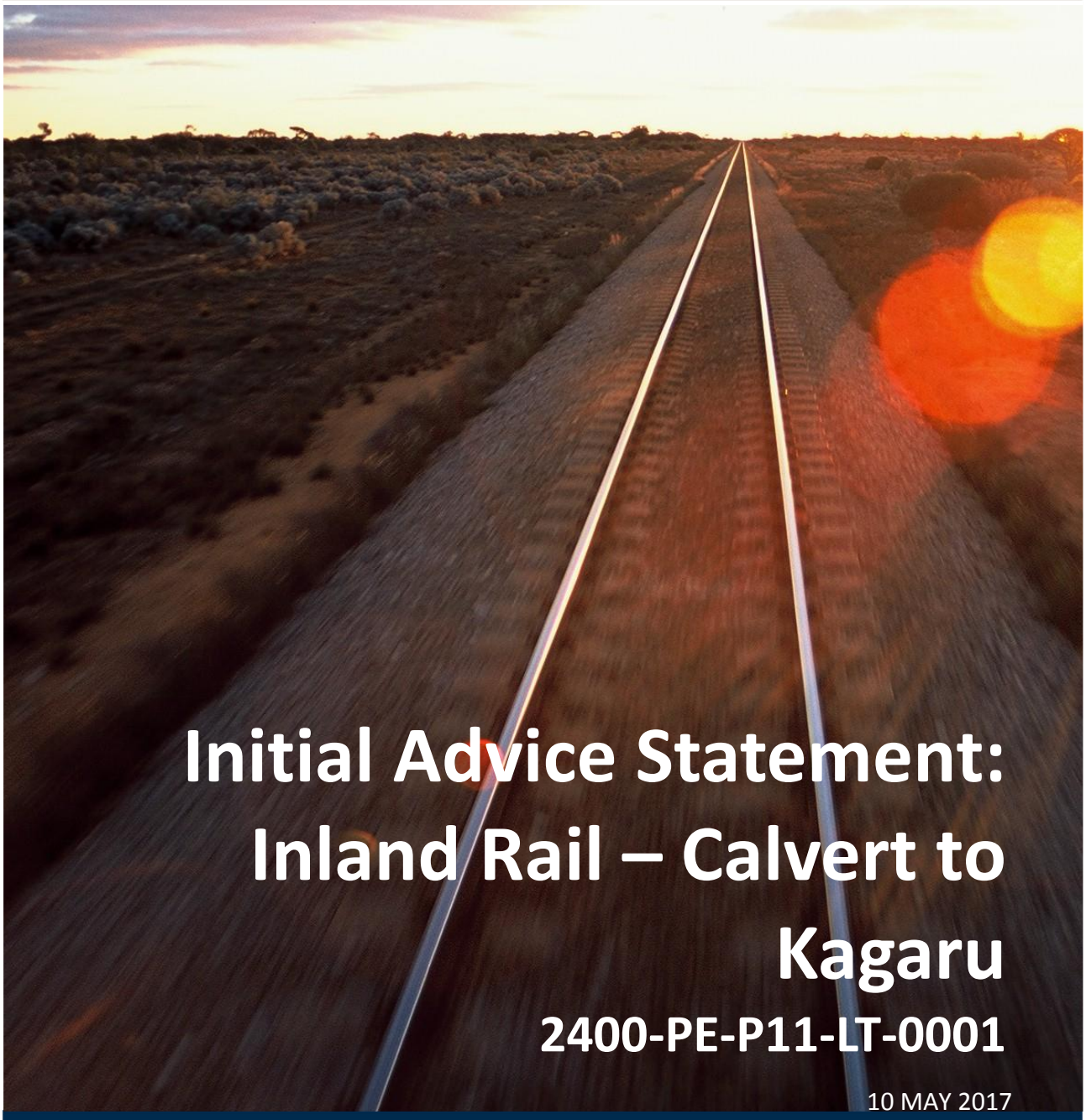
ARTC InlandRail

The Australian Government's priority freight rail project



Initial Advice Statement: Inland Rail – Calvert to Kagaru

2400-PE-P11-LT-0001

10 MAY 2017

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EXECUTIVE SUMMARY

This Initial Advice Statement (IAS) has been prepared for the Australian Rail Track Corporation (ARTC) for the Inland Rail Calvert to Kagaru Project. ARTC is an Australian Government owned corporation and current operator of the Australian freight network. ARTC currently manage and maintain approximately 8,500 kilometres (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 Project. The Calvert to Kagaru Project is one of 13 separate projects that are part of the Inland Rail Project:

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 Calvert to Kagaru Project will be constructed as an approximately 53 km long single-track dual gauge railway with crossing loops to accommodate double stack freight trains up to 1800m long. The Calvert to Kagaru Project will also include land provision for 3600m 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 Calvert to Kagaru Project will generally be located within the existing Southern Freight Rail Corridor (SFRC), protected in November 2010 as future railway land under Section 242(1) of the *Transport Infrastructure Act 1994*. The

SFRC connects the adjacent projects of Helidon to Calvert Project in the north-west and Kagaru to Acacia Ridge Project to the south east. The Calvert to Kagaru Project will connect to the Queensland Rail 'Western System' near Calvert at its north-west end and to the existing ARTC Interstate line near Kagaru in the south-east.

The Calvert to Kagaru Project is one of the 'missing links' within the Inland Rail programme. A Preferred Alignment has been identified for the Calvert to Kagaru 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 Environment Impact Statement (EIS) and design development phases.

ARTC is seeking a declaration for coordinated project status under the *State Development and Public Works Organisation Act 1971 (Qld)* (SDPWO Act). The Calvert to Kagaru Project will also be referred under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) and if determined to be a controlled action, it is anticipated that assessment of the Calvert to Kagaru Project will be progressed under the Assessment Bilateral Agreement between the Australian and Queensland Governments.

The key reasons ARTC are seeking the coordinated project declaration under the SDPWO Act are:

- To provide the public with the opportunity to comment and provide input into the terms of reference for the environmental impact statement (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 (if required).

The EIS will undertake a range of investigations into the potential impacts and mitigation measures required for the delivery of the Calvert to Kagaru 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 Project ('Inland Rail') 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 Project has evolved over several decades with many alternatives and options assessed to meet Australia's growing freight transport needs. The current Inland Rail alignment, shown in **Figure 1-1**, was confirmed in the Inland Rail 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 Project, and in 2014 engaged 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 approximately 1,700 km long, will involve:

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

Inland Rail has been divided into 13 projects, 5 of which are located in Queensland, as shown in **Figure 1-2**. Each of these projects is able to be delivered, constructed and operated independently with tie-in points on the existing railway.

The Calvert to Kagaru Project is the subject of this Initial Advice Statement (IAS). The Calvert to Kagaru Project will provide an efficient route through the steep terrain of the Teviot Ranges. The Calvert to Kagaru concept design includes a 1.1 km tunnel through the Teviot Ranges, and substantial earthworks to facilitate the Preferred Alignment across the undulating topography.

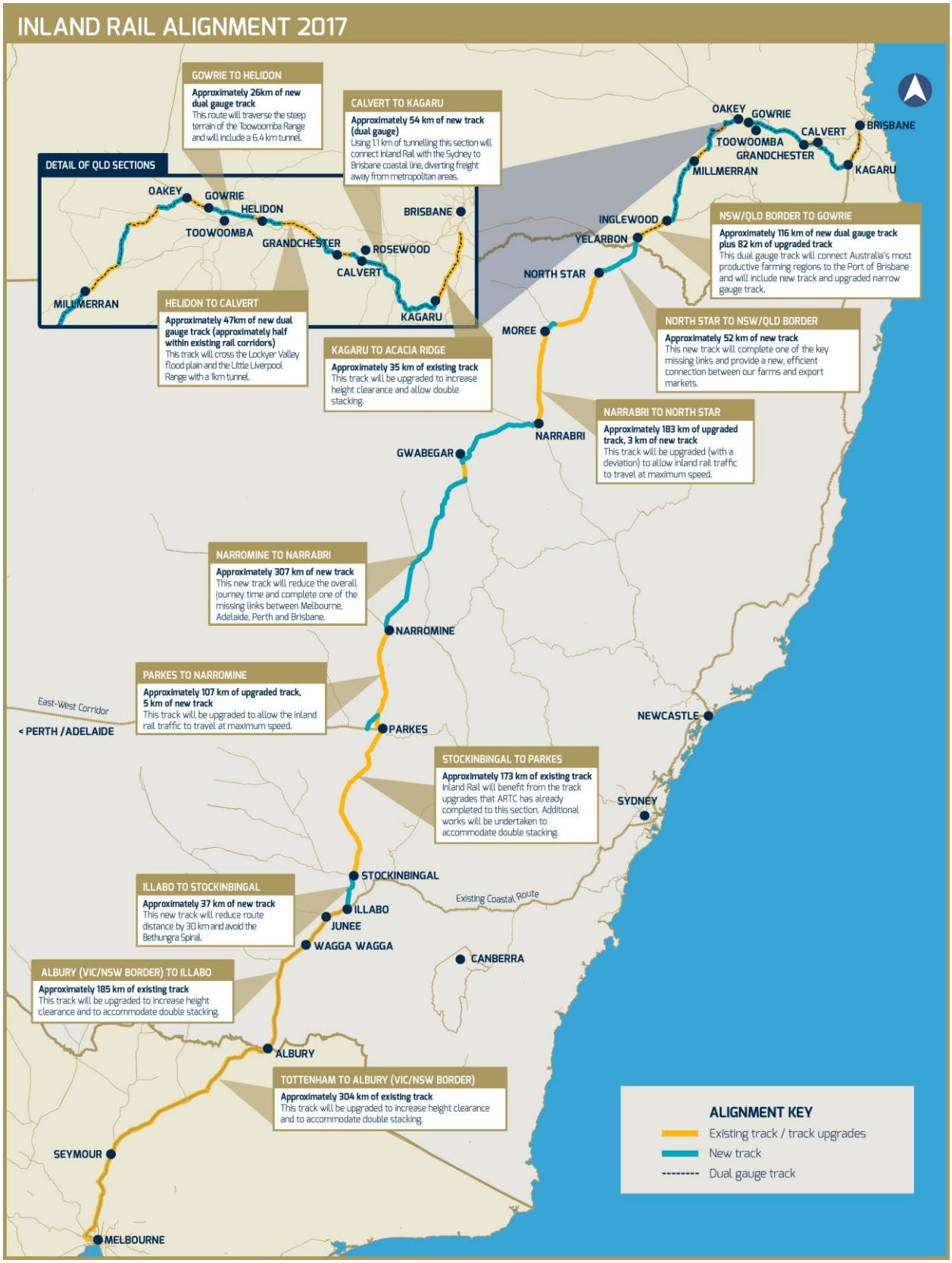


Figure 1-1 The Melbourne to Brisbane Inland Rail Project

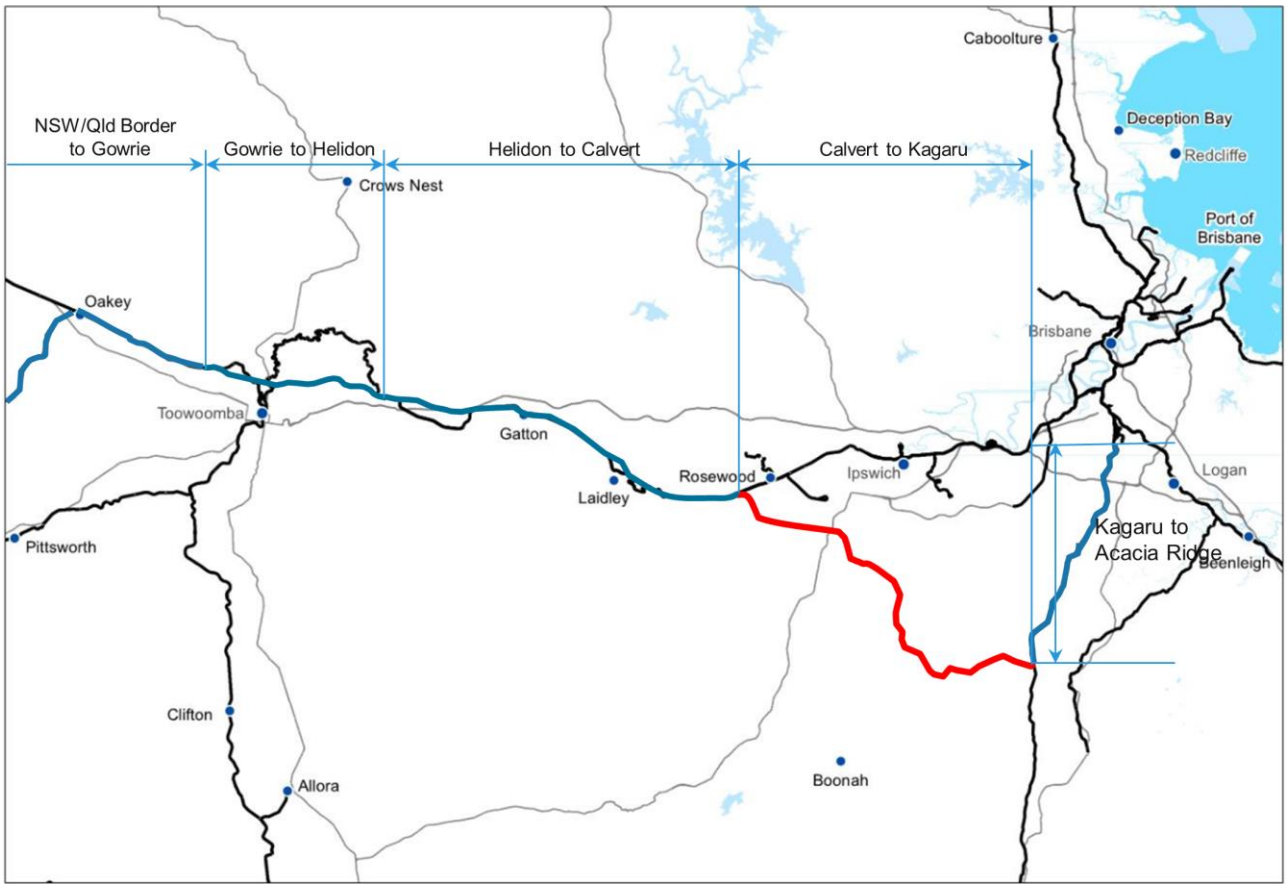


Figure 1-2 Queensland Projects in the Inland Rail Project

1.2. Purpose and Scope of the Initial Advice Statement

This IAS has been prepared for the Calvert to Kagaru 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 Calvert to Kagaru Project, ARTC believe that an EIS is appropriate for assessing the social, economic and environmental impacts.

ARTC are seeking a declaration that the Calvert to Kagaru Project is a coordinated project due to the significant infrastructure investment and strategic direct and indirect economic benefits of creating an efficient freight route through the Teviot Range. ARTC are also seeking to have Commonwealth matters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) assessed in accordance with the assessment bilateral agreement between the Queensland State Government and the Commonwealth Government, if the Commonwealth Minister determines that the Calvert to Kagaru Project is a controlled action. The Calvert to Kagaru Project will have complex approval and permitting 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 Calvert to Kagaru Project should be declared a coordinated project, to determine the appropriate assessment process, and inform the preparation of a terms of reference for an EIS should the Calvert to Kagaru Project be declared under section 26(1)(a) of the SDPWO Act, and require an EIS.

The Calvert to Kagaru Project will be referred to the Commonwealth Department of the Environment and Energy (DotEE) for a decision as to whether the Calvert to Kagaru Project is a controlled action requiring assessment and approval under the EPBC Act. If the Calvert to Kagaru 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 Calvert to Kagaru Project has been identified for consideration in the IAS and EPBC Referral. These areas have been defined to encapsulate the potential land requirements for construction of the railway and ancillary infrastructure. These aspects are discussed further in **Section 3.1**.

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. 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 manages and maintains approximately 8,500 km of rail network across Victoria, New South Wales, South Australia, Western Australia and Queensland. Since 2011, ARTC have delivered a programme of almost $3 billion capital works to modernise the east coast freight rail lines and other projects to enhance the national rail network offering to customers. The Inland Rail 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 Project team with in-house support from specialist consultant technical advisors. 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.

ARTC have not incurred any environmental prosecutions within the last five years. During the execution of almost $3 billion of capital works, ARTC have incurred two penalties relating to minor environmental incidents including:

- New South Wales Environment Protection Authority (EPA) Penalty Notice to ARTC dated 29 May 2012 for discharge of sediment-laden water at Allandale (Maitland to Minimbah Third Track Project). Penalty: $1500.
- New South Wales EPA Penalty Notice to Transport Express JV (operating under ARTC Environment Protection Licence (EPL)) dated 5 March 2012 for sediment and erosion control issues at Sawtell. Penalty: $1500.

ARTC has entered into a Voluntary Enforceable Undertaking, i.e. formal written undertakings in relation to a contravention or alleged contravention of the law, with the Commonwealth Department of the Environment and Energy (DEE) under the EPBC Act in 2011.

Contact details for the Inland Rail Project are as follows:

Inland Rail
Australian Rail Track Corporation
Level 12, 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 Calvert to Kagaru Project

The proposed Calvert to Kagaru Project is an approximately 53 km long single-track dual-gauge railway with crossing loops to accommodate double stack freight trains up to 1,800 m long. It will also involve tunnelling through the Teviot 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 60m, 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.

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 Calvert to Kagaru Project will generally be located in the gazetted future railway land of the SFRC. The corridor passes to the southwest of Ipswich (**Figure 3-1**) and is aligned in an approximate north-west to south-east direction and would connect to the Queensland Rail 'Western System' near Calvert at its north-west end, and to the existing ARTC Interstate line near Kagaru in the south-east. The Calvert to Kagaru Project is located between the adjacent Inland Rail proposed projects of Helidon to Calvert in the north-west and Kagaru to Acacia Ridge in the south east.

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 Calvert to Kagaru Project Study Area is primarily characterised by rural and rural-residential land uses on a variety of allotment sizes. The diversity in rural land use is reflected through the various rural allotment sizes, with rural residences situated on lots between 1 ha and 10 ha, and agricultural/grazing uses on lots up to 20 ha. Land uses particularly important to this study are those deemed to be potentially sensitive to impacts (such as residential dwellings), and those involving substantial capital investment, or those which are particularly important to the community (major land uses).

Land use in the Calvert area (western study area) is typically of a rural nature, with most properties within the study area consisting of large-lot grazing areas. Ebenezer (east of Calvert) is characterised by predominantly rural and rural-residential land uses, with a considerable amount of remnant vegetation. Jeebropilly coal mine and former Ebenezer coal mines are located in proximity to this section. The Preferred Alignment traverses the Ebenezer and Park Ridge Industrial Development Areas. Powerlink project (high voltage transmission line) and the Santos Moonie-Brisbane high pressure oil pipeline also cross the Preferred Alignment.

The area south of Purga towards Peak Crossing contains a mixture of land uses, including a number of rural-residential properties and agricultural estates, poultry farms, Purga Quarry, Gibb Brothers farming operations, and the township of Peak Crossing. Washpool is characterised by predominantly vegetated mountainous areas in the east and rural land uses in the west. The Purga Nature Reserve is also located in this region.

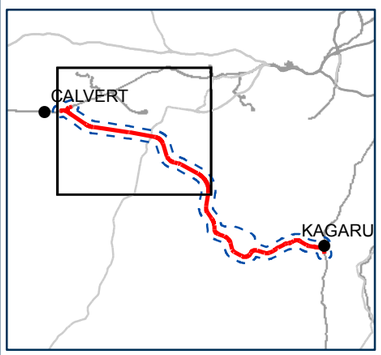
Throughout the Woolooman area (in the east of the study area) and the Teviot Range (Flinders Peak Conversation Park), terrain is of a rugged nature and there is minimal development. Wyaralong Dam is located to the south. Kagaru is predominantly rural and is located within the Bromelton State Development Area. Flagstone Priority Development Area is located north of the Preferred Alignment.

The intended land use for the Calvert to Kagaru Project is rail and associated infrastructure, including road realignments, grade separations and ancillary infrastructure.

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Project context

Figure 3-1

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Secondary Road
- Watercourse



4 Km

Coordinate System:
GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 24/02/2017
Author: IH/MS

Data source: GHD: Alignment (2016), Alignment buffers (2017); DNRM: Contour (2015), Road (2016), Rail (2014); GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008).

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ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Project context

Figure 3-1

Stewartdale Nature Refuge
OXLEY CREEK
Mount Perry Conservation Park
Peak Mountain View Park
Goolman Park
PEAK CROSSING
LIMESTONE RIDGE
IPSWICH BOONAH ROAD
Flinders Peak Conservation Park
Diiram Yani Park
Coachwood Park
Jackeroo Park
Settlers Park
WOOLLAMAN CREEK
Woolooman Tunnel 1
Woolooman Tunnel 2
KAGARU
BROOKLANDS
LOGAN RIVER
PURGA CREEK
MILLBONG
TEVIOT BROOK
TEVIOT BROOK
ALLAN CREEK

- Preferred alignment (surface)
- Preferred alignment (tunnel)
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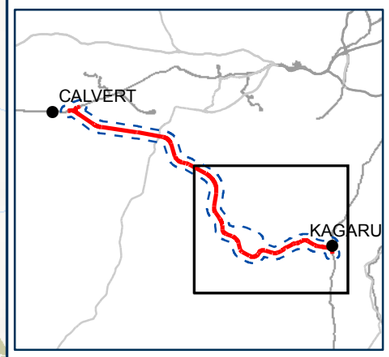

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3.3. Project Need, Justification and Alternatives Considered

3.3.1. The Melbourne to Brisbane Inland Rail Programme Business Case

The Inland Rail Project 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 Project is 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 would 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 that the transport and logistics sectors of the Australian economy contribute 14.5 per cent 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 per cent of the country's population, 78 per cent of Australia's national employment and generates 75 per cent of the nation's GDP. With the population estimated to grow by 60 per cent over the next 40 years increasing pressure would be placed on freight infrastructure and services.

The Business Case identifies that:

- Relying on road for freight transport would result in increasing safety, environmental and community impacts
- The existing rail line between Melbourne and Brisbane is constrained by passing through Sydney and cannot 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
- Would 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 Project 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. The Calvert to Kagaru Project forms an essential component of the Inland Rail Project.

3.3.2. Queensland Planning Context

ARTC is seeking that the Calvert to Kagaru 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 must have regard to:

- 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 two local government areas (LGAs) including:

1. Scenic Rim Regional Council (SRRC)
2. Ipswich City Council (ICC)

The Project traverses areas that are within the following local government planning schemes:

- Boonah Shire Planning Scheme 2006
- Beaudesert Shire Planning Scheme 2007
- Ipswich Planning Scheme 2006.

The Calvert to Kagaru Project aligns with the SFRC, which was gazetted as a future rail corridor under Section 242 of the *Transport Infrastructure Act 1994* (TI Act).

Inland Rail is identified as a priority project in the State Infrastructure Plan, and also appears in the draft South East Queensland Regional Plan. The draft regional plan states that the Inland Rail project will support efficient freight movement throughout the sub-region. This will improve national rail freight network connections with Melbourne via Toowoomba, Lockyer Valley and the Bromelton State Development Area, and ultimately link to the Port of Brisbane.

The SFRC Study and the Inland Rail Project are included within the City of Ipswich Transport Plan (iGO). The iGO is the masterplan for Ipswich's transport future. Within this plan the SFRC Study and Inland Rail Project form part of the strategic future for Ipswich's freight network.

3.3.3. Alternatives Considered – Project wide

Various alternate scenarios to the overall Inland Rail 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.

3.3.4. Alternatives Considered – Calvert to Kagaru 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:

- Maunsell Australia Pty Ltd (2005) Southern Infrastructure Corridor Study (SIC), Office of Urban Management. This study investigated at a broad level, potential routes for the SIC. The study focused on the feasibility of routes for a freight railway, as this infrastructure is more highly constrained by terrain (horizontal and vertical geometry) when compared to road and other utilities such as pipelines and powerlines. The SIC Study investigated eight route options in total (3 northern, 4 central and 1 southern) for connecting the West Moreton Rail Line to the Interstate Standard Gauge Route (SGR). All options included allowance for a potential Intermodal Freight Terminal (IFT) within the Purga Identified Growth Area and connected to the existing Western Railway via the Ebenezer rail loop. The presence of the Teviot Range was a major challenge for all options.
- Maunsell Australia Pty Ltd (2005) Purga Site Investigation Study. The Qld Coordinator-General. The Coordinator-General (CG) commissioned the Purga Site Investigation Study which investigated the pre-feasibility of the Purga Identified Growth Area, as identified in the SEQRP, for industrial land uses including an IFT and a possible extension of the proposed Amberley Aerospace Park.
- 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.
- Maunsell Australia Pty Ltd (2006-2010) Southern Freight Rail Corridor Study, Department of Transport and Main Roads (http://www.tmr.qld.gov.au/Projects/Name/S/Southern-Freight-Rail-Corridor-Study). The Southern Freight Rail Corridor study identified a future route connecting the West Moreton Rail line near Calvert to the interstate railway north of Beaudesert. The Preferred Alignment of the Calvert to Kagaru Project generally follows the SFRC.

- 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 SFRC which ARTC had previously identified as likely to be the critical path component for the completion of Inland Rail.
- 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 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 engagement with key stakeholders including the SRRC, ICC, peak industry bodies and Aboriginal parties.

3.4. Components, developments, activities and infrastructure that constitute the coordinated project

Key components of the Calvert to Kagaru Project include:

- Single track dual gauge rail line with crossing loops to ultimately accommodate trains up 3600 m long based on business needs, but initially constructed for 1800 m long train sets
- The approximately 1.1km Teviot Range tunnel, and bridges 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
- Third party infrastructure requirements to be determined during future project stages (refer **Section 3.5**)
- A temporary construction camp located at a site between the tunnel through the Teviot Range and Kagaru
- Construction workspace and access roads.

Construction activities for the project will likely include temporary roads, upgrades and/or alterations to existing roads. The construction of the Calvert to Kagaru 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 Calvert to Kagaru 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 the construction of the Calvert to Kagaru Project.

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

Key elements not included as part of the Calvert to Kagaru Project include the following:

- Complementary infrastructure, such as metropolitan and regional freight terminals;

- Upgraded fleet/rolling stock; and
- Complementary land use and freight precinct developments.

3.6. Timeframes for the Calvert to Kagaru Project

The indicative program is provided as follows:

- 2017-2019: design, planning and approvals
- 2019-end of 2020: pre-construction and land acquisition
- 2020-2024: Construction
- 2024 Project Opening.

3.7. Construction and Operational Processes

At present, only preliminary information is available about the way in which the Calvert to Kagaru Project will be designed and delivered, 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 establishment of access tracks.

Construction 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 be a mined tunnel with temporary rock support and permanent concrete lining
- Construction of bridges and viaducts at major waterways, and major infrastructure crossings (e.g. Cunningham Highway)
- Construction of drainage and stormwater treatment infrastructure
- Construction of track and signalling
- Construction and implementation of environmental management measures (e.g. fauna crossings, noise treatments)
- Landscaping and rehabilitation treatments to areas disturbed during construction.

As described in **Section 3.5**, power and water supplies will be required during the operational phase. 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.

During the operational phase, maintenance activities will be carried out as required by ARTC or contractors on behalf of ARTC. The dual gauge track will maintain the narrow gauge connectivity to the Brisbane and regional Queensland lines once the Calvert to Kagaru Project is operational.

3.8. Workforce requirements during Construction and Operation

The Calvert to Kagaru Project is part of the larger Inland Rail Project. The Business Case identifies an anticipated additional 16 000 jobs will be required programme-wide at the peak of construction (estimated in 2019 to 2020), with an average of 800 jobs per annum over the 10 year construction period. An average of 700 additional jobs per annum is anticipated over 50 years of operation (2024 to 2074). It is estimated that approximately 60 per cent of the capital expenditure (CAPEX) for Inland Rail will be expended on projects in Queensland, including the Calvert to Kagaru Project. Therefore an equivalent proportion of jobs are anticipated to be based in Queensland. Based on the capital cost associated with the Calvert to Kagaru Project (refer to **Section 3.9.1**), a peak workforce for the Calvert to Kagaru Project may be around 1600, with an average of 80 jobs per annum over the 10 year construction period programme-wide.

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 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. Due to the relative isolation of the Teviot Range it is possible that a temporary construction camp is established at a location between the range and Kagaru. It is proposed that considerable indirect employment opportunities will also arise as a result of the construction and operation of the Calvert to Kagaru 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, stimulating jobs and growth in the region.

3.9. Economic Indicators

3.9.1. Capital Cost

Inland Rail would be a strategic catalyst for economic development. A conventional economic appraisal was undertaken for the 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 (such as reduced accident and environmental costs).

Major infrastructure projects like Inland Rail inevitably involve significant construction costs. Delivering Inland Rail is expected to cost approximately $10 billion. The Calvert to Kagaru Project is expected to cost approximately $1.2 billion due to its overall length and the significant infrastructure elements of the tunnel, and significant earthworks required for the Teviot 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 50-year period (2025 to 2075).

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 $16 billion—a benefit-cost ratio (BCR) of 2.62

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

3.9.3. Local and Regional Benefits

The business case indicates that Inland Rail would 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 would also support minerals, regional freight and agriculture. Inland Rail would 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 Business Case (PwC, 2016). 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, would 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**. 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).**

Notes: Analysed over 50 year appraisal period to 2073 to 2074 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 would present opportunities for local and regional freight hub development. In particular, the Calvert to Kagaru section is expected to provide benefits to existing and future users of the South-West Moreton Railway Line by providing improved efficiencies on the Calvert to Kagaru section, compared to the existing railway.

3.10. Financing Requirements and Implications

The Australian Government approved funding for the Inland Rail 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 Calvert to Kagaru Project is dependent on funding from the Australian Government.

4. LOCATION OF KEY PROJECT ELEMENTS

4.1. Location

The Preferred Alignment passes near Calvert, Ebenezer, Purga, Peak Crossing, Washpool, Woolooman, Undullah and Kagaru (**Figure 3-1**). The Preferred Alignment is located within the ICC and the SRRC local government areas. There is no street address of the Preferred Alignment.

The main roads providing access to the area include the Cunningham Highway, the Ipswich – Boonah Road and the Rosewood – Warrill View Road with the remaining number of roads being gravel/unsealed.

4.2. Tenure

The Preferred Alignment passes through a combination of rural and agricultural areas comprising of private, government and business land holdings. The Preferred Alignment intersects 163 lots (Appendix A). The tenure of the alignment is predominately freehold with exceptions including oil and electricity easements, State land, leasehold land and reserve land.

The Calvert to Kagaru Project generally aligns with the SFRC, gazetted 'future railway land', under Section 242 of the TI Act. ARTC would be granted a sub-lease over the gazetted rail transport corridor to manage the movement of freight in accordance with the TI Act.

Of the properties within and adjacent to the Preferred Alignment, a number are owned by local or State government. This includes land parcels owned by DTMR that were acquired within the gazetted future railway land, other state land (e.g. reserve for recreation and drainage) and properties owned by local government.

5. DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1. Natural environment

5.1.1. Land

Topography

Topography along the Preferred Alignment varies between approximately 30 m Australian height datum (AHD) and 200 m AHD with the majority of the slopes along the project route and in the vicinity of the proposed route having a grade of less than 30 per cent. The study area is made of up three distinct topographical areas being the western lowlands, the central ranges (Teviot Range) and the Beaudesert Basin.

The topography of the landscape features reflects the underlying geology, which consists of a central anticline, forming rugged sandstone hills, while the flanking synclines containing coal, sedimentary and igneous rocks, give rise to gently undulating lowlands.

Geology

The majority of the Preferred Alignment is underlain by four major geological formations being the Walloon Coal Measures formation (30.7 per cent), Koukandowie formation (7.7 per cent), Gatton Sandstone formation (25.6 per cent) and Alluvial deposits (36 per cent). The geology from Calvert to Kagaru is predominantly comprised of Quaternary (clay, silt, sand and gravel; floodplain alluvial soils) and Jurassic (shale, siltstone, sandstone, coal) with some Tertiary (including claystone, siltstone sandstone, basalt, dolerite) and Late Tertiary-Quaternary (pediment slope wash, clay, scree, soil). The geology of the study area is shown in **Figure 5-1**.

The Preferred Alignment crosses alluvial floodplains for approximately 19.2 km formed by Western Creek, Frank Vale Creek and Bremer River in the northwest, Warrill Creek and Purga Creek centrally and Teviot Brook in the east.

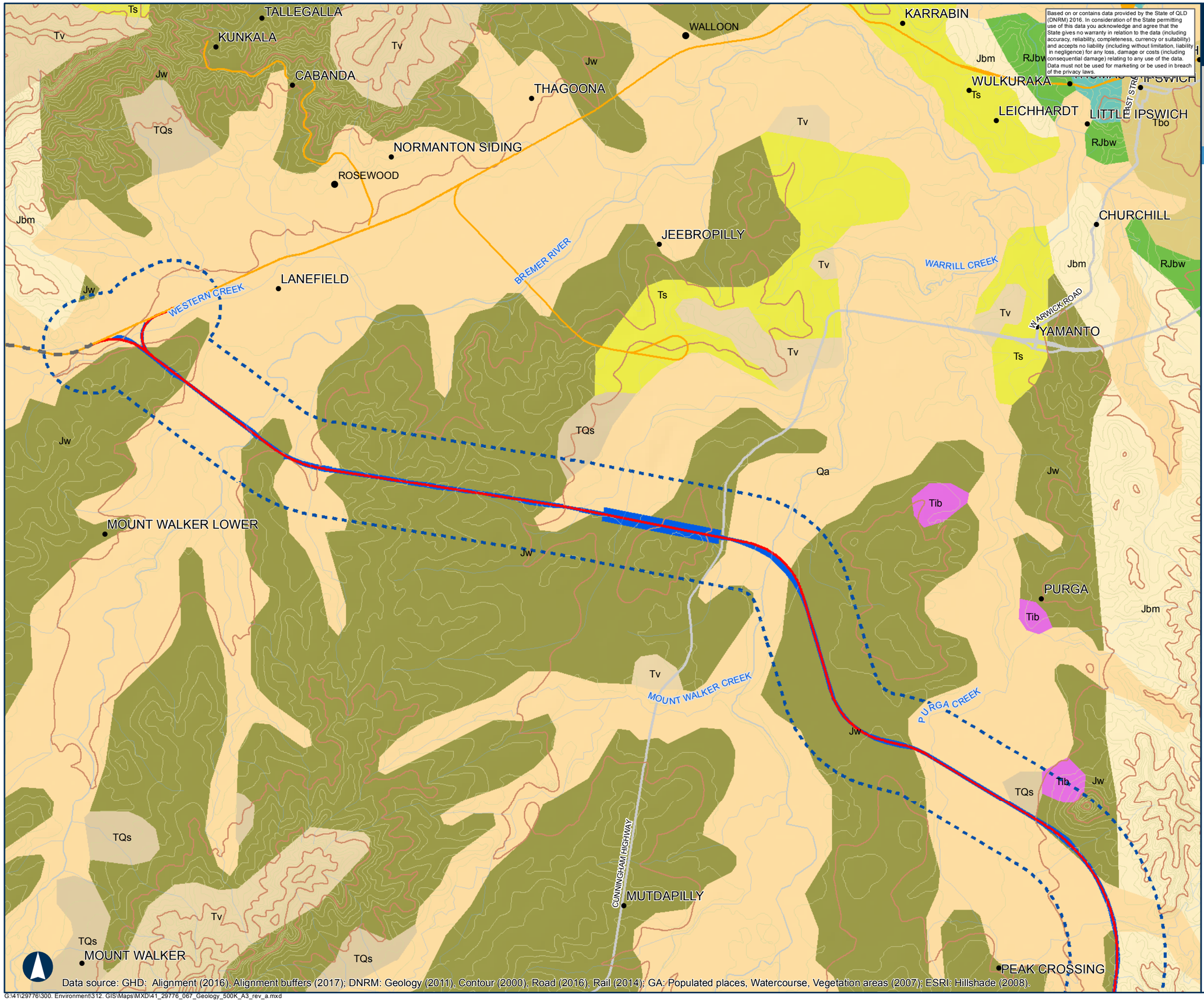
Soils

Soil mapping indicates that parent material strongly influences soil development in the area. Podzolics and solodics are confined to areas of coarse-grained quartzose sediments, acid igneous rocks and areas of sandy alluvium. Prairie soils, black earths, and grey clays have developed on the finer-grained sediments, the more basic igneous rocks, and the main development of valley alluvium. Lithosols are dependent on topography and are found only on the steepest slopes; however, parent material differences are evident in the texture of the soil.

Along the western boundary of the Logan valley deep quartz-rich sands occur where the stream gradients have suddenly decreased, depositing thick layers of coarse sediments. Such soils are too immature to reflect soil-forming processes. Preliminary field observations highlighted evidence of erosion on some riparian banks throughout the study area, primarily due to stock movement and access.

Approximately 22.2 km section along the Preferred Alignment on the Calvert side comprises Vertosols and Sodosols. Vertosols soils appear to have formed over alluvial floodplain and weathered Walloon Coal measures. The texture of these soils is generally expected to be predominantly clay which could be dispersive in general. Sodosols may contain dense sodic soils and are often dispersive.

Over the next 22.5 km in the centre of the Preferred Alignment moving towards the east, Dermosols and Chromosols are the dominant soil types. They are generally non-sodic (i.e. non-dispersive). While Rudosols (formed over the Gatton Sandstone) cover the eastern portion of the route with Dermosols becoming dominant near Kagaru.



Data source: GHD: Alignment (2016), Alignment buffers (2017); DNRM: Geology (2011), Contour (2000), Road (2016), Rail (2014); GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008).

ARTC InlandRail

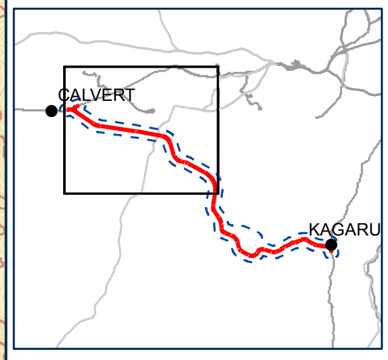
Inland Rail
Calvert to Kagaru
Initial Advice Statement
Geology and Topography

Figure 5-1

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- Contour (50m interval)
- Contour (10m interval)

Rock Unit (DNRM regional geology)

- MG-Qa
- MG-TQs
- Booval Group
- MG-Ts
- MG-Tv
- MG-Tib
- Marburg Subgroup
- Walloon Subgroup
- Ipswich Coal Measures
- Woogaroo Subgroup



4 Km

Coordinate System:
GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 24/02/2017
Author: IH/MS

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Based on or contains data provided by the State of QLD (DNRM) 2016. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Geology and Topography

Figure 5-1

- Preferred alignment (surface)
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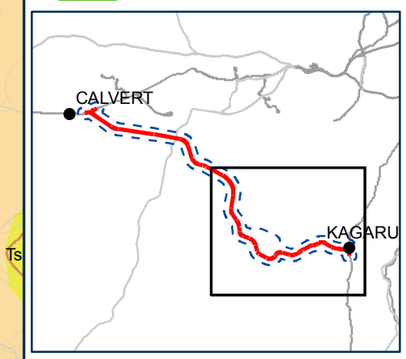
Rock Unit (DNRM regional geology)

- MG-Qa
- MG-TQs
- Flinders Dolomite
- MG-Ts
- MG-Tv
- MG-Tia
- MG-Tib
- Marburg Subgroup
- Walloon Subgroup
- Woogaroo Subgroup



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Author: IH/MS

Data source: GHD: Alignment (2016), Alignment buffers (2017); DNRM: Geology (2011), Contour (2000), Road (2016), Rail (2014); GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008).

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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. 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, or lands previously used by defence.

A review of aerial photography and previous reports relevant to the study area with field verification has identified the following land uses that warrant further review of potential contamination in future project stages:

- Livestock production, farm workshops or rural residential areas with potential contamination sources being previous storage of machinery, pesticides, hydrocarbons or other chemicals
- Existing rail corridors with potential contamination sources from unknown fill materials, historic use of herbicide sodium arsenate and potential for hydrocarbons
- Former wrecking yard and rubbish dump
- Houses on the Preferred Alignment with potential to include asbestos containing materials.

Visual Amenity

The visual amenity and scenic value of the study area is influenced by the topography, drainage and land use.

The current landscape of the study area is mostly cleared rural land used predominantly for grazing with some production from irrigated agriculture, plantations and cropping. Open agricultural fields and scattered farmsteads are a dominant feature in views across the landscape with some residential pockets.

The landscape is also characterised by a number of major roads, highways and railway lines. Industrial and mining areas include Jeebropilly and Ebenezer coal mines; Purga quarry and Willowbank industrial area. Remnant vegetation is present along roads and in small areas.

Low lying creeks (such as Teviot Brook, Purga Creek, Warrill Creek and Western Creek) and the Bremer River are lined with mature riparian vegetation and meander across the landscape.

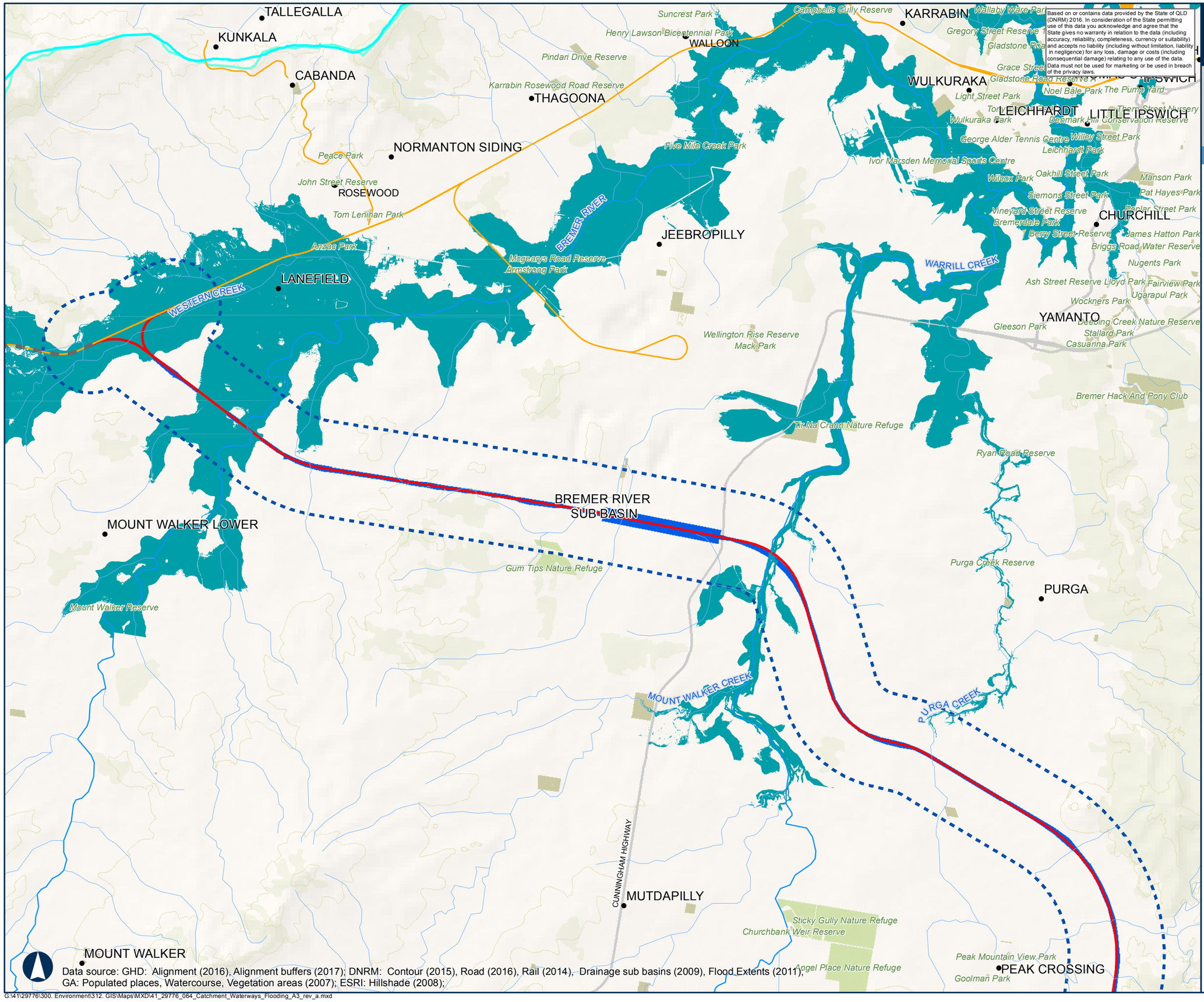
The mountainous, undulating landscape, ranging from 50 m to 679 m AHD (Mount Flinders), defines the setting and backdrop in many views with the blanketed hills of the Teviot Range (Flinders Peak Conservation Park) contributing to the rural scenic value.

The landscape types were described in the SFRC assessment report (2010) as ‘scenic wooded and undulating" “upland ranges” and “bushland ridges”, peaceful farmed landscapes of the lowland “settled pastures” and “watercourses with croplands”, fringes of “industrial” areas and “settled landscapes”.

5.1.2. Water

5.1.2.1. Surface Water Quality

The Calvert to Kagaru Project is wholly within the Bremer and Logan River Catchments. The Bremer River Catchment covers an area of 2,032 km² and extends from the junction of the Bremer River with the Brisbane River south-west to the Great Dividing Range. The Logan River Catchment covers an area of 2,986 km^2 and extends from its headwaters within Mt Barney National Park to Moreton Bay at Lagoon Island.



ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Catchments, waterways and flooding

Figure 5-2

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- Drainage sub basins
- Flood extents 2011 - Brisbane River (DNRM)

Data source: GHD: Alignment (2016), Alignment buffers (2017); DNRM: Contour (2015), Road (2016), Rail (2014), Drainage sub basins (2009), Flood Extents (2011);
GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008);

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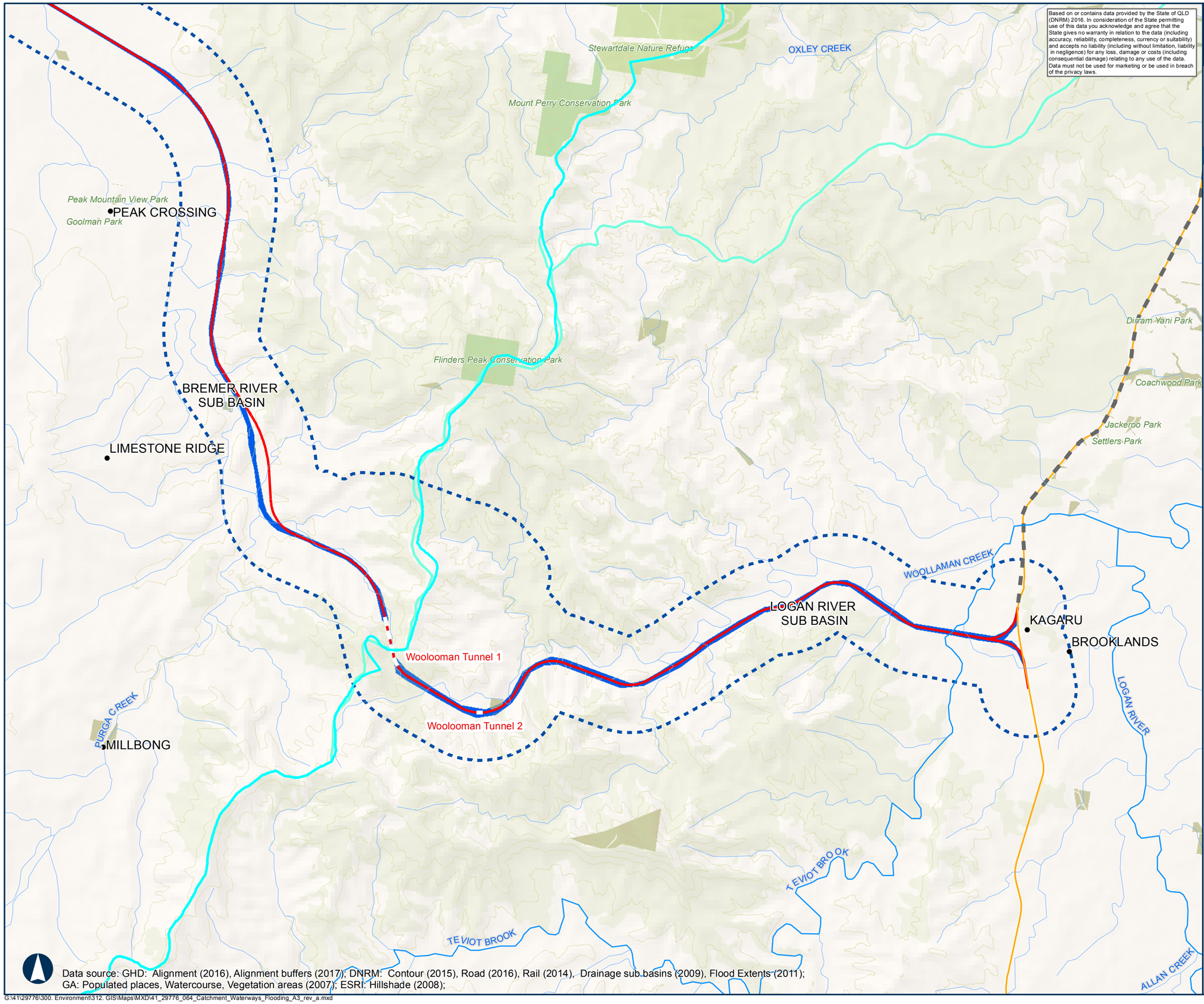

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ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Catchments, waterways and flooding

Figure 5-2

- Preferred alignment (surface)
- Preferred alignment (tunnel)
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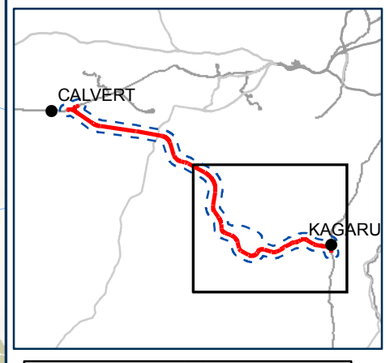

4 Km

Coordinate System:
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Water quality within the Upper Bremer River Catchment and the freshwater section of the Logan River has been historically poor. It is characterised by high sediment loads and highly variable flows. The water quality is closely dependent on land use as sites with poor water quality are usually close to urban development with minimal riparian vegetation. Many of the watercourses have relatively high levels of copper, with concentrations exceeding the Queensland Water Quality Guidelines (QWQG) 2009 the aquatic ecosystem protection values resulting in the well water exceeding groundwater quality criteria levels for drinking. The presence of copper and zinc in the waterways is due to surface erosion of soils within the catchment (AECOM, 2010).

The major watercourses within the study area include Bremer River, Bundamba Creek, Purga Creek, Reynolds Creek, Warrill Creek, Western Creek, Sandy Creek, Wild Pig Creek and Teviot Brook. The Calvert to Kagaru Project crosses 44 mapped watercourses as defined under the *Water Act 2000*.

5.1.2.2. Flooding

A large portion of the alignment is located on a floodplain with low lying watercourses. Major flooding events in the Bremer River and Warrill Creek included 1896, 1931, 1947, 1955, 1967, 1974, 1991, 2008, 2009, 2011, 2013 and 2014 (Warrill Creek only) (BoM, 2016).

5.1.2.3. Groundwater

The main groundwater resources within the study area are located within alluvial deposits associated with the waterways network. This resource has been mapped as moderate-moderate to high vulnerability. There is a strong reliance on groundwater for agricultural purposes in the study area (SFRC Final Assessment Report 2010). Densely vegetated areas rely on shallow groundwater resources.

Groundwater levels appear to fluctuate less than 5 m in most locations. However, there are few locations where greater than 5 m (up to 8.26 m at a groundwater monitoring well near chainage 1,635.5 km within alluvial flood-plain) groundwater fluctuation was recorded.

The Queensland government groundwater dependent ecosystems (GDE) mapping identifies the distribution and type of ecosystems across the landscape that may be dependent on either surface presence or sub-surface presence of groundwater. This mapping identifies the potential for a number of surface expressions of GDE and terrestrial areas within the study area.

Based on limited historical water quality data, the general quality of the groundwater in the region is poor and groundwater quality criteria for chlorine, zinc and manganese is exceeded in all registered monitoring wells.

5.1.3. Air Quality and Noise

Ambient Air Quality

The study area is predominately rural with some areas of national parks. Industrial sources of emissions (mines and quarries) are removed from the study area; however, further assessment will be required to determine their contribution to the existing environment. Nearby sources of air and noise emissions include agricultural activities, vehicles and trains.

The nearest Department of Environment and Heritage Protection (DEHP) air quality monitoring sites to the study area are Mutdapilly, Flinders View and North Maclean. Analysis of the nearest DEHP air quality monitoring sites does not indicate any non-compliance with the Queensland air quality objectives for ozone; nitrogen dioxide, sulphur dioxide and particulate matter less than 10 microns diameter (see **Table 5–1**). No data for particulate matter less than 2.5 microns or carbon monoxide was available from the DEHP monitoring sites located in the vicinity of the study area.

Table 5-1 Adopted Background Concentrations (µg/m^3)

POLLUTANT	AVERAGING PERIOD	MONITORED CONCENTRATION (PPM)	STATION
Ozone (O_3)	1 Hour*	0.061	Mutdapilly
	4 Hour*	0.054	
Nitrogen dioxide (NO_2)	1 Hour*	0.015	Mutdapilly
	Annual average (Nov 2015 to Oct 2016)	0.004	
Sulphur dioxide (SO_2)	1 Hour*	0.006	Flinders View
	24 Hour*	0.001	
	Annual average (Nov 2015 to Oct 2016)	0.001	
Particulate matter (PM_{10}) in µg/m^3	24 Hour*	25.1	Flinders View
	Annual average (Nov 2015 to Oct 2016)	12.4	

Source: DSITI, 2017

* As a maximum measured during October 2016.

Noise and Vibration

Long-term noise monitoring at eight sites within the study area undertaken in May 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.

Vibration was monitored at two sites (Calvert and Kagaru) and the levels were found to be dominated by train pass-bys.

5.1.4. Ecosystems

A field survey was conducted in 2016 to ground-truth desktop findings in support of this project (GHD, 2016).

Much of the region has been extensively cleared for grazing. Areas subject to cattle grazing have experienced substantial degradation of understorey and ground level habitats through vegetation removal, weed incursions, trampling, and associated soil compaction and erosion. Remaining habitats have been extensively fragmented and often remain in linear remnants along watercourses and floodplains. Creek lines retain value for wildlife habitat and provide corridors for movement. Several larger areas of remnant vegetation persist along the project corridor. These areas retain higher localised value for native flora and fauna.

5.1.4.1. Protected Areas

There are no protected areas within the study area. The closest protected areas are Flinders Peak Regional Park and Mount Perry Regional Park 1, located approximately 2 km and 7 km north-east of the study area. The closest national park, Lockyer National Park, is approximately 30 km north of the section.

5.1.4.2. Matters of State Environmental Significance

There are a number of matters of State environmental significance (MSES) mapped within the study area. These MSES include:

- Regulated vegetation under the *Vegetation Management Act 1999* (Qld).
- Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse map.
- Areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the *Nature Conservation Act 1992* (Qld) (NC Act).
- Wetlands and watercourses in high ecological value waters as defined in the Environmental Protection (Water) Policy 2009, schedule 2.

The significance of any potential residual impact to these MSES will be assessed as part of the EIS to determine offset requirements.

5.1.4.3. Ecological Corridors

A review of the Queensland government State-wide ecological corridor mapping shows that the study area traverses areas mapped as part of the State and regional ecological corridor. The corridors are located along Western Creek, the Bremer River, Warrill Creek, Teviot Brook and the Teviot Range.

5.1.4.4. Regional Ecosystems

Four Regional Ecosystems have been confirmed by field investigations within the study area, including one considered endangered under the *Vegetation Management Act 1999* (see **Table 5–2** and **Figure 5–2**).

Table 5-2 Regional Ecosystems within the Preferred Alignment

REGIONAL ECOSYSTEM	STATUS	DESCRIPTION
12.3.3d	Endangered	*Eucalyptus moluccana* woodland. Other frequently occurring species include *Eucalyptus tereticornis, E. crebra, E. siderophloia* and *Corymbia intermedia.*
12.3.7	Least concern	*Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.
12.9-10.2	Least concern	*Corymbia citriodora* subsp. *variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks.
12.9-10.17a	Least concern	*Lophostemon confertus* or *L. suaveolens* dominated open forest usually with emergent *Eucalyptus* and/or *Corymbia* species.

5.1.4.5. Aquatic Ecosystems

The Study Area traverses a number of creeks and tributaries including Western Creek, Bremer River, Warrill Creek, Purga Creek and Teviot Brook (see **Section 5.1.2.1**). An aquatic habitat assessment has been undertaken for watercourses traversed by the gazetted rail corridor. The majority of species identified during the assessment are common and indigenous, with no species listed under the EPBC Act or the NC Act detected. Overall, the fish community was dominated by declared (under the *Fisheries Act 1994* (Qld)) noxious pest and exotic species, including:

- European carp (*Cyprinus carpio*)
- Mosquitofish (*Gambusia holbrooki*)

- Mozambique tilapia (*Oreochromis mossambicus*)
- Guppy (*Poecilia reticulata*)

The Bremer River is a highly disturbed and modified system which increases the susceptibility to the invasion of exotic species, including fish. Consequently, the fish species captured during the field survey were considered to be typical of a disturbed catchment in south-east Queensland. This potential community comprises 56 fish species (including exotic species) and four freshwater turtle species.

ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Ecology flora and fauna

Figure 5-4

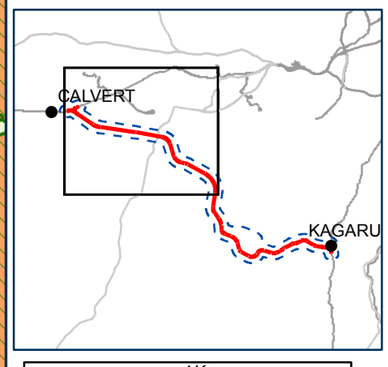
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- Essential Habitat
- Qld estate protected areas

Remnant Vegetation V8

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

Statewide environmental corridors (DEHP)

- State
- Regional



4 Km

Coordinate System:
GDA 1994 MGA Zone 56

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Author: IH/MS

Data source: GHD: Alignment (2016), Alignment buffers (2017); DNRM: Contour (2015), Road (2016), Rail (2014), Regional Ecosystems v8 ground thruthed merged with DNRM (2016), Essential Habitat (2016); GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008); DEHP: Queensland Statewide Corridors (2016)

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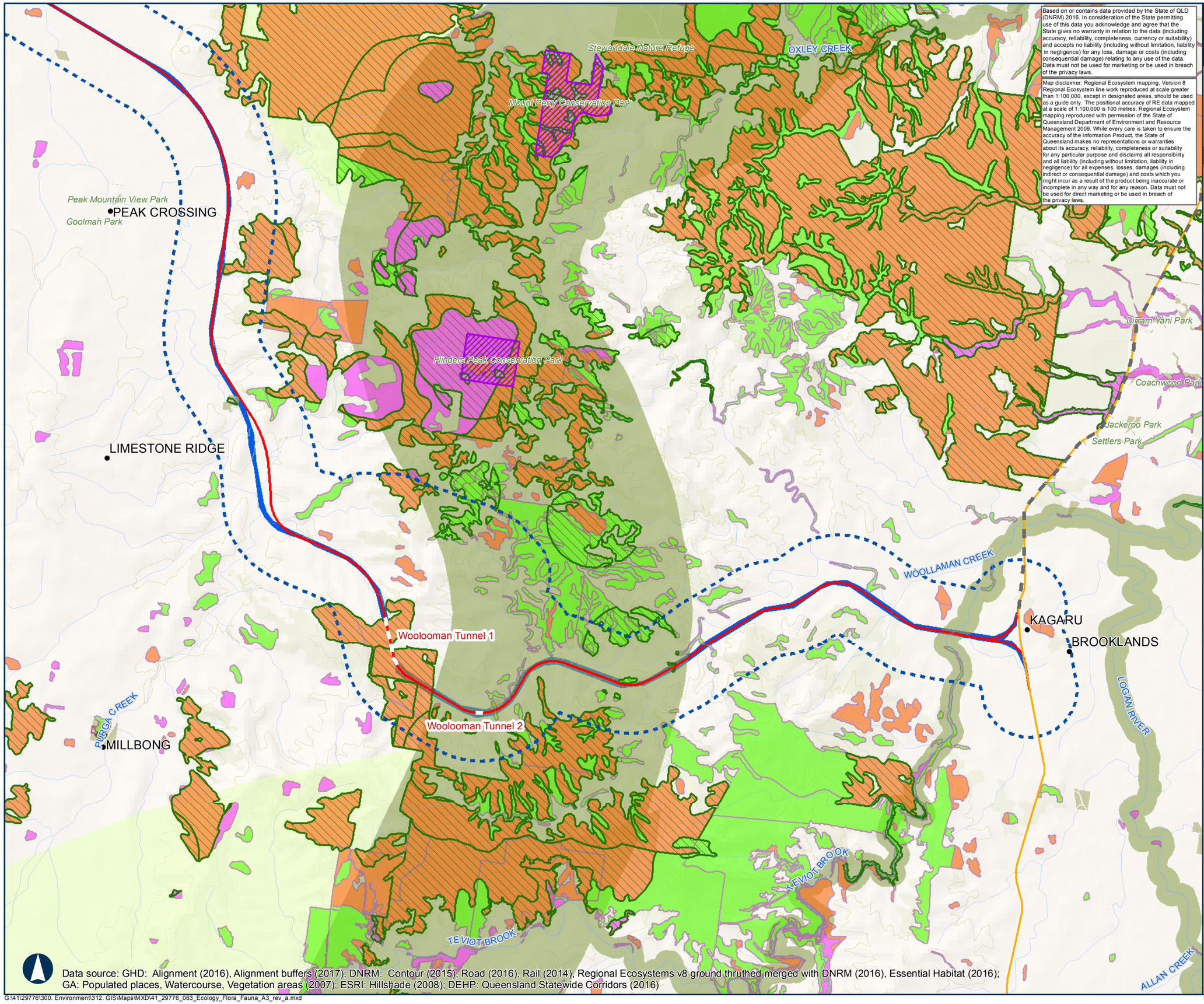

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Inland Rail
Calvert to Kagaru
Initial Advice Statement
Ecology flora and fauna

Figure 5-4

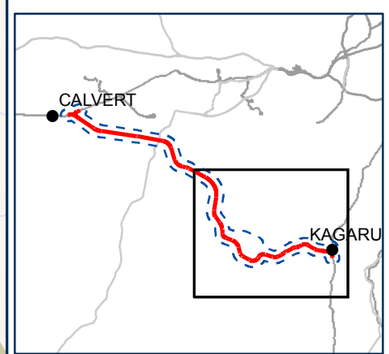
- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- Essential Habitat
- Qld estate protected areas

Remnant Vegetation V8

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

Statewide environmental corridors (DEHP)

- State
- Regional



4 Km

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5.1.4.6. Threatened Ecological Communities

A search of the Commonwealth Department of Environment and Energy's Protected Matters Database identified four threatened ecological communities (TECs) that have the potential to occur in proximity to the study area. The TEC and their EPBC Act status are as follows:

- Swamp Tea-tree (*Melaleuca irbyana*) Forest of South-east Queensland, listed as critically endangered
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, listed as critically endangered
- Lowland Rainforest of Sub-tropical Australia, listed as critically endangered
- Brigalow (*Acacia harpophylla* dominant and co-dominant), listed as endangered

One of these TECs, the Swamp Tea-tree (*Melaleuca irbyana*) Forest of South-east Queensland, was confirmed to be present during the field studies. The distribution of *M. irbyana* is geographically restricted, with the species occurring at a low number of locations from Gatton in South-East Queensland to near Casino in north eastern New South Wales. Four patches of the Swamp Tea-tree TEC occur within the study area; one of which extends into the periphery of the Preferred Alignment, with the remaining three patches within the study area but outside the Preferred Alignment (**Figure 5–2**). The Purga Nature reserve is located approximately 150 m north of the corridor, and supports the largest remaining area of this TEC.

The closest wetland of international importance is the Moreton Bay Ramsar site, located approximately 45 km east of the Preferred Alignment.

5.1.5. Flora and Fauna

Land clearing is recognised as a principal cause of biodiversity loss. While historical clearing has already impacted the flora and fauna within the study area, a number of Commonwealth and state significant species and habitat remain within the study area. These species are discussed in **Sections 5.1.5.1** and **5.1.5.2**. ARTC will make a referral of the Calvert to Kagaru Project under the EPBC Act.

5.1.5.1. Threatened Flora

Desktop assessment

A search of the Commonwealth Protected Matters Database and State Wildlife Online database identified 19 threatened flora species that have the potential to occur in proximity to the study area (see **Table 5-3**). Of these, the austral toadflax (*Thesium australe*), listed as vulnerable under the EPBC Act and the NC Act, is considered likely to occur within the study area.

Table 5-3 Threatened flora species with the potential to occur within the study area

COMMON NAME	SCIENTIFIC NAME	STATUS	
		EPBC Act	NC Act
Slender milkvine	*Marsdenia coronata*	-	Vulnerable
Brush sophora	*Sophora fraseri*	Vulnerable	Vulnerable
Lloyd's native olive	*Notelaea lloydii*	Vulnerable	Vulnerable
Austral toadflax	*Thesium australe*	Vulnerable	Vulnerable
Quassia	*Samadera bidwillii*	Vulnerable	Vulnerable
Native thistle	*Rhaponticum australe*	Vulnerable	Vulnerable
Shiny-leaved condoo	*Planchonella eerwah*	Endangered	Endangered
Mt Berryman phebalium	*Phebalium distans*	Critically endangered	Endangered
Lesser Swamp-orchid	*Phaius australis*	Endangered	Endangered
Cooneana olive	*Notelaea ipsviciensis*	Critically endangered	Endangered
Rough-shelled bush nut	*Macadamia tetraphylla*	Vulnerable	Vulnerable
Macadamia nut	*Macadamia integrifolia*	Vulnerable	Vulnerable
Wandering pepper-cress	*Lepidium peregrinum*	Endangered	Vulnerable
Bluegrass	*Dichanthium setosum*	Vulnerable	Vulnerable
Boonah tuckeroo	*Cupaniopsis tomentella*	Vulnerable	Vulnerable
Hoop pine orchid	*Bulbophyllum globuliforme*	Vulnerable	Near threatened
Three-leaved bosistoa	*Bosistoa transversa*	Vulnerable	-
-	*Bertya ernestiana*	Vulnerable	Vulnerable
Hairy-joint grass	*Arthraxon hispidus*	Vulnerable	Vulnerable

Field survey

The field survey identified flora species within the study area were locally common species that are characteristic of the Eucalypt-dominated vegetation communities of the South-East Queensland Bioregion. The swamp tea-tree (*Melaleuca irbyana*), listed as endangered under the NC Act, was identified within the corridor during the field survey (GHD, 2016).

5.1.5.2. Threatened Fauna

Desktop assessment

A search of the Commonwealth Protected Matters Database and State Wildlife Online database identified 22 threatened fauna species that have the potential to occur in proximity to the Preferred Alignment (see **Table 5-4**). Of these species, five are considered likely to occur within the study area. These species are:

- Australasian bittern (*Botaurus poiciloptilus*), listed as endangered under the EPBC Act
- Australian painted snipe (*Rostratula australis*), listed as endangered under the EPBC Act and the NC Act
- Brush-tailed rock-wallaby (*Petrogale penicillata*), listed as vulnerable under the EPBC Act and the NC Act
- Grey-headed flying fox (*Pteropus poliocephalus*), listed as vulnerable under the EPBC Act
- Greater glider (*Petauroides volans*), listed as vulnerable under the EPBC Act and the NC Act
- Koala (*Phascolarctos cinereus*), listed as vulnerable under the EPBC Act and the NC Act

Table 5-4 Threatened fauna species with the potential to occur within the study area

COMMON NAME	SCIENTIFIC NAME	STATUS	
		EPBC ACT	NC ACT
Tusked frog	*Adelotus brevis*	-	Vulnerable
Giant barred frog	*Mixophyes iteratus*	Endangered	Endangered
Australasian bittern	*Botaurus poiciloptilus*	Endangered	-
Regent honeyeater	*Anthochaera phrygia*	Critically endangered	Endangered
Curlew sandpiper	*Calidris ferruginea*	Critically endangered	-
Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered	Endangered
Eastern bristlebird	*Dasyornis brachypterus*	Endangered	Endangered
Red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Endangered
Squatter pigeon (southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable
Painted honeyeater	*Grantiella picta*	Vulnerable	Vulnerable
Swift parrot	*Lathamus discolor*	Critically endangered	Endangered
Southern black-throated Finch	*Poephila cincta cincta*	Endangered	Endangered
Southern emu-wren	*Stipiturus malachurus*	-	Vulnerable
Paradise parrot	*Psephotus pulcherrimus*	Extinct	Extinct in the wild

COMMON NAME	SCIENTIFIC NAME	STATUS	
		EPBC ACT	NC ACT
Australian painted snipe	*Rostratula australis*	Endangered	Endangered
Eastern curlew	*Numenius madagascariensis*	Critically endangered	Vulnerable
Black-breasted button-quail	*Turnix melanogaster*	Vulnerable	Vulnerable
Painted snipe	*Rostratula benghalensis (sensu lato)*	Endangered	Vulnerable
Australian lungfish	*Neoceratodus forsteri*	Vulnerable	Vulnerable
Mary river cod	*Maccullochella mariensis*	Endangered	-
Pink underwing moth	*Phyllodes imperialis smithersi*	Endangered	-
Spotted-tailed quoll (south eastern mainland population)	*Dasyurus maculatus maculatus*	Endangered	Vulnerable
Brush-tailed rock-wallaby	*Petrogale penicillata*	Vulnerable	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	-
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable
Northern quoll	*Dasyurus hallucatus*	Endangered	-
Greater glider	*Petauroides volans*	Vulnerable	Vulnerable
Long-nosed Potoroo (SE mainland)	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable
New Holland mouse	*Pseudomys novaehollandiae*	Vulnerable	-
-	*Cycas ophiolitica*	Endangered	Endangered
Collared delma	*Delma torquata*	Vulnerable	Vulnerable
Dunmall's snake	*Furina dunmalli*	Vulnerable	Vulnerable
Three-toed snake-tooth skink	*Saiphos reticulatus*	Vulnerable	-

Field survey

The field survey (GHD, 2016) recorded 143 terrestrial fauna species within the study area. The following threatened species were recorded during the field survey:

- Koala (*Phascolarctos cinereus*), listed as vulnerable under the EPBC Act and the NC Act.
- Glossy black-cockatoo (*Calyptorhynchus lathami*), listed as vulnerable under the NC Act

Koalas were confirmed present at nine locations broadly distributed across the study area. The study area contains vegetation classified under the EPBC Act as 'habitat critical to survival of koala' (**Figure 5-3**). Additional koala habitat trees occur at lower densities outside of this mapped area of habitat.

Another 98 bird species, 22 mammal species, 17 reptiles and 4 amphibians were recorded during the survey. The bird species recorded were a mix of forest-dependent species, ubiquitous woodland birds and generalist species adapted to open grazing land. Bird species richness was high in structurally complex habitat types (i.e. riparian woodland and swamp tea tree forest), moderate in habitats lacking complexity in the shrub and understorey layer (i.e. woodland and open woodland), and low to moderate in habitats that have been cleared for grazing (i.e. open grassland). Palustrine wetlands within the study area also attracted high numbers of bird species as these represent important local foraging sites within the landscape.

In addition to the koalas, two species of arboreal mammals, the common brushtail possum (*Trichosurus vulpecula*), squirrel glider (*Petaurus norfolcensis*), were recorded from scats and visual observations at numerous locations. Neither of these species is listed as threatened species under either the EBPC Act or NC Act. All three species are likely to be widely distributed in woodland habitats throughout the study area.

Three macropod species were recorded within the study area, the eastern grey kangaroo (*Macropus giganteus*), whiptail wallaby (*Macropus parryi*) and red-necked wallaby (*Macropus rufogriseus*). None of these species are listed as threatened species under either the EBPC Act or NC Act. Large mobs of eastern grey kangaroos were observed within lowland areas, while the two wallaby species were recorded in more densely vegetated habitats along rocky hillsides.

Ground mammals including the northern brown bandicoot (*Isoodon macrourus*), short-beaked echidna (*Tachyglossus aculeatus*) and yellow-footed antechinus (*Antechinus flavipes*) were also recorded during the field survey. The short-beaked echidna is listed as least concern wildlife under the NC Act, the other two ground mammals are not listed as threatened species under the EPBC Act or the NC Act. The ground mammals were recorded from riparian woodland and woodland on rocky hillsides.

None of the reptiles or amphibians recorded during the field survey is listed as threatened species under the EPBC Act or the NC Act. In general, reptile diversity was highest in habitats which retained higher microhabitat complexity at ground level (i.e. riparian woodland and woodland on rocky hillsides). The reptiles recorded included nine species of skinks, two geckos, two dragons, two elapid snakes, one python and one monitor. Native frog species observed included the broad-palmed rocket frog (*Litoria latopalmata*), green tree frog (*Litoria caerulea*) and emerald spotted tree frog (*Litoria peronii*). These species typically occur in close proximity to water sources such as farm dams and ephemeral watercourses. The feral cane toad (*Rhinella marina*) was widely distributed and abundant within the study area, with individuals often found sheltering beneath rocks and logs within woodland in areas some distance from water.

5.1.5.3. Essential Habitat

The Preferred Alignment will intersect areas of regulated vegetation and mapped essential habitat. A review of Queensland Government Essential Habitat Mapping available identified areas of essential habitat in the study area are all associated with essential habitat for the koala, which is listed as vulnerable under the EPBC Act and the NC Act (refer **Section 5.1.5.2**).

5.1.5.4. Migratory and marine species

A search of the Protected Matters Database identified seven species listed as marine and 13 species listed as migratory and marine under the EPBC Act as having the potential to occur in proximity to the corridor. Of these species, four are also listed as threatened species under the EPBC Act and the NC Act. These species include the curlew sandpiper, eastern curlew, swift parrot and the painted snipe (refer **Table 5–4** for listing status). These four species are considered unlikely to occur within the study area.

Two species listed as marine and migratory were recorded within the study area during the field survey: the rainbow bee-eater (*Merops ornatus*) and cattle egret (*Ardea ibis*).

All migratory and marine species that are likely to occur within the study area are regionally common in South-East Queensland, and are not considered likely to occur within the corridor in significant numbers. Additionally, the migratory species that are likely to occur within the corridor are not dependent on a localised breeding or foraging resource, and no 'important habitat' as defined in the EPBC Act significant impact guidelines (DoE, 2013) occurs within the project corridor for migratory or species.

5.1.5.5. Pest Species

A number of pest species have the potential to be within the study area. Restricted invasive animals listed under the *Biosecurity Act 2014* that have the potential to occur within the study area include the following:

- Feral pig (*Sus scrofa*)
- Fox (*Vulpes vulpes*)
- Rabbit (*Oryctolagus cuniculus*)
- Feral cat (*Felis catus*)
- Feral deer (*Rusa timorensis, Cervus timorensis, Cervus elaphus, Dama dama, Axis axis*)
- Wild dog (*Canis familiaris*)

With the exception of one species, all weed species identified with the potential to occur within the study area are listed as restricted invasive plants under the *Biosecurity Act 2014* (Qld) and also listed as weeds of national significance (WONS). One species, cat's claw creeper (*Dolichandra unguis-cati*) is listed as a WONS species; however, is not listed as either a restricted or prohibited invasive plant species under the *Biosecurity Act 2014*. The weed species that have the potential to occur within the study area and listed as restricted invasive plant species and WONS include the following:

- Madeira vine (*Anredera cordifolia*)
- Cabomba (*Cabomba caroliniana*)
- Rubber vine (*Cryptostegia grandiflora*)
- Water hyacinth (*Eichhornia crassipes*)
- Lantana (*Lantana camara*)
- African boxthorn (*Lycium ferocissimum*)
- Chilean needle grass (*Nassella neesiana*)

- Prickly pears (*Opuntia* spp.)
- Parkinsonia (*Parkinsonia aculeata*)
- Parthenium (*Parthenium hysterophorus*)
- Delta arrowhead (*Sagittaria platyphylla*)
- Willows (*Salix* spp. except *S.babylonica*, *S.x calodendron* and *S.x reichardtii*)
- Salvinia (*Salvinia molesta*)
- Fireweed (*Senecio madagascariensis*)
- Silver nightshade (*Solanum elaeagnifolium*)

5.2. Social and Economic Environment

The demographic characteristics of the study area suggest that it contains an ageing population with lower average household incomes than more urbanised areas. Further, the average household size is larger than more urbanised areas and the average cost of housing is lower. Generally, a larger proportion of the workforce of the study area is composed of blue-collar workers, compared with higher proportions of white-collar workers in more urbanised areas (ABS, 2016a; ABS, 2016b).

The local government areas within the study area are expected to be characterised by an ageing population between 2006 and 2026. All local government areas are expected to experience a growth in population, with ICC experiencing the greatest annual change (4.1%) (ICC, undated). The key locations for residential growth are likely to be located outside the study area. The construction and operation of the Calvert to Kagaru Project is likely to facilitate employment growth for local communities, acting as a catalyst and support for other development planned throughout the study area (ABS, 2016a; ABS, 2016b).

Community Profile

Population

The study area lies within the local government areas of ICC and SRRC. The combined population of these local government areas as at the 2011 census was 203,360 (ABS, 2016a; ABS, 2016b). According to the census data, there were 4,049 people living within the gazetted localities of the study area (ABS, 2016c; ABS, 2016d; ABS, 2016e; ABS, 2016f; ABS, 2016g; ABS, 2016h; ABS, 2016i; ABS, 2016j; ABS, 2016k).

Age profiles

Within ICC and SRRC local government areas, the median age of the population at the 2011 census was 32 and 42 respectively. The median age within the localities of the study area however, ranged from 38 to 45. This median age was higher than both the State and National median, which at the 2011 census was 36 and 37 respectively.

Education

The highest year of school completed within the study area is year 10 or equivalent, with more females completing year 12 or equivalent. In relation to non-school qualifications, the majority of the people within the study area have completed a certificate III and IV.

Income

Income within the study area is generally lower than the State and National median, ranging from $406/week to $581/week. The slightly lower median weekly income may be related to the types of industry that provide employment in the study area. As previously stated the study area is composed largely of blue-collar workers employed in industries like road freight transport, supermarket and grocery stores, defence and sheep, beef cattle and grain farming.

Industry and labour force profile

The majority of the population within these localities was employed full-time. Road freight transport industry was the major industry employer within the study area, with the second largest industry employer being education. Unemployment in the gazetted localities of the study area is generally below the State and National unemployment rates (6.1 per cent and 5.6 percent respectively), with the exception of the localities of Lanefield and Willowbank. At the time of the 2011 census, Lanefield has an unemployment rate slightly higher at 6.3 per cent and Willowbank had an unemployment rate considerably higher at 7.4 per cent.

5.2.1. Accommodation and Housing

Key settlements within the study area and wider region include:

- the primary service centre of Ipswich City
- the secondary service centres of Yamanto, Jimboomba and Beaudesert
- the rural townships of Rosewood, Peak Crossing and Harrisville
- the emerging residential areas of Deebing Heights and Flagstone
- the small communities of Amberley and Willowbank, surrounded by regional industry and other major land uses.

According to Census Data from 2011, private dwelling occupancy is high within both ICC and SRRC (approximately 92 per cent and 87 per cent respectively) (ABS, 2016a; ABS, 2016b). There are a number of short-term accommodation facilities within the study area, including hotels, motels and caravan parks. The ability to use locally based workforce and contractors will directly influence the pressure that may be placed on local residential properties and accommodation.

5.2.2. Cultural Heritage (Indigenous and non-Indigenous)

5.2.2.1. Indigenous Heritage

An Aboriginal cultural heritage investigation has been undertaken for the Calvert to Kagaru Project which included an initial desktop assessment (register searches and literature review) and preliminary Aboriginal consultation. No archaeological survey has been conducted.

The register searches identified 58 Aboriginal cultural heritage sites within a 2 km buffer of the Preferred Alignment, 25 Aboriginal cultural heritage sites identified during a previous field survey for the SFRC study and 8 Aboriginal cultural heritage sites within the 80 m to 100 m Calvert to Kagaru Preferred Alignment. Site types included artefact scatters, landscape features, resource areas, grinding grooves, and scarred / culturally modified trees, waterholes and a rock shelter. Known locations of indigenous cultural heritage are identified in **Figure 5-4**.

5.2.2.2. Non-Indigenous

No National Heritage Places or Commonwealth Heritage Places are located within 1 km of the Calvert to Kagaru Project. One historical heritage place (Undullah Station Homestead, Undullah Road, Undullah) was identified approximately 200 m from the Preferred Alignment. A targeted investigation of the study area has identified 7 properties with potential historical heritage significance. Six of these are located within the gazetted future railway land and one within 100 m of the gazetted future railway land (refer **Table 5-5**). Historic heritage sites are identified in **Figure 5-4**.

Table 5-5 Historical Sites

HISTORICAL SITE SURVEY NUMBER	POTENTIAL HERITAGE FEATURE	APPROXIMATE LOCATION
68	Buildings	Within the gazetted rail corridor, south of Wild Pig Creek Road and approximately 11.6 km west of Kagaru
79	Structures	Within the gazetted rail corridor, east of Purga Creek and approximately 11.4 km north-west of Kagaru
7	Building	Within the gazetted rail corridor, east of Dwyers Road and approximately 18.3 km north-west of Kagaru
48	Shed and stockyards	Within the gazetted rail corridor, north of Castle Hill Lane and approximately 21.6 km north-west of Kagaru
45	Stockyard	Within the gazetted rail corridor, east of Lubes Road and approximately 16.8 km south-east of Calvert
3	Shed, stockyard and building	Approximately 100 m east of the gazetted rail corridor, to the east of Lubes Road and approximately 16.9 km south-east of Calvert
87	Buildings	Within the gazetted rail corridor, west of Lubes Road and approximately 16.2 km south-east of Calvert

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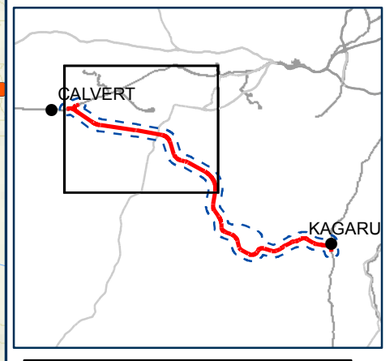
Cultural heritage indigenous and non-indigenous

Figure 5-5

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- Historic cultural heritage sites
- Aboriginal cultural heritage (DATSIP)



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Calvert to Kagaru
Initial Advice Statement

Cultural heritage indigenous and non-indigenous

Figure 5-5

Stewartdale Nature Refuge
OXLEY CREEK
Mount Perry Conservation Park
Peak Mountain View Park
PEAK CROSSING
Goolman Park
Flinders Peak Conservation Park
Diiram Yani Park
Coachwood Park
Jackeroo Park
Settlers Park
LIMESTONE RIDGE
WOOLLAMAN CREEK
KAGARU
BROOKLANDS
Woolooman Tunnel 1
Woolooman Tunnel 2
LOGAN RIVER
PURGA CREEK
MILLBONG
TEVIOT BROOK
TEVIOT BROOK
ALLAN CREEK

- Preferred alignment (surface)
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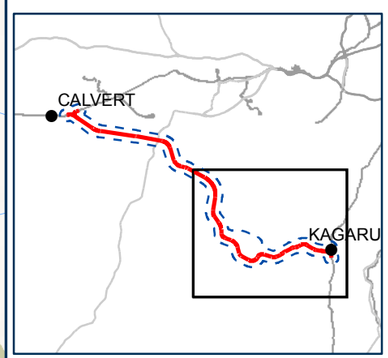

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5.3. Built Environment

Existing land use within and adjacent to the study area is predominately rural with townships at Calvert, Ebenezer, Purga, Peak Crossing, Washpool, Woolooman, Undullah and Kagaru. The main roads providing access to the region include the Cunningham Highway, the Ipswich - Boonah Road, Centenary Highway, Rosewood - Warrill View Road and the Beaudesert-Boonah Road with the remaining number of roads being unsealed.

There is little built infrastructure in the local area with the exception of a few dwellings and existing railway lines. There may be some infrastructure associated with Jeebropilly thermal coal mine (0.6 Mtpa) and Ebenezer mine which closed in 2013.

The nearest declared coordinated project is the South Burnett Coal Project, which is approximately 200 km north-west of Calvert and the proponent is currently drafting their EIS for the project. It is unlikely to have a cumulative impact due to the distance.

5.4. Traffic and Transport

The study area is serviced by network of highways, State Controlled Roads and Regional Council Roads as well as the existing train lines that are the main transport routes for the region. The study area intersects with 89 roads, varying from significant roads, to minor roads, to road reserves and private roads/farm tracks. The project would impact State controlled roads including the Cunningham Highway, the Ipswich - Boonah Road and the Rosewood - Warrill View Road. These roads are all arterial roads (type 1, 2 and 3). All other gazetted road crossings are of minor roads (type 4 and 5). Existing railway lines are located at Calvert and Kagaru.

The Calvert to Kagaru Project generally follows the alignment of gazetted future railway land.

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 Ebenezer Development Area.

5.5.1. Key Local and Regional Land Uses

5.5.1.1. Land Use

The majority of the Study Area between Calvert and Kagaru is agricultural land, with the primary land uses mapped as grazing, production from irrigated agriculture and plantations and cropping.

Land uses in the Calvert area (western study area) are typically of a rural nature, with most properties within the study area consisting of large-lot grazing areas. Ebenezer (east of Calvert) is characterised by predominantly rural and rural-residential land uses, with a considerable amount of remnant vegetation. Jeebropilly and former Ebenezer coal mines are located in proximity to this section.

The area south of Purga towards Peak Crossing contains a mixture of land uses, including a number of rural-residential properties and agricultural estates, poultry farms, Purga Quarry, Gibb Brothers farming operations, and the township of Peak Crossing. Washpool is characterised by predominantly vegetated mountainous areas in the east and rural land uses in the west. The Purga Nature Reserve is also located in this region.

Throughout the Woolooman area (in the east of the study area) and the Teviot Range (Flinders Peak Conservation Park), terrain is of a rugged nature and there is minimal development. Kagaru contains more gentle topography, with elevated and vegetated areas in the south-west and north-east, and cleared rural land in the south-east.

The study area is primarily characterised by rural and rural-residential land uses on a variety of allotment sizes. The diversity in rural land use is reflected through the various rural allotment sizes, with rural residences situated on lots between 1 ha and 10 ha, and agricultural/grazing uses on lots up to 20 ha.

The Calvert to Kagaru Project is located within the ICC and SRRC local government areas.

The Kagaru section of the Calvert to Kagaru Project is located within the Bromelton State Development Area (BSDA) in the Rural Uses Precinct.

A search of the EPBC Act Protected Matters Database identified two Commonwealth areas that are located in proximity to the Calvert to Kagaru Project. These are identified as follows:

- Defence - Amberley - AP3 Remote Receivers Site, located approximately 10 km to the north of the corridor
- Defence - Amberley - AP90 Small Arms Range (Purga), located approximately 5 km to the north-east the corridor

Given the separation distance between the corridor and the Defence sites, the Calvert to Kagaru Project would not impact on any Commonwealth areas.

Moreton Bay, a wetland of international importance (declared Ramsar wetland), is located approximately 45 km east of the Calvert to Kagaru Project.

5.5.1.2. Key Resource Areas

One key resource area (resource processing area, transport route and separation) is located within the study area. The key resource area is associated with Purga Quarry.

5.5.1.3. Agricultural Uses

Agricultural uses in the study area include livestock grazing, poultry farms, cropping farms including vegetables and irrigators. Strategic cropping land is located in the region of Calvert to the Teviot Range and near Kagaru. However, the Calvert to Kagaru Project does not trigger the provisions of the *Regional Planning Interests Act 2014* (Qld).

5.5.2. Key Local and Regional Land Tenures

Land tenure throughout the study area is predominantly freehold, with some parcels containing other forms of tenure. In particular, the study area is mostly freehold properties, with exceptions including oil and electricity easements, State land, leasehold land and reserve land. Impacts upon state owned and managed land will be assessed further in the next phase of the Calvert to Kagaru Project.

Local planning includes:

- ICC and SRRC Planning Schemes. Elements of these schemes are:
    - The corridor is located within the ICC and SRRC local government area and zoning plans for the study area generally reflect the current rural use of the land which is not consistent with the Calvert to Kagaru Project.
    - The Ebenezer/Willowbank and Bromelton Enterprise Precinct, where the future strategic intent for much of the land in the study area is for regionally significant industrial uses. The Calvert to Kagaru Project may act as a significant catalyst for development of these areas, particularly in relation to rail dependant industries and support industries associated with transport, freight handling, warehousing and logistics.
    - The planning schemes of ICC and SRRC contain development constraint overlays which are used for assessment of development applications including Good Quality Agricultural Land.

- City of Ipswich Transport Plan (iGO). The iGO is the Masterplan for Ipswich's transport future and the SFRC Study and Inland Rail form part of the strategic future for Ipswich's freight network and is therefore consistent.

Regional and State planning includes the following:

- State Infrastructure Plan (March 2016). This plan identifies Inland Rail as a priority national project on the longer-term.
- ShapingSEQ - Draft South East Queensland Regional Plan (October 2016). The Calvert to Kagaru project (SFRC) is identified as the proposed inland rail freight corridor within the SEQ Regional Plan 2009-2031 as a key transport corridor and is therefore considered to be generally consistent with the plan. The study area is largely within regional landscape and rural production area.

5.5.3. Native Title

There are no formally recognised native title rights over the study area; however, both local government areas (ICC and SRRC) are subject to active claims. In particular, the study area was subject to the Jagera People #2 Claim (Ref: QC03/15) that is discontinued. This claim covered a large area extending from Toowoomba in the west, Redlands in the east and Esk in the north.

5.6. Planning Instruments, Government Policies

5.6.1. Regional Plans

The South East Queensland Regional Plan 2009-2031 (SEQ Regional Plan) is the regional planning document for South-East Queensland. The SEQ Regional Plan has statutory force in accordance with the *Sustainable Planning Act 2009* (SP Act) and provides a strategic planning framework for the sustainable management of growth and development for the region to 2031 and beyond. The SEQ Regional Plan is currently being revised with formal statutory public notification and community consultation on the draft SEQ Regional Plan being undertaken between 20 October 2016 and 3 March 2017.

The draft SEQ Regional Plan outlines a vision for South-East Queensland, underpinned by five key themes of grow, prosper, connect, sustain and live. The 'connect' theme is the most relevant to the Calvert to Kagaru Project and seeks to prioritise transport infrastructure and improve liveability by providing access to the city, employment and recreation. The Calvert to Kagaru Project would contribute towards achieving the vision by providing employment within the region and improve connectivity between the city and regions. Regional Plan land use designations are shown in **Figure 5-5**.

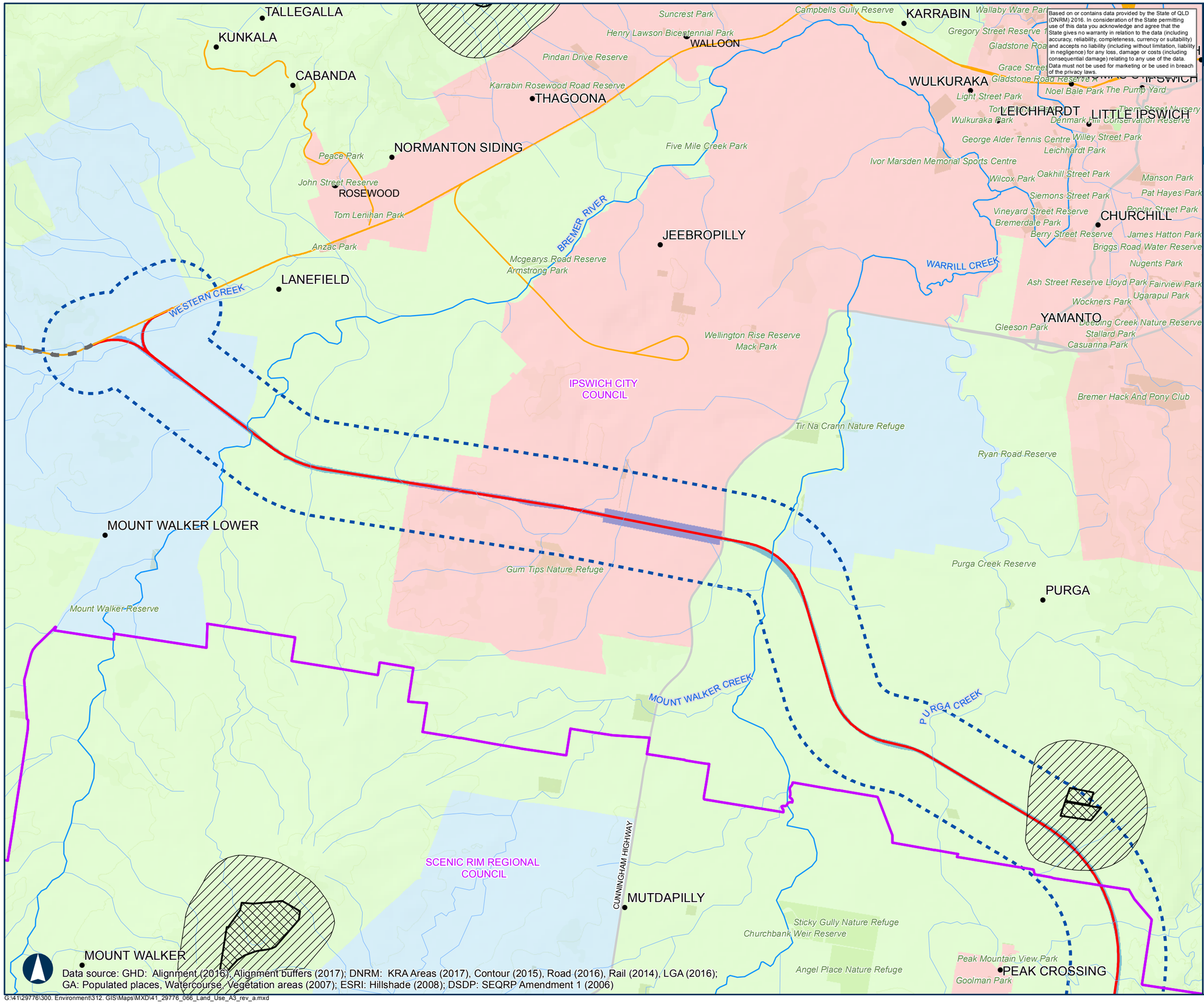
5.6.2. Local Planning Schemes – Land Use Designations

The Calvert to Kagaru Project is located within the ICC and SRRC local government areas (refer to **Figure 3-1**). Zoning within the study area is predominantly rural, which reflects the current rural use of the land. However, the Preferred Alignment passes through an area zoned regional business and industry investigation area (refer **Table 5-6**).

Table 5-6 Zoning

ALIGNMENT SECTION	ZONING	LOCAL GOVERNMENT AREA & PLANNING INSTRUMENT
Calvert to Mt Forbes Road	Mix of Rural A and Rural B	Ipswich City Council Ipswich Planning Scheme 2006
Mt Forbes Road to Cunningham Highway	Regional Business and Industry Buffer and Regional Business and Industry Investigation	
Cunningham Highway to Mount Flinders Road	Mix of Rural A, Rural B and Rural Conservation	
Mount Flinders Road to Washpool Road	Mix of Rural A, Rural B and Special Use	Scenic Rim Regional Council Ipswich Planning Scheme 2006
Washpool Road to Dugandan Creek	Rural (Precinct 1 and Precinct 4)	Scenic Rim Regional Council Boonah Shire Planning Scheme 2006
Dugandan Creek to Brennans Dip Road	Rural (Countryside Precinct)	Scenic Rim Regional Council (Beaudesert Shire Planning Scheme 2007)
Brennans Dip Road to Kagaru	Bromelton State Development Area (Bromelton Countryside Precinct)	

While the rail corridor may be considered to be inconsistent with the rural zone designation due to the potential disruption to agricultural practices, at a strategic level, the location of the rail corridor within the rural zone is considered to be more feasible than in a densely populated urban area. The location of the Calvert to Kagaru Project within the area zoned regional business and industry investigation area (the Ebenezer/Willowbank and Bromelton Enterprise Precinct) can be considered to be consistent with the strategic intent of the zone. The area has been identified as a study area for regionally significant industrial uses. The Calvert to Kagaru Project may therefore act as a catalyst for development in this area.



ARTC InlandRail

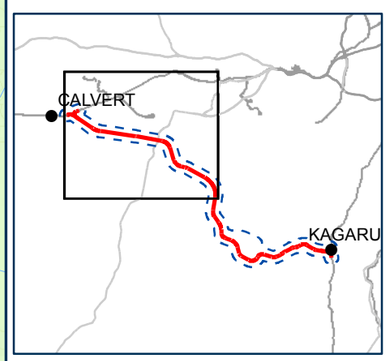
Inland Rail
Calvert to Kagaru
Initial Advice Statement
Land Use

Figure 5-6

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
- Calvert to Kagaru Protected Corridor
- Study area
- Railway
- Highway
- Watercourse
- LGA boundary
- Key Resource Area (separation area)
- Key Resource Area (resource processing area)

SEQRP land use categories

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



4 Km

Coordinate System:
GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 24/02/2017
Author: IH/MS

Data source: GHD: Alignment (2016); Alignment buffers (2017); DNRM: KRA Areas (2017), Contour (2015), Road (2016), Rail (2014), LGA (2016); GA: Populated places, Watercourse, Vegetation areas (2007); ESRI: Hillshade (2008); DSDP: SEQRP Amendment 1 (2006)

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ARTC InlandRail

Inland Rail
Calvert to Kagaru
Initial Advice Statement
Land Use

Figure 5-6

Stewartdale Nature Refuge
OXLEY CREEK
Mount Perry Conservation Park
IPSWICH CITY COUNCIL
Peak Mountain View Park
PEAK CROSSING
Goolman Park
Flinders Peak Conservation Park
LOGAN CITY COUNCIL
Diiram Yani Park
Coachwood Park
Jackeroo Park
Settlers Park
LIMESTONE RIDGE
WOOLLAMAN CREEK
KAGARU
BROOKLANDS
Woolooman Tunnel 1
Woolooman Tunnel 2
LOGAN RIVER
PURGA CREEK
MILLBONG
SCENIC RIM REGIONAL COUNCIL
TEVIOT BROOK
TEVIOT BROOK
ALLAN CREEK

- Preferred alignment (surface)
- Preferred alignment (tunnel)
- Adjacent Inland Rail Project alignments
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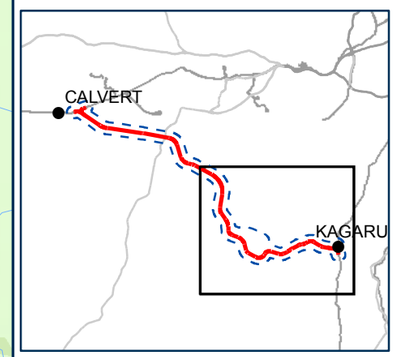

4 Km

Coordinate System:
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6. POTENTIAL IMPACTS

6.1. Natural Environment

6.1.1. Land Use

The construction and operation of the Calvert to Kagaru Project has the potential to directly impact upon land use and tenure within the local study area. The impacts would occur during both construction and operation stages, with the majority of the change occurring during construction of the project.

The potential impacts to land use and tenure associated with the Calvert to Kagaru Project in both the construction and operation phases relate to:

- 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
- Severance and access impacts arising from the construction and operation of a linear corridor

Most of the work associated with the Calvert to Kagaru Project would be undertaken within the gazetted greenfield rail corridor. During construction, there will be temporary changes in land use from the existing use of the area to construction purposes. During operation, direct land use impacts would result from any change in use associated with the operation of the project and its associated facilities.

The Preferred Alignment has been designed to avoid land use impacts as much as possible and reducing impacts upon sensitive land uses.

6.1.2. Geology and Soils

The variable geology along the Preferred Alignment from Calvert to Kagaru generates a number of potential impacts to the design, construction and operational stages of the Calvert to Kagaru 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
- Erosion due to the loamy soils on alluvial plains and terraces
- 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 landslides, slump features and mass wasting due to some instability issues including the erodibility of the Marburg Formation
- 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 Woolooman tunnels will be excavated using mined tunnel techniques (road header/drill and blast).

There are land uses within and adjacent to the Preferred Alignment that pose a known or possible risk of contamination. This includes sections of the existing rail corridor at Calvert and Kagaru which are likely contaminated. Other potential contaminated areas identified from desktop review include quarries, rural grazing and agricultural properties, and other rural uses. UXO may also be present adjacent to the Preferred Alignment however current mapped UXO do not occur within the Preferred Alignment therefore are unlikely to be impacted.

6.1.3. Water

6.1.3.1. Surface water

The Calvert to Kagaru Preferred Alignment crosses 44 mapped watercourses as defined under the *Water Act 2000*. Bridges and cross-drainage structure requirements for the watercourses have been identified. Bridges and culverts have been identified would be required to maintain drainage however, they would impact on the hydrology of systems and result in erosion of banks.

Potential impact on water quality is likely to occur chiefly during the construction phase of the Project. Without management systems in place, construction activities such as clearing vegetation, earthworks and vehicle/plant movement on un-sealed roads may result in sediments entering watercourses or wetlands. There is also potential for hydrocarbon, oil and chemical spills and leaks resulting from construction plant, equipment and vehicles on site which would contaminate receiving waters.

The Calvert to Kagaru Project may generate sediments or pollutants which may be transported into local drainage lines and watercourses which ultimately flow into Moreton Bay. However, it is highly unlikely that any impacts to the Ramsar wetlands of Moreton Bay or its ecological values would result from the project because of:

- The inclusion of sediment controls and impact mitigation measures in the design and site works
- The significant distance upstream from Moreton Bay and the small volume of runoff and potential sediments from the works
- The highly urbanised nature of downstream environments and the presence of multiple waterway barriers
- The linear nature of the development footprint would minimise downstream impacts as runoff catchments from the project are small

With the exception of Browns Swamp, the nine identified MSES High Ecological Significance wetlands within 2 km of the Calvert to Kagaru Project are not anticipated to be directly impacted however they may be indirectly impacted. Assessment of potential impacts on these wetlands with respect to water quality, flora and fauna and hydrology will be undertaken as part of the EIS.

6.1.3.2. Flooding

Under a 1 per cent annual exceedance probability (AEP) event, surface water flows within most major watercourses would be maintained predominately within the banks of the main channels or exceed the capacity and result in inundation of the overbank areas or a wider floodplain. However, the Bremer River is predicted to exceed the capacity of the main channel of the water way and inundate the Preferred Alignment.

6.1.3.3. Groundwater

The impacts to groundwater elevations from earthworks, tunnelling and bridge piling works would primarily be associated with potential dewatering requirements. However, groundwater infiltration rates into bridge foundation bore holes or cuttings would be minor and temporary given the depth to groundwater in most locations and the relatively short-term nature of these types of works.

There is also the potential for groundwater impacts associated with construction water supply. The water supply requirements for the Calvert to Kagaru Project are not known at this stage. Detailed design will investigate the potential for groundwater in the study area to be used as a possible source of water during construction activities.

The EIS will identify any nearby sensitive receptors including groundwater dependent ecosystems that would be severely impacted by temporary drawdown from potential dewatering sites or potential surface chemical spills that may contaminate groundwater quality (AECOM, 2010 Chapter 7).

Potential groundwater risks that should be considered and mitigated throughout the construction phase include avoiding groundwater contamination. This involves standard construction measures for minimising land contamination that would also protect groundwater (AECOM, 2010, Chapter 7).

It is anticipated that a high groundwater table or perched aquifers may be intercepted in some of the deeper cuttings (Jacobs-GHD, 2016a).

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 project on the Preferred Alignment.

Based on review of these documents, and in consideration of the projected freight train movements per day for the Inland Rail Project, 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 Environmental Protection (Air) Policy 2008 (EPP Air) for human health and impacts on agriculture and sensitive ecological areas and in the National Environmental Protection Measure for human health protection) are expected to be met. This includes consideration of existing background concentrations.

An air quality assessment is proposed as part of the EIS to determine the impact on sensitive receptors.

6.1.4.2. Tunnel

Trains moving through tunnels would result in a short-term increase in concentrations of emissions at tunnel portals in comparison to along the alignment in the open air. The concentration at the portal depends on the length of the tunnel and pressure differences or ventilation of the tunnel.

For Woolooman tunnel no. 2 (200 m) the emissions would be drawn through the tunnel with the train and the concentrations at the portals are unlikely to impact sensitive receptors. The nearest receptors to Woolooman tunnel no. 2 are approximately 3 km away.

The concentrations of emissions at the ports to Wooloomman tunnel no. 1, which is 1 km long, would be more concentrated and could impact on sensitive receptors. The nearest receptors to Wooloomman tunnel no. 1 are approximately 1.5 km away.

Further assessments will be undertaken for the EIS to determine the air quality impact from tunnels.

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 alignment with impacts considered to be relatively short term. Where longer-term construction is being undertaken, for example tunnel works or embankments, then 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.

The potential construction emissions will be further considered at the detailed assessment stage (EIS) of the Calvert to Kagaru Project, when the construction stages and work locations have been identified.

6.1.5. Ecosystems

Clearing as a result of the project has the potential to impact ecosystems within the rail corridor. The Preferred Alignment has been selected to reduce the impacts on the environment, including the need for clearing. Some aspects of the project will be refined in Detailed Design and will be preferably located in existing disturbed areas where possible to minimise impacts within the corridor. As described in **Section 5.1.4.4**, four Regional Ecosystems have been ground-truthed within the study area. The approximate area of these Regional Ecosystems within the gazetted rail corridor is provided in **Table 6-1**. For likely impacts on the TEC present in the corridor, refer to **Section 6.6.2**.

Table 6-1 Approximate area of Regional Ecosystem within the Gazetted Rail Corridor

REGIONAL ECOSYSTEM	STATUS	APPROXIMATE AREA WITHIN THE GAZETTED RAIL CORRIDOR
12.3.3d	Endangered	0.85 ha
12.3.7	Least concern	1.65 ha
12.9-10.2	Least concern	23.06 ha
12.9-10.17a	Least concern	2.24 ha
	Total	**27.80 ha**

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 NC Act as well as species listed under the EPBC Act. Loss of habitat, habitat fragmentation and mortality during construction and operation are the key potential impacts to fauna as a result of the Calvert to Kagaru 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. Project design elements such as viaduct and bridge structures and the retention of existing ridgeline vegetation through tunnelling

under the Teviot Range, will facilitate fauna linkages to otherwise potentially fragmented habitat 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.

Impacts to flora and fauna that may occur as a result of the project include the following:

- Vegetation clearing and fragmentation
- Direct fauna injury and mortality during earthworks
- Disturbance to fauna
- Direct loss of breeding habitat
- Importation and/or spread of weeds
- Introduction and/or proliferation of pest fauna
- Degradation of habitat through dust, sedimentation and erosion
- Degradation of aquatic environments
- Impacts on adjacent bushland

Mitigation and management measures associated with flora and fauna are summarised in **Section 7.1.4**; however, potential impacts associated with construction will be minimised through location of temporary construction areas within previously disturbed areas where possible and rehabilitation of temporary construction areas when no longer required to support construction activities.

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

6.2.1. Noise and Vibration

6.2.1.1. Construction

Construction plant and equipment may potentially impact the local ambient noise environment during standard hours where construction activities are within 1 km of sensitive receivers. The construction noise has the potential to be disturbing to the nearest sensitive receivers. Earth moving machinery, vibratory rollers and impact plant such as piling rigs and hydraulic hammers are likely to result in perceptible vibration impacts for sensitive receivers located within 20 m of construction activities. Construction activities are expected to be generally transitory and potential noise and vibration impacts associated with the works intermittent in nature and short term in duration.

6.2.1.2. Operation

During operation, noise impacts would be mainly associated with the trains travelling along the rail line. Modelling is required to determine if sensitive receptors along the alignment would be impacted.

6.2.2. Landscape and Visual

The current landscape is rural with areas of vegetation and there is minimal infrastructure. The potential impacts from the Calvert to Kagaru Project include the construction impacts such as extensive and intrusive earthworks associated with river and road crossings and operational impacts including the introduction of a railway and new structures in the landscape and the removal of vegetation.

A visual impact assessment was undertaken as part of the SFRC study. The findings were that Flinders Peak was considered to be of regional sensitivity. The significance of impact varied from negligible to moderately adverse with the most significant adverse impacts at:

- Rosewood-Aratula Road crossing
- Cunningham Highway crossing
- Ipswich-Boonah Road crossing
- Junction of Mount Flinders Road and Ipswich-Boonah Road
- Flinders Peak
- Undullah Road and Undullah Road Bridge.

The use of lighting during construction where works occur outside of standard hours may result in light spill which would impact neighbouring properties. Light spill from trains during the operational phase of the project may also impact proximal sensitive receptors.

6.3. Social Environment

The Calvert to Kagaru Project is likely to create a number of national, state-wide and regional benefits, whilst also creating a number of localised impacts. Potential social impacts will be further investigated as part of the EIS. However, a number of potential social impacts associated with the Preferred Alignment were identified for the SFRC study for a similar corridor. The following sections identify the potential social impacts associated with the project.

6.3.1. Amenity and Social Cohesion

Public perception about the Calvert to Kagaru 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 Preferred Alignment as a result of road network disruptions.

Land take for the Calvert to Kagaru 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 Calvert to Kagaru Project 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 near the Calvert to Kagaru Project.

6.3.2. Community Health and Safety

Community health and safety risks related to the operation of the Calvert to Kagaru Project include safety risks associated with access, both pedestrian and for stock, and the type of materials that are transported on the rail line. Mitigation measures in relation to pedestrian access include fencing the Preferred Alignment with suitable fencing in densely populated locations. Mitigation measures include suitable fencing and appropriate stock management.

Once operational, the rail line has the potential to be used to transport hazardous goods. Mitigation measures include movement of hazardous goods in accordance with the Australian Dangerous Goods Code and the Transport Infrastructure (Dangerous Goods by Rail) Regulation 2008. ARTC will also prepare and implement an Emergency Management Plan during the operational phase of the project.

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

Changes in road access, including increased road/rail interface, has the potential to decrease the accessibility and increase travel times associated with accessing key destinations, facilities and community services for local residents. Mitigation measures include a commitment to providing alternative access where important roads are traversed by the Preferred Alignment. This is particularly important in the more remote eastern end of the study area

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 possible temporary construction camp may be investigated near the Kagaru end of the preferred alignment due to the isolated location and absence of proximal population centres.

A rigorous social impact assessment process 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. Indigenous

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.

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 Calvert to Kagaru Project activities would be carried out in a 'high risk landscape' and meets Category 5 of the duty of care categories listed in the Duty of Care Guidelines. 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 Calvert to Kagaru 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 objects, items and values.

6.3.5.2. Historical Cultural Heritage

Historic heritage places may be subject to direct or indirect impacts. These potential impacts include the introduction of new environmental elements such as noise, altered visual aspects, and alterations to land use patterns in the area as a result of the project. The impact of these changes is considered to be manageable.

Works that may impact on known heritage-listed places may require approvals from Commonwealth, State or local authorities.

6.4. Economic Effects

As a major infrastructure project, the Calvert to Kagaru 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 Calvert to Kagaru 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 Project will result in a major transformation of the freight haulage network in eastern Australia.

Detailed socio-economic assessment will be conducted to identify and quantify the benefits and impacts of the Calvert to Kagaru Project.

6.5. Built Environment

6.5.1. Transport Infrastructure Impacts

Due to the vertical alignment of the Calvert to Kagaru Project 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 Calvert to Kagaru 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 Calvert to Kagaru Project will result in localised impacts to existing traffic and transport networks as construction progresses. Likely impacts include:

- Increased light and heavy vehicle traffic on the Cunningham Highway and other roads in the local area for the transportation of construction personnel, materials and resources for construction
- Removal and placement of spoil, with potentially 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.

6.5.2. Other Infrastructure Impacts

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 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 achieved.

The location of services would be identified and work methods developed in consultation with the relevant utility provider prior to construction to avoid, reduce or mitigate impacts to existing services and maintain the safety of the project workforce and community.

6.6. Matters of National Environmental Significance

The EPBC Act identifies matters of national environmental significance (MNES) that are protected by the EPBC Act. MNES reflect nationally and internationally significant flora, fauna, ecological communities and heritage.

An assessment of MNES has been carried out for the Calvert to Kagaru Project and based on this assessment ARTC has made a referral to the Commonwealth under the EPBC Act. A summary of the key MNES as they relate to the Calvert to Kagaru Project is summarised in the following sections. ARTC intend to coordinate the timing of the EPBC Act referral to correspond with the State SDPWO Act process so that the project may be assessed under the bilateral agreement between the Commonwealth and Queensland.

6.6.1. World Heritage Properties and National Heritage Places

The Calvert to Kagaru Project will not impact directly on any World Heritage or National Heritage property. The project may generate sediments or pollutants which may be transported into local drainage lines and watercourses. However, the closest World Heritage property, Gondwana Rainforests of Australia, is located over 40 km upstream of the referral area in an elevated location, therefore no indirect impacts are anticipated from the project. Gondwana Rainforests of Australia is also included on the National Heritage List, and is the closest National Heritage Place to the corridor.

6.6.2. Threatened Ecological Communities

As identified in **Section 5.1.4.6** one TEC was confirmed present within the corridor: the critically endangered Swamp Tea-tree (*Melaleuca irbyana*) Forest of Southeast Queensland. The extent of this TEC that will be directly impacted by clearing for the project is approximately 0.63 ha.

Other patches of this TEC in proximity to the project may be impacted through:

- Importation and/or spread of weeds
- Habitat disturbance through introduction and/or proliferation of pest fauna
- Degradation through dust, sedimentation, erosion and/or altered hydrology

No significant impacts of the project are expected to occur for the TEC present within the Study Area for the following reasons:

- Although the project will result in a reduction in the extent of the TEC, it is likely that only a minor extent along the periphery of one regrowth polygon will be impacted. This is not expected to constitute a significant impact to the TEC. Several more extensive polygons are known to occur in the surrounding landscape and will not be impacted by the project.
- No fragmentation of polygons of the TEC will occur as a result of the project.
- No change in species composition of remaining polygons is expected to occur as a result of the project.
- No fertilisers, herbicides, chemicals or other pollutants are expected to impact the TEC as a result of the project.
- Impact mitigation strategies will need to be implemented to avoid modification of abiotic factors for this TEC in the local landscape, particularly with regards to any potential alteration of surface water drainage patterns.

- Impact mitigation strategies will need to be implemented to introduction, establishment and/or spread of invasive species.

6.6.3. EPBC Act Listed Threatened Fauna

The koala is the only threatened species identified in the corridor during the field survey, with an additional five threatened fauna species and one threatened flora species considered likely to occur. These species will be impacted by the same processes identified in **Section 6.1.6**.

Impacts of particular concern with regards to koala include:

- Loss and fragmentation of koala habitat
- Barrier effects due to reduced habitat connectivity and capacity for movement of individuals
- Mortality and injury of individuals and disruption of movement during vegetation clearing and construction

One of the factors considered as part of the route selection and alignment within the SFRC gazetted future rail corridor has been based on reducing the requirement to clear koala habitat. However, the Calvert to Kagaru Preferred Alignment may still require approximately 86 ha of potential koala habitat to be cleared as a result of the project.

The Calvert to Kagaru Project has the potential to cause impacts on the local koala population, as:

- The project may introduce the potential for mortality of koalas through collision with trains and has the capacity to create a significant barrier effect to local koala movement.
- The project has the potential to create permanent barrier effects, restricting movement of koalas and gene flow and introducing local mortality pressures from potential collision with trains, unless adequate crossing points and fauna sensitive design is incorporated
- Construction activities have the potential to disrupt breeding activities if coinciding with the breeding season.
- The project contributes to a cumulative impact on foraging habitat within a region that is predicted to experience increasing urban expansion in coming decades.
- The project has the potential to increase stress levels within local koalas. There is circumstantial evidence to suggest the incidence of chlamydia may increase with environmental stresses attributed to habitat fragmentation and overcrowding (Melzer et al., 2000). The project may contribute to cumulative regional impacts that may increase the incidence of chlamydia infection.

No significant impacts of the project are expected to occur for the other threatened species that are considered likely to occur within the corridor. This is due to suitable habitat being widespread in the region and unaffected by the rail corridor, no changes in risk of predation, highly mobile species, and/or no important populations having been identified in the region.

6.6.4. EPBC Act Listed Threatened Flora

As identified in **Section 5.1.5**, one threatened flora species (Austral toadflax, *Thesium australe*) is considered likely to occur within the corridor. This species will be impacted by the same processes identified in **Section 6.1.6**.

The impacts of this project are not expected to be significant for this species. This is due to no important populations having been identified in the region, extensive similar habitat in the surrounding landscape, and the species' resilience to disturbance.

6.6.5. Migratory Species

Migratory and marine species will be impacted by the same processes identified in **Section 6.1.6**. No significant impacts to migratory species are expected as a result of the project, as all species known or considered likely to occur

in the study area are widely distributed and regionally common in south-east Queensland. The migratory and marine species known or considered likely to occur within the study area are not dependent on a localised breeding or foraging resource. The project will cause localised losses of woodland vegetation and grassland that provides nesting and foraging resources for these species. However, given the wide availability of suitable habitat within the surrounding landscape, the project is unlikely to have a significant adverse impact on important habitat for the species.

6.6.6. Wetlands of International Importance

The Moreton Bay Ramsar wetland is located approximately 45 km east of the proposed corridor.

Without effective worksite management, the proposed action may generate sediments or pollutants which may be transported into local drainage lines and watercourses which ultimately flow into Moreton Bay. However, it is highly unlikely that any impacts to this Ramsar wetland or its ecological values will result from the proposed action; due to:

- The significant distance upstream from Moreton Bay and the small volume of runoff and potential sediments from the works
- The highly urbanised nature of downstream environments and the presence of multiple waterway barriers
- The linear nature of the development footprint will minimise down impacts as runoff catchments from the project are small
- The inclusion of sediment controls and impact mitigation measures in the design and site works.

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 Calvert to Kagaru Project. Further consideration of potential land impacts (severance, access, direct impact, and amenity) will be undertaken during subsequent project phases. Further design refinements will aim to minimise impacts on property owners particularly outside of the previously protected corridor, where reasonable and practicable. Construction planning will be required to determine the laydown requirements and optimally locate construction workspaces to minimise property impact.

Geological and soils impacts will influence the design and also require mitigation during construction. Future design stages as part of the EIS process 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 construction, environmental impacts will be managed through a CEMP which will detail environmental outcomes, performance criteria and mitigation measures.

Further contaminated land investigation will be required in future project stages, including field investigations and 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 and Noise

7.1.3.1. Construction

Management of potential air quality and noise impacts during the construction phase will be documented in a CEMP prior to the commencement of construction, including measures reduce dust generation, vibration and noise impacts to sensitive receptors. The framework for the CEMP and identification of the range of possible mitigation measures will be included as part of the EIS.

7.1.3.2. Operation

Air quality and noise modelling would be completed for the EIS for the Calvert to Kagaru Project to refine impact predictions and determine appropriate mitigation measures for the operational phase of the project.

Further detailed modelling and analysis will be necessary to confirm the detailed design requirements of the tunnel ventilation system for air quality within the tunnel, and for tunnel emissions for the operational phase of the project. This will occur during the EIS phase.

7.1.4. Ecosystems and Flora and Fauna

A series of management plans will be prepared to detail impact mitigation actions. Measures of key importance are likely to include the following:

- Alternative fauna access solutions, particularly in areas of koala and glider habitat, to maintain opportunities for species movement.
- Koala exclusion fencing is to be installed in areas of high koala habitat value to reduce the potential for koala mortality.
- Vegetation clearing is to be undertaken in a sequential manner, and areas for removal are to be clearly demarcated or identified.
- Suitably qualified and experienced fauna spotter-catchers are to be present during vegetation clearing and construction to identify and clear breeding sites for threatened (and other) species listed.

- Cleared vegetation is to be stockpiled for a short period of time after clearing to allow any remaining fauna time to escape.
- Minimise clearing of large hollow - bearing trees.
- Weed and pest species control and prevention measures are to be implemented. In particular, control of dogs and other feral predators during the construction and immediate post-construction period is critical.
- Provision of environmental offsets, including for koala habitat.
- Where possible, schedule construction to minimise potential impacts to protected fauna species during breeding season.

Potential impacts to the waterways will be minimised through design solutions and tailored mitigation measures to counteract and contain potential environmental impacts such as increased sedimentation or pollutants. It is therefore highly unlikely that there would be any potential effects of the project on the Moreton Bay wetland area given the substantial distance from the Project area and the significant mitigation measures that will be implemented.

7.1.5. Landscape and Visual

To reduce the potential landscape and visual amenity impacts, the following mitigation measures are proposed:

- Investigate opportunities for advanced planting to reduce visual impacts.
- Minimise vegetation removal by protecting existing vegetation adjacent to the Preferred Alignment.
- Rehabilitate the temporarily disturbed areas as construction proceeds to encourage rapid screening views and integration of the railway into the wider landscape to minimise visual disturbance.
- Reduce night-time rail activity where practicable.

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

The Calvert to Kagaru 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 Calvert to Kagaru Project impacts and design options to avoid or mitigate impacts
- Design development to determine options for minimising impacts
- Additional survey to identify all utilities and services (including minor utilities etc.) so that they can be considered in design development.

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

7.3. Native Title and Cultural Heritage (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 Calvert to Kagaru 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 Aboriginal 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.

The Calvert to Kagaru Project will require an assessment of Native Title within the Preferred Alignment, consultation with registered Native Title parties and authorisation under the NT Act.

Preliminary consultation has been undertaken with the registered Aboriginal cultural heritage body for the area covered by the Calvert to Kagaru Project, the Jagera Daran Pty Ltd, in order to provide an overview of the project, outline the assessment process and ascertain any particular areas of cultural and archaeological sensitivity that might be present in the proposed disturbance area which was not identified in the database searches and background literature review.

7.4. Non-Indigenous Cultural Heritage Management

Non-Indigenous cultural heritage is not anticipated to be significantly impacted by the project. The EIS process will detail mitigation and management measured including a non-Indigenous cultural heritage management plan if required, Measures of key importance are likely to include the following:

- Avoid areas or items of significance through appropriate route selection.
- Establish procedures to be followed should previously unidentified historic sites and/or objects be discovered

Further heritage assessment and consultation with local heritage groups and regulatory authorities will be undertaken 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 unlisted heritage places (such as pre-war housing stock and rail infrastructure which have potential heritage value) and obtaining relevant heritage permits and approvals for impacts to listed heritage places. The CEMP would include management measures for the construction phase to describe the measures to minimise impacts to heritage values.

7.5. Greenhouse Gas Management

Construction of the Calvert to Kagaru Project will generate greenhouse gases 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 especially where tunnelling and bridging is required (Hill et al, 2011).

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

There are a number of best practice opportunities for the reduction of greenhouse gas generation during construction and operation of the Calvert to Kagaru 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 hierarchies of the National Waste Policy (DEE, 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 Calvert to Kagaru 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, and Health and Safety

A detailed risk assessment will be undertaken for the Calvert to Kagaru Project and effective mitigation measures will be developed to manage identified hazards and risks.

Hazards and risks to health and safety as part of the Calvert to Kagaru Project and their management would include:

- Bushfire and emergency response e.g. fires, explosions, flooding. An emergency response plan will be developed in consultation with state and regional emergency service providers. This plan will be consistent with ARTC's existing Safety Management System and associated procedures.
- Storage, handling and transport of dangerous goods and hazardous materials. Hazardous materials and dangerous goods would be stored, handled and transported in accordance with relevant regulatory requirements and relevant Australian Standards and Codes.
- Changing traffic conditions during construction and operation. Community health and safety will be managed through regular consultation and consideration of aspects in the traffic, transport and access management plan.

7.8. Environmental Management

All ARTC's operations and activities, including those undertaken by their contractors, 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 in accordance with 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 Calvert to Kagaru Project would 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 has been a key factor in the route selection processes for the Calvert to Kagaru Project. As the Calvert to Kagaru Project progresses, impact avoidance and reduction would 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 study area
- Design development to avoid, reduce or manage impacts to identified environmental values
- Determination of environmental offset requirements for MNES and MSES impacts.

The Calvert to Kagaru Project's environmental outcomes should also be considered in the context of the overall intent and outcomes of the Melbourne to Brisbane Inland Rail Project. 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 including the development of an environmental management plan for the construction and commissioning phases of the Calvert to Kagaru Project would be developed based on the potential environmental impacts of the Calvert to Kagaru Project. These impacts have initially been identified in this IAS and will be further assessed, developed and understood during the environmental assessment (e.g. EIS) 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. This is likely to include the following actions:

- 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 PROJECT

If the Calvert to Kagaru Project is declared a coordinated project and is also determined to be a controlled action under the EPBC Act it is anticipated that assessment will be progressed under the Bilateral Assessment Agreement between the Commonwealth 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 Calvert to Kagaru Project.

Table 8-1 summarises the approval and permit requirements likely to be applicable to the Calvert to Kagaru 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)	Commonwealth Department of the Environment and Energy	EPBC Act referral to the Commonwealth Minister for 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 on 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 Australian 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. Development Assessment in relation to the Bromelton State Development Area	Declaration by the Coordinator-General Development within the Bromelton State Development Area.	The proposed approval pathway for the Calvert to Kagaru Project currently assumes 'coordinated project for which an EIS is required' under the SDPWO Act. The project traverses the Bromelton State Development Area. A separate application will be progressed in relation to all works within this area.	Coordinated
Native Title Act 1993 (Cth)	National Native Title Tribunal	Where an interest is required on land where	Works within areas where Native Title	Native Title may still exist in areas of the Preferred	Independent

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
(NT Act)		native title has not been extinguished, the requirements of the NT Act must be met before tenure can be granted.	exists.	Alignment. The Calvert to Kagaru Project will require an assessment of Native Title within the Preferred Alignment, consultation with registered Native Title parties and authorisation under the NT 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 Calvert to Kagaru Project will require further detailed cultural heritage assessment and the Cultural Heritage Management Plan/Agreement for the works.	Coordinated
Sustainable Planning Act 2009 (Qld) (SPA)	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	Development that is assessable development requires a development permit.	Will be determined by the overall approvals pathway.	Coordinated

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
		include applicable State Planning Regulatory Provisions, State planning policy, relevant State Development Assessment Provisions (SDAP) codes			
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)	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

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
Fisheries Act 1994 (Qld)	Department of Agriculture and Fisheries (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 a waterway mapped as a waterway for waterway barrier works under the Fisheries Act.	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 Calvert to Kagaru Project will require the clearing of mapped remnant native vegetation. Potential exemptions may be applicable to the Calvert to Kagaru Project under Schedule 24 of the SP	Coordinated

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
				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 100 m 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 Program (SMP) will require approval by DEHP.	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

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
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 2016) 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 Calvert to Kagaru Project.	Coordinated
		Water licence/allocation associated with the taking or interfering with	Taking or interfering with water	Taking or interfering with water for construction purposes is likely to be	Coordinated

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
		water for construction		required for the Calvert to Kagaru 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 under SPA.	
Transport Infrastructure Act 1994 (Qld) (TI Act)	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 Cunningham Highway or other State controlled roads Access to the Cunningham Highway or other State controlled road (e.g. during construction)	Subject to detailed design and consultation with DTMR	Coordinated
Environmental Offsets Act 2014 (Qld) and	DEHP	Offsets Management Plan	An environmental offset may be required as a	The Calvert to Kagaru Project is likely to have an impact on MSES. The	Coordinated

ACT/ PROVISIONS	RESPONSIBLE/ADMINISTERING AUTHORITY	APPROVAL/PERMIT	TRIGGER	APPLICABILITY	COORDINATED/ INDEPENDENT
Policy			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.	significance of the residual impact would need to be confirmed in future project phases to determine offset requirements.	
Local Government Act 2009 (Qld)	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 BENEFITS SUMMARY

9.1. Local, State and National Economies

As described in **Section 3.3.1** and **Section 3.9**, the ARTC Business Case outlines the significant economic benefits of the Inland Rail, which contributes to the efficient movement of freight in Australia and supports economic growth. The Inland Rail is expected to increase Australia's GDP by an estimated $16 billion by 2050.

The Calvert to Kagaru Project is a key component of the Inland Rail and would 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 would be subject to further detailed study.

In summary the benefits expected to arise from the Calvert to Kagaru Project include:

- During the construction phase it is anticipated that the workforce would 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 would 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 would 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 Cunningham Highway.

The Calvert to Kagaru Project cost is expected to be in the order of $1.2 billion and would 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.

Effects on the local and state economy that will be further investigated as part of the EIS may include:

- Local and temporary access disruption during construction and associated impacts on businesses in the region
- Land acquisition and property impacts
- Influx of workers during construction and associated accommodation issues.

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 Calvert to Kagaru Project has the potential for both temporary and longer term environmental and social effects that may require further management and mitigation. Environmental and social matters that will be investigated further as part of the EIS may include:

- Clearing of regulated vegetation and fauna habitat for species listed under State and National legislation
- Potential impacts to fauna movement as a result of rail infrastructure
- Air quality and noise impacts

- Potential changes to flooding and 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 Calvert to Kagaru Project that is described above.

Environmental and social impacts will be subject to further assessment in and the EIS with the development of mitigation and management measures where required. 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 in the event that significant residual impacts are identified.

10. COMMUNITY AND STAKEHOLDER CONSULTATION

Extensive community consultation was undertaken by DTMR for the Community Infrastructure Designation (CID) process for the then SFRC study from 2007 to 2009. In 2015 and 2016, Councils and potentially impacted landholders were consulted by the Inland Rail team in preparation for the Primary Approvals phase of the Calvert to Kagaru Project.

Consultation is ongoing and is proposed to be undertaken with the following key stakeholders:

- State and Commonwealth representatives, departments and agencies
- ICC and SRRC representatives and executive management.
- Business and tourism stakeholders (e.g. local Chamber of Commerce).
- Agricultural stakeholders.
- Freight stakeholders.
- Environment stakeholders.
- Service providers (e.g. community, medical, emergency).
- Indigenous groups.
- Community groups.
- Landholders.

ARTC values active engagement with stakeholders and the community and all consultation will be undertaken in line with ARTC's Communication Strategy. A community engagement plan has been prepared for the Inland Rail Project that would guide proposed consultation activities.

10.1. SFRC Consultation 2007 - 2009

A three-phase consultation process was undertaken by DTMR during the CID process for the SFRC study from 2007 to 2009.

During that period engagement occurred with the following stakeholder groups:

- Commonwealth, State and Local government representatives
- Landowners within the corridor
- Secondary stakeholders (government and community organisations)
- Impacted communities along the corridor
- General community.

The key government stakeholders were:

- Department of Environment and Resource Management
- ICC
- SRRC
- Queensland Rail
- Department of Infrastructure and Planning
- Office of Urban Management
- Department of Primary Industry and Fisheries
- Department of Mines and Energy
- Department of Environment and Resource Management, Koala Conservation Unit
- Queensland Police Service Ipswich District

- Powerlink.

The engagement program was delivered in accordance with the CID process:

- Phase 1 – SFRC study announced/initial consultation
- Phase 2 – Submission period for draft assessment report
- Phase 3 – Revised alignment announced.

10.1.1. Phase 1 – SFRC Study Announced – Issues Summary

The key issues captured in Phase 1 are outlined in **Table 10-1**.

Table 10-1 Key Issues in Phase 1 of the SFRC Study

PERCEIVED IMPACTS	ISSUES
Social impacts	Noise Visual and scenic amenity Cultural heritage (Peak Crossing family property connections >100 years and Bora Bora rings/other areas of Aboriginal significance)
Economic impacts	Property devaluation Lack of fair compensation for land acquired Impact on property access and operations
Environmental	Flora destruction Fauna destruction Contamination of air and water supplies (natural waterways/tanks) Flooding impacts (1974 flood)

Whilst an indicative freight infrastructure corridor was identified in the South East Queensland Regional Plan and Program 2007 – 2026 the Ministerial announcement was not anticipated by the community.

The FAIRGO Committee was established as a result of the announcement of the SFRC study. It was a committee nominated at a public meeting of over 300 residents from 105 properties directly affected by the SFRC study. Residents were concerned about its effect on destroying local small farms vital in food production and the environment, particularly in the Peak Crossing-Washpool-Woollaman-Undullah region. In this region the SFRC traverses and bisects a Koala Conservation Area and a largely untouched bushland koala habitat within remote properties used for intensive beef cattle production.

The study team's impacted landowner engagement led to the revision of the rail alignment along existing property boundaries, roads and easements and the avoidance of quality agricultural land. In addition based on concerns of the Peak Crossing Township, the design was revised to maximise separation of the line from the township.

10.1.2. Phase 2 – Submission Period for Draft Assessment Report – Issues Summary

In Phase 2 the top issues from consultation were identified as being in relation potential environmental impact. These are outlined in **Table 10-2**.

Table 10-2 Key issues identified during Phase 2 of the SFRC Study

PERCEIVED IMPACTS	ISSUES
Environmental	Koala impacts (alignment traversed protected habitat) Access to water – dams, bores, irrigation systems, creeks and underground springs

The Phase 2 feed-back resulted in a Koala, Threatened Species and Habitat Working Group (including representatives of the FAIRGO committee) being established to address the issue. It led to a 12 km section of the alignment being relocated to 2km north of Ebenezer to the south of Payne's Road.

Impacted landowners continued to highlight their concerns on road and property access, resumption and hardship process, potential impact on koalas, noise and vibration and the uncertainty of the project and associated timeframe.

10.1.3. Phase 3 – Revised alignment – Issues Summary

As a result of the revised design 12 new property owners were affected. The key issues in this phase related to economic and environmental concerns which were reflected in an alternative alignment proposed by FAIRGO.

FAIRGO stated their alternative corridor, not only saved approximately 60 farms from impact, but would preserve koala habitat. DTMR commissioned the consultants to undertake a technical pre-feasibility assessment of FAIRGO's alignment. The consultants found the corridor did not offer advantage over the SFRC Preferred Corridor for the following reasons:

- Increased construction costs of over $160M
- Impacts on the Ripley Valley Future Urban Area
- Impacts on Commonwealth land
- Impacts on protected koala habitat
- Impacts on the Flinders-Goolman Conservation Estate.

The SFRC Preferred Corridor identified as a result of the two year technical investigations and consultation was gazetted by the Minister for Transport as future railway land in November 2010.

10.2. Calvert to Kagaru Project Consultation 2015

In 2015, ARTC engaged with ICC and SRRC to review issues raised as part of the DTMR 2007 - 2009 SFRC study and the public submissions received during the Department of Infrastructure and Regional Development's 2014 consultation on the Inland Rail Base Case of which the SFRC corridor was a part.

The scope of the 2015 consultation was to:

- Provide an update to key stakeholders
- Review issues raised in earlier studies and consultations and more recently by Councillors and executive representatives
- Secure local data to inform technical studies (e.g. local flood modelling)
- Understand Councils' views of Inland Rail within their respective Regional Plans

- Identify local business and community leaders to involve in future consultations
- Capture new opportunities associated with the delivery of Inland Rail at a local level (including local procurement, addressing problematic road/rail interfaces, and terminal development).

The key issues identified with Councils were:

- Public and private level crossing operations and safety (interface between road and rail)
- Land owner acquisition sensitivities
- Sound buffering and visual amenity mitigations
- Flooding and mitigation measures
- Review State and Local road plans and impacts on Inland Rail alignment
- Allowance for safe movement of freight vehicles across the rail line
- Sound buffering and visual amenity mitigations
- Planning of terminal locations and interaction with road infrastructure and industrial estates.

The opportunities identified were:

- Master planning of industrial areas and terminal locations
- Optimising links for existing businesses onto the new alignment
- Establishing environmental off-set areas.

Ipswich City Council

Ipswich stated Council was keen to move coal trains out of central Ipswich and was particularly interested in the scheduling of freight trains on the proposed Inland Rail alignment. Noise amelioration and minimisation of flooding impacts were also noted. In addition, the Ebenezer Regional Industrial Area Guideline highlights key issues to be noted including endangered species triggering the EBPC Act and the need for off-sets.

Scenic Rim Regional Council

Scenic Rim stated the establishment of a southern fork rail line from Kagaru to enable connection to the Bromelton Industrial Estate was important and was keen to know the timing of acquisition of properties for the alignment which is source of concern to landowners living in Ward 6 of the LGA.

10.3. Calvert to Kagaru Project Consultation 2016

In 2016 the engagement focus was to progress discussions with ICC and SRRC and to engage with landowners to outline the Project and seek land access for concept assessment field studies.

10.3.1. Council workshops 2016

The Inland Rail team met with SRRC in March and June, and ICC in March and July to discuss technical matters and field study results.

Concerns were raised by both Councils about:

- The road/rail interface and optimisation
- The need to avoid creating new roads and transferring management to Council
- The impact on hydrology through areas such as Ebenezer and Kagaru
- The desire for early planning around offsets
- The need for the project to consider stock movements on private property

- Property acquisition and the requirement for constituents to have assurance of Inland Rail being delivered.

Table 10-3 Calvert to Kagaru Council emerging issues

ISSUE THEME	ISSUE DESCRIPTION
Scenic Rim Regional Council	
Regional development	Council advised the southern fork at Kagaru to the Bromelton Industrial Area was critical for the region.
Property acquisition	Constituents expressed concerns about land resumption timeframes, particularly where residents may wish to move on.
Road and rail interface	The alignment intersects several key roads and there is a need to ensure that an appropriate level of access is maintained to minimise impacts on adjacent properties.
Land acquisition	Clarification was sought on what will occur with previously acquired surplus land. Issues were expressed around the maintenance and security of homes that have been acquired by DTMR.
Flood modelling	Council seeks assurance the project will not exacerbate flooding. Flood modelling has been carried out and more detailed studies will be carried out in the next phase. These studies will use data from councils.
Regional development	Certainty is needed for future developments. Economic development for locals does not just mean Ipswich or Toowoomba.
Ipswich City Council	
Flood mitigation	Grandchester rail line acts as a dam wall in times of heavy rain. Council seeks assurance the project will not exacerbate flooding in the area.
Property Access	Access to private property must be maintained.
Environmental concerns	The endangered Swamp Tea-tree forest (*Melaleuca irbyana*) flora and the presence of koalas have been identified in the project area. Need to know how noise, dust and air quality and increased coal volumes will be mitigated.
Hydrology	Hydrology impacts will be an issue through Ebenezer and early mitigation is desirable.
Road and rail interface	Information sought on the status of road and rail interface agreements as

ISSUE THEME	ISSUE DESCRIPTION
agreements	these are usually negotiated between Council and DTMR. Keen interest in understanding the operational impact of Inland Rail in terms of delays at level crossings and the likely number, size and schedule of trains.
Stakeholder engagement	Advice to engage with the community as soon as possible and maintain clear, regular communication while being clear about the potential to provide input.

10.3.2. Landowner issues

During 2016, engagement was predominantly undertaken as one-on-one meetings with directly impacted landowners whose properties were required for field studies. These meetings have provided insight into the issues associated with the project. Through liaison and meetings with 73 property owners or tenants the following key themes have been identified:

- The majority of landowners are aware of the project and recall the information provided previously on SFRC
- Timing of the project is of interest
- Landowners stated that previous town hall meetings from the 2007 – 2009 study were disrupted by attendees and not valued by many landowners. The suggestion is that one on one or small group meetings would be more productive to keep landowners informed and to gather input into the detailed design, per the Key Project Commitments of the SFRC RAR.
- Rail impacting water flows is a major concern
- A small number of landowners have halted land improvements or building due to the pending project
- A small number of landowners advised that when land was previously acquired by DTMR it remained vacant for long periods of time before finally being leased or rented. During this time there was significant deterioration of land that had previously been used for cultivation (spread of weeds, unmown grass resulting in fire hazards).
- The acquisition of property and increase in the number of renters has also been attributed to increased crime rates particularly in areas such as Washpool Road and Dwyers Road
- Landowners are being approached by legal services offering to assist in the acquisition process.

10.3.3. Broader community engagement

ARTC was advised by SRRC that broader community engagement should only occur when a defined pathway to construction was known based on community sensitivity on acquisition timing since the 2007 – 2009 study.

With the May 2016 Federal budget announcement of $594M allocated for land acquisition this provides more certainty about the Inland Rail proposal. This IAS will provide further opportunity for community input to further refine the corridor to the point of being construction–ready.

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12. GLOSSARY, ACRONYMS AND ABBREVIATIONS

A list of terms, acronyms and abbreviations are provided below.

Term	Definition	Acronym/Abbreviation
Aboriginal Cultural Heritage Act 2003		ACH Act
Australian Rail Track Corporation		ARTC
Calvert to Kagaru Project	The section of the Inland Rail Project between Calvert and Kagaru	Calvert to Kagaru Project
coastal route	The existing rail route from Melbourne to Brisbane via Sydney	
Community Infrastructure Designation		CID
Department of Environment and Energy		DEE
Department of Environment and Heritage Protection		DEHP
Department of Natural Resources and Mines		DNRM
Department of Transport and Main Roads		DTMR
dual gauge track	A line of track that provides for two trains of two separate track gauges	
chainage	A distance measured along such a line.	
easement	A legal term used to describe land over which a third-party has rights to locate infrastructure and undertake certain activities	
embankment	A bank of earth or stone built to carry a railway over an area of low ground	
environmental impact statement		EIS
Environmental Protection and Biodiversity		EPBC Act

Term	Definition	Acronym/Abbreviation
Conservation Act 1999		
Groundwater Dependent Ecosystem		GDE
Inland Rail Project	Programme to deliver Inland Rail	
Ipswich City Council	Calvert is incorporated within the Ipswich City Council area	ICC
Jagera Daran	A tribe of Australian Aboriginal people which inhabited the region southwest of the city of Brisbane before European settlement of Australia	
laydown area	Area to store materials located adjacent to ROW or remote from site	
narrow gauge	Railway track gauge of 1067mm; used in Queensland except on the interstate line from Sydney to Brisbane	
passing loop	A place on a single line railway, often located at a station, where trains travelling in opposite directions can pass each other. The project contains three passing loops with the ability to accommodate for trains 1,800m and 3,600m long.	
project area	The project area includes the project footprint and also areas which are not disturbed	
project footprint	Area of disturbance	
Queensland Rail 'western system'	Adjoins the far western section of the West Moreton system at Miles with the Western system branch lines running directly off the West Moreton system	
rail alignment	The route considering design parameters and site constraints	
rail corridor	A strip of land with a width measured in kilometres that is suitable for a railway	
right of way	Area required to construct railway	ROW
rolling stock	Any vehicle that moves on a railway	
route	A way or course taken in getting from a starting point to a destination	

Term	Definition	Acronym/Abbreviation
Scenic Rim Regional Council		SRRC
Southern Freight Rail Corridor	Gazetted as land for future railway	SFRC
standard gauge	Railway track gauge of 1,435 mm; used on the ARTC network and for the New South Wales railway system	
state-controlled road	A road declared to be a controlled road by the Department of Transport and Main Roads	
structure gauge	Specification for the position of structures such as overhead bridges, tunnels and platforms relative to a railway track to allow adequate clearance for the passage of trains	
study area	The area required to determine and assess the direct and indirect impacts	
Sustainable Planning Act 2009	The *Sustainable Planning Act 2009* will be replaced by the *Planning Act 2016* when it comes into force in mid-2017	SPA
Transport Infrastructure Act 1994		TI Act
UXO		Unexploded ordnance
waterway	There are five major waterways in which the alignment crosses: Western Creek, Bremer River, Warrill Creek, Purga Creek and Teviot Brook	
Wider economic benefits		WEB
Woolooman tunnel no. 1	Proposed tunnel required to pass Teviot Range, is approximately 1050m in length	
Woolooman tunnel no. 2	Proposed tunnel required to pass Teviot Range, is approximately 200m in length	

APPENDIX A PREFERRED ALIGNMENT TENURE

Ipswich City Council

LOT PLAN	TENURE
2SP23837	Freehold
ERP215261	Easement
3RP892957	Freehold
12CH3150	Freehold
29CH3150	Freehold
73CH31283	Freehold
3SP239551	Freehold
234CC3477	Freehold
4RP898264	Freehold
1RL7616	Lands Lease
85CC3477	Freehold
FRP215262	Easement
176RP807143	Freehold
ARP111485	Easement
6RP219931	Below the depth plans
23CC157	Freehold
24CC158	Freehold
20CC3472	Freehold
53SP243512	Freehold
23CH3150	Freehold
48CH3120	Freehold
38CH3168	Freehold
228CC1340	Freehold
11RP212796	Freehold
43CH3168	Freehold

LOT PLAN	TENURE
1RL7616	Lands Lease
90CH31654	Freehold
30CH3150	Freehold
45CH3120	Freehold
37CH3168	Freehold
25CC158	Freehold
59SP272815	Freehold
220CH31139	Freehold
9RP906566	Freehold
4RP186730	Freehold
172CH3162	Freehold
157CH3159	Freehold
156CH3159	Freehold
1RP96929	Freehold
51CH3120	Freehold
2RP192993	Freehold
57RP219930	Below the Depths
43RP898264	Freehold
1RP198984	Freehold
5RP24575	Freehold
23CC157	Freehold
24CC158	Freehold
174CH3162	Freehold
SRP901467	Easement
6RP198306	Freehold
2RP198984	Freehold

LOT PLAN	TENURE
25SP108209	Freehold
12CH3150	Freehold
FRP103799	Easement
265CH31877	Freehold
4RP178669	Freehold
7RP198306	Freehold
54SP243512	Freehold
82SP238337	Freehold
81RP218953	Freehold
2RP807143	Freehold
176RP807143	Freehold
259CH31308	Freehold
13CH3150	Freehold
1RP209603	Freehold
261CH3159	Freehold
83CC2477	Freehold
80CC3491	Freehold
84CC3477	Freehold
1RP842417	Freehold
1RP206027	Freehold
77RP218829	Freehold
81RP218953	Freehold
ARP111486	Easement
2RP892957	Freehold
18CC3472	Freehold
1RP22574	Freehold

LOT PLAN	TENURE
173CH3162	Freehold
3RP96929	Freehold
36CH3168	Freehold
74CH31210	Freehold
244CH31210	Freehold
11CH3150	Freehold
ARP111487	Easement
81CC3477	Freehold
3RP178669	Freehold

Scenic Rim Regional Council

LOT PLAN	TENURE
ARP169095	Easement
ARP169095	Easement
45CH3168	Freehold
49RP863740	Freehold
42RP22590	Freehold
1RP22586	Freehold
2RP50209	Freehold
2RP180942	Freehold
1RP173595	Freehold
262W311930	Freehold
CRP859737	Easement
49CH31187	Freehold
10SP221796	Freehold
12RP859737	Freehold
1RP59262	Freehold

LOT PLAN	TENURE
10SP221796	Freehold
5RP859807	Freehold
20SP133191	Freehold
19W31189	Freehold
53SP148223	Freehold
273W312013	Reserve
43RP22590	Freehold
46CH3168	Freehold
2RP22586	Freehold
0146CC3359	Lands Lease
123CH311750	Freehold
3RP180942	Freehold
556SP142307	Freehold
19W31189	Freehold
6SP131580	Freehold
232SP130091	Lands Lease
2RP59262	Freehold
13RP859737	Freehold
58CH31185	Freehold
50CH31185	Freehold
57CH31185	Freehold
7RP47886	Freehold
15RP48369	Freehold
22RP908750	Freehold
BRP191691	Easement
59CH31185	Freehold

LOT PLAN	TENURE
51CH31185	Freehold
44RP22590	Freehold
41RP22590	Freehold
52RP22590	Freehold
3SP148223	Freehold
259RP809310	Freehold
54CH31185	Freehold
1RP22591	Freehold
50RP22590	Freehold
4CP868996	Freehold
60CH31185	Freehold
2RP22592	Freehold
1RP180942	Freehold
30SP133190	Freehold
269W312014	Freehold
280W312013	Freehold
76SP131580	Freehold
3SP163227	Freehold
1SP163227	Freehold
280W312013	Freehold
55SP157507	Freehold
94SP157507	Freehold
251SP130092	Lands Lease
1RP22592	Freehold
146CC3359	Reserve
3RP215267	Freehold

LOT PLAN	TENURE
ARP48365	Easement
10SP133192	Freehold
10SP133192	Freehold
286W312555	Freehold
4SP163227	Freehold
259RP809310	Freehold
4SP163227	Freehold