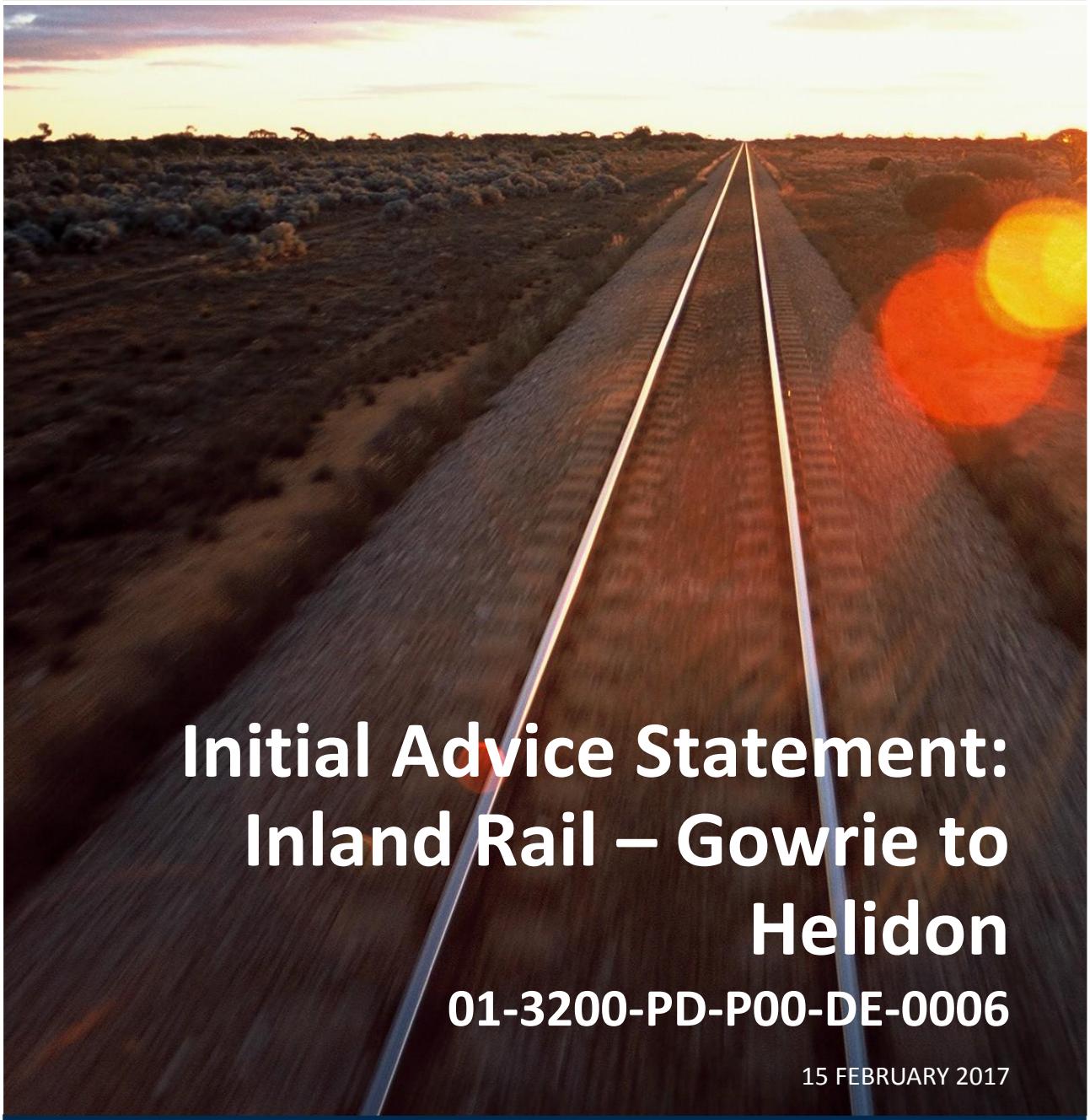
ARTC InlandRail

The Australian Government's priority freight rail project



Initial Advice Statement: Inland Rail – Gowrie to Helidon

01-3200-PD-P00-DE-0006

15 FEBRUARY 2017

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EXECUTIVE SUMMARY

Project Description

This Initial Advice Statement (IAS) has been prepared for the Australian Rail Track Corporation (ARTC) Inland Rail Gowrie to Helidon Project. ARTC is an Australian Government owned corporation and current operator of the Australian freight network. ARTC currently manage and maintain approximately 8500 km of rail network across Victoria, New South Wales, South Australia, Western Australia and Queensland.

ARTC has been tasked with delivery of the Inland Rail Programme. The Gowrie to Helidon Project is one of 13 separate projects that are part of the Inland Rail Programme:

Project Name	State	Description	Length (km)
Tottenham to Albury	Vic	Enhancement works	305
Albury to Illabo	NSW	Enhancement works	185
Illabo to Stockinbingal	NSW	New Railway	37
Stockinbingal to Parkes	NSW	Enhancement works	169
Parks to Narromine	NSW	Upgrade works	111
Narromine to Narrabri	NSW	New Railway	307
Narrabri to North Star	NSW	Upgrade works	186
North Star to NSW/QLD Border	NSW	New Railway	52
NSW/QLD Border to Gowrie	Qld	New Railway	197
Gowrie to Helidon	**Qld**	**New Railway**	**26**
Helidon to Calvert	Qld	New Railway	47
Calvert to Kagaru	Qld	New Railway	53
Kagaru to Acacia Ridge	Qld	Enhancement works	35
	Total	**Total**	**1,710**

Each project can be delivered independently with tie-in points on the existing railway. The business case shows that Inland Rail maximises value for money while meeting market needs and provides benefits to the Australian economy through efficient freight transport.

The Gowrie to Helidon Project will be constructed as an approximately 26 km long single-track dual-gauge railway with crossing loops to accommodate double stack freight trains up to 1800 m long. The Gowrie to Helidon Project will also assess the future requirements for the provision of 3600 m trains and future duplication of the freight line. Impact assessment will be undertaken for the proposed development described in the Inland Rail Business Case (2015) for rail traffic and associated activities projected at the year 2040.

The Gowrie to Helidon Project will generally be within the existing Gowrie to Grandchester future public passenger transport corridor. The Project will include accommodation for two passenger tracks for a future possible public passenger service to be undertaken by the Queensland Department of Transport and Main Roads (TMR). The infrastructure requirements for the possible future passenger transport service are excluded from this Project, and would be progressed by TMR.

The Gowrie to Helidon Project is one of the 'missing links' and is identified as a priority development project within the Inland Rail Programme. A preferred alignment has been identified for the Gowrie to Helidon Project within a broader Study Area. This will allow for route and tunnel optimisation and other value engineering opportunities to be investigated during subsequent design development, community engagement, environmental assessment and approvals processes. The final Alignment and Project Corridor will be defined during the Environmental Impact Statement (EIS) and design development phases and will include both brownfield (within existing rail corridor) and greenfield development.

The Gowrie to Helidon Project initially will require the provision of a new single track dual gauge line and crossing loops within both greenfield sections and brownfield (existing rail corridor) sections and includes a 6.3 km tunnel crossing of the Toowoomba Range. The Gowrie to Helidon Project is a new railway line, between the existing railway lines at Gowrie to the existing line at Helidon, via a new tunnel section through the Toowoomba Range.

Given the significance and complexity of the Gowrie to Helidon Project, ARTC are seeking a declaration for coordinated project status under the *State Development and Public Works Organisation Act 1971*. The Gowrie to Helidon Project will also be referred under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act)* and if deemed a controlled action, it is anticipated that assessment of the Gowrie to Helidon Project will be progressed under the Bilateral Assessment Agreement between the Australian and Queensland Governments. After conditions of approval are received, further approvals will be required under separate approvals processes under Queensland legislation. The key reasons why ARTC are seeking the coordinated project declaration are:

- To provide the public with the opportunity to comment and provide input into the Terms of Reference for the EIS, and following its development, on the draft EIS,
- To have an independent and transparent social, economic and environmental assessment of the project undertaken by the Queensland Coordinator General; and
- For the opportunity of efficient assessment of EPBC Act matters in accordance with the Queensland and Commonwealth government EPBC Act assessment bilateral agreement.

The EIS will undertake a range of investigations into the potential impacts and mitigation measures required for the delivery of the Gowrie to Helidon project. Those investigations will assess:

- Land use
- Flora and fauna
- Water quality
- Hazards, health and safety
- Social and economic factors
- Air quality
- Noise and vibration
- Water resources
- Waste management
- Cultural heritage; and
- Transport.

1. INTRODUCTION

1.1. Background

1.1.1. Inland Rail

The Australian Government has committed to building a nationally significant piece of transport infrastructure by constructing an inland railway between Melbourne and Brisbane, via regional Victoria, central-west New South Wales (NSW) and Toowoomba in Queensland (QLD).

The Melbourne to Brisbane Inland Rail ('Inland Rail') Programme will enhance Australia's existing rail network and serve the interstate freight market by delivering a road competitive service that will see freight delivered from Melbourne to Brisbane, in less than 24 hours with reliability, pricing and availability that is equal to or better than road. Inland Rail provides a step-change in freight productivity, while also catalysing a range of potential benefits from complementary investments in land use and supply chains that leverage the enhanced logistics capabilities of Inland Rail.

The Inland Rail Programme has evolved over several decades with many alternatives and options assessed to meet Australia's growing freight task. The current proposal as shown in **Figure 1-1** was confirmed in the Inland Rail Programme Business Case 2015 and the Inland Rail Implementation Group's report to the Australian Government (August 2015).

The Australian Government has prioritised the Inland Rail Programme and in 2014 engaged the Australian Rail Track Corporation (ARTC) under the guidance of the Inland Rail Implementation Group, to develop a 10-year delivery programme for Inland Rail.

The Inland Rail route, which is about 1700 kilometres long, would involve:

- Using the existing interstate rail line through Victoria and southern NSW
- Upgrading about 400 kilometres of existing track, mainly in NSW
- Providing about 600 kilometres of new track in northern NSW and South-east QLD.

Inland Rail has been divided into 13 projects, five of which are located in QLD as shown in **Figure 1-2**. Each of these projects will be delivered, and operated independently with tie-in points on the existing railway.

The Gowrie to Helidon Project is the subject of this Initial Advice Statement (IAS). The Gowrie to Helidon Project will provide an efficient route through the steep terrain of the Toowoomba Ranges. It has been identified as a priority development project within the Inland Rail Programme, taking into consideration the complexity, delivery options /timing and funding requirements of the project's key scope elements. The Gowrie to Helidon concept design includes a 6.3km tunnel crossing of the Toowoomba Ranges, substantial viaduct structures and earthworks to facilitate the rail alignment along the challenging terrain of the topography.

1.2. Purpose and Scope of the Initial Advice Statement

This IAS has been prepared for the Gowrie to Helidon Project, to support an application to the Queensland Coordinator-General for a 'coordinated project' declaration under Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). A coordinated project declaration means that ARTC must prepare either an EIS or an impact assessment report (IAR). Due to the nature and extent of the proposed H2C Project, ARTC believe that an EIS is appropriate for assessing the social, economic and environmental impacts.

ARTC are seeking a declaration for coordinated project status for the Gowrie to Helidon Project due to the significant infrastructure investment and strategic direct and indirect economic benefits of creating an efficient freight route through the Toowoomba Range. ARTC are also seeking to have Commonwealth matters under the EPBC Act assessed in accordance with the assessment bilateral agreement between the Queensland State Government and the Commonwealth Government. The Gowrie to Helidon Project will have complex approval requirements under Commonwealth, State and local legislation and the potential for significant environmental impact unless appropriately managed.

The IAS provides information to assist the Coordinator-General to decide whether the Gowrie to Helidon Project should be declared a coordinated project, to determine the appropriate assessment process, and inform the preparation of a terms of reference for an Environmental Impact Statement (EIS) should the Gowrie to Helidon Project be declared under section 26(a) of the SDPWO Act, and require an EIS.

The Gowrie to Helidon Project has also been referred to the Commonwealth Department of the Environment and Energy (DotEE) for a decision as to whether the Gowrie to Helidon Project is a controlled action requiring assessment and approval under the *Environment and Biodiversity Conservation Act 1999* (EPBC Act). If the Gowrie to Helidon Project is determined to be a controlled action, it can be assessed by the SDPWO Act EIS process accredited under the assessment bilateral agreement between the Australian Government and the State of Queensland.

A Preferred Alignment and a broader Study Area for the Gowrie to Helidon Project has been identified for consideration in the IAS and EPBC Referral. These areas have been defined to encapsulate the potential requirements for both construction and operation of the railway and ancillary infrastructure. These aspects are discussed further in **Section 3.1**.

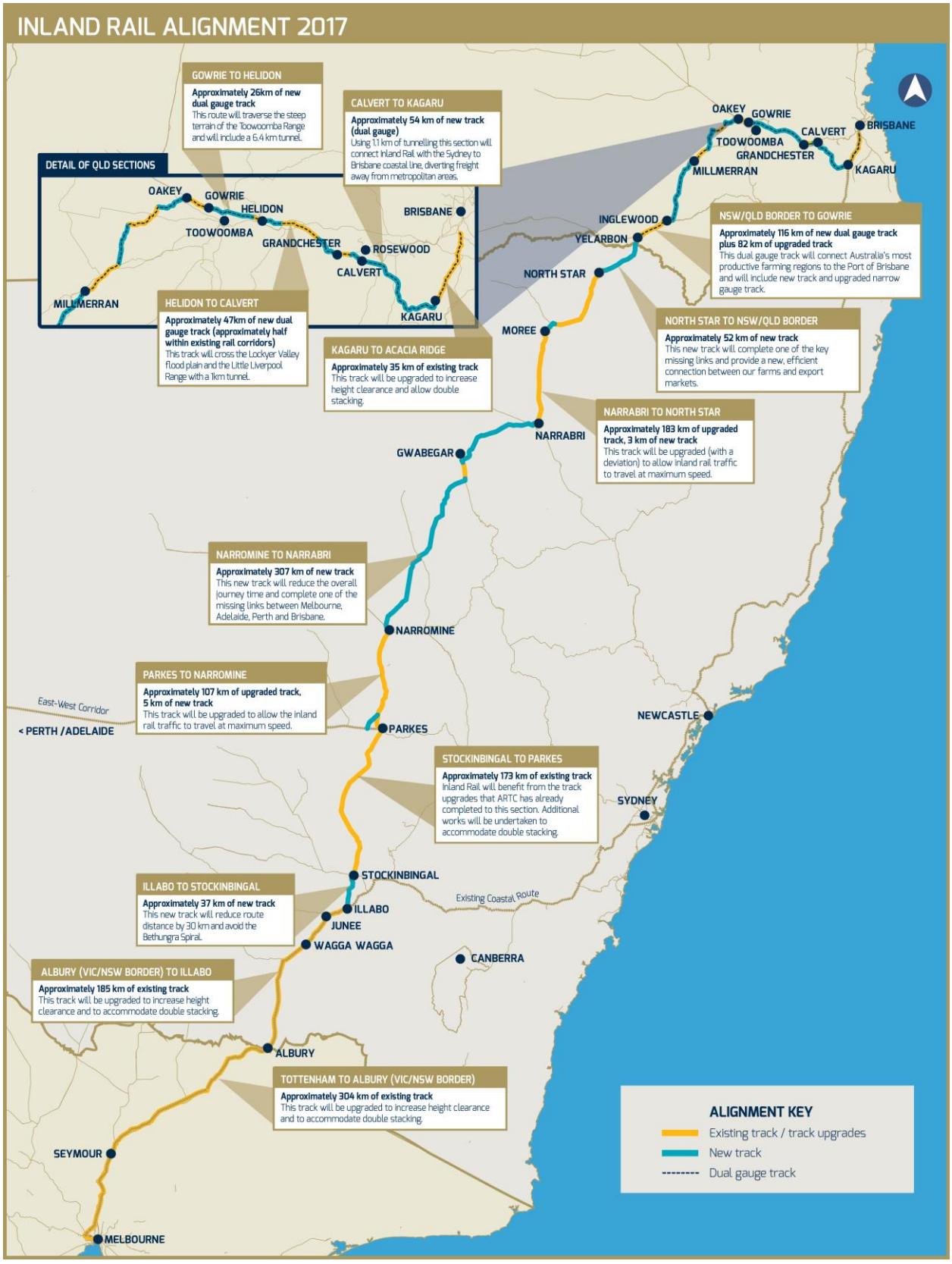

Figure 1-1 The Melbourne to Brisbane Inland Rail Programme

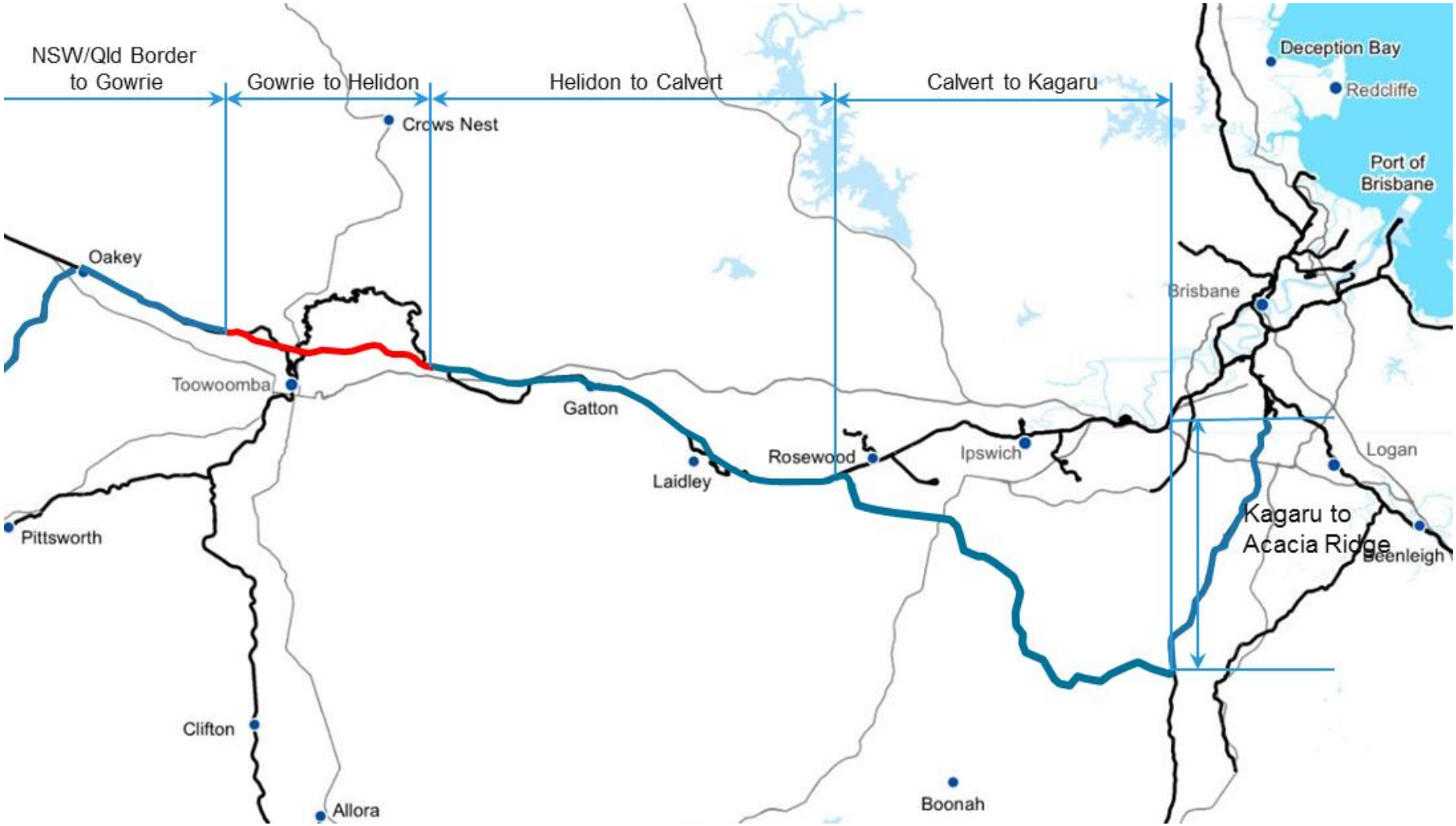

Figure 1-2 Queensland Projects of Inland Rail Programme

2. THE PROPONENT

ARTC is an Australian Government owned corporation and current operator of the Australian freight network. ARTC has been tasked with delivery of the Inland Rail Programme. ARTC was established in 1998 after the privatisation of the national rail network and Commonwealth and State Government agreement to form a 'one-stop' shop for all operators wanting access to the standardised interstate rail network.

ARTC currently manage and maintain approximately 8500 km of rail network across Victoria, New South Wales, South Australia, Western Australia and Queensland. Over the past five years alone ARTC have delivered an almost $3bn capital programme works to modernise the east coast freight rail lines and other projects to enhance the national rail network offering to customers. The Inland Rail Programme is an integral component of the future enhancement of the national rail network.

ARTC is fully capable of completing an EIS, having established an Inland Rail Programme team with in-house support from specialist consultant technical advisors from the SMEC Arup joint venture, and several specialist consultants. Packages of technical (engineering and environmental) work are also being procured from industry consultants. ARTC plan to engage with suitably qualified consultants with demonstrated experience in delivering the required social, economic and environmental impact assessment, and the associated engineering solutions for a project of this nature and scale. Procurement of specialist consultancy firms for the delivery of the EISs will occur following the finalisation of the Terms of Reference for the EIS.

ARTC have not incurred any environmental prosecutions within the last 5 years. During the execution of almost $3Bn of capital works, ARTC have incurred two penalties in New South Wales relating to minor environmental incidents including:

- NSW EPA Penalty Notice to ARTC dated 29 May 2012 for discharge of sediment-laden water at Allandale (Maitland to Minimbah Third Track Project) = $1500
- NSW EPA Penalty Notice to Transport Express JV (operating under ARTC EPL) dated 5 March 2012 for sediment and erosion control issues at Sawtell = $1500

ARTC has also previously entered into a Voluntary Enforceable Undertaking with the Commonwealth DoEE under the EPBC Act in 2011.Contact details for the Inland Rail Programme are as follows:

Inland Rail
Australian Rail Track Corporation
L12, 40 Creek Street
PO Box 2462 Queen Street
Brisbane Qld 4000
Telephone: 1800 732 761

3. NATURE OF THE PROPOSAL

3.1. Scope of the Gowrie to Helidon Project

The Gowrie to Helidon Project is proposed as an approximately 26 km long single track dual gauge railway with crossing loops to accommodate double stack freight trains up to 1800m long. It will also involve the construction of an approximately 6.3km long tunnel through the Toowoomba Range to facilitate the required gradient across the undulating topography. The corridor will be of sufficient width to accommodate future possible upgrades of the track, including a future possible requirement to accommodate trains up to 3,600m in length.

The land requirement for the Inland Rail will comprise a corridor with an average width of 65m, with some variation to accommodate particular infrastructure and to cater for local topography. The corridor will be of sufficient width to accommodate the infrastructure currently proposed for construction, as well as future expansion, including possible future requirement for 3,600m trains, and future proofing for a possible public passenger transport service.

Initial project construction will be a single track dual-gauge railway, with crossing loops to accommodate double stacked freight trains up to 1,800m long. Components of the construction will include infrastructure to accommodate possible future augmentation and upgrades of the track, including a possible future requirement for 3,600m trains. Clearing of the corridor will occur to allow for construction and to maintain the safe operation of the railway.

The operational phase at year 2040 will be of a single track with crossing loops to accommodate double stacked freight trains up to 1,800m long. Impact assessment will be undertaken for the proposed development described in the Inland Rail Business Case (2015) for rail traffic and associated activities projected at the year 2040.

The Project will generally be within the Gowrie to Grandchester future public passenger transport corridor. The Project will include accommodation for two passenger tracks for a future possible public passenger service to be operated by the Queensland Department of Transport and Main Roads (TMR). Requirements for rail transport infrastructure for a future possible public passenger service are excluded from this Project, and would be progressed by TMR.

A Preferred Alignment and a Study Area have been identified as shown in **Figure 3.1**. The Study Area will allow for route optimisation and other value engineering opportunities to be investigated during subsequent design development, community engagement, environmental assessment and approvals processes. Further details are included in **Section 3.4.**

3.2. Land Use

The Preferred Alignment is generally consistent with the alignment of the Gowrie to Grandchester public passenger transport corridor protected under the *Transport Planning and Coordination Act 1994* (TPC Act) with a deviation at Helidon. As discussed in **Section 3.1** above, a wider Study Area has been defined to enable design refinements. The Preferred Alignment is located within the local government areas of Toowoomba Regional Council (TRC) and Lockyer Valley Regional Council.

The Preferred Alignment departs from the existing rail line at Gowrie, traversing rural and grazing lands, on the south of the existing railway line. It lies parallel to Gowrie Creek for approximately 1.5 km, traversing rural land, before passing into a proposed tunnel portal. It then continues for 6.3 km in tunnel under the Toowoomba plateau, passing under the localities of Cranley, Mount Kynoch, Ballard and Harlaxton and emerging on the eastern side of the range in the vicinity of Mt Lofty. The eastern tunnel portal is in a rural area predominantly consisting of uncleared vegetation.

The Preferred Alignment then crosses through the northern edge of an area of Commonwealth land, previously used by the Department of Defence. Continuing east, the Gowrie to Helidon Project passes on the north side of Withcott,

and continues through areas of native vegetation and grazing properties, with proposed crossings over the valleys of Rocky Creek, Six Mile Creek and the Toowoomba Second Range Crossing (TSRC) motorway. It then continues from Postmans Ridge to Helidon, crossing the Upper Lockyer Creek and Oakey and Gatton Creeks before tying into the existing rail corridor west of Helidon. **Section 5.5.1** provides further detail of current land uses.

The intended land use for the Gowrie to Helidon Project is rail and associated infrastructure, including road realignments, grade separations and ancillary infrastructure. An area along the Preferred Alignment adjacent to the existing railway near Hermitage Road, Cranley, has been identified as a potential location for tunnel ventilation infrastructure if required.

ARTC InlandRail

3200 Gowrie to Helidon

Project Context

Figure 3.1

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- G2H Extents
- West Moreton Rail Line
- Highway
- Secondary road
- TSRC
- Adjacent IR Project
- Study Area
- Gowrie to Grandchester Protected Corridor

Western Portal

Eastern Portal

NEW ENGLAND HIGHWAY

CARRINGTON ROAD

TOR STREET

Toowoomba Range Tunnel

GOWRIE

MOUNT KYNOCH

TOOWOOMBA

Woolmer

Cawdor

Highfields

Spring Bluff

Charlton

Torrington

Cotsgold Hills

Wilsonton

Harlaxton

Wellcamp

Glenvale

Newtown

Mount Lofty

Gowrie Junction

Toowoomba Airport

Black Gully Reserve

Captain Cook Reserve

Historic Newtown Park

John Trousdell Park

Jubilee Park

Horn Park

Queens Park

Laurel Bank Park

Redwood Park

QLD

2 Km

Coordinate System:
GDA 1994 MGA Zone 56

Paper: A3
Date: 25/01/2017
Author: IR

Scale: 1:55,000

Data Sources: Rail network: DNRM; Highway, Protected corridor: DTMR; All other data: ARTC IR.

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ARTC InlandRail

3200 Gowrie to Helidon

Project Context

Figure 3.1

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- G2H Extents
- West Moreton Rail Line
- Highway
- Secondary road
- TSRC
- Adjacent IR Project
- Study Area
- Gowrie to Grandchester Protected Corridor

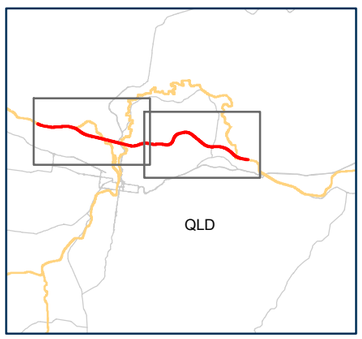
MURPHYS CREEK ROAD

POSTMANS RIDGE ROAD

WARREGO HIGHWAY

Eastern Portal

HELIDON



2 Km

Coordinate System:
GDA 1994 MGA Zone 56

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Date: 25/01/2017
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Data Sources: Rail network: DNRM; Highway, Protected corridor: DTMR; All other data: ARTC IR.

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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3.3. Project Need, Justification and Alternatives Considered

3.3.1. The Inland Rail Programme Business Case

The Inland Rail Programme has been under development for many years. This has included economic analysis, route studies and preliminary engineering analysis. The original North- South Rail corridor study was undertaken in 2006, followed by the Inland Rail Alignment Study (IRAS) released in 2010. A concept business case was prepared in 2014, followed by the preparation of the Programme Business Case in 2015. The Inland Rail Programme is also recognised in the National Land Freight Strategy (Standing Council on Transport and Infrastructure 2012).

The Business Case examines the complex issue of freight movement and forecast freight demand along the east coast of mainland Australia. ARTC estimates that without Inland Rail, more than 32 million tonnes of freight will be moved on highways between Melbourne and Brisbane by 2030.

Australia is heavily reliant on efficient supply chains to provide competitive domestic freight links and gateways for international trade. Freight transport services between major population centres, particularly our capital cities, deliver millions of tonnes of freight each year and provide for the distribution of goods throughout the country. Efficient and effective domestic supply chains that are internationally competitive against import chains, support economic growth and help keep down the cost of the products we buy. It is estimated the transport and logistics sectors of the Australian economy contribute 14.5% of Gross Domestic Product (GDP), with Australia's supply chain worth an estimated $150 billion per annum. Efficient transport of Australian exports to world markets maximises the economic returns to the Australian economy. Productive ports, freight networks and other critical infrastructure is the key to efficient supply chains and to Australia's competitiveness. Better infrastructure has a critical role in lifting our nation's wealth and prosperity and the effective operation of national freight is integral to the wellbeing of all Australians. Inefficient infrastructure networks are one of the key reasons why Australia's productivity has declined and a key driver of the cost of living pressures affecting Australians. Australia's east coast comprises 70% of the country's population, 78% of Australia's national employment and generates 75% of the nation's GDP. With the population estimated to grow by 60% over the next 40 years increasing pressure will be placed on freight infrastructure and services.

The Business Case identifies that:

- Relying on road for freight transport will result in increasing safety, environmental and community impacts
- The existing rail line between Melbourne and Brisbane is constrained by passing through Sydney and can't accommodate double stacking
- Our regional suppliers have limited transport options.

The Business Case shows that Inland Rail:

- Is compatible and interoperable with high productivity train operations in the east-west corridor, to Adelaide and Perth
- Uses and enhances existing rail infrastructure where possible, making the most of recent investments
- Bypasses the congested Sydney rail network
- Improves connections with regional and local rail and road networks
- Maximises value for money, while meeting market needs
- Delivers the service that rail customers want, at a price they are willing to pay

- Provides significant social and environmental benefits
- Will cover its ongoing operating and maintenance costs, once operational
- Is good for the country's economy – increasing Australia's GDP by an estimated $16 billion by 2050 Meets Australia's strategic, long-term needs'.

The Australian Government approved funding for the Inland Rail Programme in the 2016 Federal Budget to progress the design and engineering development, and commence primary planning and environmental approvals and property acquisition for all 13 Inland Rail Projects.

3.3.2. Queensland Planning Context

ARTC is seeking that the project be declared a 'coordinated project for which an EIS is required' under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971*.

In deciding whether to declare a project to be a coordinated project, the Coordinator General considers:

- Detailed information about the project given by the proponent in an IAS
- Relevant planning schemes or policy frameworks of a local government, the State or the Commonwealth
- Relevant State policies and Government priorities
- A pre-feasibility assessment of the project, including how it satisfies an identified need or demand
- The capacity of the proponent to undertake and complete the EIS for the project
- Any other matter the Coordinator-General considers relevant.

3.3.2.1. Relevant Planning Schemes and Policy Frameworks

The *Sustainable Planning Act 2009* is the overarching framework for Queensland's planning and development system. It is supported by the Sustainable Planning Regulation 2009, state planning regulatory provisions, the State Planning Policy, regional plans, Queensland Planning Provisions and local planning schemes.

The Preferred Alignment traverses land within two local government areas (LGAs) including:

1. Toowoomba Regional Council
2. Lockyer Valley Regional Council

As such, the following planning schemes would apply to the Project:

- Toowoomba Regional Planning Scheme 2012
- Gatton Shire Planning Scheme 2007
- Laidley Shire Planning Scheme 2003

The Laidley Shire Planning Scheme identifies a proposed rail corridor consistent with the Preferred Alignment on their Development Constraints Overlay Map I1 and protects it from incompatible development. The existing Gatton Shire Planning Scheme 2007 also has provisions for development around existing and proposed transport corridors. The Gatton Shire Planning Scheme 2007 and Laidley Shire Planning Scheme 2003 will be replaced once a single planning scheme for the Lockyer Valley is prepared and adopted. The Toowoomba Regional Council *Transport Strategy Proposals to 2031* (Brian Lister Planning and TransPosition 2010) recognise the opportunities associated with the Inland Rail proposal.

The Preferred Alignment also forms part of the rail corridor identified under the Gowrie to Grandchester Rail Corridor Study in 2003. This rail corridor was subsequently identified as a 'future public passenger transport corridor' in September 2005 in the Public Passenger Transport Guideline made under the *Transport Planning and Coordination Act 1994*.

The Gowrie to Helidon Project will co-locate with the existing Gowrie to Grandchester future public passenger transport corridor.

3.3.2.2. Relevant State Policies and Government Priorities

The State Planning Policy (SPP) and the South East Queensland Regional Plan (currently under review) are State planning instruments under the *Sustainable Planning Act 2009*. The SPP acknowledges that key transport corridors (both passenger and freight) need to be identified and protected and linked to strategic airports and the broader transport network.

'Opportunities to integrate with Inland Rail proposals' is identified as one of the freight objectives under the South East Queensland Regional Plan (currently under review). This is further supported by the South East Queensland Rail Horizon document released in 2016, which outlines rail investment priorities for South East Queensland.

The Queensland Government's Moving Freight strategy (DTMR 2013) recognises the need for Inland Rail, and identifies the Gowrie to Grandchester corridor as part of the key linkage between the West Moreton Rail System in South-western Queensland and the Port of Brisbane.

3.3.3. Local Context

The TRC *Transport Strategy Proposals to 2031* (Brian Lister Planning and TransPosition 2010) recognise the opportunities associated with the Inland Rail proposal. Consultation with local government representatives has commenced, and will be ongoing throughout the Gowrie to Helidon Project.

3.3.4. Alternatives Considered – Programme Wide

Various alternate scenarios to the overall Inland Rail Programme have been considered and are discussed in the Business Case including:

- Do nothing: freight remains on the existing road network, regional development opportunities are not realised, and potential opportunities to reduce significant greenhouse gas emissions unlikely to be realised
- Reforms to delay or remove the need for infrastructure investment (demand management, productivity enhancement or deregulation)
- Progressive upgrades of the National Highway
- Upgrades of the existing coastal railway
- Alternate freight transport solutions including air freight (cost prohibitive) and coastal shipping (constrained by port access).

The Business Case concludes that the preferred way to achieve the programme objectives is to proceed with implementation.

3.3.5. Alternatives Considered: Gowrie to Helidon Project

Alternate alignments have been investigated within the Study Area. The Preferred Alignment is the result of several iterations of option assessment, and consultation with the Queensland Government. This includes the following:

- 2003 Gowrie to Grandchester Study, undertaken by Queensland Transport (QT). The 2003 QT study was undertaken to define and protect a future railway corridor suitable for 200 km/h passenger services, and freight between Gowrie and Grandchester. The 2003 QT alignment that this study identified was subsequently reserved as future public passenger transport corridor in government planning schemes.
- The 2006 North South Rail Corridor Study, commissioned by the Australian Government Department of Transport and Regional Services. This study assessed the high level viability of four north south freight corridors between Melbourne and Brisbane. The study was not designed to identify a preferred option but identified the most affordable and economic corridor within which to focus future investigation.
- 2010 IRAS undertaken by ARTC. This study set the blueprint for the development of an inland railway to meet the future freight demands of eastern Australia. This route included consideration of the Gowrie to Grandchester section of Inland Rail (including the Toowoomba Range and Little Liverpool Range crossings) which ARTC had previously identified as likely to be the critical path component for the completion of Inland Rail. An alternate alignment between Gowrie and Grandchester was selected at the conclusion of this study.
- In 2014 the decision was made to move from the 2010 IRAS alignment to an alignment between Gowrie and Calvert that comprised the previously protected corridor known as the 2003 QT - Gowrie to Grandchester route. This was based on input and further options analysis undertaken by DTMR, building upon the existing corridor location and inclusion in planning schemes.
- 2015 Melbourne to Brisbane Inland Rail Business Case confirms the 2014 alignment decision and the 2016 ARTC Concept Assessment process proceeds in consultation with the Queensland Government on this basis.

The Preferred Alignment and wider Study Area described in **Section 3.1** is the result of further options analysis undertaken by ARTC's consultants in 2016 in consultation with the Queensland Government. The concept assessment included a review of previous options analyses, further preliminary engineering design and environmental assessment and was informed by initial engagement with key stakeholders including the Toowoomba City Council, Lockyer Valley Regional Council, peak industry bodies and Aboriginal parties.

3.4. Components, Developments, Activities and Infrastructure that Constitute the Gowrie to Helidon Project to be Declared Coordinated

Key components of the Gowrie to Helidon Project that include:

- Single track dual gauge rail line with passing loops to ultimately accommodate trains up 3600 m long based on business needs, but initially constructed for 1800 m long train sets
- The approximately 6.3km Toowoomba Range tunnel, earthworks (cut and fill), bridges and viaducts to accommodate topography and project crossings of waterways and other infrastructure
- Tie-ins to the existing West Moreton Railway Line at the project boundary and other potential intermediate locations to be confirmed by operational modelling
- The construction of associated rail infrastructure including maintenance sidings and signalling infrastructure to support the Advanced Train Management Systems (ATMS)
- Ancillary works including road and public utility crossings and realignments
- External infrastructure requirements to be determined during future project stages (refer **Section 3.5**)
- Construction workspace and access roads.

At the request of TMR, the Gowrie to Helidon Project is being developed taking into account the potential for future rail transport infrastructure for passenger services to be delivered by TMR. The resulting total corridor width will be wide enough to accommodate two dual gauge freight tracks and two narrow gauge passenger tracks. At a point in time defined by demand, business needs, operational modelling and design, the next stage of the project may include construction works for additional infrastructure within the corridor including additional track, duplication or extension of passing loops to accommodate longer trains and passenger infrastructure.

Construction activities for the project will likely include temporary roads, upgrades and/or alterations to existing roads. The construction of the Gowrie to Helidon Project may also require relocation of some services, depending on their proximity to the construction zone. These aspects will be further examined in future design stages.

The Gowrie to Helidon Project description will be further refined in future design development and environmental assessment during the EIS process.

3.5. Third Party Infrastructure Requirements

Third party infrastructure requirements will be determined during future design development. Power and water supply will be required during construction of the Gowrie to Helidon Project.

During the operational phase of the Gowrie to Helidon Project tunnel operations may require power and water supplies for ventilation, fire and life safety. Electricity supply will also be needed for points and other infrastructure. It is anticipated that the supply of these services will be delivered by relevant providers under the terms of their respective approvals and/or assessment exemptions.

Key elements not included as part of the Gowrie to Helidon Project include the following:

- Complementary infrastructure, such as metropolitan and regional freight terminals
- Upgraded fleet / rolling stock
- Complementary land use and freight precinct developments.

3.6. Timeframes for the Gowrie to Helidon Project

The Inland Rail Programme will be delivered over approximately 10 years, and consist of multiple projects. It is anticipated that while planning for these projects will be undertaken concurrently, each project may be delivered as staged or independent infrastructure developments as funding availability and delivery approaches necessitate. The extents of each project have been defined to facilitate this, with each project commencing and ending at tie-in points on an existing railway alignment.

The Gowrie to Helidon section has been identified as one of the priority development projects within the Inland Rail Programme, taking into consideration the complexity, procurement models and funding requirements of the project's key infrastructure tunnels, bridges, viaducts and earthworks elements.

The indicative programme for the Gowrie to Helidon Project timeframe is as follows:

- 2017-2019: design, planning and approvals
- 2019-end of 2020: pre-construction and land acquisition
- Construction would commence once land acquisition, funding and procurement processes are completed.
- 2024 Project Opening.

The Gowrie to Helidon project has been identified as one of the priority development projects within the Inland Rail Programme, taking into consideration the complexity, procurement models and funding requirements of the project's key infrastructure tunnel, bridges, viaducts and earthworks elements.

The Gowrie to Helidon Project is being developed to facilitate the future provision of a duplicated track, longer freight trains and to not preclude the possibility of future passenger services being delivered by TMR. Therefore, at a point in time yet undefined, the next stage of the project may include construction works for additional infrastructure within the identified Preferred Alignment including additional track, extension of crossing loops and passenger infrastructure, however that infrastructure shall be contained within the planning footprint of the Gowrie to Helidon Project being assessed in the proposed EIS.

3.7. Construction and Operational Processes

At present, only preliminary information is available about the way in which the Gowrie to Helidon Project will be constructed and operated, with future stages of design and assessment to provide further clarification of these aspects.

Pre-construction activities are anticipated to include geotechnical investigations, survey, ecological investigations and cultural heritage surveys. This will include vegetation clearing and establishment of access tracks.

Construction process will involve the following:

- Site preparation, earthworks and vegetation clearing for construction accesses and laydown areas
- Early works, including relocation of impacted utilities and roads
- Resourcing all construction and construction-related materials, including won material, manufactured materials and construction water
- Earthworks, including construction of embankments and fill
- Tunnelling, currently anticipated to utilise a tunnel boring machine
- Construction of bridges and viaducts at major waterways, and major infrastructure crossings (e.g. Warrego Highway)
- Construction of drainage and stormwater treatment infrastructure
- Construction of track, ATMS and signalling
- Constructions and implementation of environmental management measures (e.g. fauna crossings, noise treatments)
- Landscaping and rehabilitation treatments to areas disturbed during construction.

Operational processes will include the use of the railway for freight purposes, potential future use for passenger services, operation and maintenance of tunnel ventilation and safety systems, signalling, and general track and infrastructure maintenance.

3.8. Workforce Requirements during Construction and Operation

The Inland Rail Programme Business Case identifies an anticipated additional 16 000 jobs at the peak of construction (estimated in 2019 to 2020), an average of 800 jobs per annum over the construction period and an average of 700 additional jobs per annum over 50 years of operation (2024 to 2074). It is estimated that approximately 60% of the

capital expenditure (CAPEX) for Inland Rail will be expended on projects in Queensland, and therefore an equivalent proportion of jobs. The 10 year delivery schedule would support economic activity in the regions and create regional jobs in Queensland, New South Wales and Victoria during both construction and operations.

The Gowrie to Helidon Project has been identified as a priority development project within the Inland Rail Programme. The Gowrie to Helidon Project area and terrain challenges are relatively comparative to the Toowoomba Second Range Crossing (TSRC) motorway which is currently under construction and reported to require a workforce of 1800 full-time jobs during its three year design and construction phase between 2016 and 2018. The construction workforce requirements for the Gowrie to Helidon Project are anticipated to be of a similar quantum. The TSRC motorway has had a local focus for the recruitment of workforce, sourcing suppliers and sub-contractors from the greater Toowoomba Region, and it is anticipated that the Gowrie to Helidon Project would adopt a similar approach. Depending on the timing, the construction of the Gowrie to Helidon Project has the potential to generate employment continuity, employing construction personnel as demobilisation of the TSRC motorway occurs post 2018. In addition the Gowrie to Helidon Project's proximity to Brisbane provides the opportunity for sourcing the construction workforce from the Brisbane Region if required. Further, the expansion in the construction sector would support additional flow on demand through the construction industry supply chain and additional spending on consumer orientated products by the construction workforce in the local area. It is postulated that indirect employment opportunities will also arise as a result of the construction and operation of the Gowrie to Helidon Project. The associated supply of construction materials, the development of associated external infrastructure and complementary services as described in **Section 3.5** will require additional workforce beyond those directly associated with the Inland Rail programme.

3.9. Economic Indicators

3.9.1. Capital Cost

The Inland Rail programme will be a strategic catalyst for economic development. A conventional economic appraisal was undertaken for the Programme Business Case in line with relevant Government guidelines focusing on the direct economic benefits from increased transport efficiency and the standard indirect benefits which flow from moving freight from roads onto rail.

Major infrastructure projects like Inland Rail inevitably involve significant construction costs. Delivering Inland Rail is expected to cost approximately $10 billion. The Gowrie to Helidon Project is expected to cost approximately $1.35 billion due to the significant infrastructure elements of the tunnel, viaduct and bridges and significant earthworks required for the Toowoomba Range Crossing.

3.9.2. Economic Analysis

An important aspect to assist governments in deciding whether or not to invest in such projects are the benefits to the community as a whole from the investment, and whether the net benefits of the project over the life of the infrastructure are likely to exceed its net cost. The economic analysis contained within the Inland Rail business case compares a scenario where there is an Inland Railway, to one where road and rail freight would use the existing roads and coastal railway, over a fifty-year period (2025 to 75).

Comparing these two scenarios, the economic analysis indicates that Inland Rail would deliver almost $22.5 billion worth of direct and indirect benefits to the nation, based on 2015 dollars, of which approximately $6.4 billion direct operating cost savings would be accrued by freight users and assumed to flow on directly to consumers. The resulting net economic benefit of Inland Rail is expected to be approximately $13.9 billion—a benefit-cost ratio (BCR) of 2.62

based on a discount rate of 4%. That is, the benefits of Inland Rail are approximately 2.6 times the cost (when measured at the 4% discount rate).

3.9.3. Local and Regional Benefits

The business case indicates that Inland Rail will generate significant economic activity, including jobs and an increase in GDP.

Regional communities along and adjacent to the Inland Rail would benefit through more efficient and effective rail access to metropolitan and international markets. While the purpose of Inland Rail is primarily for interstate intermodal freight such as moving shipping containers, whitegoods, steel and other commodities, Inland Rail will also support minerals, regional freight and agriculture. Inland Rail will enable farmers to move agricultural commodities more efficiently to capital cities and ports for export.

3.9.4. Wider Economic Benefits

An assessment of the Wider Economic Benefits (WEBs) of Inland Rail is provided in the Addendum to the ARTC 2015 Inland Rail Programme Business Case (2015). Since the release of the 2015 Programme Business Case, stakeholder feedback has supported the role of Inland Rail in transforming the economic geography of inter-capital freight and creating additional benefits across the broader economy. This addendum therefore seeks to provide an assessment of these broader benefits in two parts:

- *A more expansive calculation of induced freight benefits that considers the benefits that may arise across the supply chain (e.g. to rail operators and retailers in the relevant markets) from the additional freight demand induced by lower supply chain costs of Inland Rail; and*
- *WEBs that arise because businesses benefit from agglomeration economies (improved accessibility to customers, suppliers and labour markets).*

It is considered that improved accessibility to customers, suppliers and labour markets (i.e. effective density or agglomeration) from the operating cost savings delivered by Inland Rail, will result in agglomeration economies. The Inland Rail operating cost savings have been estimated to effectively increase the catchment of customers, suppliers and products that may be accessed in the absence of Inland Rail resulting in an increase in productivity.

The economic appraisal results for each business case scenario including the three alternative calculations of producer surplus described previously are presented in **Table 3-1** below. These results are not cumulative.

Table 3-1 Economic appraisal results with expanded benefits*

PROGRAMME BUSINESS CASE RESULTS ($ M)	7% DISCOUNT RATE	4% DISCOUNT RATE
Programme Business Case results (August 2015)	1.02	2.62
Programme Business Case results with Wider Economic Benefits	1.06	2.74
Producer surplus of rail operators	1.08	2.81
Producer surplus of rail operators and from sale of final good	1.17	3.07
Producer surplus of businesses along all supply chain	1.52	4.15

Source: Addendum to the ARTC 2015 Inland Rail Programme Business Case (March 2016).
***incremental to the base case, discounted, real 2014-15 dollars**
Notes: Analysed over 50 year appraisal period to 2073–74 and discounted applying real discount rates; based on P50 cost certainty; excludes Port of Brisbane Extension; assumes complementary investment on the QR network (West Moreton Railway Line and Brisbane metropolitan network) Source: PwC 2016

3.9.5. Synergies with Business and Industry

The construction and operation of inland rail will present opportunities for local and regional freight hub development. In particular, the Gowrie to Helidon section is expected to provide benefits to existing and future users of the south-West Moreton Railway Line by providing improved efficiencies on the Gowrie to Helidon Project compared to the existing railway. The construction of the Gowrie to Helidon Project will also provide the potential for future provision of passenger services, which in turn could support further regional economic development and growth.

3.10. Financing Requirements and Implications

The Australian Government approved funding for the Inland Rail Programme in the 2016 Federal Budget to progress the design and engineering development, and commence primary planning and environmental approvals and property acquisition. The timing of the construction phase of the Gowrie to Helidon Project is dependent on funding from the Australian Government.

4. LOCATION OF KEY PROJECT ELEMENTS

4.1. Location

The Preferred Alignment for the Gowrie to Helidon Project commences at a tie in point with the existing West Moreton Railway Line at Gowrie. The preferred alignment deviates south from the existing rail corridor and enters the 6.3km Toowoomba Tunnel portal at Cranley. The Gowrie to Helidon Project continues in tunnel from Cranley to Mt Lofty, passing under the localities of Mount Kynoch and Harlaxton exiting on the eastern escarpment of the Range. The Gowrie to Helidon project then passes on the north side of Withcott, Postmans Ridge and Helidon Spa before connecting back into the existing railway at Helidon.

4.2. Tenure

The Preferred Alignment intersects or passes under approximately 76 lots, the majority which are held in freehold title. Other tenure arrangements within the corridor include Lands Lease (e.g. railway land) and Reserve. Other tenures within the broader Study Area include State Land and Covenant. Land required for the Gowrie to Helidon Project would be acquired in accordance with the provisions of the TIA and the *Acquisition of Land Act 1967*.

The Preferred Alignment is generally along the alignment of the protected corridor for future public passenger transport under the TPC Act, however there are areas of the Preferred Alignment that fall outside the protected corridor (including the alternative alignment west of Helidon).

Of the properties within the Preferred Alignment, a number are owned by local, State or Commonwealth government. This includes properties such as the Mt Lofty Rifle Range at the location of the Toowoomba eastern tunnel portal (Department of Defence land), land parcels owned by DTMR that were acquired within the protected corridor or for the TSRC Project, other state land (e.g. reserve for recreation and drainage) and properties owned by local government (such as the Toowoomba Waste Transfer station above the Toowoomba Tunnel location).

5. DESCRIPTION OF EXISTING ENVIRONMENT

5.1. Natural Environment

5.1.1. Land

Topography

Starting at Gowrie (600 m AHD) , the project departs from the existing rail line and lies directly adjacent to the south of the existing railway line, parallel to Gowrie Creek for approximately 1.5 km and into the proposed western tunnel portal for the 6.3 km tunnel section passing east under the Toowoomba plateau. The proposed tunnel passes immediately north of Toowoomba under the New England Highway, exiting on the eastern side of the Toowoomba Range. To the east of the ridge, the land falls steeply down the escarpment toward Withcott and Postman's Ridge and includes significant crossings over the valleys of Rocky Creek and Six Mile Creek and the TSRC motorway. The topography in this location requires the construction of a series of large cuts and fills, and some long and high viaducts.

From Withcott to Helidon the terrain of the Lockyer Valley is gently undulating, crossing Upper Lockyer Creek tributaries and Oakey and Gatton Creeks with typical elevations in the range of 130 m to 200 m AHD. This route utilises the natural terrain on the northern side of the ridge near Howmans Road before moving east towards Murphys Creek road. The corridor passes through generally undeveloped land before skirting to the rear of the Withcott seedlings farm, crossing Cattos Road, before re-joining the existing railway adjacent to Airforce Road to the west of Helidon. The route is characterised by a steep 1:60 gradient from the Western portal of the Toowoomba Tunnel to Airforce Road.

Geology

Located within the Southeast Queensland region, the vicinity of the Gowrie to Helidon alignment can be divided into three broad geological divisions:

- Tertiary Main Range Volcanics
- Jurassic Marburg Formation (Koukandowie Formation and Gatton Sandstone)
- Quaternary Alluvium and Colluvium.

The geology of the Study Area is shown in **Figure 5-1**. The Tertiary Main Range Volcanics, the predominant geological formation from Gowrie to Mount Kynoch, is comprised of Olivine Basalts. These basalts are typically described as layered flows, dark grey, fine grained rock of high to extremely high strength and often highly fractured. Within the lower part of the Volcanics trachytic to rhyolitic breccias and thin beds of lacustrine sediments also occur. A 10 to 30 m thick lateritic cap has formed over the Main Range as a result of weathering and a general weathered profile, up to 15 m thick, exists on the slopes off the range. Nearby site investigations have classified the basalt as vesicular/amygdaloidal which, if present along the proposed tunnel alignment, has the potential to affect the reusability of excavated material.

Between Mount Kynoch and Six Mile Creek Road, the geology encountered is the Jurassic Koukandowie Formation and Gatton Sandstone. The Gatton Sandstone is a pale orange/brown to grey, fine to medium grained interlaminated sandstone/sandy siltstone with a low to medium strength. The Koukandowie Formation, typically comprised of coal measure rock types, is a grey brown to grey, fine to medium grained rock of very low to low strength with sub-horizontal bedding. The Marburg Formation in the area has a weathered profile, up to 5 m thick, topped by a solodic profile.

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3200 Gowrie to Helidon

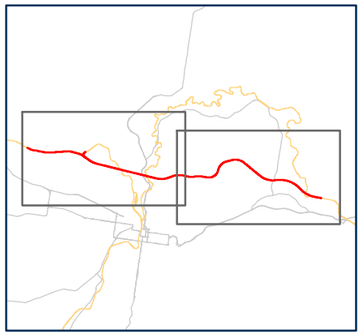
Geology and Terrain

Figure 5.1

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail project alignments
- Gowrie to Grandchester Protected Corridor
- Study Area
- West Moreton Rail Line
- TSRC
- Highway
- Contours (50m interval)
- Contours (10m interval)

Rock Unit (DNRM regional geology):

- Helidon Sandstone
- Alluvium (MG-Qa)
- MG-Tv
- Main Range Volcanics
- Marburg Subgroup
- Walloon Subgroup
- Water body (unspecified)



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GOWRIE

Main Range Volcanics

Marburg Subgroup

Marburg Subgroup

Data Sources: Regional geology: DNRM; Protected corridor: DTMR; All other data: ARTC IR

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3200 Gowrie to Helidon

Geology and Terrain

Figure 5.1

Main Range Volcanics

Marburg Subgroup

Helidon Sandstone

MG-P

MG-Qa

HELIDON

Lockyer

Withcott

Mt Sylvia

Preferred alignment (surface)

Preferred alignment (tunnel)

Adjacent Inland Rail project alignments

Gowrie to Grandchester Protected Corridor

Study Area

West Moreton Rail Line

TSRC

Highway

Contours (50m interval)

Contours (10m interval)

Rock Unit (DNRM regional geology):

- Helidon Sandstone
- Alluvium (MG-Qa)
- MG-Tv
- Main Range Volcanics
- Marburg Subgroup
- Walloon Subgroup
- Water body (unspecified)

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Data Sources: Regional geology: DNRM; Protected corridor: DTMR; All other data: ARTC IR

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From Six Mile Creek Road to Helidon, Quaternary Alluvium underlies the Preferred Alignment. This geological unit has a well-developed pedological profile comprised of black earths and is typically 20m thick through the valley. The alluvium, including clays, silts, sands and gravels, overlies sandstone and is limited to low lying flood plain areas. Colluvium is also present on some steep slopes overlaying the Main Range Volcanics near Murphy's Creek. This material includes some landslides and ballast boulder scree. The Toowoomba tunnel may be excavated using either a tunnel-boring machine or mined tunnel (road header/drill and blast) techniques. The tunnel is likely to encounter Basalt in the western portal and in the western section of the tunnel, transitioning into the Jurassic sedimentary rocks as the tunnel progresses east.

Soils

Overlying the Main Range Volcanics and Marburg Formation are solodic soils generally comprising the following pedological sequence:

- Thin organic topsoil: dark shallow porous loamy soils and friable and cracking dark clays
- Sandy-silty layer: red friable earths
- Medium to high plasticity clay: deeper dark cracking clays.

These solodic soils, characterised by their sodic/saline nature, are dispersive and highly susceptible to water, transitioning from a hard material when dry to non-trafficable when wet due to their plasticity. The cracking clays also experience significant shrinkage and swelling with variations in moisture content.

The Quaternary Alluvium is typically overlain by black earth comprised of black and dark grey clays of high plasticity. These reactive soils undergo shrinkage and swelling with the addition or removal of moisture, allows the mixing of organic content from the surface during the shrink/swell process.

Alluvium in the Study Area is associated with watercourses and floodplains of Rocky, Lockyer and Gatton Creeks and is closely aligned with the mapping of important agricultural areas, by Department of Agricultural and Fisheries.

According to the Australian Soil Resource Information System (2011) Acid Sulphate Soils mapping, there is no known occurrence of acid sulfate soils along the route from Gowrie to west of Helidon. Around Helidon there is a low probability of encountering acid sulfate soils.

Contaminated Land and Unexploded Ordnance

A desktop review of land uses and known contaminated areas has been conducted for the Study Area to identify potential sources of contamination.

The majority of the Preferred Alignment between Gowrie and Helidon is located in natural vegetation with minimal previous disturbance and hence reduces the likelihood that previous land uses have resulted in contamination. Land uses that present a higher risk of existing contamination include areas used for industry, intensive agriculture and livestock farming, mining, storage of chemicals, gas, wastes disposal (landfills) or liquid fuel storage.

A review of aerial photography, land use mapping (Queensland Land Use Mapping Program, February 2016) and previous reports relevant to the Study Area has identified the following land uses that warrant further review of potential contamination in future project stages:

- Existing rail corridors are treated as be potentially contaminated due to:
    - the unconfirmed nature of historic construction fill materials

  - the widespread historical use of the herbicide sodium arsenate which was sprayed onto the track to control weed growth
  - Potential for hydrocarbon spills, and potential historic use of hydrocarbons to 'grease' the tracks on curves

- Toowoomba waste management centre (landfill) is located adjacent to and within the corridor to the west of Mount Kynoch, where the Preferred Alignment will be in tunnel therefore surface impacts are unlikely. The site is registered on the EMR and contains potential sources of contamination including buried waste, machinery and landfill leachate.
- The railway line east of Mount Kynoch is listed on the EMR based on potential concerns related to arsenic. Previous testing identified arsenic concentrations were lower than nominated investigation levels. This area is also at the proposed Toowoomba tunnel location so surface impacts are unlikely.
- The alignment traverses the irrigation dams / evaporation ponds on the Withcott Seedlings property which is intensive horticulture. The site may include storage and use of chemicals such as pesticides, other chemicals or hydrocarbons. The contamination status of this site is unknown
- Other potential sources of contamination in the Study Area may include previous storage of machinery, pesticides, hydrocarbons or other chemicals, associated with livestock production, farm workshops or rural residential areas. There is a potential for the presence of historic cattle dips, fuel and chemical storage in the Study Area.

Unexploded Ordnance (UXO) may occur in the Study Area. In Queensland, most UXO is found on land formerly used by the defence force, particularly during World War II. A search of Department of Defence mapping (Department of Defence 2016) identified known areas of UXO concern within or adjacent to the Study Area as shown in **Table 5-1.**

Department of Defence property (ex-rifle range) is traversed by the Preferred Alignment immediately east of the eastern Toowoomba Tunnel portal. This site has the potential for UXO or other contamination although is not currently identified in the Department of Defence UXO Mapping.

Table 5-1 Potential UXO sites in the Gowrie to Helidon region

Lot Plan	Site name	Description	Assessment	Location relative to Preferred Alignment
125CP907566	Helidon (Queensland Magazine)	Explosives storage from WWII to present. Now controlled by Queensland State Government.	This site is assessed as having a UXO contamination potential of "Other".	Immediately north of the Preferred Alignment at Air Force Road
4RP186965	Toowoomba	Two inch mortar and grenades	This site is assessed as having a UXO contamination potential of "Other".	Partially intersects the alternative Helidon alignment of the Preferred Alignment
114SP134518	Mt Tabletop	4.2inch mortar and weapons.	This site is assessed as having a UXO	More than 3km south of the Preferred

Lot Plan	Site name	Description	Assessment	Location relative to Preferred Alignment
			contamination potential of "Slight"[1].	Alignment

Visual Amenity

The visual amenity and scenic value of the Study Area is influenced by the topography, drainage and land use. A summary of the key contributing components is provided in the following sections.

Land use

- Open agricultural fields are a dominant feature in views across the landscape, with areas of both pastoral and arable farming. Mature vegetation frequently lines local roads with scattered trees across open pastoral fields
- Local pockets of residential properties and farmsteads scatter the landscape with the larger residential areas including Gowrie Junction, Cranley, Mount Kynoch and Helidon.

Topography and Drainage

- The mountainous, undulating landscape traversed by the Preferred Alignment, ranging from -26 m to 710 m, defines the setting and backdrop in many views with the blanketed hills of the Lockyer National Park and mountainous range contributing to the rural scenic value
- The low lying creeks, including Gowrie Creek, Six Mile Creek, Lockyer Creek and Sandy Creek are lined with mature riparian vegetation and meander across the landscape.

The key landscape character areas in the Study Area are shown in **Figure 5-2**.

[1] Areas categorised as slight will have a confirmed history of military activities that have resulted in residual UXO but which the Department of Defence considers it inappropriate to assess as substantial.

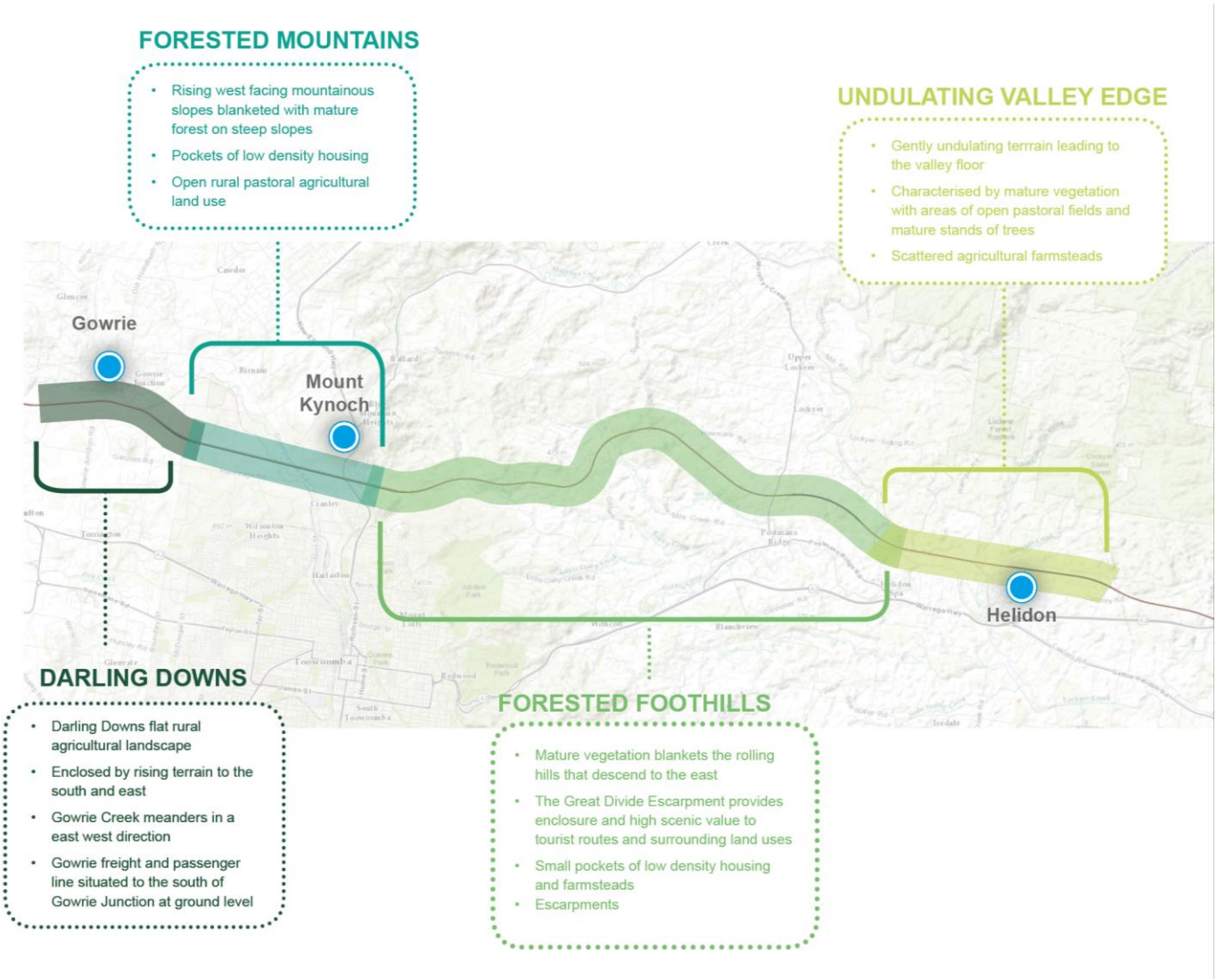

Figure 5-2 Landscape Character Areas

5.1.2. Water

5.1.2.1. Surface Water Quality

The Preferred Alignment and the wider Study Area traverse the catchments of the Condamine River and Lockyer Creek, with the boundary between these two catchments along the crest of the Toowoomba Range. The Condamine River drains west toward the Balonne-Condamine drainage basin and is part of the Drainage Division for the Murray Darling Basin. Lockyer Creek drains northeast toward the Brisbane River and is part of the Drainage Division for the North East Coast. **Figure 5-3** shows the catchments and key watercourses within the Study Area.

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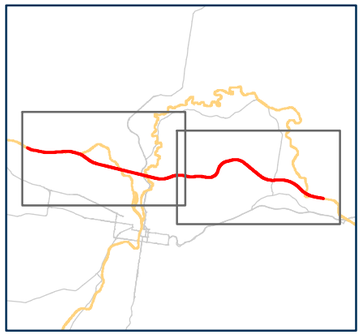
Catchments, Waterways and Flooding

Figure 5.3

- Study Area
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent IR Project
- TSRC Project
- West Moreton Rail Line
- Highway
- Waterways
- Gowrie to Grandchester Protected Corridor
- Drainage sub basins
- Flood extents 2011 - Gowrie Creek
- Lockyer Creek Q100 modelled flood extent (Jacobs, 2014)



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Author: IR

Data Sources: Flood modelling: TRC, LVRC; Brisbane flood extent, Drainage sub-basins: DNRM; Protected corridor: DTMR; All other data: ARTC IR

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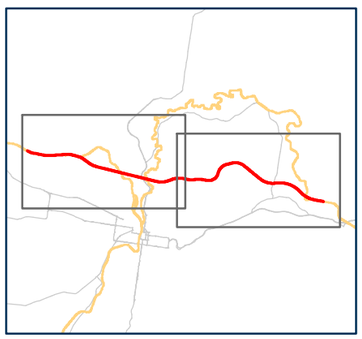
Catchments, Waterways and Flooding

Figure 5.3

- Study Area
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent IR Project
- TSRC Project
- West Moreton Rail Line
- Highway
- Waterways
- Gowrie to Grandchester Protected Corridor
- Drainage sub basins
- Flood extents 2011 - Gowrie Creek
- Lockyer Creek Q100 modelled flood extent (Jacobs, 2014)



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Scale: 1:55,000

Data Sources: Flood modelling: TRC, LVRC; Brisbane flood extent, Drainage sub-basins: DNRM; Protected corridor: DTMR; All other data: ARTC IR

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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The Preferred Alignment crosses a number of creek and tributaries, as listed in **Table 5-2**. The design details of each waterway crossing will be determined during the EIS and future design development phases, taking into consideration regulatory requirements and guidance. **Table 5-2** also identifies each waterway's status for waterway barrier works as mapped under the Fisheries Queensland GIS Layer: Queensland Waterways for Waterway Barrier Works (WWBW). This provides an indication of the level of the importance of maintaining fish passage at crossing locations and guidance on potential approval requirements under the Fisheries Act if passage is impeded. This table also identifies if the waterway is defined as a watercourse under Section 5 of the *Water Act 2000*, which indicates whether further approvals for taking or interfering with water in these watercourses would be required under this Act.

Table 5-2 Waterways traversed by the Preferred Alignment

NAME	WWBW WATERWAY LEVEL (FISHERIES ACT 1994)	DEFINED AS WATERCOURSE (WATER ACT 2000)
Tributary of Gowrie Creek	green (low)	No
Tributary of Gowrie Creek	amber (moderate)	No
Tributary of Gowrie Creek	red (high)	No
Tributary of Gowrie Creek	green (low)	No
Tributary of Gowrie Creek	green (low)	No
Tributary of Gowrie Creek	green (low)	No
Gowrie Creek	red (high)	Yes
Tributary of Gowrie Creek	green (low)	No
Oakey Creek	amber (moderate)	No
Rocky Creek	red (high)	Yes, just downstream of Preferred Alignment
Six Mile Creek	amber (moderate)	Yes
Tributary of Six Mile Creek	amber (moderate)	No
Minor tributary of Lockyer Creek	green (low)	No
Minor tributary of Lockyer Creek	green (low)	No
Minor tributary of Lockyer Creek	green (low)	No

NAME	WWBW WATERWAY LEVEL (FISHERIES ACT 1994)	DEFINED AS WATERCOURSE (WATER ACT 2000)
Minor tributary of Lockyer Creek	green (low)	No
Minor tributary of Lockyer Creek	green (low)	No
Minor tributary of Lockyer Creek	green (low)	No
Tributary of Lockyer Creek	green (low)	No
Lockyer Creek	purple (major)	Yes

The Condamine Catchment Natural Resource Management (NRM) Plan groups a range of indicators into five categories for the water aspect of a report card - water quality, water health risk, flow, fish and macroinvertebrates. The water component of the Condamine Catchment as a whole received a score of B (good, most indicators meet the benchmark/guideline value). For the Central Uplands (where the Preferred Alignment is located), water overall scored a combined D (poor, few indicators meet the benchmark/guideline values). Anecdotally the water quality in Gowrie Creek is known to be poor due to surrounding land uses and releases of effluent from the Wetalla Sewage Treatment Plant (Queensland Government 2003).

The overall environmental condition of the Lockyer catchment was assessed as poor in the SEQ Healthy Waterways Ecosystem Health Monitoring Program. Very low sediment and nutrient loads are being generated but poor riparian vegetation is resulting in very poor stream health. The western catchments are generally in poor condition due to a legacy of long-term riparian vegetation clearing.

5.1.2.2. Flooding

The preferred alignment crosses the Gowrie Creek floodplain before passing through the proposed Toowoomba tunnel and crossing the Oakey, Gatton, Rocky and Six Mile and Lockyer Creeks and also Upper Lockyer Creek tributaries. Apart from Gowrie Creek floodplain where the alignment runs nearly parallel to the waterway, the other crossings are deep valleys, including the crossing of Lockyer Creek tributaries north of Helidon Spa.

Flooding data is available for Gowrie Creek corresponding to the January 2011 flooding events (TRC, 2014a) and indicates that the alignment of the existing West Moreton Railway Line is located within the Gowrie Creek floodplain. Other than the Gowrie Creek floodplain, the waterway crossings in the Study Area are in deep valleys where either tunnels or geometry driven viaducts would be adopted. Flood impact assessments and design event modelling would need to be undertaken in subsequent project phases.

The potential impacts from flooding to adjacent properties and the environment are well documented, and may result in both negative and positive impacts. The consequences of flooding vary greatly and depend on the location, duration, depth and speed of water flows relative to the vulnerability of the natural and built environment. In many natural systems, floods play an important role in maintaining key ecosystem functions and biodiversity. Railways and embankments have an impact on flood risk management because they can alter flood flows and behaviour.[2]

[2] http://www.chiefscientist.qld.gov.au/publications/understanding-floods/flood-consequences

Additional discussion of the potential impact of the Gowrie to Helidon Project in relation to flooding is discussed in **Section 6.1.3.2**. Further flood assessment will be undertaken during the EIS phase to determine design details and confirm impact mitigations for the floodplain crossing.

5.1.2.3. Groundwater

The Gowrie to Helidon Project is located within the boundary of the Great Artesian Basin. The western part of the Study Area is located on the very eastern edge of the Surat Basin, within a "recharge area"; where the rock layers that form aquifers are exposed along the western slopes of the Great Dividing Range allowing rainfall and river water to percolate into the ground as part of the groundwater. It is anticipated that the groundwater in this area would form part of the Upper Condamine Alluvium Aquifer, an aquifer of relatively good quality, being used intensively for irrigation, industrial and stock and domestic purposes.

The water table divide follows the Helidon Ridge. On the west side of the water table divide, shallow groundwater flows west into the Surat Basin, and on the east side, shallow groundwater flows toward the east, toward the Clarence-Moreton Basin. The deeper groundwater is expected to be influenced by deeper, older geological structures, and as such the groundwater flows in the deeper aquifers are expected to form a different divide than occurs in the water table.

The groundwater-bearing sequence in the Clarence-Moreton bioregion includes shallow aquifers along river courses and floodplains and deeper formations composed of sedimentary or volcanic rocks. There are numerous alluvial aquifers in the Clarence-Moreton bioregion, of particular note is the Lockyer Valley alluvial aquifer which is economically important as it is used for irrigation and is closely managed. The Lockyer Valley alluvial aquifer is a recharge area, with groundwater flowing into the Main Range Volcanics aquifer.

5.1.2.4. Groundwater Dependant Ecosystems

In the region, known Groundwater Dependent Ecosystems (GDEs) are limited with the closest approximately 5 km from the Preferred Alignment. This is likely a reflection of the lack of investigations in the area as well as the lack of conditions suitable for GDEs. Based on the Department of Environment and Heritage Protection (DEHP) mapping, no other GDEs have been predicted with high confidence within 10 km of the Preferred Alignment.

Field validation would be required to confirm the presence of GDEs.

5.1.3. Air Quality and Noise

Ambient Air Quality

Ambient air quality data, published by the Queensland Department of Science, Information Technology and Innovation in the vicinity of the Gowrie to Helidon Project has been utilised in this assessment to characterise existing air quality in the Study Area. The data includes ambient air quality data from Toowoomba (North), Rocklea, Flinders View and Jondaryan. The adopted background concentrations considered in the review are presented in **Table 5-3**.

Table 5-3 Adopted Background Concentrations (µg/m^3)

Pollutant	Averaging Period	Adopted Background Concentration (µg/m^3)	Station
CO	8 Hour	224.7	Toowoomba
NO_2	1 Hour	42.7	Toowoomba
	Annual	16.4	Flinders View
PM_{10}	24 Hour	24.3	Jondaryan
$PM_{2.5}$	24 Hour	17.7	Flinders View

The land use in the Study Area is characterised by an urbanised area centred on Toowoomba, with smaller population centres at Gowrie, Withcott and Helidon. Between the major centres, the land use is largely rural residential and rural activities. Existing air quality emissions in the region are principally related to typical transport related emissions, including road emissions and the existing rail line. Specific industrial sources occur on the outskirts of Toowoomba, and in some of the regional towns. In the rural areas, farming related emissions (primarily dust from farm activities and wind erosion) are likely to have some influence on existing air quality.

The Queensland Government Air Quality Index rates air quality based on the relationship between observed pollutant and pollutant goal concentrations. Using this air quality rating system, the adopted pollutant background concentrations **(Table 5-3**) in the Study Area for carbon monoxide (CO) and nitrogen dioxide (NO_2) are rated as 'Very Good', PM_{10} as 'Good', and $PM_{2.5}$ as 'Fair'.

Noise

Long-term noise monitoring within the study area undertaken in 2016 found noise levels to be typical of a rural area with low background noise levels. Elevated noise levels were present at the brownfield measurement sites that are adjacent to the existing rail lines. Detailed noise modelling will be undertaken during the EIS phase to determine the appropriate mitigation measures needed to ensure compliance with relevant policy and guidelines.

5.1.4. Ecosystems

This section describes the protected areas, mapped remnant vegetation (Queensland regional ecosystems) and mapped essential habitat likely to be present in the Study Area. Aquatic habitats (creeks in the Study Area) are also described. Matters of National Environmental Significance (MNES) are described in **Section 6.6**.

5.1.4.1. Protected Areas

No protected areas have been identified within the Preferred Alignment, however there are a number of protected areas to the north and northeast of the Study Area, including Geham State Forest (approx. 13 km to the north), Lockyer National Park (approx. 2 km north), Lockyer Regional Park and Lockyer State Forest (both 3-4 km north east of the eastern extent of the Gowrie to Helidon Project).

5.1.4.2. Matters of State Environmental Significance

Matters of State Environmental Significance (MSES) mapped within the Study Area include:

- Regulated vegetation (eastern slopes of Toowoomba Ranges, and throughout the Study Area)
- Waterways (throughout the Study Area)
- State Conservation Areas (adjacent areas):
  - Lockyer National Park and adjacent areas: Large expanse of regulated vegetation, wildlife habitat and protected area designation associated with Lockyer National Park, north of Helidon.
  - Large corridor of Wildlife Habitat and Regulated vegetation, which continues to a protected area in the Mt Mort area
- Areas of mapped wildlife habitat associated with the creeks and tributaries intersected by existing east-west infrastructure corridors.

5.1.4.3. Regional Ecosystems

The Preferred Alignment will intersect areas of regulated vegetation and mapped essential habitat particularly in the vicinity of the Toowoomba Range. A number of Eucalypt dominated “of concern” regional ecosystems (REs) will be intersected by the Preferred Alignment.

ARTC InlandRail

3200 Gowrie to Helidon

Ecology, Flora and Fauna

Figure 5.4

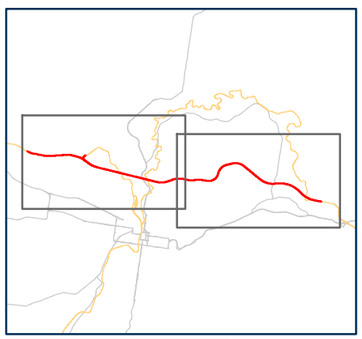
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail project alignments
- Gowrie to Grandchester Protected Corridor
- Study Area
- West Moreton Rail Line
- TSRC
- Highway
- Qld estate protected areas
- Essential Habitat

Remnant Vegetation (v8):

- Endangered (dominant)
- Endangered (sub dominant)
- Of concern (dominant)
- Of concern (sub dominant)
- Least concern

Statewide environmental corridors (DEHP):

- State
- Regional



2 Km

Coordinate System:
GCS GDA 1994

Paper: A3 Scale: 1:55,000
Date: 25/01/2017
Author: IR

Data Sources: State environmental corridors: DEHP; Essential habitat: DNRM; West Moreton rail line: DTMR; QLD protected areas: DNPSR; Remnant vegetation (v8): DSITI

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3200 Gowrie to Helidon

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Figure 5.4

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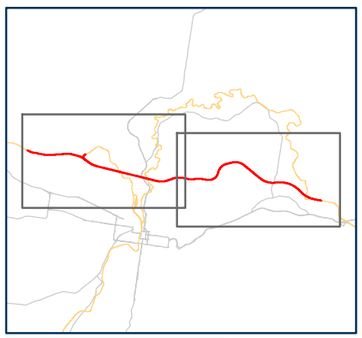
- State
- Regional



2 Km

Coordinate System:
GCS GDA 1994

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The Regional Ecosystems (REs) listed in **Table 5-4** are mapped in the vicinity of the Study Area.

Table 5-4 REs in the Study Area

RE	VM Act Class	Biodiversity Status	Description
11.3.25	Least Concern	Of Concern	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
11.8.5	Least Concern	Not of Concern	*Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks
12.3.7	Least Concern	Not of Concern	*Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland
12.3.7 / 12.3.3	Least Concern / Endangered	Not of Concern / Endangered	*Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland and *Eucalyptus tereticornis* woodland on Quaternary alluvium
12.8.14 / 12.8.17	Least Concern	Not of Concern	*Eucalyptus eugenioides*, *E. biturbinata*, *E. melliodora* +/- *E. tereticornis*, *Corymbia intermedia* woodland on Cainozoic igneous rocks and *Eucalyptus melanophloia* +/- *E. crebra*, *E. tereticornis*, *Corymbia tessellaris*, *C. intermedia* and/or *C. clarksoniana*, *E. melliodora*, *Angophora subvelutina* grassy woodland. Occurs on Cainozoic igneous rocks, especially basalt. (BVG1M: 11a)
12.8.17	Least Concern	Not of Concern	*Eucalyptus melanophloia* +/- *E. crebra*, *E. tereticornis*, *Corymbia tessellaris*, *C. intermedia* and/or *C. clarksoniana*, *E. melliodora*, *Angophora subvelutina* grassy woodland. Occurs on Cainozoic igneous rocks, especially basalt. (BVG1M: 11a)
12.8.21	Endangered	Endangered	Semi-evergreen vine thicket with *Brachychiton rupestris* on Cainozoic igneous rocks. Usually southern half of bioregion
12.8.21 / 12.8.9	Endangered / Least Concern	Endangered / Of Concern	Semi-evergreen vine thicket with *Brachychiton rupestris* on Cainozoic igneous rocks. Usually southern half of bioregion and *Lophostemon confertus* open forest on Cainozoic igneous rocks
12.9-10.15	Endangered	Endangered	Semi-evergreen vine thicket with *Brachychiton rupestris* on sedimentary rocks
12.9-10.15 / 12.3.7	Endangered/ Least Concern	Endangered / Not of Concern	Semi-evergreen vine thicket with *Brachychiton rupestris* on sedimentary rocks and *Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp.

RE	VM Act Class	Biodiversity Status	Description
			cunninghamiana +/- *Melaleuca spp*. fringing woodland
12.9-10.15 / 12.9-10.7	Endangered / Of Concern	Endangered / Of Concern	Semi-evergreen vine thicket with *Brachychiton rupestris* on sedimentary rocks and *Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp*., *E. melanophloia* woodland on sedimentary rocks
12.9-10.2	Least Concern	Not of Concern	*Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks
12.9-10.2 / 12.9-10.3	Least Concern / Of Concern	Not of Concern / Of Concern	*Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks and *Eucalyptus moluccana* open forest on sedimentary rocks
12.9-10.2 / 12.9-10.7	Least Concern / Of Concern	Not of Concern / Of Concern	*Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks and *Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp*., *E. melanophloia* woodland on sedimentary rocks
12.9-10.7	Of Concern	Of Concern	*Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp*., *E. melanophloia* woodland on sedimentary rocks
12.9-10.7 / 12.9-10.15	Of Concern / Endangered	Of Concern / Endangered	*Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp*., *E. melanophloia* woodland on sedimentary rocks and Semi-evergreen vine thicket with *Brachychiton rupestris* on sedimentary rocks
12.9-10.7 / 12.9-10.2	Of Concern / Least Concern	Of Concern / Not of Concern	*Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp*., *E. melanophloia* woodland on sedimentary rocks and *Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks

5.1.4.4. Aquatic Ecosystems

The Preferred Alignment traverses Gowrie Creek, Rocky Creek, Six Mile Creek, and Lockyer Creek.

Gowrie Creek runs parallel to the existing railway, with agricultural uses extending up to the high banks of the creek. Gowrie Creek is the subject of a rehabilitation project led by TRC, with a focus on 'revitalising the Gowrie Creek system

to a more natural state'. This rehabilitation is part of the Gowrie Creek Catchment Management Strategy, which is primarily aimed at reducing the flood risk within the Toowoomba CBD area.

Rocky Creek is described in the TSRC motorway EPBC Act Referral as a 'perennial stream with a series of semi-permanent waterholes'. The referral describes the water quality as moderate turbidity, low dissolved oxygen, elevated organic nitrogen and phosphorous'.

Six Mile Creek is also described in the TSRC motorway EPBC Act Referral as 'ephemeral, extremely sinuous, and characterised by deeply incised meanders.

The western catchments of Lockyer Creek are described in the SEQ Healthy Waterways Ecosystem Health Monitoring Program as generally in poor condition due to a legacy of long-term riparian vegetation clearing.

5.1.4.5. Threatened Ecological Communities

Six Threatened Ecological Communities (TECs) were identified in the EPBC Act Protected Matters Search Tool (PMST) as potentially occurring within 5 km of the Preferred Alignment. TECs are a matter of national environmental significance (MNES) and are discussed in **Section 6.6**.

5.1.4.6. Habitat Connectivity

The escarpment and foothills of the Toowoomba Range are generally heavily vegetated and are mapped as a State-wide ecological corridor of State significance, providing north-south connectivity for a range of terrestrial fauna species. Some significant infestations of *Lantana camara* are present on the escarpment slopes, which may impact reducing fauna habitat values for some species.

The Lockyer Creek corridor is also mapped as both state and regionally significant ecological corridors. At the local scale, waterways and remnant vegetation across the Study Area provide for habitat connectivity.

5.1.5. Flora and Fauna

5.1.5.1. Threatened Fauna- Queensland

The Endangered, Vulnerable, Near- threatened or Threatened species (EVNT) protected under the NC Act and listed in **Table 5-5** were identified in searches of the Queensland Government Wildlife online database. These are in addition to the EPBC Act listed species identified in **Section 6.6**.

Table 5-5 Species protected under the Queensland *Nature Conservation Act 1992*

SCIENTIFIC NAME	COMMON NAME	Q	HABITAT AND DISTRIBUTION**	LIKELIHOOD OF OCCURRENCE
Calyptorhynchus lathami lathami	glossy black-cockatoo (eastern)	V	Forests and woodlands with she-oaks (*Allocasuarina* spp.); nests in large tree hollow	Moderate, but no feeding evidence was detected during preliminary surveys
Falco hypoleucos	Grey Falcon	V	Range covers eastern Australia in arid and semi-arid areas.	Low, lack of suitable habitat
Ornithorhynchus anatinus	Platypus	SL	Dependant on rivers, streams and bodies of freshwater, ideal habitat	High, previous records in area

SCIENTIFIC NAME	COMMON NAME	Q	HABITAT AND DISTRIBUTION**	LIKELIHOOD OF OCCURRENCE
			consists of earth banks and coarser bottom substrates.	
Tachyglossus aculeatus	Short-beaked Echidna	SL	Common in dry open country on eastern Australia, open heathlands and in forests.	High, previous records in area
Acanthophis antarcticus	Common Death Adder	V	Habitats associated with deep leaf litter	Possible, possible suitable habitat
Hemiaspis damelii	Grey Snake	E	Favours woodlands with cracking clay soils in areas with small gullies and water bodies.	Low to None, no suitable habitat
Ninox strenua	Powerful Owl	V	Open forests and woodlands along watercourses	Recorded in studies for TSRC motorway

5.1.5.2. Essential Habitat

The Preferred Alignment will intersect areas of regulated vegetation and mapped essential habitat, particularly in the vicinity of the Toowoomba Range. A review of Queensland Government Essential Habitat Mapping available identified four areas of essential habitat in the Study Area and surrounds as listed in **Table 5-6**.

Table 5-6 Mapped Essential Habitat

AREA	DESCRIPTION
Eastern slopes of the Toowoomba Range	Large area of essential habitat either not attributed to a particular fauna type or attributed as habitat for koala
Wards Hill area	Another large area of essential habitat attributed as habitat for koala, north and south of Wards Hill
Lockyer Creek	Essential habitat attributed as habitat for koala
Lockyer National Park, north of Helidon	Large expanse of essential habitat mapped, attributed as habitat for koala

5.1.5.3. Threatened Flora - *Nature Conservation Act 1992*

Parts of the Study Area are located within the DEHP Protected Plants High Risk Flora Survey Trigger map area, particularly the area along the Toowoomba Range, and the area north of Postmans Ridge/Helidon, indicating records of NC Act listed flora in the vicinity. **Table 5-7** lists the Wildlife Online search results for threatened flora for the Study Area, which should be read in conjunction with **Section 6.6**.

Table 5-7 Threatened Flora – Wildlife Online Results

Scientific Name	Common Name	NC Act Status
Eucalyptus taurina	Helidon Ironbark	V
Caustis blakei subsp. macrantha	Koala Fern	V
Cyperus clarus	-	V
Digitaria porrecta	Finger Panic Grass	NT
Bulbophyllum globuliforme	Miniature Moss-orchid	V*

* Also listed as vulnerable under the EPBC Act.

Whilst the initial field survey effort was not targeted for protected plant surveys, the presence of *Thesium australe* (vulnerable under the NC Act and EPBC Act) was noted within a pasture to the west of Helidon. This record was identified as part of the nearby TSRC motorway investigations. The potential for the presence of threatened flora including both State and Commonwealth listed species will need to be considered in future survey effort and impact assessment.

5.1.5.4. Pests

The PMST identified a number of Weeds of National Significance as potentially occurring in the Study Area including but not limited to *Lantana camera* (Lantana), *Asparagus asparagoides* (Bridal Creeper), *Chrysanthemoides monilifera* (Bitou Bush), *Cryptostegia grandiflora* (Rubber Vine) and *Dolichandra unguis-cati* (Cat's Claw vine). A number of weeds that potentially occur in the Study Area are also identified under the *Biosecurity Act 2014* as Category 2through 5 Restricted matter.

Field investigations confirmed an extensive invasion of lantana on the eastern slopes of the Toowoomba Range.

Pest fauna species likely to occur in the area include *Rhinella marina* (cane toad), *Canis familiaris* (wild dogs) and *Felis catus* (feral cats), feral deer, *Lepus capensis* (hares), *Oryctolagus cuniculus* (rabbits), *Rattus rattus* and *Rattus norvegicus* (black and brown rats), *Mus musculus* (house mouse), *Sus scrofa* (pigs) and *Vulpes vulpes* (foxes). Other introduced species including *Columba livia* (pigeons), ducks and *Hemidactylus frenatus* (Asian house gecko).

5.2. Social and Economic Environment

European settlement in key townships in the Toowoomba and Lockyer Valley regions dates back to the mid-19th Century, associated predominantly with intensive agricultural land uses. The region in which the Gowrie to Helidon Project is located is undergoing significant growth that is being largely driven both by external factors, i.e. growth outside the region in mining, as well as proactive measures by the local government areas of Toowoomba and Lockyer Valley to develop economic potential and capitalise on its strategic location. This is considered to be important context

for understanding the existing socio-economic environment, as this is likely to impact on the social fabric of the region over next decade.

The following provides a regional snapshot of some key developments that are currently occurring and/or planned to occur in the region that will ultimately shape the socio-economic environment. A desktop review of the following was undertaken to prepare this overview:

- Toowoomba Region Economic Profile (August 2015)
- Lockyer Valley Regional Development Framework – 2013 to 2023.

Toowoomba

In the regional context, Toowoomba is experiencing considerable growth, by virtue of its geographic 'gateway' location, namely its proximity to significant projects in the Surat and Cooper Basins, as well as key infrastructure investment and economic activity such as the TSRC motorway, Brisbane West Wellcamp Airport and major CBD Investment. Additionally, substantial growth in national freight movements (Melbourne to Brisbane) within the region will also greatly enhance future economic development opportunities.

Key developments in the vicinity of the Study Area are:

- The TSRC motorway, which will provide commercial and heavy vehicles with an alternative crossing of the range to the north of Toowoomba. It will run from the Warrego Highway at Helidon in the east, to the Gore Highway at Athol in the west via Charlton.
- The Charlton Wellcamp enterprise area, located 13 km west of Toowoomba, covering an area of approximately 2,000 hectares. The area is of strategic importance in supporting growth in Toowoomba and the Surat Basin as it will host major supplies of engineering services and logistics for the resource industry. Vital infrastructure for the area has already received a significant boost with an infrastructure agreement with FK Gardner & Sons. This agreement involves the construction of reticulated water and sewer systems, road works on Witmack and O'Mara Roads and improvements to the Dry Creek Stormwater system.

Lockyer Valley

Within the Lockyer Valley Council there are number of key initiatives planned or underway over the short to medium term that are intended to capitalise on the intensive agricultural focus of the area and also position complementary activities (e.g. tourism) to benefit from regional growth. The Lockyer Valley Regional Council is working with Regional Development Australia Ipswich and West Moreton on the Sustainable Food Bowl project. It is intended to position Lockyer Valley as a major agricultural production area in Australia.

5.2.1.1. Community profile

The community profile is intended to provide an understanding of the key demographic characteristics of the area in which the Preferred Alignment is to be located which is predominantly in the local government area of Toowoomba and Lockyer Valley in which the corridor is located. Information sourced from http://profile.id.com.au.

Population

The Toowoomba Estimated Resident Population for 2015 is 163232, with a population density of 0.13 persons per hectare. From 2005 to 2015 there has been an increase in population annually in the range of 1 to 1.5% per year.

The Lockyer Valley Estimated Resident Population for 2015 is 38798. From 2005 to 2015, and there has been an increase in population annually in the range of 2 to 3% per year.

Age Profiles

For both Toowoomba and Lockyer Valley, the age structure between 2001 and 2011 was characterised by a large proportion of the population in the 0 to 19 year old age brackets. This period also saw a significant increase in the proportion of the population in the 45 to 74 year old age bracket.

Education

For the Toowoomba local government area, in the period between, 2001 and 2011 there has been an increase in all forms of tertiary education and a decrease in the number of unqualified individuals.

For Lockyer local government area, while there has been a strong increase in all forms of tertiary education, and vocational training. As a percentage, this change has been greatest in the number of people receiving vocational training (trades, Technical and Further Education etc.), with the Lockyer Valley lying above the South East Queensland average. Despite a growth across all education types, strong growth in vocational training as well as an increase in the number of individuals without tertiary or vocational qualifications, this is likely to be indicative of the labour intensive agrarian nature of the Lockyer Valley.

Income

In Toowoomba, low income earners (those earning less than $400 per week in total) comprised 41.1% of the population, compared to 35.9% of the population in Lockyer. On the other end of the spectrum, for Toowoomba high income earners (those who earn $1500 or more per week), comprised 5.7% of the population compared to 9% of the population in Lockyer.

Industry and Labour force profile

As at 2011, 95.2% of the labour force in Toowoomba was employed. Most occupational areas saw an increase in their workforce from a raw numbers perspective, with the largest percentage increases in the Professionals and Community service workers occupations. Sales workers, Managers and Labourers all saw shrinkage in their workforce.

By comparison, Lockyer Valley also experienced increase in the rate of employment from 2001 to 2011 of close to 2% as well as an increase in the labour force. As of 2011, 93.5% of the labour force was employed. All occupational areas saw an increase in their workforce, with the largest increases in the Professionals and Community service workers occupations, whereas Managers and Labourers saw shrinkage in their workforce.

5.2.2. Accommodation and Housing

The capacity of the existing accommodation to house the Gowrie to Helidon Project's construction and operational workforces is dependent on the size and timing of the workforce to be accommodated relative to other construction projects in the region including timing of adjacent Inland Rail Projects (Helidon to Calvert and Border to Gowrie). The TSRC motorway is currently under construction and is due to be completed in late 2018. The TSRC construction workforce has been accommodated locally, implemented a local participation policy, and has also provided a construction day camp for workers at Bedford Street, Cranley. The construction of the Gowrie to Helidon Project is anticipated to have similar requirements.

5.2.3. Cultural Heritage (Indigenous and Non-indigenous)

5.2.3.1. Indigenous Heritage

The Study Area is located within the country of the Jagera People and the Western Wakka Wakka People.

An initial cultural heritage assessment was undertaken by desktop review of existing information (database searches and previous studies) and supplemented with initial workshops with Aboriginal parties.

Archaeological research indicates that Aboriginal occupation goes back at least 22,000 years in this region of Queensland. There is a substantial body of cultural material present throughout the Study Area and all items are considered to be of very high social significance to the Aboriginal groups.

The *Aboriginal Cultural Heritage Act 2003* defines Aboriginal cultural heritage as a significant Aboriginal object or, evidence of archaeological or historic significance of Aboriginal occupation of an area of Queensland, or Aboriginal human remains. Aboriginal cultural heritage can therefore be tangible (i.e. physical evidence in the landscape) or intangible (e.g. story places, ceremonial sites, other special associations etc.).

Aboriginal cultural heritage items most likely to be encountered within the soils and across the geological formations of the Study Area would be surface stone artefacts, and rock shelters used as living spaces and as art surfaces.

The most likely evidence of past Aboriginal utilisation of vegetation communities in the Study Area would be the presence of scarring on trees, particularly on gums. The presence of mature Bunya Pines may also be indicative of past use of the landscape through anthropogenic plantings. Where water features exist, there is a higher likelihood for the presence of Aboriginal cultural heritage material.

Sections of the Study Area have been heavily disturbed through the construction of infrastructure and vegetation clearing for agricultural activity. As such, the potential to identify Aboriginal cultural heritage items in those areas is also diminished.

Database search results identified 12 sites (including artefact scatters, scarred trees, a landscape feature and an Aboriginal intangible place) within the Preferred Alignment and more than 200 sites within 5 km of the Preferred Alignment. Database search results are shown in **Figure 5-5**.

The existence of known Aboriginal cultural heritage sites and intangible sites within, and in proximity to, the Study Area, as well as high risk landscape features such as creeks, indicate that there is a high cultural heritage risk to the Gowrie to Helidon Project. It is likely that further Aboriginal cultural heritage values exist, as yet unidentified, within the Study Area.

The results of initial consultation meetings with the Aboriginal parties for the Study Area and recent findings during TSRC investigations also indicate the likely presence of additional Aboriginal cultural heritage object, items and values.

5.2.3.2. Non-Indigenous Historical context

The earliest recorded visits of non-Aboriginal people to the region were in the late 1820s and early 1830s following the establishment of the Moreton Bay Penal Settlement in 1824-5. Toowoomba was first surveyed in 1852 and grew to service the early pastoral sector in the region. Pastoral interests dominated the region into the 1860's and agricultural activity grew from 1859. The Main Line Railway, part of the West Moreton Rail Network, was constructed between 1865 and 1867 and resulted in the establishment of railway towns in the region including Gatton and Helidon. The turn of the twentieth century saw the establishment of Lockyer Valley farming practices, included dairying, cattle grazing, small cropping and orchards. The industry peaked in the Toowoomba region in 1937. World War Two had a physical impact on the region, particularly in Toowoomba, with occupation of some of the town buildings, schools, and hospitals by the military and the construction of air raid shelters in the city. Townships expanded post-war due to returning service people and urban expansion was the result. Massive subdivision, particularly around major towns, occurred from the 1950s onwards.

There are multiple listed places of historical heritage significance within the broader Study Area, and the Main Range Railway intersected by the Preferred Alignment is listed under the Queensland Heritage Register.

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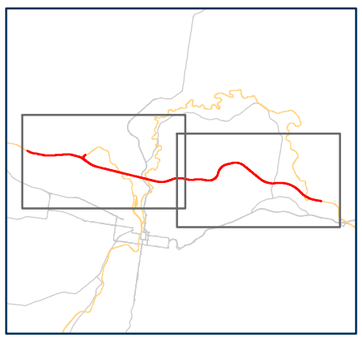
3200 Gowrie to Helidon

Cultural Heritage
Indigenous and Historical

Figure 5.5

- Historic Culturtal Heritage Sites
- Aboriginal Cultural Heritage (DATSIP)
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Study Area
- Gowrie to Grandchester Protected Corridor
- Adjacent Inland Rail project alignments
- TSRC
- Highway
- West Moreton Rail Line



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Coordinate System:
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Paper: A3 Scale: 1:55,000
Date: 25/01/2017
Author: IR

Data Sources: Aboriginal Cultural Heritage: DATSIP; Cultural Heritage: DEHP; All other data: ARTC IR.

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ARTC InlandRail

3200 Gowrie to Helidon

Cultural Heritage
Indigenous and Historical

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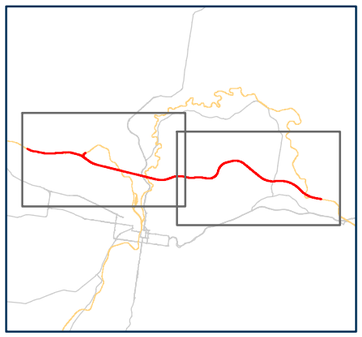

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5.3. Built Environment

Key existing regional infrastructure in the Study Area includes major transport networks such as the Warrego Highway and the existing railway line (these are described further in **Section 5.4**), which will be crossed by the Preferred Alignment. There are also a number of local and sub-arterial roads in the Study Area, particularly in proximity to local centres such as Gowrie and Helidon.

The map of coordinated projects identifies one completed coordinated project in the Study Area and one to the northwest of the Study Area, shown in **Figure 5-6**.

- Wetalla Water Pipeline: A 45 km underground water pipeline to supply up to 5500 mega litres of treated waste water to the New Acland coal mine. The pipeline runs from the Wetalla Wastewater Reclamation Facility in Toowoomba to the mine – 35 km north-west of the city. The pipeline is within the Study Area and adjacent to the Preferred Alignment near Gowrie.
- New Acland Coal Mine Stage 3 Project: development of parts of the Manning vale and Willeroo resource areas, upgrades to existing coal handling and preparation plant and supporting infrastructure, relocation of the Jondaryan rail load-out facility 8km from Jondaryan and creation of a rail spur, road works, water management structures and relocation and potential upgrade of power supply.

The Gowrie to Helidon Project is likely to interact with numerous existing services, in particular near townships (Gowrie, Helidon) and when constructing adjacent to the existing rail corridor (Helidon). The Preferred Alignment crosses the Roma to Brisbane gas pipeline in three locations (one at ground level above the Toowoomba tunnel, the other two at ground level under the proposed alignment). Powerlink has high voltage transmission lines in the area while Ergon and Energex also have smaller distribution networks that interact nearby. Numerous high voltage transmission lines cross the Preferred Alignment. Additional studies to identify all service crossings are required. This needs to include an understanding of all municipal services and other miscellaneous services such as farm irrigation.

The Harlaxton quarry is a Key Resource Area (KRA) located on the northern fringe of Toowoomba, east of the Western railway line and the New England Highway. KRAs are identified locations containing important extractive resources of state or regional significance worthy of protection for future use. The KRA separation area for the Harlaxton quarry is within the Study Area, shown in **Figure 5-6**.

The TSRC motorway is a new 41 km motorway currently under construction connecting the Warrego Highway at Helidon Spa in the east with the Gore Highway at Athol in the west, via Charlton, also shown in **Figure 3-1**. The TSRC provides a second range crossing to the north of Toowoomba rather than through it and is crossed by the Preferred Alignment for the Gowrie to Helidon Project. The interaction of the TSRC with the Preferred Alignment is described in **Section 3.2**.

5.4. Traffic and Transport

The Warrego Highways is the key transport route in the Study Area. The Warrego Highway is Queensland's principal east-west freight route, extending 714 km from Brisbane to Charleville. The Highway connects Brisbane to Toowoomba and southern Queensland, central and western New South Wales and Victoria and the Northern Territory. The highway provides for major freight movements interstate, and regionally (between Toowoomba, Dalby and Roma, the agriculture sectors in the Lockyer Valley, Darling Downs and the south-west, and the energy and resource developments of the Surat Basin).

The Warrego Highway has existing capacity and safety issues and is experiencing rapid growth in traffic. The construction of the TSRC is underway to address a key bottleneck on the Warrego Highway.

The New England Highway is another major highway that runs from Newcastle to north of Toowoomba and is aligned in a north-south direction through the Study Area near Toowoomba.

The West Moreton Railway Line extends from Rosewood to Miles. The Toowoomba Tunnel of the Preferred Alignment would pass under the Main Line at the top of the Toowoomba Range where it is parallel with the New England Highway. The Toowoomba Tunnel section of the Preferred Alignment would also pass under the West Moreton Railway Line which extends north and then west from Toowoomba. From the proposed western portal of the Toowoomba tunnel to Gowrie the Preferred Alignment and the existing West Moreton Railway Line run parallel. The Preferred Alignment would also cross the existing rail line at Helidon. **Figure 3-1** shows the Preferred Alignment and existing rail line.

There are a number of transport infrastructure crossings along the Preferred Alignment including arterial and local roads and the existing rail line. The potential impacts to transport infrastructure arising from the Project are described further in **Section 5.4.**

Once operational, the Inland Rail Programme will result in a major transformation of the freight haulage network in eastern Australia and bring a national rail freight focus to Toowoomba. When developed, Inland Rail Programme will establish Toowoomba as a major inland multi-modal freight hub.

5.5. Land Use and Tenures

Under the land categories of the SEQ Regional Plan 2009-2031 the Study Area is largely within Regional Landscape and Rural Production area. The exception of this is around the Toowoomba and Helidon localities where it is predominantly Urban Footprint land use designation. There is some Rural Living land use designation near Helidon.

Tenure within the Preferred Alignment is described in **Section 4.2**.

5.5.1. Key Local and Regional Land Uses

5.5.1.1. Land Use

Gowrie Junction is located at the western extent of the Study Area. The locality is centred north of the existing rail line, and is described as a historic rural residential area, with growth potential. The surrounding rural lands are used largely for crop farming and grazing.

Cranley is a rural residential locality on the outskirts of Toowoomba. It is characterised by large lot rural residential with a waste water treatment plant located between the existing railway line and Gowrie Creek. Queensland Government mapping shows land on the corner of Goombungee Road and Townson Street as a Powerlink/ Energex substation, however this land is currently undeveloped.

Mount Kynoch is a rural and emerging rural residential and residential area. A residential subdivision is located adjacent to the New England Highway. Land associated with the TSRC motorway is located in this area, including an overpass of the New England Highway. Mount Kynoch Park, and the water treatment plant are also located on the New England Highway, with the residential locality of Blue Mountain Heights further north.

The localities of Ballard, Harlaxton and Mt Lofty are located east of Mount Kynoch, on the Toowoomba range. The topography of this area is steep and undulating, and subsequently has not been subjected to the extent of rural and urban development evident on the plains or plateau. An operational quarry is located in Harlaxton, down slope from residential areas. Commonwealth-owned land is located in this area, including the Mt Lofty Rifle Range.

Continuing east, the localities of Withcott and Postmans Ridge includes areas of natural vegetation and grazing on the hillsides, rural and rural residential areas, and a small township at Withcott. The township includes residential,

commercial and industrial land uses. Agricultural uses in the area are predominantly grazing and vegetable growing. Ricky Creek, Six Mile Creek and Wards Hill are located within the Withcott and Postmans Ridge area. The Bicentennial National Trail traverses this area, passing from Murphy's Creek in the north to Withcott in the south. Withcott Seedlings, a major commercial supplier of vegetable seedlings, is located east of Withcott at Postmans Ridge. North of Postmans Ridge are the localities of Lockyer and Upper Lockyer, located on Lockyer Creek, with a mix of agricultural and natural vegetation, and extensive area of rural residential development at Upper Lockyer.

Helidon Spa and Helidon are dominated by rural and rural residential uses, and include the small township of Helidon. The Helidon area is historically associated with natural springs and sandstone, which was historically quarried for building materials across Queensland.

The relevant planning schemes do not provide a standardised locality classification for the relevant areas. Therefore, a more standardised approach to the classification was required. The Australian Government - Rural, Remote and Metropolitan Areas (RRMA) classification was utilised as this approach in this instance. The structure of the RRMA classification is shown in **Table 5-8.**

Table 5-8 Rural, Remote and Metropolitan Areas Classification

ZONE	CATEGORY
Metropolitan Zone	Capital cities
	Other metropolitan centres (urban centre population > 100,000)
Rural Zone	Large rural centres (urban centre population 25,000 - 99,999)
	Small rural centres (urban centre population 10,000 - 24,999)
	Other rural areas (urban centre population < 10,000)
Remote Zone	Remote centres (urban centre population > 4,999)
	Other remote areas (urban centre population < 5,000)

Source: Rural, Remote and Metropolitan Areas (RRMA) classification http://www.aihw.gov.au/rural-health-rrma-classification/

The localities in the vicinity of the Preferred Alignment are all classified as remote zone- other remote areas in accordance with **Table 5-8**. Toowoomba is classified as a metropolitan zone.

5.5.1.2. Key Resource Areas

There are a number of KRAs in the Study Area. Harlaxton KRA no 8 is a source of quarry rock, and is located within both Toowoomba and Lockyer Regional Council local government areas. The surrounding separation area is constrained by residential development.

The Gatton Shire Extractive Industries overlay map shows an additional large resource area to the north of the existing railway line, with significant extents of land identified as KRAs or mining leases. The overlay maps note that the Helidon KRA contains 'sandstone building stone materials, extractive materials, explosives manufacturing and buffer areas'. The Helidon KRA is not identified in the SPP Mapping.

5.5.1.3. Agricultural Uses

A review of mapping associated with the Queensland Government Agricultural Land Audit dataset shows agricultural uses are a mixture of medium and high pasture production from Gowrie to Helidon within the Study Area. This includes grazing lands and dry land cropping between Gowrie and Mount Kynoch, grazing between Withcott and Postmans Ridge, with more intensive irrigated cropping evident in the Helidon Spa and Helidon localities.

Under the Queensland Government SPP and Regional Interests Mapping, Important Agricultural Areas and Agricultural land Class-A is mapped between Gowrie and Cranley, and then along the valleys and plains associated with Rocky Creek, Six Mile Creek and Lockyer Creeks.

5.5.2. Key Local and Regional Land Tenures

The majority of land within the Study Area is held in freehold title as described in **Section 4.2**. Other tenure arrangements within the Preferred Alignment include lands lease (e.g. the rail corridor) and reserve. The tenure of properties within the Preferred Alignment is included in Appendix A.

5.5.3. Native Title

The predominant tenure across the Study Area is freehold, with reserves and state owned land in discrete pockets. Native Title interests may exist over non-freehold land, including road reserves dedicated after 1996 and waterways.

The Jagera Daran #2 People (QC2003/015 PRC/ QUD6014/03) and the Western Wakka People (QC1999/004 PRC / QUD6004/99) are Previously Registered Claimants for their respective areas. Under the *Aboriginal Cultural Heritage Act 2003*, previously registered Native Title claimants continue to be the Native Title party for that area providing there is no other registered native title claim for the area and there is not, and has never been, a native title holder for the area.

5.6. Planning Instruments, government Policies

5.6.1. Regional Plans

Both the South East Queensland Regional Plan 2009-2031 and the Darling Downs Regional Plan (2013) are relevant to the Study Area.

The subject regional land use categories are described as follows:

- Regional Landscape and Rural Production Area (RLRPA) (Light Green) – Identifies land with regional landscape, rural production or other non-urban values.
- Urban Footprint (Pink) – Identifies land that can meet the region's urban development needs to 2031 in a more compact form.
- Rural Living (Orange) – Comprises locations currently designated for rural residential development in local government planning schemes, and where further rural residential development through infill and consolidation is permitted under the SEQ Regional Plan.

Within the Gowrie to Helidon area the main land use category is Regional Landscape and Rural Production Area. The exception of this is within TRC around the Cranley locality, with predominantly Urban Footprint land use areas mapped. Between Postmans Ridge and Helidon Spa regional plan indicates areas of Rural Living land use. **Figure 5-6** provides an extract from the Regional Plans.

The TRC Planning Scheme and the Planning Schemes relevant to the Lockyer Valley Regional Council local government area (Gatton and Laidley Shires) are generally in accordance with the regional plan land use categories.

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3200 Gowrie to Helidon

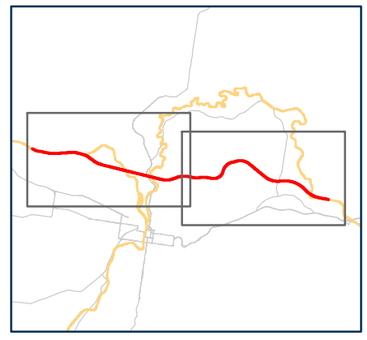
Land Use

Figure 5.6

- Study Area
- Gowrie to Grandchester Protected Corridor
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent IR Project
- LGA boundary
- West Moreton Rail Line
- TSRC
- Highway
- Secondary road
- Coordinated projects
- Key Resource Area (resource processing area)
- Key Resource Area (separation area)

SEQRP land use categories:

- Urban Footprint
- Rural Living Area
- Regional Landscape and Rural Production Area
- Waterways



2 Km

Coordinate System:
GCS GDA 1994

Paper: A3 Scale: 1:55,000
Date: 25/01/2017
Author: IR

GOWRIE
Wetalla Water Pipeline
TOOWOOMBA REGIONAL COUNCIL
LOCKYER VALLEY REGIONAL COUNCIL
MOUNT KYNOCH
Woolmer
Cawdor
Glencoe
Spring Bluff
Cabarlah
Gowrie Junction
Birnam
Blue Mountain Heights
Cranley
Charlton
Torrington
Wilsonton Heights
Harlaxton
Horn Park
Jubilee Park
Mount Lofty
Wellcamp
Glenvale
Toowoomba
Queens Park
Redwood
Redwood Park
Highfields Rd
Old Homebush Rd
Jannuschs Rd
Cronin Rd
Hanleys Rd
Warrego Hwy
Gowrie-Muldu Rd
Hermitage Rd
Dry Creek
Hursley Rd
Taylor St
Bridge St
North St
Ruthven St
Boundary St
McDougall St
Glenvale Rd
Drayton Wellcamp Rd
Gooburrum Rd
Gowrie Creek
Oaky Creek
600 m
630 m
681 m
687 m
692 m
740 m

Data Sources: SEQ Regional Plan: DILGP; Protected corridor, highways, Rail network: DTMR; Key resource areas, LGA boundaries, Waterways: DNRM; All other data: ARTC IR.

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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ARTC InlandRail

3200 Gowrie to Helidon

Land Use

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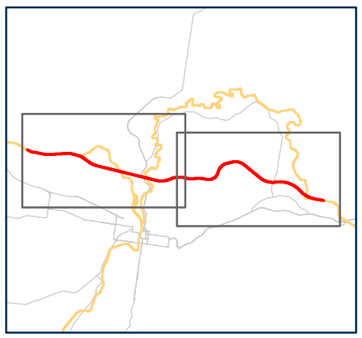

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5.6.2. Local Planning Schemes – Land Use Designations

Available planning scheme mapping for TRC and the Lockyer Valley Regional Council has been reviewed within the Study Area from Gowrie to Helidon. The Lockyer Valley Draft Planning Scheme is yet to be finalised, therefore Planning Scheme information from the former Gatton Shire is still in force in the Study Area.

Local government planning scheme mapping generally allows for the relevant alignment. Land use designations and their location in the Study Area are summarised in **Table 5-9**.

Table 5-9 Planning Scheme Designations

LAND USE DESIGNATION	LOCATION / AREA
Toowoomba Regional Council	
Rural Zone	The Rural Zone is the predominant land use around Gowrie and Gowrie Junction.
Community Facilities Zone	The Preferred Alignment is generally contained within this land use designation throughout the TRC area.
Rural Residential Zone	Some Rural Residential lots adjoin the Preferred Alignment between Gowrie and Cranley.
Low Impact Industry Zone	Small pocket of low impact industry zone lots in the vicinity of the Preferred Alignment around Mount Kynoch.
High Impact Industry Zone	Small pocket of high impact industry zone lots in the vicinity of the Preferred Alignment around Mount Kynoch.
Limited Development (Constrained Land) Zone	A few limited development lots are located in the vicinity of the Preferred Alignment around Mount Kynoch.
Low – medium density residential Zone	One pocket of low-medium density residential lots is located at the boundary of TRC and Lockyer Valley Regional council, near Mount Kynoch.
Lockyer Valley Regional Council (Gatton Planning Scheme)	
Rural Uplands	This Rural Uplands zoning is the predominant designation within the Ballard region.
Rural General	The Rural General designation is spread in areas throughout the Preferred Alignment, but with more of a presence within the Withcott area.
Rural Agriculture	A small pocket of this land use designation is situated within the Ballard Region, near the local area boundary of TRC.
Industrial	The Preferred Alignment traverses a concentration of industrial lots located within the Lockyer locality
Rural Residential (Homestead Residential Precinct)	Some Rural Residential Lots are within close proximity to the Preferred Alignment around the Helidon township.

LAND USE DESIGNATION	LOCATION / AREA
Urban Residential	Some urban Residential Lots are within close proximity to the Preferred Alignment in the Helidon township.

6. POTENTIAL IMPACTS

6.1. Natural Environment

6.1.1. Land Use

The Preferred Alignment is generally contained within the Gowrie to Grandchester future public passenger transport corridor protected under the provisions of the TPC Act, however the protected corridor does not contain all works associated with the Gowrie to Helidon Project. At this stage two new property impacts have been identified at Gowrie (18RP34896 and 21RP34896) and seven new property impacts are associated with the Helidon Tunnel Bypass section of the Preferred Alignment (17SP186715, 7SP186715, 147CC2371, 6SP186716, 2RP903777, 259CC317 and 11RP839411). A review of the construction footprint will need to be undertaken in future stages to determine if any further property impacts are likely to occur. Future design stages may identify opportunities to refine the Preferred Alignment which may result in further deviations from the protected corridor.

In general, land impacts potentially arising from the Gowrie to Helidon Project include the following:

- Localised changes to terrain, particularly at tunnel portals and areas where significant earthworks (embankments and cuts) are required
- Potential air quality, noise and visual impacts to rural residential and residential land uses during construction and operation
- Direct impacts to existing land uses such as loss of rural agricultural land, impacts to existing businesses (e.g. Withcott Seedlings)
- Severance and access impacts arising from the construction and operation of a linear corridor.
- Future land use surrounding proposed passenger station locations may change to support this future use.

No nature conservation reserves were identified in the Preferred Alignment, although the Lockyer National Park is located to the north of the Preferred Alignment at Helidon. Whilst these areas are not likely to be impacted by the Gowrie to Helidon Project, habitat connectivity values will be investigated further in future stages of the Gowrie to Helidon Project.

6.1.2. Geology and Soils

The variable geology along the Preferred Alignment from Gowrie to Helidon generates a number of potential impacts to the design, construction and operational stages of the Gowrie to Helidon Project. Potential impacts relating to soils and geology include, but are not limited to, the following:

- Cracking and/or settlement of structures due to the high potential for shrinkage and swelling of the black soils and cracking clays. Cracking may also result from the removal of vegetation with roots in these soils
- Limitations to construction programme due to black soils and cracking clays being non-trafficable during wet conditions

- Slope instability requiring stabilisation of cut faces
- Gully erosion due to the dispersive nature of cracking clays and black soils
- Rock fall onto track due to colluvial loose scree on existing slopes or weathering
- Less opportunities to reduce environmental footprint as the poor engineering qualities of black earth and cracking clays reduces their potential for re-use and increases the quantity of imported materials required
- Risks of landslip due to erodibility of the Marburg Formation, loose colluvial material, unstable scree slopes and an unknown water table
- Large quantities of material import and export- due to the poor founding characteristics of alluvial soils
- Due to the nature of the bedrock that will be encountered and the relatively short length of tunnel, it is envisaged that the Little Liverpool Tunnel will be excavated using mined tunnel techniques (road header/drill and blast).

Existing land uses within and adjacent to the project corridor may pose a known or possible risk of contamination. This includes sections of the existing rail corridor, and potential contaminated areas identified from desktop review include the Toowoomba Waste Management Centre however the alignment would be in tunnel at this location therefore surface impacts are unlikely.

If not remediated or managed appropriately during construction, disturbance of contaminated land has the potential to result in human health and environmental impacts including impacts to soils, groundwater, vegetation and habitats.

6.1.3. Water

6.1.3.1. Surface Water

The Study Area is located within two catchments and the Preferred Alignment crosses a number waterways and tributaries, as described in **Section 5.1.2**.

Several water storages (dams) are located in the vicinity of the Preferred Alignment and may be directly or indirectly affected during the construction or operation of the Gowrie to Helidon Project and will be further assessed during subsequent Project stages.

Potential impact associated with a new railway from a water resources perspective primarily occur during construction and decommissioning and to a lesser extent during operations. Direct impacts from construction can include:

- The removal of riparian vegetation which may lead to indirect impacts like the deterioration in water quality due to the increased sediment runoff or wind borne erosion of exposed soils
- Disturbance in the waterway including both water quality modifications and alterations to surface water flows
- The introduction or spread of exotic vegetation that could undermine the quality of riparian vegetation communities
- Spills and accidents which may affect water quality.

Impacts to water quality and surface water flows can have indirect impacts both at the construction site and downstream. These impacts can be both biological, where the health of the stream ecology degrades, and on water users where the water quality may no longer be suitable for previous uses (e.g. recreational or agricultural purposes).

Impacts to surface water resources during the operational phase are likely to be minimal, where water quality treatment measures and spill containment devices are implemented as part of design and construction. Some maintenance activities would be required that may affect riparian vegetation communities, introduce the risk of spills

and accidents, and introduce the risk of spread of exotic vegetation. Spill containment facilities would be designed to take into account the potential spill volumes and sensitivity of the receiving environment.

6.1.3.2. Flooding

The Gowrie to Helidon Project will require numerous structures including culverts, bridges and larger multi-span viaducts over the waterways, flow paths and floodplains intersected by the Preferred Alignment. The Preferred Alignment determined during the Concept Assessment has been based on preliminary flood extent and flood level information available. The design will be further assessed and detailed in future design stages. No flood impact assessment has been conducted for this IAS.

Crossing of the Gowrie Creek floodplain would need to address potential impacts to the flood regime and risks within the area. This will be addressed in further design stages.

Other than the Gowrie Creek floodplain, the waterway crossings for the Gowrie to Helidon project are currently located at crossings of deep valleys where geometry driven viaducts or bridge structures would need to be adopted. Flooding characteristics at these large viaducts are not considered a design constraint due to their size and heights, however further analysis will be carried out in future stages of design.

Design shall ensure that the proposed project does not increase the likelihood or intensity of flooding events in the local area.

6.1.3.3. Groundwater

Nine registered private groundwater bores were identified within the Preferred Alignment using the DNRM Australian Groundwater Explorer. The depths of the bores varied from 24 to 95 m. Given the significant development in the area in recent years, further study will be required to determine the existing groundwater quality and understand the nature of potential impacts of railway construction and operation. Key potential impacts of a railway to groundwater resources are as follows:

- Activities which cause a decrease in ground water level such as dewatering activities and earthworks, particularly cuttings and tunnels, with potential impacts to water users and groundwater dependent ecosystems
- Activities which cause the spill or leaching of contaminants potentially impacting groundwater quality
- Impact to registered bore users, either through loss of access to bores within the corridor, or changes to bore levels or water quality.

6.1.4. Air Quality

6.1.4.1. Rail Corridor Constraints

Published monitoring and modelling studies of rail freight projects were reviewed in order to identify the likely air quality impacts from the operation of the proposed rail alignment.

Based on review of these documents, and in consideration of the projected freight train movements per day for the Inland Rail Programme, the following conclusions can be made with respect to potential air quality impacts.

- Beyond 25 m of the rail alignment, it is expected that there will be negligible influence from particulate emissions (diesel engine, emissions from load, and recirculated dust)
- Beyond 50 m of alignment, the gaseous criteria (as defined in EPP Air for human health and impacts on agriculture and sensitive ecological areas and in the National Environmental Protection Measures for human health protection) are expected to be met. This includes consideration of existing background concentrations.

Analysis of cadastral data and aerial photography was completed to identify residential and commercial receptors at a range of setback distances from the Preferred Alignment. The majority of sensitive receptors identified along the Preferred Alignment were found to be residential, making up the majority of all sensitive receptors identified. Localities that contributed significant numbers of residential receptors include - Mount Kynoch and Gowrie Junction in Toowoomba. Other residential receptors along the Preferred Alignment consist mainly of rural residential and rural properties. No receptors were identified to be within 50 m of the Preferred Alignment (except those directly impacted by the earthworks footprint which is assumed to be resumed). However further detailed analysis, such as air quality modelling, is recommended for the EIS stage of the Gowrie to Helidon Project to confirm predicted impacts and whether mitigation measures are required.

6.1.4.2. Tunnel

The initial air quality modelling results for the concept tunnel design suggest that based on modelled emissions from the tunnel portals only, there is potential for non-compliances for nitrogen dioxide (1 hour average) for the Toowoomba eastern and western portals, and potential non-compliance for PM_{10} (24 hour) for the western portal at sensitive receptors. Therefore detailed modelling is recommended to be undertaken during future project phases to determine the potential impacts on air quality and requirements for mitigations such as stack dispersion / ventilation in the tunnel design.

6.1.4.3. Construction Air Quality Impacts

Potential construction air quality impacts primarily relate to particulate emissions which are greatest during any clearing or earthworks. Earthworks and truck movements over unpaved surfaces result in the disturbance of surface material, which may be dispersed towards sensitive receptors during downwind conditions. The key air quality indicators for these types of activity are particulates.

Other aerosol emissions from construction activities include combustion products from the operation of diesel engines. These pollutants include carbon monoxide, nitrogen dioxide and PM_{10}.

Construction of new sections of line will progress in a linear fashion along the Preferred Alignment with impacts considered to be temporary (i.e. months). Where specific construction is being completed, for example tunnel works or embankments, the activities will be concentrated in a specific location for a longer period of time, and there may be a greater risk of air quality impacts.

It is recommended that the potential construction emissions should be further considered at the detailed assessment stage of the Gowrie to Helidon Project, when the construction stages and work locations have been identified.

6.1.5. Ecosystems

The Preferred Alignment will intersect areas of regulated vegetation and mapped essential habitat, particularly in the vicinity of the Toowoomba Range escarpment and foothills. The TEC Semi evergreen vine thicket has been previously identified in the Preferred Alignment in earlier studies although it has been confirmed as unlikely, based on a targeted RE verification survey.

A number of Eucalypt dominated “of concern” regional ecosystems will be intersected by the Preferred Alignment. Some of the regional ecosystems in the Study Area are also mapped as essential habitat (denoted by a * in **Table 6-1**).

Regional Ecosystems likely to be affected are listed as follows

Table 6-1 Potentially Impacted REs

Section	RE	VM Act Class	Biodiversity Status	Comment
Gowrie to Tunnel	No REs	NA	NA	Traverses agricultural areas, some protected plants may be present and will require survey in future stages of investigation.
Tunnel under Gowrie Creek	11.3.25 11.8.5 12.8.14/12.8.17 12.8.17 12.8.21 12.8.21/12.8.9	Least Concern Least Concern Least Concern Least Concern Endangered Endangered / Least Concern	OC NC NC/NC NC E E/OC	Unlikely these REs would be impacted as construction of the tunnel would not likely have surface disturbance
Tunnel exit to Jones Road	12.9-10.15 12.9-10.15**/12.3.7* 12.9-10.15**/12.9-10.7* 12.9-10.2/12.9-10.7* 12.9-10.7*	Endangered Endangered/ Least Concern Endangered/Of Concern Least Concern / Of Concern Of Concern	E E/NC E/OC NC/OC OC	The extent of impact is yet to be determined, as this cannot be based on the design footprint alone. Validation of the recent field investigations to verify the presence or absence of RE 12.9-10.15 will also be required.
Jones Road to McNamara's Road	12.9-10.2/12.9-10.3* 12.9-10.2/12.9-10.7* 12.9-10.7/12.9-10.2*	Least Concern /Of Concern Least Concern /Of Concern Of Concern/ Least Concern	NC/OC NC/OC OC/NC	10.9-10.7/12.9-10.2 will be passed over via a bridge and may have reduced impacts, depending on construction methods adopted.
Helidon Option-North (Preferred Alignment)	12.3.7* 12.3.7/12.3.3 12.9-10.7* 12.9-10.7/12.9-10.2*	Least Concern Least Concern / Endangered Of Concern Of Concern / Least Concern	NC NC/E OC OC/NC	This area was not traversed during surveys and therefore will require further investigation.
Helidon Option-South (Base Case)	12.9-10.7* 12.9-10.7/12.9-10.15* 12.9-10.7/12.9-10.2*	Of Concern Of Concern/ Endangered Of Concern/ Least Concern	OC OC/E OC/NC	This area is associated with the base case and is unlikely to proceed.

Section	RE	VM Act Class	Biodiversity Status	Comment
Murphys Creek Road to Helidon	12.3.7/12.3.3* 12.9-10.2	Least Concern / Endangered Least Concern	NC/E NC	12.9-10.2 is associated with a creek. Sections of both REs will have bridges which will reduce the impacts associated with the Gowrie to Helidon Project through those sections.
Note- * denotes where an RE is also mapped as essential habitat ** denotes where an RE is suspected of being incorrectly mapped, more likely to be RE 12.8.16				

6.1.6. Flora and Fauna

The Study Area provides potential habitat and movement opportunities for a large number of fauna species listed under the Queensland *Nature Conservation Act 1992* (NC Act) as well as species listed under the EPBC Act. Whilst *Phascolarctos cinereus* (Koala) is the most widespread, localised impacts (both direct and cumulative) on other threatened fauna species are possible.

Loss of habitat, habitat fragmentation and mortality during construction and operation are the key impacts to fauna that are likely to occur as a result of the Gowrie to Helidon Project.

A rail corridor may form a linear barrier to fauna movement, particularly if exclusion fencing is installed. Habitat fragmentation may isolate populations, which if confined to sufficiently small patches of habitat, may have a high chance of local extinction. Movement barriers may also restrict gene flow across the landscape. The Gowrie to Helidon Project includes a 6.3 km tunnel section under the Toowoomba Ranges and significant viaduct structures at Rocky Creek (approximately 600 m) and Six Mile Creek approximately (800 m), which are mapped within a state-wide environmental corridor. These design elements will reduce the impact to fauna movement including Koalas at these locations. Further development of the design during future project stages will identify additional fauna crossing locations and mitigation measures for fauna sensitive design.

The significance of the Toowoomba escarpment as part of the Great Dividing Range fauna movement corridor must be considered in future stages of design refinement. The cumulative impact of the TSRC motorway and the Inland Rail Gowrie to Helidon Project will also need to be investigated in future stages of impact assessment.

The current investigations have not identified any significant ecological issues which are likely to impact long term operation of the completed project. The Gowrie to Helidon Project will be referred under the EPBC Act for its potential to impact on matters of national environmental significance (described **Section 6.6**). Following referral and refinement of the project design it is likely that more detailed targeted surveys for EPBC Act and NC Act species including *Phascolarctos cinereus* (Koala), *Delma torquata* (Collared Delma) and *Turnix melanogaster* (Black Breasted Button Quail) and further verification of the absence or presence of TECs will be required.

6.2. Amenity, including noise, air quality, vibration, lighting, urban design and visual aesthetics

6.2.1. Noise and Vibration

The preliminary noise and vibration assessment for the Gowrie to Helidon Project included unattended noise monitoring at four locations in the Study Area to characterise typical noise environments that may be expected along the Preferred Alignment:

- Rural - close to existing railway
- Remote rural – no major infrastructure
- Outer suburban - some rail and local roads in the vicinity
- Major infrastructure – Warrego Highway and existing rail.

The likely noise and vibration impacts associated with the operation of the Gowrie to Helidon Project were predicted using an airborne noise propagation model implemented in SoundPlan. Groundborne noise and vibration will be modelled as part of the EIS.

Noise modelling will occur during the EIS phase that will determine the required location and nature of mitigation measures for airborne noise.

6.2.2. Landscape and Visual

A qualitative appraisal of potential landscape and visual impacts has been prepared with reference to the key prominent design features, including tunnel portals, proposed elevated structures and area of extensive excavation and cutting to accommodate the Preferred Alignment.

A summary of the anticipated impacts have been described in **Table 6-2**.

Table 6-2 Summary of Anticipated Impacts

LOCALITY	DESCRIPTION
1. Gowrie rail alignment deviation	• Severance of existing agricultural parcels of land and potential impact on agricultural character • Impact on existing farmsteads • Potential visual impact on properties along Ganzer Road and Hermitage Road, the northern edge of Cotswold Hill and Wilsonton Heights and properties situated within Mount Kynoch.
2. Toowoomba Tunnel Western portal	• Excavation at the tunnel portal resulting in the removal of some mature vegetation • Potential visual impact on properties situated to the west and from distant elevated scenic viewpoints.
3. Toowoomba Tunnel Eastern portal	• Excavation at the tunnel portal resulting in the removal of mature vegetation • Potential impact on local properties and farmstead.
4. Undulating terrain	• Areas of deep cutting and embankment are anticipated, resulting in the removal of mature vegetation and impact on the forested foothills character

LOCALITY	DESCRIPTION
	• Potential visual impact from Mount Kynoch
5. Elevated structures	• Anticipated areas of elevated structure with potential for far reaching visual impact • Potential for impact on the forested hills character as a result of the introduction of rail infrastructure and structures.
6. Foothills topography	• Potential for extensive earthworks across the undulating foothills with sections of deep cutting, earthworks and structure to allow the rail alignment to connect across the landscape • Extent of earthworks and structure are difficult to determine at this stage, however landscape and visual impacts are likely to arise • Impact on the Bicentennial National Trail.
7. Elevated structures	• In areas long elevated embankments and bridge structures are anticipated to meet the vertical curvature requirements of the rail alignment. The introduction of the bridge structure has the potential to impact on the forested foothills character.
8. Helidon	• The alignment is anticipated to be visible from the northern edge of Helidon Spa, Helidon and properties situated on Conner Road • At this location the alignment is anticipated to be close to ground level with localised areas of cutting and embankment.

6.3. Social Environment

A review of previous studies for similar proposals and information from stakeholder engagement for the Gowrie to Helidon Project has been used to identify likely social impacts. Potential social impacts during planning, construction and operation are identified hereafter. It should be noted that not all impacts listed are adverse, neither is this list definitive.

6.3.1. Amenity and Social Cohesion

Public perception about the Gowrie to Helidon Project and concerns about impacts during different phases of planning and construction may lead to social stress and confusion in affected communities.

During construction there may be reduced connectivity between key locations along the rail corridor as a result of road network disruptions.

Land take for the Gowrie to Helidon Project may result in severance of properties and a reduction in available land for agricultural holdings, potentially affecting the viability of operations. The presence of the Preferred Alignment may result in long term changes to land use patterns around it.

During construction and operation there are likely to be amenity impacts to residential, rural residential and rural land uses where the Preferred Alignment passes through these areas. This includes noise, air quality and visual impacts which are described in **Section 6.2**.

6.3.2. Community Health and Safety

Potential community health and safety concerns that will require detailed assessment in future project stages includes impacts arising from locomotive exhaust, coal and grain dust and the potential risk of rail accidents. The new Preferred Alignment will cross a number of existing roads and there is a risk that level crossings will increase the risk to road and rail users. Level crossings will be subject to a risk assessment to determine acceptable safety.

Increased road traffic particularly heavy vehicles during construction may also increase the risk of traffic incidents and generate increased noise and dust.

6.3.3. Access

The construction of the Gowrie to Helidon Project may result in temporarily reduced access to some open spaces, retail, community or educational services in the Study Area. The construction of the Gowrie to Helidon Project may also cause temporary disruption to the availability of rail services and accessibility of stations.

6.3.4. Housing and Workforce

During construction there is the potential for temporary and localised inflation in property prices and reduction in the availability of rental properties to the influx of additional workers to the area. There is an opportunity to utilise local workforce and enhance economic development opportunities through local supply chains.

A rigorous social impact assessment process in future project stages will analyse potential social impacts in further detail, with input from the community through consultation. This will identify how positive social impacts can be enhanced and negative impacts mitigated and/ or managed. A Social Impact Management Plan will address management measures through all project phases (planning/design, construction and operation).

6.3.5. Cultural Heritage

6.3.5.1. Aboriginal Cultural Heritage

In accordance with the *Aboriginal Cultural Heritage Act 2003*, all persons in Queensland have a Duty of Care to take all reasonable and practicable measures to ensure they do not harm Aboriginal cultural heritage whenever they undertake an activity. The *Aboriginal Cultural Heritage Act 2003* provides a number of processes that allow a person undertaking an activity to meet their Duty of Care, including an assessment of the proposed activity against the Duty of Care Guidelines (undertaking a cultural heritage risk assessment).

Despite some sections of the Study Area being cleared there remains a risk to Aboriginal cultural heritage, especially adjacent to creeks and tributaries which although cleared may contain evidence of prior Aboriginal use.

Based on the results of the desktop assessment, the proposed Project activities would be carried out in a 'high risk landscape' and meets Category 5 of the Duty of Care Category. This means the proposed activity would traverse or be in proximity to landscapes which have a higher risk of Aboriginal Cultural Heritage being present. High risk landscapes include those where natural landscape features are present, such as rock outcrops, caves, wetlands, permanent water holes, creeks, springs, hills and mound formations.

The existence of known Aboriginal cultural heritage sites and intangible sites within and in proximity to the Study Area, as well as high risk landscape features such as creeks, indicate that there is a high cultural heritage risk to the Gowrie to Helidon Project. It is likely that further Aboriginal cultural heritage values exist as yet unidentified within the Study Area.

The results of initial consultation meetings with the Aboriginal parties for the Study Area also indicate the likely presence of additional Aboriginal cultural heritage object, items and values.

6.3.5.2. Historical Cultural Heritage

A search of the Australian Heritage Database, Queensland Heritage Register, Local Planning Schemes (Toowoomba, Lockyer Valley, and Ipswich) and Queensland Rail Heritage Register identified one place within the Study Area – the Main Range Railway (recorded on the Queensland Heritage Register).

Any works that may impact on known heritage-listed places may require approvals from Commonwealth, State or local authorities and therefore represent a potential constraint to the Gowrie to Helidon Project.

Desktop analysis identified the presence of previously unidentified and unlisted historical heritage places and values within the Study Area. The potential for public nomination to a heritage register or list of previously unlisted places poses an additional potential constraint on the Gowrie to Helidon Project.

6.4. Economic Effects

As a major infrastructure project, the Gowrie to Helidon Project is likely to contribute significantly to the economy of Queensland; in particular the following positive economic impacts are expected:

- Creation of employment opportunities during the planning, design, construction and operation of the Gowrie to Helidon Project
- Flow on economic effects in local communities due to employment opportunities and presence of the workforce within the Study Area
- Ongoing economic benefits arising from increased efficiency of freight transport
- Once operational, the Inland Rail Programme will result in a major transformation of the freight haulage network in eastern Australia.

Detailed socio-economic assessment will be conducted in future project phases to identify and quantify the benefits and impacts of the Gowrie to Helidon Project.

6.5. Built Environment

Major built infrastructure and transport infrastructure in the Study Area is described in **Section 5.3 and 5.4**.

6.5.1. Transport Infrastructure Impacts

There are a number of transport infrastructure crossings along the Preferred Alignment including arterial and local roads and the existing rail line.

Due to the vertical alignment of the Preferred Alignment and the cuts and embankments required, a number of grade separations are required for existing roads. However level crossings will also be required. The strategy for road crossings for the Gowrie to Helidon Project has considered a number of options including grade separation, active crossings (boom gates and lights), passive crossings (stop signs), road closures and road diversion. In general, highway and arterial road crossings are to be grade separated, and sub-arterial to local/undefined roads will be determined on a risk basis in accordance with national risk-based approaches. In future project stages consultation with DTMR and local councils will be conducted to agree the specific treatment at each crossing.

During construction the Gowrie to Helidon Project will result in localised impacts to existing traffic and transport networks as construction progresses in stages through the Study Area. Likely impacts include:

- Increased light and heavy vehicle traffic on the Warrego Highway and other roads in the Study Area for the transportation of construction personnel, materials and resources for construction.
- Based on concept phase alignment design, construction is likely to generate an excess quantity of material and it is likely that a large proportion of the materials excavated will have some engineering reuse. Due to the significant tunnelling and cut requirements, there is likely to be an excess of material which will need to be spoiled, potentially with significant haulage requirements.
- Local access changes where local roads are required for construction access, this may include temporary road closures or detours.

Construction traffic management will be detailed in future project stages and will include a traffic management plan as part of the Construction Environmental Management Plan (CEMP) and consultation with stakeholders including local and state authorities.

As identified in **Section 5.4** the Gowrie to Helidon Project interacts with the corridor of the TSRC project. The TSRC design made allowance for the location of piers for the Gowrie to Helidon project to go between the road lanes for a viaduct structure on a high skew near Helidon. As part of the alignment refinement process conducted for the Gowrie to Helidon project, the Preferred Alignment no longer runs through the TSRC at that location, but crosses the route further to the west on a shorter span which crosses perpendicular. Liaison with TSRC designers will be required to assess the implications of this change on both schemes.

6.5.2. Other Infrastructure Impacts

As identified in **Section 5.3** there are a number of utilities and services in the Study Area that will be crossed by or interact with the Preferred Alignment, including a gas pipeline, water pipeline, transmission lines and other smaller services.

Subject to consultation with APA Petroleum Pty Ltd, the Roma to Brisbane gas pipeline which is traversed by the Preferred Alignment may have to be diverted or bridged by the rail alignment and these details will be confirmed in the next phases of design.

Clearance to transmission lines and towers at each crossing must be confirmed through survey and field assessments to ensure adequate clearance. If there is insufficient clearance then raising or relocation of power lines, or rail alignment variations might be required to increase the clearance.

Crossing of other services has not been considered in the concept design stage however this will need to be assessed in future stages of design.

Engagement with major utility providers and land owners will need to occur to ensure any planned modification or upgrades to this infrastructure can also be considered.

Although the Harlaxton Key Resource separation area occurs within the Study Area, no direct impacts to the KRA have been identified. This will need to be confirmed in future project stages when the locations and details of project infrastructure and ancillary facilities are known.

6.6. Matters of National Environmental Significance under the EPBC Act

The Study Area provides potential habitat and movement opportunities for a large number of fauna species listed under the NC Act as well as species listed under the EPBC Act.

MNES potentially relevant to the Gowrie to Helidon Project were identified through a search of the DotE's PMST, adopting a search buffer of 5 km from the Preferred Alignment. This identified six listed TECs, 26 listed threatened species (including 12 bird species, 10 mammal species, 5 reptile species, 1 fish species and 20 flora species), and 13 listed migratory species as potentially occurring in the Study Area. A further 20 marine species were identified in the search.

6.6.1. Threatened Ecological Communities

Six TECs were identified in the EPBC Act PMST as potentially occurring within 5 km of the Preferred Alignment, including the semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Regions (Endangered).

Regional Ecosystem mapping identifies an area of Endangered RE 12.9-10.15 Semi-evergreen vine thicket with *Brachychiton rupestris* (Queensland Bottle Tree) on sedimentary rocks in the vicinity of the Toowoomba tunnel portal (east) in the Preferred Alignment. In Queensland, the semi-evergreen vine thicket TEC is only listed as a matter of national environmental significance in the Brigalow Belt bioregion. The vegetation community is also known to occur in the South-east Queensland bioregion, where it is not listed as a TEC.

It is noted that ecological investigations undertaken in the early 2000's for the Gowrie to Grandchester Study (QT, 2003) identified the potential for 'endangered vine thicket' protected under the EPBC Act and the NC Act to occur on the 'scree slopes of the Toowoomba Range escarpment'. These scree slopes are on the eastern edge of the escarpment, within the South-east Queensland bioregion. The Gowrie to Grandchester Rail Corridor Study was referred under the EPBC Act in 2001 and 2002, but both referrals were withdrawn. Based on the current TEC listing for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions, this statement concerning the endangered status this community under the EPBC Act is incorrect due to the location of the mapped semi-evergreen vine thicket in the South East Queensland bioregion.

Despite the mapped semi-evergreen vine thicket being located in the South-east Queensland bioregion this community is classified as endangered in Queensland and additional site investigations were completed to ground-truth the vegetation composition. Initial field investigations undertaken in April and June 2016 identified that the dominant canopy species present in this patch include *Eucalyptus crebra* (Narrow leaved Iron Bark), *E. tereticornis* (Forest Red Fum), *C. intermedia* , *A. floribunda* White Sally Wattle), *L. confertus*, (Queensland Brush Box) and *E.*

melliodora (Yellow Box). Based on these observations, this area is considered likely to be consistent with RE 12.8.16, *Eucalyptus crebra* +/- *E. melliodora*, *E. tereticornis* woodland on Cainozoic igneous rocks. However, an area of semi-evergreen vine thicket appears to be present on the steep slope south-east of the tunnel portal, outside the Gowrie to Helidon Project footprint.

RE 12.8.16 can, however, be associated with another TEC, according to the DoE listing and conservation advice for the Critically Endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC (also known as Box-Gum Grassy Woodland and Derived Grassland) in the far western part of the bioregion. This TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*) and/or Blakely's Red Gum (*Eucalyptus blakelyi*) trees. Initial field observations, which included a quaternary level vegetation assessment, indicate that this patch is considered unlikely to meet the condition class requirements as defined in the listing advice and conservation advice for this TEC. Several key canopy indicator tree species were not observed during the site investigation, including White Box and Blakely's Red Gum and *E. melliodora* was only a minor component within the canopy, with only a single tree observed.

In addition to the species composition of the canopy layer, the native species diversity in the understory was also low and the dominant shrub was Lantana (*Lantana camara*), a declared pest plant. To be considered as a TEC, the native perennial vegetation of the ground layer must be dominated by native species and contain at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns and sedges).

Based on the vegetation survey the evidence for the TEC being a component of the RE is weak, due to only *E. melliodora* being present in the canopy, reduced native species diversity in the understorey and the dominance of Lantana in the shrub layer. In future stages, further investigation and consultation with DNRM will be required as this may require a correction to the RE mapping within the alignment.

The remaining four TECs were not considered likely to occur, based on a review of DNRM regional ecosystem mapping. These were also not identified during initial field investigations. The four TECs considered unlikely to occur include:

- Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions: Endangered
- Lowland Rainforest of Subtropical Australia: Critically Endangered
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland: Critically Endangered
- Weeping Myall Woodlands: Endangered.

6.6.2. EPBC Act Listed Threatened Fauna

The EPBC listed threatened fauna species considered to have higher potential to occur in the area, based on a preliminary species likelihood assessment, observations during initial field investigations and species records documented for the nearby TSRC motorway include:

- Koala (*Phascolarctos cinereus*)
- Collared Delma (*Delma torquata*)
- Spotted Quoll (*Dasyurus maculatus maculatus*)
- Greater Glider (*Petauroides volans*)

- Grey Headed Flying Fox (*Pteropus poliocephalus*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Regent Honeyeater (*Anthochaera phrygia*)
- Red Goshawk (*Erythrotriorchis radiates*)
- Painted Honeyeater (*Grantiella picta*)
- Swift Parrot (*Lathamus discolour*)
- Black-breasted Button-quail (*Turnix melanogaster*)
- Yakka Skink (*Egernia rugosa*)
- Giant Barred Frog (*Mixophyes iteratus*), although not documented in desktop searches, with suitable habitat identified at one location.

The potential for the presence of threatened fauna including both EPBC Act listed and State listed species will need to be considered in future survey effort and impact assessment.

The Gowrie to Helidon Project will likely have an impact on Koala habitat. Koala Spot Assessment Technique (KSAT) survey was undertaken across seventeen sites within the current investigation area. The data collected suggests low koala activity levels across the area which may indicate transitory individuals at some sites although it is also possible that areas of lower population density were sampled.

6.6.3. EPBC Act Listed Threatened Flora

The EPBC Act listed flora species considered to have higher potential to occur in the area, based on a preliminary species likelihood assessment, observations during initial field investigations and species records documented for the nearby TSRC motorway include:

- Hairy-joint Grass (*Arthraxon hispidus*)
- *Grevillea quadricauda*
- Wandering Pepper-cress (*Lepidium peregrinum*)
- Austral Toadflax (*Thesium australe*)
- Stream Clematis (*Clematis fawcettii*)
- Austral Cornflower, Native Thistle (*Rhaponticum australe*)
- *Sophora fraseri*.

Whilst the initial field survey effort was not targeted for protected plant surveys, the presence of *Thesium australe* was observed. This record was identified as part of the nearby TSRC motorway investigations. The potential for the presence of threatened flora including both EPBC Act listed and State listed species will need to be considered in future survey effort and impact assessment.

6.6.4. Migratory Species

Thirteen migratory species (MNES under the EPBC Act) were identified in the PMST search undertaken for the Study Area and surrounds. Additional migratory species were also identified in the WildNet search. A preliminary species likelihood assessment concluded the following species as having potential to occur.

- Australian Reed-warbler (*Acrocephalus australis*) (possible in limited habitat)
- Fork-tailed Swift (*Apus pacificus*) (high likelihood)
- Cattle Egret (*Ardea ibis*) (high likelihood)
- Latham's snipe (*Gallinago hardwickii*) (possible in limited habitat)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*) (Occasional)
- Rainbow Bee-eater (*Merops ornatus*) (known)
- Black-faced Monarch (*Monarcha melanopsis*) (High in limited habitat)
- Rufous Fantail (*Rhipidura rufifrons*) (High in limited habitat)
- Spectacled Monarch (*Symposiachrus trivirgatus*) (High in limited habitat)
- Marsh Sandpiper (*Tringa stagnatilis)* (Moderate likelihood).

6.6.5. Wetlands of International Importance

The PMST identified four Wetlands of International Importance (Ramsar) as potentially relevant to the Study Area. This included the Narran Lake Nature Reserve (400-500 km upstream), the Banrock Station Wetland Complex, the Riverland and the Coorong and Lakes Alexandrina and Albert Wetland, all located more than 1200 km away. Whilst activities in the upper reaches of these catchments can have an influence downstream, the sheer distance and number of different land use activities and pressures between the Study Area and these Ramsar sites significantly reduces the likelihood of an impact being generated at this distance.

7. ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

7.1. Natural environment

7.1.1. Land

Land use impacts (direct and indirect) are likely to result from the Gowrie to Helidon Project. Further consideration of potential land impacts (severance, access, direct impact, and amenity) will be undertaken during subsequent project phases. Further design refinements will be aim to minimise impacts on property owners particularly outside of the previously protected corridor. Construction planning will be required to determine the laydown requirements and optimally locate construction workspaces to minimise property impact.

Other impacts to land include geological and soils impacts identified that will influence the design and also require mitigation during construction. Future design stages will include geotechnical testing to confirm ground conditions and progress the design accordingly. Design mitigation will include measures to minimise the effect of shrink/swell in soils, minimise slope instability, drainage design to reduce the inflow of water into dispersive soils.

During the construction phase, management of environmental impacts will be directed by a CEMP, detailing necessary mitigation such as erosion and sediment control planning, and staging of vegetation clearing and earthworks to minimise the extent of exposed ground to prevent topsoil transport.

Further contaminated land investigation will be required in future project stages, including field investigations testing where risk of contamination is likely. Similarly, further review of UXO risk in the Study Area is warranted given the history of previous defence uses in the vicinity. This includes works within proximity to the existing rail corridor.

7.1.2. Water

Due to the linear nature of a railway, it is often not possible to avoid crossing and impacting waterways. The following principles and mitigation measures will be investigated during the design phase to minimise impacts.

- Reduce in-stream disturbance impacts through the widening of existing bridges and/or culverts, rather than establishing new structures
- Minimise the number of crossings on each waterway where possible, however multiple perpendicular crossings are preferred to crossing of long sections
- Minimise the need for in-stream works, i.e. bridges are preferable to culverts at major waterway crossings
- Where possible, avoid realignment of waterways
- Design bridges such that works are avoided within riparian, littoral and in-stream environments as much as possible
- Design drainage systems to provide stormwater quality treatment prior to discharge to sensitive receptors
- Provide spill containment devices using a risk based approach taking into account sensitive receptor locations
- Design tunnels to prevent inflow and consequent draw down of the water table
- Identify areas that may require additional scour protection during construction
- Undertake geological investigations to inform the management of erosion prone and alluvium aquifer areas, and determine the risk of soils being impacted by the lowering of groundwater causing the soils to change properties and release contaminants

- Undertake hydrological investigations to determine the size and location of stormwater management devices to collect any excess water and treat stormwater run-off and determine the location of high risk areas in terms of impacts to groundwater quality and draw down.

Management of impacts during the construction phase will be documented in a CEMP prior to the commencement of construction and will likely include:

- Design and implementation of erosion and sediment control measures to minimise erosion occurring and sedimentation impacting surface waters
- Avoidance of high risk construction activity / earthworks during wet weather
- Minimise disturbance to stream banks and beds
- Rehabilitate and revegetate the worksite after the completion of works (or as areas are no longer required for construction activities).
- Exclude from the construction zone as far as practicable sensitive areas where groundwater is close to the surface
- Where it is determined that groundwater will be extracted and used during construction, minimise the groundwater use and cease groundwater extraction once the amount specified/permitted is reached.

7.1.3. Air Quality

7.1.3.1. Preferred Alignment

No receptors have been identified in the 50 m screening buffer separation distance from the rail corridor centreline adopted for the initial review of potential air quality impacts. However to assess whether there is an actual risk of non-compliance with the air quality goals, air quality modelling will be completed for the EIS stage of the Gowrie to Helidon Project to refine impact predictions and determine appropriate mitigation measures.

7.1.3.2. Tunnel

Preliminary dispersion modelling has been completed, and this indicates that the air quality goals for nitrogen dioxide and PM_{10} may be exceeded at the nearest receptors to the eastern and western portals for the Toowoomba tunnel. On this basis, it is concluded that air quality mitigation measures in the form of mechanical ventilation and potential dispersion of emissions via a vertical stack may be necessary. Further detailed modelling and analysis will be necessary to confirm the mitigation requirements, and the specific design details to achieve air quality goals.

7.1.3.3. Construction

Management of potential air quality impacts during the construction phase will be documented in a CEMP prior to the commencement of construction, including measures to minimise dust generation, minimise exposed earth, implementation of erosion and sediment controls, measures for rehabilitation of works areas after completion, and traffic management to reduce dust generation and impacts to sensitive receptors.

Many of these requirements will require further documentation and or approval as part of the EIS or in post-EIS approvals.

7.1.4. Noise and Vibration

Construction noise and vibration will be managed in accordance with the state legislation and policy.

Noise impact mitigation measures for the operational phase will be employed where modelling indicates that it is required. The type and extent of mitigation measures will be contingent on the results of future noise modelling that will be undertaken during future design phases and throughout the EIS process.

7.1.5. Ecosystems and Flora and Fauna

The Gowrie to Helidon Project will be referred under the EPBC Act for its potential to impact on MNES.

There are opportunities to incorporate ecological outcomes into the project design for example through the provision of fauna passage at key locations in the Preferred Alignment and to minimise ecological impacts in key areas through reduced earthworks footprints and alignment refinement. Design will need to incorporate fauna movement considerations.

A Construction EMP will be developed to ensure management and mitigation measures and conditions of approval are clearly documented, and are implemented during the construction phase of the Gowrie to Helidon Project. This will include definition of no-go zones, requirements for post-works rehabilitation, and scheduling of works where necessary to minimise impacts during breeding periods or times of heightened environmental sensitivity.

More detailed targeted surveys for EPBC Act and NC Act listed threatened species including Koala (*Phascolarctos cinereus*), Collared Delma (*Delma torquata*) and Black Breasted Button Quail (*Turnix melanogaster*) will be required to determine potential impacts, and mitigation measures.

An offsets strategy is currently under development.

7.1.6. Landscape and Visual

A number of potential landscape and visual mitigation measures have been identified for consideration in future project stages to avoid, minimise and manage the potential impacts that may arise. These may include development of site specific earthworks design solutions to reduce impact where possible, such as steeper earthworks profiles to reduce extent of physical impact where required, or shallower earthworks to respond to surrounding terrain with opportunities to return larger extent of acquired land to current use, and profiling of earthworks to reduce engineered appearance and reflect the surrounding natural landform.

Landscape and visual treatments will also be defined in future stages of design including screening and planting. A residual land strategy could identify ways to maximise the amenity value and future use (such as screening or revegetation) for areas of residual land.

Landscape and visual treatments can be delivered as part of a coordinated response, integrated with provision of noise, fauna sensitive design and water quality provisions.

7.2. Built Environment

Built infrastructure and traffic and transport within the Study Area are described in **Sections 5.3 and 5.4** and potential impacts identified in **Section 6.5**. The Gowrie to Helidon Project will interact with existing infrastructure including road, rail, pipelines and utilities in the Study Area. Key mitigation for these impacts will be detailed in future design stages but will include:

- Consultation with stakeholders including State and local authorities and utility providers to discuss potential Project impacts and design options to avoid or mitigate impacts
- Design development to determine options for minimising impacts
- Liaison with TSRC motorway designers will be required to assess the implications of the Preferred Alignment on both schemes
- Additional survey to identify all utilities and services (including minor utilities, farm irrigation etc.) so that they can be considered in design development

7.3. Cultural Heritage Management Plan (Indigenous)

The existence of known Aboriginal cultural heritage sites and intangible sites within, and in proximity to, the Study Area, as well as high risk landscape features such as creeks, indicate that there is a high cultural heritage risk to the Gowrie to Helidon Project. It is likely that further Aboriginal cultural heritage values exist within the Study Area.

Further assessment and consultation is proposed in future project stages to determine the management measures required for Indigenous Cultural Heritage. This includes:

- A Cultural Heritage Field Assessment of the entire route by a suitably qualified archaeologist with the relevant Aboriginal parties to identify Aboriginal and/or historical cultural heritage objects, items and places
- Development of a Cultural Heritage Management Plan under Part 7 of the *Aboriginal Cultural Heritage Act 2003* or a voluntary Cultural Heritage Management Agreement in order to manage Aboriginal cultural heritage.

Native Title may still exist in areas of the Preferred Alignment. Whilst Native Title has been extinguished over freehold land under the NT Act, Native Title interests and rights may exist over other land. The Gowrie to Helidon Project will require an assessment of Native Title within the Preferred Alignment, consultation with registered Native Title parties and authorisation under the Native Title Act.

The CEMP for the Gowrie to Helidon Project will include measures for the management of cultural heritage impacts, including a protocol for the 'Accidental discovery of Aboriginal cultural heritage'.

7.4. Non-indigenous Cultural Heritage Management

There is a listed heritage place within the Preferred Alignment and the potential for other unlisted places of heritage significance in the Preferred Alignment and wider Study Area. Further heritage assessment will be conducted in future project stages and consultation with local heritage groups and regulatory authorities to determine heritage values and required management measures. This would include design refinement to minimise impacts to listed heritage places (the Main Line Railway) and obtaining relevant heritage permits and approvals for impacts to listed heritage places. The CEMP would also include management measures for the construction phase to describe the measures to minimise impacts to heritage values in the Preferred Alignment.

7.5. Greenhouse Gas Management

Greenhouse gas (GHG) calculations have not been conducted at this stage of the Gowrie to Helidon Project due to the preliminary stage of design and construction planning. Construction of the Gowrie to Helidon Project will generate GHG through the transport of materials, embodied energy of materials used for construction and the consumption of electricity and other fuels during construction (earthworks, tunnel boring etc.). Construction of large-scale infrastructure projects is GHG intensive, with tunnelling and bridging known to be more GHG intensive construction activities (Hill et al 2011).

During operation the key contribution to GHG emissions include diesel consumption from locomotives and electricity consumption required for tunnel operation. The Gowrie to Helidon Project will also have a significant beneficial impact in GHG generation due to the transfer of freight transport from road to rail. On average, road transport has significantly greater GHG emissions that rail transport – approximately 62g Co_2/tonne-km compared to 22g CO_2/tonne-km (Cefic 2011).

There are a number of opportunities for the reduction of GHG generation during construction and operation of the Gowrie to Helidon Project, including:

- Optimise tunnel ventilation to reduce energy requirements during operation
- Selection of construction materials with low embodied energy
- Optimising the cut/fill balance for earthworks to minimise material transport requirements
- Driver assistance systems and speed management.

7.6. Waste Management

The ARTC Environmental Policy (2014) commits to 'preventing or minimising pollution and the generation of waste' in all of their activities'. This policy is broadly consistent with the waste and resource management hierarchy's of the National Waste Policy (DoE, 2009) and the Queensland Waste Management Strategy (DEHP, 2014) which set an order of preference for options for managing waste—from avoiding/reducing, to reusing, recovering, treating and disposing of waste.

The further development of the Gowrie to Helidon Project design and construction will be required to manage waste and materials in accordance with ARTC's Environmental Policy and industry standards through procurement requirements. Furthermore economic incentives to balance earthworks materials to minimise material moved within and into/out of the project area during the construction phase are expected to drive design development and construction approaches.

7.7. Hazard and Risk, Health and Safety

All ARTC's operations and activities, including activities undertaken by their contractor's, are required to be undertaken in accordance with ARTC's Safety Policy and Standards which are available on the ARTC website (www.artc.com.au).

The Inland Rail programme including the Gowrie to Helidon project will be procured, designed, constructed and operated with regard to ARTC's policies and systems and relevant legislation, guidelines and standards.

7.8. Environmental Management

All ARTC's operations and activities, including those undertaken by their contractor's, are required to be undertaken in accordance with ARTC's Environmental Policy (2014) which is available on the ARTC website (www.artc.com.au) and

Environmental Management System. The ARTC Environmental Policy provides a framework for continual improvement of an Environmental Management System and sets our commitments for managing potential environmental risks.

This EMS outlines processes that are designed to guide compliance with environmental laws, statutes, regulations and corporate policies while managing ARTC's environmental impacts.

The principal benefits of operating the ARTC EMS include:

- A clear definition of the corporate environmental goals;
- Documented policies and procedures that aim to prevent and / or minimise environmental damage and achieve legal compliance;
- Improved management of environmental risks;
- Documented roles and responsibilities in the decision making process; and
- Improved community relationships.
- The EMS also provides a structure for staff training, measuring environmental performance, environmental auditing and managing non-conformances.

The Gowrie to Helidon Project will be procured, designed, constructed and operated with regard to ARTC's policies and systems and relevant legislation, guidelines and standards.

Avoidance and minimisation or environmental impacts have been a key factor in the route selection processes for the Gowrie to Helidon Project. As the Gowrie to Helidon Project progresses, impact avoidance and reduction will remain key drivers in design development.

Key aspects to be addressed include:

- Further definition of habitat and vegetation impacts, through iterative design and environmental assessment
- Confirmation of the location of MNES and MSES habitat and species presence, and significance of populations, through targeted ecological investigations, in accordance with relevant State and Commonwealth survey guidance
- Confirmation of other environmental values in the project area
- Design development to avoid, reduce or manage impacts to identified environmental values
- Determination of environmental offset requirements for MNES and MSES impacts. A Programme-wide approach to biodiversity offset management is currently being considered.

The Gowrie to Helidon Project's environmental outcomes should also be considered in the context of the overall intent and outcomes of the Inland Rail Programme. The establishment of a freight rail route that provides a comparable level of service to road freight is expected to negate or delay the need for progressive upgrades of the National Highway and associated environmental impacts.

An environmental management approach consistent with the including development of and Environmental Management Plan for the Construction and Operational phase of the Gowrie to Helidon Project will be developed based on the potential environmental impacts of the Gowrie to Helidon project. These have initially been identified in this IAS and will be further developed and understood during the environmental assessment phase.

7.9. Temporary Infrastructure Decommissioning and Rehabilitation

7.9.1. Laydown Areas, Offices, Stockpiles, Topsoil and Cleared Vegetation

The project will incorporate numerous laydown areas along the preferred alignment. The location and extent of these will be determined during future design phases during the EIS.

During construction the laydown areas will be progressively decommissioned and rehabilitated.

Demountable buildings will be removed progressively and concrete slabs broken up. The surface of all rehabilitated areas will be relieved of compaction prior to rehabilitation. De-compaction (ripping) or aeration will be done in accordance with management plans developed during the EIS. Previously excavated material stockpiled on site will be used to reinstate and the ground form to ensure that it is returned to its pre-existing profile and contour.

Some sediment and erosion control measures will be left in place until completion of the rehabilitation of the area. Upon removal of offices, laydowns, stockpiles, topsoil and cleared vegetation will be spread over the area and seeding undertaken according to a Rehabilitation Plan that shall be developed in later phases of the project.

Permanent erosion and sediment control measures (drainage and berms) may be installed as appropriate prior to re-spreading of topsoils and maintained until rehabilitation goals are achieved.

Some office facilities may be left for the Commissioning phase within the railway corridor.

7.9.2. Access Tracks and Roads

Access roads and tracks that will no longer be used will be decommissioned. Decommissioning of the temporary road/accesses shall achieve complete stabilisation and restoration to a condition generally consistent with the pre-existing area characteristics.

Treatments will be designed and implemented to completely eliminate the road/access track by restoring natural contours, hydrology, and vegetation through mechanical and/or natural means.

8. APPROVALS REQUIRED FOR THE GOWRIE TO HELIDON PROJECT

If the Gowrie to Helidon Project is declared a coordinated project and is also determined to be a controlled action under the EPBC Act it is anticipated that assessment may be progressed under the Bilateral Assessment Agreement between the Australian and Queensland Governments.

Further approvals are likely to be required under separate approvals processes. By the time this point is reached, the Queensland *Sustainable Planning Act 2009* is anticipated to be replaced by the *Planning Act 2016* (and subsequent regulations). This new legislation will establish the requirements for development permits including waterway barrier works and vegetation clearing. Other permits may be required under the NC Act (Protected Plant clearing permits, Species Management Programs). Furthermore other post-approval management plans may be required to progress implementation of the Gowrie to Helidon Project.

Table 8-1 summarises the approval and permit requirements likely to be applicable to the Gowrie to Helidon Project. Approval and permit requirements may vary depending on the final design and construction methodology, and future changes in statutory requirements prior to project implementation. Further detailed review of legislative requirements should be conducted in future project phases.

Table 8-1 Anticipated Approvals

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	Federal Department of the Environment and Energy	EPBC Act referral to the Federal Department of the Environment and Energy for determination on whether the proposal is a 'controlled action'	Undertaking an action which has or is likely to have a significant impact to Matters of National Environmental Significance	Potential project impacts to Matters of National Environmental Significance including threatened species and threatened ecological communities	Coordinated and assessed under the provision of the assessment bilateral between the Queensland and Commonwealth governments.
State Development and Public Works Organisation Act 1971 (Qld) (SDPWO Act)	Coordinator General	Coordinated Project decision and subsequent Environmental Impact Statement or Impact Assessment Report	Declaration by the Coordinator-General	The proposed approval pathway for the Gowrie to Helidon Project currently assumes 'coordinated project for which an EIS is required' under the SDPWO Act.	Coordinated
Native Title Act 1993 (Cth)	National Native Title Tribunal	Where an interest is required on land where native title has not been extinguished, the requirements of the NT Act must be met before tenure can be granted.	Works within areas where Native Title exists.	Native Title may still exist in areas of the Preferred Alignment. The Gowrie to Helidon Project will require an assessment of Native Title within the Preferred	Independent

				Alignment, consultation with registered Native Title parties and authorisation under the Native Title Act.	
Aboriginal Cultural Heritage Act 2003 (Qld)	Queensland Department of Aboriginal Torres Strait Islander Partnerships (DATSIP)	Duty of care to take all reasonable and practical measures not to harm Aboriginal cultural heritage Cultural Heritage Assessment/ Cultural Heritage Management Plan	Construction works with the potential for impact to Aboriginal Cultural Heritage	The Gowrie to Helidon Project will require further detailed cultural heritage assessment and the Cultural Heritage Management Plan/Agreement for the works.	Coordinated
Sustainable Planning Act 2009 (Qld)	Department of Infrastructure, Local Government and Planning (DILGP)	Development Permit for Material Change of Use, Operational Work, Reconfiguring a Lot and/or Building Work (as defined under Section 10 of the SPA) Development assessed against applicable instruments, which may include applicable State Planning Regulatory Provisions, State planning policy, relevant State Development Assessment Provisions (SDAP) codes	Development that is assessable development requires a development permit. Development that cannot be declared to be development of a particular type (e.g. exempt development) is outlined in Schedule 4 of the SP Regulation).	Will be determined by the overall approvals pathway. It is likely that the Gowrie to Helidon Project will be determined 'development that cannot be declared to be development of a particular type'.	Coordinated

Environmental Protection Act 1994 (Qld)	Department of Environment and Heritage Protection (DEHP)	Section 424 Disposal Permit	Disposal of contaminated material from a site listed on the Environment Management Register (EMR) or Contaminated Land Register (CLR) and/or making a material change of use of premises if all or part of the premises is on the EMR or CLR	The likelihood of an approval being required will be dependent on the nature of contaminants present within the material to be disposed. Subject to EMR/CLR search and further contaminated land investigations.	Coordinated
		Environmental Authority	Undertaking an Environmentally Relevant Activity (ERA) listed under Schedule 2 of the Environmental Protection Regulation 2008 (EP Regulation)	Potential ERAs associated with construction to be confirmed in future project phases and may include: Chemical storage Extractive and screening activities Crushing, milling, grinding or screening material Regulated waste storage/transport	Coordinated

Fisheries Act 1994 (Qld)	DAF and DILGP	Operational works permit for works within a declared Fish Habitat Area	Development in a declared fish habitat area	Not applicable as no Declared Fish Habitat Areas in the vicinity of the Preferred Alignment	Coordinated
		Development permit for Operational Works that is raising or constructing a waterway barrier	Constructing or raising waterway barrier works in fish habitats	There are a number of waterways in the Preferred Alignment that are mapped as low, medium or high risk under the Fisheries Act. Requirement for permit to be confirmed in future project phases, depends on the design and nature of creek crossings and whether crossings can comply with self-assessable codes for permanent or temporary works.	Coordinated
Vegetation Management Act 1999 (Qld) (VM Act)	Department of Natural Resources and Mines (DNRM) and DILGP	Operational works permit for clearing remnant native vegetation (and possibly regrowth vegetation pending changes to the VM Act)	Removal of native vegetation	The Gowrie to Helidon Project will require the clearing of mapped remnant native vegetation. Potential exemptions may be applicable to the Gowrie to Helidon Project under Schedule 24 of the SP	Coordinated

				Regulation Extent of native vegetation clearing and applicability of exemptions to be confirmed in future project phases.	
Nature Conservation Act 1992 (Qld) (NC Act)	DEHP	Protected Plant Clearing Permit Protected Plant Exemption Notification	Clearing of protected plants under the NC Act, or within 100m of protected plants Clearing of vegetation within the high risk flora trigger area	Parts of the Preferred Alignment are within the High Risk Flora Survey Trigger Area, requiring flora survey and identification of protected plants, and if applicable a clearing permit or exemption will be required.	Coordinated
		Approval to tamper with an animal breeding place.	If an animal breeding place used by an endangered, vulnerable or least concern fauna species requires removal a species-specific Species Management	There is the potential for animal breeding places to be present within the Preferred Alignment. This is to be confirmed in future project phases through detailed fauna survey, and if necessary a SMP will be required.	Coordinated

			Program (SMP) will require approval by DEHP.		
Queensland Heritage Act 1992 (Qld)	DEHP and Queensland Heritage Council	Exemption certificate (for a low impact activity which will not significantly detract from the heritage values of the place) or Development Application for impacts to a Queensland Heritage Place / Local government heritage place	Impacts to a Queensland Heritage Place / Local government heritage place	There are Queensland Heritage places and local heritage places within the Study Area. The extent of impact to these places should be determined in future project phases to determine if an exemption certificate or approval is required.	Coordinated
Water Act 2000 (Qld)	DNRM and DILGP	Riverine Protection Permit unless the Riverine protection permit exemption requirements (DNRM 2013) can be complied with.	Destroying of vegetation, excavating or placing fill in watercourse, lake or spring	Exemptions from the requirement for a Riverine Protection Permit may apply if the excavation or placing of fill is a necessary part of another permitted activity, or if the project is "prescribed assessable development" under the definition in Section 814 of the *Water Act 2000*. If this is not the case, a Riverine Protection Permit should be obtained for the Gowrie to Helidon Project.	Coordinated

		Water licence/allocation associated with the taking or interfering with water for construction	Taking or interfering with water	Taking or interfering with water for construction purposes is likely to be required for the Gowrie to Helidon Project. Construction entities may take water without an allocation, subject to conditions prescribed under a regulation. Creek diversions may also require licences under the Water Act and development permits.	Coordinated
Transport Infrastructure Act 1994 (Qld) (TIA)	Queensland Rail	Approval to interfere with a railway (s255)	Crossing of existing rail line or works within existing rail corridor	Subject to detailed design and consultation with Queensland Rail	Coordinated
	Department of Transport and Main Roads (DTMR)	Road corridor permit for works within a State Controlled Road (s50) Access to State Controlled Road (s62/66)	Works within the Warrego Highway or other State Controlled Road Access to the Warrego Highway or other State Controlled Road (e.g. during	Subject to detailed design and consultation with DTMR	Coordinated

			construction)		
Environmental Offsets Act 2014 (Qld) and Policy	DEHP	Offsets Management Plan	An environmental offset may be required as a condition of approval where—following consideration of avoidance and mitigation measures—the activity is likely to result in a significant residual impact on prescribed environmental matters.	The Gowrie to Helidon Project is likely to have an impact on matters of state environmental significance (MSES). The significance of the residual impact would need to be confirmed in future project phases to determine offset requirements.	Coordinated
Local Government Act 2009	Local Government	Work on a local government controlled road permit	Construction works within a local government controlled road.	The Preferred Alignment intersects a number of local roads. Construction works are likely to occur within local roads.	Independent

9. COSTS AND BENEFIT SUMMARY

9.1. Local, State and National Economies

As described in **Section 3.3 and Section 3.9**, the ARTC Business Case outlines the significant economic benefits of the Inland Rail Programme, which contributes to the efficient movement of freight in Australia and supports economic growth. The Inland Rail Programme is expected to increase Australia's GDP by an estimated $16 billion by 2050.

The Gowrie to Helidon Project is a key component of the Inland Rail Programme and will bring economic benefits to the region and State by providing a critical element of the State and national freight network. In future project stages the economic costs and benefits will be subject to further detailed study.

In summary the benefits expected to arise from the Gowrie to Helidon Project include:

- During the construction phase it is anticipated that the workforce will primarily be derived from local and regional sources depending on the nature of the skills required, creating local and regional job opportunities. Workforce numbers and their source will be determined once a construction methodology has been finalised and would be quantified as far as possible in the EIS.
- Job creation has the potential to create flow-on economic benefits in regional centres in the Study Area.
- Regional communities along and adjacent to the Inland Rail Corridor would benefit through more efficient and effective freight rail access to metropolitan and international markets. Subject to the location of freight terminals, Inland Rail will enable farmers to move grain and cotton more efficiently for export to port.
- Provision of rail transport for freight potentially delays the need for road infrastructure investment and reduces the congestion and safety issues on existing transport routes such as the Warrego Highway.
- The future provision of passenger transport along the corridor between Toowoomba and Calvert would increase access between regional and metropolitan centres and potentially contribute to economic growth in regional towns.

The Gowrie to Helidon Project cost is expect to be in the order of $1.35 billion and will require substantial public funding, however the business case demonstrates that operating revenues would cover operating costs (including maintenance), meaning that once delivered, Inland Rail would not require on-going taxpayer support.

Economic costs to the local and state economy may include:

- Local and temporary access disruption during construction with potentially negative effects on businesses in the region
- Land acquisition and property impacts potentially affecting the viability of agricultural properties
- The scale of the Gowrie to Helidon Project may affect availability of resources and personnel for other significant construction projects in the region
- Influx of workers during construction may result in increased rents and property prices
- Workforce accommodation requirements may result in temporary accommodation shortages.

9.2. Natural and Social Environments

Without Inland Rail, consideration of other freight solutions would be required. This could include upgrades to the National Highway network, or the existing coast railway corridor. The establishment of a freight rail route that provides a comparable level of service to road freight is expected to negate or delay the need for progressive upgrades of the National Highway and associated environmental impacts. Furthermore it provides opportunities for regional development, supports regional agricultural business by providing improved access to freight services.

The Gowrie to Helidon Project will have both temporary and longer term environmental and social impacts requiring management during construction and operation, including:

- Clearing of regulated vegetation and fauna habitat for species listed under State and National legislation
- The rail corridor will potentially form a barrier to fauna movement (when not in tunnel or on viaduct)
- Air quality and noise impacts during construction and operation
- Potential flooding impacts and impacts to watercourses due to crossing of floodplains and watercourses
- Landscape and visual impacts particularly at significant embankments, cuttings and viaducts
- Potential impacts to known and unknown Indigenous and historical heritage places.

Social benefits are expected to arise from the economic benefits and opportunities of the Gowrie to Helidon Project that is described previously.

Environmental and social impacts will be subject to further assessment in future project phases and mitigation and management measures detailed. There is also an opportunity for design refinement in future phases to minimise or remove some of the impacts identified. A programme-wide biodiversity offset strategy is currently being investigated for significant residual impacts.

10. COMMUNITY AND STAKEHOLDER CONSULTATION

Extensive community consultation was undertaken by the Queensland Government for the studies to inform the protection of the Gowrie to Grandchester future public passenger transport corridor in 2003. ARTC have commenced consultation with key government and industry stakeholders and the outcomes of these initial consultations have informed the concept assessment phase. ARTC will implement an extensive public consultation program for the Gowrie to Helidon Project and more broadly for the Inland Rail Programme.

10.1. Peak Body Consultation

- Specific issues raised during preliminary consultation are outlined in Table 10-1.

Table 10-1 Issues across the Gowrie to Helidon Project

STAKEHOLDER	ISSUES and OPPORTUNITIES	2015	2016	STATUS
Peak bodies	**Flooding impacts** Flood mitigation is a big issue, residents question whether there should be a levee around Forest Hill. Previous impacts in Laidley, Grantham and Helidon		✔	Flooding a key consideration of alignment refinement. Detailed modelling to be undertaken in future planning. Opportunity to use catchment groups flood modelling data.
	Environmental impacts Helidon Hills is an important environmental area for SEQ (rock wallabies)		✔	To be addressed in more detail during future environmental assessments.
	Supply chain benefits Interested in having loading facilities in the Lockyer and how this could work with climate-controlled containers and need to identify the value-add for the area.		✔	Relevant stakeholders, such as trucking companies and growers consulted
	Connectivity to industrial and infrastructure developments Impact of loss of connectivity across Gatton and to the Warrego Highway		✔	More information to be provided on staging and timing when available.
	Operational impacts Townships and communities such as Gowrie Junction and Gatton and associated operational impacts such as		✔	To be addressed in more detail during future environmental assessments

	noise, visual amenity, disruption to lifestyle, level crossing operations			

10.2. Landowner Consultation

Private landowners engaged to obtain agreement to access their properties for the purpose of conducting ecological studies. Key themes included:

- The majority of landowners were aware of the existence of the protected rail corridor within their properties, however a small number of private landowners were unaware of the protected rail corridor
- Land acquisition arrangements and timing
- Future operation of existing rail line
- Landowners asked about plans for a tunnel through the Toowoomba range
- Negative experiences with adjacent infrastructure projects, such as the Toowoomba Second Range Crossing, including field studies

Ongoing consultation with the dedicated community engagement lead was a consistent request.

Table 10-2 Summary of issues raised by landowners

STAKEHOLDER	ISSUES and OPPORTUNITIES	2015	2016	STATUS
Landowners	**Awareness of the Gowrie to Grandchester 2003 protected rail corridor** The majority of landowners were aware of the existence of the protected rail corridor within their properties, however small number of private landowners were unaware of the protected rail corridor.		✔	Release of detailed corridor information deferred until completion of concept assessment report and selection of alignment.
	Land acquisition arrangements and timing Concerns about lack of information being provided about the corridor location and project timing		✔	Commitments were provided to provide further information when it became available.
	Future operation of existing rail line Several landowners queried the planned operation of the existing rail line.		✔	All were advised this information could not be provided at this time, given the early stage of planning for the Inland Rail alignment.

	Tunnel through Toowoomba range Landowners asked about plans for a tunnel through the Toowoomba range and several questioned if a cutting would be used in the same way as the Toowoomba Second Range Crossing.		✔	It was confirmed that plans involved construction of a tunnel through the Toowoomba Range, however specific details such as location of portals was not provided to landowners.
	Adjacent infrastructure Many property owners located in the Toowoomba region had recent experiences with adjacent infrastructure projects, such as the Toowoomba Second Range Crossing, including with field studies undertaken as part of design for those projects and during construction activities. A number of negative comments were expressed relating to property impacts caused by access and construction activities.		✔	Comments were noted.
	Operational impacts Townships and communities such as Gowrie Junction and associated operational impacts such as noise, visual amenity, disruption to lifestyle, level crossing operations		✔	To be addressed in more detail during future environmental assessments

10.3. Community Information Sessions

Advertised community information and feedback sessions were held 20 to 23 June 2016. Direct mail invitations were distributed to landowners in a 500 metre radius to the corridor. The following are general issues raised:

- Lack of awareness about the location of the 2003 Gowrie to Grandchester protected corridor
- Concern from landowners located adjacent to the protected corridor about operational impacts
- Investment in their properties, such as building new infrastructure were now in doubt
- Interest in Inland Rail, when it will be constructed and in operation.
- Volume of freight traffic likely to be using the new line and potential impacts
- Flooding issues, particularly from residents in Forest Hill and Laidley.
- Opportunities for corridor modifications considering farmland operations, valley, flood plain, and access.
- Access for farmers, movement of stock and machinery across the rail corridor.

- Land acquisition and compensation processes.
- Opportunities for intermodal and freight interfaces within local communities.

10.4. Stakeholder Workshops

Stakeholder workshops were held in Toowoomba and Gatton to identify key issues to be addressed during the environmental assessment process; opportunities to create additional value for the project and project stakeholders; and an initial indication of the potential social license and risks. Attendees included Condamine Alliance, Gowrie Junction Progress Association, Queensland Farmers Federation, Queensland Murray Darling Committee, Regional Development Australia, Toowoomba Chamber of Commerce, Toowoomba Surat Basin Enterprise – Supply Chain, AgForce, Millmerran Business Association, Darling Downs Environment Council and Toowoomba Regional Council.

- Issues associated with Gowrie Junction township, including:
  - Current existing level crossing (Old Homebush Road near Junction Street) – future road rail interface - Gowrie Creek constrained as well
  - Proposed passing loop near portal, interference with road network – delays with 3.6km trains
  - Noise mitigation, planting to provide visual screening and noise attenuation – south of Morris Road
  - Tunnel portal and proposed ventilation outlet on a hill – visual, noise, air quality, pollution impacts
  - Cumulative impact from various corridors – TSRC, Wellcamp, community precincts
  - Type of freight including dangerous goods and impacts on communities
  - Future and current subdivisions north of Hayden Road – growing area with residents moving in
  - Basalt, ground water and bores: how to deal with this and the tunnel
- Visual amenity and noise impacts from Eastern Portal of Toowoomba Range tunnel
- Environmental issues associated with Range Escarpment
- Issues associated with the Border to Gowrie section, west of Gowrie towards Kingsthorpe

Table 10-3 Summary of issues raised by peak bodies

STAKEHOLDER	ISSUES and OPPORTUNITIES	2015	2016	STATUS
Peak Bodies	**Environmental impacts** Helidon Hills is an important environmental area for SEQ (rock wallabies)		✔	To be addressed in more detail during future environmental assessments.
	Supply chain benefits Interested in having loading facilities in the Lockyer and how this could work with climate-controlled containers and need to identify the value-add for the area.		✔	Relevant stakeholders, such as trucking companies and growers consulted

	Connectivity to industrial and infrastructure developments.		✔	More information to be provided on staging and timing when available.
	Operational impacts Townships and communities such as Gowrie Junction and associated operational impacts such as noise, visual amenity, disruption to lifestyle, level crossing operations		✔	To be addressed in more detail during future environmental assessments

10.5. Emerging Themes

Emerging themes and issues for Gowrie to Helidon captured at Council meetings and workshops, peak body workshops, impacted landowners and the broader community are summarised in Table 10-4

Table 10-4 Gowrie to Helidon emerging issues

ISSUE THEMES	ISSUE DESCRIPTION
Alignment options	• Community was advised the scope of the concept assessment included consideration of potential refinement to the G2G protected corridor within a study area either side of the corridor. • Selection of the location of western tunnel portal and passing loops near Gowrie Junction were a concern to representatives of the Gowrie Junction community in terms of operational noise impacts and visual amenity and local road connectivity • Other options were considered near Helidon to improve constructability and operational safety, address flooding issues, reduce project cost and address community impacts. • Keen interest around the tunnel portals to understand noise, ventilation and air quality issues. Comments from the Gowrie community that this will need consideration.
Environment	• Concerns regarding the need to maintain connectivity of wildlife corridors and habitat preservation • The potential to cover cuts and therefore achieve best practice in maintaining wildlife corridor connectivity • Impacts on vulnerable species such as koala.
Road and rail interface	• Maintaining local road connectivity by minimising level crossings is a major challenge, particularly to future development areas - examples Boundary Road, Toowoomba and Old Homebush Road, Gowrie Junction.
Future passenger services	• Strong interest in passenger services connecting Toowoomba with Rosewood, through townships including Helidon, Gatton and Laidley.
Land acquisition and	• Mixed levels of awareness about the existence or location of the G2G corridor

ISSUE THEMES	ISSUE DESCRIPTION
compensation	with some landowners who had recently purchased property expressing shock at the alignment and stating that it hadn't appeared in property searches • Landowners expressing varying degrees of financial and emotional stress as a result. • Questions around timing, process, valuations and extent of required land acquisition. • Questions from landowners located in the G2G corridor, as well as landowners located adjacent to the corridor regarding opportunity for acquisition or compensation for impacts • Lessons learned from experiences with other infrastructure projects including Toowoomba Second Range Crossing, where landowners claim agreements were not documented or honoured.
Farming impacts	• Impacts to fertile and prime farming lands and property • Implications of property severance on farming activity • Access to farmers to move stock and machinery • Land acquisition and impacts to farm viability
Corridor identification, protection and preservation	• Questions were raised about why the G2G protected corridor was chosen over other options • Gowrie Junction community endorses the amended alignment from that presented in 2014, however this amendment has direct impacts on residents • Interest in the scope for variation from the protected corridor and the process for informing landowners that may be impacted but are not located in the G2G protected corridor, due to refinement options selected - Long timeframes since protection of the corridor, and until construction caused concerns from landowners about potential for resale or value of investing in the property • Strong dissatisfaction expressed with the change report process followed by Toowoomba Second Range Crossing to follow a different design and alignment than the one that community was consulted on. Community stakeholders believe they should be consulted on the final alignment and design.
Operational noise impacts	• Landowners were interested in the frequency, volume, size and speed of freight rail traffic on the new line and the associated operational noise impacts. - This was particularly relevant to existing townships where the proposed alignment goes directly adjacent, e.g. Gowrie Junction. - Interest in potential noise and air quality impacts associated with the operational rail line, particularly in the light of potential increases of coal volumes • Interest in the location of passing loops, particularly around built up areas and future growth areas.
Economic benefits	• Stakeholders in the project region would like to see economic opportunities and benefits beyond construction of the project, • Significant interest in connections to existing industrial areas and infrastructure,

ISSUE THEMES	ISSUE DESCRIPTION
	as well as optimising the project to provide supply chain value in the Lockyer Valley. - Support for local involvement of suppliers and source for material, accommodation camps etc. - Support from the local trucking industry, with representatives saying they believe Inland Rail will help them to better meet peak demand associated with seasonal agricultural produce. • The strong feedback that 'local' opportunities mean opportunities for the towns within the project area, not only a nearby regional centre such as Toowoomba.

10.6. Aboriginal Parties

The Study Area crosses both the Jagera people's and the Western Wakka Wakka people's Native Title Claim areas. ARTC commenced initial consultations with representatives from the Jagera People and the Western Wakka Wakka people in mid and late 2016, to introduce the Gowrie to Helidon Project and the study process, and further engagement is envisaged during subsequent project stages. ARTC will be responsible for the development of a Cultural Heritage Management Plan and Agreement separately with the Jagera people and the Western Wakka Wakka people (2 groups), in accordance with the *Aboriginal Cultural Heritage Act 2003*.

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12. GLOSSARY, ACRONYMS AND ABBREVIATIONS

TERM	DESCRIPTION
µg/m^3	Micrograms per cubic meter of air
A	Australia
AEP	*Annual Exceedance Probability*
AHD	Australian Height Datum
ARTC	Australian Rail Track Corporation
CEMP	Construction Environmental Management Plan
CLR	Contaminated Land Register
CO	Carbon Monoxide
DAF	*Department of Agriculture and Fisheries*
dB(A)	A-weighted decibel
DEHP	Department of Environment and Heritage Protection
DILGP	Department of Infrastructure, Local Government and Planning
DNRM	Department of Natural Resources and Mines
DoEE	Department of the Environment and Energy
DTMR	Department of Transport and Main Roads
E	Endangered
EIS	Environmental Impact Statement
EMR	Environment Management Register
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*

TERM	DESCRIPTION
EVNT	Endangered, Vulnerable and Near Threatened
g Co_2/tonne-km	Grams of Carbon Dioxide per transport of one tonne over one kilometre
Gowrie to Helidon	Gowrie to Helidon
GDE	*Groundwater Dependant Ecosystems*
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IAS	Initial Advice Statement
IRAS	Inland Rail Alignment Study
km	kilometres
KRA	Key Resource Area
KSAT	Koala Spot Assessment Tool
LA_{eq}	A-weighted equivalent sound level
LA_{max}	Maximum Noise Level
LeastC	Least Concern
m	metres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NA	Not Applicable
NC	Not of Concern
NC Act	*Nature Conservation Act 1992*

TERM	DESCRIPTION
NO2	Nitrogen Dioxide
NRM	*Natural Resource Management*
NT	Near Threatened
OC	Of concern
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PMST	Protected Matters Search Tool
Q	Queensland
QR	Queensland Rail
QT	Queensland Transport
REs	Regional Ecosystems
RRMA	Rural, Remote and Metropolitan Areas
SDAP	State Development Assessment Provisions
SDPWO Act	State Development and Public Works Organisation Act 1971
SEQ	Southeast Queensland

TERM	DESCRIPTION
SL	Special Least Concern
SMP	Species Management Program
SP Regulation	*Sustainable Planning Regulation 2009*
SPA	Sustainable Planning Act 2009
SPP	State Planning Policy
TECs	Threatened Ecological Communities
TIA	*Transport Infrastructure Act 1994*
TPC Act	*Transport Planning and Coordination Act 1994*
TRC	Toowoomba Regional Council
TSRC	Toowoomba Second Range Crossing motorway
UXO	Unexploded Ordnance
V	Vulnerable
VM Act	*Vegetation Management Act 1999*
WEBs	*Wider Economic Benefits*
ZTV	Zone of Theoretical Visibility

APPENDIX A – PREFERRED ALIGNMENT TENURE

LOT PLAN	TENURE	SHIRE NAME	LOCALITY	SECTION
591SP117148	Lands Lease	Lockyer Valley Regional	Ballard	Tunnel
452SP117138	Lands Lease	Lockyer Valley Regional	Helidon	
591SP117148	Lands Lease	Toowoomba Regional	Mount Kynoch	Tunnel
12SP186718	Freehold	Lockyer Valley Regional	Withcott	
11SP186717	Freehold	Lockyer Valley Regional	Withcott	
6SP186716	Freehold	Lockyer Valley Regional	Withcott	
7SP186715	Freehold	Lockyer Valley Regional	Withcott	
3SP194139	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
4SP200753	Freehold	Lockyer Valley Regional	Lockyer	
1SP186914	Freehold	Lockyer Valley Regional	Lockyer	
5SP198121	Freehold	Toowoomba Regional	Gowrie Junction	Tunnel
4SP198120	Freehold	Toowoomba Regional	Gowrie Junction	Tunnel
1SP186912	Freehold	Lockyer Valley Regional	Postmans Ridge	
1SP186911	Freehold	Lockyer Valley Regional	Postmans Ridge	
2RP34953	Lands Lease	Toowoomba Regional	Cranley	Tunnel
61SP122171	Lands Lease	Toowoomba Regional	Gowrie Junction	
2RP34933	Lands Lease	Toowoomba Regional	Gowrie Junction	
4RP34921	Lands Lease	Toowoomba Regional	Gowrie Junction	
3RP34929	Lands Lease	Toowoomba Regional	Gowrie Junction	
4RP34924	Lands Lease	Toowoomba Regional	Gowrie Junction	
2RP34892	Lands Lease	Toowoomba Regional	Gowrie Junction	
2RP34883	Lands Lease	Toowoomba Regional	Gowrie Junction	
3RP34918	Lands Lease	Toowoomba Regional	Gowrie Junction	
3RP34912	Lands Lease	Toowoomba Regional	Gowrie Junction	
2RP34877	Lands Lease	Toowoomba Regional	Gowrie Junction	
2RP34887	Lands Lease	Toowoomba Regional	Gowrie Junction	
115AG1509	Lands Lease	Toowoomba Regional	Gowrie Junction	
1RP205894	Lands Lease	Toowoomba Regional	Gowrie Junction	
13SP122211	Lands Lease	Toowoomba Regional	Gowrie Junction	
12SP122211	Lands Lease	Toowoomba Regional	Gowrie Junction	
316SP122170	Lands Lease	Toowoomba Regional	Gowrie Junction	
11SP122211	Lands Lease	Toowoomba Regional	Gowrie Junction	
18SP186716	Freehold	Lockyer Valley Regional	Withcott	
0SP275276	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
0SP275276	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
2SP275276	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
11RP839411	Freehold	Lockyer Valley Regional	Lockyer	
50RP889026	Freehold	Toowoomba Regional	Gowrie Junction	
14RP889026	Freehold	Toowoomba Regional	Gowrie Junction	
2RP144734	Freehold	Toowoomba Regional	Cranley	Tunnel
374SP272172	Freehold	Lockyer Valley Regional	Ballard	
3SP272172	Freehold	Lockyer Valley Regional	Ballard	Tunnel
31SP272174	Freehold	Lockyer Valley Regional	Ballard	Tunnel
468AG3378	Freehold	Toowoomba Regional	Gowrie Junction	
470AG3378	Freehold	Toowoomba Regional	Gowrie Junction	
469AG3378	Freehold	Toowoomba Regional	Gowrie Junction	
467AG3378	Freehold	Toowoomba Regional	Gowrie Junction	
201CP893797	Freehold	Toowoomba Regional	Gowrie Junction	
11SP180260	Freehold	Toowoomba Regional	Cranley	Tunnel
1SP198597	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
136RP901409	Freehold	Lockyer Valley Regional	Lockyer	
1RP142669	Freehold	Toowoomba Regional	Cranley	Tunnel
2SP198597	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
2RP142669	Freehold	Toowoomba Regional	Cranley	Tunnel
203G1861	Freehold	Toowoomba Regional	Gowrie Junction	

7G1862	Freehold	Toowoomba Regional	Gowrie Junction	
202G1861	Freehold	Toowoomba Regional	Gowrie Junction	
1SP173941	Freehold	Toowoomba Regional	Cranley	Tunnel
355CH312304	Freehold	Lockyer Valley Regional	Ballard	
4SP194139	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
3SP146573	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
2SP173941	Freehold	Toowoomba Regional	Cranley	Tunnel
320CH312556	Freehold	Lockyer Valley Regional	Withcott	
354CH312304	Freehold	Lockyer Valley Regional	Ballard	
354CH312304	Freehold	Lockyer Valley Regional	Ballard	
2SP194138	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
371CC675	Freehold	Lockyer Valley Regional	Ballard	
2SP198120	Freehold	Toowoomba Regional	Gowrie Junction	
2RP903777	Freehold	Lockyer Valley Regional	Lockyer	
204G1861	Freehold	Toowoomba Regional	Gowrie Junction	
21RP34896	Freehold	Toowoomba Regional	Gowrie Junction	
2RP34993	Freehold	Toowoomba Regional	Gowrie Junction	
2RP806906	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
1RP192838	Freehold	Toowoomba Regional	Gowrie Junction	
2RP192838	Freehold	Toowoomba Regional	Gowrie Junction	
1RP46221	Freehold	Toowoomba Regional	Mount Lofty	
308SP207169	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
309SP207169	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
404RP826021	Freehold	Toowoomba Regional	Gowrie Junction	
400RP826021	Freehold	Toowoomba Regional	Gowrie Junction	
15RP804590	Freehold	Toowoomba Regional	Gowrie Junction	
12SP106686	Freehold	Toowoomba Regional	Cranley	Tunnel
13SP106686	Freehold	Toowoomba Regional	Cranley	Tunnel
197CH31508	Freehold	Lockyer Valley Regional	Lockyer	
153CH31327	Freehold	Lockyer Valley Regional	Lockyer	
51CC835	Freehold	Lockyer Valley Regional	Helidon	
245CC315	Freehold	Lockyer Valley Regional	Withcott	
87CA31624	Freehold	Lockyer Valley Regional	Helidon	
259CC317	Freehold	Lockyer Valley Regional	Withcott	
147CC2371	Freehold	Lockyer Valley Regional	Withcott	
43G18611	Freehold	Toowoomba Regional	Gowrie Junction	
2SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
9SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
3SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
6SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
10SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
4SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
1SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
5SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
7SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
8SP264476	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
1SP270010	Freehold	Toowoomba Regional	Cranley	Tunnel
2RP32750	Freehold	Lockyer Valley Regional	Helidon Spa	
1RP32750	Freehold	Lockyer Valley Regional	Helidon Spa	
3RP32749	Freehold	Lockyer Valley Regional	Helidon Spa	
2RP205944	Freehold	Lockyer Valley Regional	Postmans Ridge	
29SP206637	Freehold	Lockyer Valley Regional	Ballard	
13SP157008	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
14SP157008	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
16SP157008	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
15SP157008	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
12SP157008	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel

40SP157008	Reserve	Toowoomba Regional	Mount Kynoch	Tunnel
102CSH619	Freehold	Lockyer Valley Regional	Helidon	
125CP907566	Reserve	Lockyer Valley Regional	Helidon	
101CSH619	Freehold	Lockyer Valley Regional	Helidon	
135CSH836056	Reserve	Lockyer Valley Regional	Helidon	
1RP112770	Freehold	Lockyer Valley Regional	Lockyer	
1RP216741	Freehold	Toowoomba Regional	Cranley	Tunnel
12SP259243	Freehold	Toowoomba Regional	Cranley	Tunnel
44RP216739	Freehold	Toowoomba Regional	Gowrie Junction	
20SP127094	Freehold	Lockyer Valley Regional	Postmans Ridge	
17SP186715	Freehold	Lockyer Valley Regional	Withcott	
18SP186716	Freehold	Lockyer Valley Regional	Withcott	
100SP256697	Freehold	Toowoomba Regional	Mount Kynoch	Tunnel
20SP186717	Freehold	Lockyer Valley Regional	Withcott	
19SP186718	Freehold	Lockyer Valley Regional	Withcott	
172SP189517	Freehold	Toowoomba Regional	Cranley	Tunnel
208SP186914	Freehold	Lockyer Valley Regional	Lockyer	
11SP189518	Freehold	Toowoomba Regional	Cranley	Tunnel
260SP200756	Freehold	Lockyer Valley Regional	Postmans Ridge	
214SP200754	Freehold	Lockyer Valley Regional	Postmans Ridge	
463AG3898	Freehold	Toowoomba Regional	Gowrie Junction	
40AG1255	Freehold	Toowoomba Regional	Gowrie Junction	
213SP200754	Freehold	Lockyer Valley Regional	Lockyer	
473A34873	Freehold	Toowoomba Regional	Gowrie Junction	
157AG2455	Freehold	Toowoomba Regional	Gowrie Junction	
45AG937	Freehold	Toowoomba Regional	Gowrie Junction	
456A34873	Freehold	Toowoomba Regional	Gowrie Junction	
459A34873	Freehold	Toowoomba Regional	Gowrie Junction	
471A34873	Freehold	Toowoomba Regional	Gowrie Junction	
472A34873	Freehold	Toowoomba Regional	Gowrie Junction	
457A34873	Freehold	Toowoomba Regional	Gowrie Junction	
462A34873	Freehold	Toowoomba Regional	Gowrie Junction	
406A34873	Freehold	Toowoomba Regional	Gowrie Junction	
407A34873	Freehold	Toowoomba Regional	Gowrie Junction	
452A34873	Freehold	Toowoomba Regional	Gowrie Junction	
454A34873	Freehold	Toowoomba Regional	Gowrie Junction	
451A34873	Freehold	Toowoomba Regional	Gowrie Junction	
453A34873	Freehold	Toowoomba Regional	Gowrie Junction	
460A34873	Freehold	Toowoomba Regional	Gowrie Junction	
475A34873	Freehold	Toowoomba Regional	Gowrie Junction	
474A34873	Freehold	Toowoomba Regional	Gowrie Junction	
458A34873	Freehold	Toowoomba Regional	Gowrie Junction	
461A34873	Freehold	Toowoomba Regional	Gowrie Junction	
10AG89	Reserve	Toowoomba Regional	Cranley	Tunnel
6A342696	Freehold	Toowoomba Regional	Gowrie Junction	
466AG3378	Freehold	Toowoomba Regional	Gowrie Junction	
122AG3560	Freehold	Toowoomba Regional	Gowrie Junction	
12SP189517	Freehold	Toowoomba Regional	Cranley	Tunnel
1SP180260	Freehold	Toowoomba Regional	Cranley	Tunnel
12RP34896	Freehold	Toowoomba Regional	Cranley	Tunnel
78SP154249	Freehold	Toowoomba Regional	Cranley	Tunnel
2RP34879	Lands Lease	Toowoomba Regional	Gowrie Junction	
51SP122210	Lands Lease	Toowoomba Regional	Gowrie Junction	
42AG1509	Freehold	Toowoomba Regional	Gowrie Junction	
6SP200754	Freehold	Lockyer Valley Regional	Lockyer	
18SP105106	Freehold	Lockyer Valley Regional	Helidon Spa	
1RP34993	Freehold	Toowoomba Regional	Gowrie Junction	

18RP34896	Freehold	Toowoomba Regional	Gowrie Junction
16SP198120	Freehold	Toowoomba Regional	Gowrie Junction
100SP270462	Freehold	Toowoomba Regional	Gowrie Junction
246CC315	Freehold	Lockyer Valley Regional	Withcott
1RP856600	Freehold	Lockyer Valley Regional	Ballard
120CC675	Freehold	Lockyer Valley Regional	Ballard
2SP186911	Freehold	Lockyer Valley Regional	Postmans Ridge
39AG1255	Freehold	Toowoomba Regional	Gowrie Junction
476A34873	Freehold	Toowoomba Regional	Gowrie Junction
169SP200753	Freehold	Lockyer Valley Regional	Lockyer