-24	24		108.2%					24	#DIV/0!	#DIV/0!
		2014	5,675		0.82%				0.78%	5,675	-631	6,306		0.4%				1.7%	6,306	111.12%	
		2015	5,675		0.82%					5,675	5,437	238		11.1%					238	4.19%	
		2016	5,675		0.82%					5,675	5,650	25		104.4%					25	0.45%	
		2018		5,805		46.8	-88,637.40			5,805			1,424		26.4	-51,768.05			1,424	24.53%	
		2028		6,273				0.78%		6,273			1,688				1.7%		1,688	26.91%	27.04%
		2038		6,741				0.75%		6,741			1,951						2,000	29.67%	
River Road	136249	2010								-									-		
	Between Queen	2011								-									-		
		2012	-							-									-	#VALUE!	
		2013	-							-									-	#VALUE!	#VALUE!
		2014	-							-								0.0%	-	#VALUE!	
		2015	6,611		69.73%					6,611									-	0.00%	
		2016	6,495		70.97%					6,495									-	0.00%	
		2018				-116.0	240,351.00			-										#DIV/0!	
		2028						0.00%		-			-				0.0%		-	#DIV/0!	#DIV/0!
		2038						0.00%		-			-							#DIV/0!	
Pacific Highway	12205	2010								-									-		
	Hotham Ck and (	2011								-											
		2012	135,414		3.23%					135,414	135,397	17		-15039.3%					17	0.01%	
		2013	138,279		3.16%					138,279	138,279								-	0.00%	21.29%
		2014	144,437		3.03%				2.19%	144,437	6,158	138,279		-1.9%				-20.6%	138,279	95.74%	
		2015	148,511		2.95%					148,511	132,653	15,858		-16.4%					15,858	10.68%	
		2016	152,177		2.88%					152,177	152,169	9		30521.6%					9	0.01%	
		2018		161,267		4,375.8	-8,669,097.60			161,267			28,812		-2,594.3	5,264,178.59			28,812	17.87%	
		2028		205,025				2.43%		205,025			2,869				-20.6%		2,869	1.40%	6.46%
		2038		248,783				2.19%		248,783			-23,075						286	0.11%	
Pacific Highway	11640	2010								-									-		
	North of Coomba	2011								-									-		
		2012	143,920							143,920									-		
		2013	146,357		3.49%					146,357	146,357	-							-	0.00%	0.00%
		2014	142,092						2.65%	142,092	-4,265	146,357		-7.1%				0.0%	146,357		
		2015	157,678							157,678											
		2016	163,823		3.12%					163,823	163,823	-							-	0.00%	
		2018		171,225		5,112.7	-10,146,203.80			171,225			10,454		-10,454.1	21,106,770.21			10,454	6.11%	
		2028		222,352				2.65%		222,352			-94,087				0.0%		10,454	4.70%	4.88%
		2038		273,479				2.37%		273,479			-198,627						10,454	3.82%	

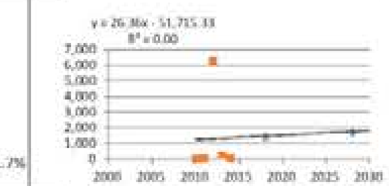


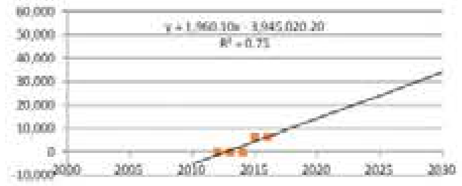


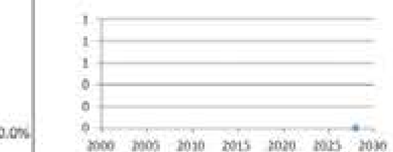


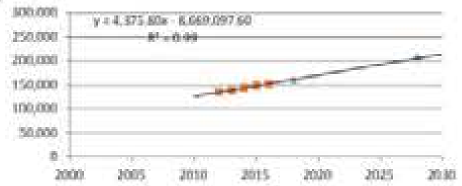


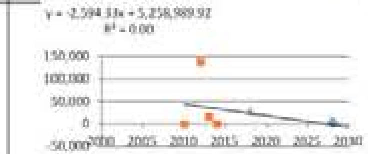


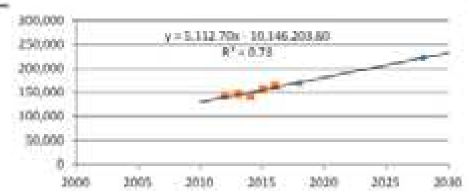


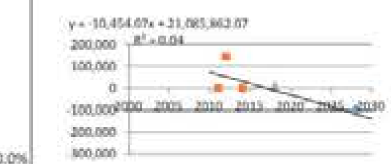




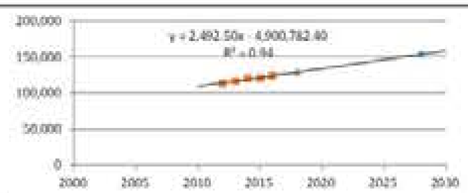


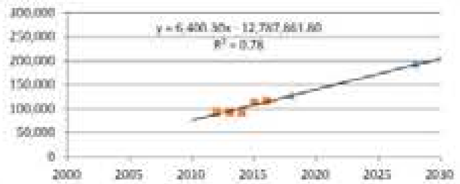


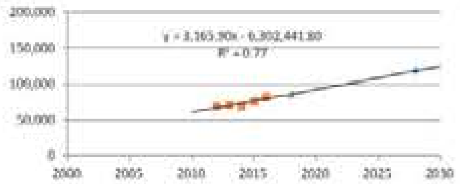


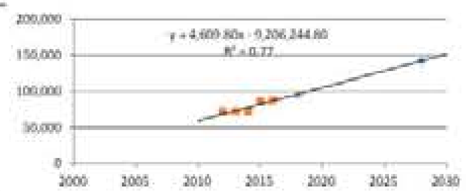


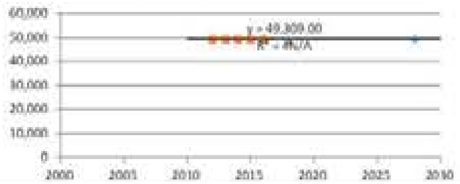
Location & Year			Annual Average Daily Traffic (AADT) growth rates							Heavy Vehicles (HV) percent projections											
Segment	Station Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year %	Final Growth Rate %	Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth %	Final Growth Rate %	Projected HV: Estimated HV	Percent of HV %	Final Percent of HV: Average %
Pacific Highway	11641	2010								-									-		
	North of VMS Sit	2011								-									-		
		2012	113,750							113,750									-		
		2013	116,244		2.14%					116,244	116,244	-							-	0.00%	0.00%
		2014	120,823						1.65%	120,823	4,579	116,244		-7.1%				0.0%	116,244		
		2015	120,823							120,823									-		
		2016	123,923		2.01%					123,923	123,923	-							-	0.00%	
		2018		129,083		2,492.5	-4,900,782.40			129,083			8,303		-8,303.1	16,764,045.43			8,303	6.43%	
		2028		154,008				1.78%		154,008			-74,728				0.0%		8,303	5.39%	5.49%
		2038		178,933				1.65%		178,933			-157,760						8,303	4.64%	
Pacific Highway	11399	2010								-									-		
	Between Neilsen	2011								-									-		
		2012	94,036		6.81%					94,036	94,026	10		0.9%					10	0.01%	
		2013	94,036							94,036	94,026	10		0.9%					10		33.34%
		2014	94,036		6.81%				3.53%	94,036	-	94,036		0.0%				0.0%	94,036	100.00%	
		2015	113,097		5.66%					113,097	113,087	10		0.8%					10	0.01%	
		2016	116,507							116,507	116,497	10		0.9%					10		
		2018		127,944		6,400.3	-12,787,861.80			127,944			18,815		0.1	18,647.93			18,815	14.71%	
		2028		191,947				4.14%		191,947			18,816				0.0%		18,816	9.80%	10.62%
		2038		255,950				3.53%		255,950			18,817						18,817	7.35%	
Pacific Highway	10034	2010								-									-		
	Nth of Robina Pa	2011								-									-		
		2012	69,562		4.55%					69,562	69,555	7		10221.7%					7	0.01%	
		2013	70,572		4.49%					70,572	70,562	10		7343.8%					10	0.01%	22.24%
		2014	69,363		4.56%				2.79%	69,363	-1,209	70,572		1.0%				3.4%	70,572	101.74%	
		2015	76,459		4.14%					76,459	69,258	7,201		10.0%					7,201	9.42%	
		2016	82,448		3.84%					82,448	82,438	10		7343.8%					10	0.01%	
		2018		86,344		3,165.9	-6,302,441.80			86,344			18,439		719.7	-1,433,904.32			18,439	21.35%	
		2028		118,003				3.17%		118,003			25,636				3.4%		25,636	21.72%	22.30%
		2038		149,662				2.79%		149,662			32,833						35,642	23.81%	
Pacific Highway	11749	2010								-									-		
	M1 Between Pal	2011								-									-		
		2012	71,831		6.42%					71,831	71,823	8		10107.0%					8	0.01%	
		2013	71,831		6.42%					71,831	71,823	8		10121.8%					8	0.01%	21.98%
		2014	71,831		6.42%				3.41%	71,831	-	71,831		1.2%				3.7%	71,831	100.00%	
		2015	86,347		5.34%					86,347	77,816	8,531		10.0%					8,531	9.88%	
		2016	87,622		5.26%					87,622	87,614	8		10121.8%					8	0.01%	
		2018		96,332		4,609.8	-9,206,244.80			96,332			19,486		852.3	-1,700,364.72			19,486	20.23%	
		2028		142,430				3.99%		142,430			28,009				3.7%		28,009	19.67%	20.42%
		2038		188,528				3.41%		188,528			36,532						40,259	21.35%	
Pacific Highway	12058	2010								-									-		
	WIM Site Tugun	2011								-									-		
		2012	49,309		9.35%					49,309	49,304	5		11857.6%					5	0.01%	
		2013	49,309		9.35%					49,309	49,300	9		6454.2%					9	0.02%	22.30%
		2014	49,309		9.35%					49,309	-	49,309		1.1%				3.6%	49,309	100.00%	
		2015	49,309		9.35%					49,309	43,667	5,642		10.0%					5,642	11.44%	
		2016	49,309		9.35%					49,309	49,300	9		6454.2%					9	0.02%	
		2018		49,309		-	49,309.00			49,309			13,251		564.1	-1,125,100.27			13,251	26.87%	
		2028		49,309				0.00%		49,309			18,892				3.6%		18,892	38.31%	39.94%
		2038		49,309				0.00%		49,309			24,533						26,934	54.62%	
Average									2.0%									3.02%			

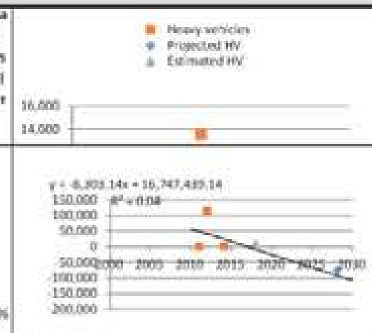


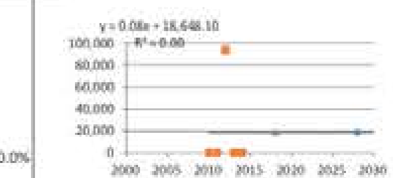
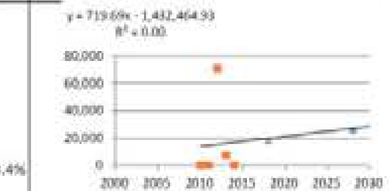
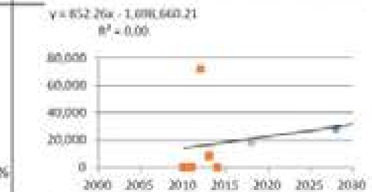
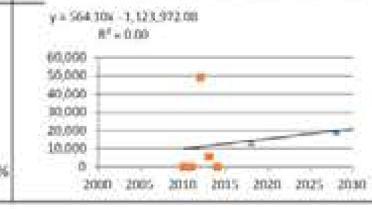










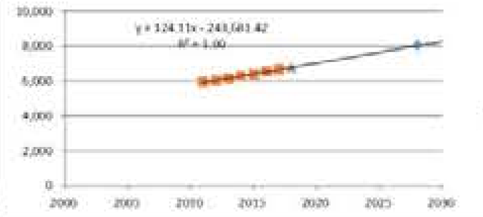
APPENDIX U

Traffic Impact Assessment

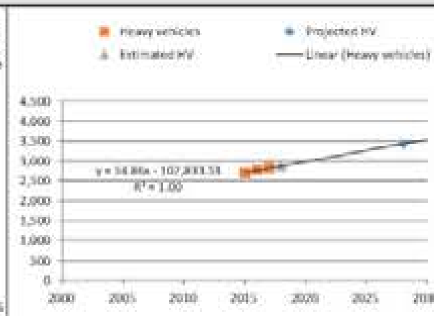
Appendix B Roads and Maritime Services traffic growth rates

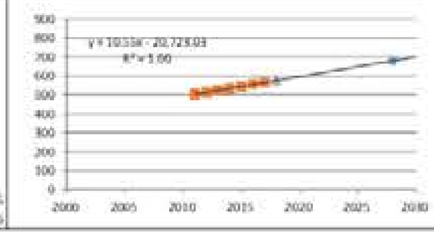
GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

Location & Year				Annual Average Daily Traffic (AADT) growth rates						
Segment	Station	Lanes	Year	Annual Average Daily Traffic: Historic AADT	Projected AADT: Estimated AADT	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %	Final Growth Rate: %
	6115		2011							
	Between QLD/ NS		2012							
			2013							
Pacific Motorway			2014							
			2015	7,497		2.02%				1.76%
			2016	7,647		1.98%				
			2017	7,800		1.94%				
			2018		7,951		151.4	-297,653.89		
			2028		9,465				1.76%	
			2038		10,980				1.67%	
	04331		2010							
	Between Trenayr I		2011	5,903						
			2012	6,021						
			2013	6,141						
Summerland Way			2014	6,264						1.73%
			2015	6,390		1.98%				
			2016	6,517		1.94%				
			2017	6,648		1.90%				
			2018		6,772		126.6	-248,624.14		
			2028		8,037				1.73%	
			2038		9,303				1.60%	
Average										1.74%



Location & Year		Heavy Vehicles (HV) percent projections											
Segment	Year	Total (all lanes) by vehicle type: Historic AADT	Light vehicles	Heavy vehicles	Projected HV: Estimated HV	Linear Growth Rate per year and equation used for projections (y=a*x+b): %	a	b	Equivalent Exponential Growth Rate per year: %	Final Growth Rate: %	Projected HV: Estimated HV	Percent of HV: %	Final Percent of HV: Average %
	2011		-								-		
	2012	-	-								-		
	2013	-	-	-							-		36.23%
Pacific Motorway	2014										-		
	2015	7,497	4,781	2,716		2.0%				1.8%	2,716	36.23%	
	2016	7,647	4,877	2,770		2.0%					2,770	36.23%	
	2017	7,800	4,974	2,826		1.9%					2,826	36.23%	
	2018	7,951			2,880		54.9	-107,833.53			2,880	36.23%	
	2028	9,465			3,429				1.8%		3,429	36.23%	36.55%
	2038	10,980			3,978				1.6%		4,082	37.18%	
	2010	5,903	5,903								-	0.00%	
	2011	6,021	5,519	502		2.1%					502	8.34%	
	2012	6,141	5,629	512		2.1%					512	8.34%	6.74%
	2013	6,141	5,619	522		2.0%					522	8.50%	
Summerland Way	2014	6,264	5,732	533		2.0%				1.7%	533		
	2015	6,390	5,846	543		1.9%					543	8.50%	
	2016	6,517	5,963	554		1.9%							
	2017	6,648	6,082	565		1.9%							
	2018	6,772			575		10.6	-20,723.03			575	8.50%	
	2028	8,037			681				1.7%		681	8.47%	8.54%
	2038	9,303			786				1.6%		806	8.66%	





APPENDIX

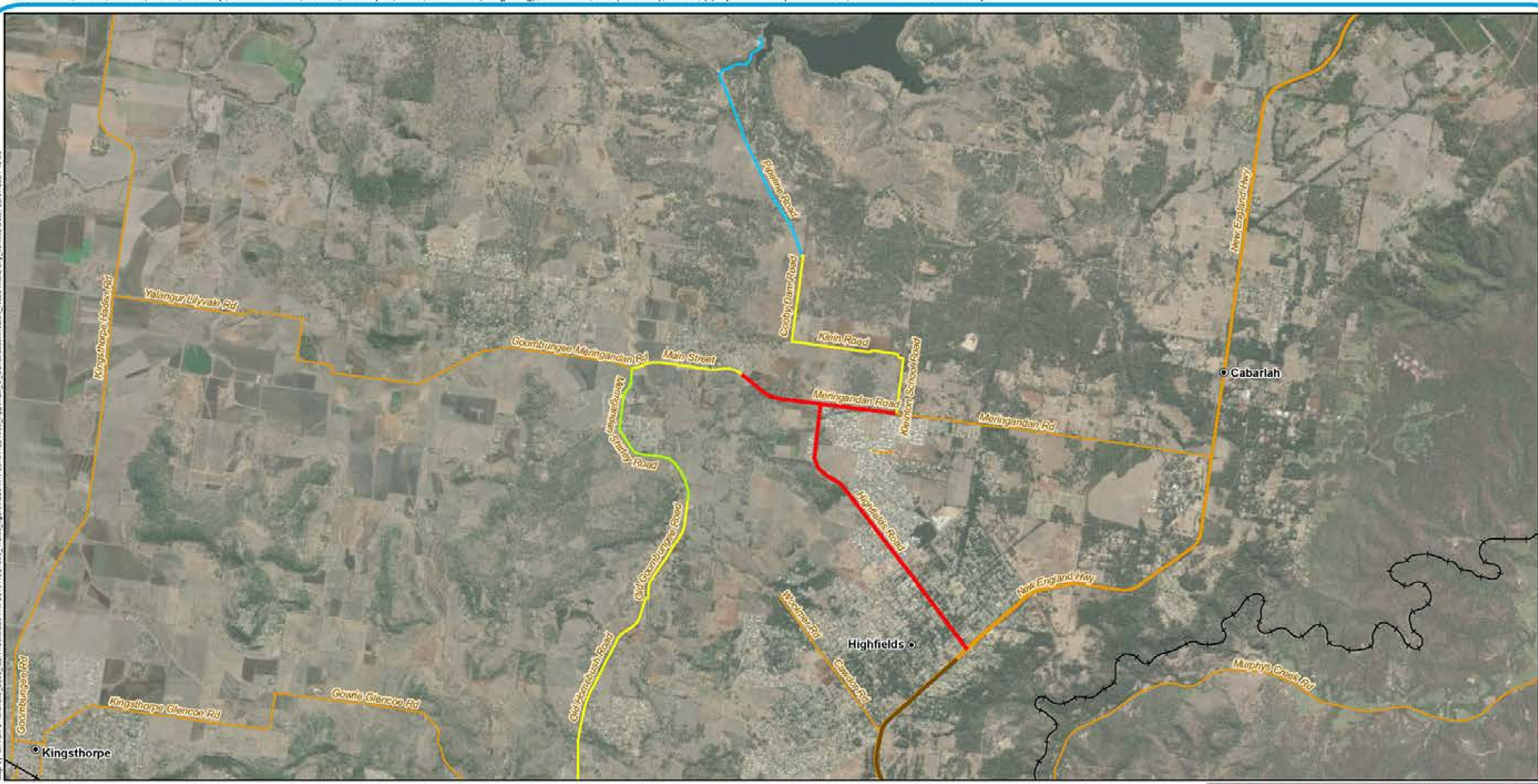
U

Traffic Impact Assessment

Appendix C Road hierarchy

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Rural arterial
- Rural collector
- Rural local
- Urban arterial
- Urban collector

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

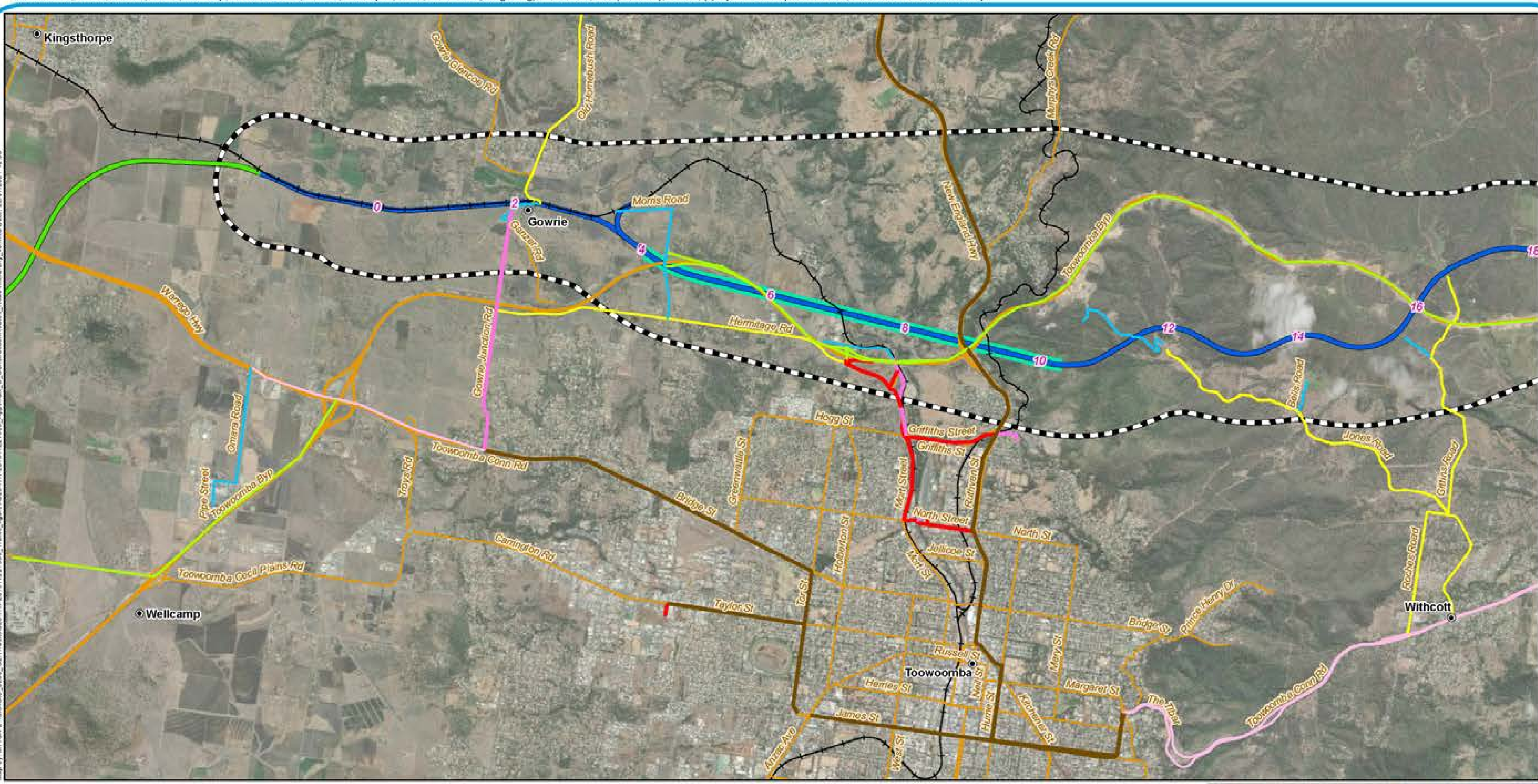
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C1: Construction routes - road hierarchy

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



Legend

- 5 Chainage (km)
- Localities
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Existing rail
- Tunnel
- EIS investigation corridor

Construction routes – road hierarchy

- Rural arterial
- Rural collector
- Rural local
- Rural motorway
- Urban arterial
- Urban collector
- Urban local

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

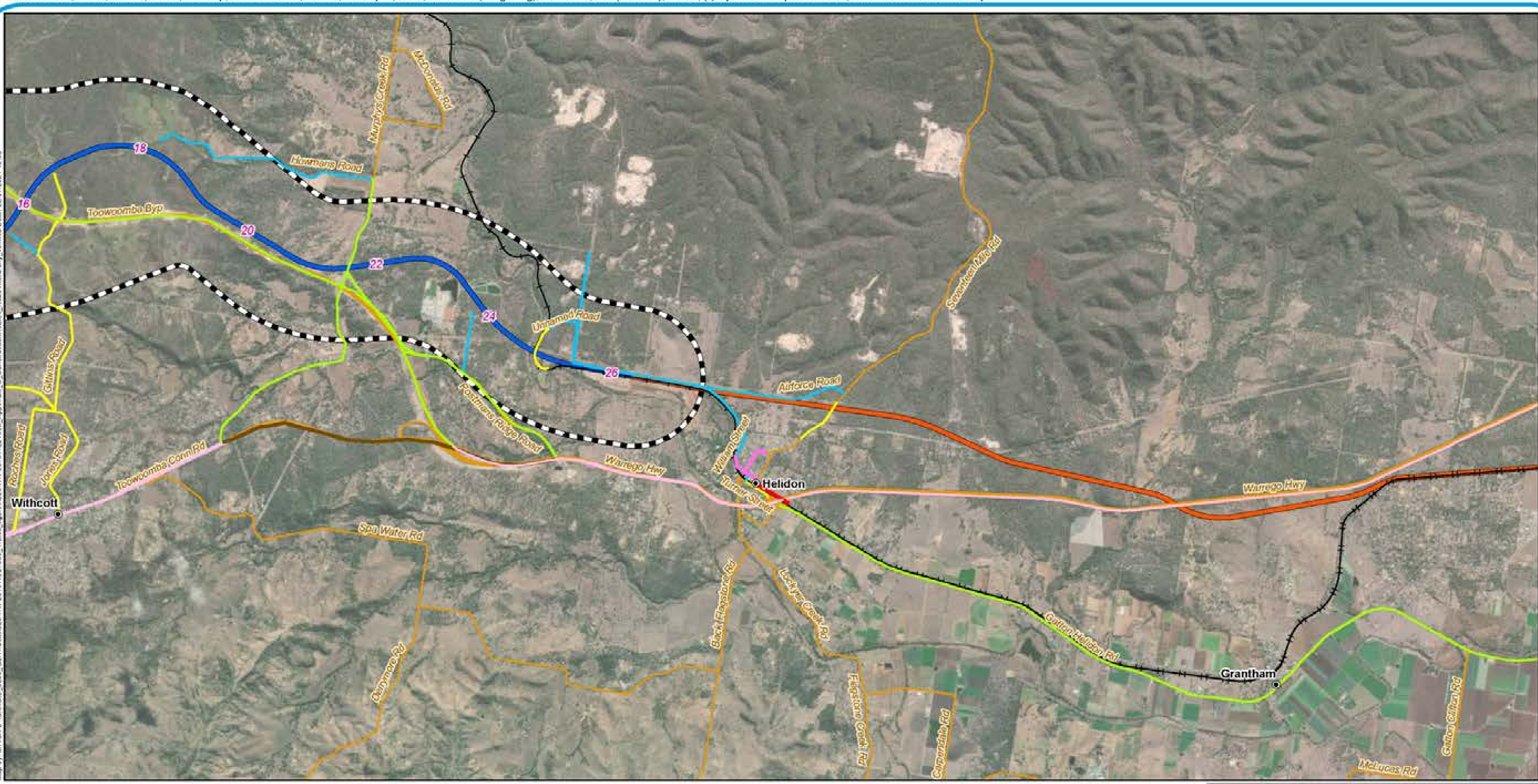
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C2: Construction routes - road hierarchy

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



Legend

- 5 Chainage (km)
- Localities
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- Existing rail
- EIS investigation corridor

Construction routes – road hierarchy

- Rural arterial
- Rural collector
- Rural local
- Rural motorway
- Urban arterial
- Urban collector
- Urban local

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

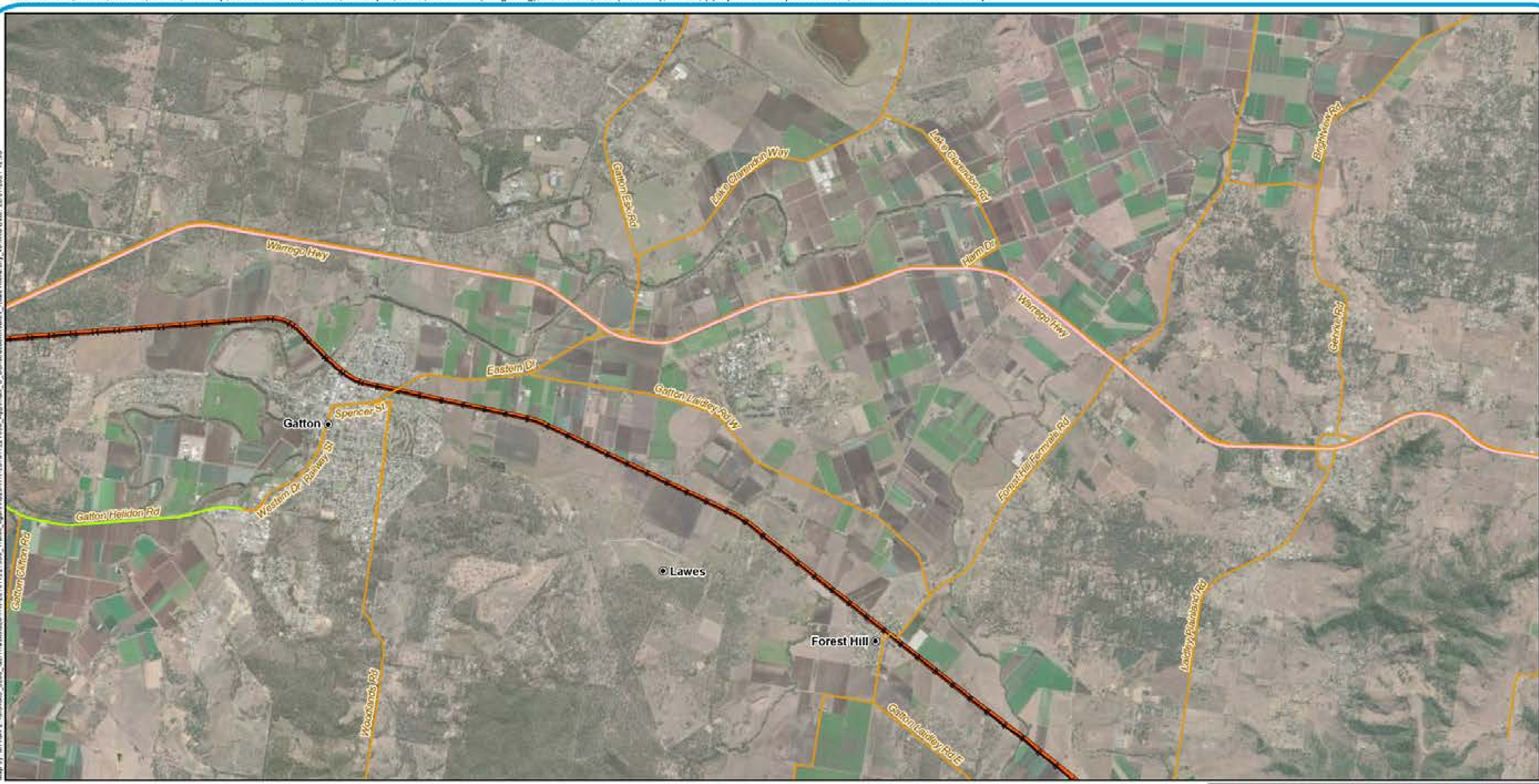
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C3:
Construction routes - road hierarchy

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



Legend

- Localities
- H2C project alignment
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Rural arterial
- Rural motorway

A3 scale: 1:60,000

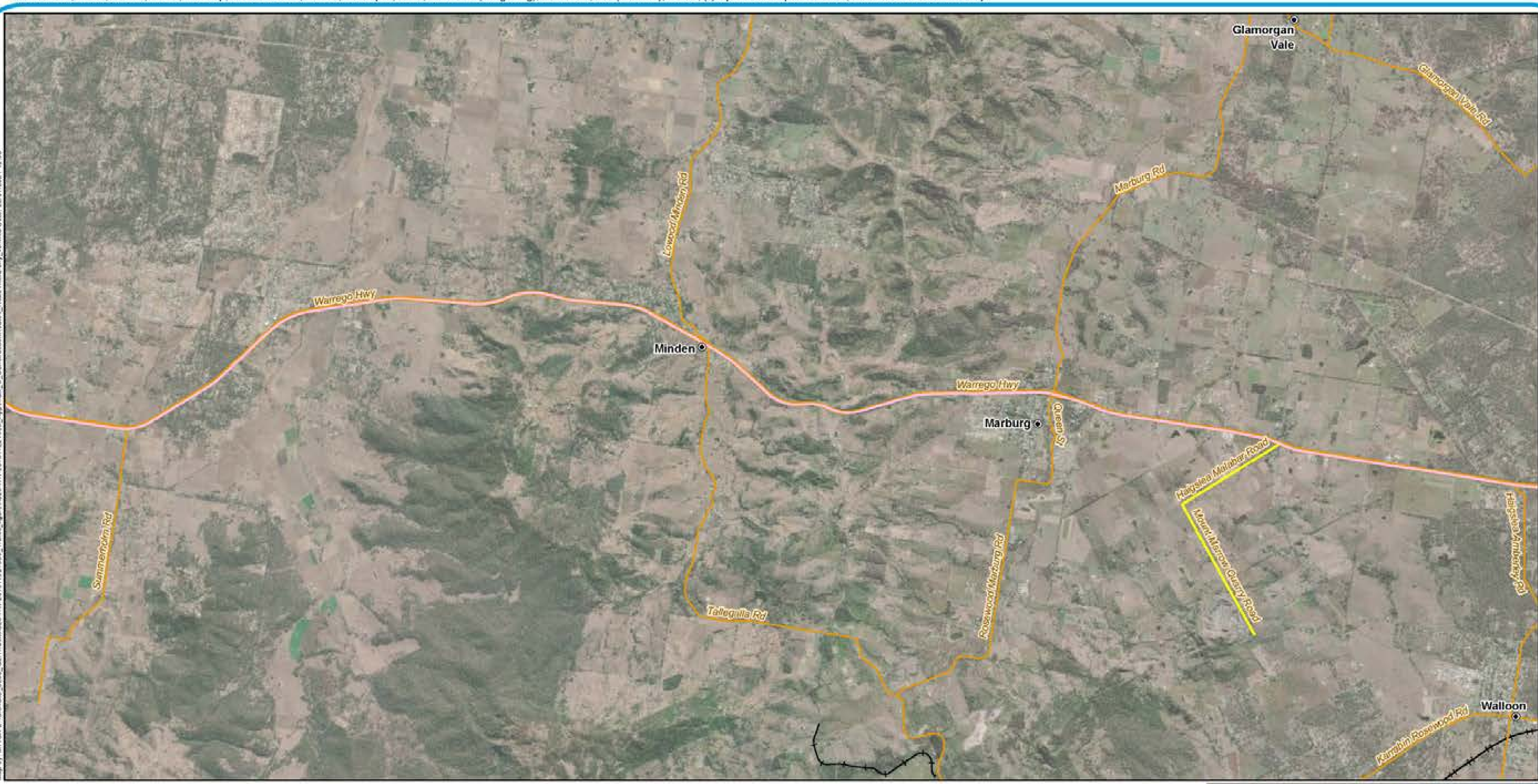
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix C4:
Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Rural collector
- Rural motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

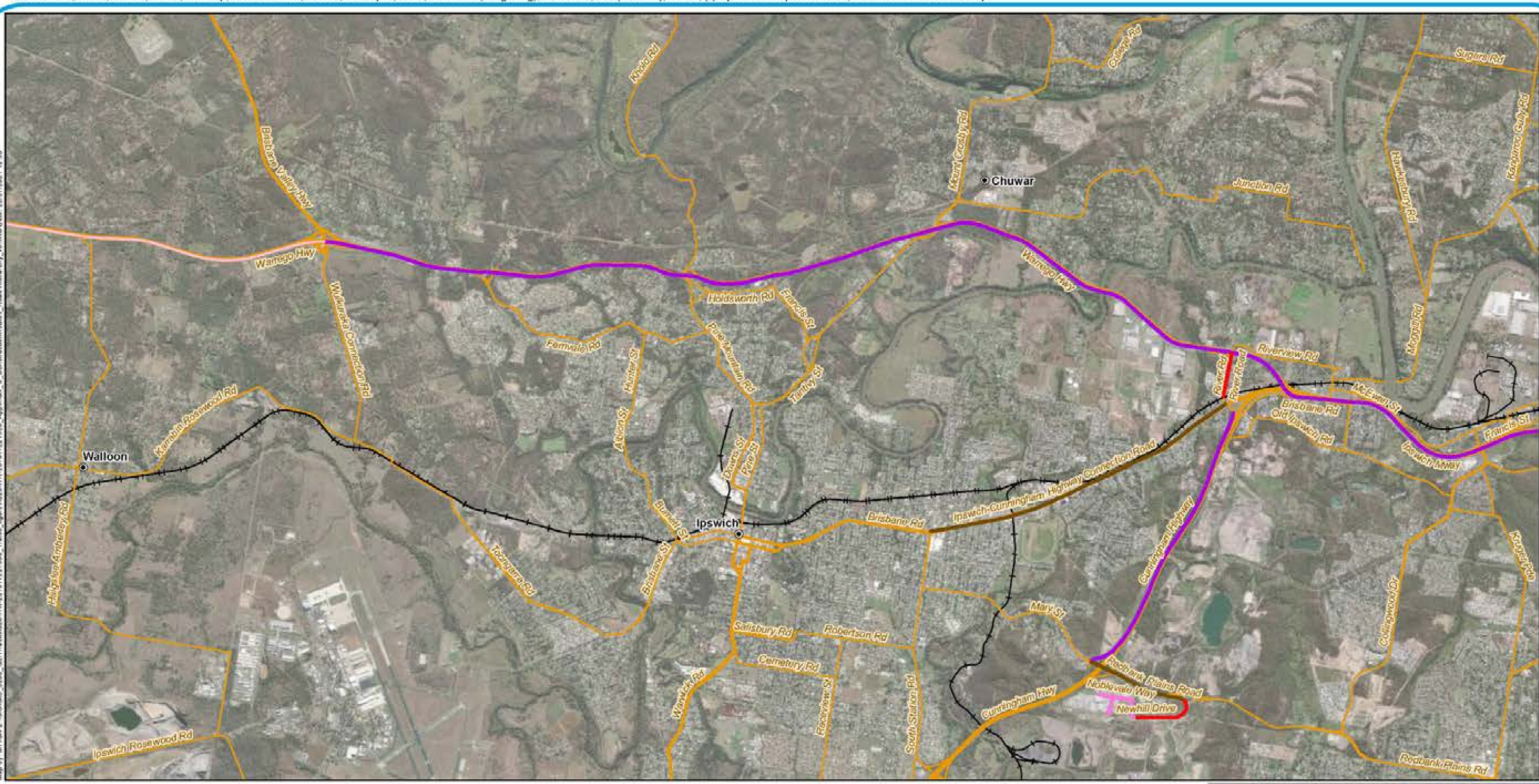
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C5:

Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Rural motorway
- Urban arterial
- Urban collector
- Urban local
- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

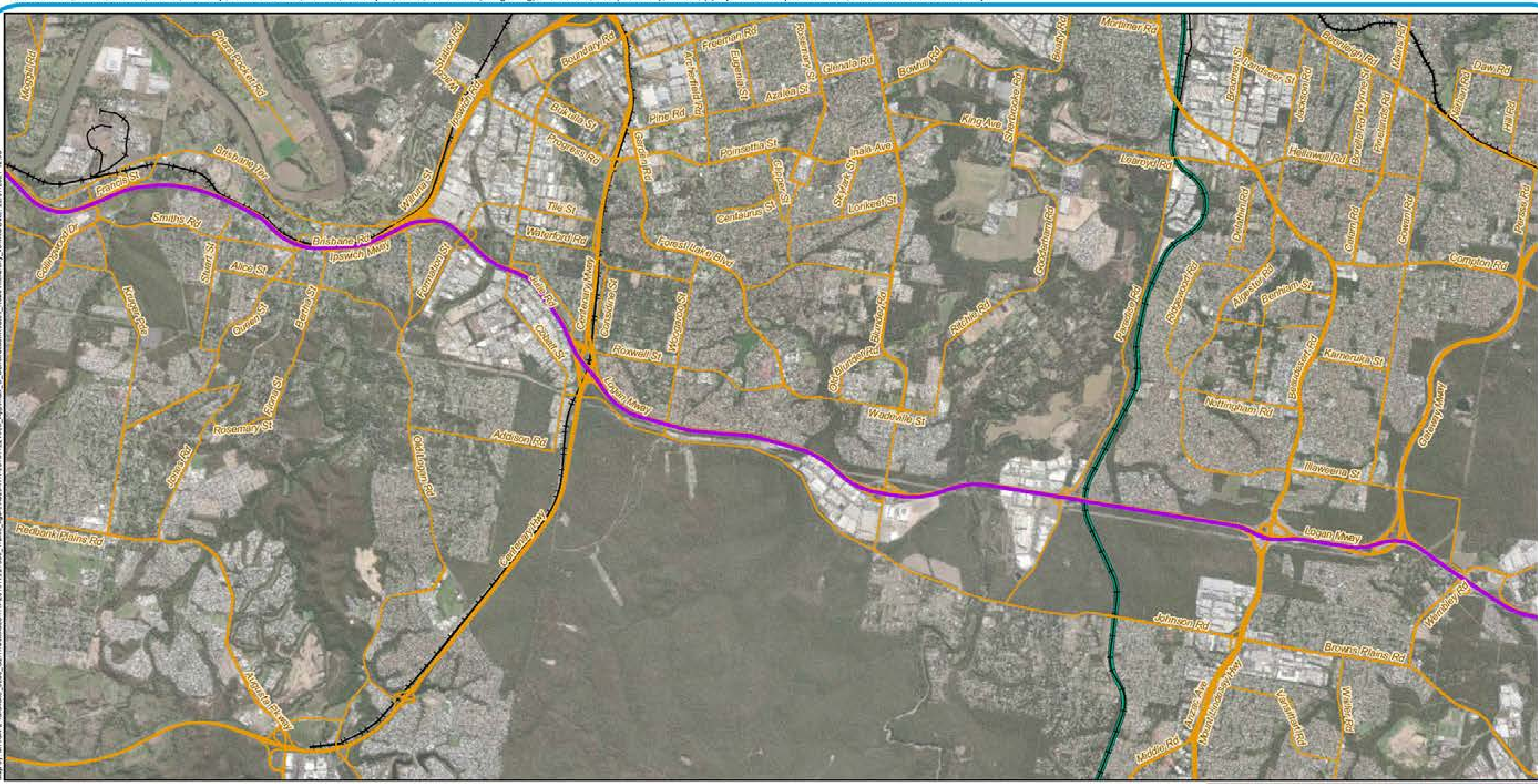
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C6:
Construction routes - road hierarchy

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



Legend

- K2ARB project alignment
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

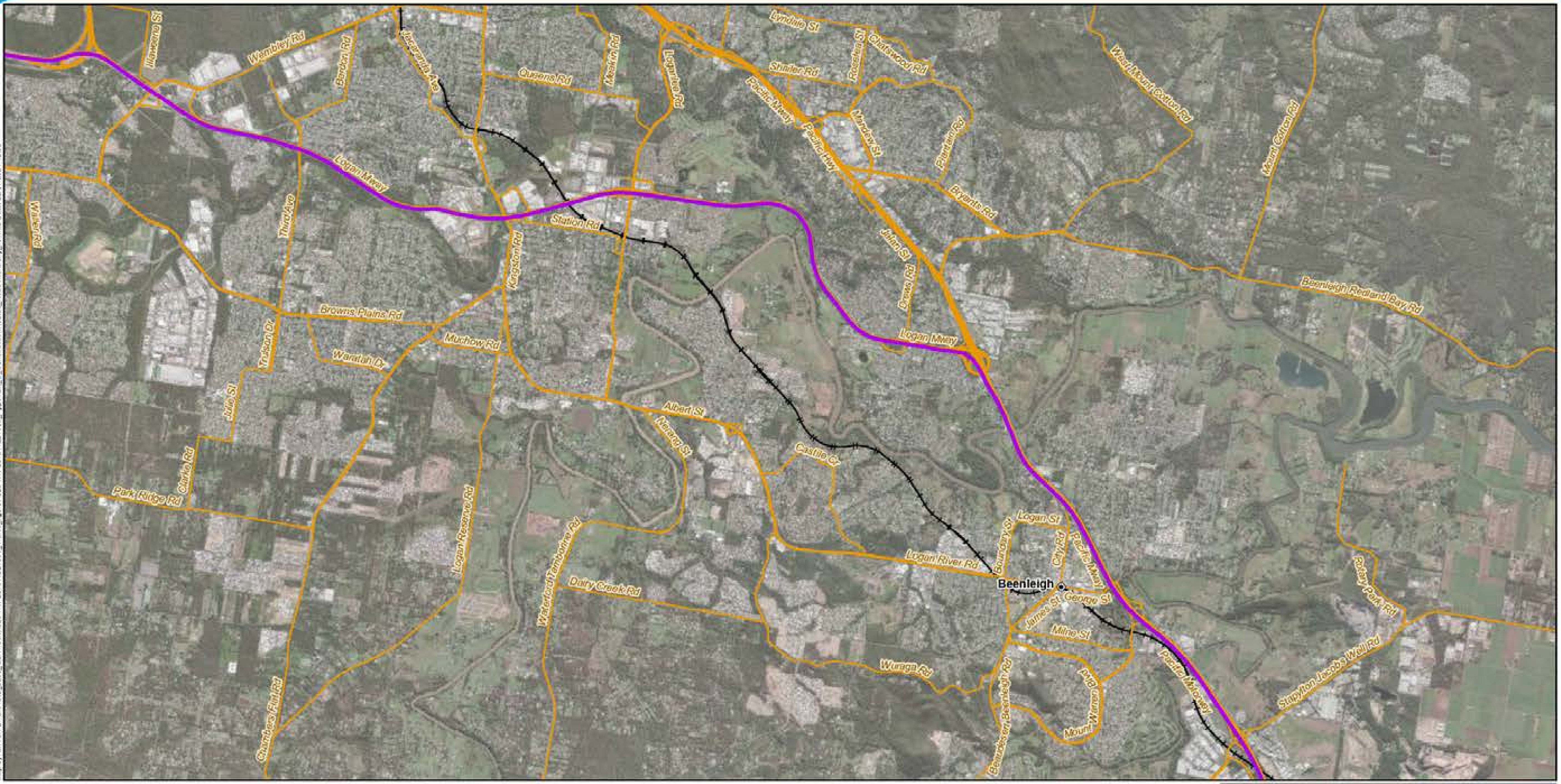
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C7:
Construction routes - road hierarchy



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

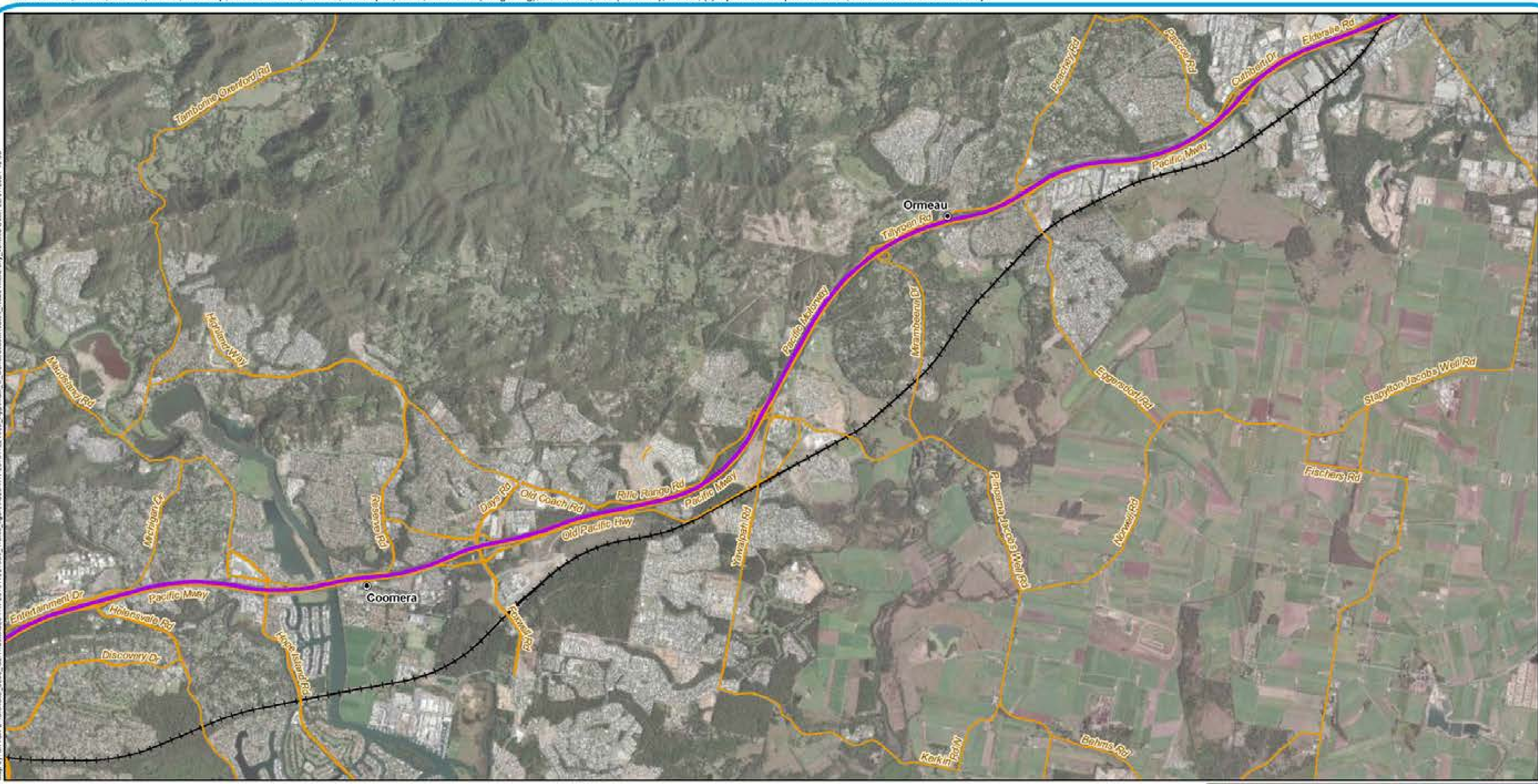
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C8:
Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

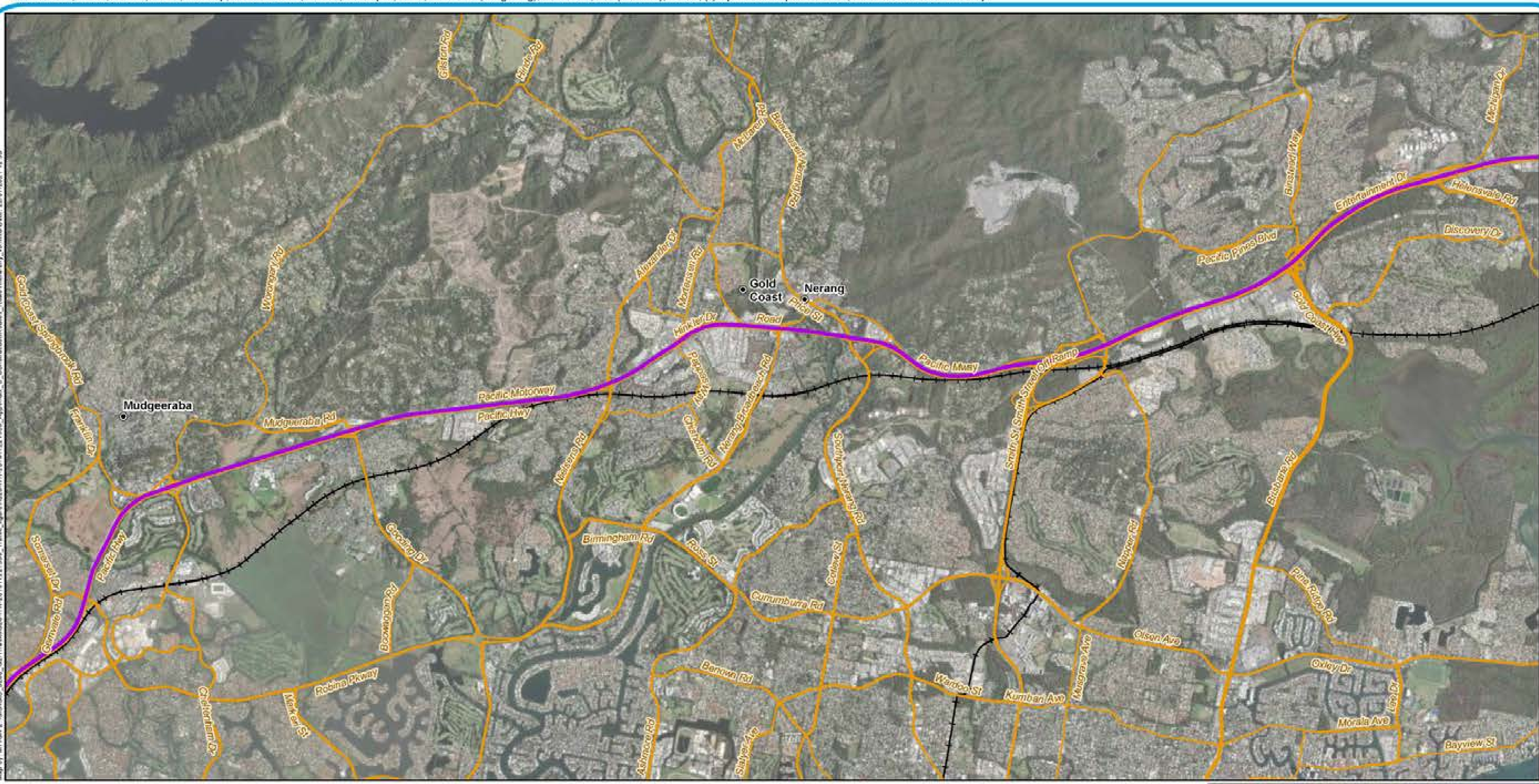
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C9:

Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads
- Existing rail

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

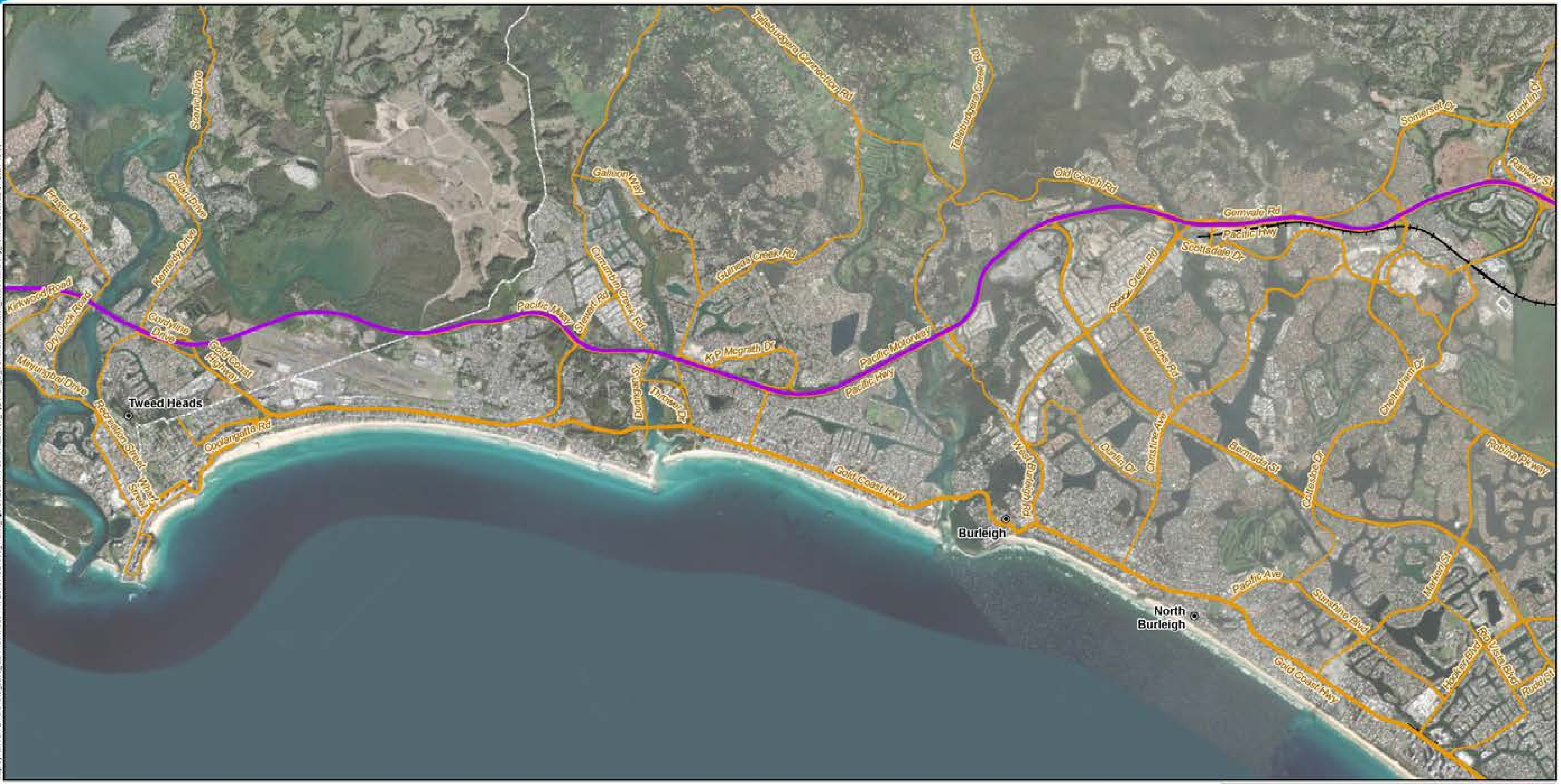
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C10:

Construction routes - road hierarchy

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



Map by: MFIGN 2 Y:\GIS\GIS_3200_G2H\Tasks\320-ITR-201911221559_Traffic_figures\320-ITR-201911221559_Appendix_C_ConstructionRoutes_Road Hierarchy_v3.mxd Date: 22/01/2021 12:33

Legend

- Localities
- Major roads
- Minor roads
- Existing rail
- QLD/NSW border

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

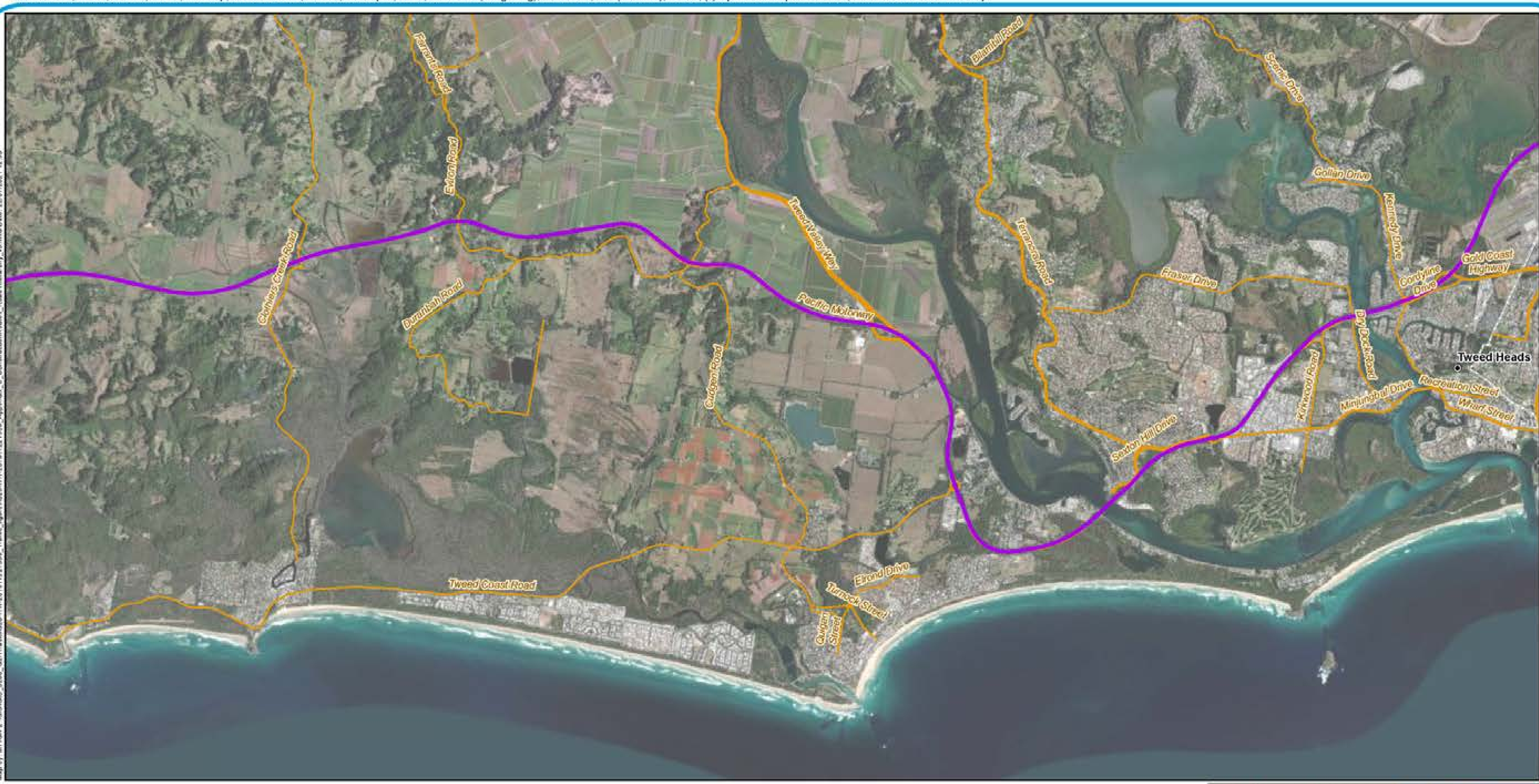
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C11:
Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads
- QLD/NSW border

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

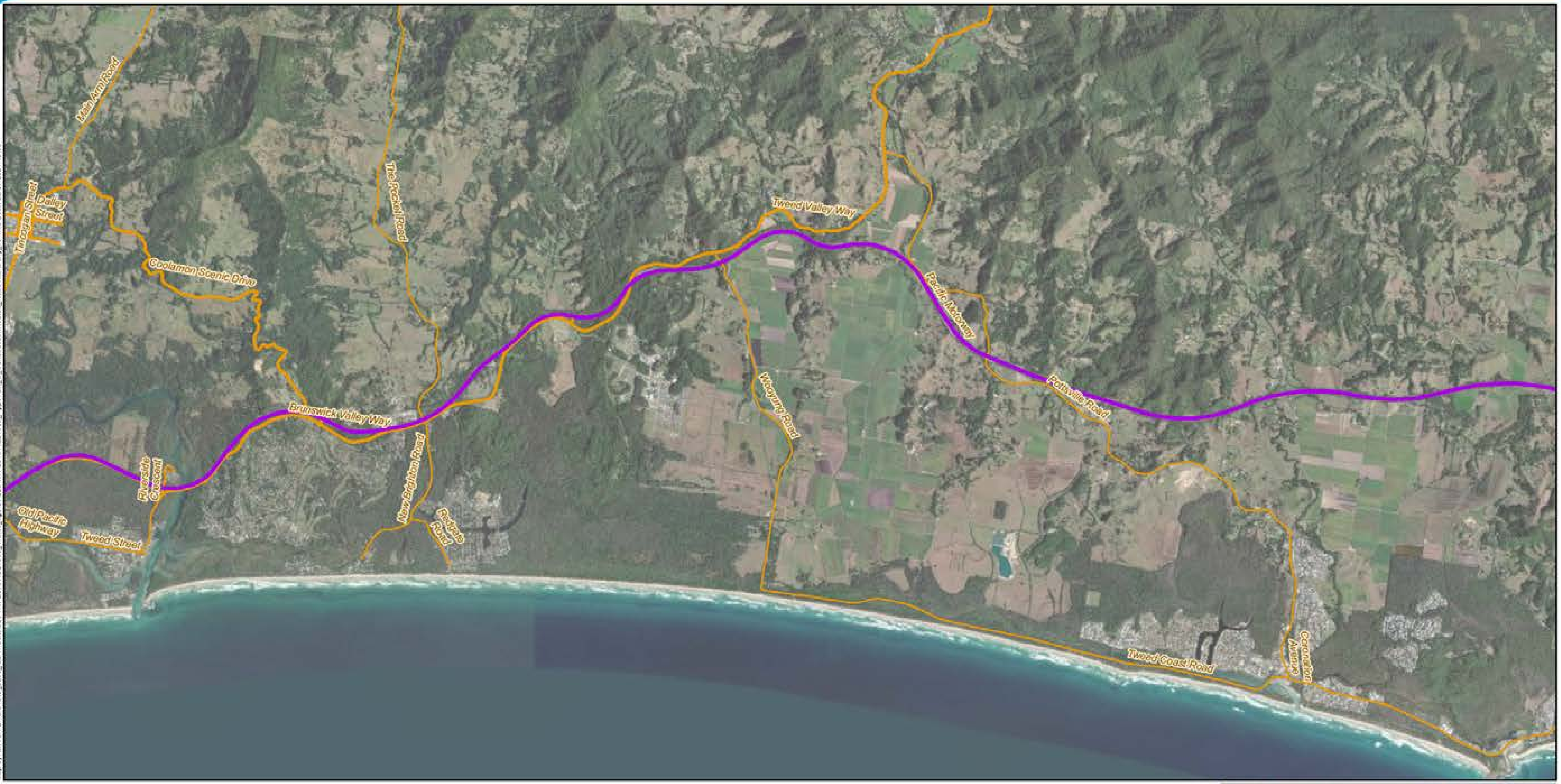
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C12:
Construction routes - road hierarchy

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



Legend

Major roads

Minor roads

Construction routes – road hierarchy

Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

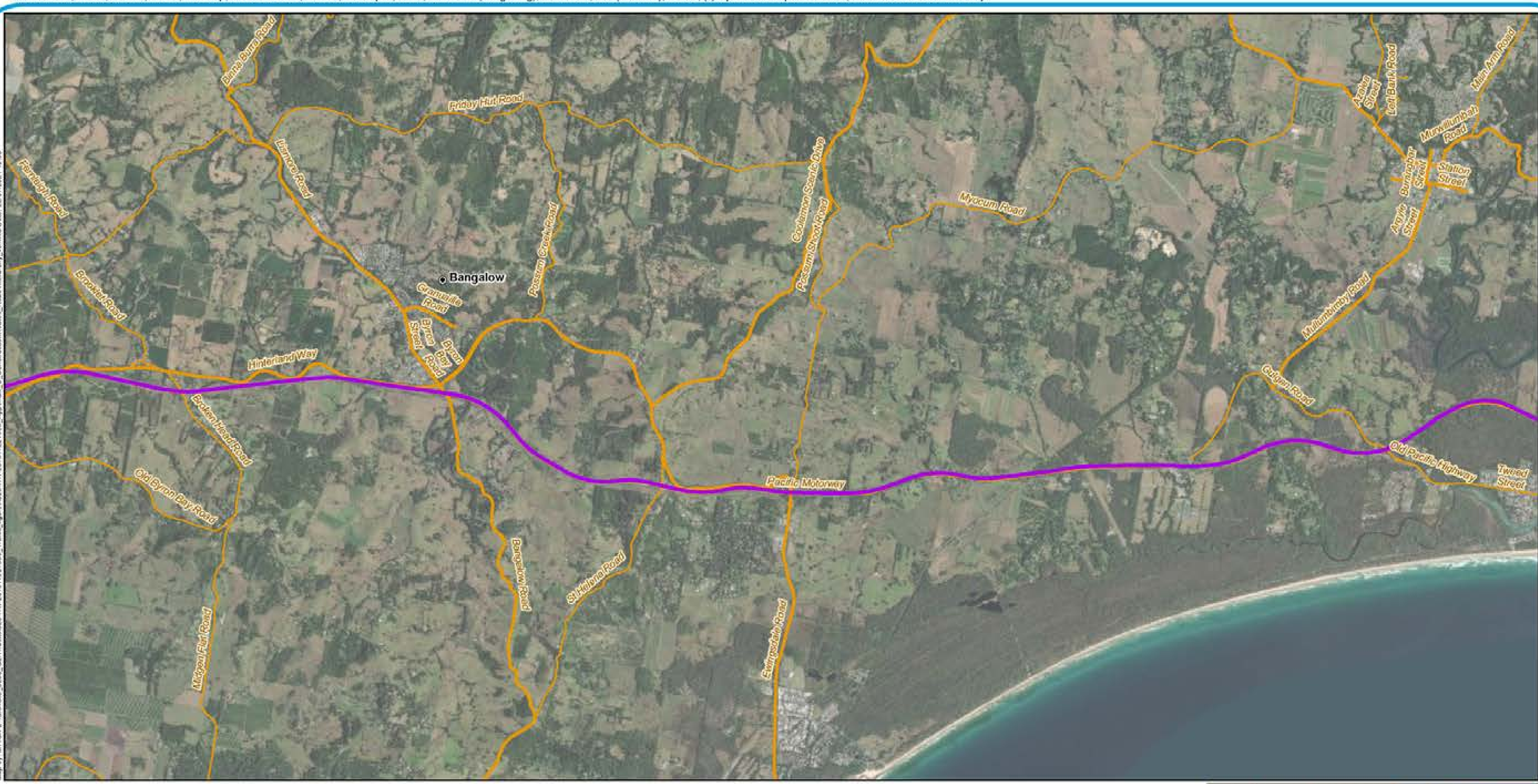
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C13: Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

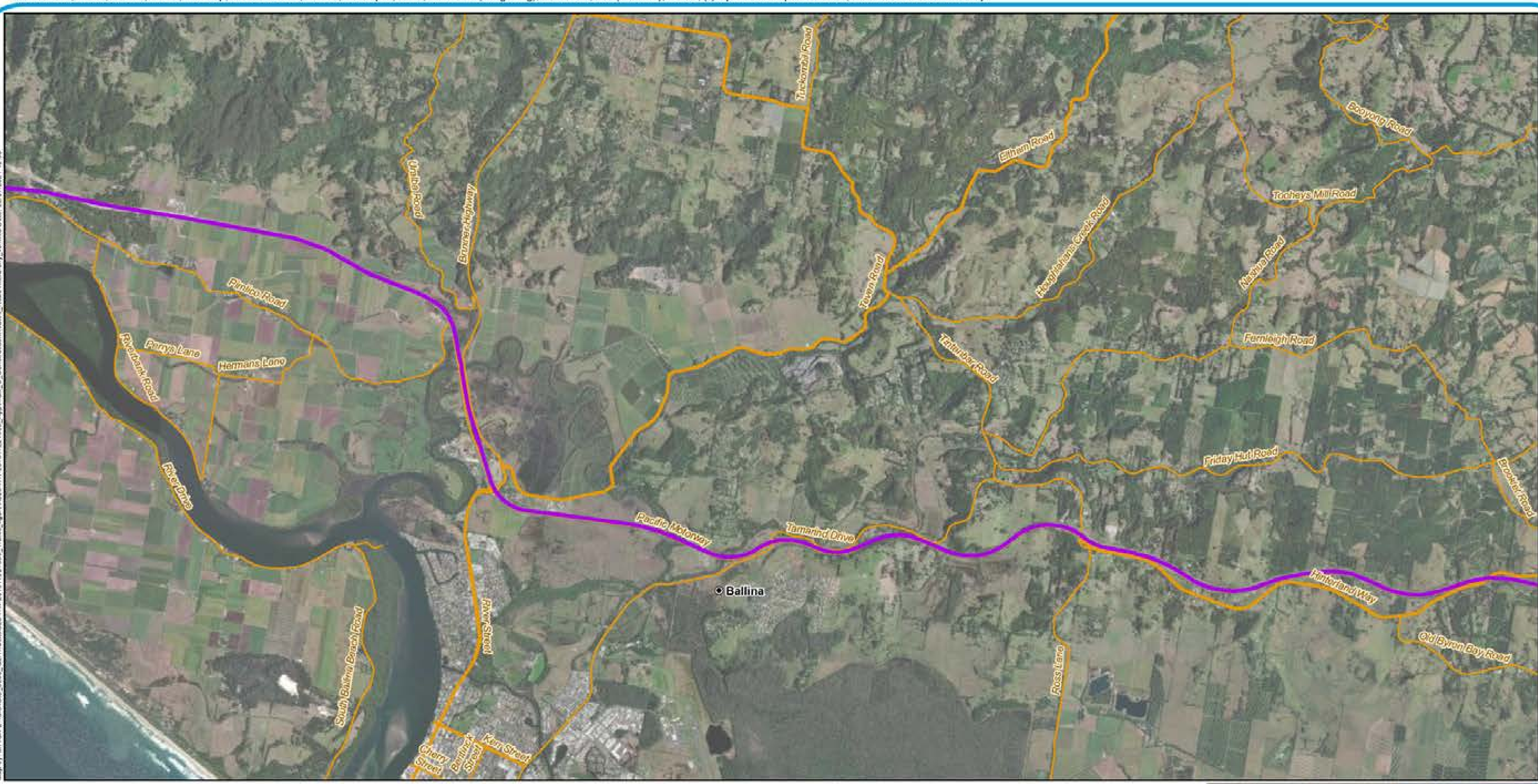
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix C14:
Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

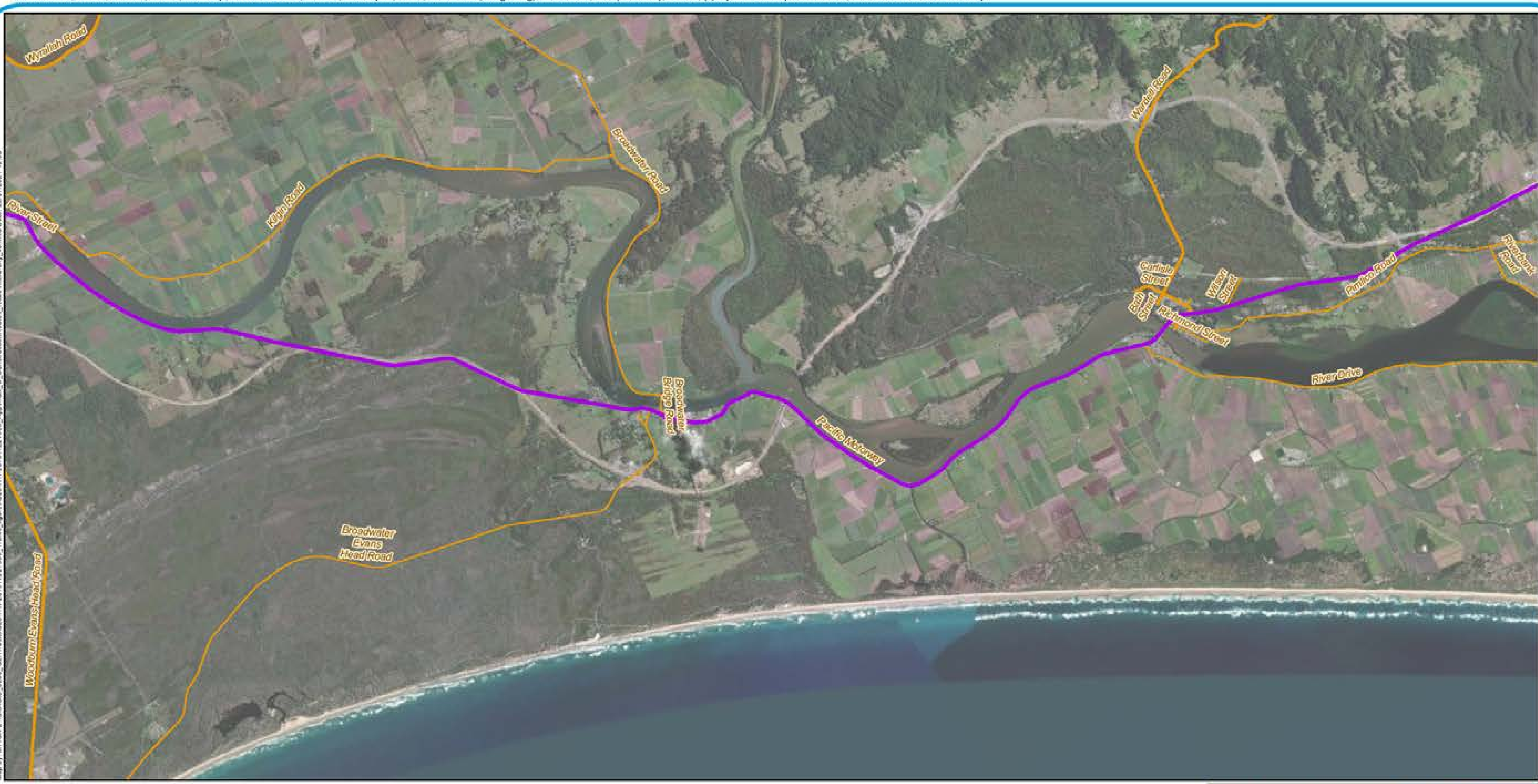
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C15:
Construction routes - road hierarchy

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



Legend

Major roads

Minor roads

Construction routes – road hierarchy

Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C16:
Construction routes - road hierarchy

Legend

- Localities
- Major roads
- Minor roads

Construction routes – road hierarchy

- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

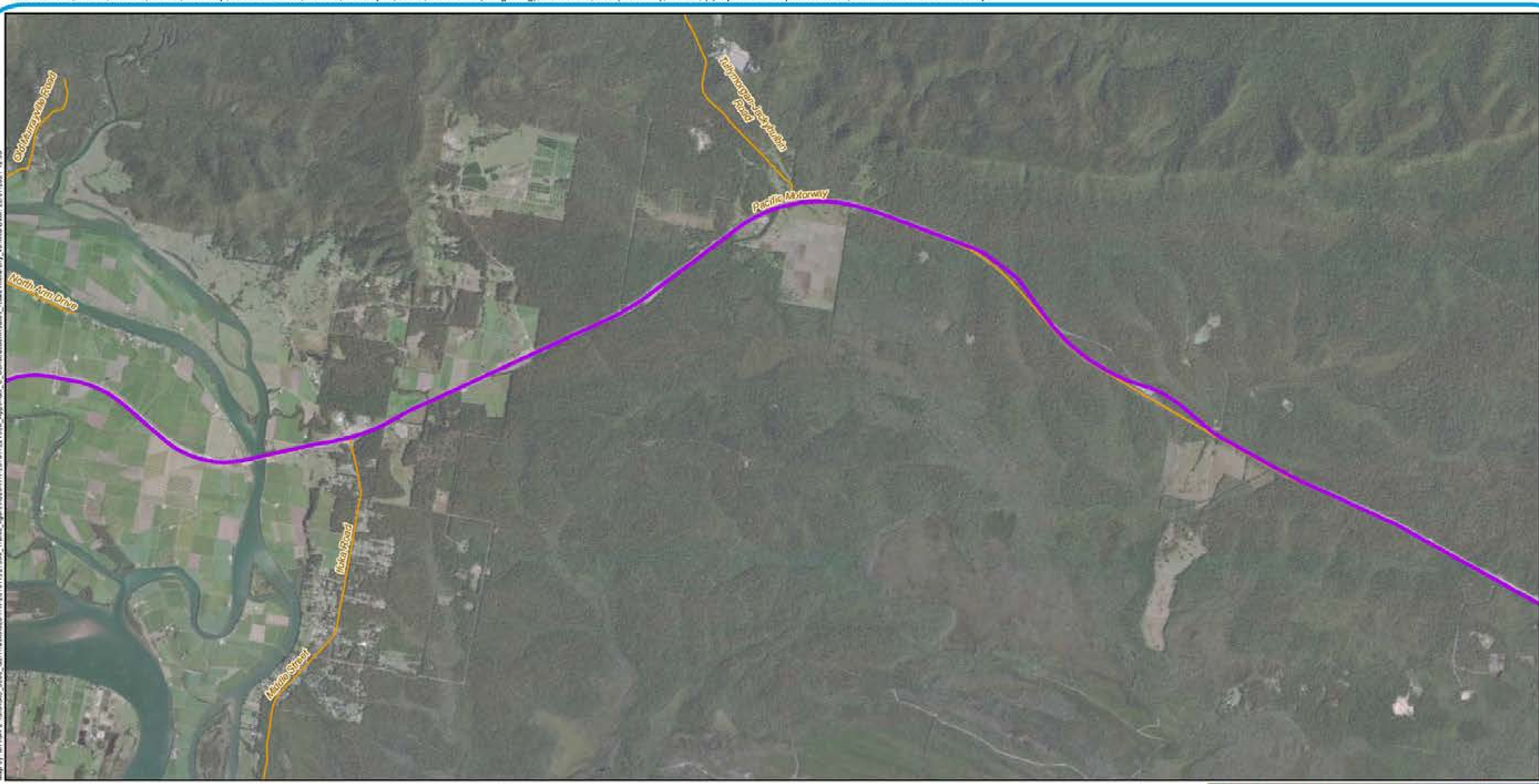
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C17:

Construction routes - road hierarchy

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



Legend

Major roads

Minor roads

Construction routes – road hierarchy

Urban motorway

A3 scale: 1:60,000

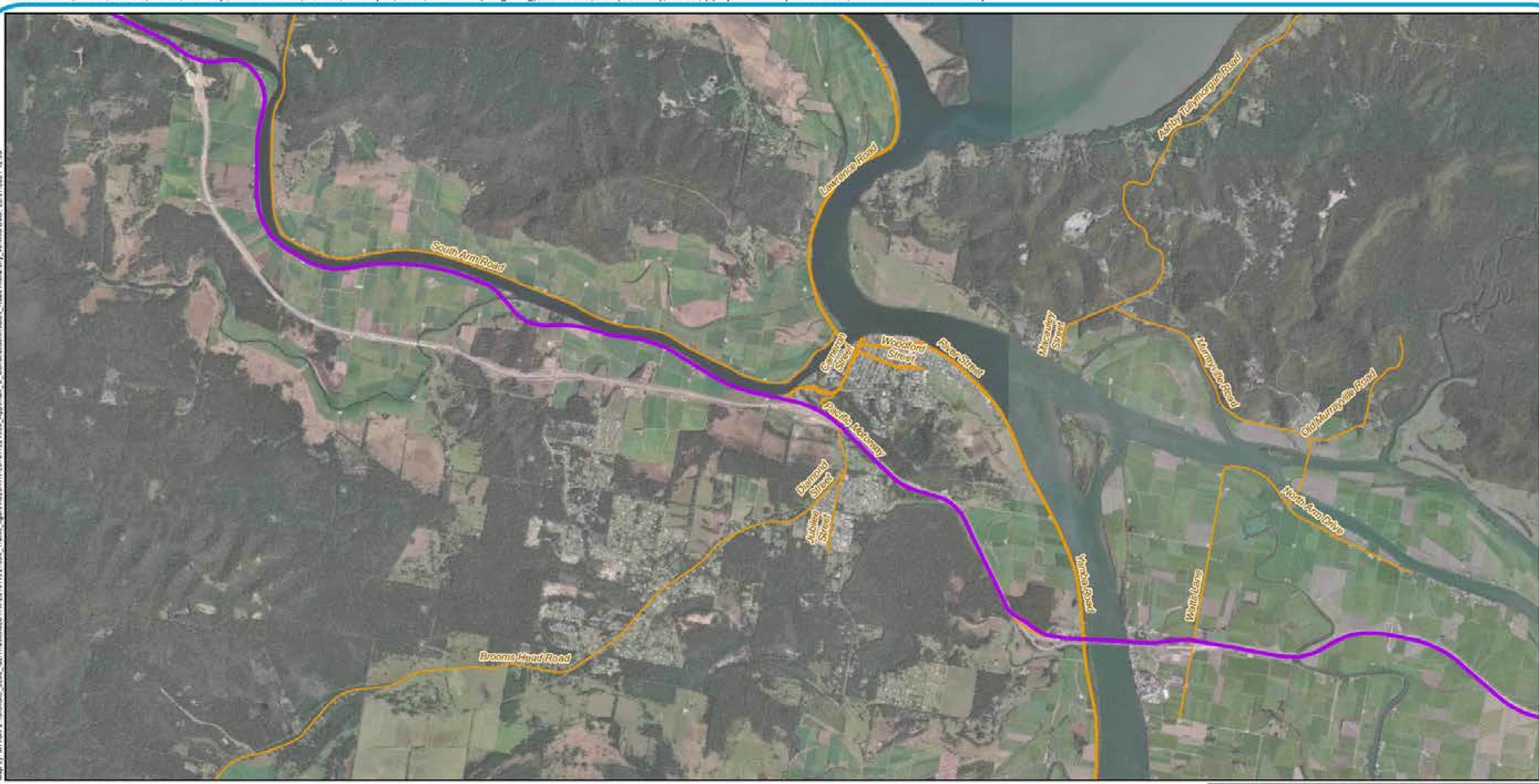
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix C18: Construction routes - road hierarchy

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



Legend

Major roads

Minor roads

Construction routes – road hierarchy

Urban motorway

A3 scale: 1:60,000

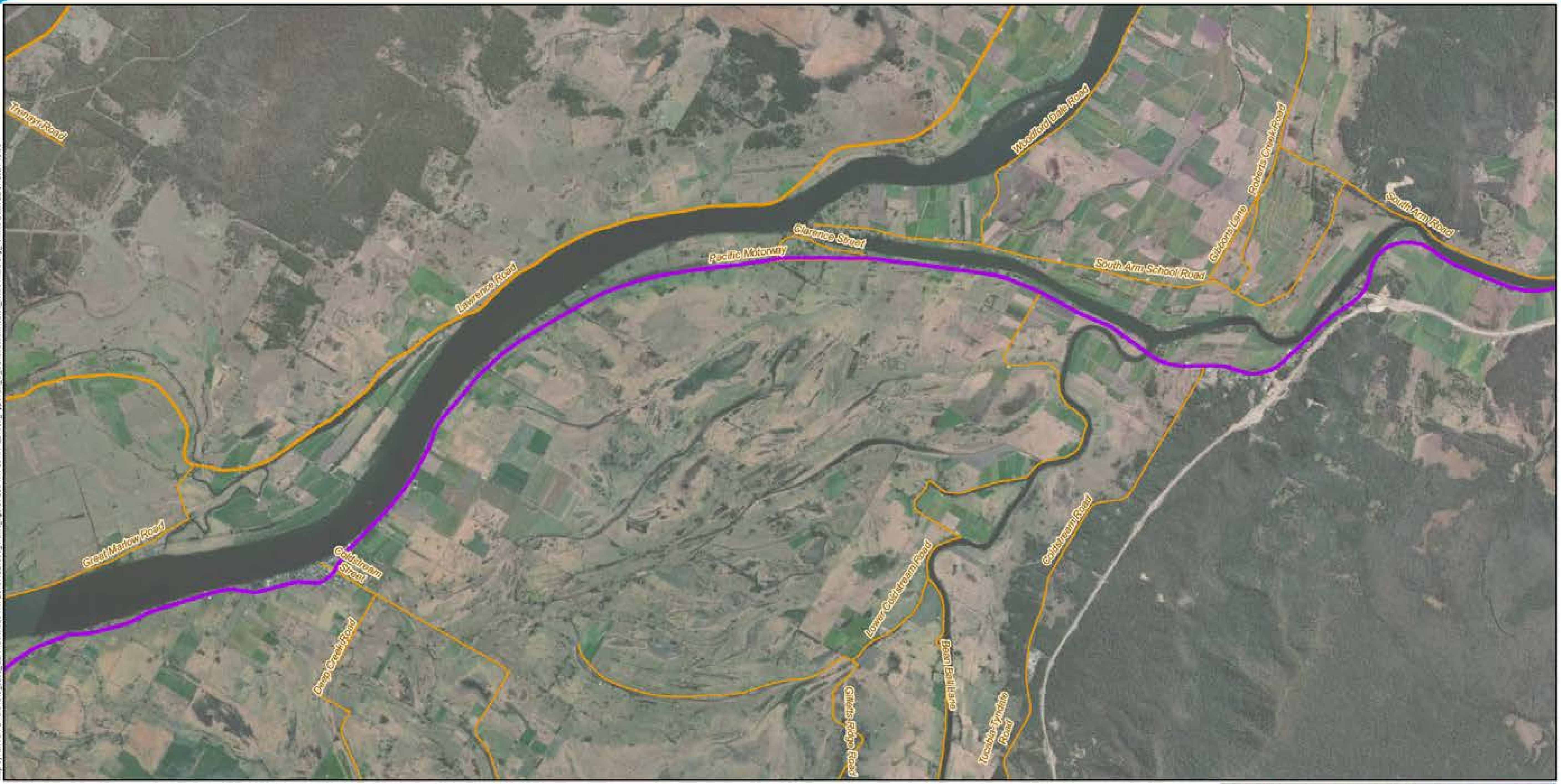
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix C19:
Construction routes - road hierarchy

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



Legend

Major roads

Minor roads

Construction routes – road hierarchy

Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

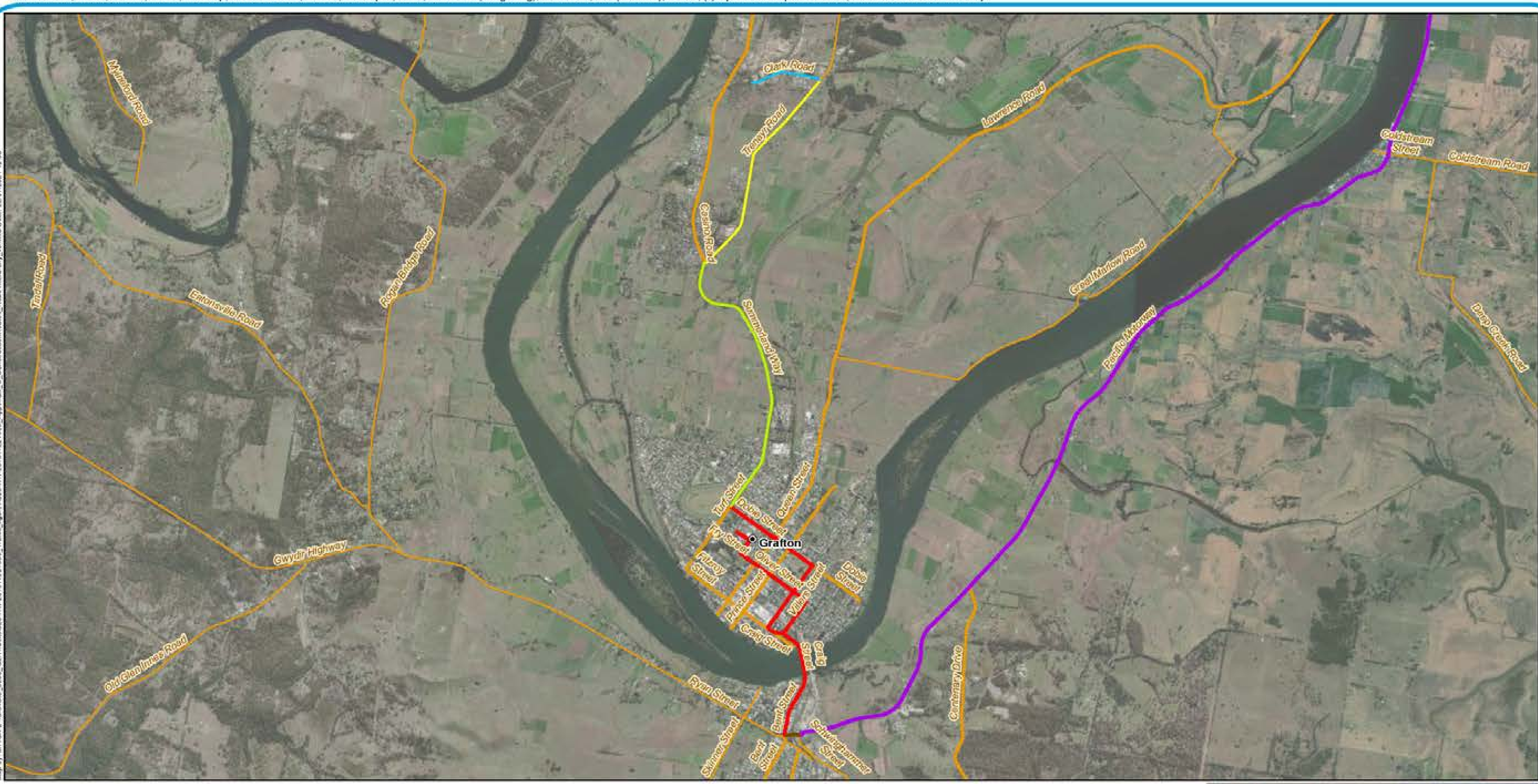
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C20:

Construction routes - road hierarchy

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



Legend

- Localities
- Major roads
- Minor roads

Construction routes – road hierarchy

- Rural arterial
- Rural collector
- Rural local
- Urban arterial
- Urban collector
- Urban motorway

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix C21:
Construction routes - road hierarchy

APPENDIX

U

Traffic Impact Assessment

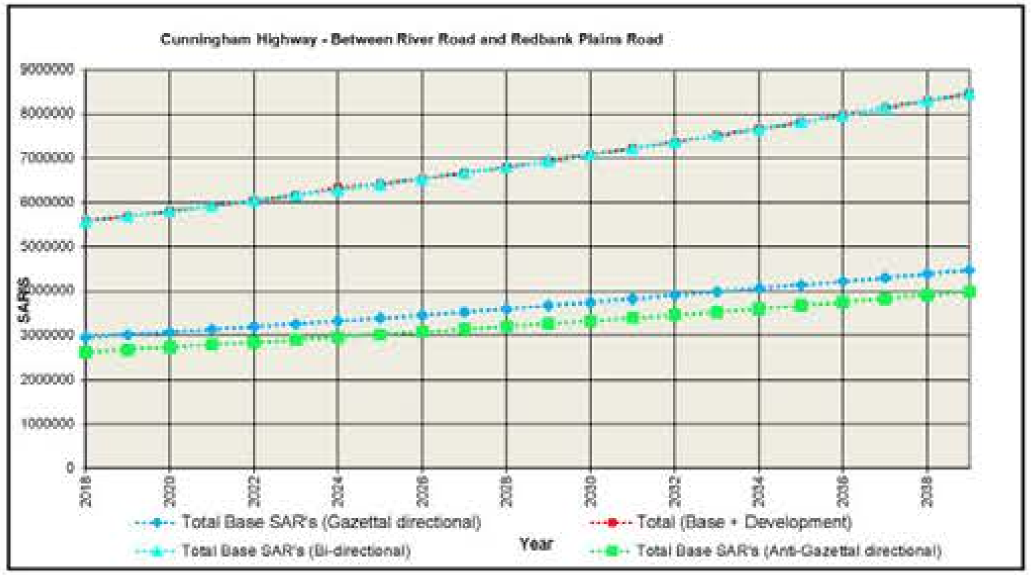
Appendix D Existing standard axle repetitions and pavement impact analysis

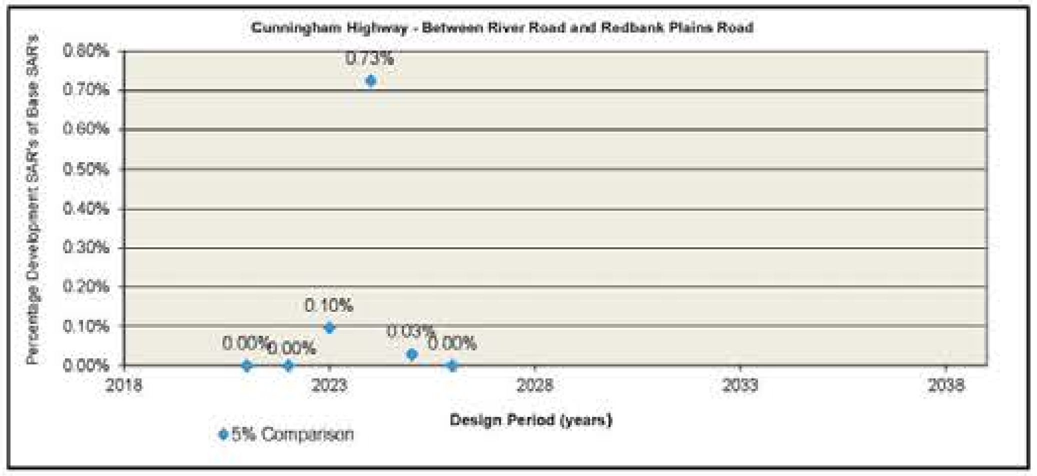
GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

Cunningham Highway - Between River Road and Redbank Plains Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	3.58	n/a
Class 5	n/a	n/a
Class 6	n/a	n/a
Class 7	n/a	n/a
Class 8	n/a	n/a
Class 9	4.93	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Cunningham Highway				Between River Road and Redbank Plains Road			
Base SAR's				Development SAR's			
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	2627744	2966092	5583835			5583835	
2019	2680298	3015213	5695512			5695512	
2020	2733904	3075518	5809422	0	0	5809422	
2021	2788582	3137028	5925610	0	0	5925610	0.00%
2022	2844354	3199769	6044123	0	0	6044123	0.00%
2023	2901241	3263764	6165005	2983	2983	6170971	0.10%
2024	2959266	3329039	6288305	22807	22807	6333919	0.73%
2025	3018451	3395620	6414071	934	934	6415940	0.03%
2026	3078820	3463532	6542353	0	0	6542353	0.00%
2027	3140397	3532803	6673200			6673200	
2028	3203205	3603459	6806664			6806664	
2029	3267269	3675528	6942797			6942797	
2030	3332614	3749039	7081653			7081653	
2031	3399266	3824020	7223286			7223286	
2032	3467252	3900500	7367752			7367752	
2033	3536597	3978510	7515107			7515107	
2034	3607329	4058080	7665409			7665409	
2035	3679475	4139242	7818717			7818717	
2036	3753065	4222027	7975091			7975091	
2037	3828126	4306467	8134593			8134593	
2038	3904689	4392597	8297285			8297285	
2039	3982782	4480448	8463231			8463231	

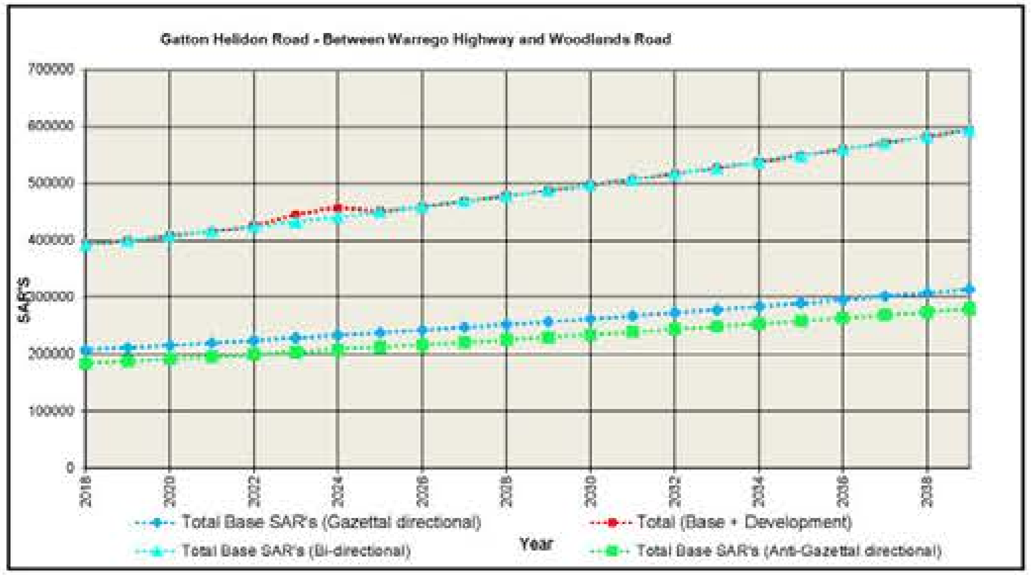




Gatton Helidon Road - Between Warrego Highway and Woodlands Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

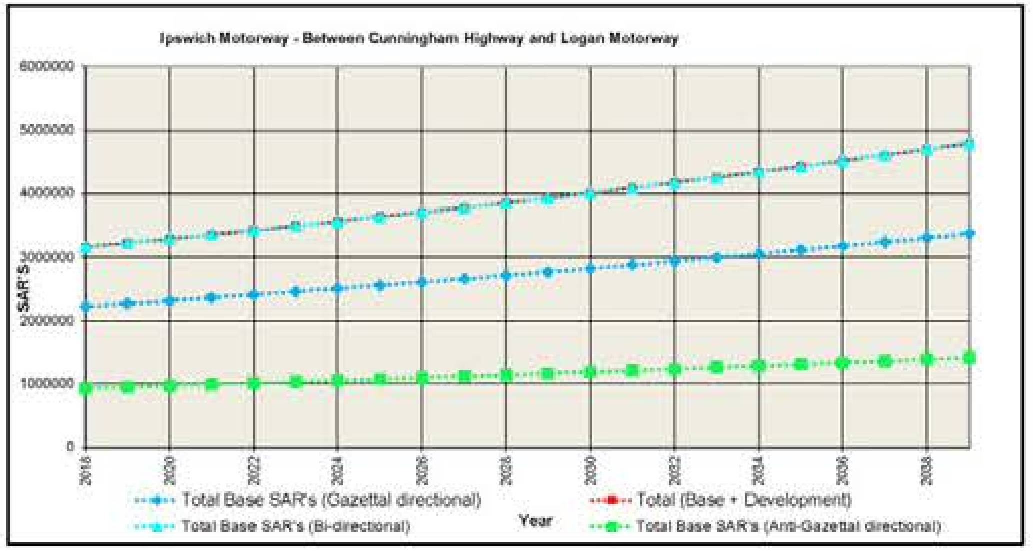
Gatton Helidon Road				Between Warrego Highway and Woodlands Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	184974	207213	392187			392187	
2019	188673	211357	400030			400030	
2020	192447	215584	408031	0	0	408031	
2021	196296	219896	416192	0	0	416192	0.00%
2022	200222	224294	424515	754	754	426024	0.36%
2023	204226	228780	433006	6285	6285	445575	2.90%
2024	208311	233355	441666	7774	7774	457214	3.52%
2025	212477	238022	450499	673	673	451845	0.30%
2026	216726	242783	459509	0	0	459509	0.00%
2027	221061	247638	468699			468699	
2028	225482	252591	478073			478073	
2029	229992	257643	487635			487635	
2030	234592	262796	497388			497388	
2031	239283	268052	507335			507335	
2032	244069	273413	517482			517482	
2033	248950	278881	527832			527832	
2034	253929	284459	538388			538388	
2035	259008	290148	549156			549156	
2036	264188	295951	560139			560139	
2037	269472	301870	571342			571342	
2038	274861	307907	582769			582769	
2039	280359	314065	594424			594424	

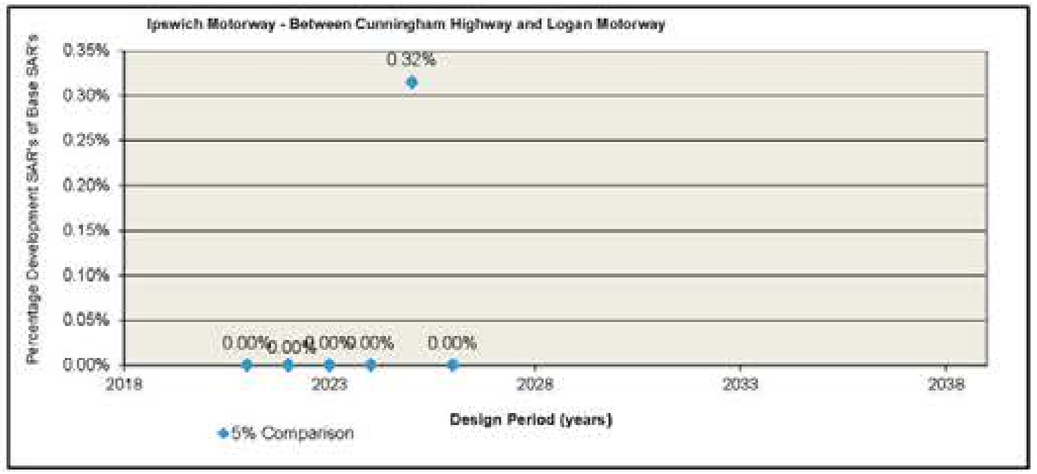


Ipswich Motorway - Between Cunningham Highway and Logan Motorway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Ipswich Motorway				Between Cunningham Highway and Logan Motorway			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	938929	2225909	3164838			3164838	
2019	957707	2270427	3228134			3228134	
2020	976862	2315836	3292697	0	0	3292697	
2021	996399	2362152	3358551	0	0	3358551	0.00%
2022	1016327	2409395	3425722	0	0	3425722	0.00%
2023	1036653	2457583	3494236	0	0	3494236	0.00%
2024	1057386	2506735	3564121	0	0	3564121	0.00%
2025	1078534	2556870	3635404	5729	5729	3646862	0.32%
2026	1100105	2608007	3708112	0	0	3708112	0.00%
2027	1122107	2660167	3782274			3782274	
2028	1144549	2713370	3857919			3857919	
2029	1167440	2767638	3935078			3935078	
2030	1190789	2822991	4013779			4013779	
2031	1214605	2879450	4094055			4094055	
2032	1238897	2937039	4175936			4175936	
2033	1263675	2995780	4259455			4259455	
2034	1288948	3055696	4344644			4344644	
2035	1314727	3116810	4431537			4431537	
2036	1341022	3179146	4520167			4520167	
2037	1367842	3242729	4610571			4610571	
2038	1395199	3307583	4702782			4702782	
2039	1423103	3373735	4796838			4796838	

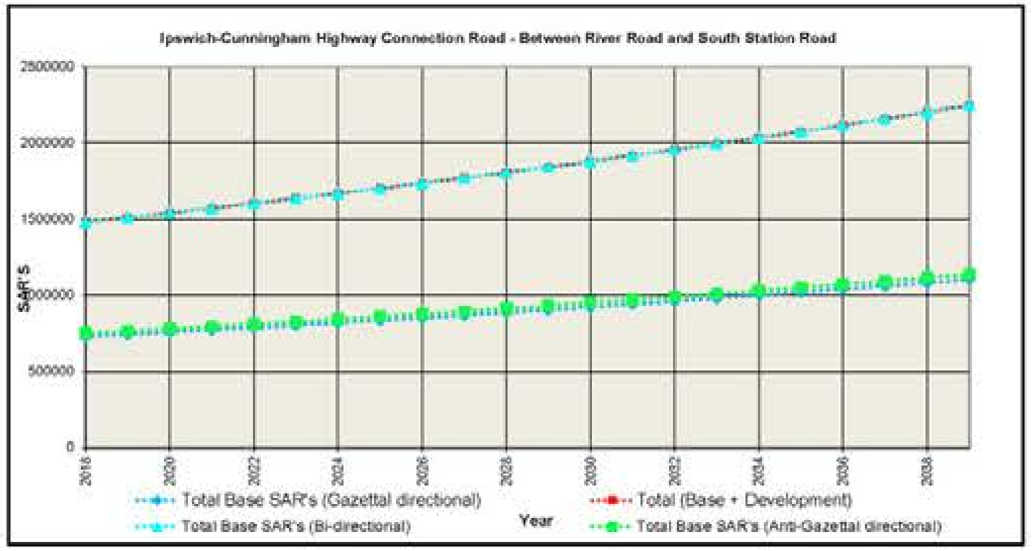


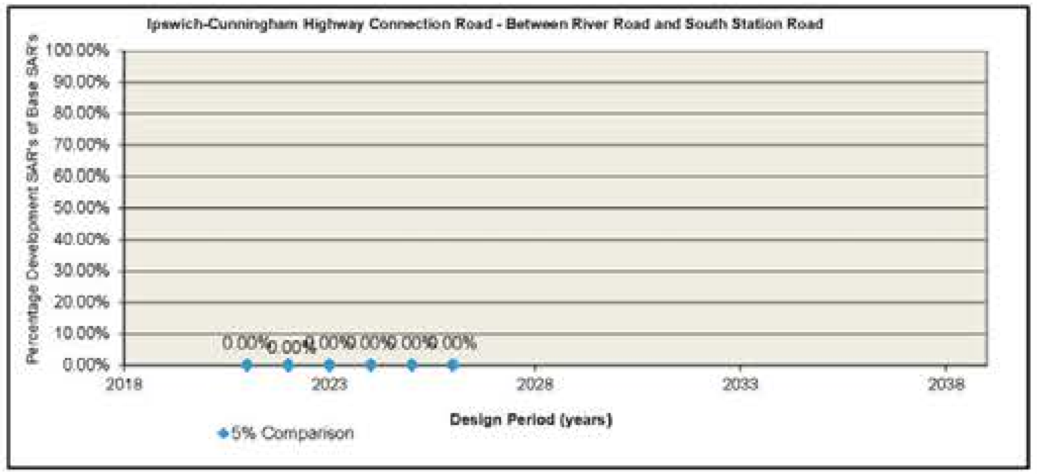


Ipswich-Cunningham Highway Connection Road - Between River Road and South Station Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Ipswich-Cunningham Highway Connection Road				Between River Road and South Station Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	752503	730906	1483409			1483409	
2019	767553	745524	1513078			1513078	
2020	782904	760435	1543339	0	0	1543339	
2021	798562	775644	1574206	0	0	1574206	0.00%
2022	814534	791157	1605690	0	0	1605690	0.00%
2023	830824	806980	1637804	0	0	1637804	0.00%
2024	847441	823119	1670560	0	0	1670560	0.00%
2025	864390	839582	1703971	0	0	1703971	0.00%
2026	881677	856373	1738051	0	0	1738051	0.00%
2027	899311	873501	1772812			1772812	
2028	917297	890971	1808268			1808268	
2029	935643	908790	1844433			1844433	
2030	954356	926966	1881322			1881322	
2031	973443	945505	1918948			1918948	
2032	992912	964415	1957327			1957327	
2033	1012770	983704	1996474			1996474	
2034	1033026	1003378	2036403			2036403	
2035	1053686	1023445	2077131			2077131	
2036	1074760	1043914	2118674			2118674	
2037	1096255	1064793	2161047			2161047	
2038	1116180	1086088	2204268			2204268	
2039	1140544	1107810	2248354			2248354	

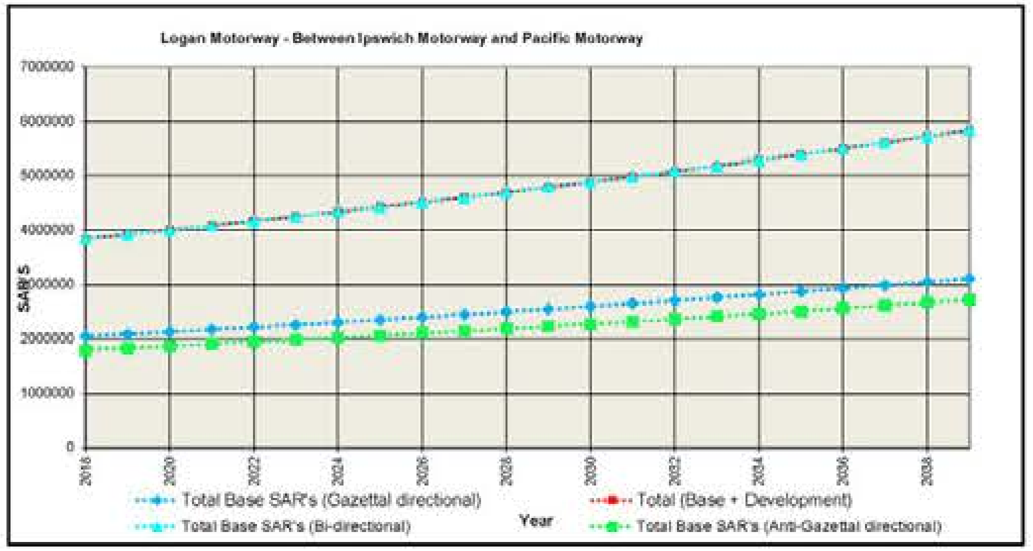


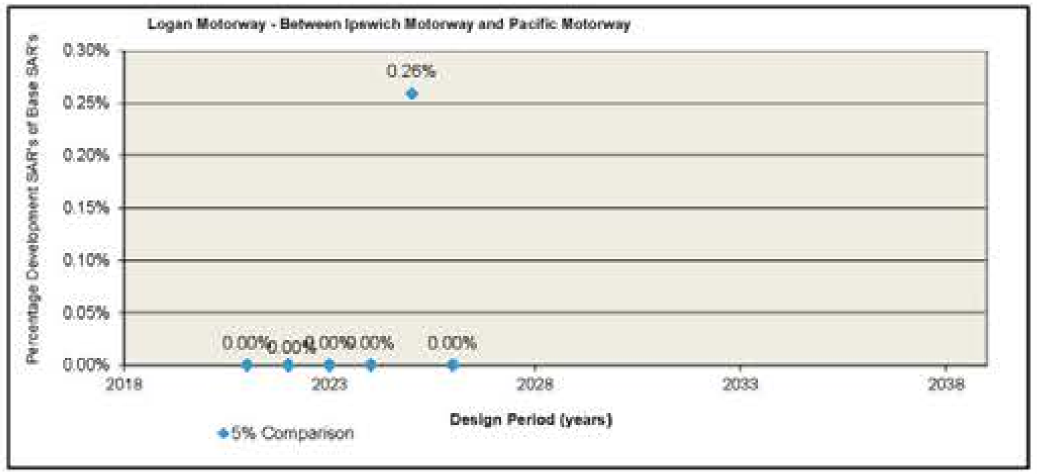


Logan Motorway - Between Ipswich Motorway and Pacific Motorway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Logan Motorway				Between Ipswich Motorway and Pacific Motorway			
Base SAR's				Development SAR's			
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	1798714	2053421	3852136			3852136	
2019	1834689	2094490	3929178			3929178	
2020	1871382	2136380	4007762	0	0	4007762	
2021	1908810	2179107	4087917	0	0	4087917	0.00%
2022	1946986	2222689	4169676	0	0	4169676	0.00%
2023	1985926	2267143	4253069	0	0	4253069	0.00%
2024	2025644	2312486	4338130	0	0	4338130	0.00%
2025	2066157	2358736	4424893	5729	5729	4436351	0.26%
2026	2107480	2405910	4513391	0	0	4513391	0.00%
2027	2149630	2454029	4603659			4603659	
2028	2192623	2503109	4695732			4695732	
2029	2236475	2553171	4789647			4789647	
2030	2281205	2604235	4885439			4885439	
2031	2326829	2656320	4983148			4983148	
2032	2373365	2709446	5082811			5082811	
2033	2420833	2763635	5184467			5184467	
2034	2469249	2818908	5288157			5288157	
2035	2518634	2875286	5393920			5393920	
2036	2569007	2932791	5501798			5501798	
2037	2620387	2991447	5611834			5611834	
2038	2672795	3051276	5724071			5724071	
2039	2726251	3112302	5838552			5838552	

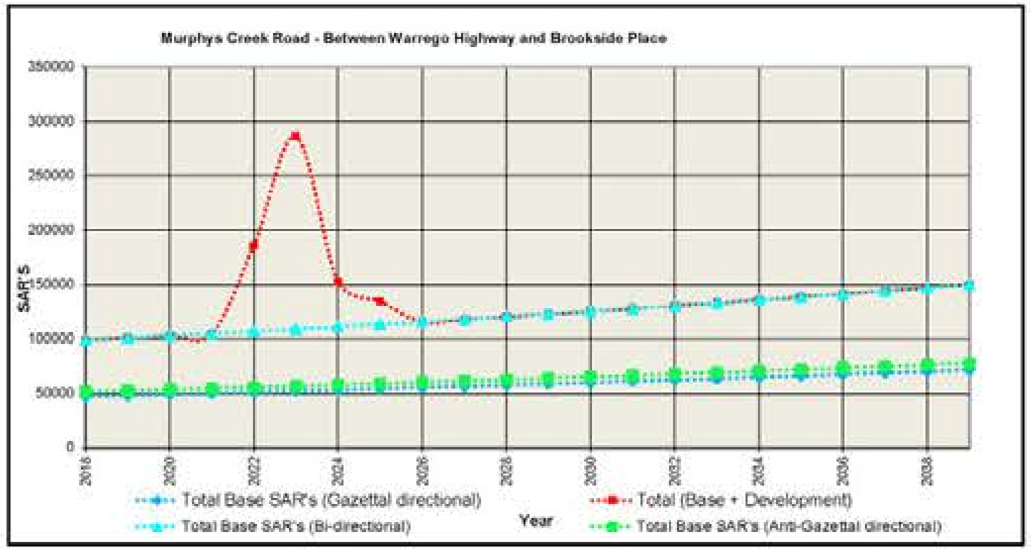


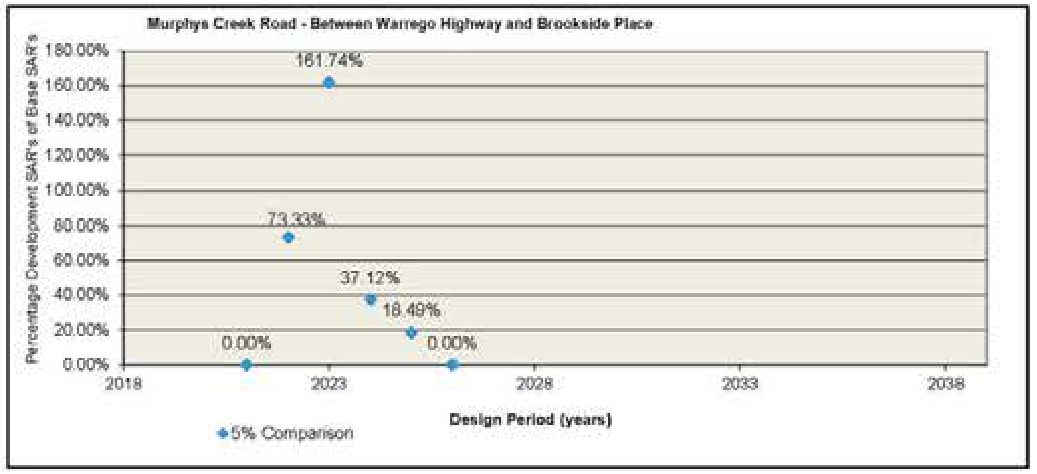


Murphys Creek Road - Between Warrego Highway and Brookside Place

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Murphys Creek Road				Between Warrego Highway and Brookside Place			
Base SAR's				Development SAR's			
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	51617	47441	99058			99058	
2019	52649	48390	101039			101039	
2020	53702	49358	103060	0	0	103060	
2021	54776	50345	105121	0	0	105121	0.00%
2022	55872	51352	107224	39311	39311	185846	73.33%
2023	56989	52379	109368	88448	88448	286264	161.74%
2024	58129	53427	111556	20706	20706	152969	37.12%
2025	59292	54495	113787	10519	10519	134825	18.49%
2026	60477	55585	116062	0	0	116062	0.00%
2027	61687	56697	118384			118384	
2028	62921	57831	120751			120751	
2029	64179	58987	123166			123166	
2030	65463	60167	125630			125630	
2031	66772	61370	128142			128142	
2032	68107	62598	130705			130705	
2033	69469	63850	133319			133319	
2034	70859	65127	135986			135986	
2035	72276	66429	138705			138705	
2036	73722	67758	141479			141479	
2037	75196	69113	144309			144309	
2038	76700	70495	147195			147195	
2039	78234	71905	150139			150139	

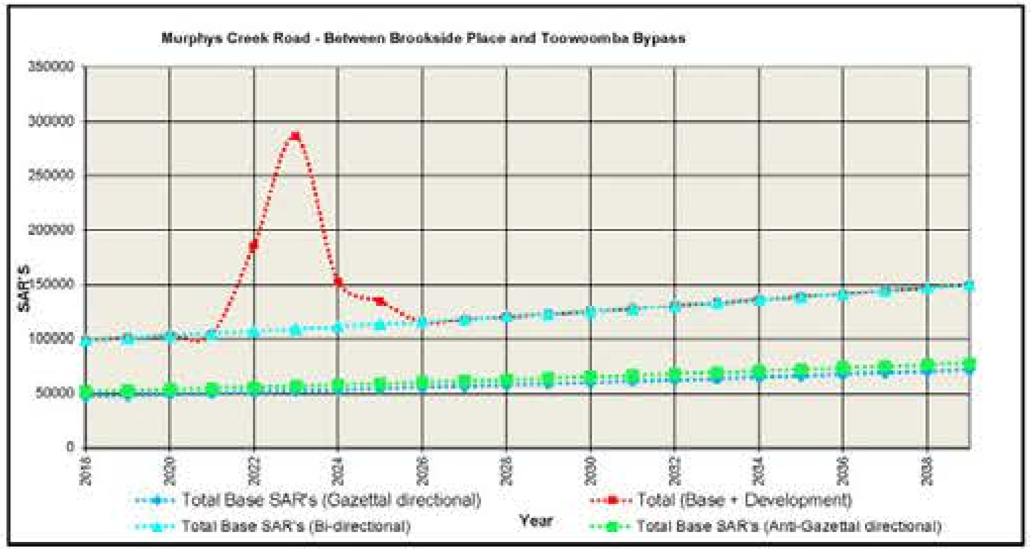


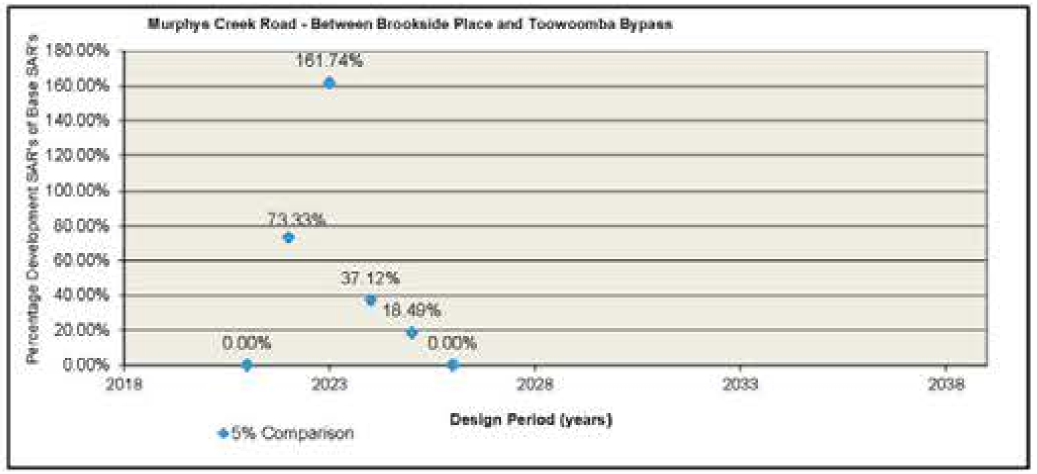


Murphys Creek Road - Between Brookside Place and Toowoomba Bypass

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Murphys Creek Road				Between Brookside Place and Toowoomba Bypass			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	51617	47441	99058			99058	
2019	52649	48390	101039			101039	
2020	53702	49358	103060	0	0	103060	
2021	54776	50345	105121	0	0	105121	0.00%
2022	55872	51352	107224	39311	39311	185846	73.33%
2023	56989	52379	109368	88448	88448	286264	161.74%
2024	58129	53427	111556	20706	20706	152969	37.12%
2025	59292	54495	113787	10519	10519	134825	18.49%
2026	60477	55585	116062	0	0	116062	0.00%
2027	61687	56697	118384			118384	
2028	62921	57831	120751			120751	
2029	64179	58987	123166			123166	
2030	65463	60167	125630			125630	
2031	66772	61370	128142			128142	
2032	68107	62598	130705			130705	
2033	69469	63850	133319			133319	
2034	70859	65127	135986			135986	
2035	72276	66429	138705			138705	
2036	73722	67758	141479			141479	
2037	75196	69113	144309			144309	
2038	76700	70495	147195			147195	
2039	78234	71905	150139			150139	

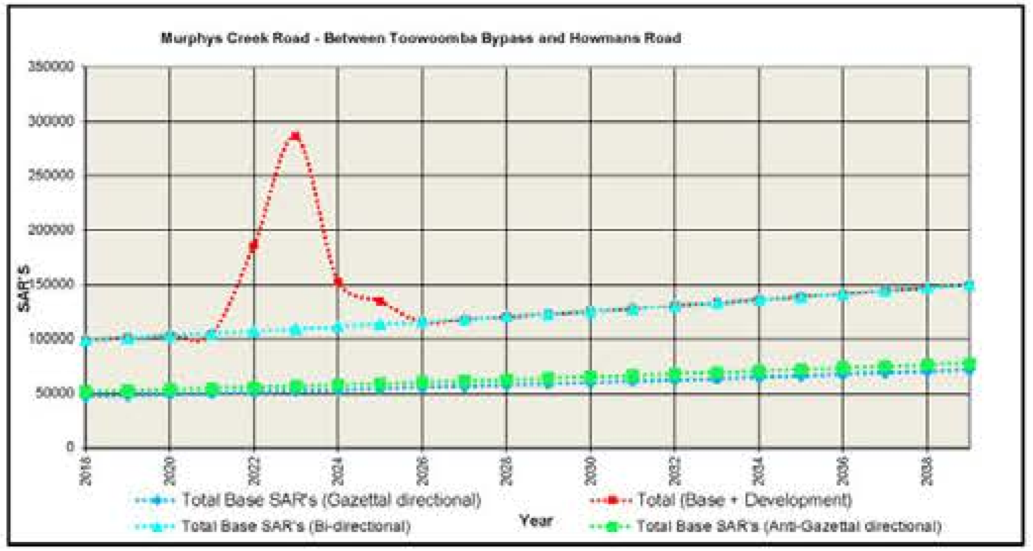


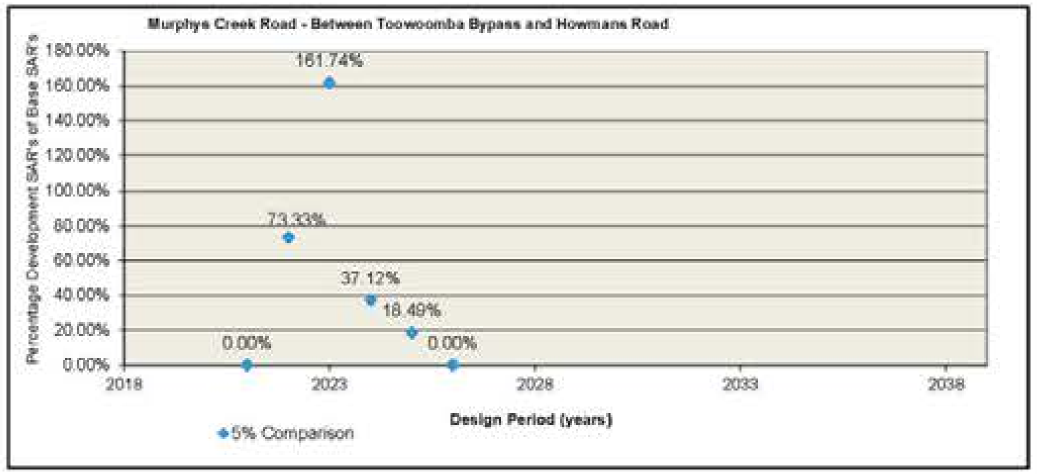


Murphys Creek Road - Between Toowoomba Bypass and Howmans Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Murphys Creek Road				Between Toowoomba Bypass and Howmans Road			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	51617	47441	99058			99058	
2019	52649	48390	101039			101039	
2020	53702	49358	103060	0	0	103060	
2021	54776	50345	105121	0	0	105121	0.00%
2022	55872	51352	107224	39311	39311	185846	73.33%
2023	56989	52379	109368	88448	88448	286264	161.74%
2024	58129	53427	111556	20706	20706	152969	37.12%
2025	59292	54495	113787	10519	10519	134825	18.49%
2026	60477	55585	116062	0	0	116062	0.00%
2027	61687	56697	118384			118384	
2028	62921	57831	120751			120751	
2029	64179	58987	123166			123166	
2030	65463	60167	125630			125630	
2031	66772	61370	128142			128142	
2032	68107	62598	130705			130705	
2033	69469	63850	133319			133319	
2034	70859	65127	135986			135986	
2035	72276	66429	138705			138705	
2036	73722	67758	141479			141479	
2037	75196	69113	144309			144309	
2038	76700	70495	147195			147195	
2039	78234	71905	150139			150139	

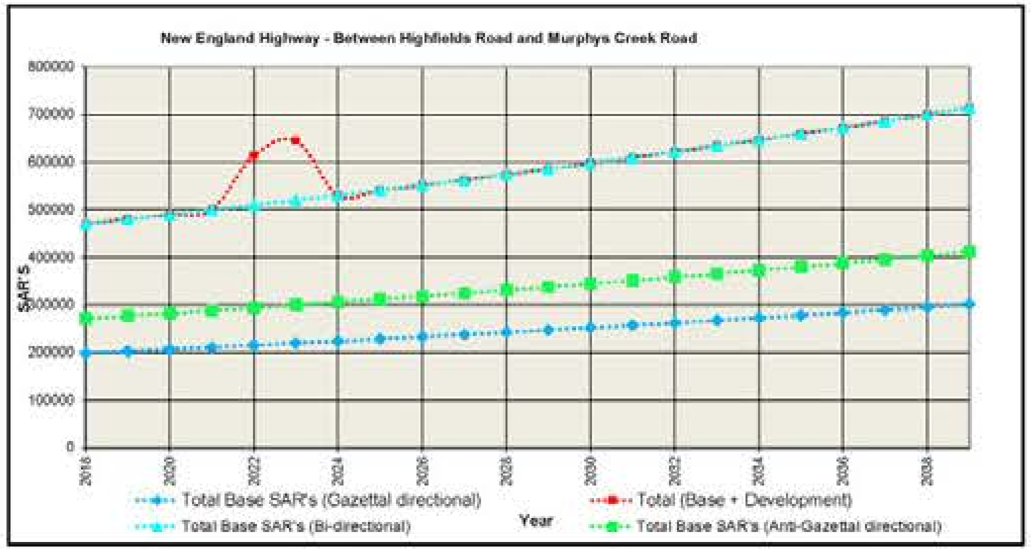


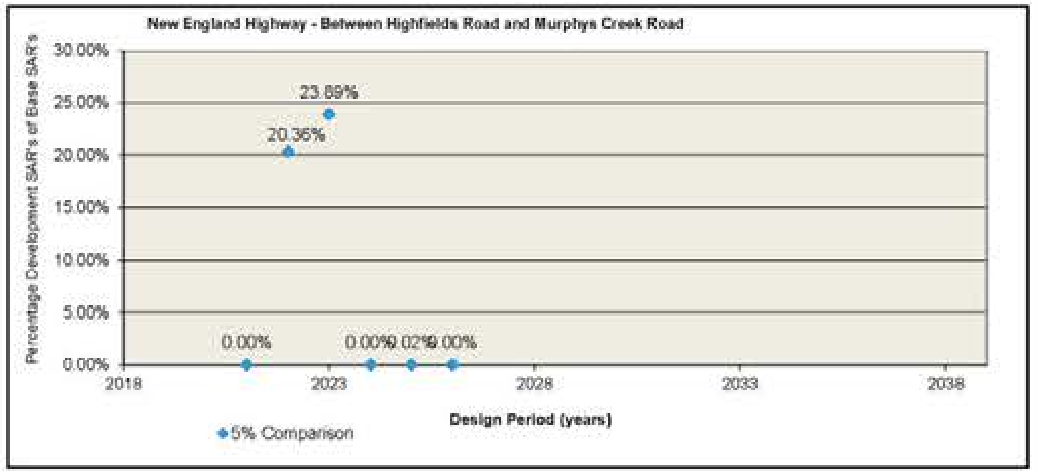


New England Highway - Between Highfields Road and Murphys Creek Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

New England Highway				Between Highfields Road and Murphys Creek Road			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	271974	199297	471272			471272	
2019	277414	203283	480697			480697	
2020	282962	207349	490311	0	0	490311	
2021	288621	211496	500117	0	0	500117	0.00%
2022	294394	215726	510120	51942	51942	614003	20.36%
2023	300282	220040	520322	62157	62157	644637	23.89%
2024	306287	224441	530729	0	0	530729	0.00%
2025	312413	228930	541343	55	55	541454	0.02%
2026	318661	233509	552170	0	0	552170	0.00%
2027	325035	238179	563213			563213	
2028	331535	242942	574478			574478	
2029	338166	247801	585967			585967	
2030	344929	252757	597687			597687	
2031	351828	257812	609640			609640	
2032	358865	262969	621833			621833	
2033	366042	268228	634270			634270	
2034	373363	273593	646955			646955	
2035	380830	279064	659894			659894	
2036	388446	284646	673092			673092	
2037	396215	290339	686554			686554	
2038	404140	296145	700285			700285	
2039	412223	302068	714291			714291	

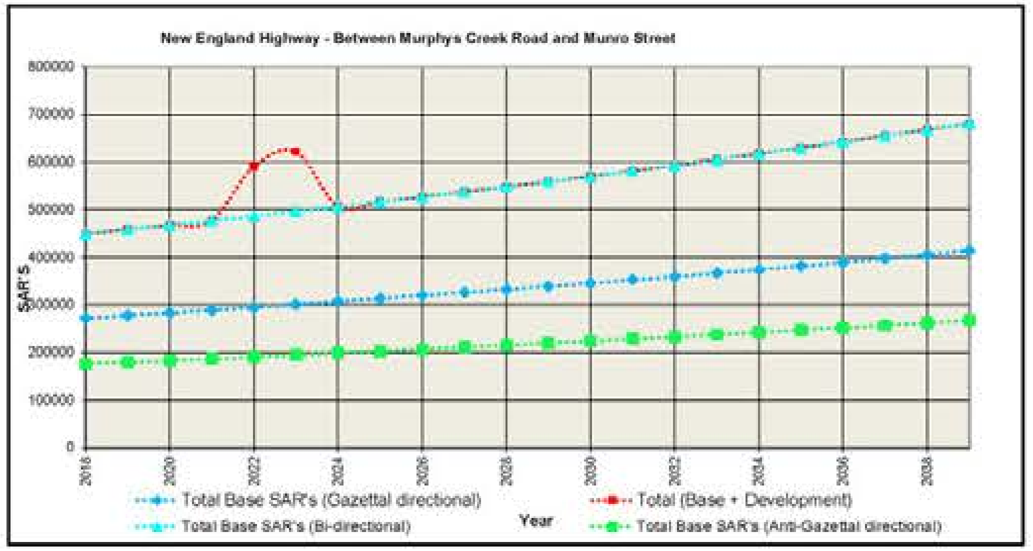


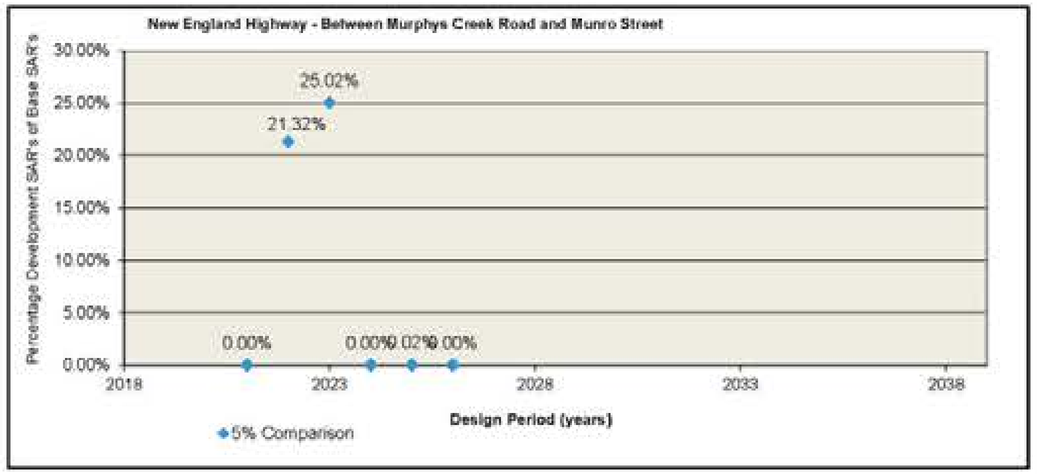


New England Highway - Between Murphys Creek Road and Munro Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

	New England Highway			Between Murphys Creek Road and Munro Street			
	Base SAR's			Development SAR's			
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	176981	273119	450100			450100	
2019	180621	278582	459102			459102	
2020	184131	284153	468284	0	0	468284	
2021	187814	289836	477650	0	0	477650	0.00%
2022	191570	295633	487203	51942	51942	591086	21.32%
2023	195401	301546	496947	62157	62157	621262	25.02%
2024	199309	307577	506886	0	0	506886	0.00%
2025	203295	313728	517024	55	55	517134	0.02%
2026	207361	320003	527364	0	0	527364	0.00%
2027	211509	326403	537911			537911	
2028	215739	332931	548670			548670	
2029	220054	339589	559643			559643	
2030	224455	346381	570836			570836	
2031	228944	353309	582253			582253	
2032	233523	360375	593898			593898	
2033	238193	367583	605776			605776	
2034	242957	374934	617891			617891	
2035	247816	382433	630249			630249	
2036	252772	390082	642854			642854	
2037	257828	397883	655711			655711	
2038	262984	405841	668825			668825	
2039	268244	413958	682202			682202	

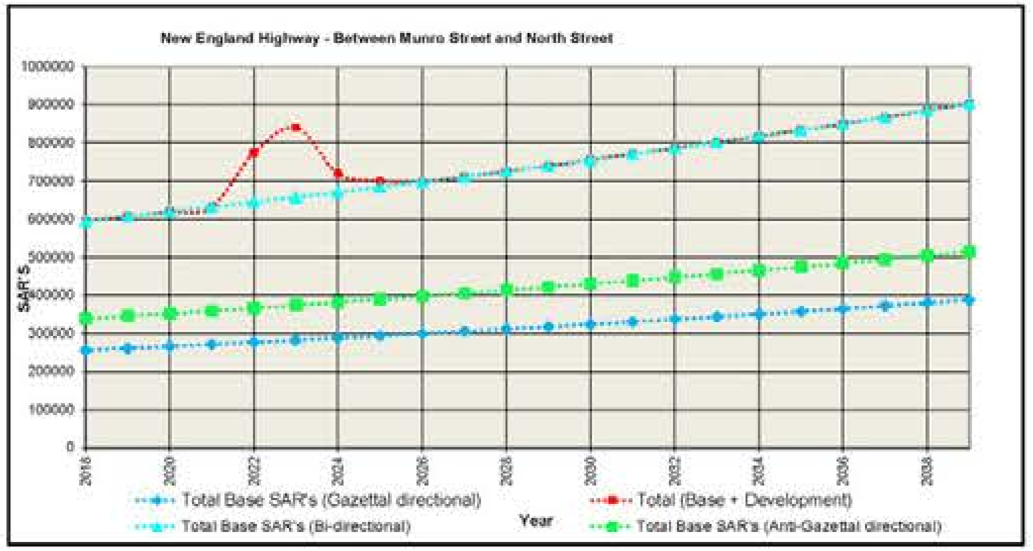




New England Highway - Between Munro Street and North Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

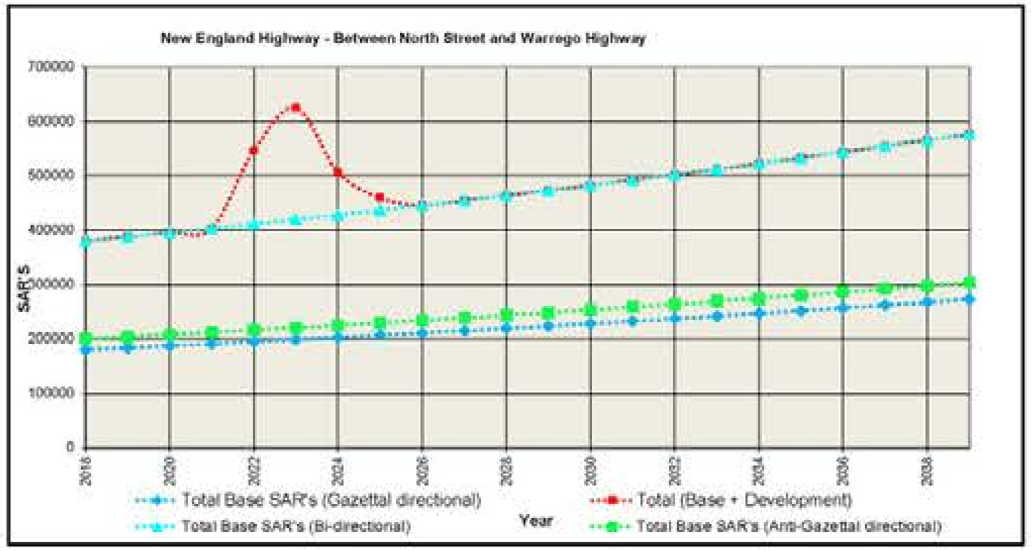
New England Highway				Between Munro Street and North Street			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	339844	256337	596182			596182	
2019	346641	261464	608105			608105	
2020	353574	266693	620267	0	0	620267	
2021	360645	272027	632673	0	0	632673	0.00%
2022	367858	277468	645326	64316	64316	773959	19.93%
2023	375215	283017	658233	91396	91396	841024	27.77%
2024	382720	288678	671397	24495	24495	720386	7.30%
2025	390374	294451	684825	7685	7685	700195	2.24%
2026	398182	300340	698522	0	0	698522	0.00%
2027	406145	306347	712492			712492	
2028	414268	312474	726742			726742	
2029	422554	318723	741277			741277	
2030	431005	325098	756102			756102	
2031	439625	331600	771224			771224	
2032	448417	338232	786649			786649	
2033	457385	344996	802382			802382	
2034	466533	351896	818430			818430	
2035	475864	358934	834798			834798	
2036	485381	366113	851494			851494	
2037	495089	373435	868524			868524	
2038	504991	380904	885894			885894	
2039	515090	388522	903612			903612	

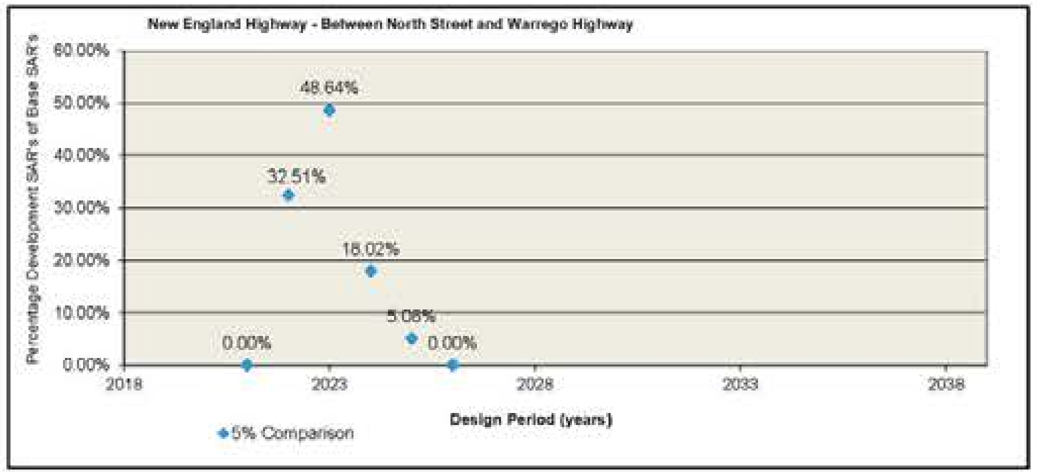


New England Highway - Between North Street and Warrego Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

New England Highway				Between North Street and Warrego Highway			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	200377	180334	380711			380711	
2019	204385	183941	388326			388326	
2020	208472	187620	396092	0	0	396092	
2021	212642	191372	404014	0	0	404014	0.00%
2022	216895	195200	412094	66991	66991	546077	32.51%
2023	221233	199104	420336	102225	102225	624785	48.64%
2024	225657	203086	428743	38639	38639	506021	18.02%
2025	230170	207147	437318	11106	11106	459530	5.08%
2026	234774	211290	446064	0	0	446064	0.00%
2027	239469	215516	454985			454985	
2028	244259	219826	464085			464085	
2029	249144	224223	473367			473367	
2030	254127	228707	482834			482834	
2031	259209	233282	492491			492491	
2032	264393	237947	502341			502341	
2033	269681	242706	512387			512387	
2034	275075	247560	522635			522635	
2035	280576	252511	533088			533088	
2036	286188	257562	543750			543750	
2037	291912	262713	554625			554625	
2038	297750	267967	565717			565717	
2039	303705	273327	577032			577032	

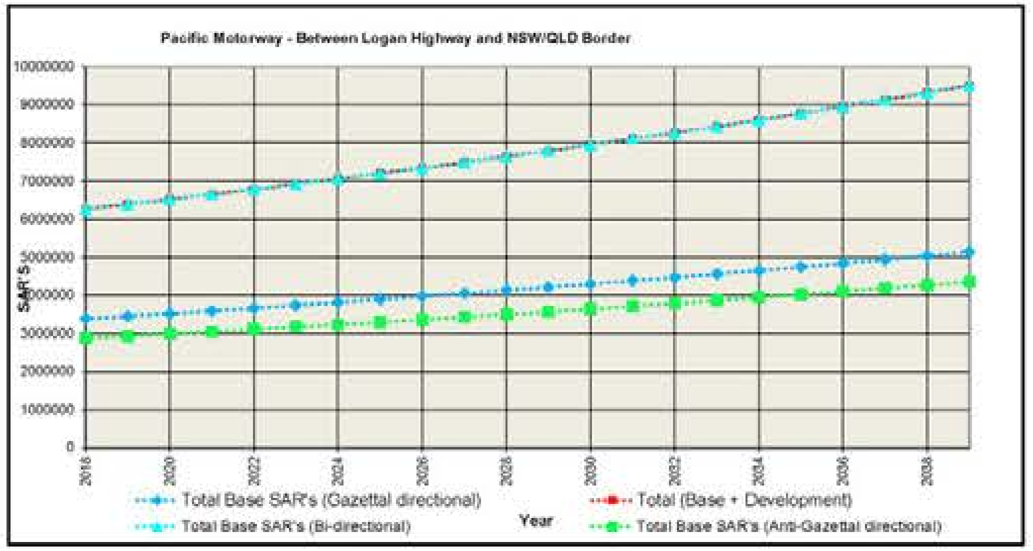


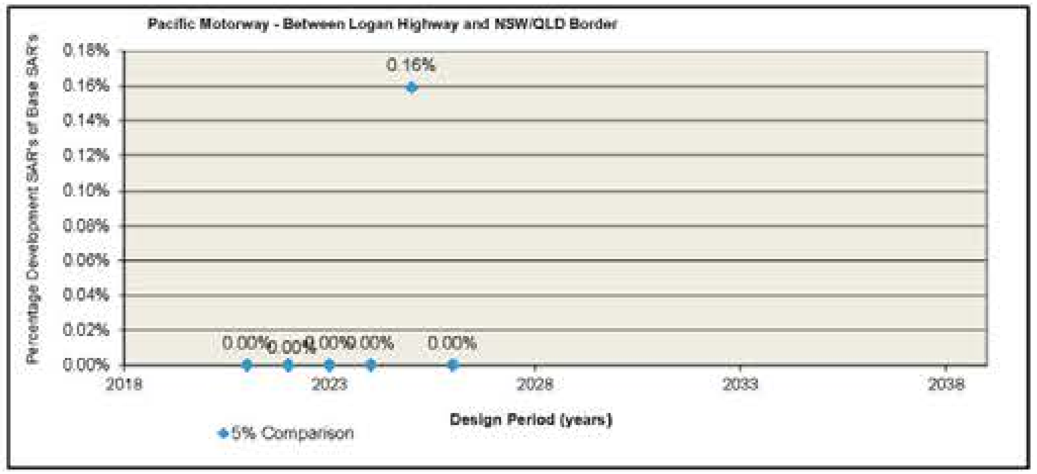


Pacific Motorway - Between Logan Highway and NSW/QLD Border

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Pacific Motorway				Between Logan Highway and NSW/QLD Border			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2879074	3395833	6274907			6274907	
2019	2936656	3463749	6400405			6400405	
2020	2995389	3533024	6528413	0	0	6528413	
2021	3055297	3603686	6658981	0	0	6658981	0.00%
2022	3116403	3675759	6792161	0	0	6792161	0.00%
2023	3178731	3749274	6928004	0	0	6928004	0.00%
2024	3242305	3824259	7066564	0	0	7066564	0.00%
2025	3307151	3900744	7207896	5729	5729	7219354	0.16%
2026	3373294	3978759	7352054	0	0	7352054	0.00%
2027	3440760	4058334	7499095			7499095	
2028	3509575	4139501	7649077			7649077	
2029	3579767	4222291	7802058			7802058	
2030	3651362	4306737	7958099			7958099	
2031	3724390	4392872	8117261			8117261	
2032	3798877	4480729	8279607			8279607	
2033	3874855	4570344	8445199			8445199	
2034	3952352	4661751	8614103			8614103	
2035	4031399	4754986	8786385			8786385	
2036	4112027	4850085	8962112			8962112	
2037	4194268	4947087	9141355			9141355	
2038	4278153	5046029	9324182			9324182	
2039	4363716	5146949	9510665			9510665	

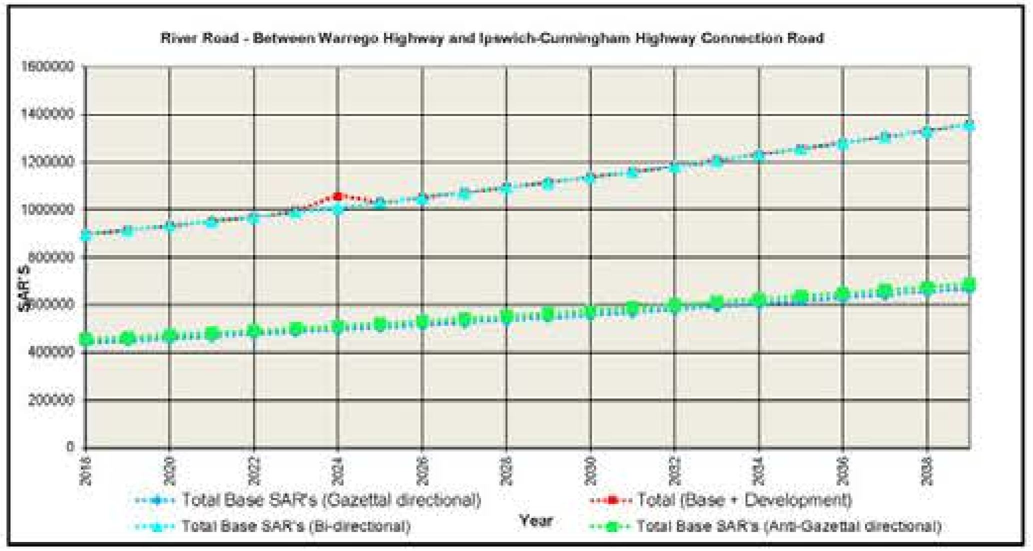


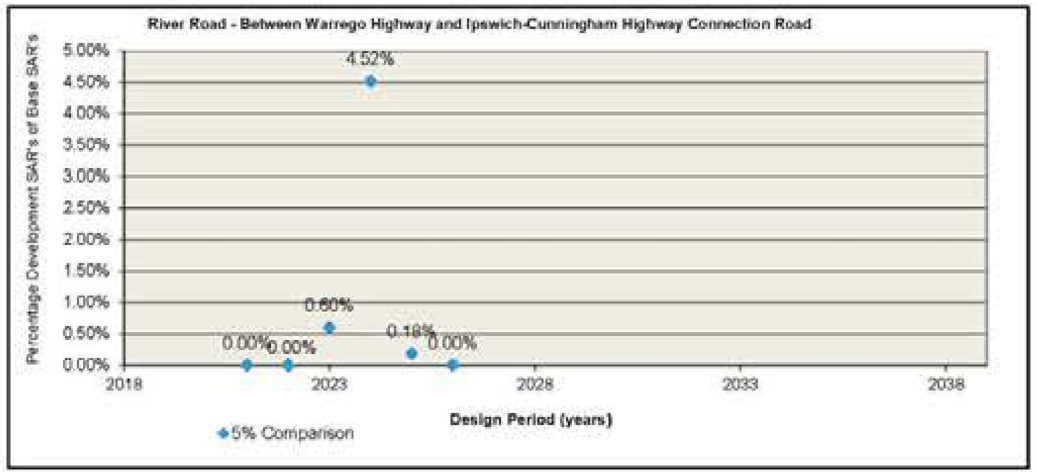


River Road - Between Warrego Highway and Ipswich-Cunningham Highway Connection Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

River Road				Between Warrego Highway and Ipswich-Cunningham Highway Connection Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	455532	441515	897047			897047	
2019	464643	450345	914988			914988	
2020	473936	459352	933288	0	0	933288	
2021	483414	468539	951954	0	0	951954	0.00%
2022	493083	477910	970993	0	0	970993	0.00%
2023	502944	487468	990413	2983	2983	996378	0.60%
2024	513003	497218	1010221	22807	22807	1055835	4.52%
2025	523263	507162	1030425	934	934	1032294	0.18%
2026	533729	517305	1051034	0	0	1051034	0.00%
2027	544403	527651	1072054			1072054	
2028	555291	538204	1093496			1093496	
2029	566397	548968	1115365			1115365	
2030	577725	559948	1137673			1137673	
2031	589279	571147	1160426			1160426	
2032	601065	582570	1183635			1183635	
2033	613086	594221	1207307			1207307	
2034	625348	606106	1231454			1231454	
2035	637855	618228	1256083			1256083	
2036	650612	630592	1281204			1281204	
2037	663624	643204	1306828			1306828	
2038	676697	656068	1332965			1332965	
2039	690435	669189	1359624			1359624	

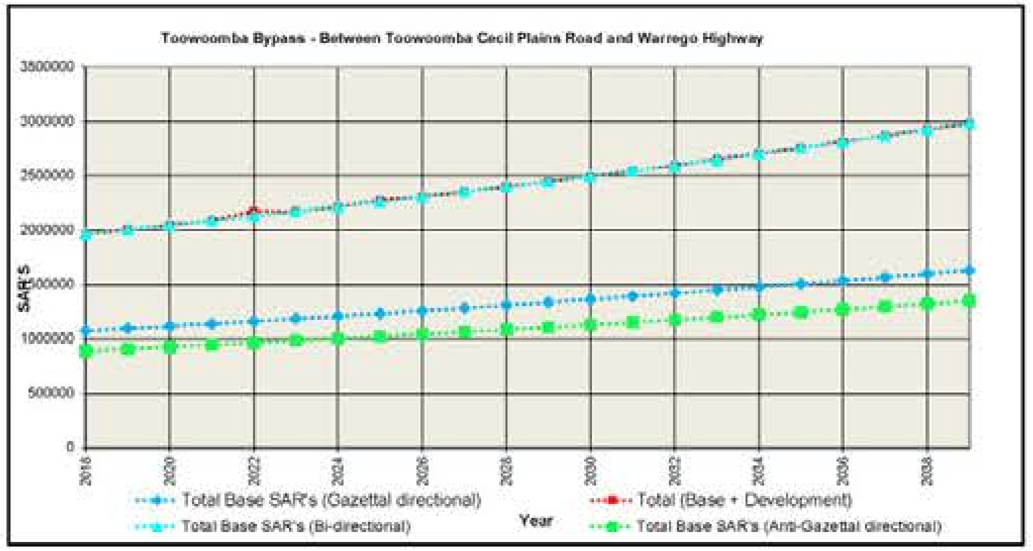


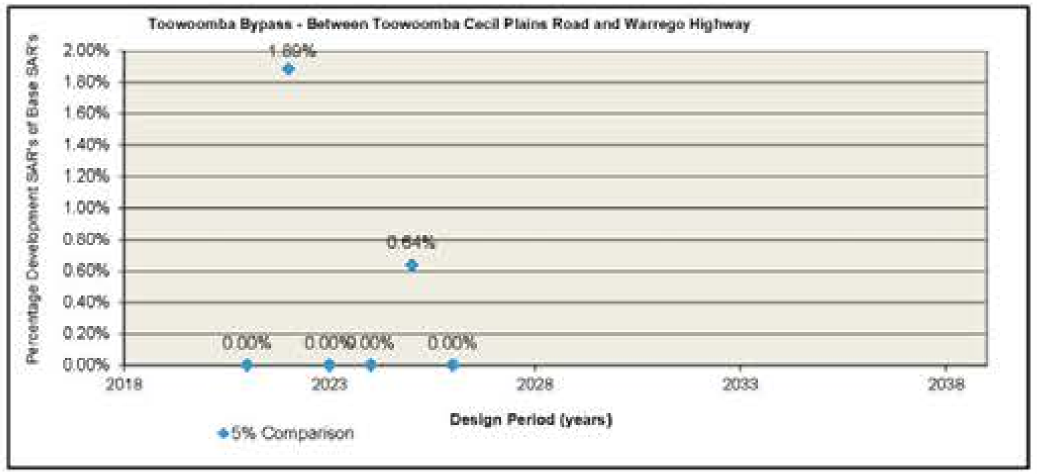


Toowoomba Bypass - Between Toowoomba Cecil Plains Road and Warrego Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Toowoomba Bypass				Between Toowoomba Cecil Plains Road and Warrego Highway			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	892625	1077016	1969641			1969641	
2019	910477	1098557	2009034			2009034	
2020	928687	1120528	2049215	0	0	2049215	
2021	947261	1142938	2090199	0	0	2090199	0.00%
2022	966206	1165797	2132003	20108	20108	2172220	1.89%
2023	985530	1189113	2174643	0	0	2174643	0.00%
2024	1005241	1212895	2218136	0	0	2218136	0.00%
2025	1025345	1237153	2262499	7212	7212	2276922	0.64%
2026	1045852	1261896	2307749	0	0	2307749	0.00%
2027	1066769	1287134	2353904			2353904	
2028	1088105	1312877	2400982			2400982	
2029	1109867	1339134	2449001			2449001	
2030	1132064	1365917	2497981			2497981	
2031	1154706	1393235	2547941			2547941	
2032	1177800	1421100	2598900			2598900	
2033	1201356	1449522	2650878			2650878	
2034	1225383	1478513	2703896			2703896	
2035	1249890	1508083	2757973			2757973	
2036	1274888	1538244	2813133			2813133	
2037	1300386	1569009	2869395			2869395	
2038	1326394	1600389	2926783			2926783	
2039	1352922	1632397	2985319			2985319	

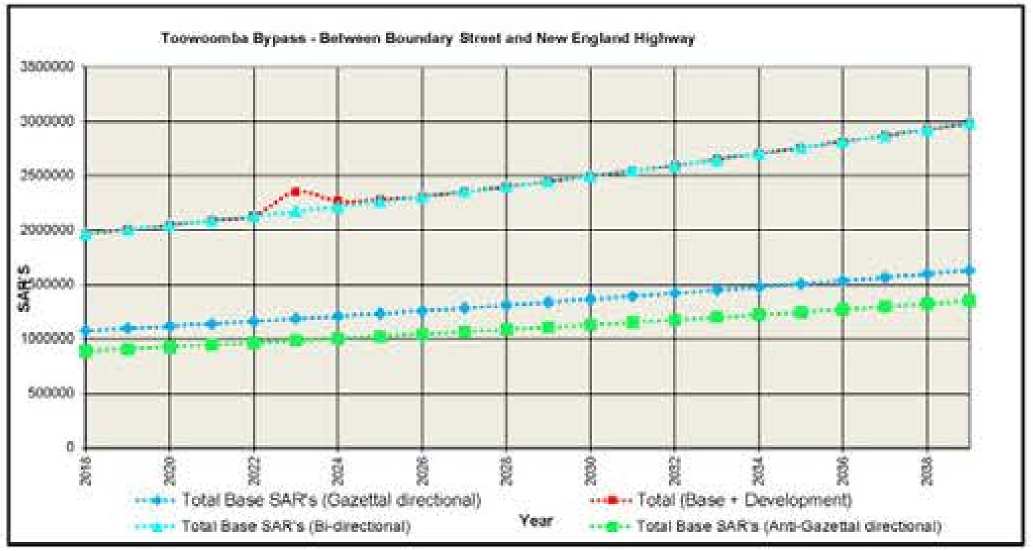


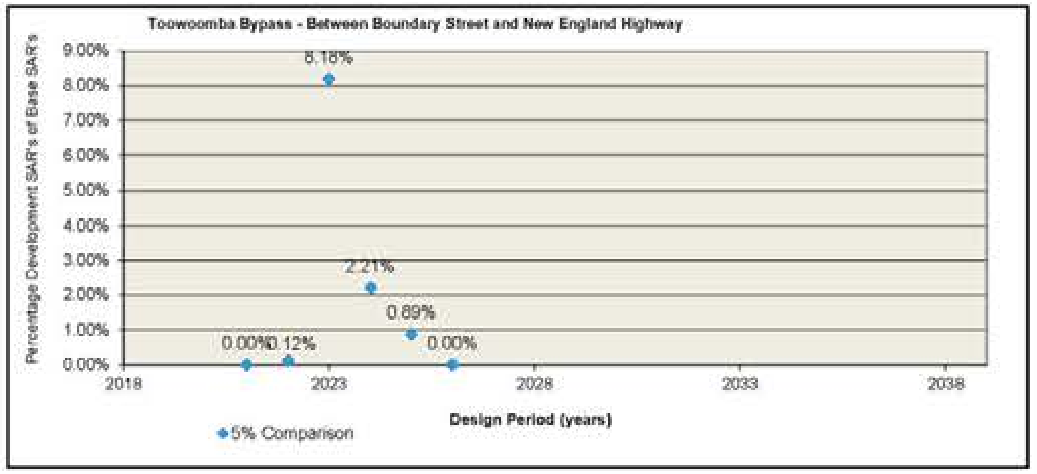


Toowoomba Bypass - Between Boundary Street and New England Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Toowoomba Bypass				Between Boundary Street and New England Highway			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	892625	1077016	1969641			1969641	
2019	910477	1098557	2009034			2009034	
2020	928687	1120528	2049215	0	0	2049215	
2021	947261	1142938	2090199	0	0	2090199	0.00%
2022	966206	1165797	2132003	1236	1236	2134474	0.12%
2023	985530	1189113	2174643	88959	88959	2352561	8.18%
2024	1005241	1212895	2218136	24495	24495	2267125	2.21%
2025	1025345	1237153	2262499	10024	10024	2282546	0.89%
2026	1045852	1261896	2307749	0	0	2307749	0.00%
2027	1066769	1287134	2353904			2353904	
2028	1088105	1312877	2400982			2400982	
2029	1109867	1339134	2449001			2449001	
2030	1132064	1365917	2497981			2497981	
2031	1154706	1393235	2547941			2547941	
2032	1177800	1421100	2598900			2598900	
2033	1201356	1449522	2650878			2650878	
2034	1225383	1478513	2703896			2703896	
2035	1249890	1508083	2757973			2757973	
2036	1274888	1538244	2813133			2813133	
2037	1300386	1569009	2869395			2869395	
2038	1326394	1600389	2926783			2926783	
2039	1352922	1632397	2985319			2985319	

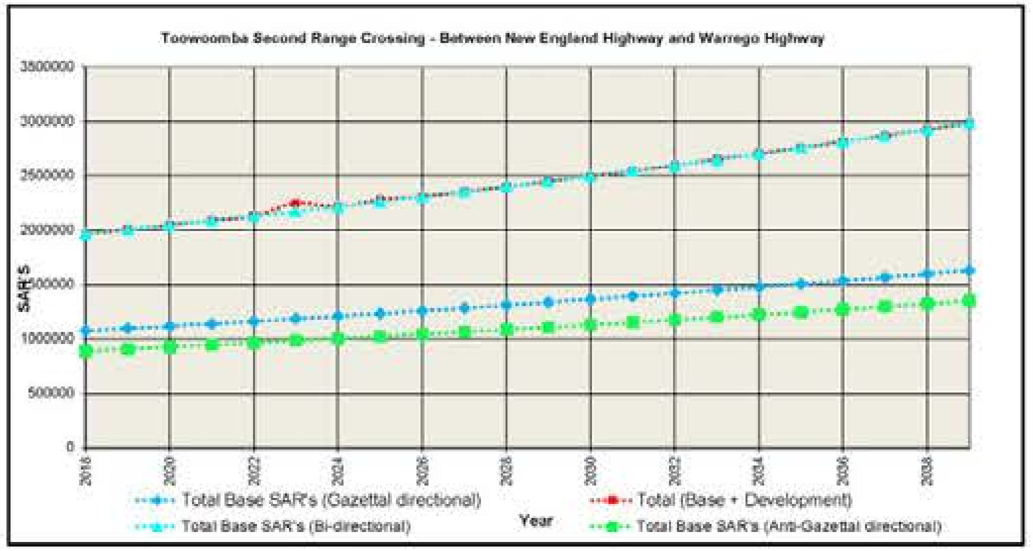


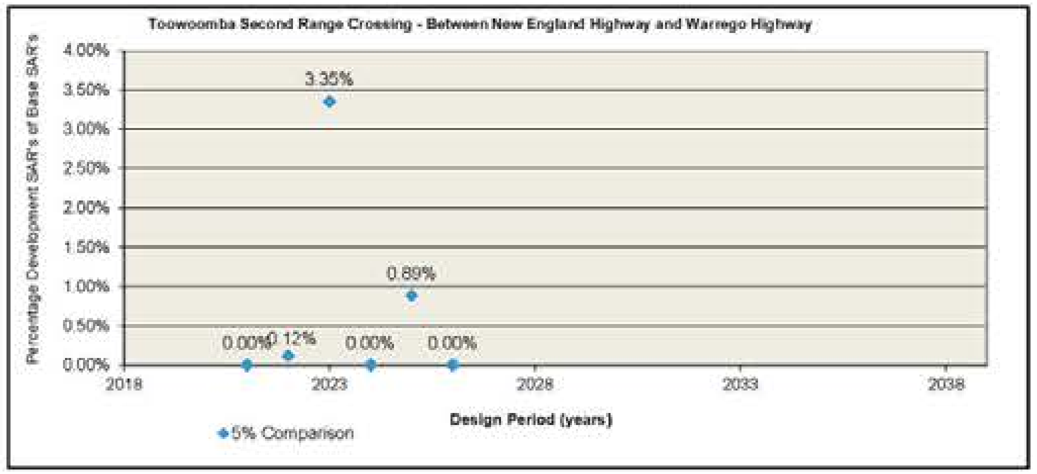


Toowoomba Second Range Crossing - Between New England Highway and Warrego Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Toowoomba Second Range Crossing				Between New England Highway and Warrego Highway			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	892625	1077016	1969641			1969641	
2019	910477	1098557	2009034			2009034	
2020	928687	1120528	2049215	0	0	2049215	
2021	947261	1142938	2090199	0	0	2090199	0.00%
2022	966206	1165797	2132003	1236	1236	2134474	0.12%
2023	985530	1189113	2174643	36446	36446	2247536	3.35%
2024	1005241	1212895	2218136	0	0	2218136	0.00%
2025	1025345	1237153	2262499	10024	10024	2282546	0.89%
2026	1045852	1261896	2307749	0	0	2307749	0.00%
2027	1066769	1287134	2353904			2353904	
2028	1088105	1312877	2400982			2400982	
2029	1109867	1339134	2449001			2449001	
2030	1132064	1365917	2497981			2497981	
2031	1154706	1393235	2547941			2547941	
2032	1177800	1421100	2598900			2598900	
2033	1201356	1449522	2650878			2650878	
2034	1225383	1478513	2703896			2703896	
2035	1249890	1508083	2757973			2757973	
2036	1274888	1538244	2813133			2813133	
2037	1300386	1569009	2869395			2869395	
2038	1326394	1600389	2926783			2926783	
2039	1352922	1632397	2985319			2985319	

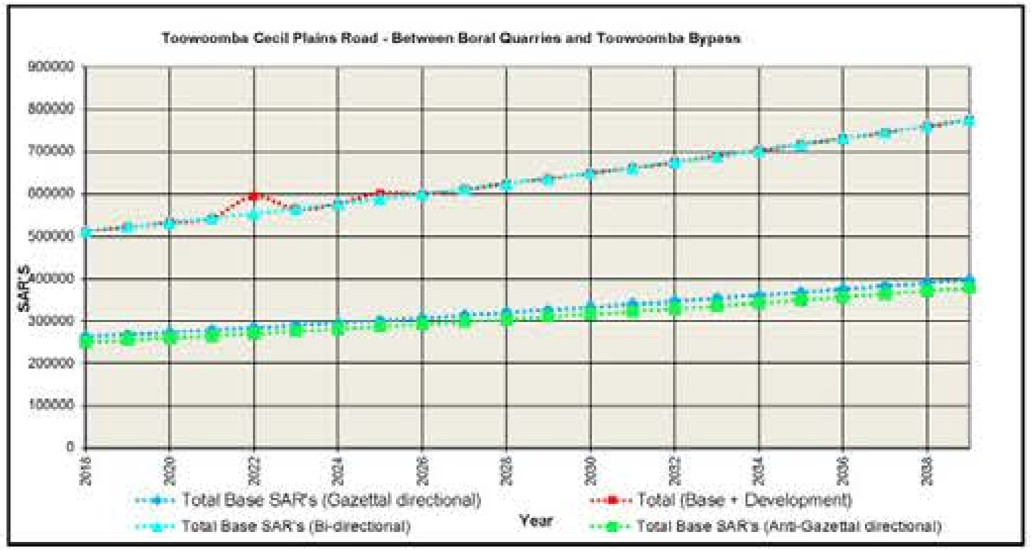


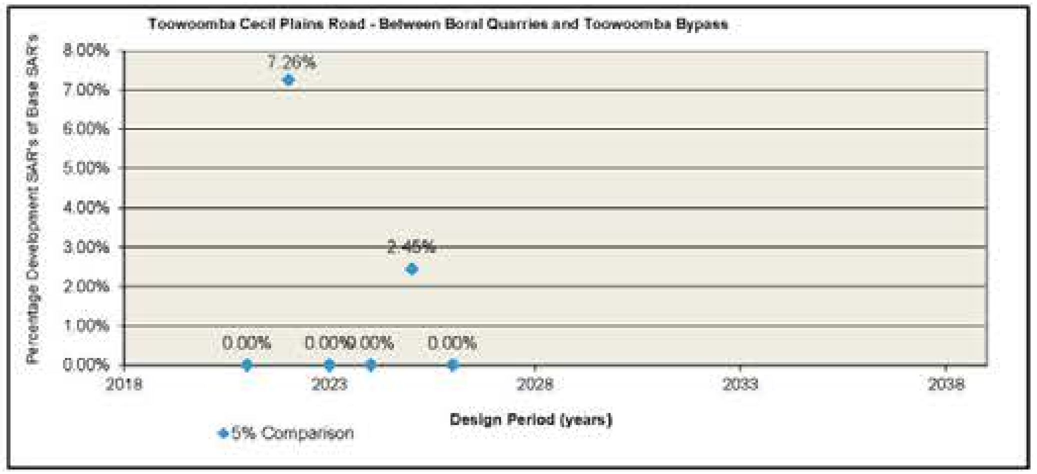


Toowoomba Cecil Plains Road - Between Boral Quarries and Toowoomba Bypass

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Toowoomba Cecil Plains Road				Between Boral Quarries and Toowoomba Bypass			
Base SAR's				Development SAR's			
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	249404	262431	511835			511835	
2019	254392	267680	522071			522071	
2020	259480	273033	532513	0	0	532513	
2021	264669	278494	543163	0	0	543163	0.00%
2022	269963	284064	554026	20108	20108	594243	7.26%
2023	275362	289745	565107	0	0	565107	0.00%
2024	280869	295540	576409	0	0	576409	0.00%
2025	286486	301451	587937	7212	7212	602361	2.45%
2026	292216	307480	599696	0	0	599696	0.00%
2027	298061	313629	611690			611690	
2028	304022	319902	623924			623924	
2029	310102	326300	636402			636402	
2030	316304	332826	649130			649130	
2031	322630	339482	662113			662113	
2032	329083	346272	675355			675355	
2033	335665	353197	688862			688862	
2034	342378	360261	702639			702639	
2035	349225	367467	716692			716692	
2036	356210	374816	731026			731026	
2037	363334	382312	745646			745646	
2038	370601	389959	760559			760559	
2039	378013	397758	775771			775771	

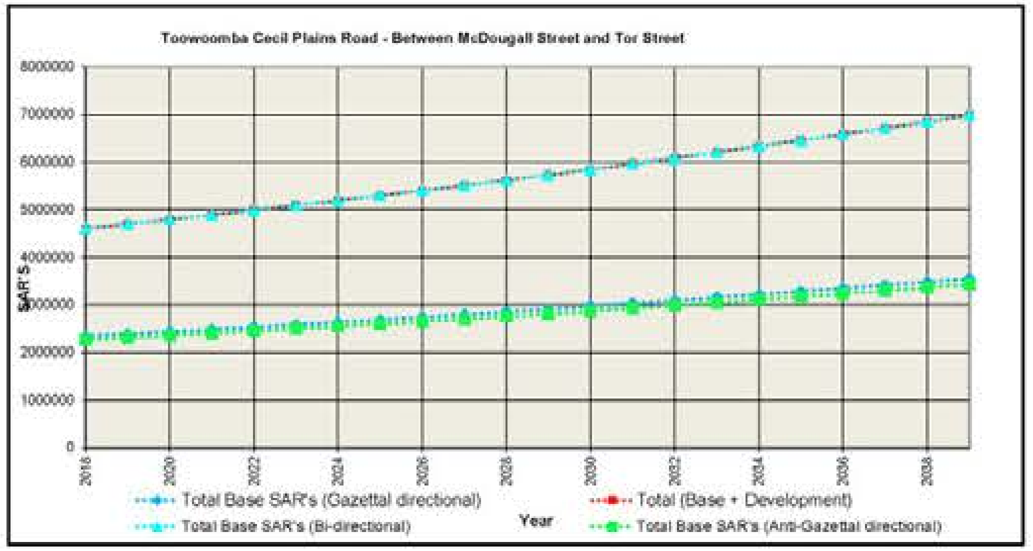


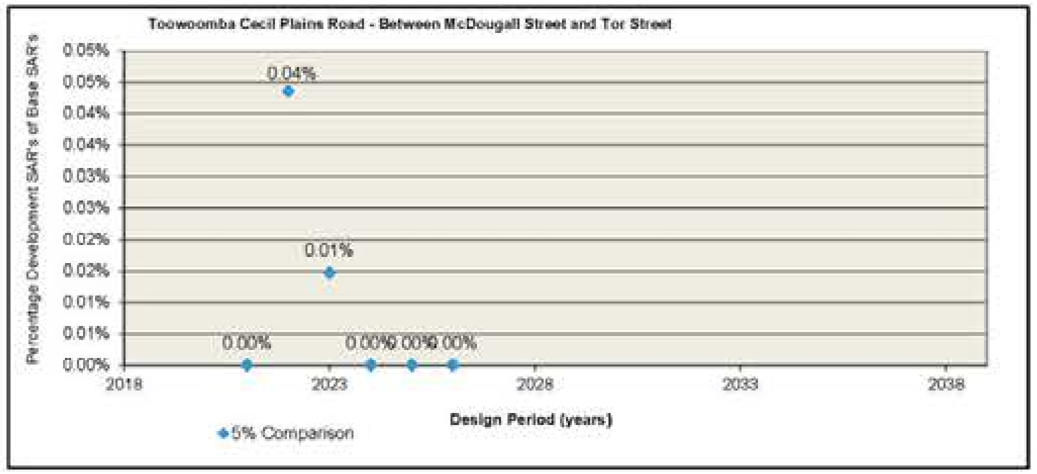


Toowoomba Cecil Plains Road - Between McDougall Street and Tor Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Toowoomba Cecil Plains Road				Between McDougall Street and Tor Street			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2267430	2346889	4614319			4614319	
2019	2312778	2393827	4706605			4706605	
2020	2359034	2441703	4800737	0	0	4800737	
2021	2406215	2490537	4896752	0	0	4896752	0.00%
2022	2454339	2540348	4994687	1089	1089	4996865	0.04%
2023	2503426	2591155	5094581	375	375	5095331	0.01%
2024	2553494	2642978	5196472	0	0	5196472	0.00%
2025	2604564	2695838	5300402	0	0	5300402	0.00%
2026	2656655	2749754	5406410	0	0	5406410	0.00%
2027	2709789	2804749	5514538			5514538	
2028	2763984	2860844	5624829			5624829	
2029	2819264	2918061	5737325			5737325	
2030	2875649	2976422	5852072			5852072	
2031	2933162	3035951	5969113			5969113	
2032	2991825	3096670	6088496			6088496	
2033	3051662	3158603	6210265			6210265	
2034	3112696	3221775	6334471			6334471	
2035	3174949	3286211	6461160			6461160	
2036	3238448	3351935	6590383			6590383	
2037	3303217	3418974	6722191			6722191	
2038	3369281	3487353	6856635			6856635	
2039	3436667	3557100	6993767			6993767	

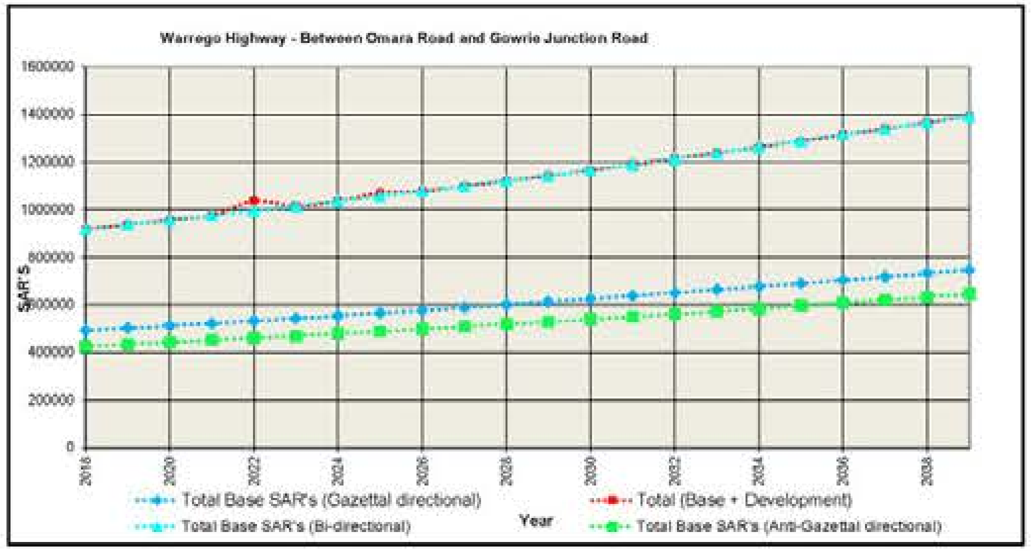


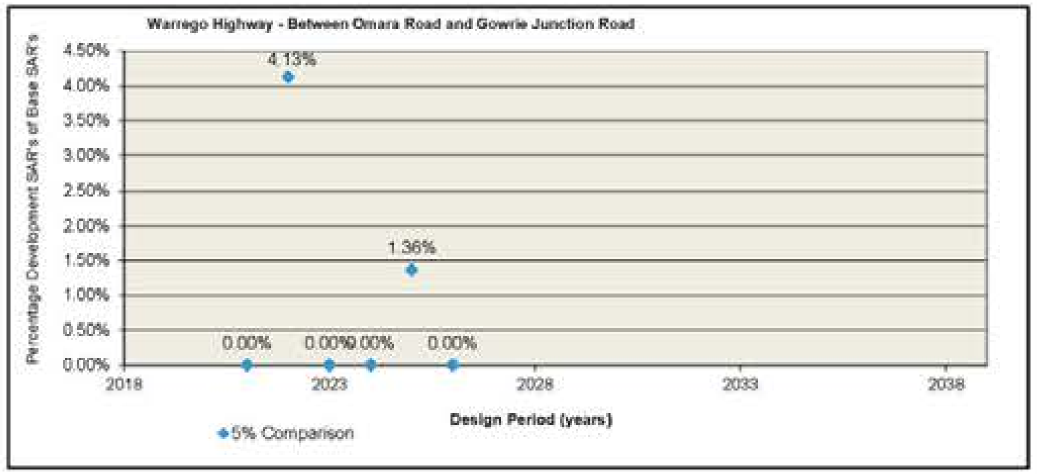


Warrego Highway - Between Omara Road and Gowrie Junction Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Omara Road and Gowrie Junction Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	426676	493850	920526			920526	
2019	435210	503727	938936			938936	
2020	443914	513801	957715	0	0	957715	
2021	452792	524077	976870	0	0	976870	0.00%
2022	461848	534559	996407	20559	20559	1037525	4.13%
2023	471085	545250	1016335	0	0	1016335	0.00%
2024	480507	556155	1036662	0	0	1036662	0.00%
2025	490117	567278	1057395	7212	7212	1071819	1.36%
2026	499919	578624	1078543	0	0	1078543	0.00%
2027	509918	590196	1100114			1100114	
2028	520116	602000	1122116			1122116	
2029	530518	614040	1144558			1144558	
2030	541129	626321	1167449			1167449	
2031	551951	638847	1190798			1190798	
2032	562990	651624	1214614			1214614	
2033	574250	664657	1238907			1238907	
2034	585735	677950	1263685			1263685	
2035	597450	691509	1288959			1288959	
2036	609399	705339	1314738			1314738	
2037	621587	719446	1341032			1341032	
2038	634019	733835	1367853			1367853	
2039	646699	748511	1395210			1395210	

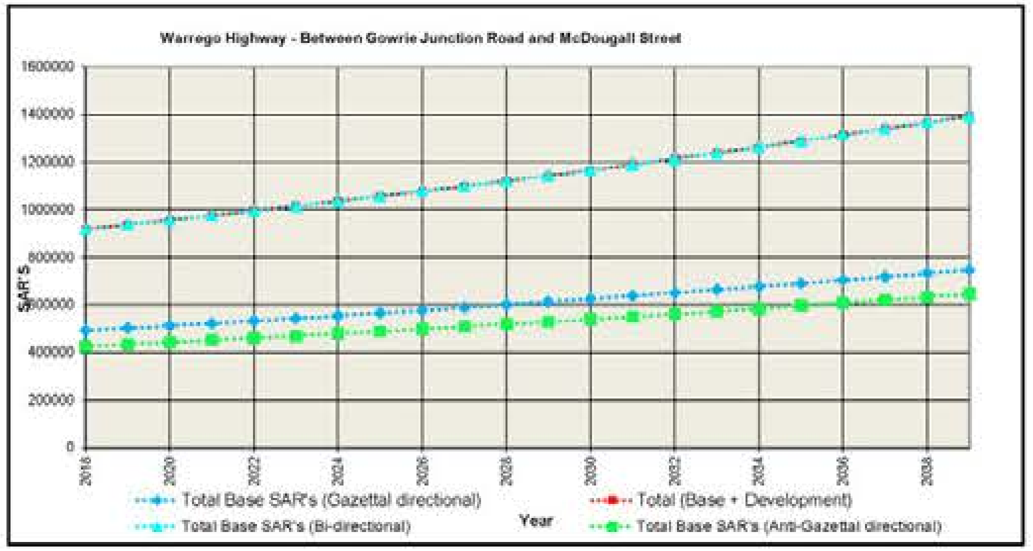


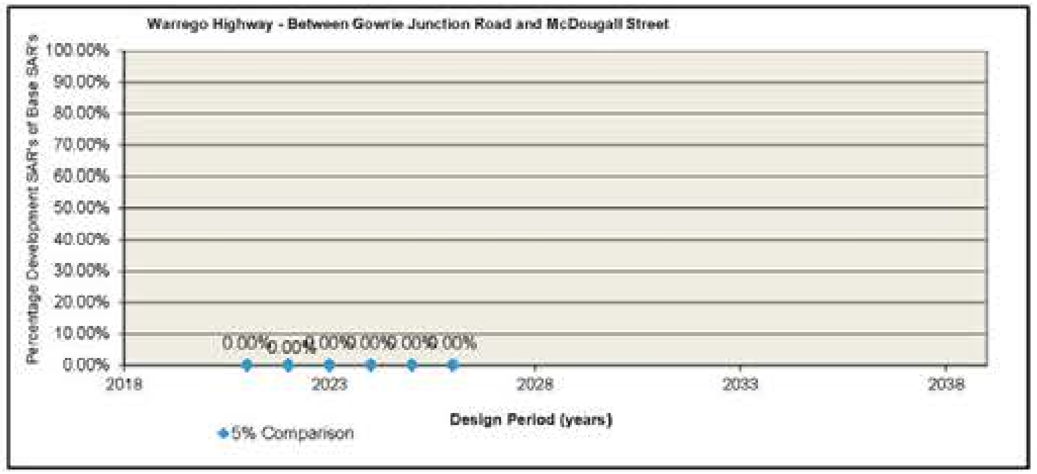


Warrego Highway - Between Gowrie Junction Road and McDougall Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Gowrie Junction Road and McDougall Street			
Base SAR's				Development SAR's			
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	426676	493850	920526			920526	
2019	435210	503727	938936			938936	
2020	443914	513801	957715	0	0	957715	
2021	452792	524077	976870	0	0	976870	0.00%
2022	461848	534559	996407	0	0	996407	0.00%
2023	471085	545250	1016335	0	0	1016335	0.00%
2024	480507	556155	1036662	0	0	1036662	0.00%
2025	490117	567278	1057395	0	0	1057395	0.00%
2026	499919	578624	1078543	0	0	1078543	0.00%
2027	509918	590196	1100114			1100114	
2028	520116	602000	1122116			1122116	
2029	530518	614040	1144558			1144558	
2030	541129	626321	1167449			1167449	
2031	551951	638847	1190798			1190798	
2032	562990	651624	1214614			1214614	
2033	574250	664657	1238907			1238907	
2034	585735	677950	1263685			1263685	
2035	597450	691509	1288959			1288959	
2036	609399	705339	1314738			1314738	
2037	621587	719446	1341032			1341032	
2038	634019	733835	1367853			1367853	
2039	646699	748511	1395210			1395210	

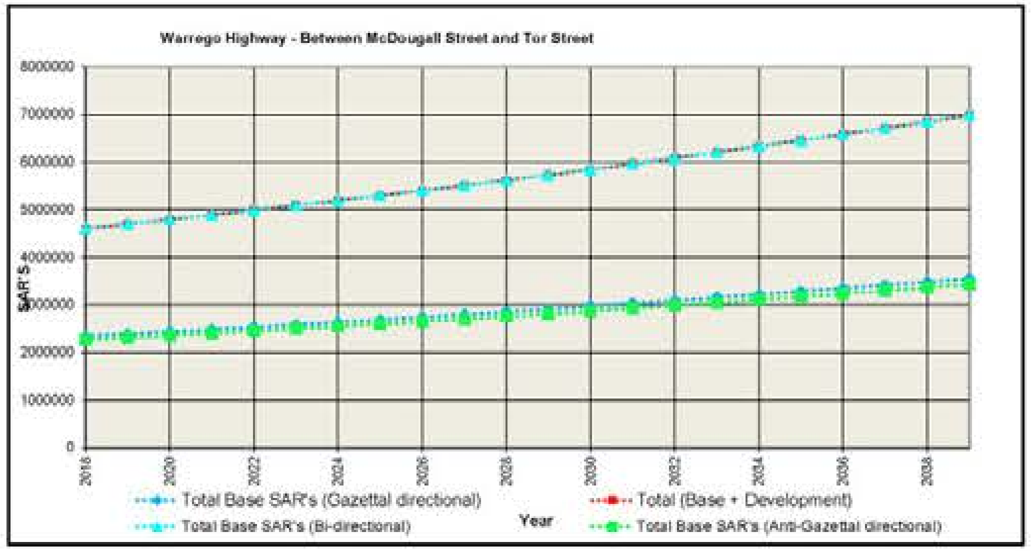


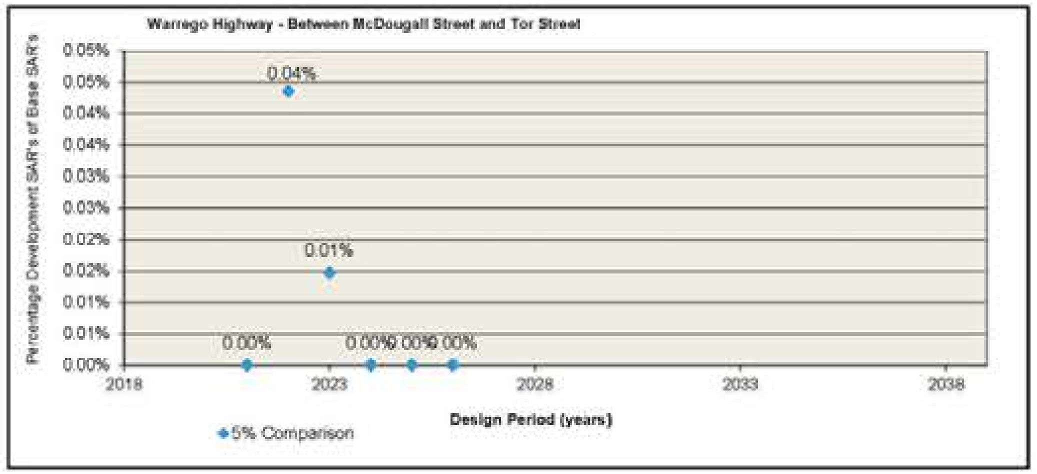


Warrego Highway - Between McDougall Street and Tor Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between McDougall Street and Tor Street			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2267430	2346889	4614319			4614319	
2019	2312778	2393827	4706605			4706605	
2020	2359034	2441703	4800737	0	0	4800737	
2021	2406215	2490537	4896752	0	0	4896752	0.00%
2022	2454339	2540348	4994687	1089	1089	4996865	0.04%
2023	2503426	2591155	5094581	375	375	5095331	0.01%
2024	2553494	2642978	5196472	0	0	5196472	0.00%
2025	2604564	2695838	5300402	0	0	5300402	0.00%
2026	2656655	2749754	5406410	0	0	5406410	0.00%
2027	2709789	2804749	5514538			5514538	
2028	2763984	2860844	5624829			5624829	
2029	2819264	2918061	5737325			5737325	
2030	2875649	2976422	5852072			5852072	
2031	2933162	3035951	5969113			5969113	
2032	2991825	3096670	6088496			6088496	
2033	3051662	3158603	6210265			6210265	
2034	3112696	3221775	6334471			6334471	
2035	3174949	3286211	6461160			6461160	
2036	3238448	3351935	6590383			6590383	
2037	3303217	3418974	6722191			6722191	
2038	3369281	3487353	6856635			6856635	
2039	3436667	3557100	6993767			6993767	

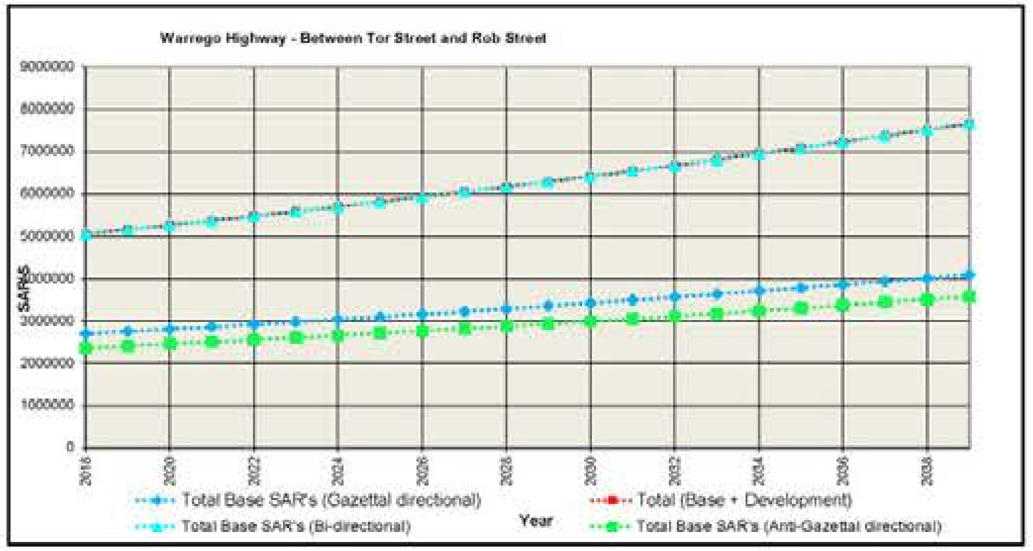


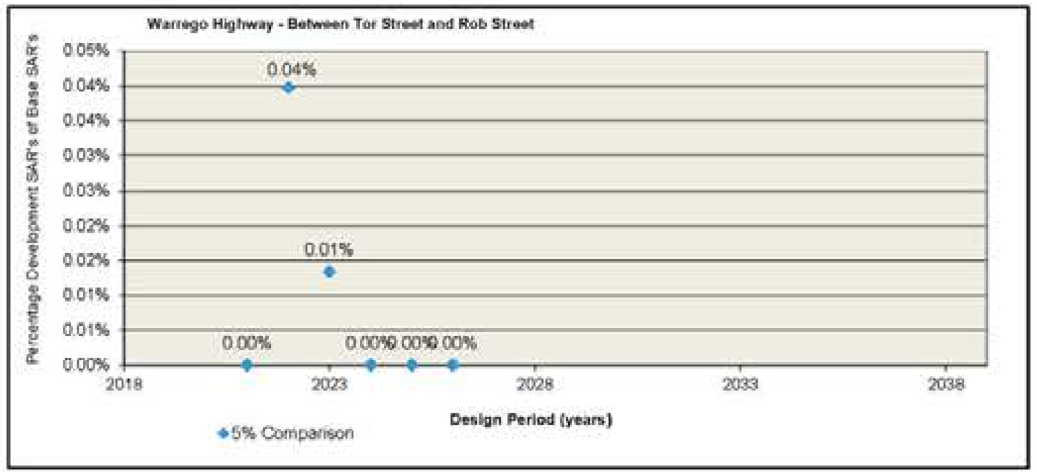


Warrego Highway - Between Tor Street and Rob Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Tor Street and Rob Street			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2361592	2701013	5062605			5062605	
2019	2408824	2755034	5163858			5163858	
2020	2457001	2810134	5267135	0	0	5267135	
2021	2506141	2866337	5372477	0	0	5372477	0.00%
2022	2556263	2923664	5479927	1089	1089	5482105	0.04%
2023	2607389	2982137	5589526	375	375	5590276	0.01%
2024	2659536	3041780	5701316	0	0	5701316	0.00%
2025	2712727	3102615	5815342	0	0	5815342	0.00%
2026	2766982	3164667	5931649	0	0	5931649	0.00%
2027	2822321	3227961	6050282			6050282	
2028	2878768	3292520	6171288			6171288	
2029	2936343	3358370	6294714			6294714	
2030	2995070	3425538	6420608			6420608	
2031	3054971	3494049	6549020			6549020	
2032	3116071	3563930	6680000			6680000	
2033	3178392	3635208	6813600			6813600	
2034	3241960	3707912	6949872			6949872	
2035	3306799	3782071	7088870			7088870	
2036	3372935	3857712	7230647			7230647	
2037	3440394	3934866	7375260			7375260	
2038	3509202	4013564	7522765			7522765	
2039	3579386	4093835	7673221			7673221	

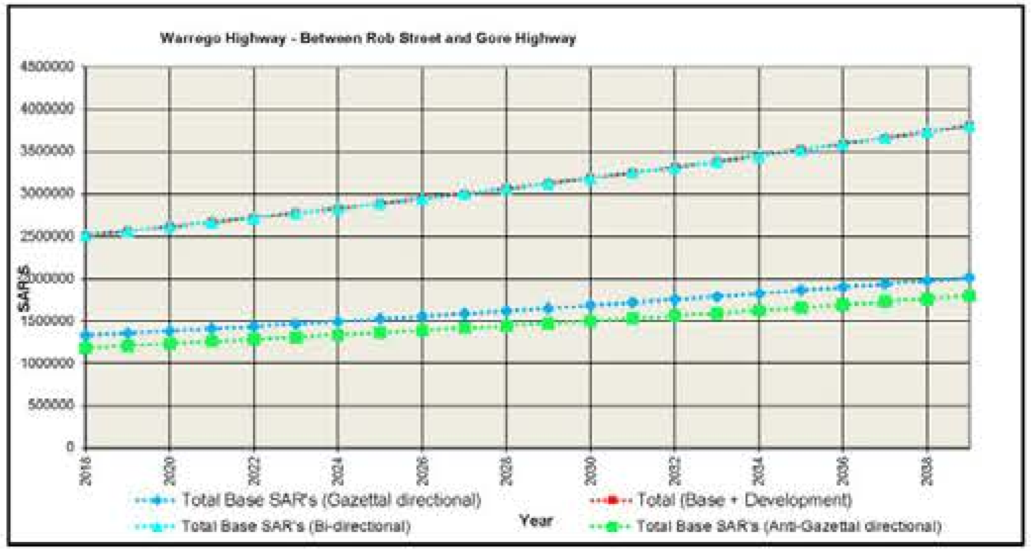


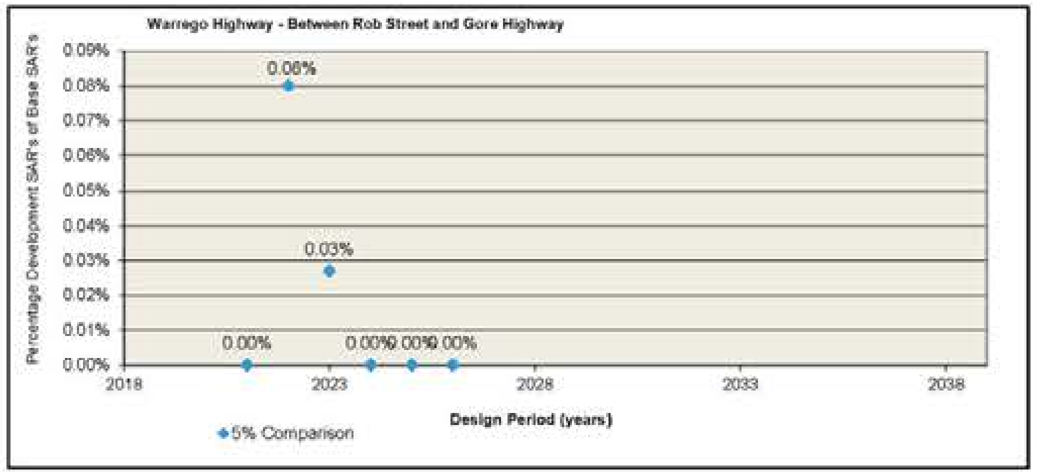


Warrego Highway - Between Rob Street and Gore Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Rob Street and Gore Highway			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1185294	1328931	2514225			2514225	
2019	1209000	1355510	2564509			2564509	
2020	1233180	1382620	2615799	0	0	2615799	
2021	1257843	1410272	2668115	0	0	2668115	0.00%
2022	1283000	1438478	2721478	1089	1089	2723655	0.08%
2023	1308660	1467247	2775907	375	375	2776658	0.03%
2024	1334833	1496592	2831425	0	0	2831425	0.00%
2025	1361530	1526524	2888054	0	0	2888054	0.00%
2026	1388760	1557054	2945815	0	0	2945815	0.00%
2027	1416536	1588195	3004731			3004731	
2028	1444866	1619959	3064826			3064826	
2029	1473764	1652359	3126122			3126122	
2030	1503239	1685406	3188645			3188645	
2031	1533304	1719114	3252418			3252418	
2032	1563970	1753496	3317466			3317466	
2033	1595249	1788566	3383815			3383815	
2034	1627154	1824337	3451492			3451492	
2035	1659697	1860824	3520521			3520521	
2036	1692891	1898041	3590932			3590932	
2037	1726749	1936001	3662751			3662751	
2038	1761284	1974721	3736006			3736006	
2039	1796510	2014216	3810726			3810726	

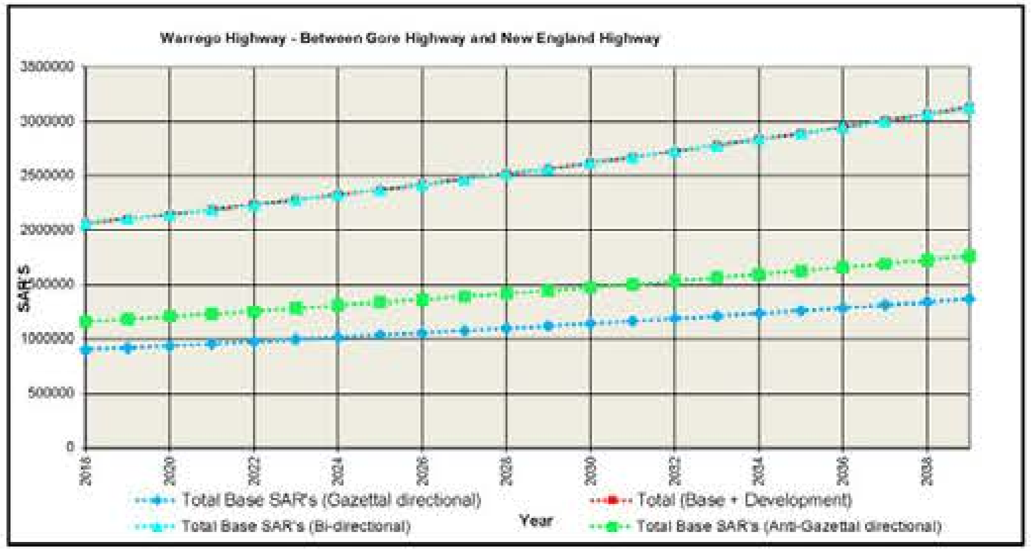


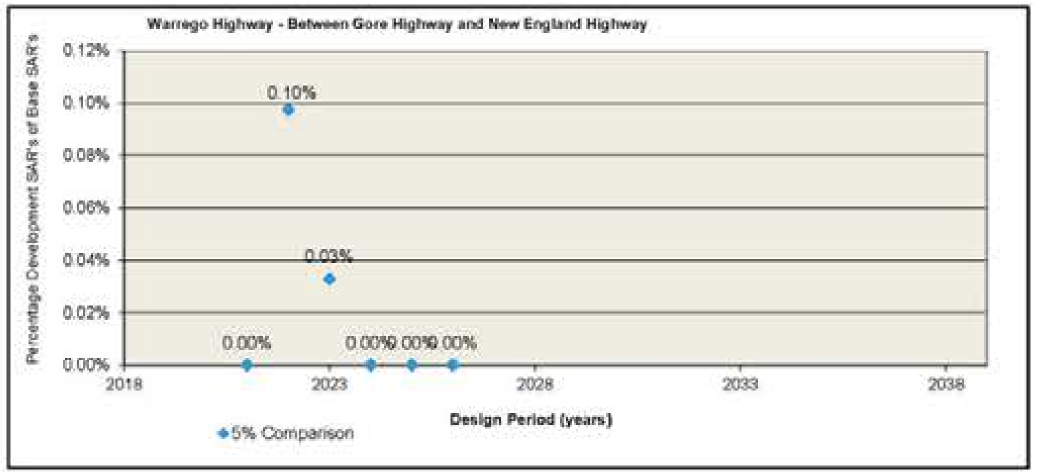


Warrego Highway - Between Gore Highway and New England Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Gore Highway and New England Highway			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1163214	902108	2065323			2065323	
2019	1186479	920151	2106629			2106629	
2020	1210208	938554	2148762	0	0	2148762	
2021	1234412	957325	2191737	0	0	2191737	0.00%
2022	1259100	976471	2235572	1089	1089	2237749	0.10%
2023	1284282	996001	2280283	375	375	2281034	0.03%
2024	1309968	1015921	2325889	0	0	2325889	0.00%
2025	1336168	1036239	2372407	0	0	2372407	0.00%
2026	1362891	1056964	2419855	0	0	2419855	0.00%
2027	1390149	1078103	2468252			2468252	
2028	1417952	1099665	2517617			2517617	
2029	1446311	1121659	2567969			2567969	
2030	1475237	1144092	2619329			2619329	
2031	1504742	1166974	2671716			2671716	
2032	1534836	1190313	2725149			2725149	
2033	1565533	1214119	2779652			2779652	
2034	1596844	1238402	2835245			2835245	
2035	1628781	1263170	2891950			2891950	
2036	1661356	1288433	2949789			2949789	
2037	1694583	1314202	3008785			3008785	
2038	1728475	1340486	3068961			3068961	
2039	1763045	1367296	3130340			3130340	

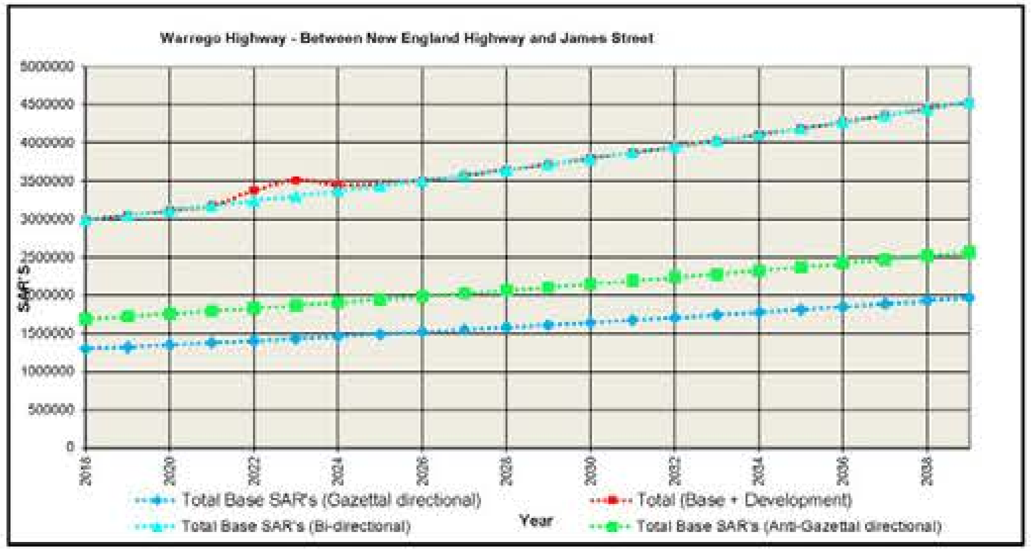


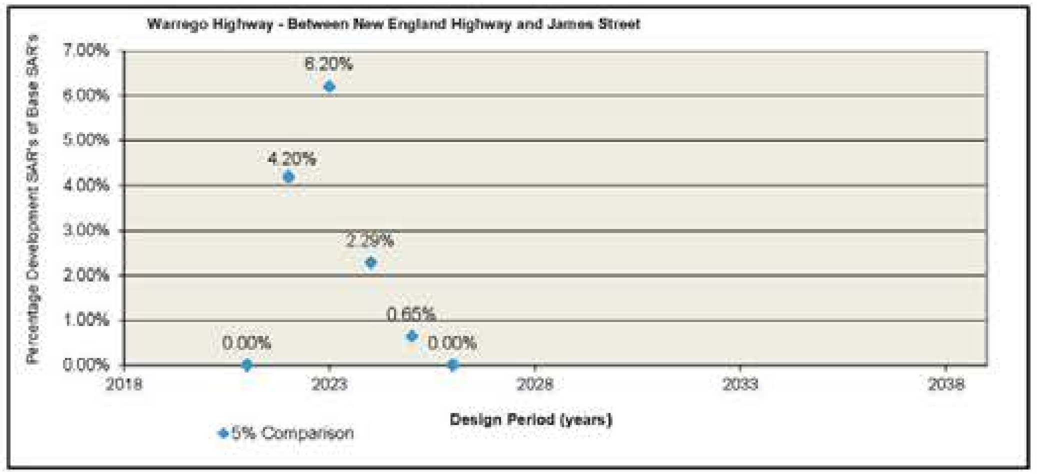


Warrego Highway - Between New England Highway and James Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between New England Highway and James Street			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1696464	1299347	2995812			2995812	
2019	1730394	1325334	3055728			3055728	
2020	1765002	1351841	3116843	0	0	3116843	
2021	1800302	1378878	3179179	0	0	3179179	0.00%
2022	1836308	1406455	3242763	68080	68080	3378923	4.20%
2023	1873034	1434585	3307618	102600	102600	3512818	6.20%
2024	1910494	1463276	3373771	38639	38639	3451049	2.29%
2025	1948704	1492542	3441246	11106	11106	3463458	0.65%
2026	1987678	1522393	3510071	0	0	3510071	0.00%
2027	2027432	1552840	3580272			3580272	
2028	2067981	1583897	3651878			3651878	
2029	2109340	1615575	3724915			3724915	
2030	2151527	1647887	3799414			3799414	
2031	2194558	1680844	3875402			3875402	
2032	2238449	1714461	3952910			3952910	
2033	2283218	1748751	4031968			4031968	
2034	2328882	1783726	4112608			4112608	
2035	2375460	1819400	4194860			4194860	
2036	2422969	1855788	4278757			4278757	
2037	2471428	1892904	4364332			4364332	
2038	2520857	1930762	4451619			4451619	
2039	2571274	1969377	4540651			4540651	

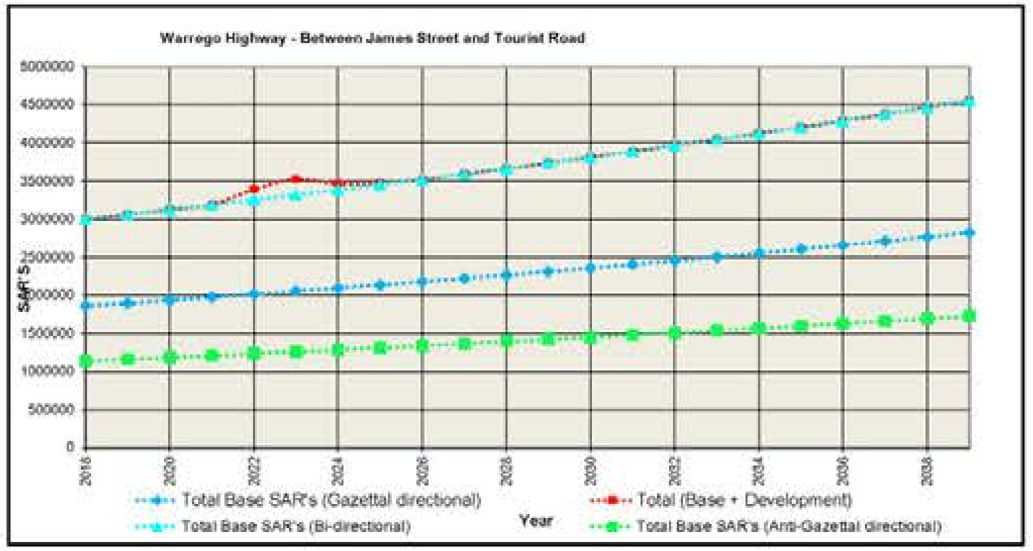


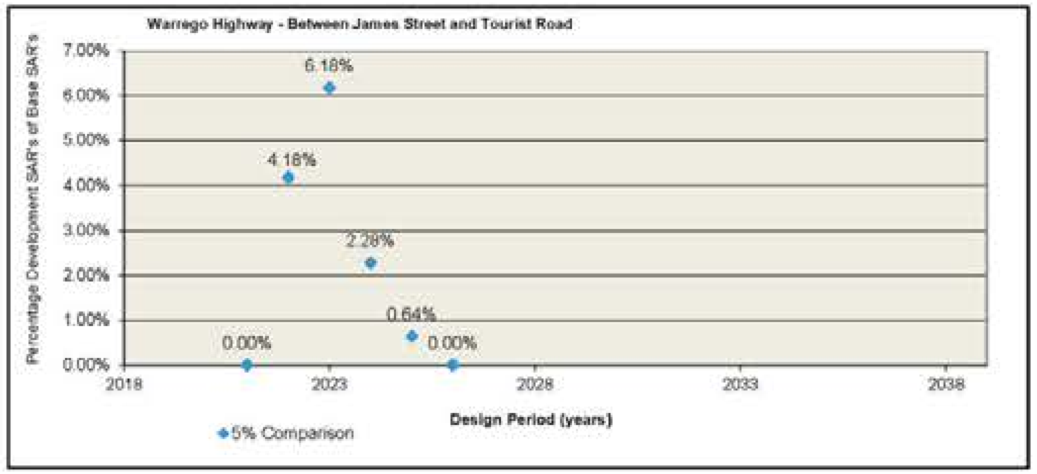


Warrego Highway - Between James Street and Tourist Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between James Street and Tourist Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1145103	1863717	3008820			3008820	
2019	1168006	1900991	3068996			3068996	
2020	1191366	1939011	3130376	0	0	3130376	
2021	1215193	1977791	3192984	0	0	3192984	0.00%
2022	1239497	2017347	3256844	68080	68080	3393004	4.18%
2023	1264287	2057694	3321980	102600	102600	3527181	6.18%
2024	1289572	2098848	3388420	38639	38639	3465699	2.28%
2025	1315364	2140825	3456188	11106	11106	3478400	0.64%
2026	1341671	2183641	3525312	0	0	3525312	0.00%
2027	1368504	2227314	3595818			3595818	
2028	1395875	2271860	3667735			3667735	
2029	1423792	2317297	3741090			3741090	
2030	1452268	2363643	3815911			3815911	
2031	1481313	2410916	3892230			3892230	
2032	1510940	2459135	3970074			3970074	
2033	1541158	2508317	4049476			4049476	
2034	1571981	2558484	4130465			4130465	
2035	1603421	2609653	4213074			4213074	
2036	1635490	2661846	4297336			4297336	
2037	1668199	2715083	4383283			4383283	
2038	1701563	2769385	4470948			4470948	
2039	1735595	2824773	4560367			4560367	

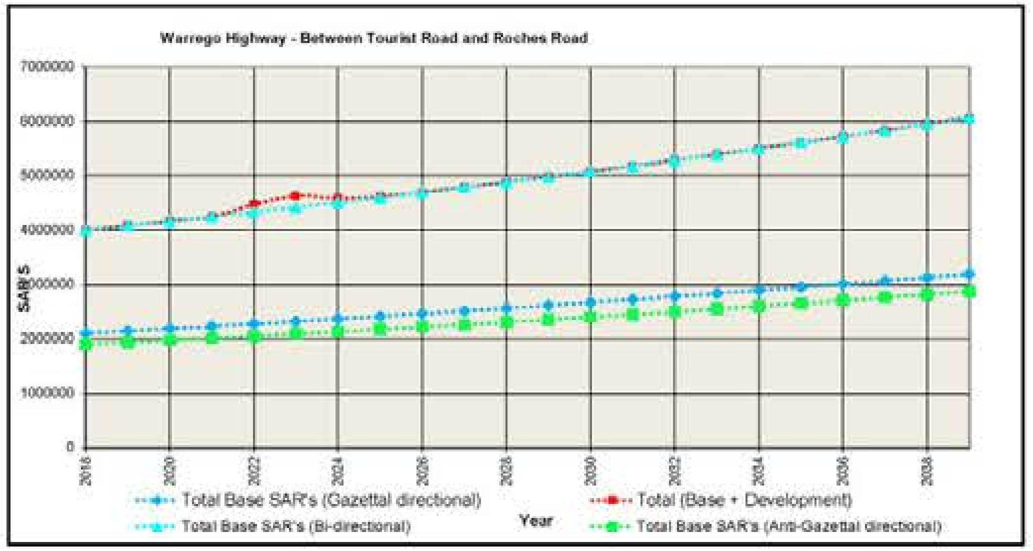


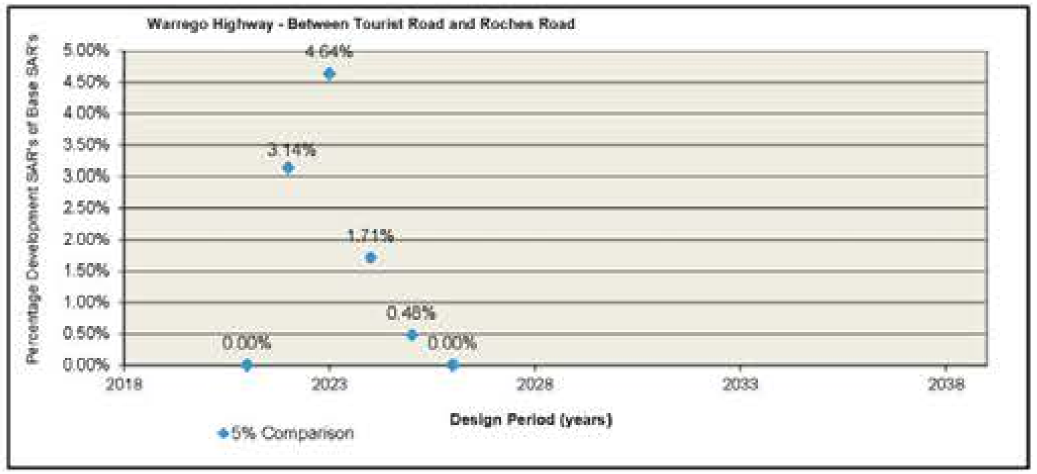


Warrego Highway - Between Tourist Road and Roches Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Tourist Road and Roches Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1899018	2109521	4008539			4008539	
2019	1936999	2151712	4088710			4088710	
2020	1975739	2194746	4170484	0	0	4170484	
2021	2015253	2238641	4253894	0	0	4253894	0.00%
2022	2055558	2283414	4338972	68080	68080	4475132	3.14%
2023	2096670	2329082	4425751	102600	102600	4630952	4.64%
2024	2138603	2375663	4514266	38639	38639	4591545	1.71%
2025	2181375	2423177	4604552	11106	11106	4626764	0.48%
2026	2225003	2471640	4696643	0	0	4696643	0.00%
2027	2269503	2521073	4790576			4790576	
2028	2314893	2571494	4886387			4886387	
2029	2361191	2622924	4984115			4984115	
2030	2408414	2675383	5083797			5083797	
2031	2456583	2728891	5185473			5185473	
2032	2505714	2783468	5289183			5289183	
2033	2555829	2839138	5394966			5394966	
2034	2606946	2895920	5502866			5502866	
2035	2659084	2953839	5612923			5612923	
2036	2712266	3012916	5725181			5725181	
2037	2766511	3073174	5839685			5839685	
2038	2821841	3134637	5956479			5956479	
2039	2878278	3197330	6075608			6075608	

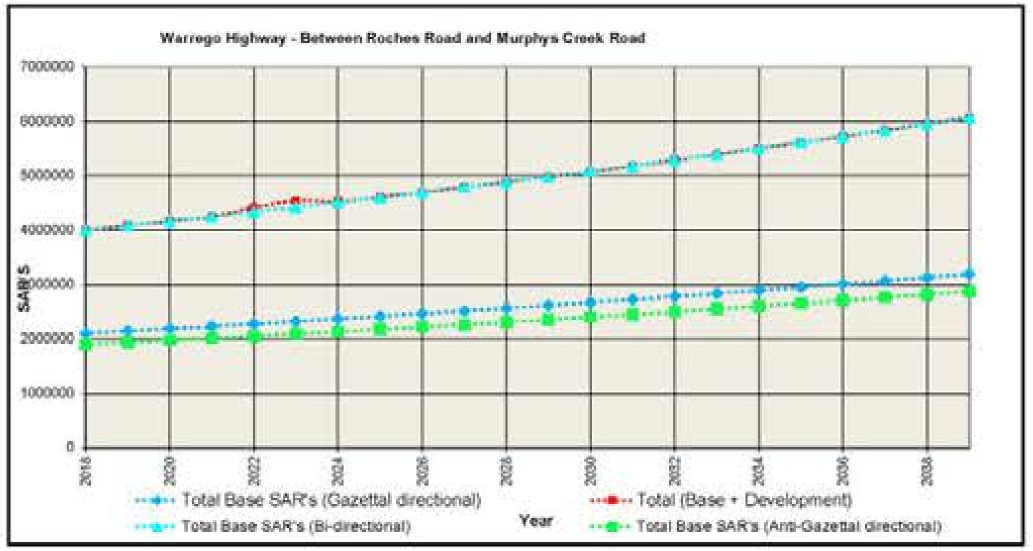


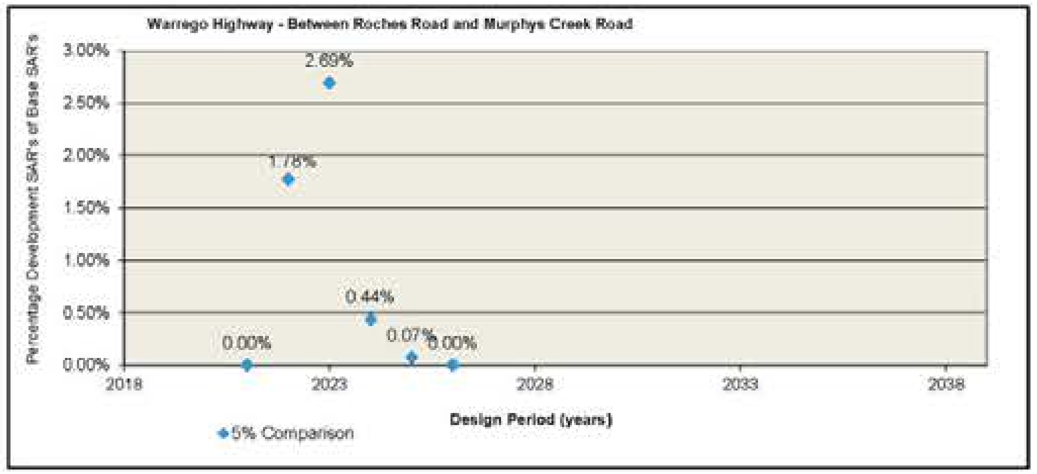


Warrego Highway - Between Roches Road and Murphys Creek Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Roches Road and Murphys Creek Road			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1899018	2109521	4008539			4008539	
2019	1936999	2151712	4088710			4088710	
2020	1975739	2194746	4170484	0	0	4170484	
2021	2015253	2238641	4253894	0	0	4253894	0.00%
2022	2055558	2283414	4338972	38557	38557	4416086	1.78%
2023	2096670	2329082	4425751	59629	59629	4545009	2.69%
2024	2138603	2375663	4514266	9875	9875	4534016	0.44%
2025	2181375	2423177	4604552	1644	1644	4607840	0.07%
2026	2225003	2471640	4696643	0	0	4696643	0.00%
2027	2269503	2521073	4790576			4790576	
2028	2314893	2571494	4886387			4886387	
2029	2361191	2622924	4984115			4984115	
2030	2408414	2675383	5083797			5083797	
2031	2456583	2728891	5185473			5185473	
2032	2505714	2783468	5289183			5289183	
2033	2555829	2839138	5394966			5394966	
2034	2606945	2895920	5502866			5502866	
2035	2659084	2953839	5612923			5612923	
2036	2712266	3012916	5725181			5725181	
2037	2766511	3073174	5839685			5839685	
2038	2821841	3134637	5956479			5956479	
2039	2878278	3197330	6075608			6075608	

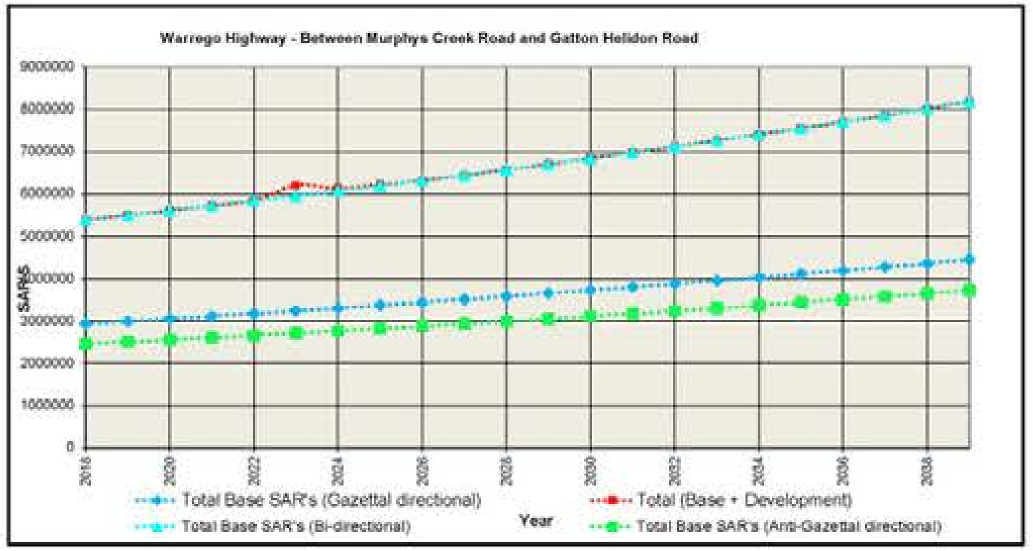


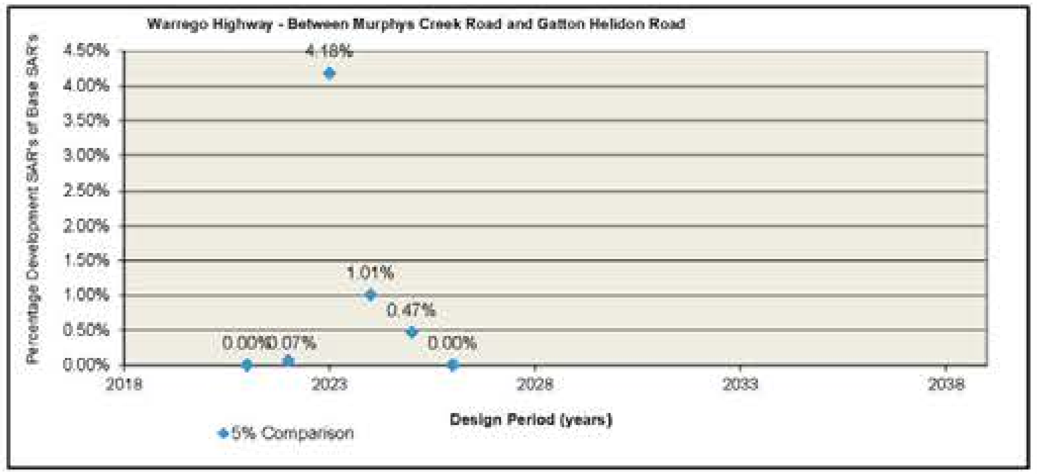


Warrego Highway - Between Murphys Creek Road and Gatton Helidon Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Murphys Creek Road and Gatton Helidon Road			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2457030	2938329	5395359			5395359	
2019	2506170	2997096	5503266			5503266	
2020	2556294	3057038	5613331	0	0	5613331	
2021	2607419	3118179	5725598	0	0	5725598	0.00%
2022	2659568	3180542	5840110	1990	1990	5844090	0.07%
2023	2712759	3244153	5956912	124364	124364	6205640	4.18%
2024	2767014	3309036	6076050	30581	30581	6137212	1.01%
2025	2822355	3375217	6197571	14472	14472	6226515	0.47%
2026	2878802	3442721	6321523	0	0	6321523	0.00%
2027	2936378	3511576	6447953			6447953	
2028	2995105	3581807	6576912			6576912	
2029	3055007	3653443	6708451			6708451	
2030	3116108	3726512	6842620			6842620	
2031	3178430	3801042	6979472			6979472	
2032	3241998	3877063	7119062			7119062	
2033	3306838	3954604	7261443			7261443	
2034	3372975	4033697	7406672			7406672	
2035	3440435	4114371	7554805			7554805	
2036	3509243	4196658	7705901			7705901	
2037	3579428	4280591	7860019			7860019	
2038	3651017	4366203	8017220			8017220	
2039	3724037	4453527	8177564			8177564	

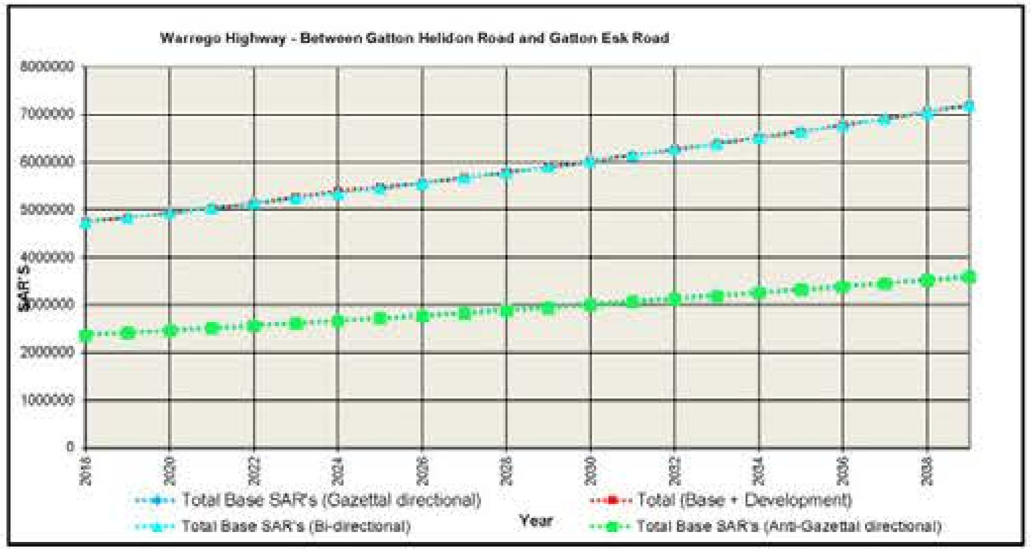


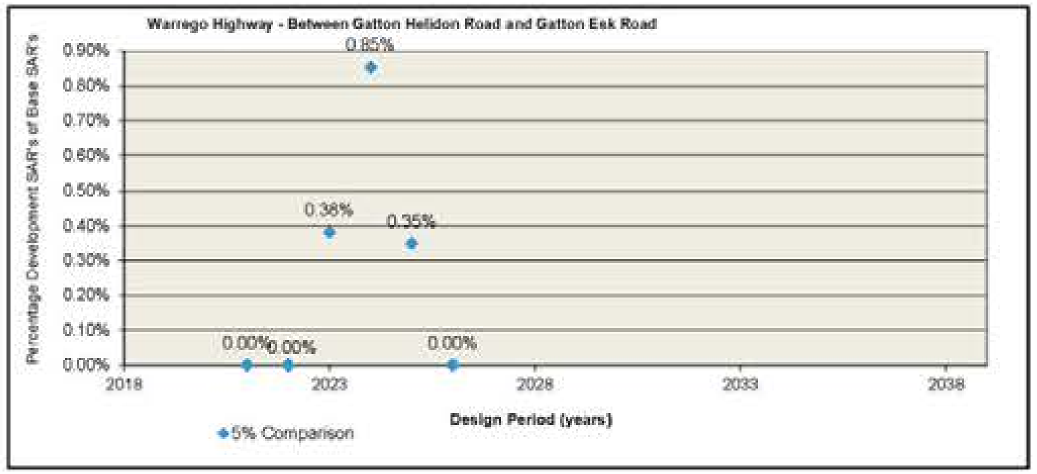


Warrego Highway - Between Gatton Helidon Road and Gatton Esk Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Gatton Helidon Road and Gatton Esk Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2365453	2382696	4748149			4748149	
2019	2412762	2430350	4843112			4843112	
2020	2461017	2478957	4939975	0	0	4939975	
2021	2510238	2528536	5038774	0	0	5038774	0.00%
2022	2560442	2579107	5139550	0	0	5139550	0.00%
2023	2611651	2630689	5242341	10004	10004	5262348	0.38%
2024	2663884	2683303	5347187	22807	22807	5392801	0.85%
2025	2717162	2736969	5454131	9518	9518	5473168	0.35%
2026	2771505	2791709	5563214	0	0	5563214	0.00%
2027	2826935	2847543	5674478			5674478	
2028	2883474	2904494	5787968			5787968	
2029	2941144	2962583	5903727			5903727	
2030	2999966	3021835	6021802			6021802	
2031	3059966	3082272	6142238			6142238	
2032	3121165	3143917	6265082			6265082	
2033	3183588	3206796	6390384			6390384	
2034	3247260	3270932	6518192			6518192	
2035	3312205	3336350	6648556			6648556	
2036	3378449	3403077	6781527			6781527	
2037	3446018	3471139	6917157			6917157	
2038	3514939	3540562	7055500			7055500	
2039	3585238	3611373	7196610			7196610	

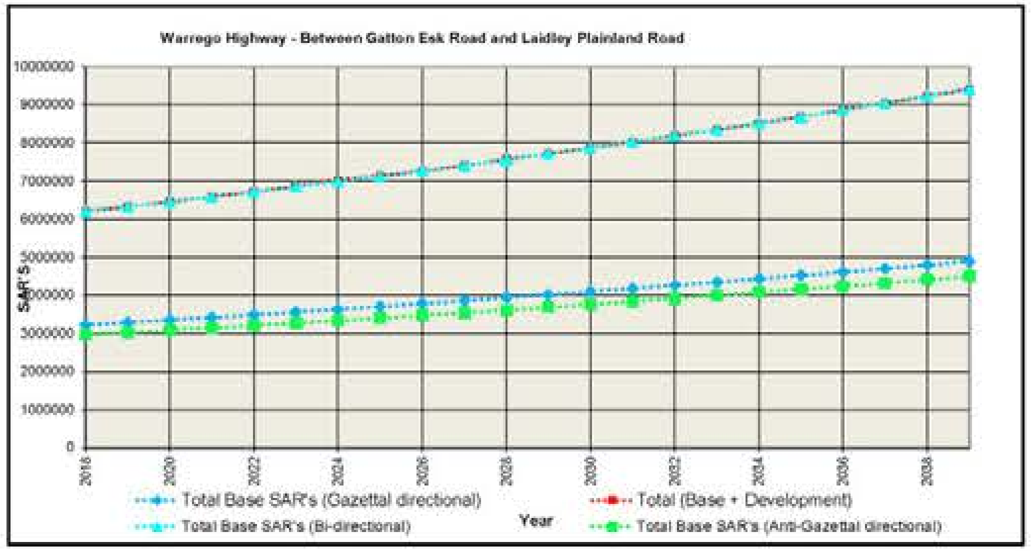


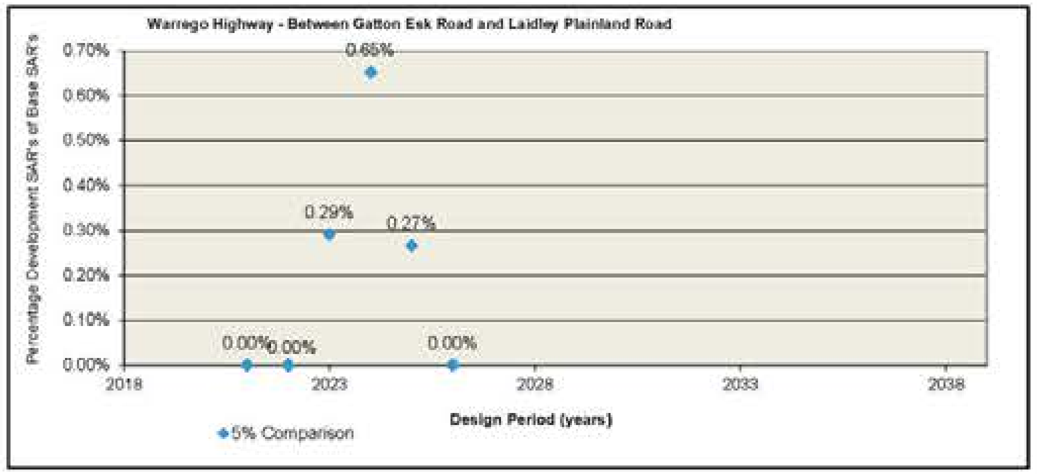


Warrego Highway - Between Gatton Esk Road and Laidley Plainland Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Gatton Esk Road and Laidley Plainland Road			
Base SAR's				Development SAR's			
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	2975114	3236680	6211794			6211794	
2019	3034616	3301414	6336030			6336030	
2020	3095309	3367442	6462751	0	0	6462751	
2021	3157215	3434791	6592006	0	0	6592006	0.00%
2022	3220359	3503487	6723846	0	0	6723846	0.00%
2023	3284766	3573556	6858323	10004	10004	6878330	0.29%
2024	3350462	3645028	6995489	22807	22807	7041103	0.65%
2025	3417471	3717928	7135399	9518	9518	7154436	0.27%
2026	3485820	3792287	7278107	0	0	7278107	0.00%
2027	3555537	3868132	7423669			7423669	
2028	3626648	3945496	7572143			7572143	
2029	3699180	4024405	7723585			7723585	
2030	3773164	4104893	7878057			7878057	
2031	3848627	4186991	8035618			8035618	
2032	3925600	4270731	8196331			8196331	
2033	4004112	4356145	8360257			8360257	
2034	4084194	4443268	8527462			8527462	
2035	4165878	4532134	8698012			8698012	
2036	4249196	4622776	8871972			8871972	
2037	4334179	4715232	9049411			9049411	
2038	4420863	4809537	9230400			9230400	
2039	4509280	4905727	9415008			9415008	

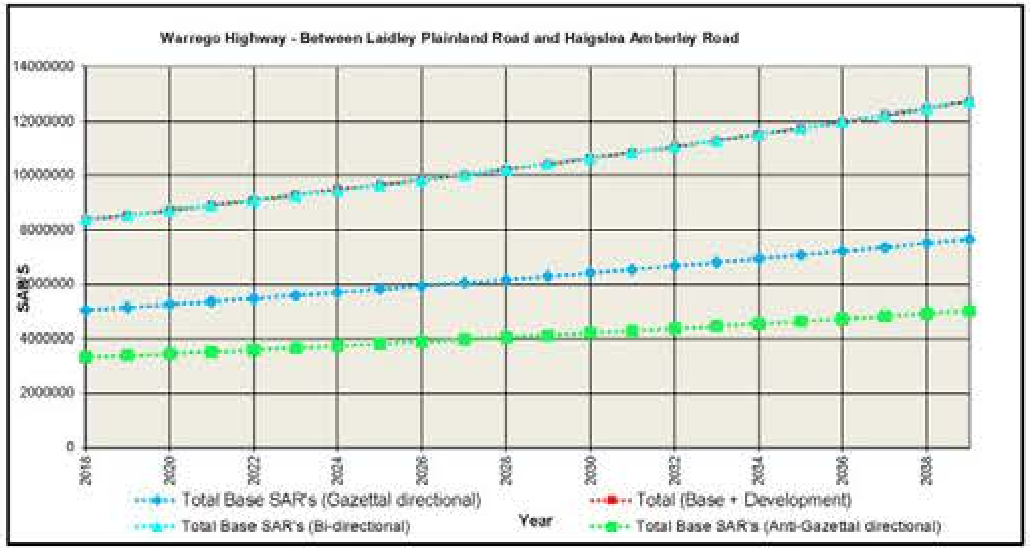


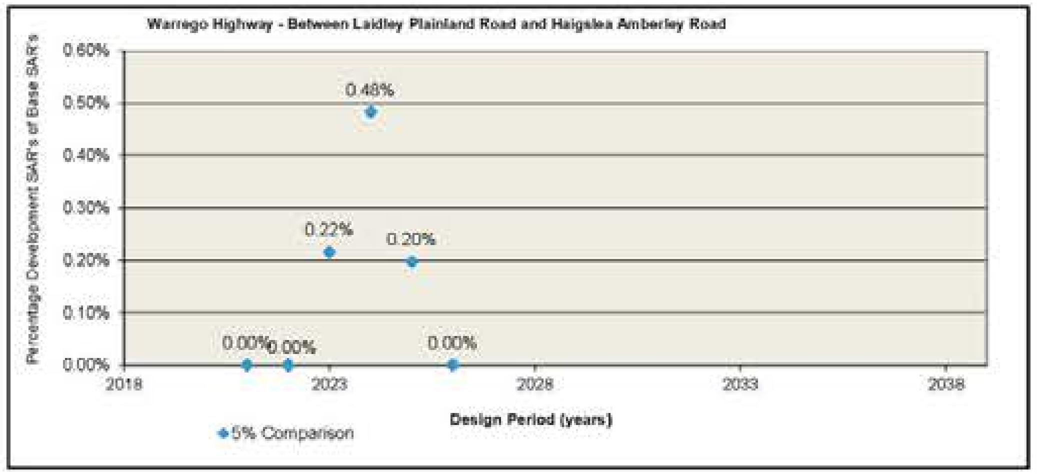


Warrego Highway - Between Laidley Plainland Road and Haigslea Amberley Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Laidley Plainland Road and Haigslea Amberley Road			
Base SAR's				Development SAR's			5% Comparison
Total Base SAR's (Anti-Gazettal directio		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	3328157	5061433	8389589			8389589	
2019	3394720	5162661	8557381			8557381	
2020	3462614	5265915	8728529	0	0	8728529	
2021	3531866	5371233	8903099	0	0	8903099	0.00%
2022	3602504	5478658	9081161	0	0	9081161	0.00%
2023	3674554	5588231	9262784	10004	10004	9262792	0.22%
2024	3748045	5699995	9448040	22807	22807	9493654	0.48%
2025	3823006	5813996	9637001	9518	9518	9656038	0.20%
2026	3899466	5930275	9829741	0	0	9829741	0.00%
2027	3977455	6048881	10026336			10026336	
2028	4057004	6169858	10226863			10226863	
2029	4138144	6293255	10431400			10431400	
2030	4220907	6419121	10640028			10640028	
2031	4305325	6547503	10852828			10852828	
2032	4391432	6678453	11069885			11069885	
2033	4479261	6812022	11291283			11291283	
2034	4568846	6948262	11517108			11517108	
2035	4660223	7087228	11747450			11747450	
2036	4753427	7228972	11982399			11982399	
2037	4848496	7373552	12222047			12222047	
2038	4945466	7521023	12466488			12466488	
2039	5044375	7671443	12715818			12715818	

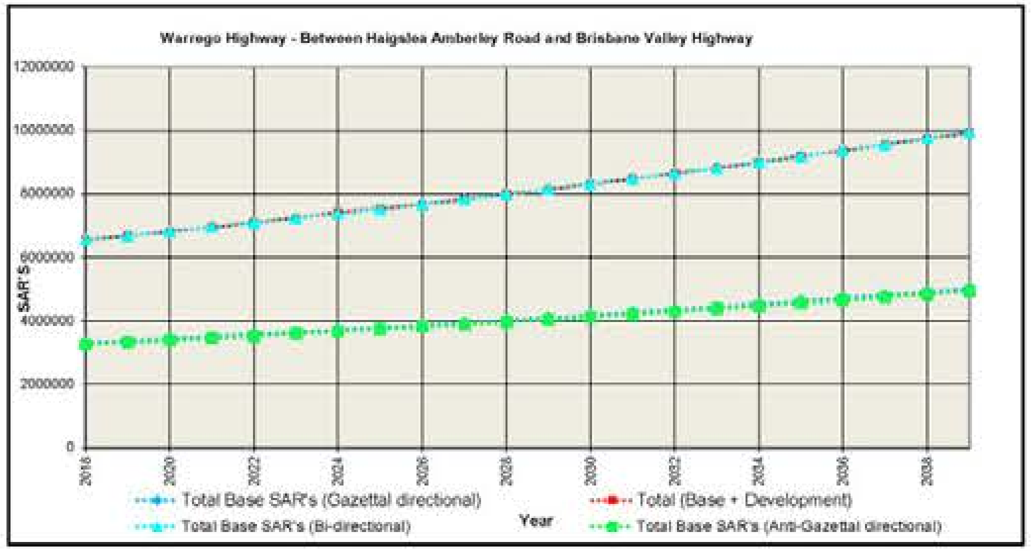


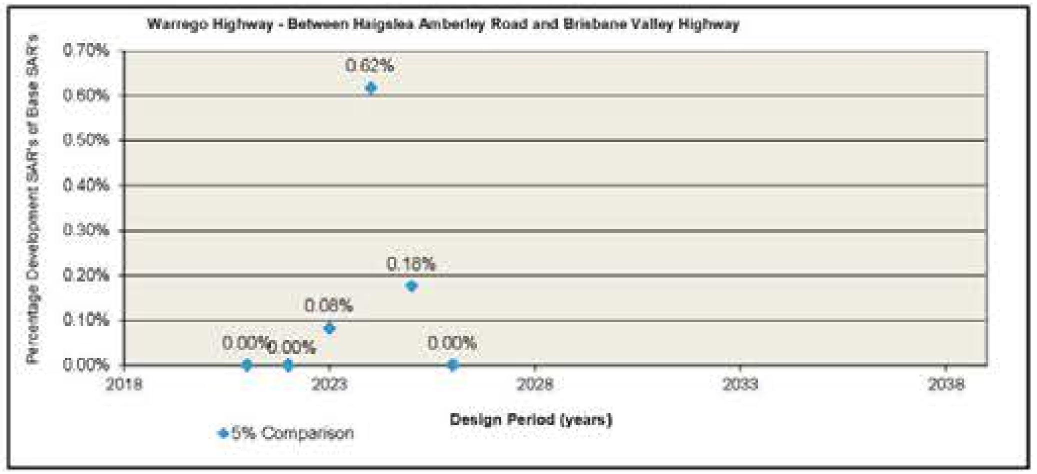


Warrego Highway - Between Haigslea Amberley Road and Brisbane Valley Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Haigslea Amberley Road and Brisbane Valley Highway			
Base SAR's				Development SAR's			
	Total Base SAR's (Anti-Gazettal directic	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	3256235	3300659	6556894			6556894	
2019	3321360	3366673	6688032			6688032	
2020	3387787	3434006	6821793	0	0	6821793	
2021	3455543	3502686	6958229	0	0	6958229	0.00%
2022	3524653	3572740	7097393	0	0	7097393	0.00%
2023	3595146	3644195	7239341	2983	2983	7245307	0.08%
2024	3667049	3717079	7384128	22807	22807	7429742	0.62%
2025	3740390	3791420	7531811	6663	6663	7545138	0.18%
2026	3815198	3867249	7682447	0	0	7682447	0.00%
2027	3891502	3944594	7836096			7836096	
2028	3969332	4023485	7992818			7992818	
2029	4048719	4103955	8152674			8152674	
2030	4129693	4186034	8315727			8315727	
2031	4212287	4269755	8482042			8482042	
2032	4296533	4355150	8651683			8651683	
2033	4382463	4442253	8824717			8824717	
2034	4470113	4531098	9001211			9001211	
2035	4559515	4621720	9181235			9181235	
2036	4650705	4714154	9364860			9364860	
2037	4743719	4808438	9552157			9552157	
2038	4838594	4904606	9743200			9743200	
2039	4935366	5002698	9938064			9938064	

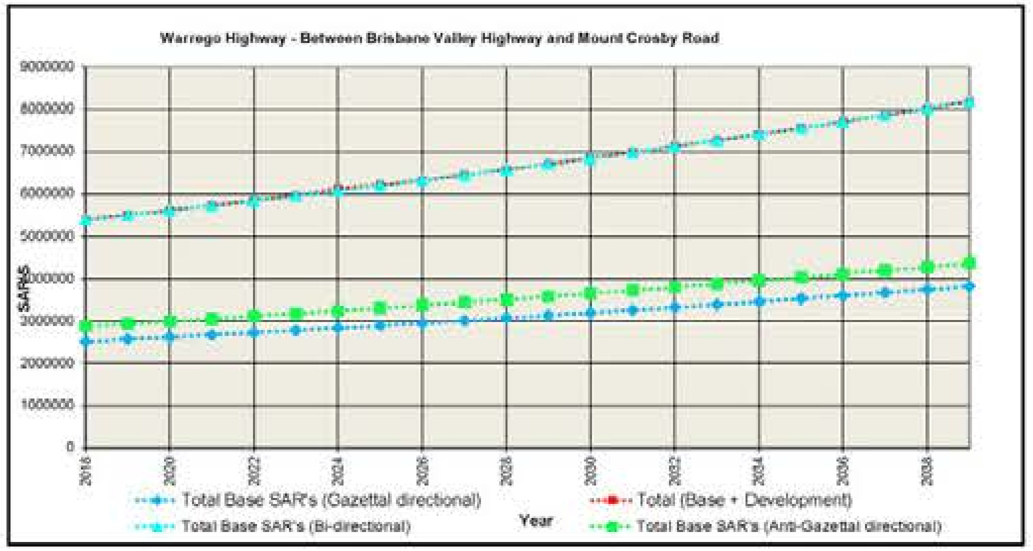


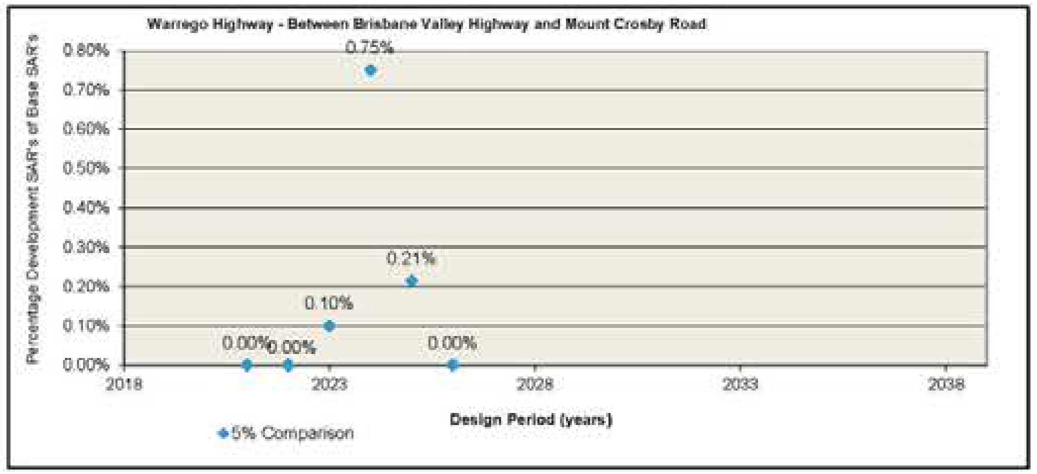


Warrego Highway - Between Brisbane Valley Highway and Mount Crosby Road

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Brisbane Valley Highway and Mount Crosby Road			
Base SAR's				Development SAR's			5% Comparison
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	2878750	2519866	5398616			5398616	
2019	2936325	2570263	5506588			5506588	
2020	2995052	2621668	5616720	0	0	5616720	
2021	3054953	2674102	5729055	0	0	5729055	0.00%
2022	3116052	2727584	5843636	0	0	5843636	0.00%
2023	3178373	2782135	5960508	2983	2983	5966474	0.10%
2024	3241940	2837778	6079719	22807	22807	6125333	0.75%
2025	3306779	2894534	6201313	6663	6663	6214640	0.21%
2026	3372915	2952424	6325339	0	0	6325339	0.00%
2027	3440373	3011473	6451846			6451846	
2028	3509181	3071702	6580883			6580883	
2029	3579364	3133136	6712501			6712501	
2030	3650952	3195799	6846751			6846751	
2031	3723971	3259715	6983686			6983686	
2032	3798450	3324909	7123359			7123359	
2033	3874419	3391408	7265827			7265827	
2034	3951907	3459236	7411143			7411143	
2035	4030945	3528420	7559366			7559366	
2036	4111564	3598989	7710553			7710553	
2037	4193796	3670969	7864764			7864764	
2038	4277672	3744388	8022060			8022060	
2039	4363225	3819276	8182501			8182501	

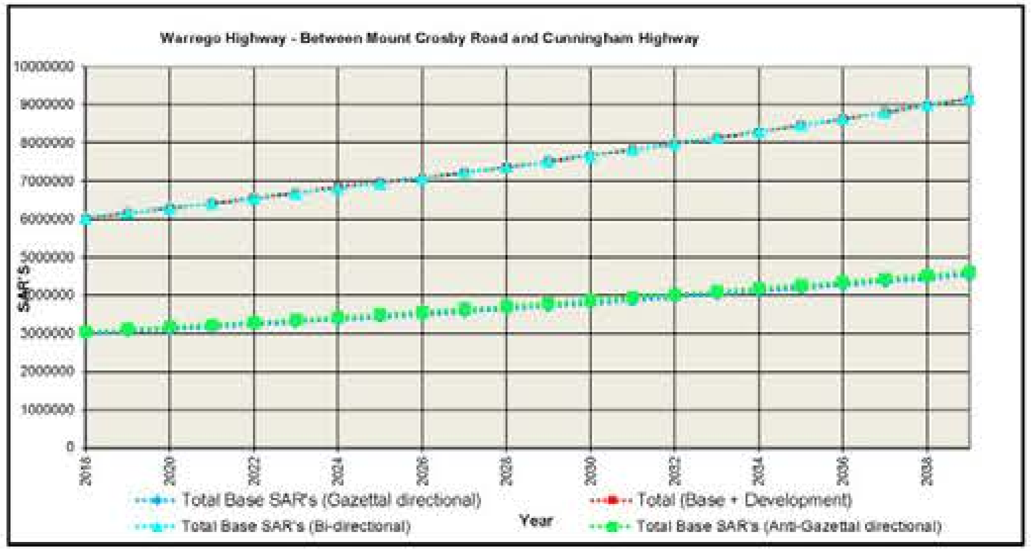


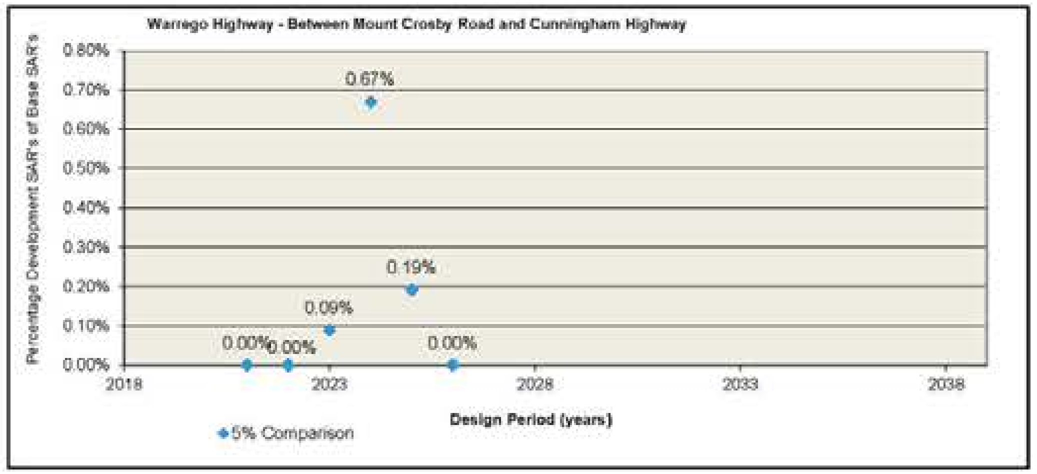


Warrego Highway - Between Mount Crosby Road and Cunningham Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	n/a	n/a
Class 5	4.09	n/a
Class 6	n/a	n/a
Class 7	5.02	n/a
Class 8	n/a	n/a
Class 9	n/a	n/a
Class 10	7.72	n/a
Class 11	n/a	n/a
Class 12	n/a	n/a
Special	12.21	n/a

Warrego Highway				Between Mount Crosby Road and Cunningham Highway			
Base SAR's				Development SAR's			
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	5% Comparison
2018	3054118	2996506	6050624			6050624	
2019	3115201	3056436	6171636			6171636	
2020	3177505	3117565	6295069	0	0	6295069	
2021	3241055	3179916	6420971	0	0	6420971	0.00%
2022	3305876	3243514	6549390	0	0	6549390	0.00%
2023	3371993	3308385	6680378	2983	2983	6686343	0.09%
2024	3439433	3374552	6813985	22807	22807	6859599	0.67%
2025	3508222	3442043	6950265	6663	6663	6963592	0.19%
2026	3578386	3510884	7089270	0	0	7089270	0.00%
2027	3649954	3581102	7231056			7231056	
2028	3722953	3652724	7375677			7375677	
2029	3797412	3725778	7523190			7523190	
2030	3873360	3800294	7673654			7673654	
2031	3950827	3876300	7827127			7827127	
2032	4029844	3953826	7983670			7983670	
2033	4110441	4032902	8143343			8143343	
2034	4192650	4113560	8306210			8306210	
2035	4276503	4195832	8472334			8472334	
2036	4362033	4279748	8641781			8641781	
2037	4449273	4365343	8814617			8814617	
2038	4536259	4452650	8990909			8990909	
2039	4629024	4541703	9170727			9170727	

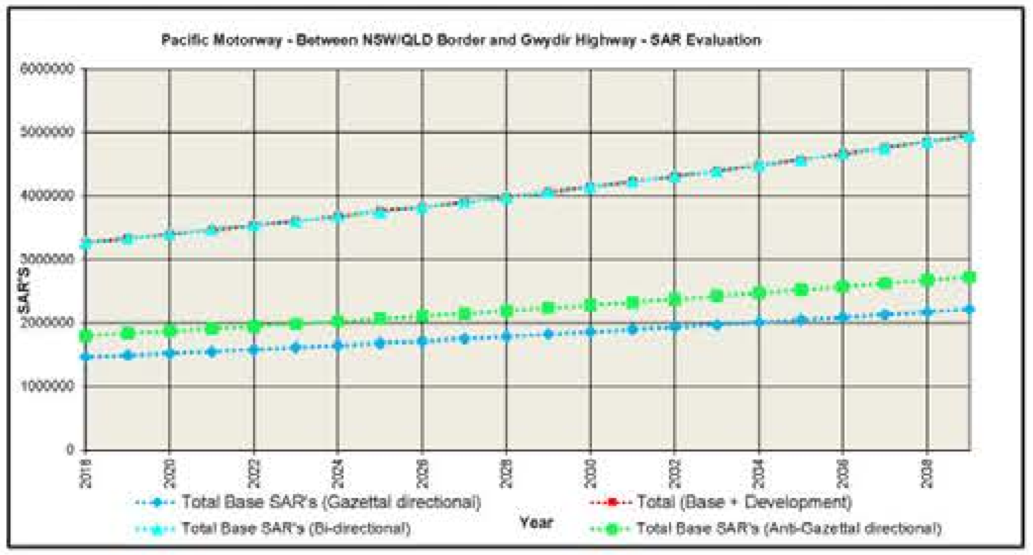


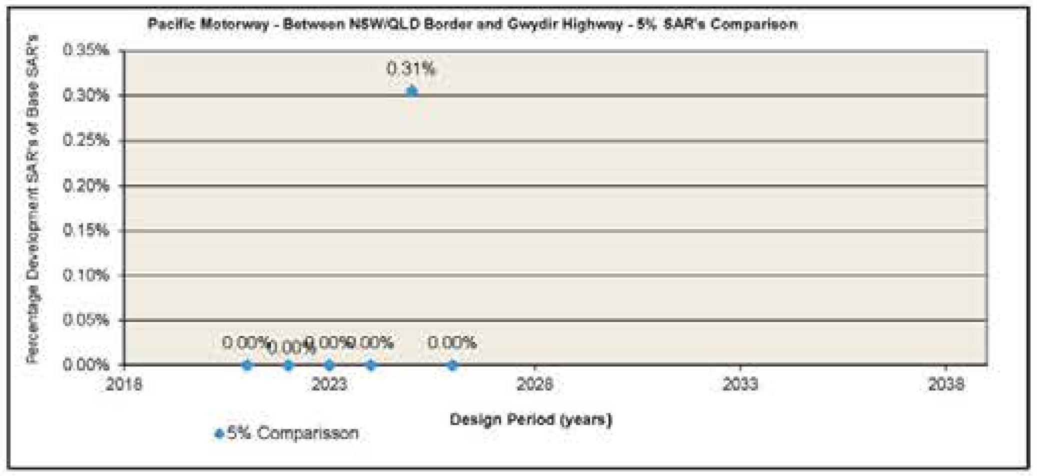


Pacific Motorway - Between NSW/QLD Border and Gwydir Highway

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	3.58	0.51
Class 5	n/a	n/a
Class 6	n/a	n/a
Class 7	n/a	n/a
Class 8	n/a	n/a
Class 9	4.93	1.68
Class 10	7.72	1.67
Class 11	n/a	n/a
Class 12	n/a	n/a

Pacific Motorway				Between NSW/QLD Border and Gwydir Highway			
Base SAR's				Development SAR's			5% Comparisson
Total Base SAR's (Anti-Gazettal directic		Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	1802046	1466825	3268871			3268871	
2019	1838087	1496161	3334248			3334248	
2020	1874849	1526084	3400933	0	0	3400933	
2021	1912346	1556606	3468952	0	0	3468952	0.00%
2022	1950593	1587738	3538331	0	0	3538331	0.00%
2023	1989605	1619493	3609098	0	0	3609098	0.00%
2024	2029397	1651883	3681280	0	0	3681280	0.00%
2025	2069985	1684921	3754905	5729	5729	3766363	0.31%
2026	2111384	1718619	3830003	0	0	3830003	0.00%
2027	2153612	1752991	3906603			3906603	
2028	2196684	1788051	3984736			3984736	
2029	2240618	1823812	4064430			4064430	
2030	2285430	1860288	4145719			4145719	
2031	2331139	1897494	4228633			4228633	
2032	2377762	1935444	4313206			4313206	
2033	2425317	1974153	4399470			4399470	
2034	2473823	2013636	4487459			4487459	
2035	2523300	2053909	4577209			4577209	
2036	2573766	2094987	4668753			4668753	
2037	2625241	2136887	4762128			4762128	
2038	2677746	2179624	4857370			4857370	
2039	2731301	2223217	4954518			4954518	

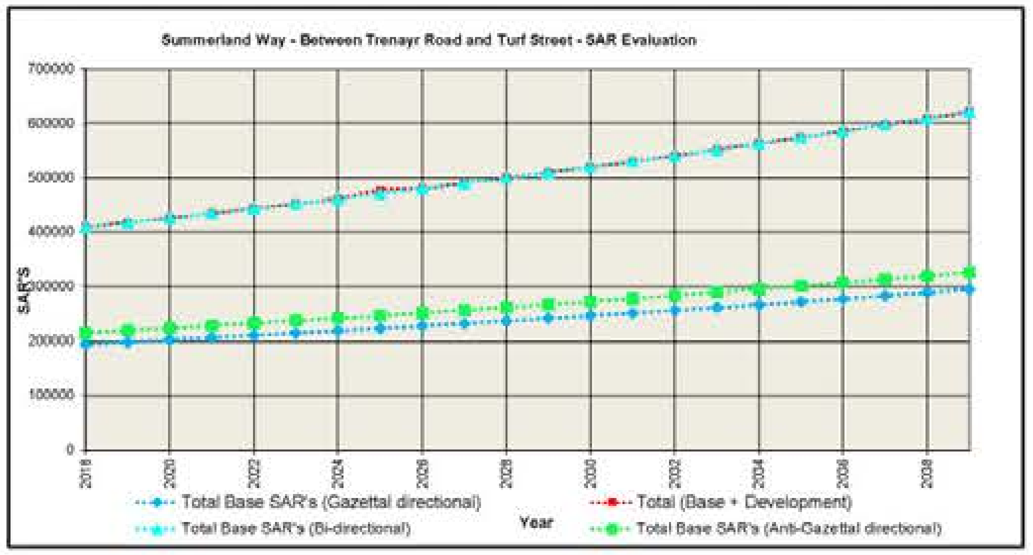


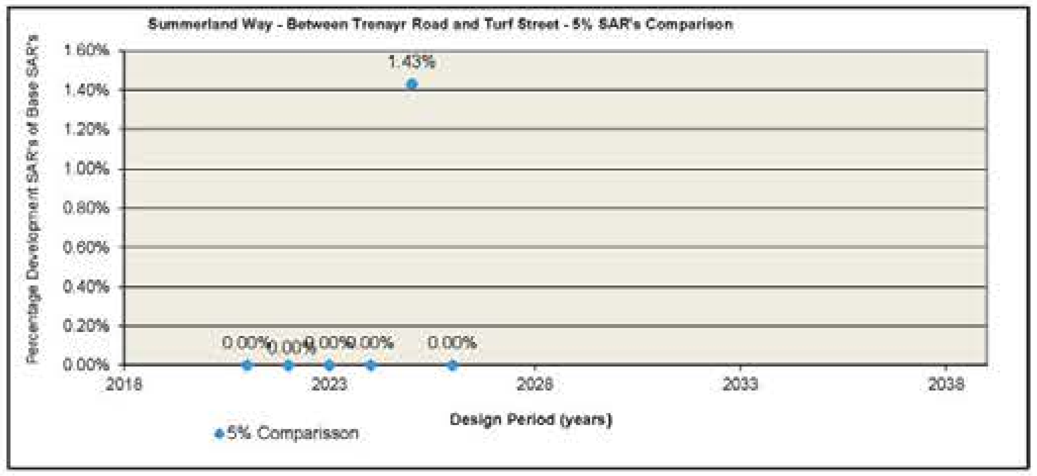


Summerland Way - Between Trenayr Road and Turf Street

SAR's per heavy vehicle - Development	Loaded	Unloaded
Class 3	n/a	n/a
Class 4	3.58	0.51
Class 5	n/a	n/a
Class 6	n/a	n/a
Class 7	n/a	n/a
Class 8	n/a	n/a
Class 9	4.93	1.68
Class 10	7.72	1.67
Class 11	n/a	n/a
Class 12	n/a	n/a

Summerland Way				Between Trenayr Road and Turf Street			
Base SAR's				Development SAR's			5% Comparisson
	Total Base SAR's (Anti-Gazettal directio	Total Base SAR's (Gazettal directional)	Total Base SAR's (Bi-directional)	Unloaded	Loaded	Total (Base + Development)	
2018	215446	194796	410242			410242	
2019	219755	198692	418447			418447	
2020	224150	202666	426816	0	0	426816	
2021	228633	206719	435352	0	0	435352	0.00%
2022	233206	210854	444059	0	0	444059	0.00%
2023	237870	215071	452941	0	0	452941	0.00%
2024	242627	219372	461999	0	0	461999	0.00%
2025	247480	223760	471239	3371	3371	477981	1.43%
2026	252429	228235	480664	0	0	480664	0.00%
2027	257478	232800	490278			490278	
2028	262627	237456	500083			500083	
2029	267880	242205	510085			510085	
2030	273238	247049	520286			520286	
2031	278702	251990	530692			530692	
2032	284276	257030	541306			541306	
2033	289962	262170	552132			552132	
2034	295761	267414	563175			563175	
2035	301676	272762	574438			574438	
2036	307710	278217	585927			585927	
2037	313864	283781	597646			597646	
2038	320141	289457	609598			609598	
2039	326544	295246	621790			621790	





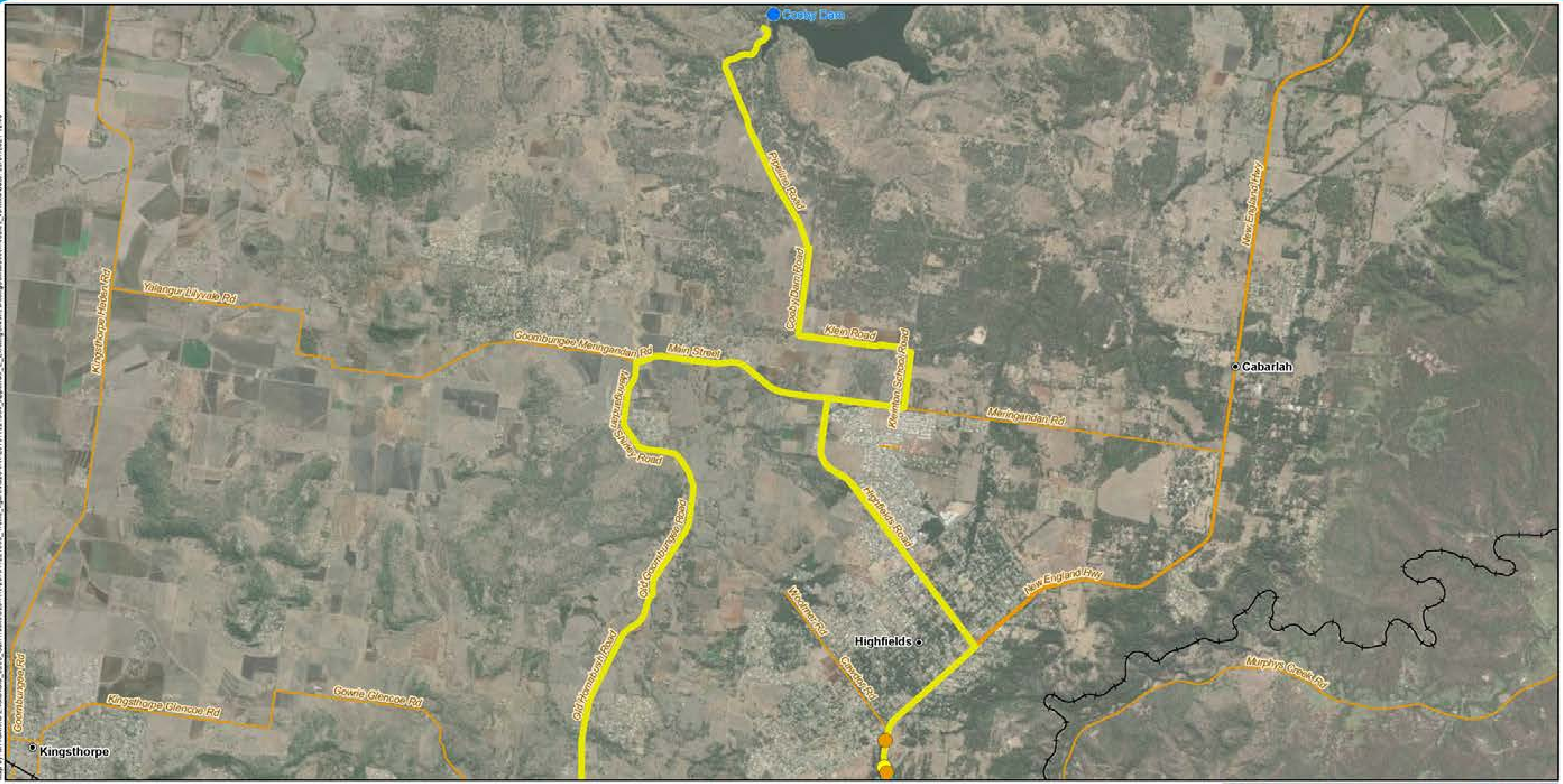
APPENDIX U

Traffic Impact Assessment

Appendix E Existing crashes along construction routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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



Legend

- Localities
- Cooby Dam
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

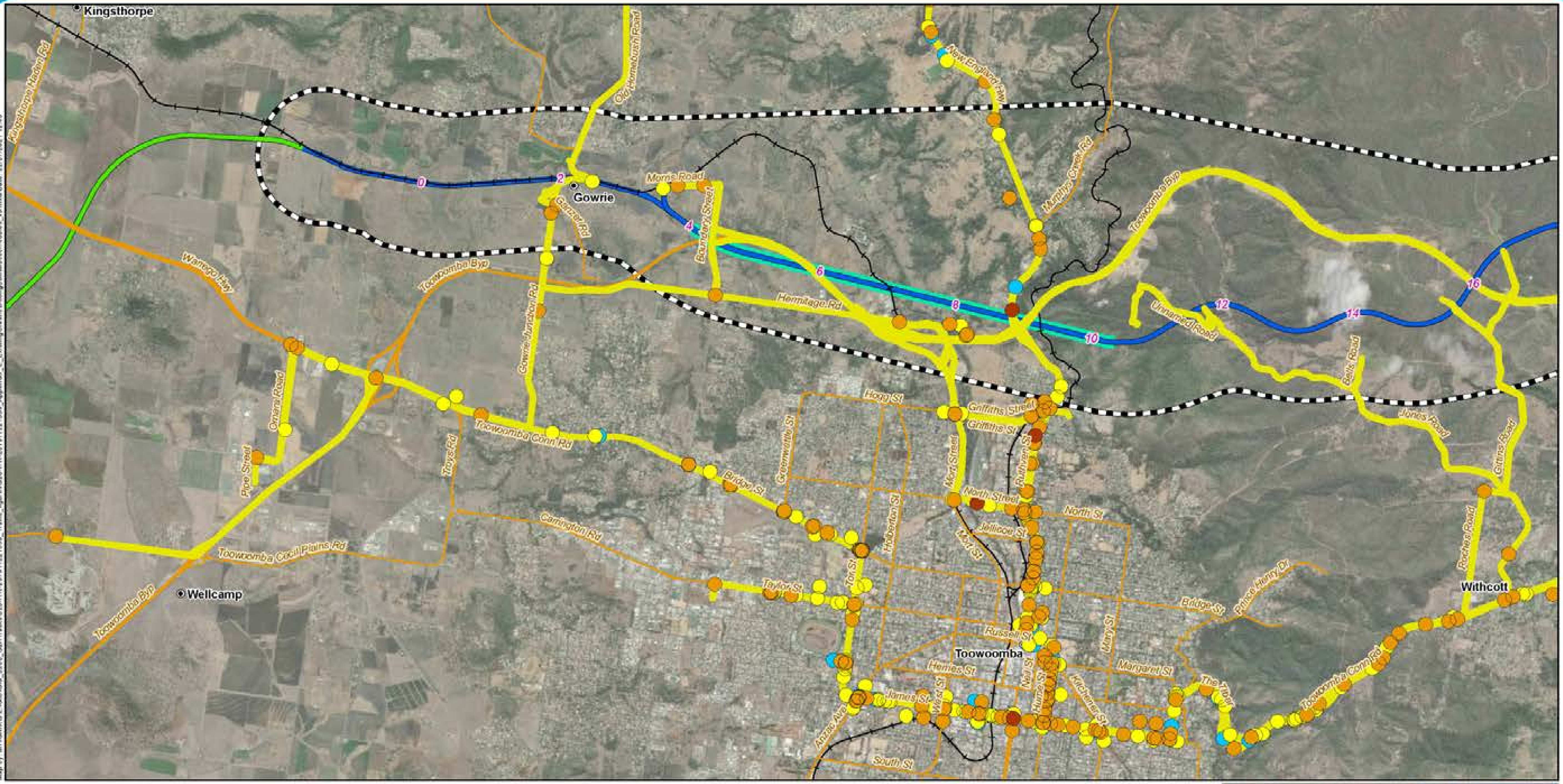
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E1:
Existing crashes along construction routes

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



Legend

- 5 Chainage (km)
- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail
- EIS investigation corridor
- B2G project alignment
- G2H project alignment
- Tunnel

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

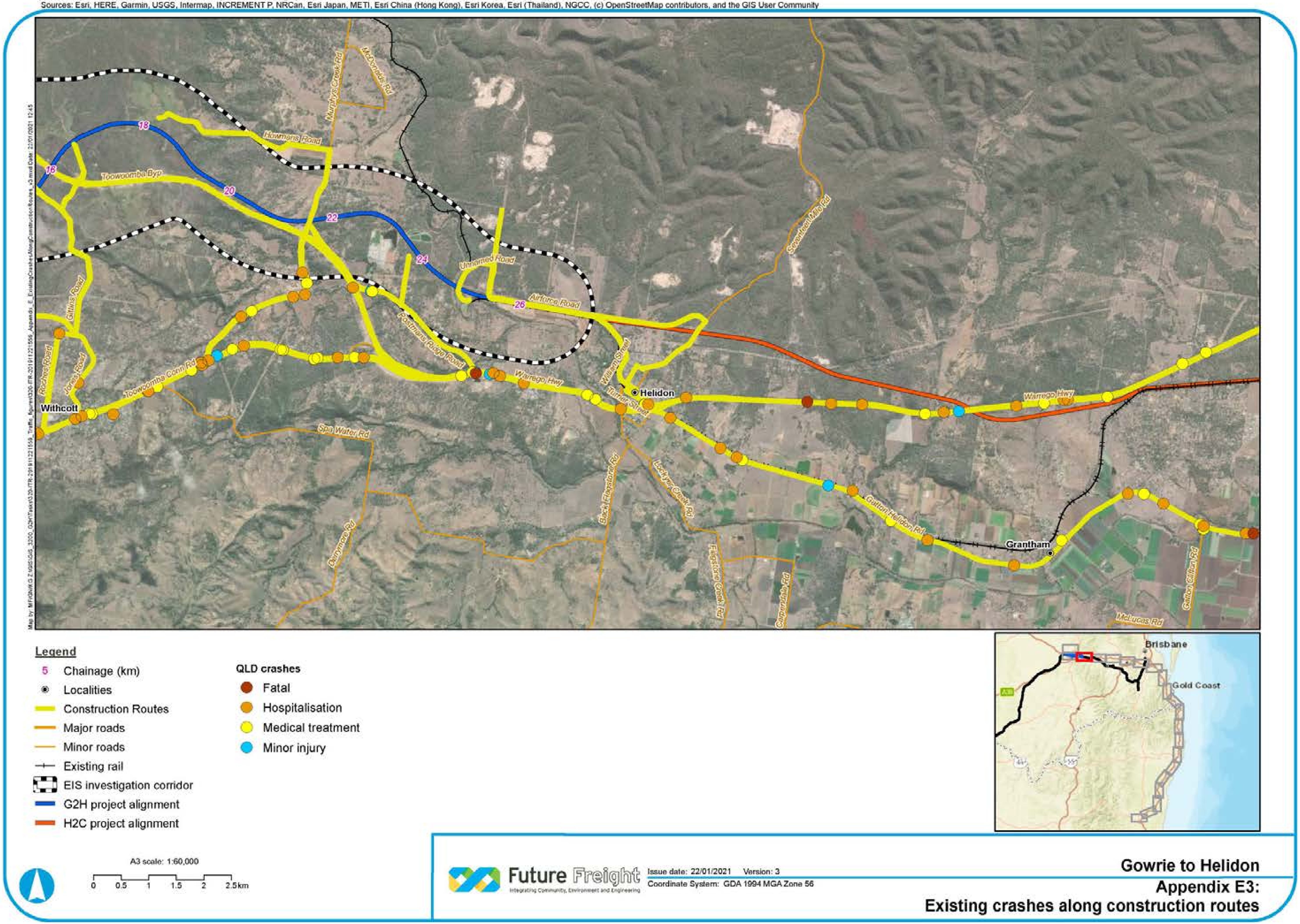
Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E2:

Existing crashes along construction routes

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



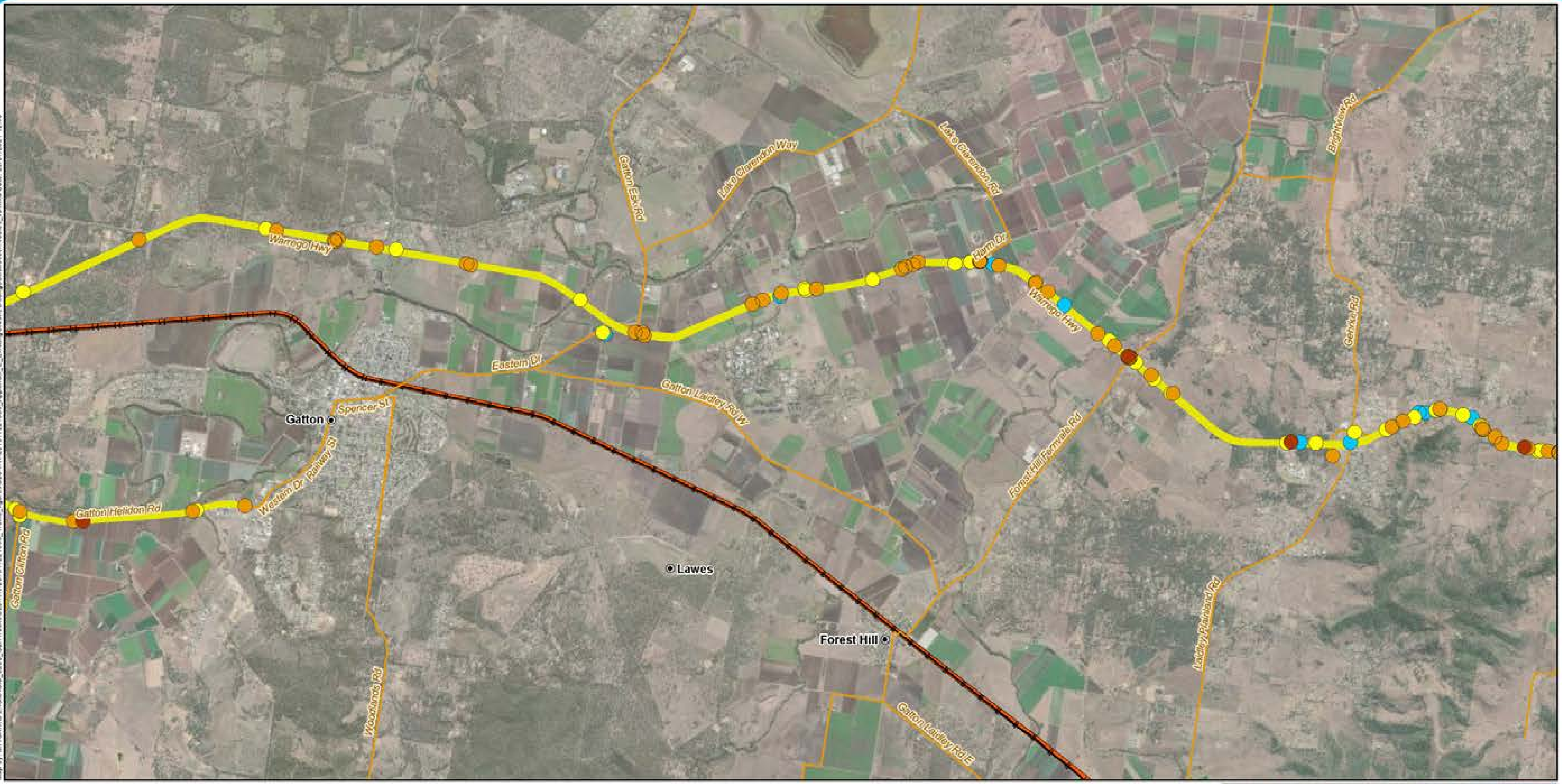
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E3: Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail
- H2C project alignment

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

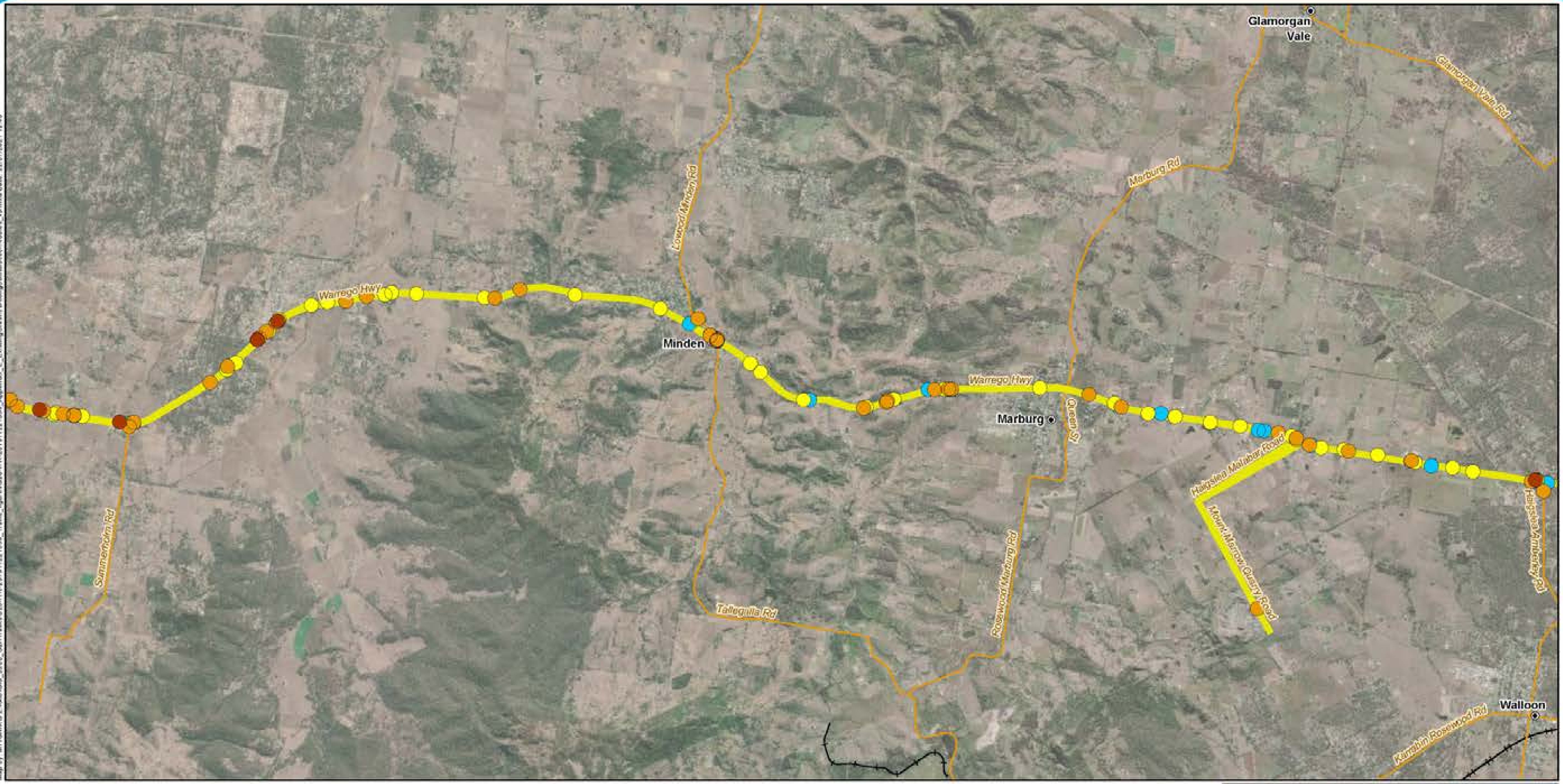
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E4:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

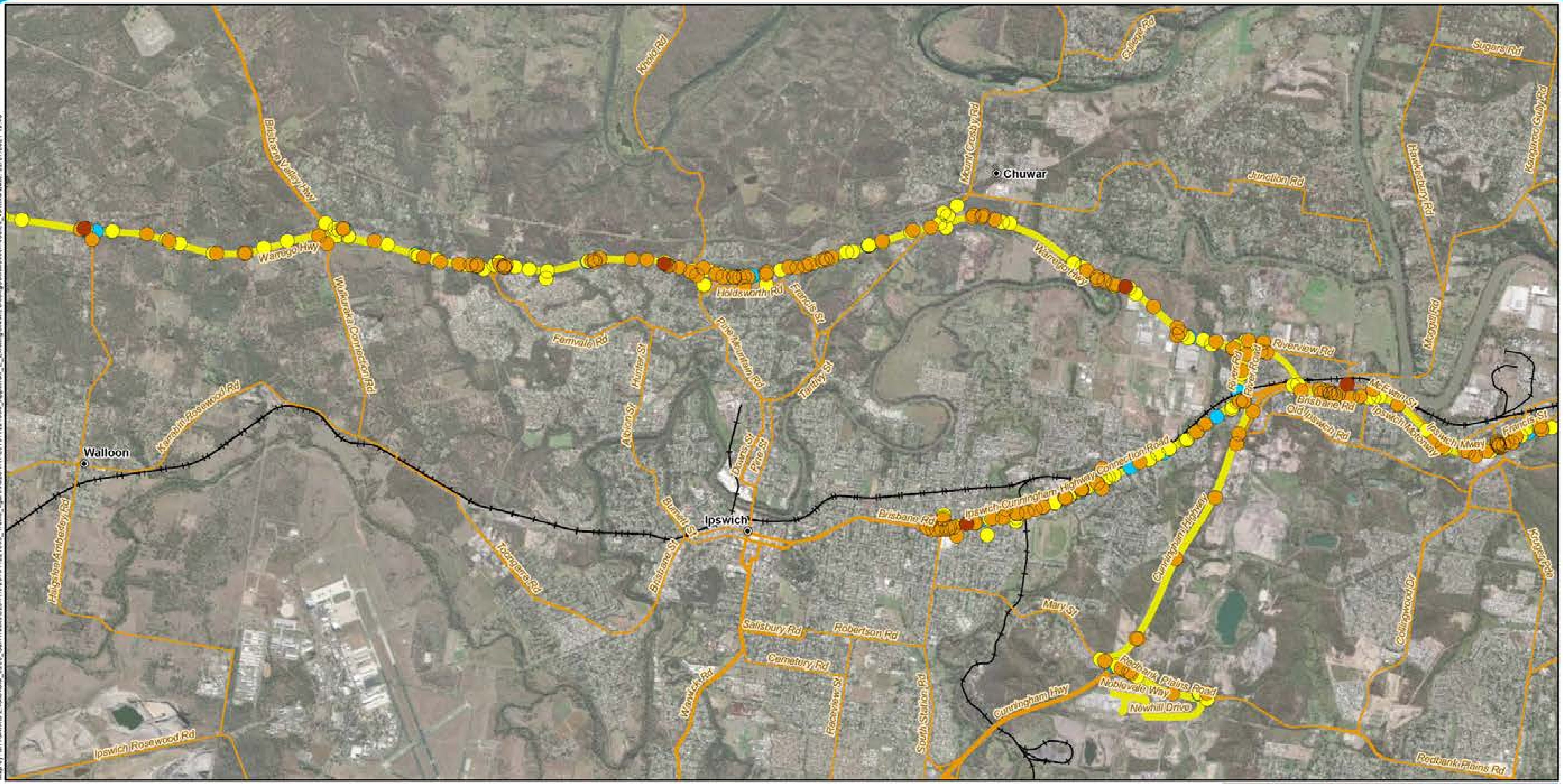
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E5:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E6:
Existing crashes along construction routes

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

Legend

- Construction Routes
- Major roads
- Minor roads
- Existing rail
- K2ARB project alignment

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

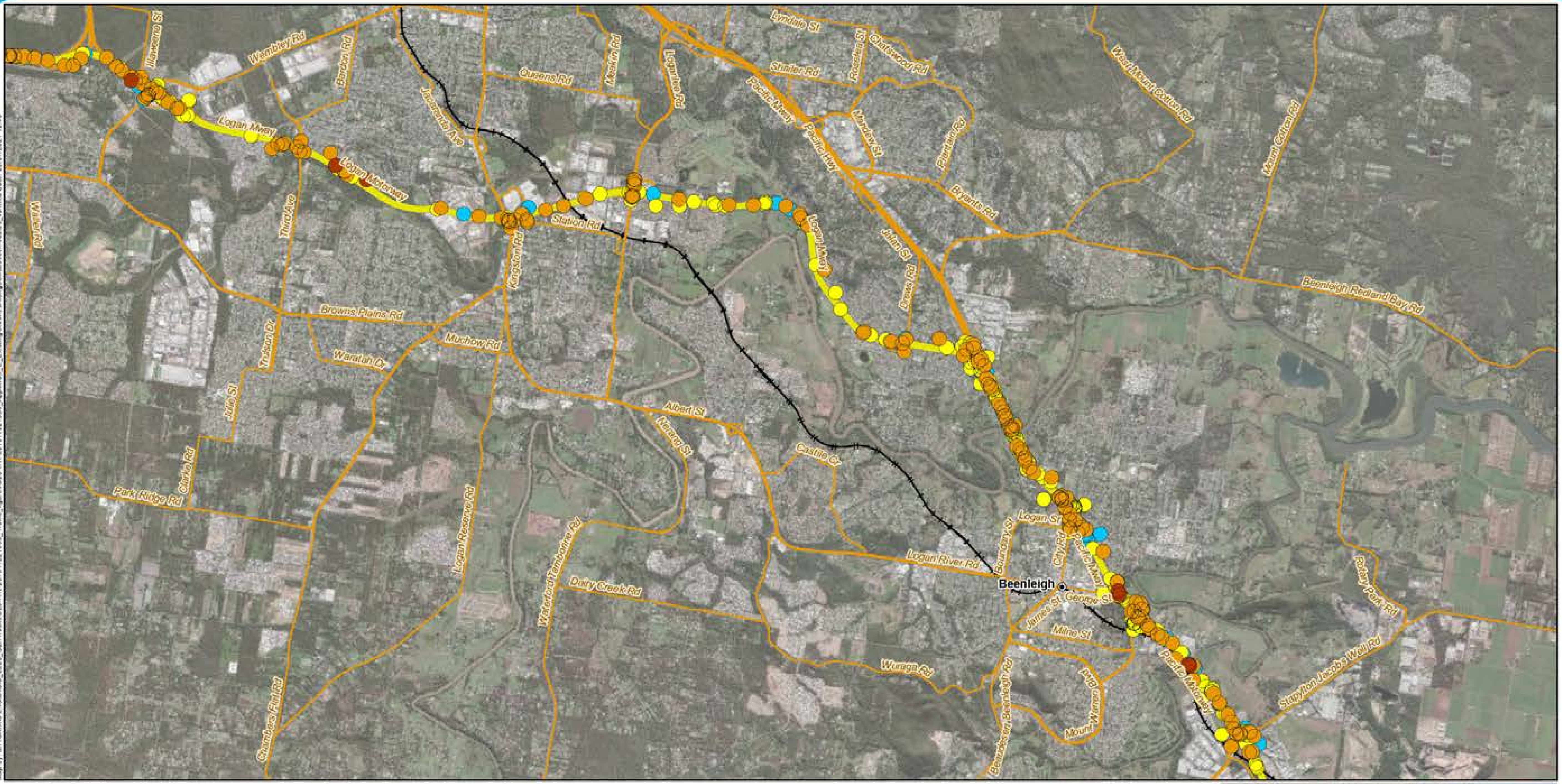
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E7:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E8:
Existing crashes along construction routes

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

Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

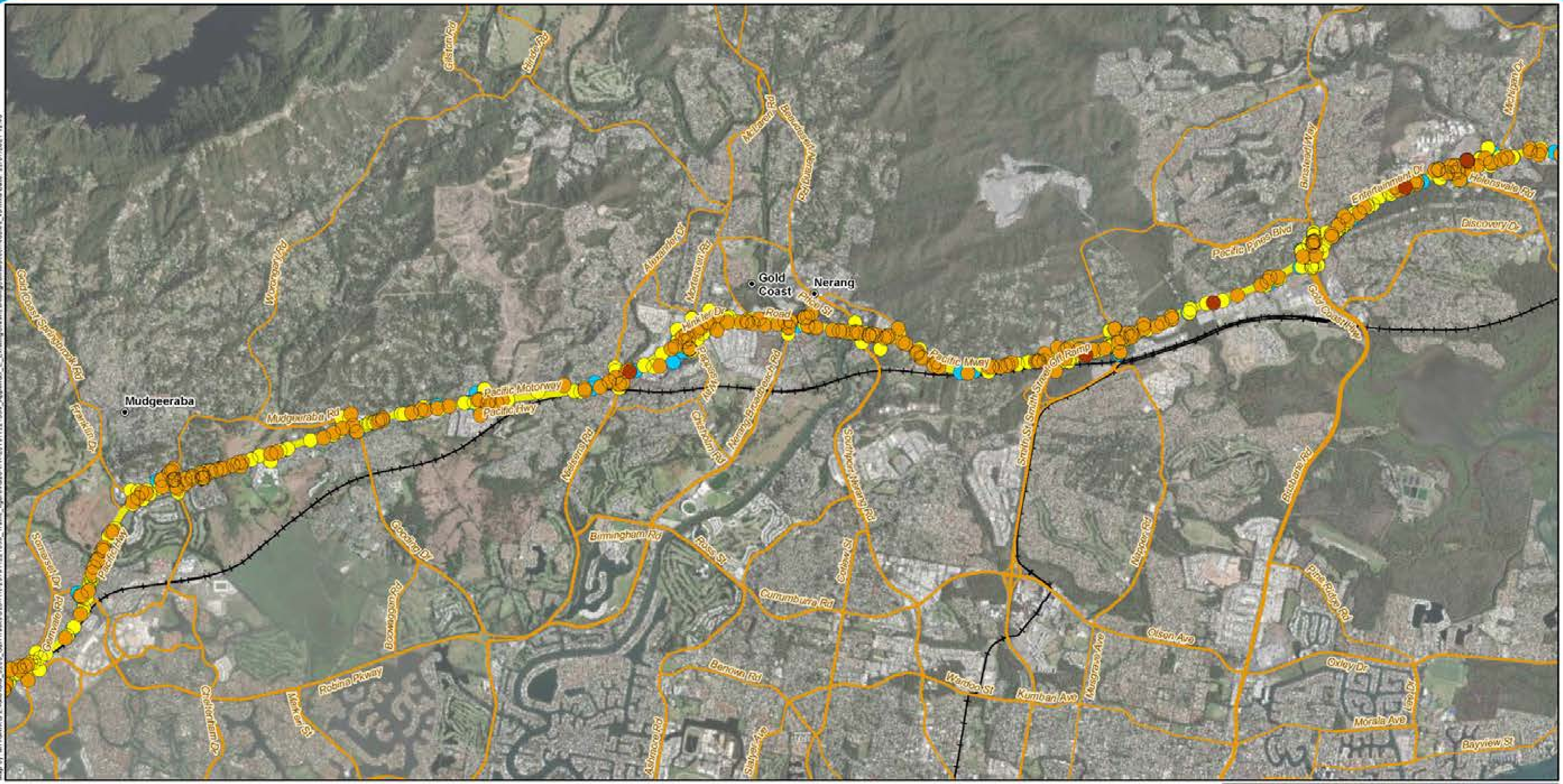
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E9:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight — Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3

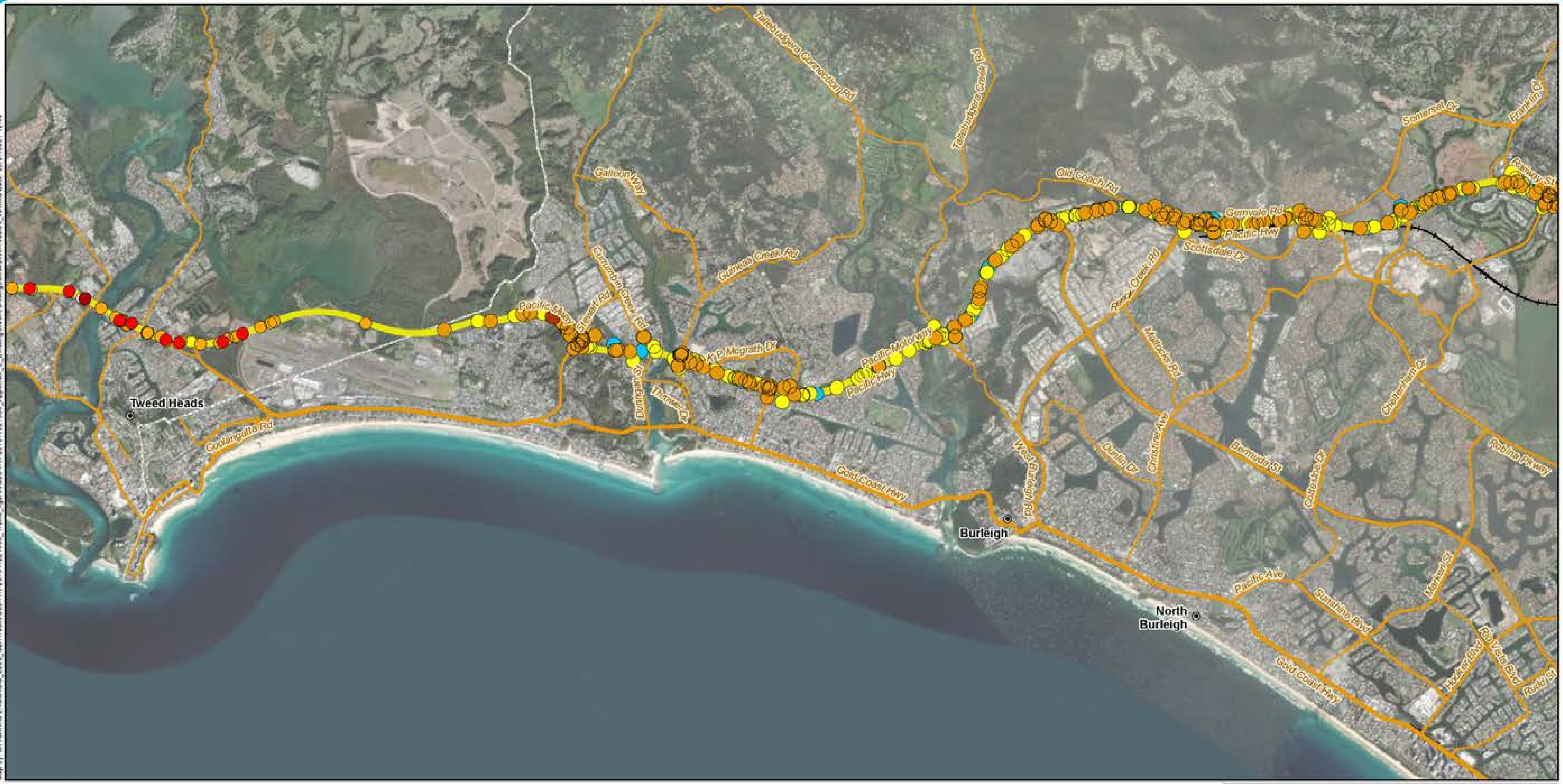
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E10:

Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- Existing rail
- QLD/NSW border

QLD crashes

- Fatal
- Hospitalisation
- Medical treatment
- Minor injury

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E11:
Existing crashes along construction routes

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

Legend

- Localities
- Construction Routes
- Major roads
- Minor roads
- QLD/NSW border

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E12:
Existing crashes along construction routes

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

Legend

- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E13:

Existing crashes along construction routes

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

Legend

- Localities
- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

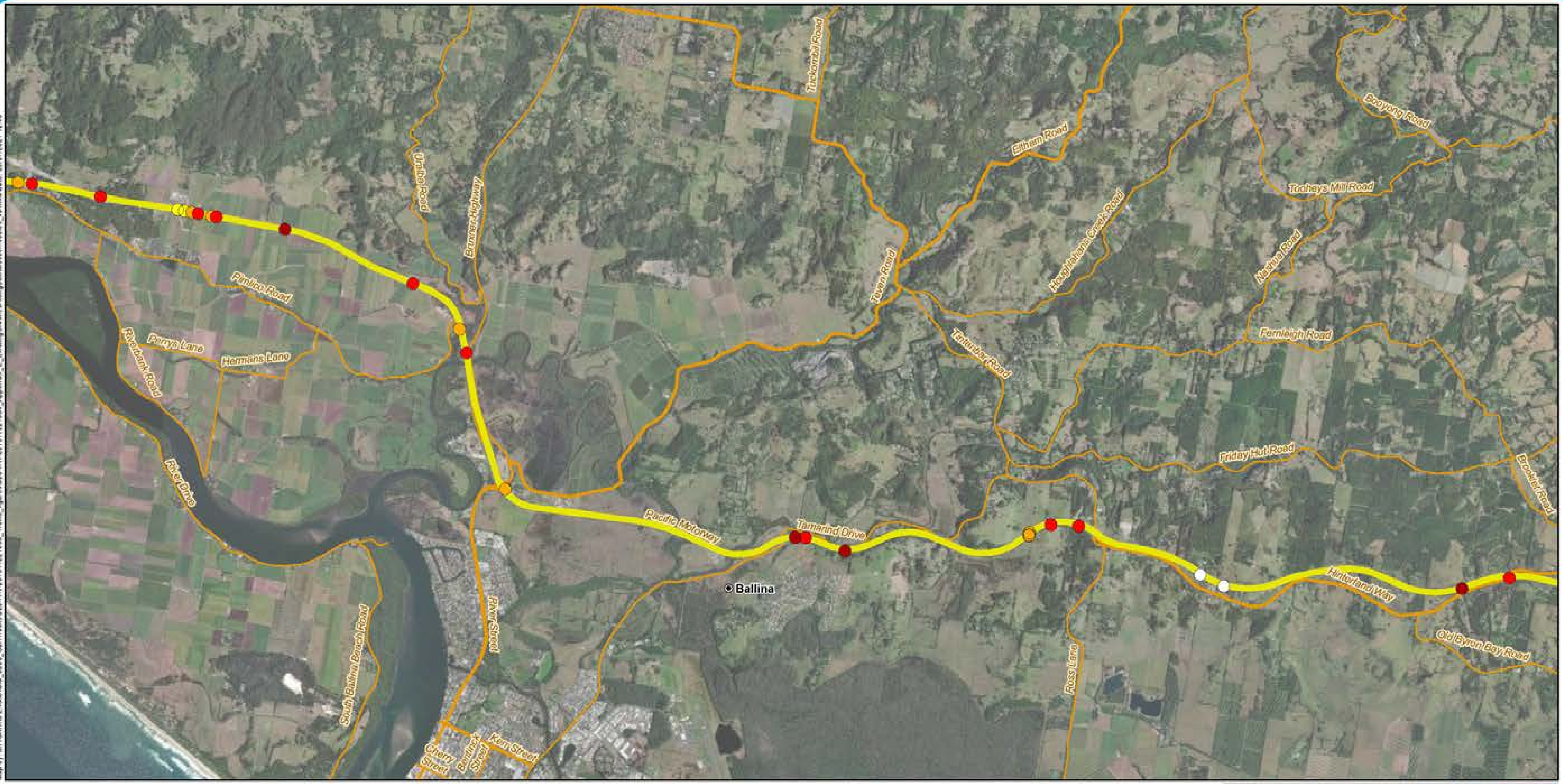
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E14:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix E15:
Existing crashes along construction routes

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

Legend

- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

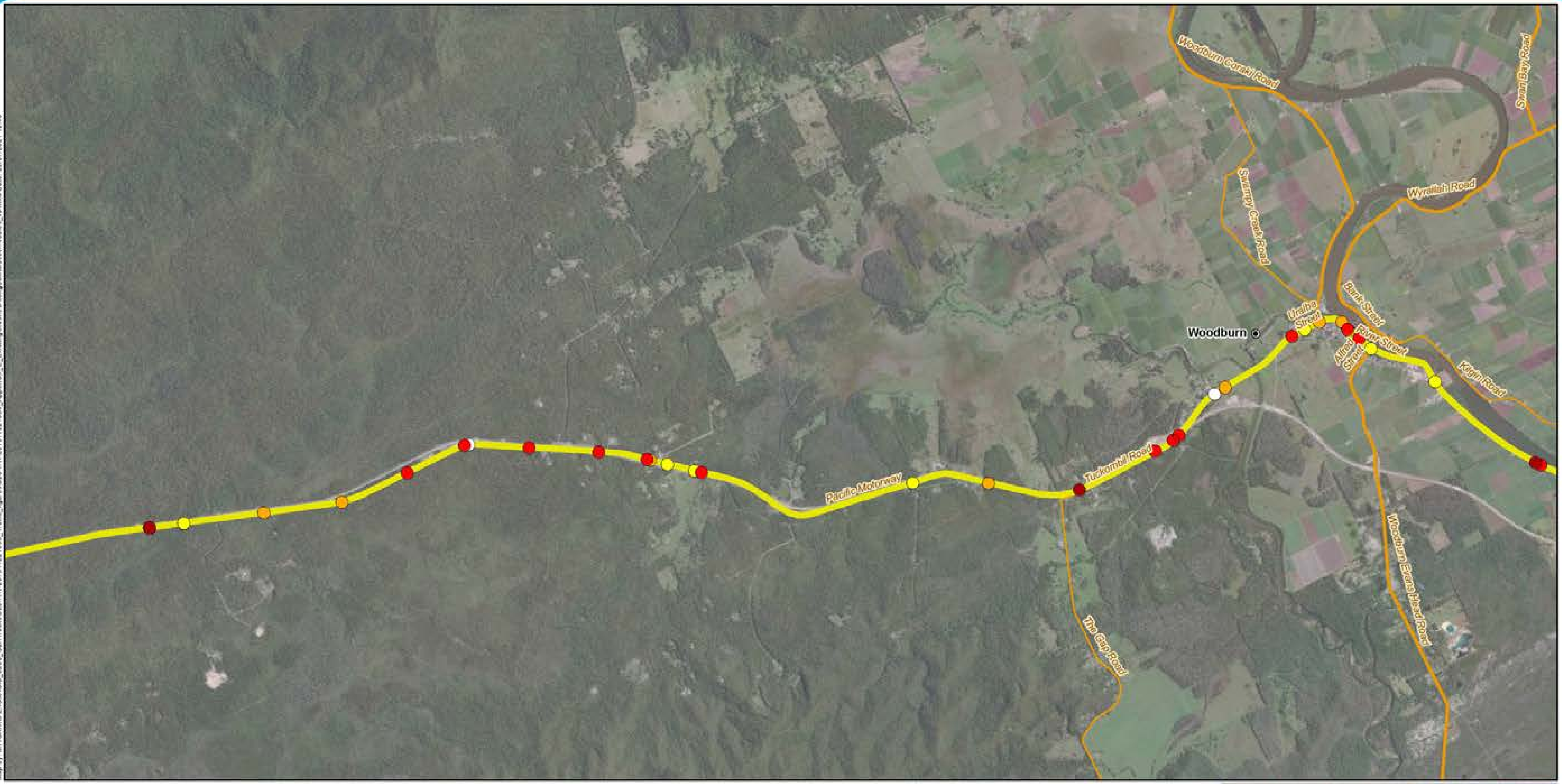
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E16:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

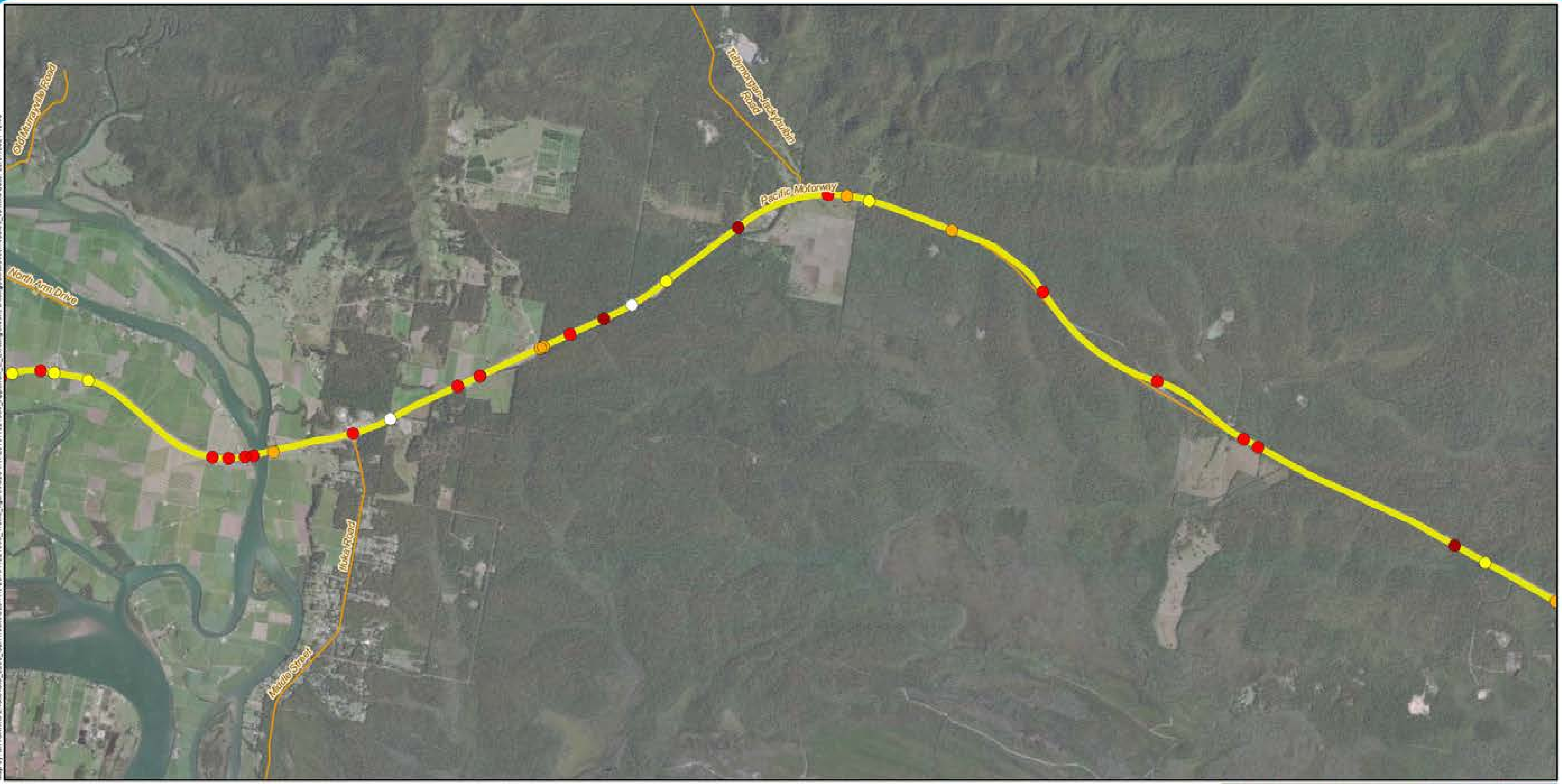
A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E17:
Existing crashes along construction routes



Legend

- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

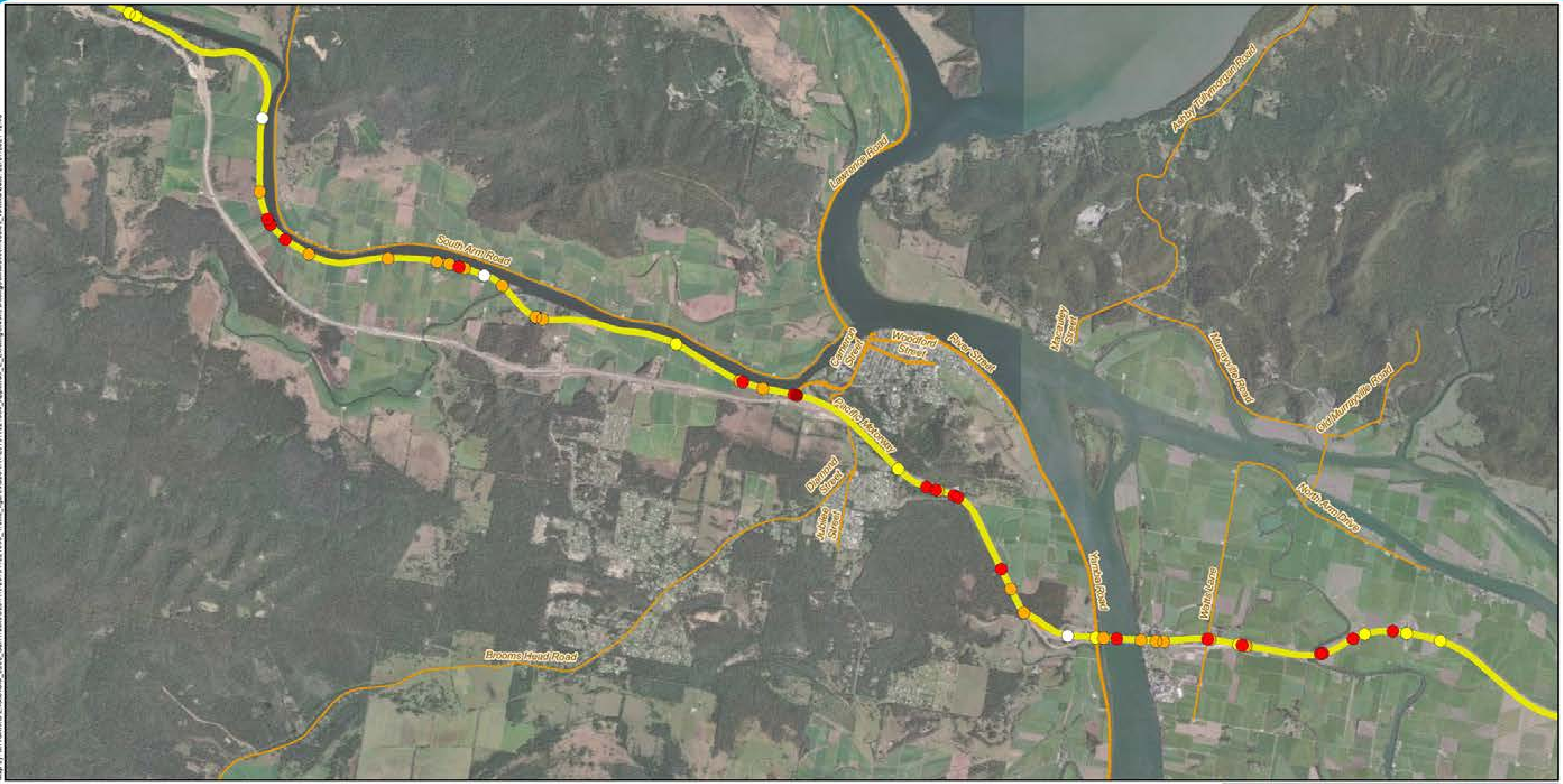
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E18:
Existing crashes along construction routes

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



Legend

- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

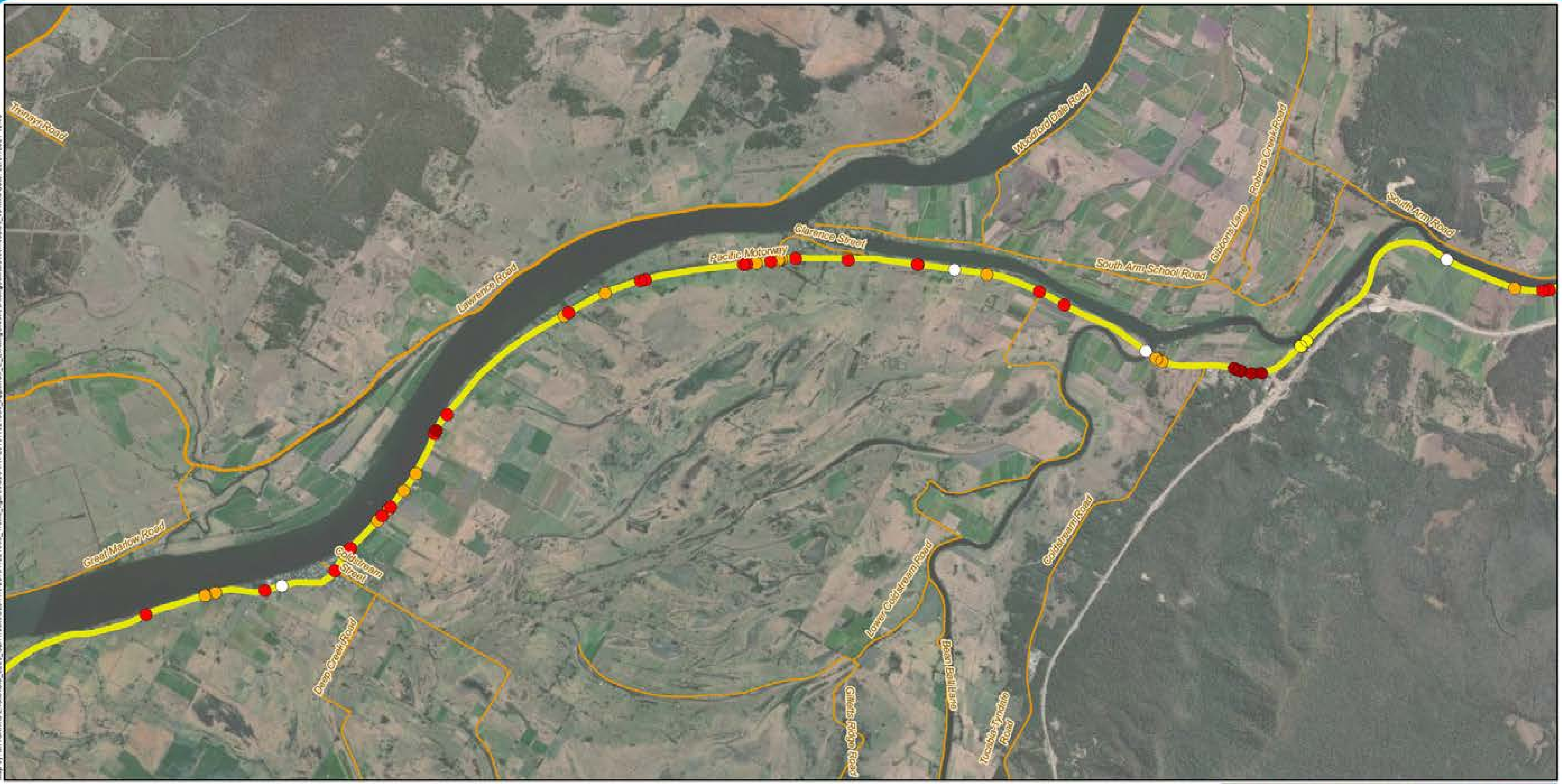
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E19:
Existing crashes along construction routes

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



Legend

- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

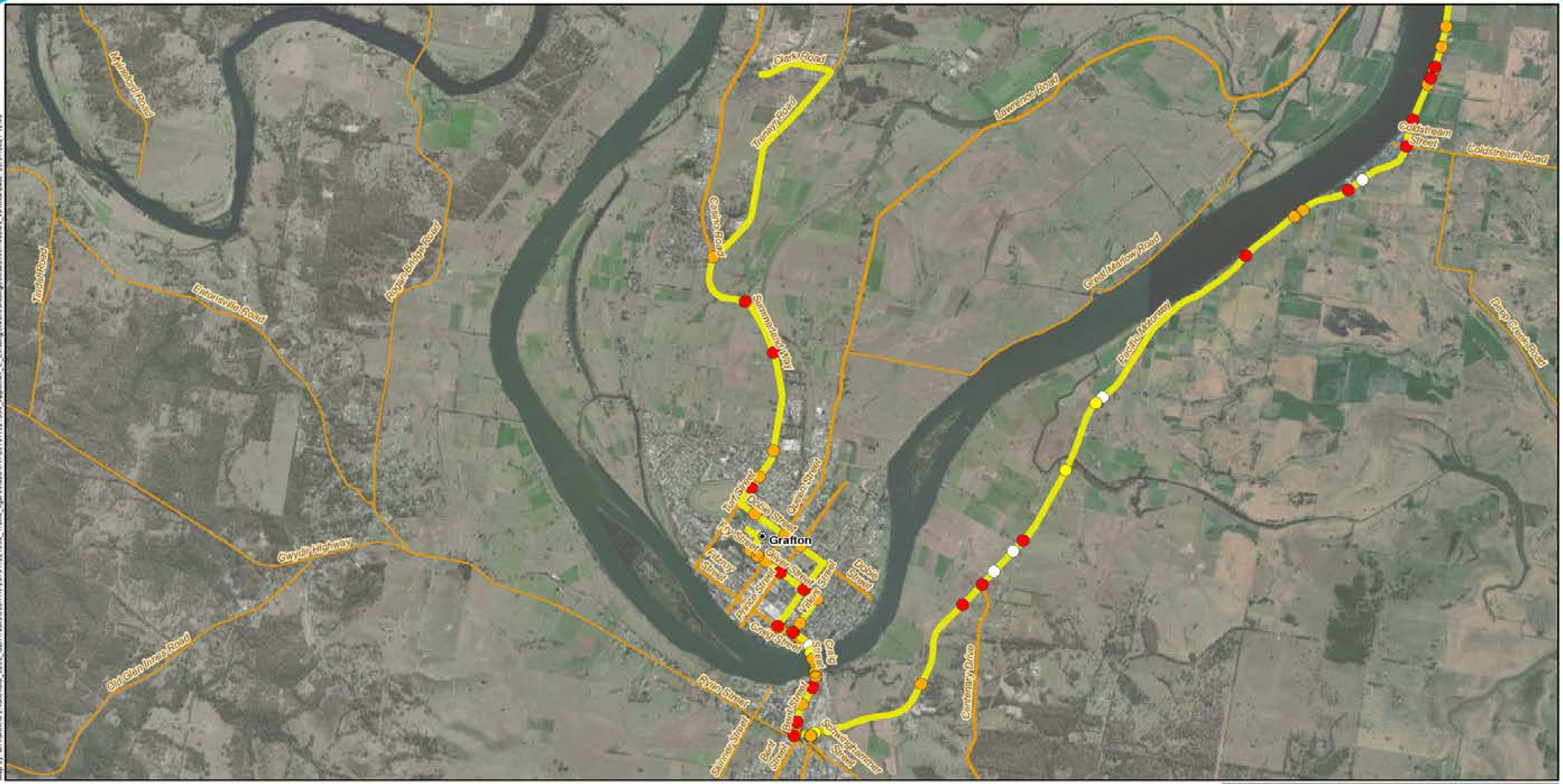
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix E20:
Existing crashes along construction routes

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



Legend

- Localities
- Construction Routes
- Major roads
- Minor roads

NSW crashes

- Serious Injury
- Moderate Injury
- Minor/Other Injury
- Uncategorised Injury (NSW only)

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

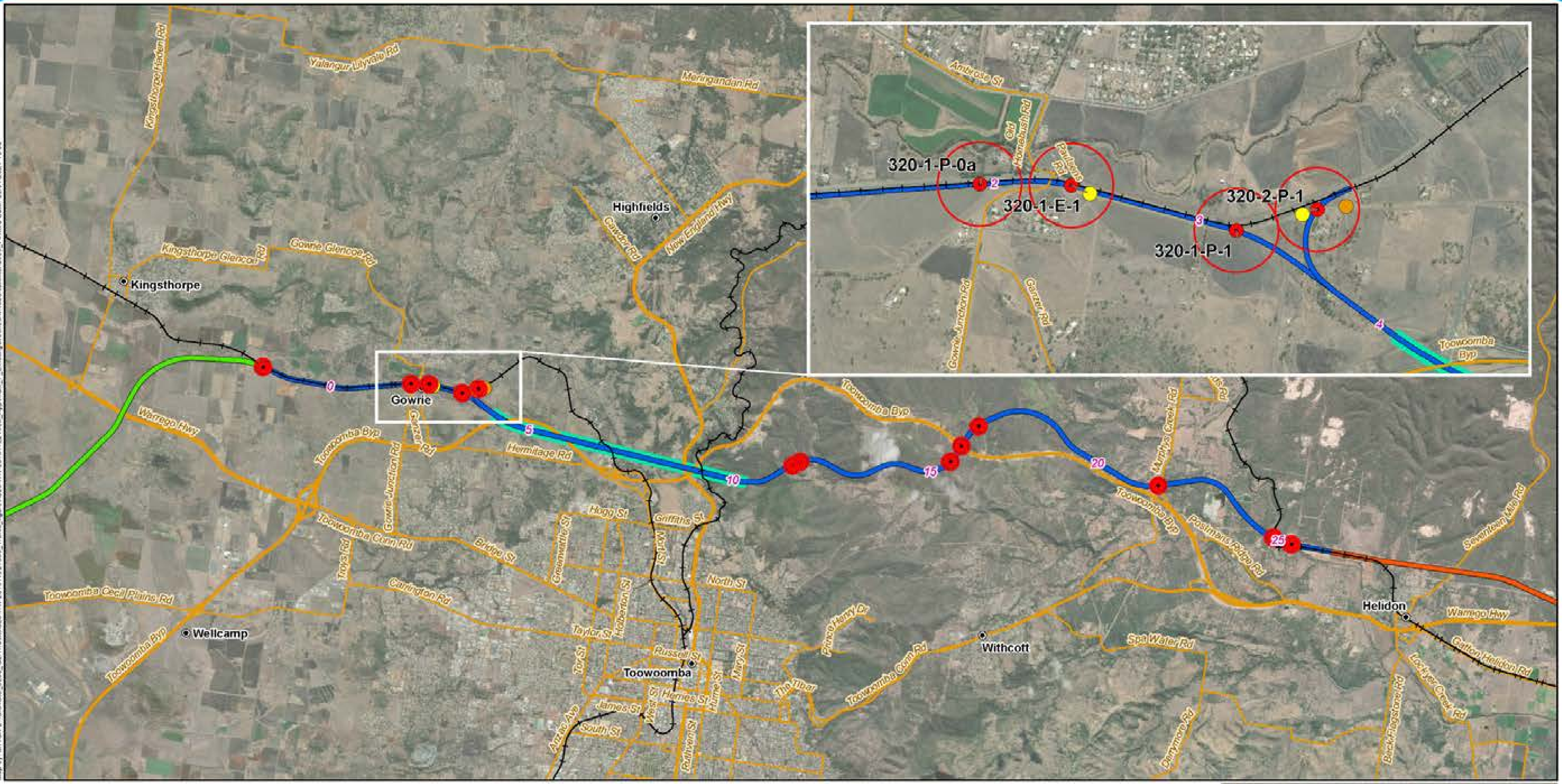
Gowrie to Helidon
Appendix E21:
Existing crashes along construction routes

APPENDIX U

Traffic Impact Assessment

Appendix F Existing crashes at road–rail interfaces

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



Map by: MFIGN 2 Y:\GIS\GIS_3200_G2H\Tasks\320-ITR-201911221559_Traffic_figure\320-ITR-201911221559_Appendix_F_ExistingCrashesAtRoadRailInterfaces_v4.mxd Date: 22/01/2021 13:02

Legend

- 5 Chainage (km)
- Localities
- Road rail interfaces
- Hospitalisation
- Medical treatment
- B2G project alignment
- G2H project alignment
- H2C project alignment
- Existing rail
- Major roads
- Minor roads
- Tunnel
- 200m buffer

A3 scale: 1:100,000

0 1 2 3 4 5 Kilometers

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 4
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix F:
Existing crashes at road rail interfaces

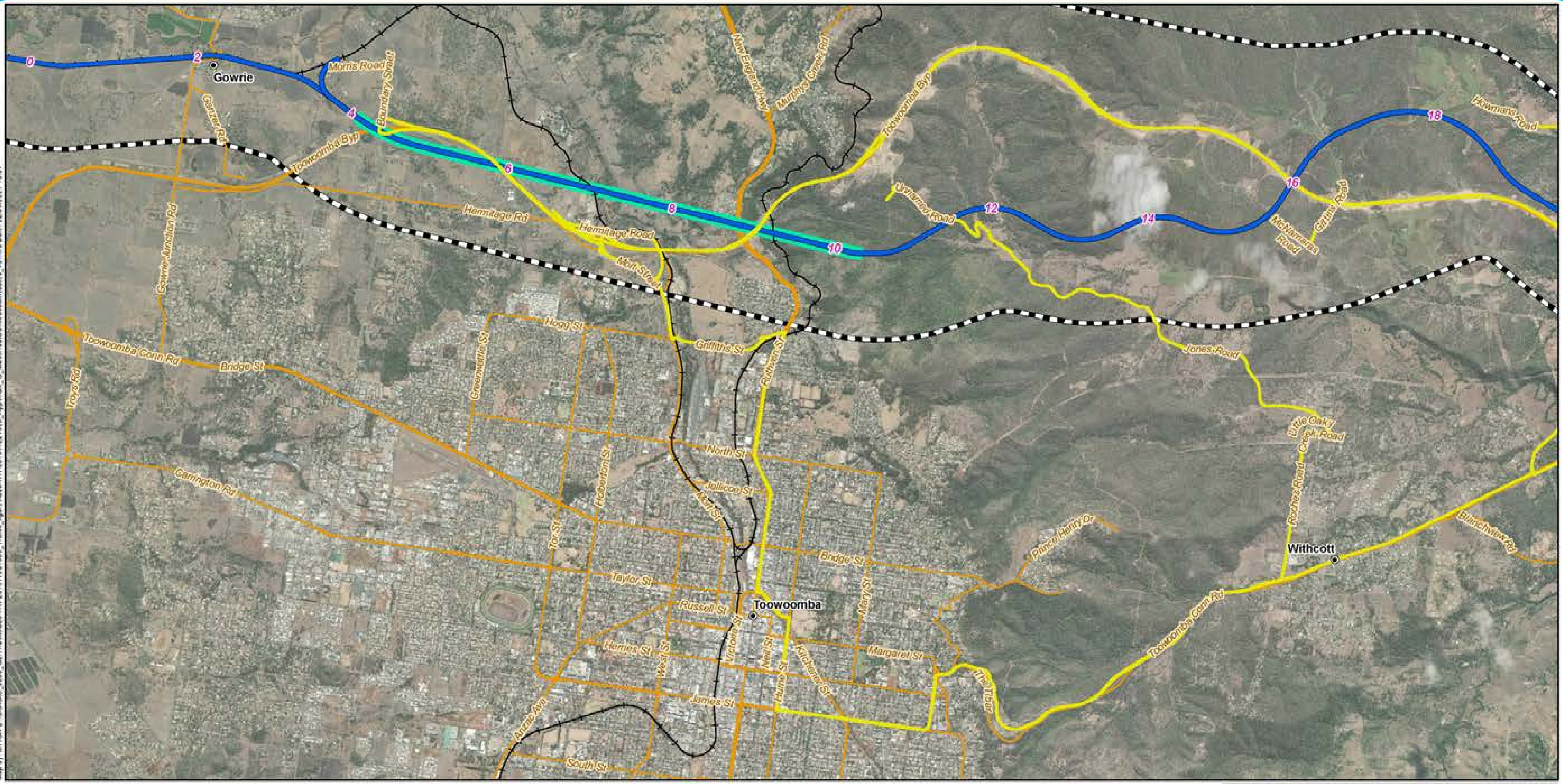
APPENDIX U

Traffic Impact Assessment

Appendix G Mass haul construction traffic routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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



Legend

- 5 Chainage (km)
- Localities
- Earthworks construction routes
- Existing rail
- Major roads
- Minor roads
- G2H project alignment
- Tunnel
- EIS investigation corridor

A3 scale: 1:50,000

0 0.5 1 1.5 2 2.5km

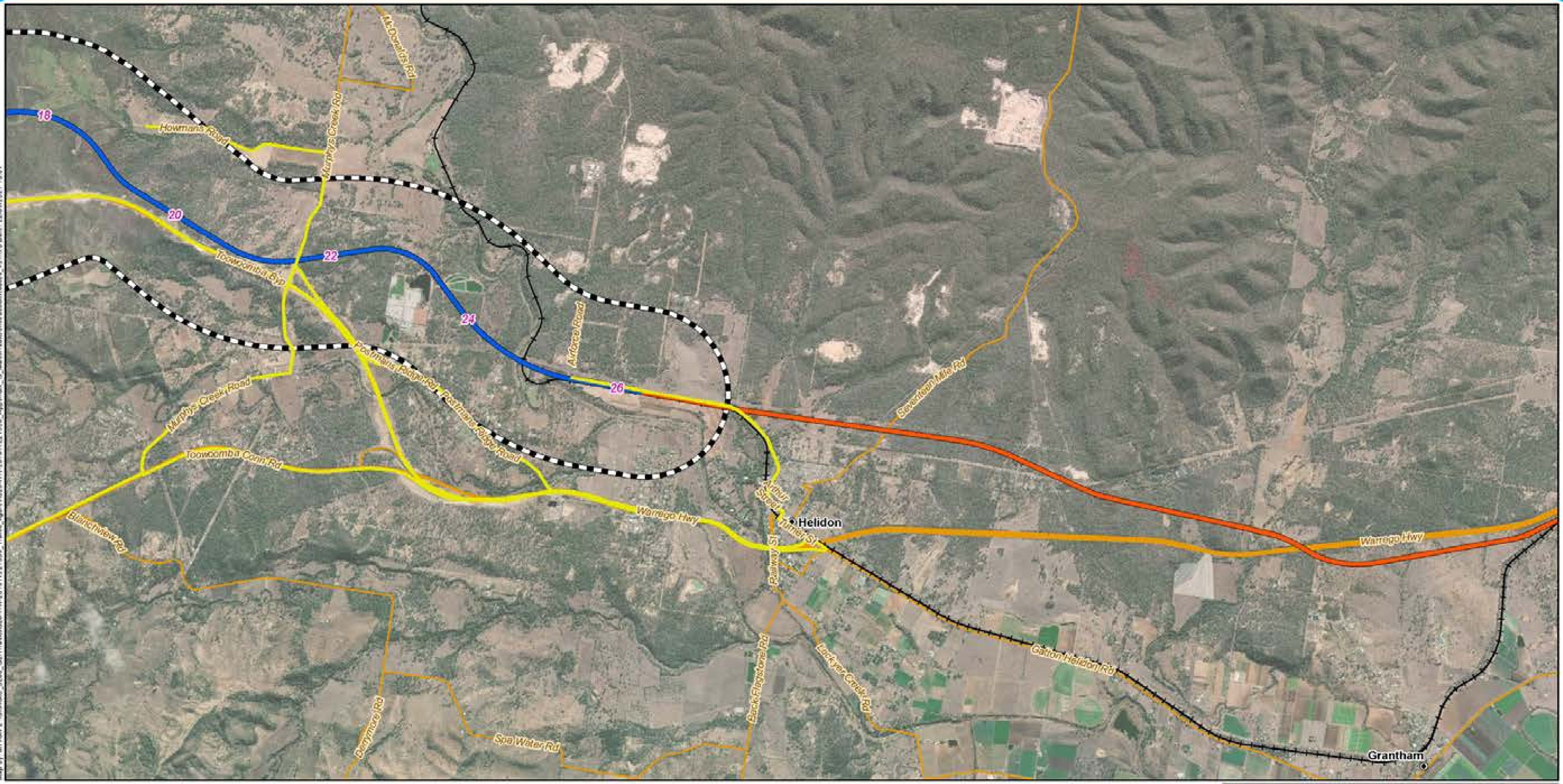
Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix G1:
Mass haul construction traffic routes

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



Legend

- 5 Chainage (km)
- Localities
- Earthworks construction routes
- Existing rail
- Major roads
- Minor roads
- G2H project alignment
- H2C project alignment
- EIS investigation corridor

A3 scale: 1:50,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 22/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix G2:
Mass haul construction traffic routes

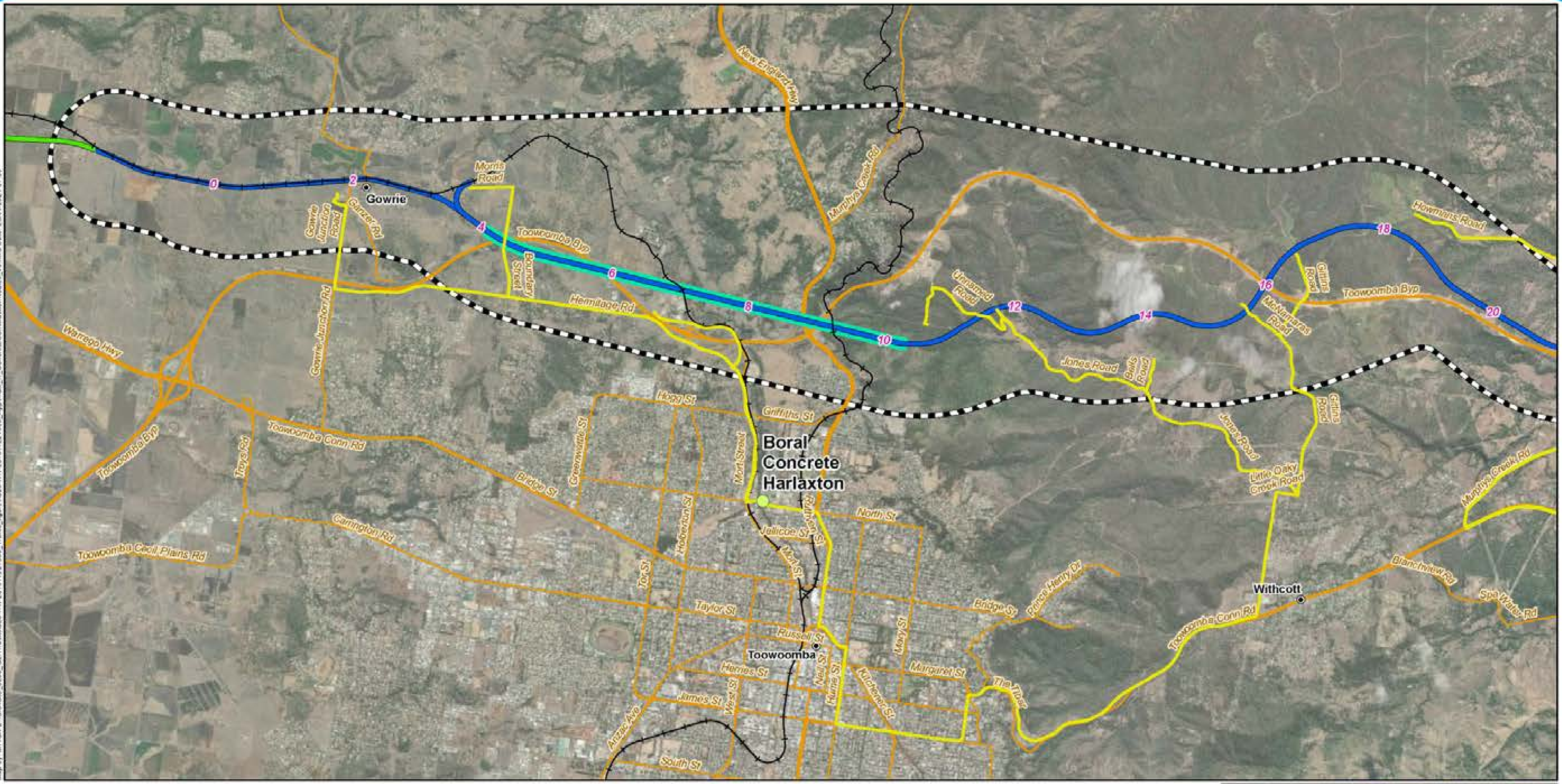
APPENDIX
U

Traffic Impact Assessment

Appendix H Concrete construction traffic routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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



Legend

- 5 Chainage (km)
- Concrete batch plants
- Localities
- Concrete routes
- Existing rail
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 3km

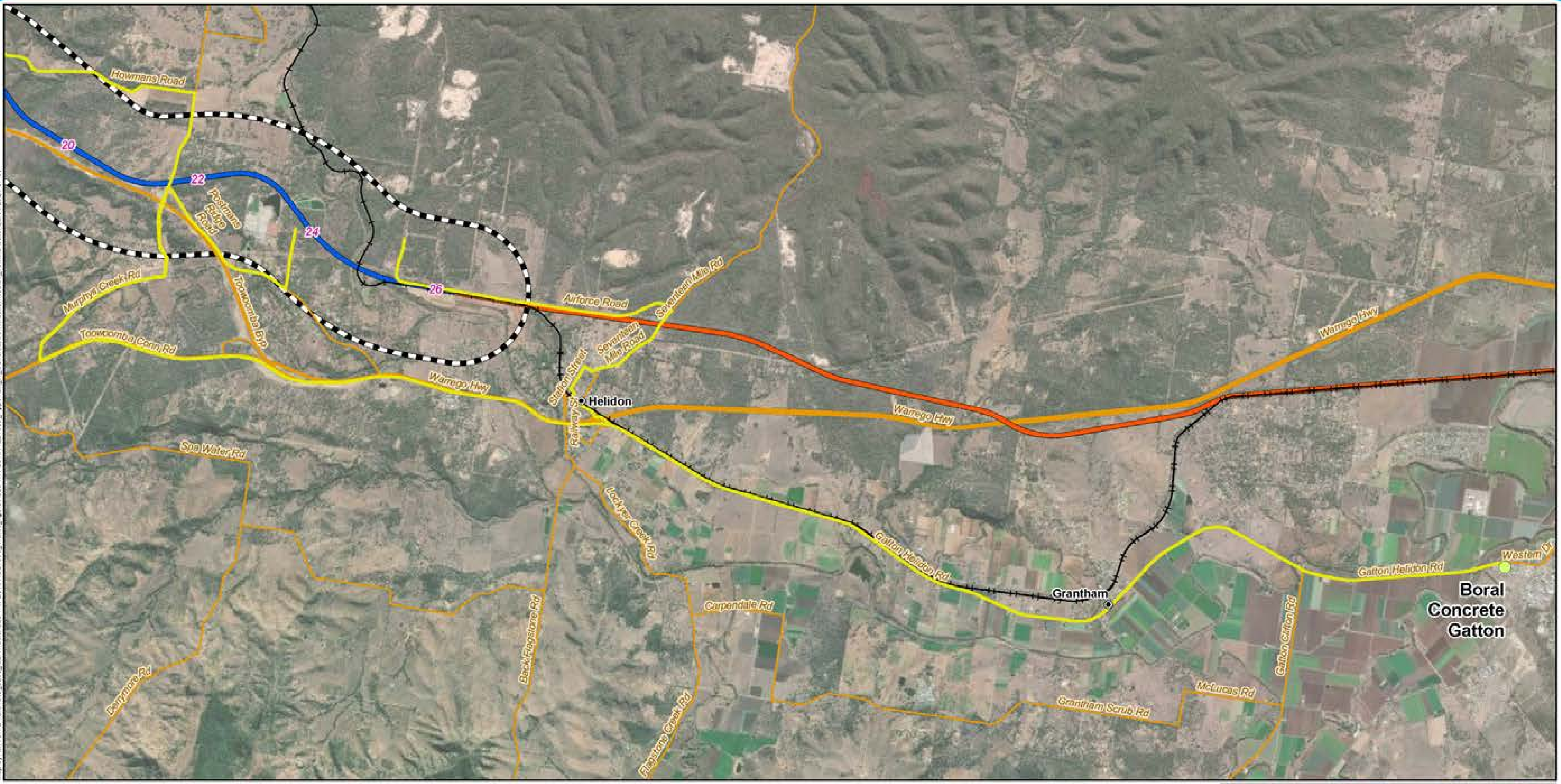
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

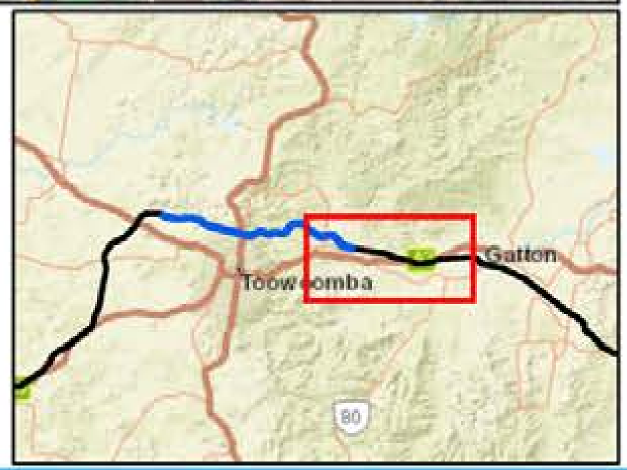
Appendix H1: Concrete construction traffic routes

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



Legend

- 5 Chainage (km)
- Concrete batch plants
- Localities
- Concrete routes
- Existing rail
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- EIS investigation corridor



A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 3km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix H2:
Concrete construction traffic routes

APPENDIX U

Traffic Impact Assessment

Appendix I Precast concrete—bridge construction traffic routes

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

Legend

- Localities
- Precast concrete bridge routes
- Existing rail
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

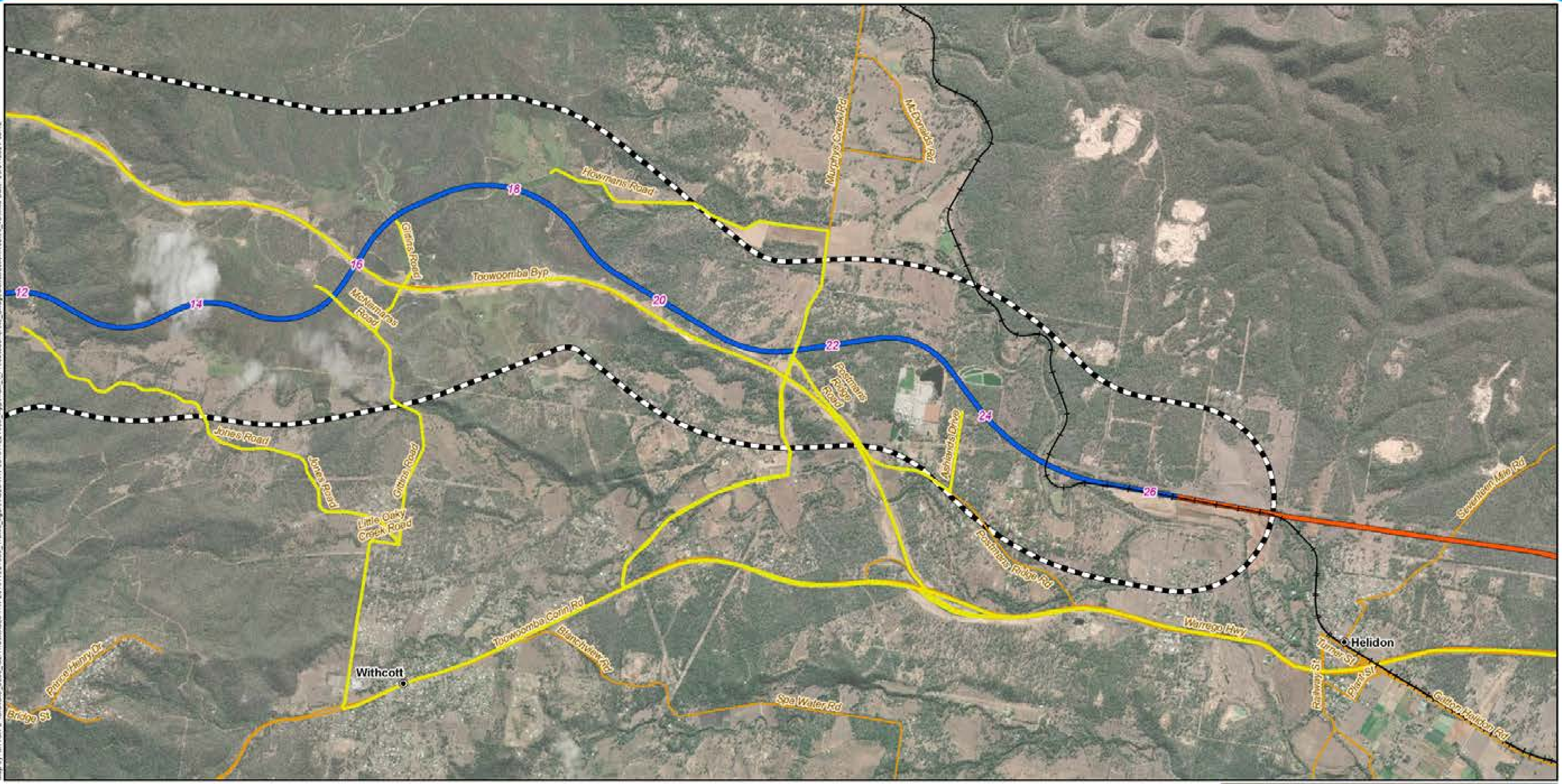
Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix I1:

Precast concrete - bridge construction traffic routes

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



Legend

- Localities
- Precast concrete bridge routes
- Existing rail
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- EIS investigation corridor

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

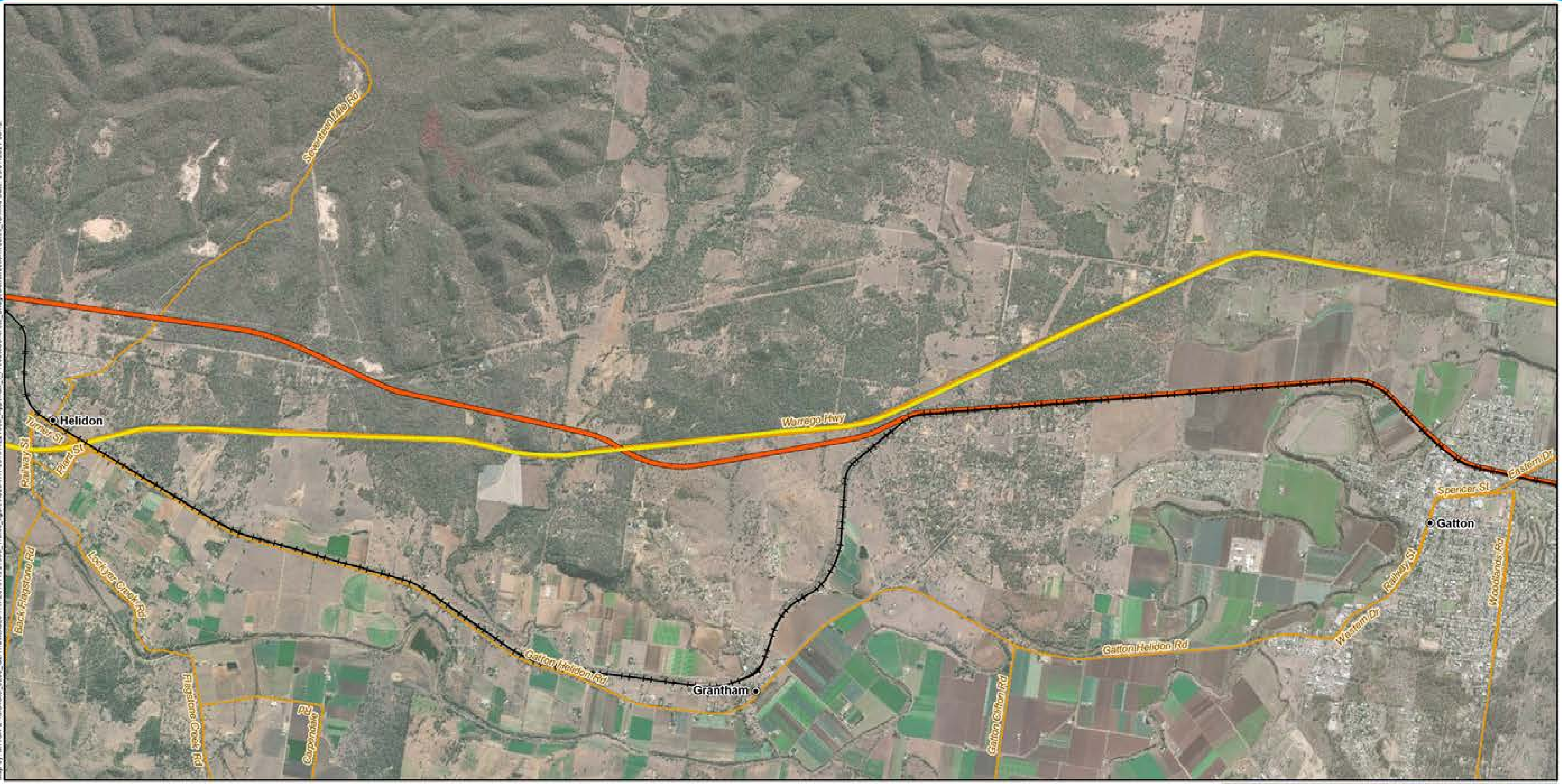
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix I2:
Precast concrete - bridge construction traffic routes

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



Legend

- Localities
- Precast concrete bridge routes
- Existing rail
- H2C project alignment
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix I3:
Precast concrete - bridge construction traffic routes

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

Legend

- Localities
- Precast concrete bridge routes
- Existing rail
- H2C project alignment
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

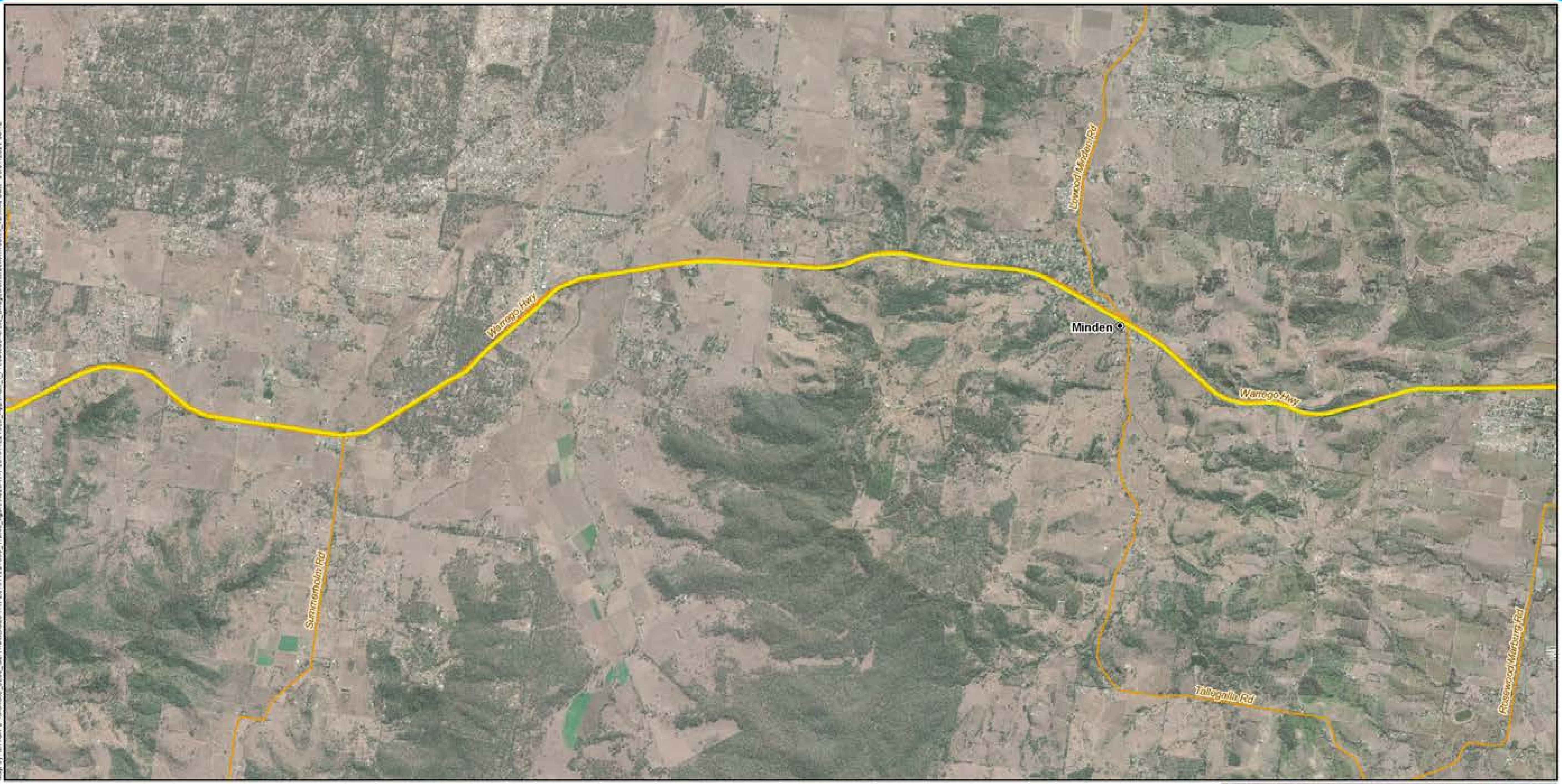
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix I4:
Precast concrete - bridge construction traffic routes

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



Legend

- Localities
- Precast concrete bridge routes
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix I5:
Precast concrete - bridge construction traffic routes

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

Legend

- Localities
- Precast concrete bridge routes
- Existing rail
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

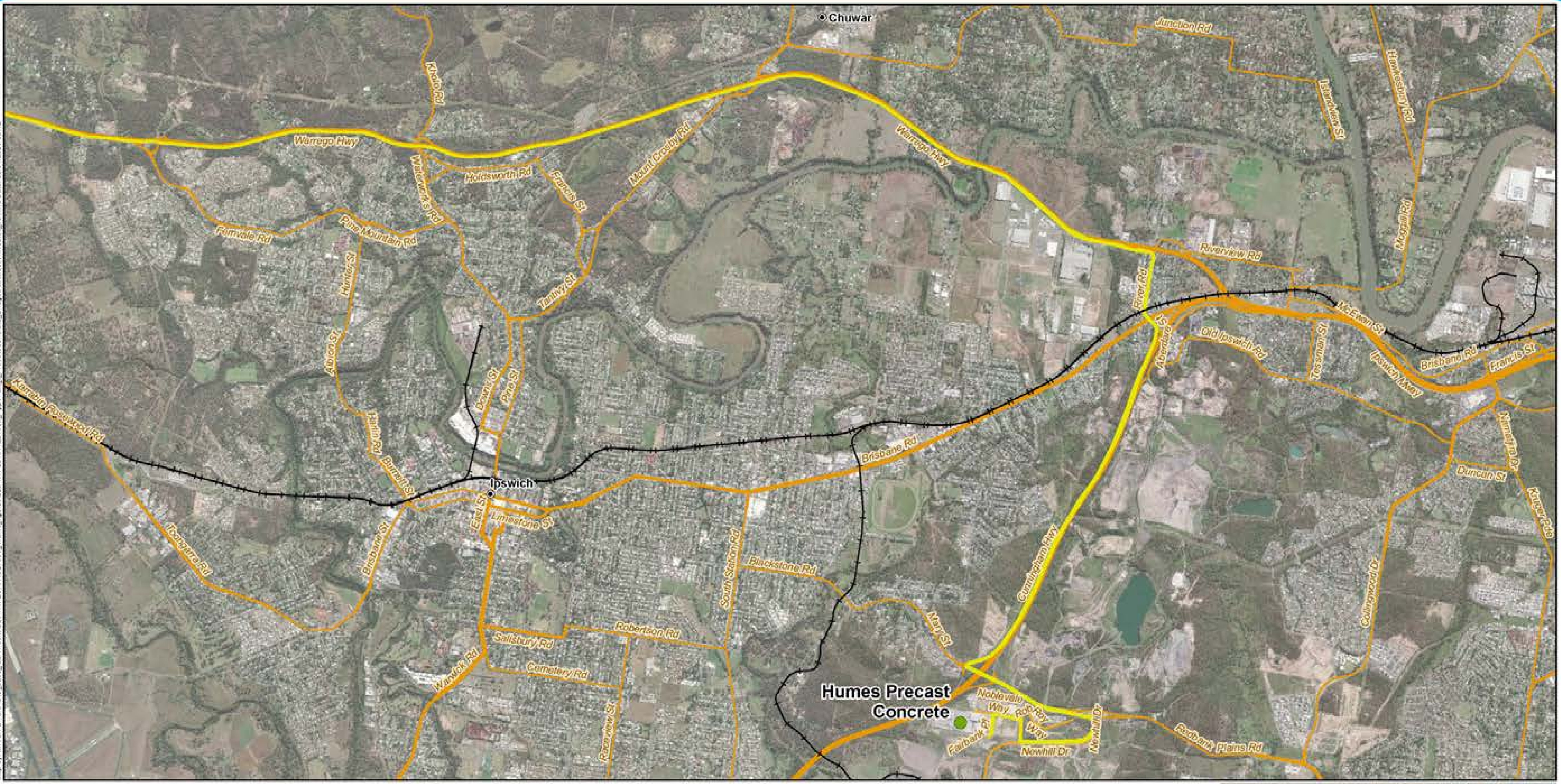
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix I6:
Precast concrete - bridge construction traffic routes

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



Legend

- Precast concrete plants
- Localities
- Precast concrete bridge routes
- Existing rail
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix I7:

Precast concrete - bridge construction traffic routes

APPENDIX U

Traffic Impact Assessment

Appendix J Precast concrete—culverts construction traffic routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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

Legend

- 5 Chainage (km)
- Localities
- Precast concrete plants
- Existing rail
- Precast concrete culvert routes
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:35,000

0 0.4 0.8 1.2 1.6 2km

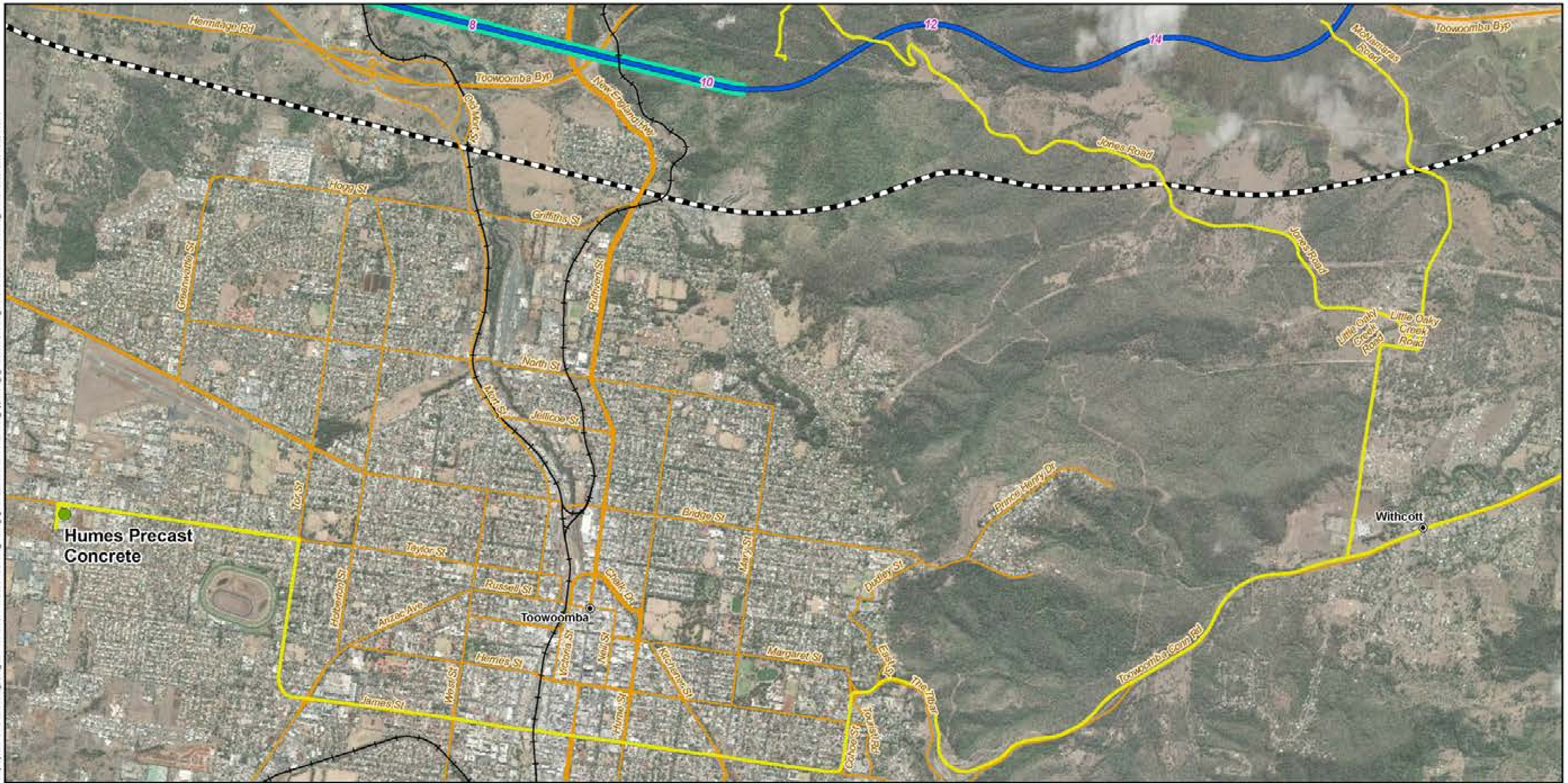
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix J1:
Precast concrete - culverts construction traffic routes

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



Legend
- 5 Chainage (km)
- Localities
- Precast concrete plants
- Existing rail
- Precast concrete culvert routes
- G2H project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:35,000

0 0.4 0.8 1.2 1.6 2km

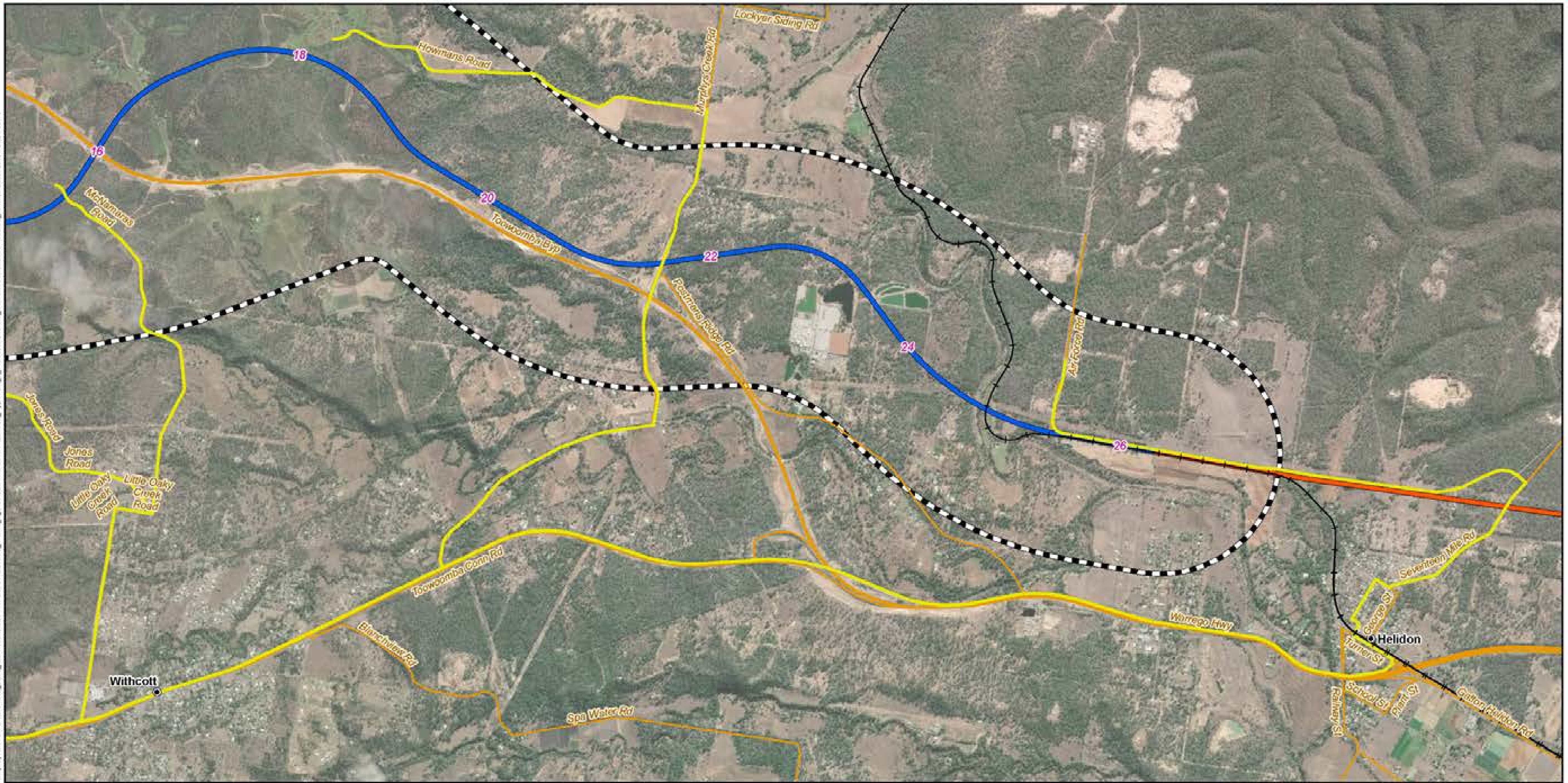
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix J2:
Precast concrete - culverts construction traffic routes

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



Legend

- 5 Chainage (km)
- Localities
- Existing rail
- Precast concrete culvert routes
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- EIS investigation corridor

A3 scale: 1:35,000

0 0.4 0.8 1.2 1.6 2 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix J3:
Precast concrete - culverts construction traffic routes

APPENDIX

U

Traffic Impact Assessment

Appendix K Quarry construction traffic routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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

Legend

- 5 Chainage (km)
- Localities
- Quarry
- Existing rail
- Quarry routes
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:45,000

0 0.4 0.8 1.2 1.6 2km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix K1:
Quarry construction traffic routes

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

Legend

- 5 Chainage (km)
- Localities
- Quarry
- Existing rail
- Quarry routes
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- Tunnel
- EIS investigation corridor

A3 scale: 1:50,000

0 0.45 0.9 1.35 1.8 2.25km

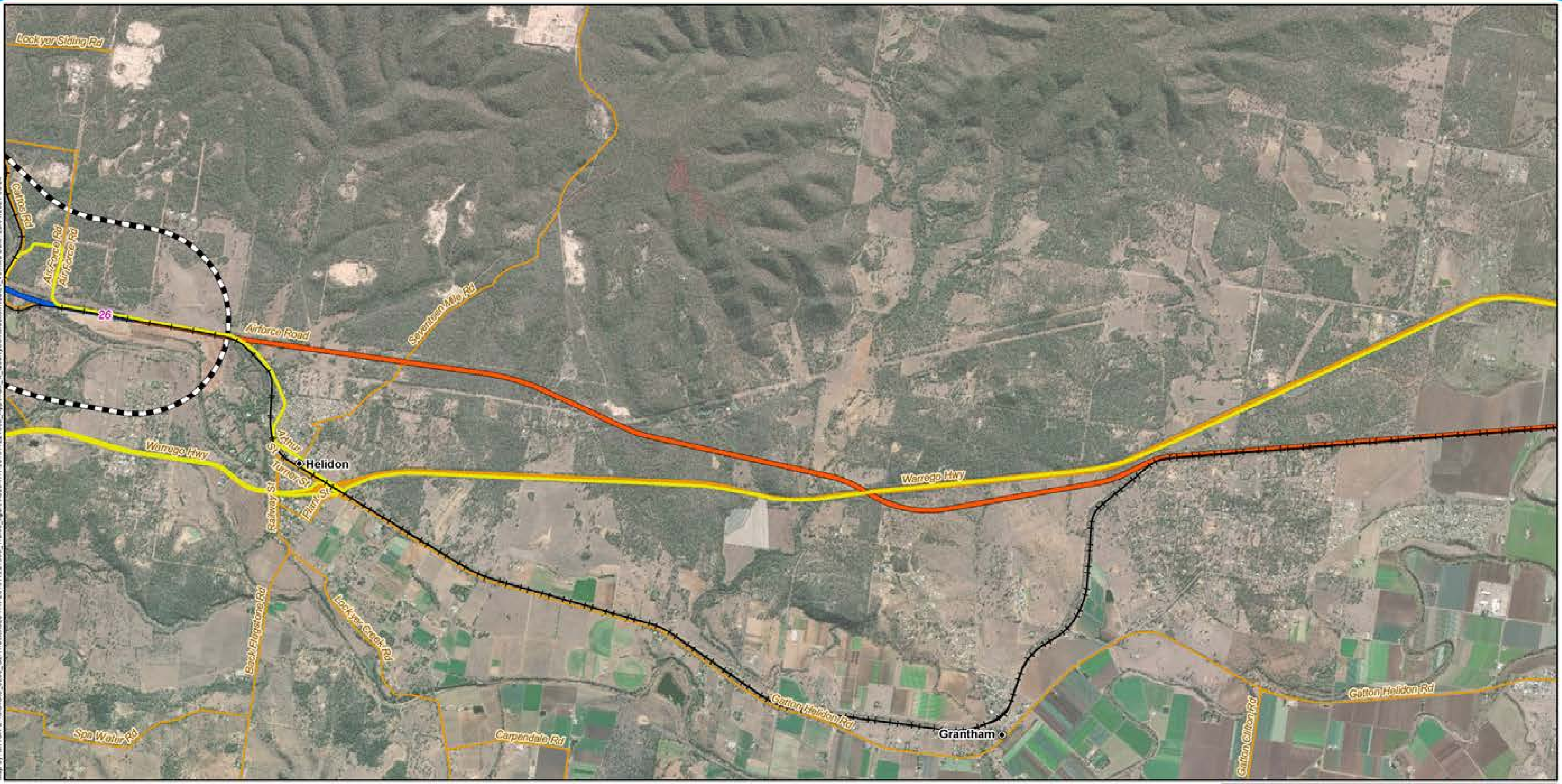
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix K2:
Quarry construction traffic routes

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



Legend

- 5 Chainage (km)
- Localities
- Existing rail
- Quarry routes
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- EIS investigation corridor

A3 scale: 1:45,000

0 0.4 0.8 1.2 1.6 2km

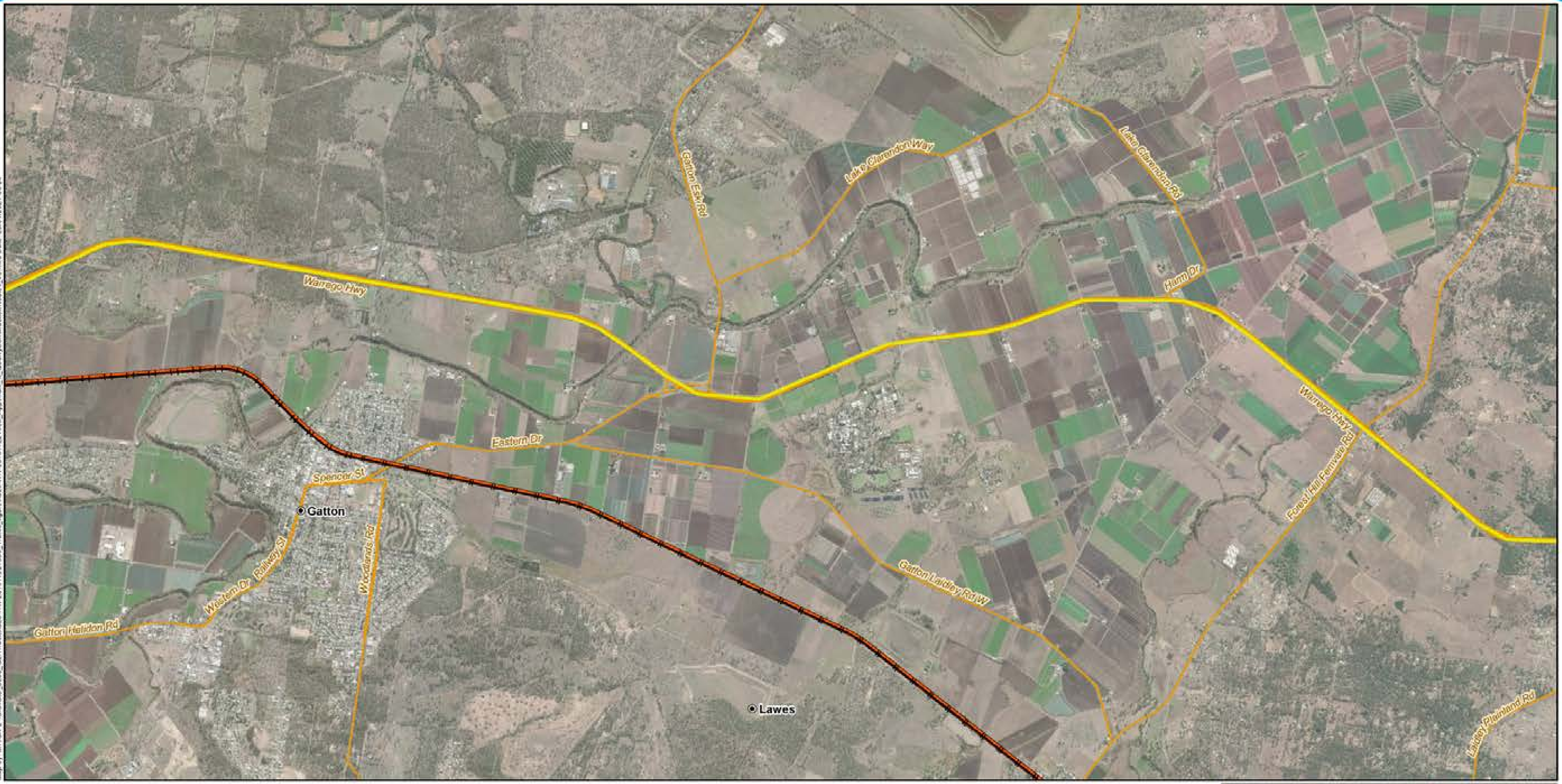
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix K3:
Quarry construction traffic routes

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



Legend

- Localities
- Existing rail
- Quarry routes
- H2C project alignment
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.4 0.8 1.2 1.6 2km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix K4:
Quarry construction traffic routes

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

Legend

- Localities
- Quarry routes
- Major roads
- Minor roads

A3 scale: 1:45,000

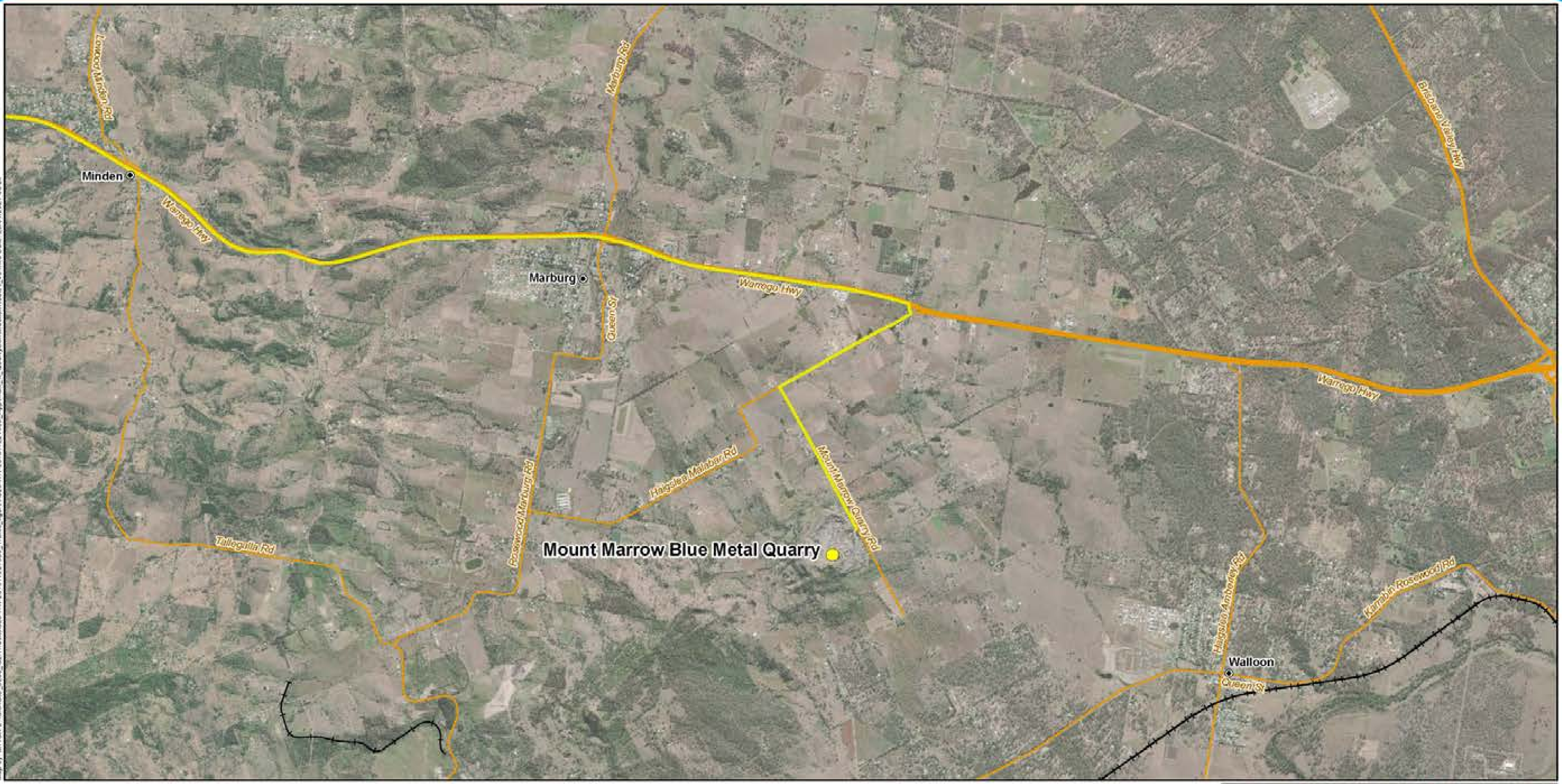
0 0.4 0.8 1.2 1.6 2km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix K5:
Quarry construction traffic routes

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



Legend

- Localities
- Quarry
- Existing rail
- Quarry routes
- Major roads
- Minor roads

A3 scale: 1:45,000

0 0.4 0.8 1.2 1.6 2 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix K6:
Quarry construction traffic routes

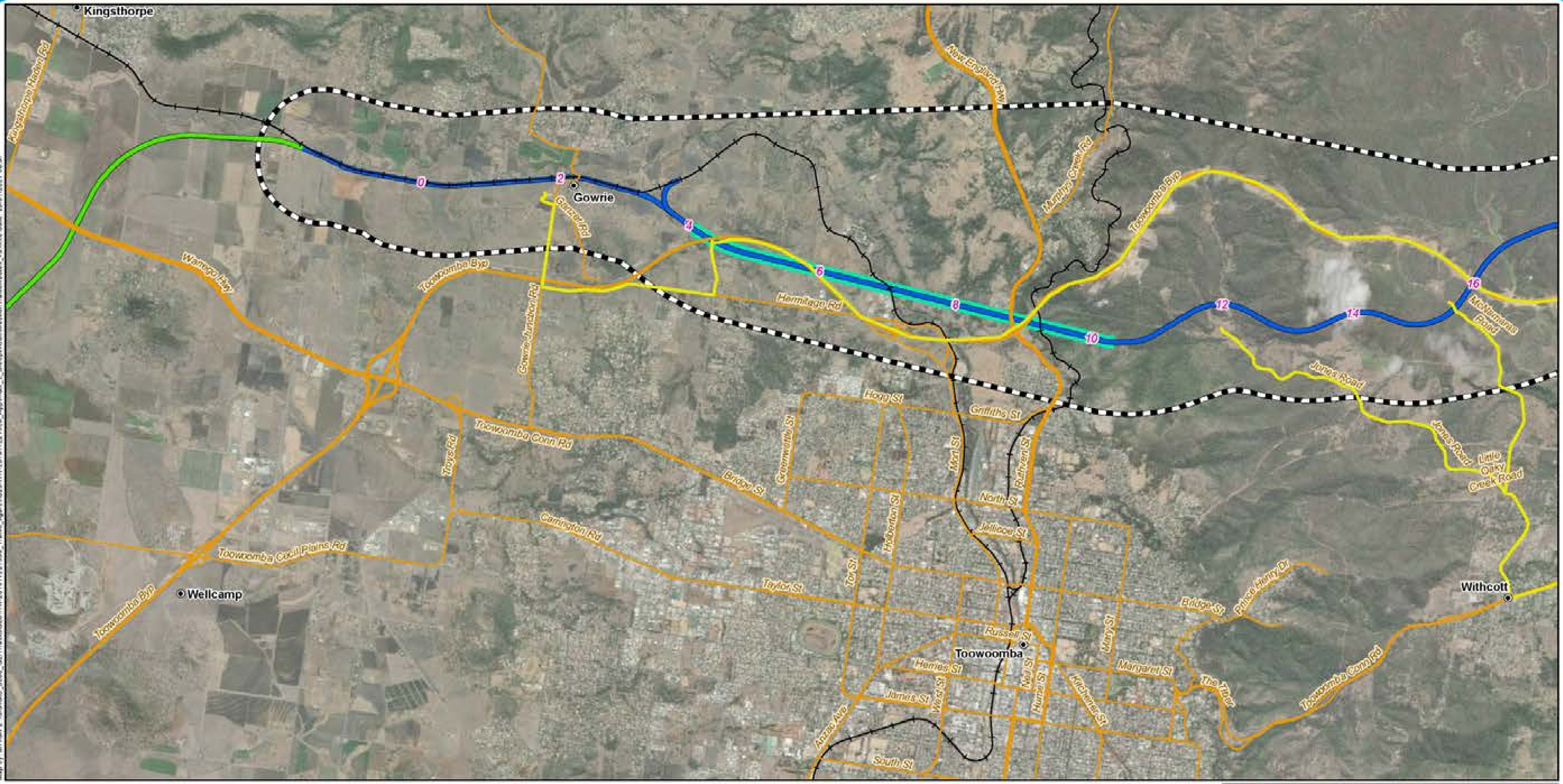
APPENDIX U

Traffic Impact Assessment

Appendix L Sleepers construction traffic routes

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

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



Legend

- 5 Chainage (km)
- Localities
- Sleeper routes
- B2G project alignment
- G2H project alignment
- Major roads
- Minor roads
- Existing rail
- Tunnel
- EIS investigation corridor

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

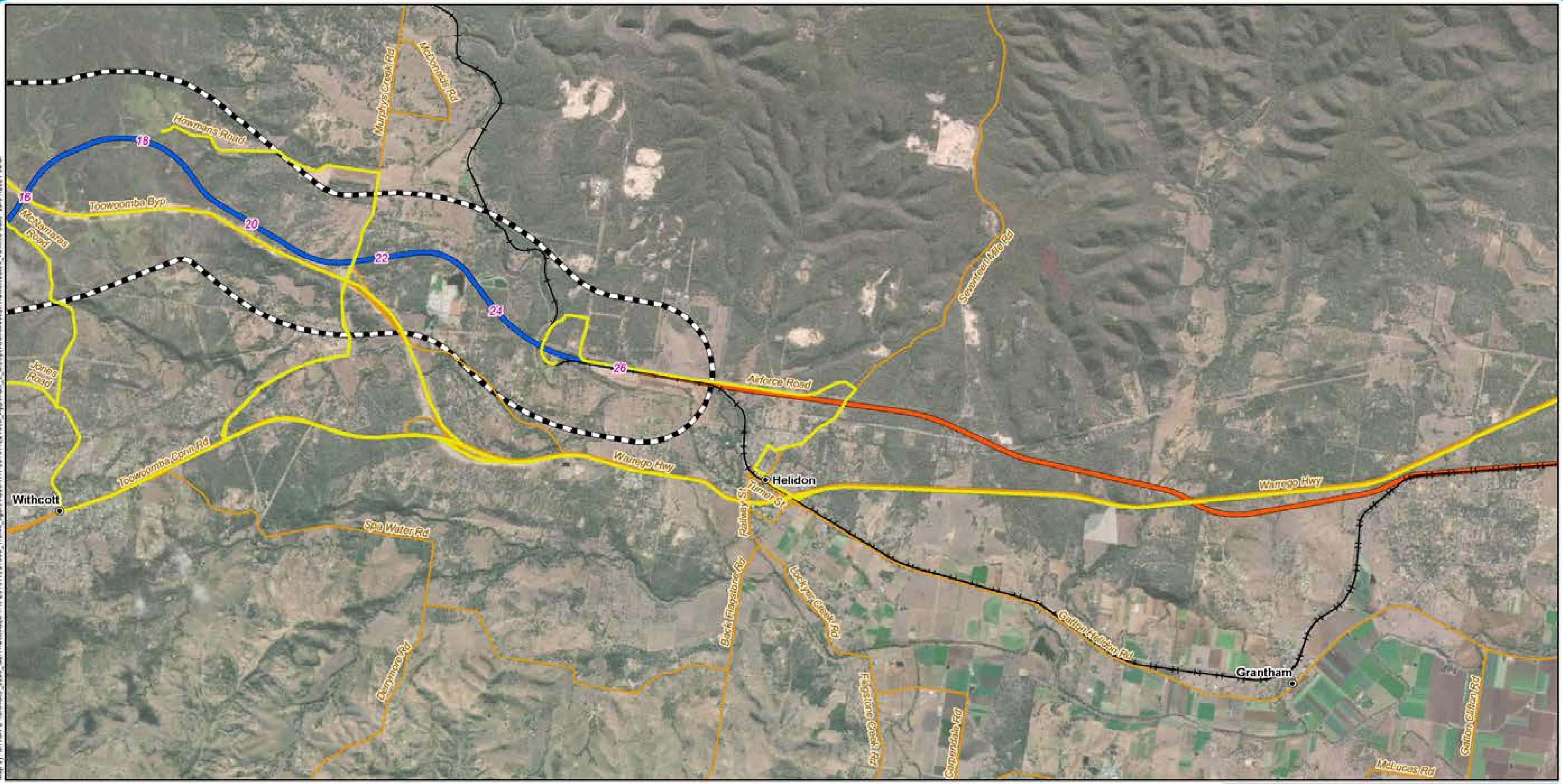
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L1:
Sleepers construction traffic routes

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



Legend

- 5 Chainage (km)
- Localities
- Sleeper routes
- G2H project alignment
- H2C project alignment
- Major roads
- Minor roads
- Existing rail
- EIS investigation corridor

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L2:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- H2C project alignment
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

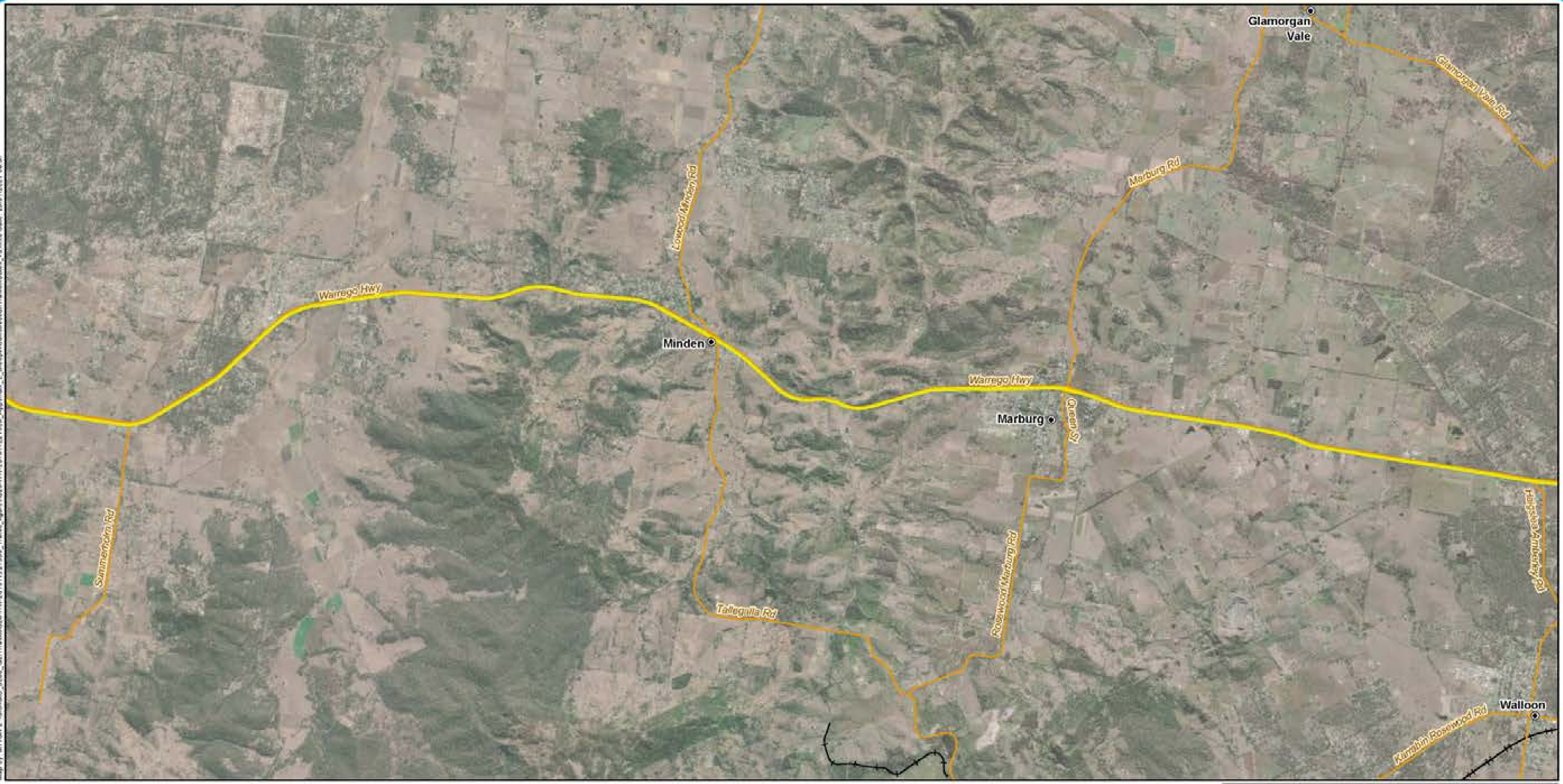
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L3:
Sleepers construction traffic routes

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



Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

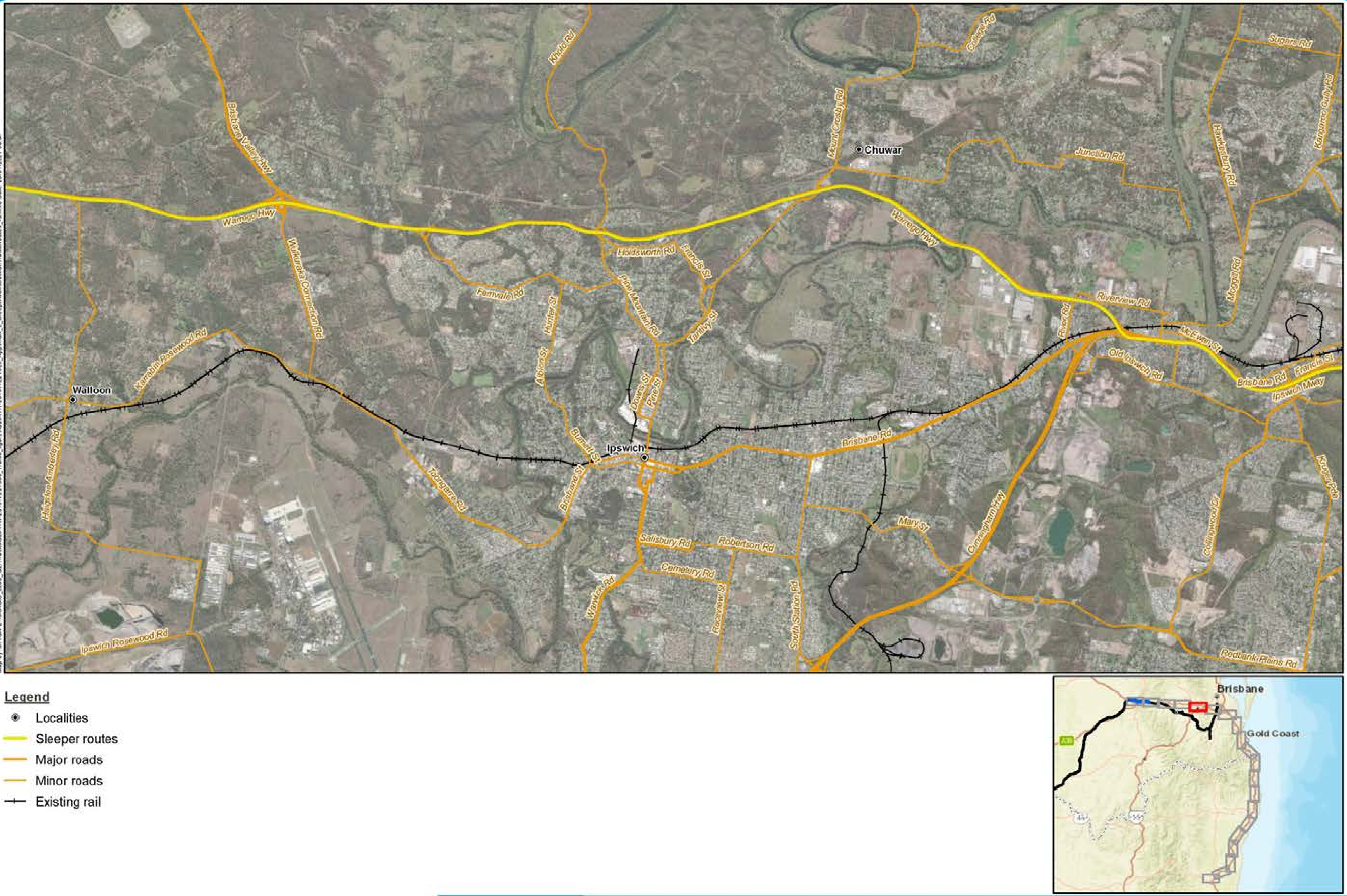
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L4:
Sleepers construction traffic routes

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



Map by: MFIGN 2 Y:\GIS\GIS_3200_G2H\Tasks\320-ITR-201911221559_Traffic_figures\320-ITR-201911221559_Appendix_L_SleeperConstructionTrafficRoutes_v3.mxd Date: 25/01/2021 08:37

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

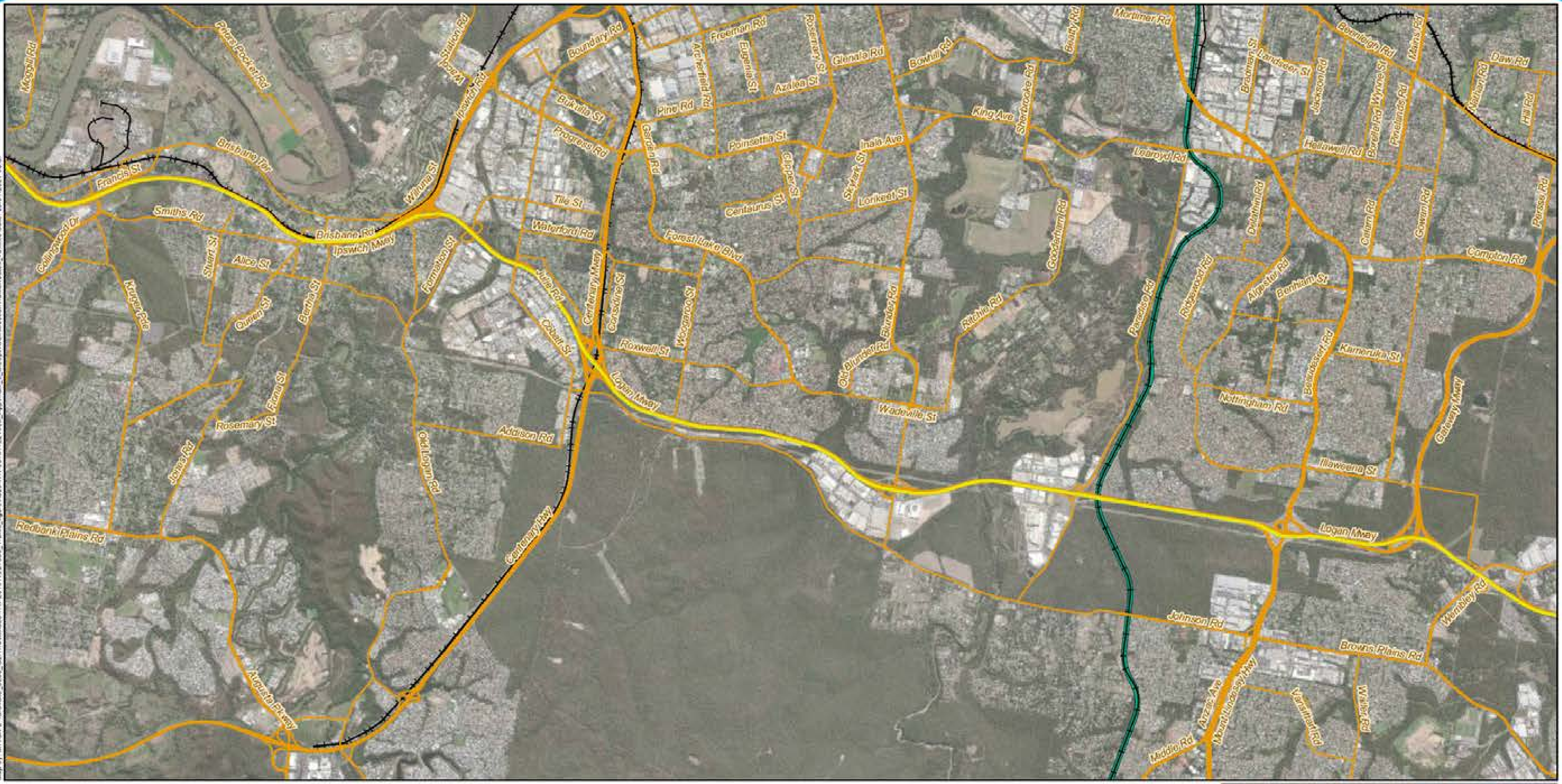
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L5:
Sleepers construction traffic routes

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



Legend

- Sleeper routes
- K2ARB project alignment
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

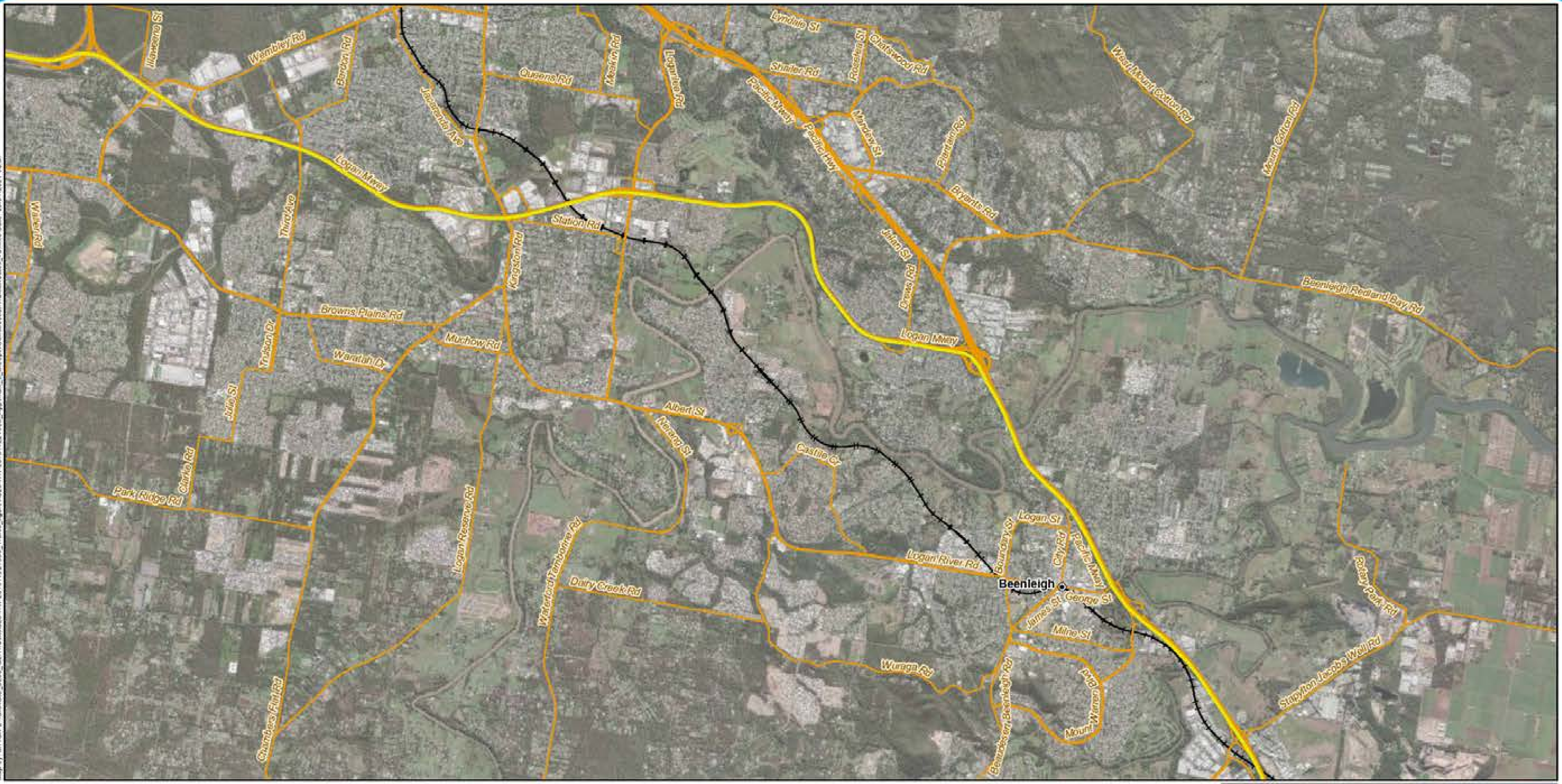
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L6: Sleepers construction traffic routes

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



Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

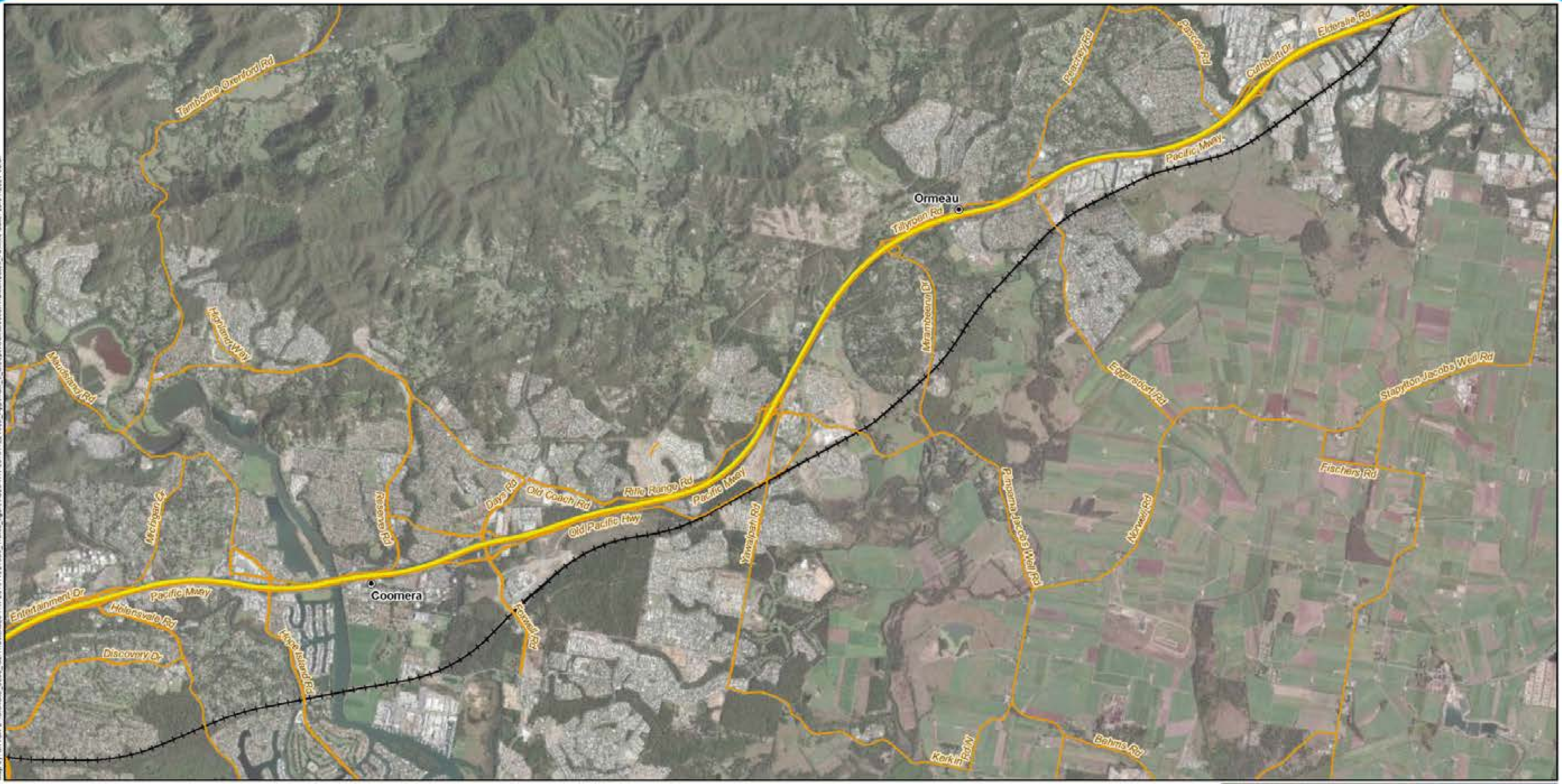
0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L7:
Sleepers construction traffic routes

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



Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L8:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L9:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- Existing rail
- QLD/NSW border

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L10:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads
- QLD/NSW border

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L11:
Sleepers construction traffic routes

Legend

- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

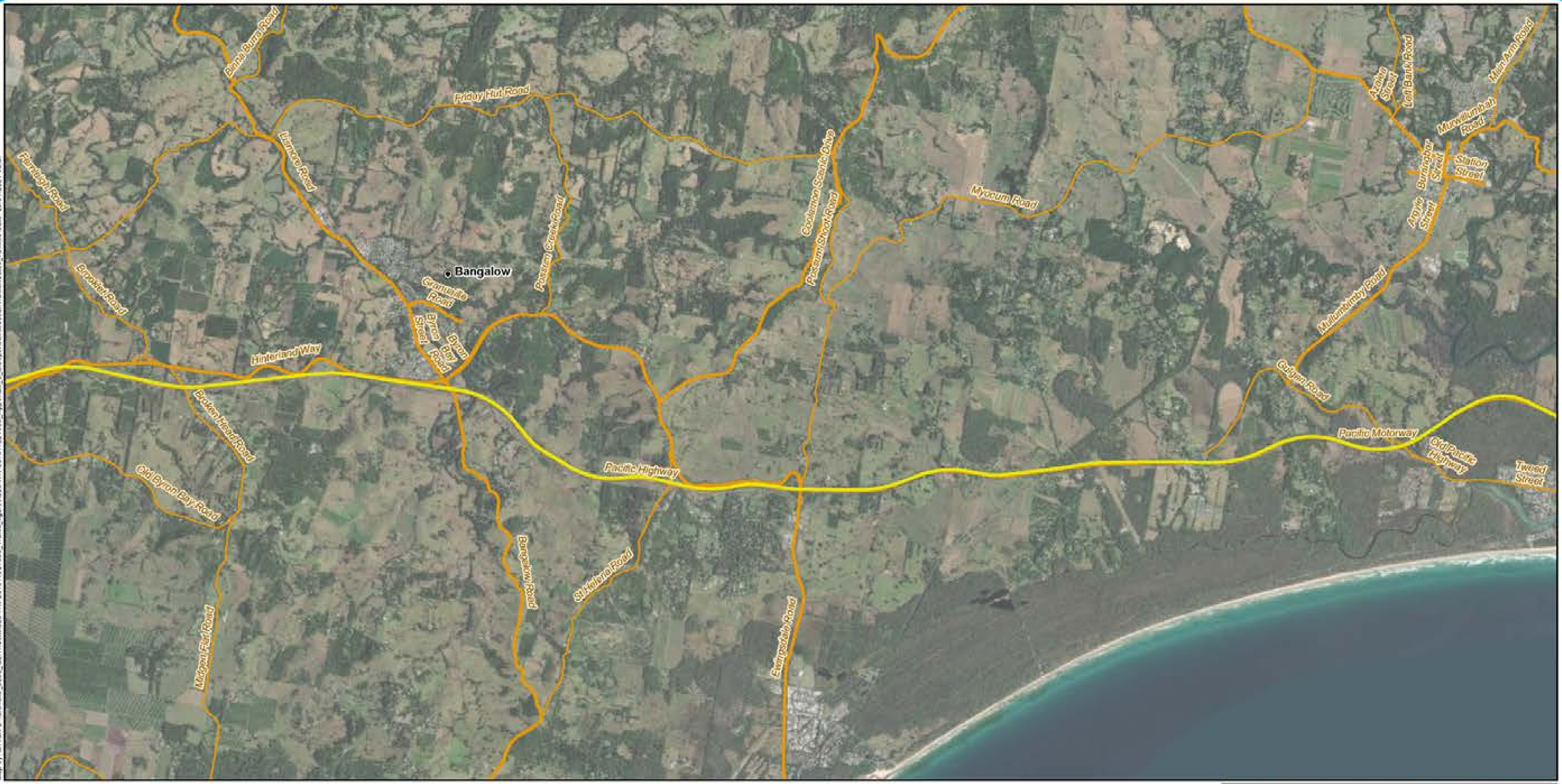
0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L12:
Sleepers construction traffic routes

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



Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L13:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L14:
Sleepers construction traffic routes

Map by: MFIGN 2 Q:\GIS\GIS_3200_G2H\Tasks\320-ITR-201911221559_Traffic_figures\320-ITR-201911221559_Appendix_L_SleeperConstructionTrafficRoutes_v3.mxd Date: 25/01/2021 08:37

Legend

- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L15:
Sleepers construction traffic routes

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

Legend

- Localities
- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L16:
Sleepers construction traffic routes

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

Legend

- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L17:
Sleepers construction traffic routes

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

Legend

- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

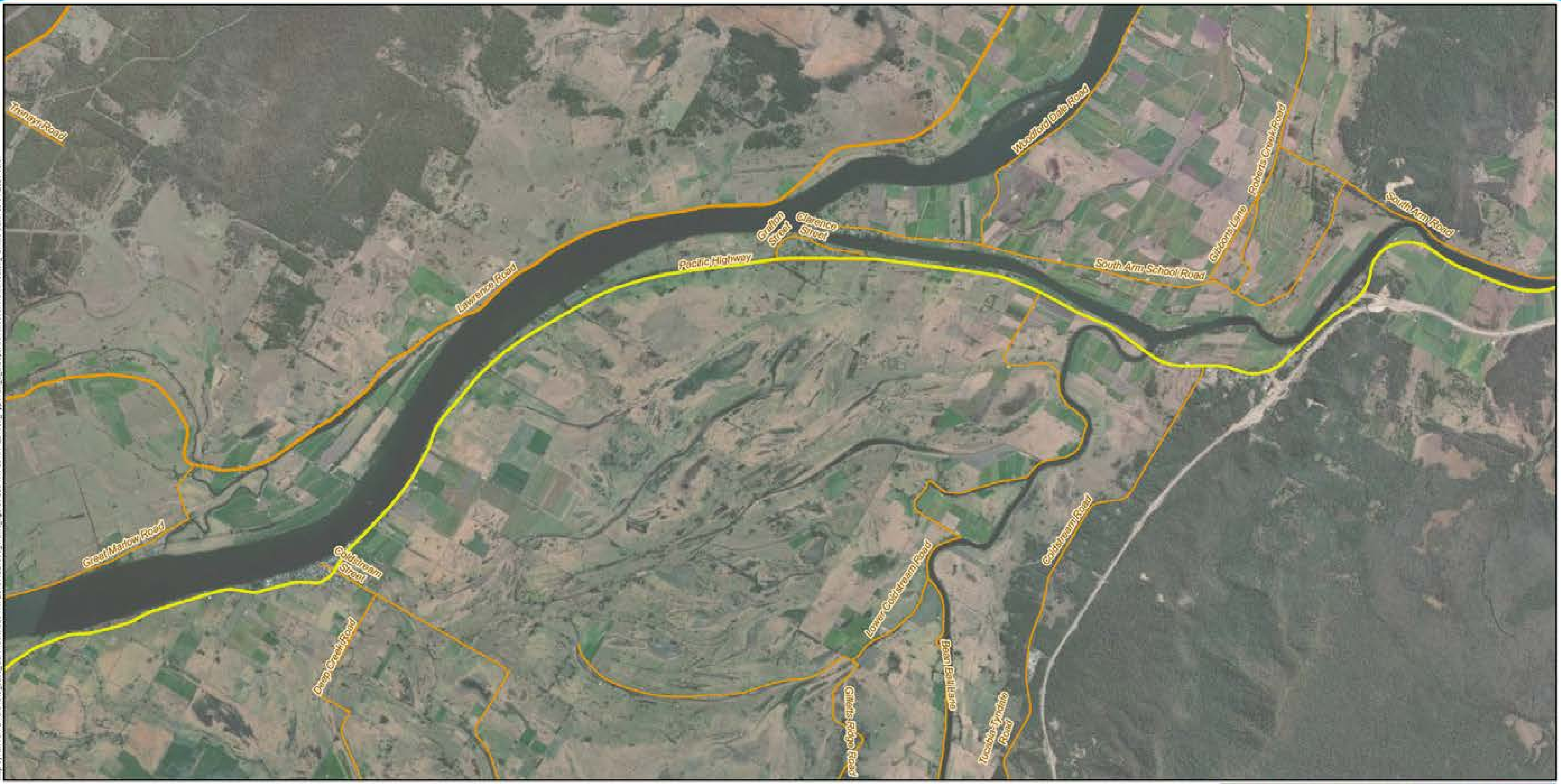
Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon

Appendix L18:
Sleepers construction traffic routes

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



Legend

- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L19: Sleepers construction traffic routes

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

Legend

- Rocla precast sleepers
- Localities
- Sleeper routes
- Major roads
- Minor roads

A3 scale: 1:60,000

0 0.5 1 1.5 2 2.5 km

Future Freight
Integrating Community, Environment and Engineering

Issue date: 25/01/2021 Version: 3
Coordinate System: GDA 1994 MGA Zone 56

Gowrie to Helidon
Appendix L20:
Sleepers construction traffic routes