ARTC InlandRail

The Australian Government's priority freight rail project

Initial Advice Statement: Inland Rail – Kagaru to Acacia Ridge and Bromelton

March 2019

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EXECUTIVE SUMMARY

This Initial Advice Statement (IAS) has been prepared for the Australian Rail Track Corporation (ARTC) Inland Rail Kagaru to Acacia Ridge and Bromelton Project (the Project).

ARTC is an Australian Government owned corporation and current operator of a significant portion of the Australian freight network. ARTC currently manage and maintain approximately 8,500 km of rail network across Victoria, New South Wales, South Australia, Western Australia and Queensland.

ARTC has been tasked with delivery of the Inland Rail Programme. The Kagaru to Acacia Ridge and Bromelton Project is one of 13 separate projects that are part of the Inland Rail Programme:

PROJECT NAME	STATE	DESCRIPTION	LENGTH (KM)
Tottenham to Albury	Vic	Enhancement works	305
Albury to Illabo	NSW	Enhancement works	185
Illabo to Stockinbingal	NSW	New Railway	37
Stockinbingal to Parkes	NSW	Enhancement works	169
Parks to Narromine	NSW	Upgrade works	111
Narromine to Narrabri	NSW	New Railway	307
Narrabri to North Star	NSW	Upgrade works	186
North Star to NSW/QLD Border	NSW	New Railway	52
NSW/QLD Border to Gowrie	Qld	New Railway	220
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	49
		Total	**1,733**

Each project can be delivered as part of an integrated package, interfacing to the existing railway where required. 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 Project will be constructed as an enhancement of approximately 49 km of existing single-track dual-gauge railway with crossing loops to accommodate double stack freight trains up to 1800 m long. The Project will also assess the future requirements for the provision of 3600 m trains. 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 infrastructure requirements for the possible future passenger transport service are excluded from this Project and will be progressed by the Queensland Department of Transport and Main Roads (DTMR). It is understood that such services are to be considered as part of the DTMR Salisbury to Beaudesert Project.

A preferred alignment has been identified for the Project within the existing rail corridor. This will allow for value engineering opportunities to be investigated during subsequent design development, community engagement, environmental assessment and approvals processes. The final Alignment and Project corridor will be defined during the Environmental Impact Statement (EIS) and design development phases.

The Project is for the upgrade of the existing dual gauge line and crossing loops within a brownfield (existing rail corridor) sections of corridor spanning 49km and, will tie into the newly constructed Calvert to Kagaru Project.

Given the potential increase in traffic on the existing corridor, and its alignment through a number of residential areas, ARTC are seeking a declaration for coordinated project status under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). Preliminary assessments show that the Project will not have a significant impact on matters of national environmental significance, and the Project will be referred to the Commonwealth Minister for the Environment for assessment *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) at a future point in time. Following the EIS process, further approvals may be required under separate approvals processes under Queensland legislation.

The key reasons why ARTC is seeking the coordinated project declaration are:

- To provide the public with the opportunity to comment and provide input into the Terms of Reference for the EIS, and following its development, on the draft EIS; and
- To have an independent and transparent social, economic and environmental assessment of the Project undertaken by the Queensland Coordinator-General.

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

- Land use;
- Flora and fauna;
- Water quality;
- Hazards, health and safety;
- Social and economic factors;
- Air quality;
- Noise and vibration;

- Water resources;
- Waste management;
- Cultural heritage; and
- Transport.

1. INTRODUCTION

1.1. Background

1.1.1. Inland Rail

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

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

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

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

The Inland Rail route, which is about 1,700 kilometres long, would involve:

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

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

Figure 1-1 The Melbourne to Brisbane Inland Rail Programme

Figure 1-2 Queensland Projects in the Inland Rail Programme

1.2. Purpose and Scope of the Initial Advice Statement

This IAS has been prepared for the Kagaru to Acacia Ridge and Bromelton Project (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 Environmental Impact Statement (EIS) or an Impact Assessment Report (IAR) for evaluation by the Coordinator-General. Due to the nature of the Project, and community interest in the Project, ARTC believe that an EIS is appropriate for assessing the social, economic and environmental impacts.

ARTC are seeking a declaration that the Project is a coordinated project due to the significant infrastructure investment and, strategic direct and indirect economic benefits of creating an efficient freight route to Bromelton (south) and Brisbane's major intermodal terminal at Acacia Ridge (north).

The IAS provides information to assist the Coordinator-General to decide whether the 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 Kagaru to Acacia Ridge and Bromelton Project be declared under section 26(1)(a) of the SDPWO Act as requiring an EIS.

A Study Area for the Project has been identified for consideration in the IAS. This area has 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 a significant portion of the Australian freight network. ARTC has been tasked by the Australian Government with delivery of the Inland Rail programme. ARTC was established in 1998 after the privatisation of the national rail network and Commonwealth and State Government agreement to form a 'one-stop' shop for all operators wanting access to the standardised interstate rail network.

ARTC currently manages and maintains approximately 8,500 km of rail network across Victoria, NSW, South Australia, Western Australia and QLD. Since 2011, ARTC has delivered a capital works programme of almost $3 billion 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 programme 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 plans to engage 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 has 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 DEE under the EPBC Act in 2011.

Contact details for the Inland Rail Project are as follows:

Inland Rail
Australian Rail Track Corporation
Level 9, 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 Kagaru to Acacia Ridge and Bromelton Project

The proposed Project is a 49 km long single-track dual-gauge railway with crossing loops to accommodate double stacked freight trains up to 1,800 m long. The existing rail corridor is of sufficient width to accommodate the infrastructure currently proposed for construction, as well as future expansion, including possible future requirement for 3,600 m trains. The scope proposed for the Kagaru to Acacia Ridge and Bromelton project is not required to support current rail operations but is required for double stacked train operations associated with the Inland Rail Programme.

The existing brownfield section between Kagaru to Acacia Ridge and, Kagaru to Bromelton requires upgrading to improve the existing operational capacity to accommodate longer 1,800m trains and higher 'double stacked' container trains with provision for a connection into an existing intermodal freight terminal at Bromelton. For clarity, the following definitions are utilised within this IAS:

- Alignment – this relates to the proposed new rail corridor of other Inland Rail projects.
- Existing / Corridor – the existing gazetted Queensland Rail or ARTC rail corridor (lands lease area), where the proposed works are to occur.
- Study Area – The area required to determine and assess the direct and indirect impacts. The proposed study area is a nominal 1 km corridor from the existing rail centreline from Kagura to Acacia Ridge and Bromelton.

The corridor and surrounding Study Area is depicted in **Figure 3-1.**

The upgrade to the existing railway will include the following works:

- Increasing clearances under existing road bridges and overhead service structures to accommodate double stacked 'Plate F' rolling stock outline container traffic. The sites where increased clearances are required include:
  - Learoyd Road over rail bridge - Lower track by approximately 1.2m to achieve 7.1 m overhead clearance, provide sub-structure support to existing overhead watermain service. Estimated length of track lowering is 440m.
  - Johnson Road over rail bridge and overhead water main service - Lower track by approximately 1.43 m to achieve 7.1 m vertical clearance, relocate existing water main and services to achieve the desired electrical clearance. Estimated length of track lowering 720 m.
  - Middle Road over rail bridge - Lower track by approximately 1.3 m to achieve 7.1 m vertical clearance and slew track. Estimated length of track lowering is 790m.
  - Pub Lane over rail bridge - Lower track by approximately 0.94 m to achieve 7.1 m vertical clearance. Estimated length of track lowering 390m.
  - Beaudesert Road over rail bridge - Lower track by approximately 0.6m to achieve 7.1m vertical clearance. Estimated length of this track lowering is 550 m.
- Provision of crossing loops 2150 m minimum length. The crossing loops sites include:
  - Larapinta (new loop) – Estimated length of 2250 m at 962.155 km to 964.405 km on existing Interstate Corridor. The indicative location of the new loop is positioned on the eastern side of the existing track to align with the Greenbank loop and 4.5 m track centres which have been adopted to provide for Plate F

container clearance between tracks. This position is subject to change as operational modelling progresses through the Feasibility phase;

- Kagaru (new loop) – Estimated 2150 m at 943.100 to 945.250 km on existing Interstate Corridor. New loop positioned to the eastern side of the track to align with the existing Greenbank Loop. This position is subject to change as operational modelling progresses through the Feasibility phase;
- Greenbank (extension to existing loop) - Extend the existing loop on the eastern side of the corridor to the south and extend track centres to 4.65 m to achieve Plate F clearance;
- Bromelton (extension to existing loop) - New loop minimum length of 2150 m at 930.859 km to 933.450 km on the western side of the existing Interstate corridor; and

- Provision of a turnout connection into the Bromelton Intermodal Freight Terminal - Northern turnout located to the south of the existing SCT Bromelton facility. Includes associated formation and potential bridge / culvert works to accommodate.

Impacts on the receiving environment and the community are outlined in **Section 6** of this IAS. The operation of the longer, double stacked freight trains travelling at an increased frequency along the proposed route under the Inland Rail service offering, has the potential to increase noise, vibration and air emissions. ARTC operates the Interstate Corridor in accordance with sub-lease from the Department of Transport and Main Roads (DTMR). Proposed changes to this corridor will require approval from DTMR.

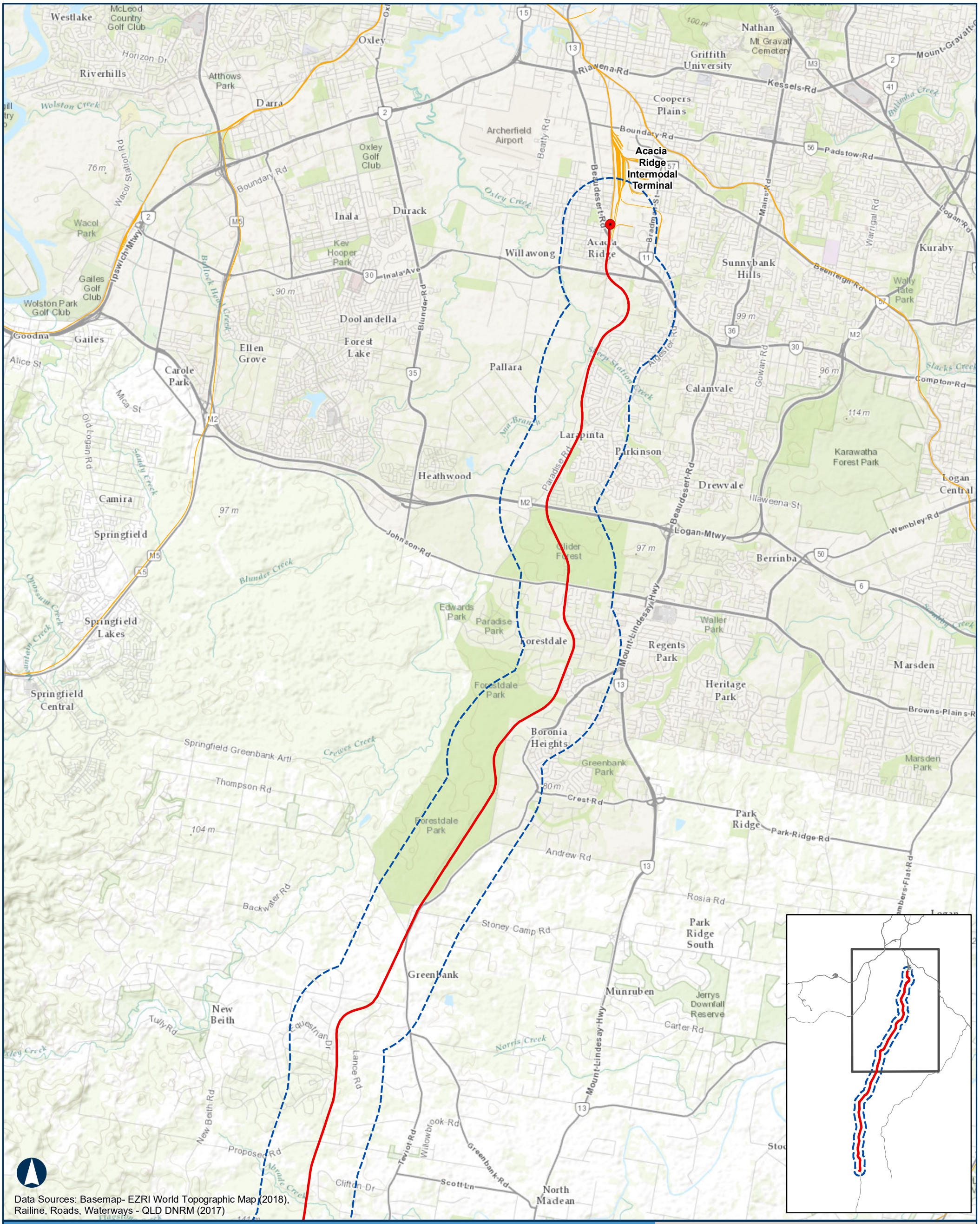
3.2. Land Use

The Project corridor traverses through land characterised by three distinctive land use areas, namely: the more rural southern portion between Bromelton and Flagstone; the central mix residential, future residential and open space portion from Flagstone to the M2 Motorway; and the northern mixed residential, commercial and industrial uses from the M2 through to Acacia Ridge.

The Greenbank Training Area, a Commonwealth owned property, is located west of the Corridor. Additionally, a future master-planned community is proposed and also located within Greenbank (Logan LGA), south of the Greenbank Training Area.

Figure 3-1 Project Context

Figure 3-1 Project Context



KAGARU TO ACACIA RIDGE AND BROMELTON Project Context

Figure 3-1 Map 1 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Highway
- Secondary Road
- Watercourse
- Railway

ARTC InlandRail

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

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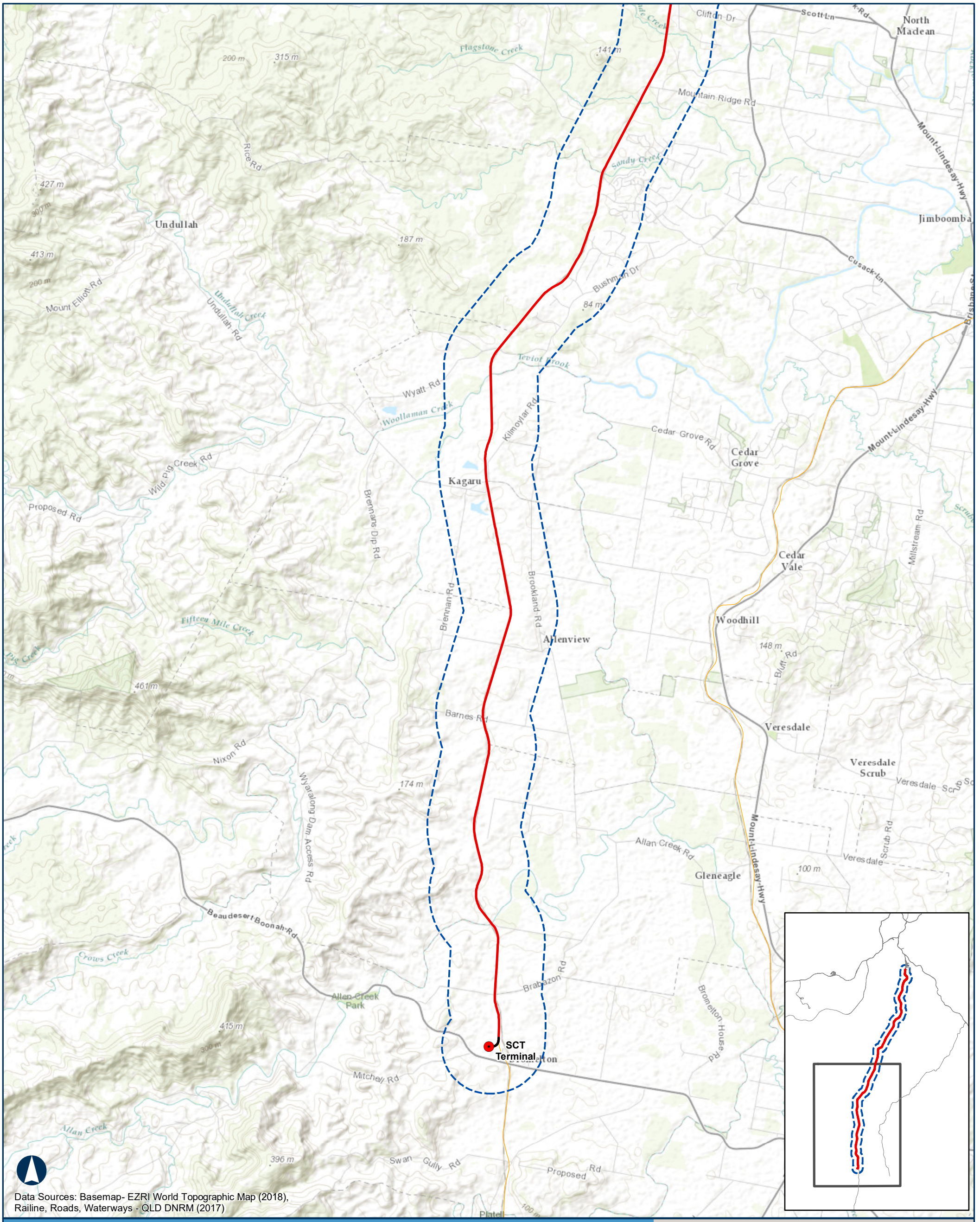

Data Sources: Basemap- EZRI World Topographic Map (2018), Railine, Roads, Waterways - QLD DNRM (2017)

KAGARU TO ACACIA RIDGE AND BROMELTON Project Context

Figure 3-1 Map 2 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
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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 programme has been under development for over ten 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 (ARTC, 2010). A concept business case was prepared in 2014, followed by the preparation of the Programme Business Case in 2015 (ARTC, 2015). The Inland Rail programme is recognised in the National Land Freight Strategy (Standing Council on Transport and Infrastructure, 2012) and endorsed by Infrastructure Australia.

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

Australia is heavily reliant on efficient supply chains to provide competitive domestic freight links and gateways for international trade. Freight transport services between major population centres, particularly our capital cities, deliver millions of tonnes of freight each year and provide for the distribution of goods throughout the country. Efficient and effective domestic supply chains that are internationally competitive against import chains, support economic growth and help keep down the cost of the products we buy.

It is estimated 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 (ARTC, 2015). 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 (ARTC, 2015). 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 will 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; and
- 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 compared with road transport;
- Would cover its ongoing operating and maintenance costs, once operational; and
- Is good for the country's economy – increasing Australia's GDP by an estimated net $16 billion by 2050 meets Australia's strategic, long-term needs.

The Australian Government through ARTC, is delivering Inland Rail in partnership with the private sector and has to date committed a total of $9.3bn to progress the design, approvals, construction and property acquisition for all 13 Inland Rail projects. The Kagaru to Acacia Ridge and Bromelton Project forms an essential component of the Inland Rail programme.

3.3.2. Queensland Planning Context

ARTC is seeking that the Project be declared a 'coordinated project for which an EIS is required' under section 26(1)(a) of the SDPWO Act.

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 *Planning Act 2016* is the overarching framework for Queensland's planning and development system. It is supported by the Planning Regulation 2017, the State Planning Policy, regional plans, local planning schemes and other statutory instruments.

The Project traverses three local government areas (LGAs) being:

- Scenic Rim Regional Council (SRRC);
- Logan City Council (LCC); and
- Brisbane City Council (BCC).

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

- For Scenic Rim Regional Council:
  - Beaudesert Shire Planning Scheme 2007;
  - Boonah Shire Planning Scheme 2006; and
  - Ipswich Planning Scheme 2006.
- Logan Planning Scheme 2015; and
- Brisbane City Plan 2014.

Inland Rail is identified as a priority project in the State Infrastructure Plan Part B: Program – 2018 update (DSDMIP, 2018a). It is also specified as major enabling infrastructure in the South East Queensland Regional Plan 2017 (ShapingSEQ) (DSDMIP, 2018b). Additionally, this is supported in the Moving Freight Strategy (DTMR, 2013), which recognises the need for Inland Rail and the potential benefits to the State of Queensland. At a local level, Inland Rail is identified within transport infrastructure planning. Brisbane City Council's Transport Plan (BCC, 2018) recognises the need for long-term land freight infrastructure planning, The Ipswich City Transport Plan, iGO (ICC, 2016), identifies the Inland Rail project as a key freight action.

The Project will support efficient freight movement to Acacia Ridge intermodal freight terminal (north) and future Bromelton intermodal freight terminal (south). Importantly, the Project connects to the adjacent Calvert to Kagaru Project, which builds upon previous work undertaken by the Queensland Government protecting the Southern Freight Rail Corridor (SFRC). Further, the Project traverses, and is partly located within, the Bromelton State Development Area. The enhancement of this rail line will contribute to the ongoing industrial and economic development planned for the Bromelton State Development Area.

3.3.3. Alternatives Considered – Programme Wide

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

- Do nothing: freight remains on the existing road network, regional development opportunities are not realised, and potential opportunities to reduce significant greenhouse gas emissions unlikely to be realised;
- Reforms to delay or remove the need for infrastructure investment (demand management, productivity enhancement or deregulation);
- Progressive upgrades of the National Highway;
- Upgrades of the existing coastal railway; and
- 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 of the Inland Rail.

3.3.4. Alternatives Considered – Kagaru to Acacia Ridge and Bromelton Project

The Project is being developed in line with the 2015 Inland Rail Business Case, which proposes enhancements to the existing freight corridor only, to support double stacking of containers and longer trains. Within these parameters, alternative solutions are limited to technical responses to modification to existing infrastructure, including:

- Structure Clearances (road over rail bridges).
- Assessments measured vertical and horizontal clearances under each existing structure, existing data from local councils and the Department of Transport and Main Roads (DTMR), constructability considerations and site data informing the track lowering extents at the clearance locations. This data was compared against alternative new bridge / structure options or bridge jacking at each location. The disruption to asset owners largely ruled against provision of new structures or bridge jacking.
- Crossing Loops – Initial operational analysis to accommodate 1800m trains has determined the need for two new crossing loops at Larrapinta and Kagaru, along with crossing loop extensions at Greenbank and Bromelton. Current concept engineering assessments indicate that crossing loops will remain within the existing rail corridor.

Future extension of the crossing loops to accommodate 3600m trains was included in the options assessment process. Key factors considered included the need to minimise impacts to existing infrastructure and the surrounding environment, operational requirements with respect to adequate spacing between loops, minimum track centres to accommodate all rolling stock without the need to acquire additional land, vertical grading criteria and constructability within an operational rail environment.

The scope of work for the Project described in **Section 3.1** is the result of an options analysis undertaken by ARTC's consultants in 2016 in consultation with the Queensland Government. The concept assessment included a review of options analyses, further preliminary engineering design and environmental assessment and, was informed by initial engagement with key stakeholders including BCC, SRRC, LCC, peak industry bodies, and Aboriginal parties.

3.4. Components, Developments, Activities and Infrastructure that Constitute the Coordinated Project

Key components of the Project include:

- Enhancement works at nine locations within 49 km of the existing operational Interstate Corridor.
- The rail line is to be single track dual gauge with crossing loops for 1,800 m long train sets, with the ability to extend in the future to accommodate trains up to 3,600 m long based on business and market needs.
- Crossing of watercourses utilising a combination of bridges and/or culverts.
- Tie-ins to the existing Acacia Ridge Intermodal Terminal, Bromelton SCT Logistics Terminal and to the future Inland Rail Calvert to Kagaru Project.
- The construction of associated rail infrastructure including on track and trackside monitoring, maintenance sidings and signalling infrastructure to support the Advanced Train Management Systems (ATMS).
- Ancillary works including road and public utility crossings and realignments.
- Construction of temporary site offices and temporary workforce accommodation if required.
- Third party infrastructure requirements to be determined during future project stages (refer **Section 3.5**)
- Construction workspace, laydown areas and access roads (if required).

Construction activities for the Project will likely include temporary roads within the existing rail corridor (if required), upgrades and/or alterations to existing roads. The construction of the 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.

3.5. Third Party Infrastructure Requirements

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

Electricity supply will also be needed for points, signalling and other rail 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 Project include the following:

- Third party rail operator infrastructure requirements;
- Complementary infrastructure, such as metropolitan and regional freight terminals;

- Upgraded fleet/rolling stock;
- Administration, train provisioning, fuelling and maintenance depots;
- Train crew change and other intermediate depots/facilities; and
- Complementary land use and freight precinct developments.

3.6. Timeframes for the Kagaru to Acacia Ridge and Bromelton Project

The indicative program is provided as follows:

- 2017 - 2021: Design, planning and approvals;
- 2021 - 2022: Pre-construction and land acquisition/requirements for construction;
- 2022 - 2024: Construction; and
- 2025: Project Commissioning.

3.7. Construction and Operational Processes

The below description sets out the likely construction and operational processes for the Project. These processes will be refined through further design and assessment.

Pre-construction activities are anticipated to include geotechnical investigations, survey, ecological investigations and cultural heritage surveys. This may include establishment of access tracks where required.

Construction activities will involve the following:

- Site preparation, earthworks and vegetation clearing for construction accesses, depots and laydown areas;
- Early works, including ground disturbance and relocation of impacted utilities, roads and fencing at key locations for safety and construction access;
- Sourcing all construction and construction related materials, including won material, manufactured materials and construction water;
- Earthworks, including construction of embankments/fill and cuttings;
- Construction of bridges at watercourses, which may require temporary or permanent stream diversion;
- Relocation or protection of services and public utilities.
- Construction of drainage and stormwater treatment infrastructure;
- Construction of track and signalling;
- Construction and implementation of environmental management measures (e.g. noise treatments, sedimentation control); and
- Landscaping and rehabilitation treatments to areas disturbed during construction.

As described in **Section 3.5**, power supply 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 QLD lines along the Inland Rail corridor once the Project is operational.

3.8. Workforce Requirements During Construction and Operation

The Project is part of the larger Inland Rail programme. The Business Case anticipates that an additional 16,000 direct and indirect jobs will be created programme-wide at the peak of construction (estimated in 2021 to 2022). An average of 700 additional jobs per annum is anticipated over 50 years of operation (2025 to 2075). It is estimated that approximately 60 per cent of the capital expenditure (CAPEX) for Inland Rail will be expended on projects in Queensland, including this Project. Therefore, an equivalent proportion of jobs are anticipated to be based in QLD. The construction workforce requirements for the Project are anticipated to be commensurate with that of a typical rail enhancement project, given the project alignment within the existing rail corridor. Based on the capital cost associated with the Project (refer to **Section 3.9.1**), a peak workforce for the Project may be around one hundred (100) staff at the height of the construction phase. Detailed construction planning will be undertaken to determine the profile of this resource requirement. Where rail corridor access constraints permit, the intention would be to create continuity of employment for the duration of the construction period. Additionally, it is anticipated that the expansion in the construction sector would support additional flow-on demand through the construction industry supply chain and additional spending on consumer orientated products by the construction workforce in the local area. It is postulated that temporary indirect employment opportunities may also arise as a result of the construction phase of the Project. The associated supply of construction materials, the development of associated external infrastructure and complementary services as described in Section 3.5 will require additional workforce beyond those directly associated with the Inland Rail programme.

The operational workforce following commissioning is unlikely to change significantly, as this corridor is currently maintained by an existing asset management team. The proposed works under this project (which excludes ATMS) will not have significant changes to the rail maintenance regime given their enhancement status. ARTC will undertake detailed feasibility studies that will inform the work force requirements during the operational phase of this project.

3.9. Economic Indicators

3.9.1. Capital Cost

Inland Rail will 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 the Inland Rail programme inevitably involve significant construction costs. Delivering Inland Rail is expected to cost approximately $10.9 billion. The Project is expected to have construction costs of approximately $87 million.

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 the Inland Rail programme could 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 the Inland Rail programme 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 the Inland Rail programme 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 will generate significant economic activity, including jobs and an increase in GDP.

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

3.9.4. Wider Economic Benefits

An assessment of the wider economic benefits (WEBs) of Inland Rail is provided in the Addendum to the ARTC Business Case (ARTC, 2016). Since the release of the 2015 Programme Business Case (ARTC, 2015), 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 are presented in **Table 3-1**. These results are not cumulative.

Table 3-1 Economic appraisal results with expanded benefits*

PROGRAMME BUSINESS CASE RESULT ($ 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

PROGRAMME BUSINESS CASE RESULT ($ M)	7% DISCOUNT RATE	4% DISCOUNT RATE
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

***incremental to the base case, discounted, real 2014-15 dollars**

Source: ARTC, 2016

Notes: Analysed over 50-year appraisal period to 2073–74 and discounted applying real discount rates; based on P50 cost certainty; excludes Port of Brisbane Extension; assumes complementary investment on the QR network (Western 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. With some of the Project located within the Bromelton State Development Area and connecting to existing Intermodal freight operations (SCT Logistics Bromelton), the Project will provide benefits immediately to existing operations in addition to creating conducive conditions for future investment in freight hubs and terminals.

The Australian Government has committed $9.3 billion for ARTC to develop and build Inland Rail. Additional funds will come from a partnership with the private sector.

4. LOCATION OF KEY PROJECT ELEMENTS

4.1. Location

The Project commences at Kagaru, then traverses northwards towards Acacia Ridge, and southwards towards Bromelton. The Project utilises existing rail corridor; where the Kagaru to Acacia Ridge section is 37 km and the Kagaru to Bromelton section is 12 km.

The Kagaru to Acacia Ridge corridor spans across three LGAs, where the track begins in the SRRC suburb of Kagaru and travels northwards through the LCC suburbs of Riverbend, Monarch Glen, Flagstone, New Beith, South Maclean, North Maclean, Greenbank, Boronia Heights, Hillcrest and Forestdale. Then, the track progresses through the BCC suburbs of Larapinta, Parkinson, Pallara, Algester and Willawong, before terminating in Acacia Ridge.

The Kagaru to Bromelton corridor is located wholly within SRRC LGA and begins in the suburb of Kagaru and traverses southwards through Allenview, Gleneagle and terminates in Bromelton.

The Kagaru to Acacia Ridge and Bromelton corridor is depicted in **Figure 3-1**.

4.2. Tenure

The Kagaru to Acacia Ridge and Bromelton Project is primarily located within the existing gazetted rail corridor, the tenure of the alignment itself is under lands lease from the state governments. Surrounding land tenure is private/freehold, State and Commonwealth (federal).

5. DESCRIPTION OF EXISTING ENVIRONMENT

5.1. Natural Environment

5.1.1. Land

TOPOGRAPHY

Topography along the proposed Kagaru to Acacia Ridge alignment is gently undulating with elevations varying between 30 m Australian Height Datum (AHD) to 70 m AHD, with the elevation generally decreasing towards the northern extent. The topography along the proposed Kagaru to Bromelton alignment is gently sloping, interspersed by small foothills and varying between 40 m AHD to 80 m AHD.

Topographical contours are shown on Figure 5-1.

GEOLOGY

The geological formation of the proposed Kagaru to Acacia Ridge alignment comprises of the following:

- Sunnybank Formation – Lacustrine and fluviatile quartzose to sublabile sandstone, conglomerate, silty clay, siltstone, clayey mudstone, mildly laterised;
- Woogaroo Subgroup – Quartzose sandstone, siltstone, shale, conglomerate, coal;
- Gatton Sandstone – Lithic labile and feldspathic labile sandstone;
- Koukandowie Formation – Lithofeldspathic, labile and sublabile to quartzose sandstone, siltstone, shale, minor coal, ferruginous oolite marker;
- Alluvium of various ages overlies the above solid geology and comprises a mixture of clay, silt, sand and gravel; and
- Fill associated with the existing rail corridor has been found at various locations.

The proposed Kagaru to Bromelton alignment generally consists of siltstone, sandstone, alluvium and quaternary alluvium.

This is shown in Figure 5-1**.**

SOILS

A profile of the soils that are located within the Study Area has been established with reference to the Australian Soil Resource Information System (CSIRO, 2014). A descriptive summary of all soil types within the Study Area is provided in **Table 5-1**.

Table 5-1 Soil Type Summary

MAP UNIT	SOIL TYPE	DESCRIPTION
Mw30	Kandosols	Gently undulating area of tertiary sediments and igneous rocks: chief soils are red earths (Gn2.14) with associated areas of red friable earths (Gn3.11).
Tb64	Tenosols	Rolling to hilly terrain with gentle to moderate slopes: chief soils are hard acidic yellow (Dy3.41) and red (Dr3.41) mottled soils.
MM9	Vertosols	Mountainous land on granites and associated acid to intermediate plutonic rocks: chief soils are gritty leached sands (Uc2.12) and (Uc4.1).
Kb12	Vertosols	Gently rolling areas of the subcoastal lowland (less than 400 ft. above sea level) on altered basic rocks; maximum relief is 50 ft. between crests and valleys: chief soils are shallow dark cracking clays (Ug5.12) with hard neutral red and yellow soils (Dr2.12) and (Dy2.12).
Qd5	Sodosols	Hilly: hill slopes of hard-setting loamy soils with red and red mottled clayey subsoils (Dr2.41 and Dr2.42). Associated are: (Um4.2) and (Dr2.21) soils and rock outcrops on upper slopes; (Dy3.2 and Dy3.4) and less commonly (Dy5.4 and Dy5.6) soils on mid and lower slopes; scattered areas of various friable soils, such as (Db3.12), (Dr4.12), (Um6.2), (Uf6), and (Ug5.12) soils on rounded hills and slopes; occasional pockets of red earths (Gn2.1); narrow stream valleys of soils of unit Kd6; and broader undulating valleys of (Dy3.42) soils.

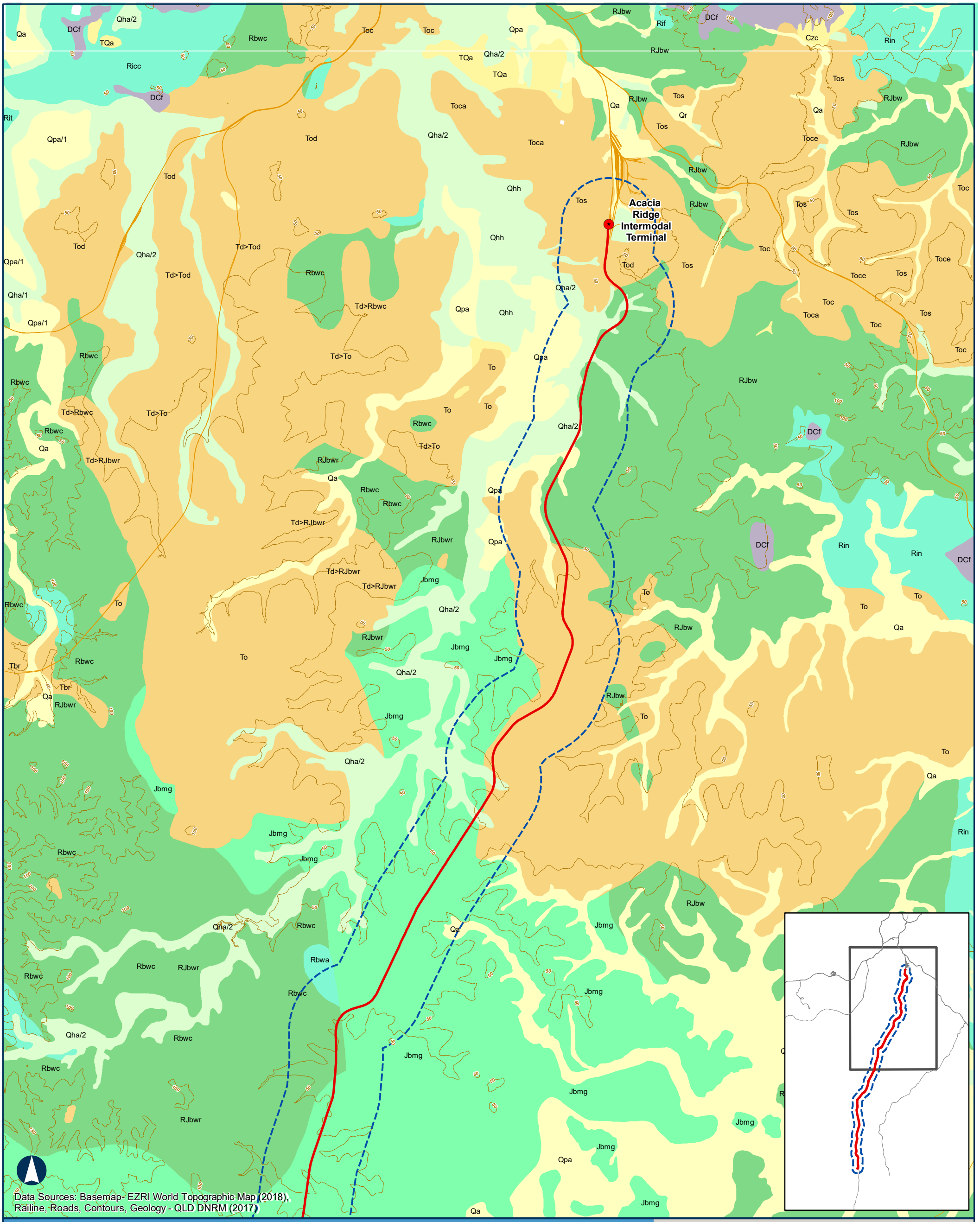
Acid sulfate soils (ASS) contain iron sulfides which oxidise on exposure to air and water and potentially result in the release of sulfuric acid into the environment, if natural buffering is not available within the soils (Dear et. al., 2014). ASS are more prevalent in low-lying areas and the risk of occurrence is generally delineated in accordance with the following categories:

- Land at or below 5 m AHD (moderate to high risk); and
- Land above 5 m AHD and below 20 m AHD (low to moderate risk).

A limited area (approximately 40 ha) of the northern section of the corridor is mapped as including 'Land above 5 m AHD and below 20 m AHD' on the Brisbane City Plan 2014 Interactive Mapping (BCC, 2016). The mapped area extends along the corridor approximately from Boundary Road to the Logan Motorway, as depicted in Figure 5-1. It is considered very unlikely that ASS will be present in other areas of the Study Area.

Figure 5-1 Geology and Topography

Figure 5 1 Geology and Topography



Data Sources: Basemap- EZRI World Topographic Map (2018), Railine, Roads, Contours, Geology - QLD DNRM (2017)

KAGARU TO ACACIA RIDGE AND BROMELTON Geology and Topography

Figure 5-1 Map 1 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 21/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Railway
- Contour (50m)

ARTC InlandRail

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

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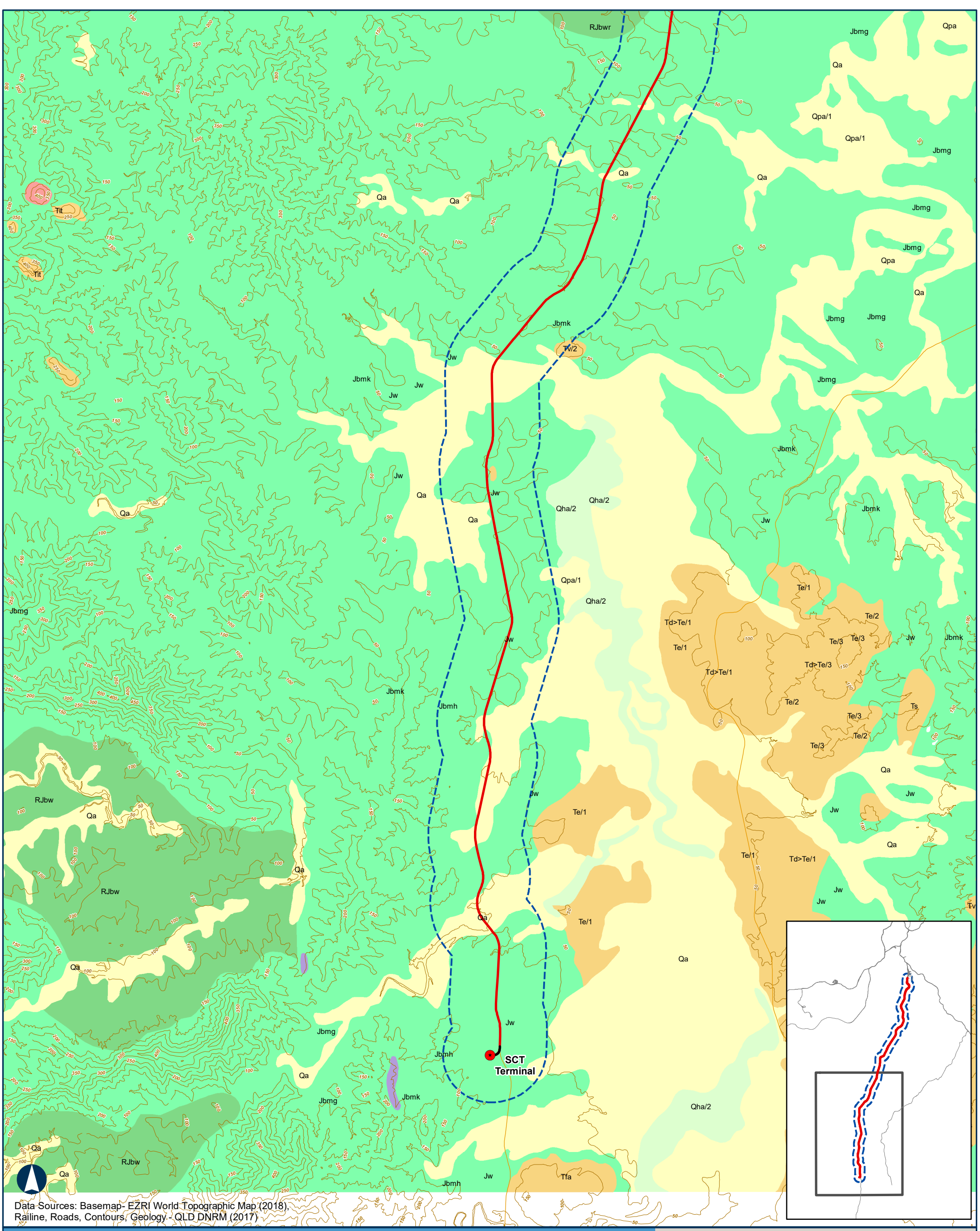

Data Sources: Basemap- EZRI World Topographic Map (2018), Railine, Roads, Contours, Geology - QLD DNRM (2017)

KAGARU TO ACACIA RIDGE AND BROMELTON Geology and Topography

Figure 5-1 Map 2 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 21/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Railway
- Contour (50m)

ARTC InlandRail

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CONTAMINATED LAND

A desktop review of land uses and known contaminated areas has been conducted for the Study Area to identify potential sources of contamination. It is noted that the alignment is an existing railway and therefore has the potential to be contaminated in parts due to historical activities.

A desktop contaminated land assessment of the corridor found that all lots forming the corridor are listed on the Queensland Environmental Management Register (EMR) as having a Hazardous Contaminant, with the exception of Lot 2 on RP43893 which has been listed on the EMR as having been used as a Railway Yard.

A field investigation of the Kagaru to Acacia Ridge alignment in 2016 revealed no obvious indicators of potential contamination or indication of land use activities other than rail related activities.

A review of the historical aerial photographs for the Kagaru to Acacia Ridge Corridor revealed no land use activity other than rail related activities were undertaken within the study area from 1955 to the present. A review of information held at local historical societies did not identify any rail related incidents that may have occurred within the Study Area that may have had the potential to contaminate the land.

Field investigation has not yet been conducted for the Kagaru to Bromelton portion of the Corridor, however desktop study and review of the Queensland Contaminated Land Register (CLR) identified the hazardous contaminant within this section as 'possible high arsenic levels along the rail corridor'.

UNEXPLODED ORDNANCE

A search of the Department of Defence unexploded ordnance (UXO) mapping identified the following:

- Lot 201 on SP130090, Lot 221 on SP130089, Lot 6 on S31536 and Lot 3 on RP49296 – Slight UXO potential: Areas categorised as slight will have a confirmed history of military activities that have resulted in residual UXO, but which the Department of Defence considered it inappropriate to assess as substantial. All land usage and development within these areas may continue without further UXO investigation or remediation.
- Lot 173 on SP130087, Lot 174 on SP130087, Lot 251 on SP130092, Lot 252 on SP130092 and Lot 5 on RP47884 – Cadastre outside UXO areas: Applicable to land adjacent to land identified as having potential to contain UXOs. Unlikely to be a high degree of risk associated with works in these areas.

VISUAL AMENITY

The Project traverses a range of landscapes. Predominantly, the portion between Bromelton and the start of Flagstone consists of open, slightly undulating areas with rising foothills to the west with a more level open floodplain around Kagaru. The corridor along this portion is largely sparsely vegetated with open grazing areas with isolated stands of vegetation. The landscape then changes and can be characterised as a mix of forested hills, open rural landscapes disbursed by large lot rural residential and residential areas with isolated commercial developments. Much of the corridor along this portion is lined by mature native vegetation offering a high level of screening of the rail line. The area to the west of the corridor, while highly vegetated, is designated for a future master planned community within the Logan LGA.

5.1.2. Water

5.1.2.1. Surface Water Quality

There are 48 surface water features within the corridor. Of these, two mapped watercourses, as defined under the *Water Act 2000*, have been identified, being Teviot Brook and Allan Creek (State of Queensland, 2018). The Corridor traverses through the Moreton Bay and Logan River Catchments. The catchments are characterised as lowland freshwater type water, comprising lowland streams, wallum/tannin-stained stream and coastal streams.

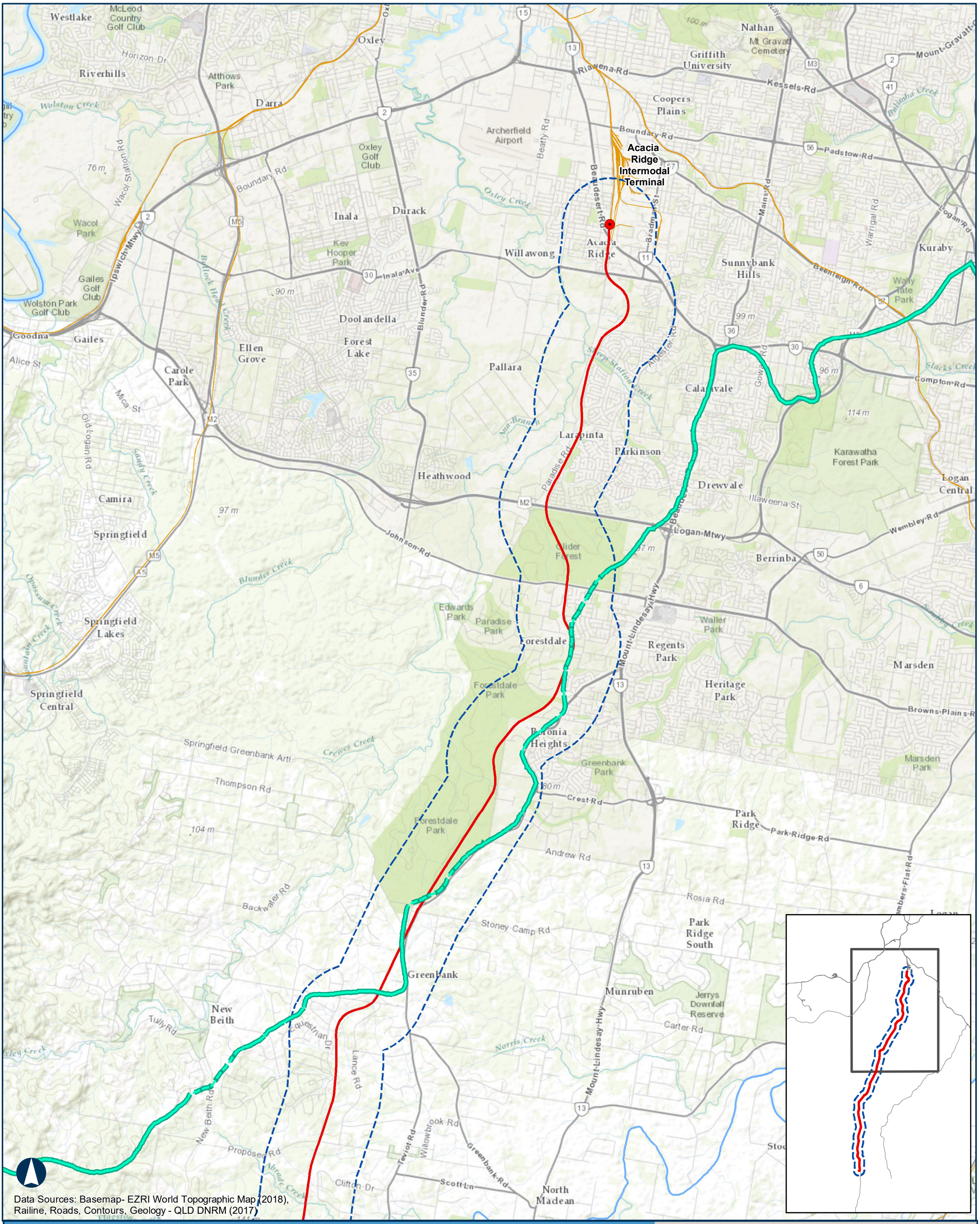
Water quality testing against the Environmental Protection (EPP) (Water) Policy 2009 was conducted for the Kagaru to Acacia Ridge, in 2016. The tested water was deemed to be generally compliant with the water quality outcomes.

No water quality testing has yet been undertaken for the Kagaru to Bromelton portion of the corridor.

Figure 5-2 depicts the catchments and key watercourses in Study Area.

Figure 5-2 Catchments and Waterways

Figure 5 2 Catchments and Waterways



KAGARU TO ACACIA RIDGE AND BROMELTON Catchments & Waterways

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Railway
- Minor Watercourse
- Major Watercourse
- Drainage Basin
- Drainage Sub-Basin

Figure 5-2 Map 1 of 2

ARTC InlandRail

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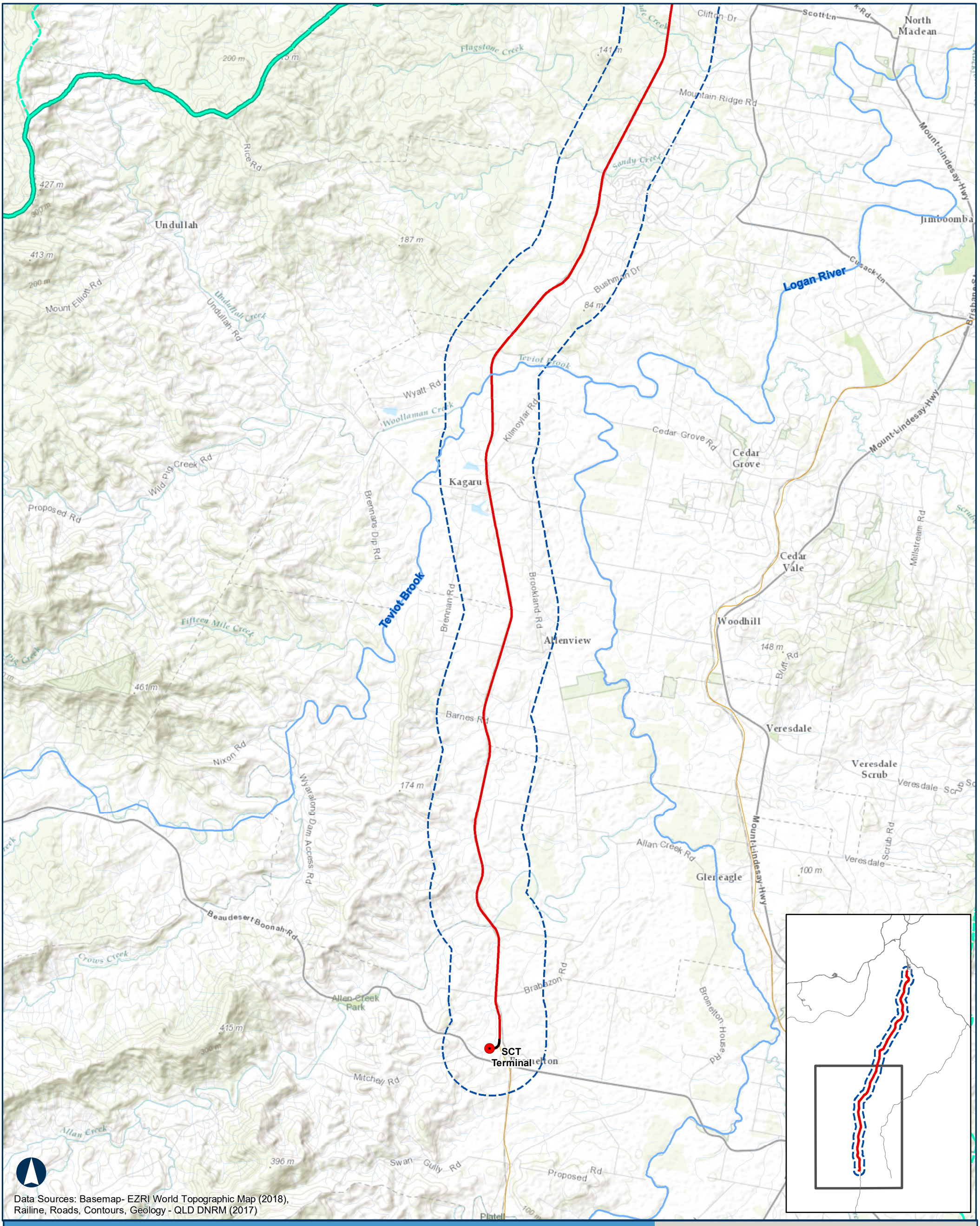

Data Sources: Basemap- EZRI World Topographic Map (2018), Railine, Roads, Contours, Geology - QLD DNRM (2017)

KAGARU TO ACACIA RIDGE AND BROMELTON

Catchments & Waterways

Figure 5-2 Map 2 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Proposed New Rail Line
- Study Area
- Corridor
- Railway
- Minor Watercourse
- Major Watercourse
- Drainage Basin
- Drainage Sub-Basin

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5.1.2.2. Flooding

The existing Kagaru to Acacia Ridge portion of the corridor contains the following hydrological conditions:

- Johnson Road – Johnson Road has two culvert structures identified that cross the rail alignment. Although existing data is considered incomplete at this location, it is likely that the 1% Annual Exceedance Probability (AEP) peak flood level would overtop the top of rail at this location and flood immunity criteria are not met.
- Learoyd Road – Learoyd Road is located at the northern extent of the corridor and contains an existing road overpass. Immediately north and south of the overpass are identified as being within a flood zone. Further analysis on flood risk will be required through design development.
- Teviot Brook – Flood information for Teviot Brook was extracted from the Southern Freight Rail Corridor (SFRC) study. Locations upstream and downstream of the rail bridge across Teviot Brook were assessed and identified an existing 1% AEP level and developed 1% AEP flood level of 31.8 m upstream and 31.69 m downstream.

In relation to the Kagaru to Bromelton portion of the corridor, the Beaudesert Planning Scheme 2007 Flood Hazard Area maps (SRRC, 2018) were reviewed and found the following historical flooding events:

- Logan River (1974 and 1991 flood events);
- Albert River (1974 flood event);
- Oxley River (1974 flood event);
- Burnett Creek (1974 flood event); and
- Cannon Creek (1974 flood event).

The Kagaru to Bromelton Study corridor is only partially located within land mapped as being within a Flood Hazard Area in proximity to Allen Creek. Localised flooding in streams not directly mapped during the above-listed events may also occur during a defined flood event.

5.1.2.3. Groundwater

Groundwater within the Kagaru to Acacia Ridge and Bromelton corridor are located within alluvial deposits and is generally used for agricultural and domestic uses. Queensland Globe mapping (State of Queensland, 2018) identified a total of 796 registered groundwater bores in proximity to the corridor. Given the nature of the proposed Project, it is highly unlikely that groundwater resources will be affected.

5.1.3. Air Quality and Noise

AMBIENT AIR QUALITY

Background ambient air quality data was obtained from the Queensland Government Air Monitoring Network for the most recent five years available (2013-2017 inclusive) for the following stations:

- North Maclean, located approximately 6.2 km south-east of Pub Lane area;
- Rocklea, located approximately 6.8 km north-west of Beaudesert Road Rail bridge area; and
- Springwood, located approximately 10 km east of Learoyd Road Rail bridge.

As none of the above stations collect carbon monoxide (CO) data, ambient CO concentrations were obtained from Woolloongabba monitoring station, located approximately 10 km north of the Beaudesert Road Rail bridge area. The Woolloongabba monitoring station is located next to a busy road and commercial business area and therefore it is

considered that CO ambient concentrations measured at this station provide a conservative background for the Project. It should be also noted that Josephville monitoring station is also located in close proximity to the Study Area, however it only provides meteorological data.

The following pollutants (listed in **Table 5-2**) were measured at the monitoring stations, based on adopted background levels for assessment. No exceedances of the Queensland air quality objective concentrations were found. Although the data collected by the Queensland Government Air Monitoring Network does not include all the likely emissions from the Project, the background values for species other than those described in **Table 5-2** are likely to be negligible in the Study Area.

Table 5-2 Adopted Background Concentrations

POLLUTANT	AVERAGING PERIOD	CONCENTRATION (MG/M³)	MONITORING STATION
NO_2	1 Hour	117	North Maclean, Rocklea and Springwood
	Annual	14	
PM_{10}	24 Hours	43.98	Rocklea and Springwood
$PM_{2.5}$	1 Hour	20.34	Rocklea and Springwood
	24 Hours	25	Rocklea and Springfield
SO_2	1 Hour	49	Springwood
	24 Hour	13	
Benzene	Annual	0.003	Springwood
Formaldehyde	1 Hour	0.04	Springwood
	24 Hour	0.03	
CO	8 Hours	3,123	Woolloongabba

Source: Queensland Government, 2018

NOISE AND VIBRATION

The northern, urban portion of the Kagaru to Acacia Ridge corridor within the Brisbane LGA consists of residential, and industrial land uses. The ambient acoustic and existing rail operational noise environment of this portion of the corridor is characterised by low levels of industry noise, noise from heavy vehicle movements on public roads, and local light vehicle traffic. As such, background noise at this location is considered to be slightly high.

Further southwards in the Logan LGA, the background acoustic environment of this urban area consists primarily of local traffic and distant road traffic noise from the Logan Motorway and surrounding feeder road network. Further

southwards in the rural Scenic Rim LGA, the background noise environment consists of local road traffic and wildlife. At the southern portion of the Kagaru to Acacia Ridge corridor, the background acoustic environment comprises wildlife noises and local road traffic pass-bys and has a lower background sound (level particularly at night).

The Kagaru to Bromelton corridor is located in a predominantly rural area which is likely to have a low level of ambient background noise. The existing operation of trains within the Kagaru to Bromelton corridor is likely to be one of the main contributors to noise within the area. Few sensitive receptors are identified in proximity to the Kagaru to Bromelton corridor and most residential dwellings within the area are offset significantly from the existing rail line (>100 m).

5.1.4. Ecosystems

Terrestrial and aquatic ecosystems have been ground-truthed by a field survey in 2016. The Kagaru to Acacia Ridge and Bromelton corridor is located within the South East Queensland (SEQ) bioregion. The bioregion extends from the Border Ranges at the NSW border, north to the dry coastal corridor between Gladstone and Rockhampton. It is the most densely populated area of Queensland and is subject to a variety of land uses include grazing, nature conservation, agriculture, urban uses and rural living. The region is highly fragmented, and remaining vegetation is considered important for biodiversity.

Key biodiversity features of the landscape associated with the corridor include the Glider Forest, Greenbank Military Area. The Acacia Ridge to Bromelton section of the corridor winds in a south-westerly direction from the industrial setting of Acacia Ridge through a number of residential suburbs and adjacent other industrial land uses. At Larapinta the alignment traverses Glider Forest and Parkinson Bushland for approximately 1.7 km.

5.1.4.1. Protected Areas

A review of the Department of Environment and Science (DES) register of parks and forests has revealed that there are no protected areas within the Kagaru to Acacia Ridge and Bromelton corridor. The closest protected area (as defined under the NC Act) is the Toohey Forest Conservation Park. Moreton Island and Minjerribah recreation areas are the closest recreation areas to the Kagaru to Acacia Ridge and Bromelton Corridor (DES, 2012).

The closest National Parks are the Daisy Hill Conservation Park, Moggill Conservation Park, Venman Bushland National Park and Tamborine National Park.

While not protected areas, it is noted that the corridor traverses through Glider Forest and Parkinson Bushland, which is part of the Flinders Karawatha Corridor, located at Larapinta, south of the Logan Motorway. The Flinders Karawatha Corridor is a voluntary initiative of the Queensland Government and Ipswich City, Logan City, Scenic Rim and Brisbane city councils (DES, 2015).

5.1.4.2. Matters of State Environmental Significance

A review of the Matters of State Environmental Significance (MSES) is provided in **Appendix A.** Specifically, the following MSES have been identified as being within the Kagaru to Acacia Ridge and Bromelton Study Area:

- Prescribed regional ecosystems (endangered) located in a category B area on the regulated vegetation management map;
- Prescribed regional ecosystems (of concern) located in a category B area on the regulated vegetation map;
- Prescribed regional ecosystems (within defined distance of relevant watercourse);
- Prescribed regional ecosystems (intersecting essential habitat for EN or VU species); and

- Protected wildlife habitat (EN, VU or SLC species).

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 Queensland Government State mapping (State of Queensland, 2018) shows that the existing corridor traverses through a number of State and regional biodiversity corridors. State corridors exist at Teviot Brook, between Forestdale and Hillcrest, and Larapinta and Parkinson. It is also noted that the corridor is partially located within the Oxley Creek corridor at Pallara. The existing corridor also traverses through Greenbank. The southern portion of Greenbank (located within the regional corridor) is earmarked for urban residential development.

5.1.4.4. Regional Ecosystems

Eight Regional Ecosystems identified from the Department of Natural Resources, Mines and Energy (DNRME) (2018a) have been confirmed by field investigations within the Study Area. Of these, two are considered endangered under the *Vegetation Management Act 1999*. **Table 5-3** and **Figure 5-3** provide further detail.

Table 5-3 Regional Ecosystems within the Preferred Alignment

REGIONAL ECOSYSTEM	STATUS	DESCRIPTION
REMNANT VEGETATION		
12.3.3	Endangered	*Eucalyptus tereticornis* woodland on Quaternary alluvium
12.9-10.2	Least concern	*Corymbia citriodora subsp. variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks
12.9-10.3	Of concern	*Eucalyptus moluccana* open forest on sedimentary rocks
12.9-10.4	Least concern	*Eucalyptus racemosa subsp. racemosa* woodland on sedimentary rocks
12.9-10.7	Of concern	*Eucalyptus crebra* +/- *E. tereticornis*, *Corymbia tessellaris*, *Angophora spp.*, *E. melanophloia* woodland on sedimentary rocks
12.9-10.12	Endangered	*Eucalyptus seeana, Corymbia intermedia, Angophora leiocarpa* woodland on sedimentary rocks
12.9-10.17	Least concern	c. *Eucalyptus carnea, E. tindaliae, E. helidonica, Corymbia citriodora subsp. variegata* open forest on sedimentary rocks
12.9-10.19	Least concern	*Eucalyptus fibrosa subsp. fibrosa* woodland on sedimentary rocks
REGROWTH VEGETATION		

REGIONAL ECOSYSTEM	STATUS	DESCRIPTION
Non-remnant	-	Dominated by hickory wattle (*Acacia disparrima*), black wattle (*Acacia concurrens*), swamp box (*Lophostemon suaveolens*), broad-leaved paperbark (*Melaleuca quinquenervia*) and black-she-oak (*Allocasuarina littoralis*) to a median height of approximately 4 m. Field survey recorded mature regrowth of 12.9-10.19, 12.9-10.4, 12.9-10.12, 12.9-10.2, 12.9-10.7, 12.9-10.3, 12.9-10.17 regional ecosystem types.
MAINTAINED NON-NATIVE GRASSLAND		
Non-remnant	-	Dominated by sour grass (*Paspalum conjugatum*), Rhodes grass (*Chloris gayana*), red Natal grass (*Melinis repens*) with subdominant flaxleaf fleabane *(Conyza bonariensis*) and associated introduced and common native flora species.

5.1.4.5. Aquatic Ecosystems

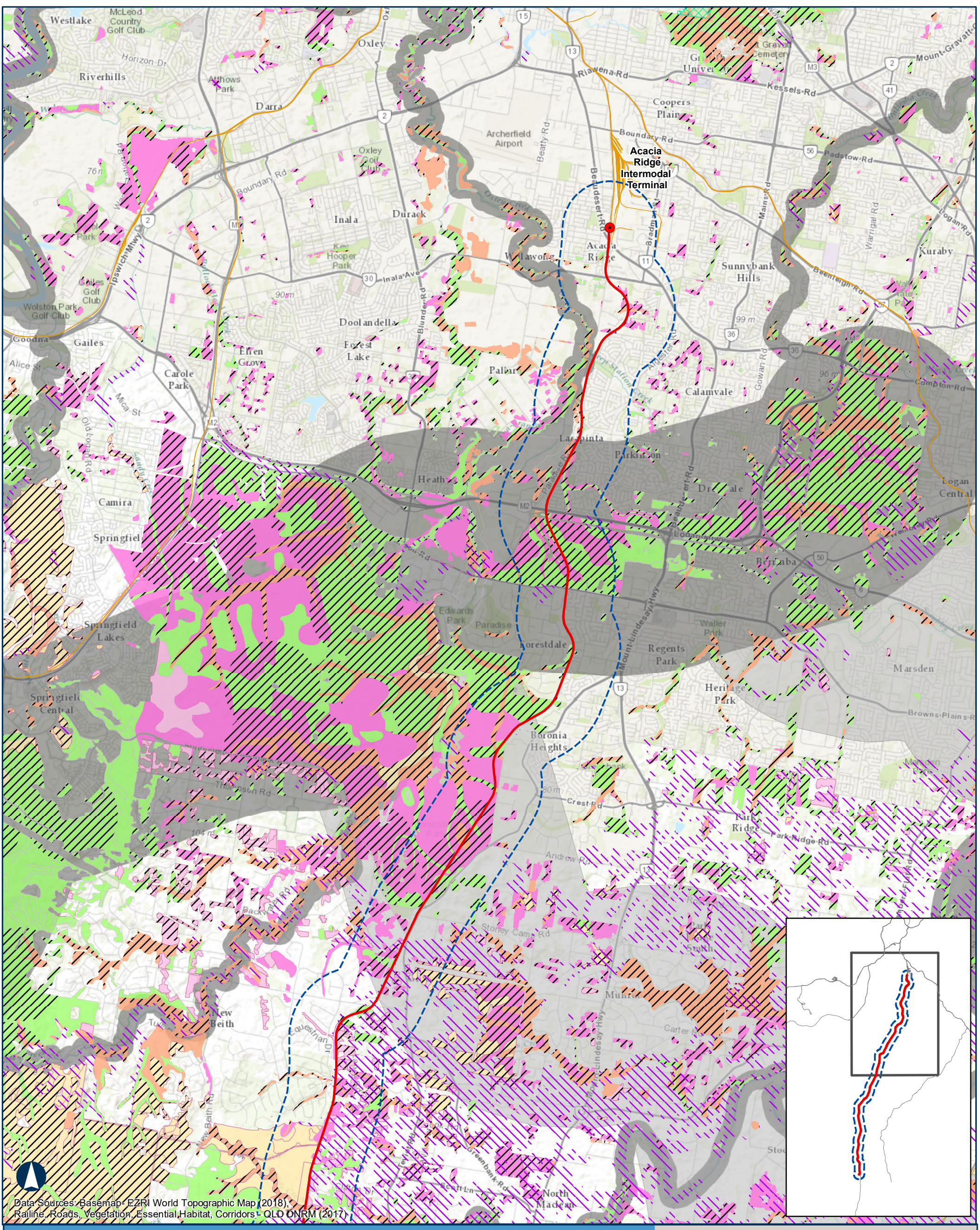
The Project is located within the Logan Basin and Moreton Catchments, where the water quality is generally poor with high levels of nutrients. The Project is located within the following sub-catchments:

- Brisbane River Basin (basin 143)
  - Oxley Creek Catchment (Level 3 Catchment (WQ1434))
    - Stable Swamp Creek – freshwater
    - CMU 6 Logan Conservation and Urban freshwater
      - Area G1
    - Upper Oxley Creek – freshwater
- Logan-Albert Basin (basin 145)
  - Lower Logan River Catchment (Level 3 Catchment (WQ1454))
    - Eastern Logan River
  - Lower Teviot Brook sub-catchment (lowland freshwaters)
    - HD1121
  - Western Logan River sub-catchment (lowland freshwaters).

The Oxley Creek and the Logan River are moderately to highly disturbed, with the exception being Area G1 – Greenbank military training camp waters, which contains high ecological value.

Figure 5-3 Ecology Flora and Fauna

Figure 5 3 Ecology Flora and Fauna



KAGARU TO ACACIA RIDGE AND BROMELTON

Ecology, flora & fauna

Figure 5-3 Map 1 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Highway
- Watercourse

Vegetation Class

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

- Protected Area
- Essential Habitat (Regrowth)
- Essential Habitat

Statewide Environmental Corridor

- State Significance
- Regional State Significance

ARTC InlandRail

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

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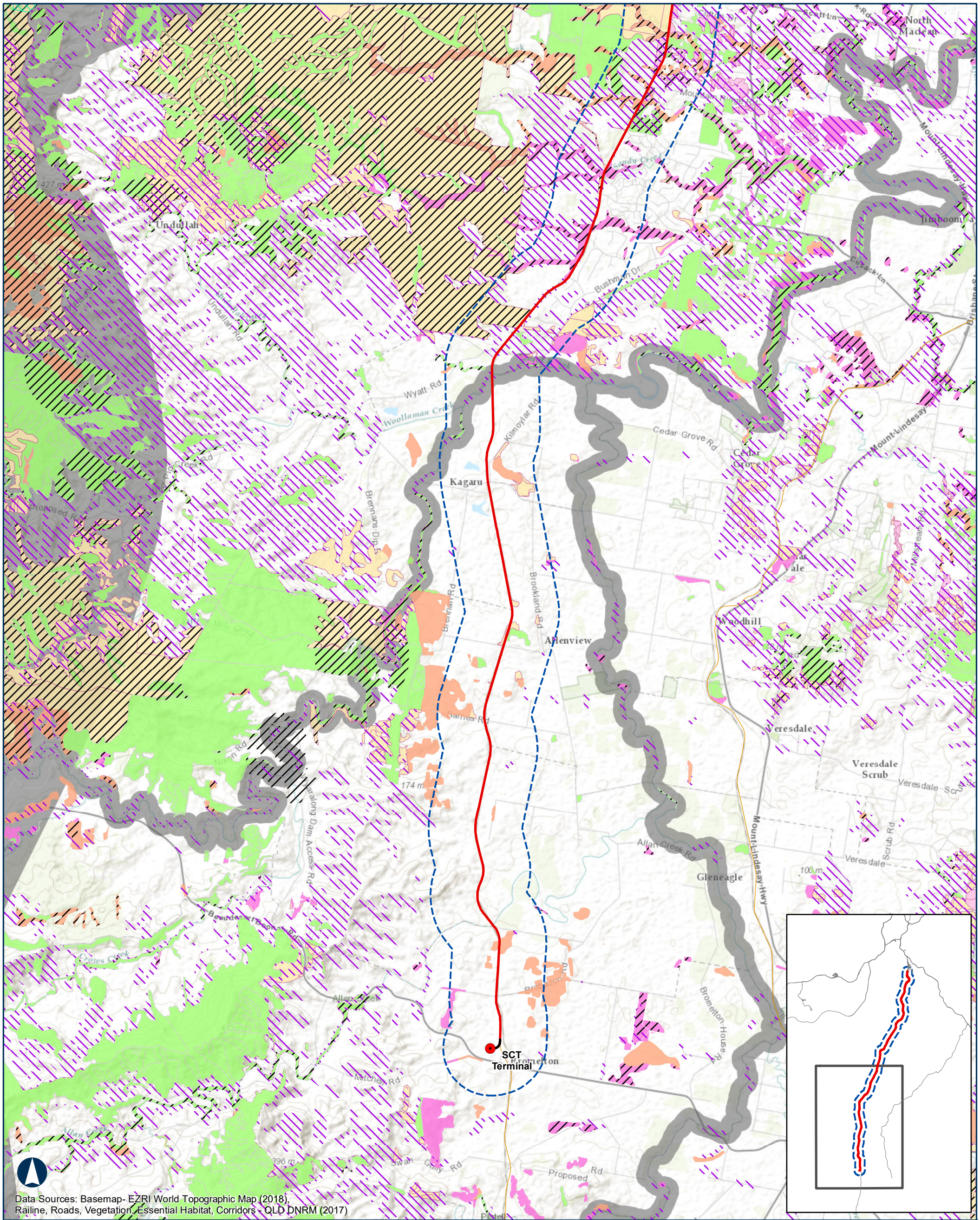

Data Sources: Basemap- EZRI World Topographic Map (2018),
Railine, Roads, Vegetation, Essential Habitat, Corridors - QLD DNRM (2017)

KAGARU TO ACACIA RIDGE AND BROMELTON

Ecology, flora & fauna

Figure 5-3 Map 2 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Highway
- Watercourse

Vegetation Class

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

- Protected Area
- Essential Habitat (Regrowth)
- Essential Habitat

Statewide Environmental Corridor

- State Significance
- Regional State Significance

ARTC InlandRail

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5.1.4.6. Threatened Ecological Communities

The DEE Protected Matters Search Tool (PMST) returned the following three 'threatened ecological communities (TECs)', listed as Matters of National Environmental Significance (MNES) under the EPBC Act, as being predicted to occur within 10 km of the corridor:

- Lowland Rainforest of Subtropical Australia;
- Swamp Tea-tree (*Melaleuca irbyana*) Forest of South-east Queensland; and
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

A preliminary likelihood of occurrence for each TEC within the Study Area and corridor was undertaken by identifying the State Government regional ecosystems mapped within the Study Area or corridor that have the potential to constitute the definition of each respective TEC. The assessment found that it was possible that Swamp Tea-tree could appear as smaller patches within larger patches of remnant RE. Furthermore, it was unlikely that Lowland Forest of Subtropical Australia and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland would be present.

Despite the desktop study, field surveys did not find any TECs within or proximate to the corridor. It was also determined that based on the lack of remnant vegetation, the likelihood of occurrence is low.

5.1.5. Flora and Fauna

Desktop database and mapping products have been queried in conjunction with information obtained from field surveys. The results of these studies are presented below.

5.1.5.1. Threatened Flora

DESKTOP ASSESSMENT

Fifty-three flora species listed under the EPBC Act and *Nature Conservation Act 1992* (NC Act) have the potential to occur in proximity to the Study Area, and are listed in **Appendix B**. Based on this, a likelihood assessment was undertaken and found the following species that were to be likely or possible to be present within the Study Area:

- *Thesium austral*;
- Weeping paperbark (*Melaleuca irbyana*);
- *Maundia triglochinoides;*
- Bailey's cypress (*Callitris baileyi*);
- Plunkett mallee (*Eucalyptus curtisii*);
- Angle-stemmed myrtle (*Gossia gonoclada*);
- Weeping paperbark (*Melaleuca irbyana*);
- *Picris conyzoides;*
- Shaggy-haired cockspur flower (*Plectranthus habrophyllus*); and
- *Zieria furfuracea ssp. gymnocarpa.*

FIELD SURVEY

Field surveys were conducted in 2016 and 2018. The 2016 survey did not find any threatened species listed under the EPBC Act or NC Act. Similarly, the 2018 survey did not find any EPBC Act or NC Act threatened species.

5.1.5.2. Threatened Fauna

DESKTOP ASSESSMENT

Fifty-nine fauna species listed under the EPBC Act and NC Act that have the potential to occur in proximity to the Study Area, and are listed in **Appendix C**. A likelihood assessment was undertaken for these species, and identified the following species that were likely or possible to be present within the corridor, and were subsequently targeted as part of field surveys:

- Spotted-tailed quoll (*Dasyurus maculatus maculatus*);
- Greater glider (*Petauroides volans*);
- Koala (*Phascolarctos cinereus*);
- Powerful owl (*Ninox strenuai*);
- Short-beaked echidna (*Tachyglossus aculeatus*);
- Cattle egret (*Ardea ibis*);
- Rainbow bee-eater (*Merops ornatus*); and
- Glossy ibis (*Plegadis falcinellus*).

FIELD SURVEYS

The field survey conducted in 2016 found a number of habitat types were verified as being within the Study Area, including woodlands, open forests, riparian forests, low shrubby regrowth and modified open grasslands (provided in **Appendix D**). Despite this, the 2016 survey did not find any fauna species of conservation significance under the EPBC Act or NC Act within the corridor. A survey conducted in 2018 reflected similar results, whereby no fauna species of conservation significance under the EPBC Act or NC Act were observed.

5.1.5.3. Essential Habitat

Essential habitat is defined under the *Vegetation Management Act 1999* as the habitat of listed species prescribed under the NC Act. Accordingly, essential habitat is associated with areas of remnant vegetation.

The Kagaru to Acacia Ridge alignment contains approximately 11.4 ha of mapped 'essential habitat', summarised in **Table 5-4** and depicted in **Figure 5-3.**

Table 5-4 Essential Habitat Mapped within the Study Area

ECOSYSTEM	AREA (ha)	ESSENTIAL HABITAT AREA (ha)				
		696 - WALLUM FROGLET	706 - TUSKED FROG	803 - SPOTTED-TAILED QUOLL	12135 - *MAUNDIA TRIGLOCHINOIDES*	29186 - KOALA
12.3.3	0.6	–	0.6	0.6	–	0.6
12.5.3a/12.5.2a	0.2	–	0.2	0.2	–	0.2
12.9-10.12	1.1	–	1.1	1.1	–	–

ECOSYSTEM	AREA (ha)	ESSENTIAL HABITAT AREA (ha)				
		696 - WALLUM FROGLET	706 - TUSKED FROG	803 - SPOTTED-TAILED QUOLL	12135 - *MAUNDIA TRIGLOCHINOIDES*	29186 - KOALA
12.9-10.12/ 12.9-10.2	0.8	–	0.8	0.8	–	–
12.3.11	1.3	–	1.3	1.3	1.3	1.3
12.9-10.7a	0.5	–	0.5	0.5	–	0.5
12.3.6	0.3	0.3	0.3	0.3	–	0.3
12.3.11/12.3.7	0.2	–	0.2	0.2	0.2	0.2
12.9-10.2	0.5	–	0.5	0.5	–	–
12.9-10.2/ 12.9-10.7/ 12.9-10.17a/ 12.9-10.3/ 12.9-10.7a	0.7	–	0.7	0.7	–	0.7
12.9-10.4	3.1	–	3.1	3.1	–	3.1
12.9-10.17c	0.4	–	0.4	0.4	–	0.4
12.9-10.19	1.7	–	1.7	1.7	–	–
Totals	**11.4**	**0.3**	**11.4**	**11.4**	**1.5**	**7.3**

It is noted that the actual extent of remnant vegetation is less than that which is shown on the regulated vegetation management map. As such, areas which meet the requirements for consideration as essential habitat is also expected to be less than is mapped. Furthermore, the corridor provides limited habitat values for threatened fauna species listed under the NC Act.

The spotted-tailed quoll, greater glider and koala may periodically travel along or across the Kagaru to Acacia Ridge Study Area when moving between habitats, especially where wildlife corridors and riparian corridors traverse the Kagaru to Acacia Ridge corridor. The wallum froglet and/or tusked frog are likely to occur in the wetland and drainage line habitats within the Kagaru to Acacia Ridge Study Area. The koala may periodically shelter and possibly forage on non-juvenile koala habitat trees in the Study Area. However, the habitat is of relatively low value to the koala compared to the better habitats found within the surrounding region. Although of low value, the Kagaru to Acacia Ridge Study Area does support habitat for the wallum froglet, tusked frog, spotted-tailed quoll and koala.

The Kagaru to Bromelton corridor does not contain any remnant vegetation, and therefore, no essential habitat, as depicted in **Figure 5-3**. However, a number of areas of essential habitat are present within the surrounding area and are associated with the following protected fauna species (for the Kagaru to Bromelton Study Area component):

- Short-beaked echidna; and
- Koala.

Field investigations in 2016, and 2018 did not identify either fauna species as being present but noted that they may be located within or in proximity to the Study Area in areas of marginal vegetation.

5.1.5.4. Migratory and Marine Species

16 migratory and marine species listed under the EPBC Act have the potential to occur within the Study Area (refer to **Appendix E**). Following a likelihood of occurrence assessment, three species were identified as having a moderate likelihood of occurring. These species are/were subsequently targeted as part of field surveys:

- Oriental cuckoo (*Cuculus optatus*);
- Satin flycatcher (*Myiagra cyanoleuca); and*
- Rufous fantail (*Rhipidura rufifrons)*.

During the field survey in 2016, the rainbow bee-eater was recorded. This species is distributed across all of Australia and is an aerial feeder, feeding on insects. The key threat to this species is the introduced cane toad (*Bufo marinus*), which feed on eggs and nestlings (DEE, 2018). However, no migratory species were observed during the survey undertaken in 2018.

5.1.5.5. Pest Species

A number of pest species have the potential to be within the Study Area. Restricted animals listed under the *Biosecurity Act 2014* that have the potential to occur within the Study Area are listed in **Appendix F**. A total of 11 fauna and 32 flora invasive species were identified.

A field survey in 2018 found a total of 6 introduced fauna with 3 listed under the Biosecurity Act. A total of 45 introduced flora with 3 listed as Weeds of National Significance and 8 listed under the Biosecurity Act were also recorded.

Additionally, the Project is located within the following fire ant biosecurity zones:

- Acacia Ridge to Greenbank – Fire ant biosecurity zone 1;
- New Beith to Kagaru – Fire ant biosecurity zone 2;
- Kagaru – Fire ant biosecurity zone 2; and
- Allenview – Fire ant biosecurity zone 2.

5.2. Social and Economic Environment

The Project is principally contained within the existing rail corridor, traversing across three LGAs, as outlined in **Section 4.1**. The Study Area (as depicted in **Figure 3-1**) consists of both rural and urban areas and also contains land earmarked for future urban growth and recreational areas (parks/reserves).

5.2.1. Community Profile

POPULATION

In general, Brisbane, Logan, and Scenic Rim LGA populations have shown an increase in size between 2011 and 2016. Australian Bureau of Statistics' census data found that 73,595 people lived in the aforementioned suburbs within the Study Area (ABS, 2018a & 2018b).

AGE PROFILES

In 2016, the median age of the of the population was 44 years old in SRRC, 34 years old in LCC and 35 years old in BCC (ABS, 2018b). This is compared to the median age of 37 years old in Queensland.

EDUCATION

In 2016, the majority of the population within the Study Area completed Year 12 or equivalent schooling, with Undullah being the exception. Certificate III and IV were the highest non-school qualifications attained, apart from in Parkinson where the highest non-school qualification attained was Bachelor's Degree.

INCOME

In 2016, median personal income within the Study Area ranges from $350/week to $752/week, compared to Queensland median of $660/week.

INDUSTRY AND LABOUR FORCE

The majority of the population within the Study Area was employed full-time in 2016. The top industries of employment within the Study Area were: agriculture forestry and fishing; construction; manufacturing; transport, postal and warehousing; retail trade; and health care and social assistance.

5.2.2. Accommodation and Housing

Key settlements within the Study Area and wider region include:

- The primary service centre of Brisbane and Logan Cities;
- The urban suburbs of Acacia Ridge, Algester, Willawong, Pallara, Parkinson, Forestdale, Hillcrest and Boronia Heights;
- The emerging residential areas of Larapinta, Greenbank, North Maclean, South Maclean, New Beith, Undullah and Flagstone; and
- The rural townships of Allenview, Gleneagle, Kagaru and Bromelton.

It is noted that 2016 census data shows that over 90% of private housing is occupied in aforementioned areas, apart from Undullah, where this was 82%. There are a number of short-term accommodation facilities in proximity of 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.

5.2.3. Cultural Heritage (Indigenous and Non-Indigenous)

5.2.3.1. Indigenous Heritage

The corridor extends through the country of the Yuggera Ugarapul People, Turrbal People, and Danggan Balun (Five Rivers) People. Archaeological research indicates Aboriginal occupation of the Brisbane area commenced from at least c.22,000 years (Neal and Stock, 1986), however late Pleistocene sea-level rise has meant the archaeological record for the last 6,000 years yields the most information. Prior to contact with Europeans, it is estimated that the local population for the Moreton Region was approximately 4000 people with a density of about 1.25km per person, comparatively high for the area (Davies and David, 1993). The first instance of contact with Europeans occurred on 16 July 1799 with Matthew Flinders at Skirmish Point, Bribie Island. Following the European settlement of the area, the Aboriginal population declined sharply owing to introduced diseases and European aggression (Davies and David, 1993).

Today, the area surrounding the corridor contains many known and documented features of significance to the Yuggera Ugarapul People, Turrbal People, and Danggan Balun (Five Rivers) People, including place names, Bora grounds and campsites (Davies and David, 1993). Searches were undertaken of the Aboriginal and Torres Strait Islander Register and Database held by the Department of Aboriginal and Torres Strait Islander Partnership (DATSIP) on 9

February 2018. No sites were identified within the corridor. Five (5) sites are located within 100 m of the corridor (**Table 5-5**).

Table 5-5 DATSIP registered sites within 100 m of corridor

Site_ID	Latitude	Longitude	Attribute	Distance from Centreline
KB-0015-1	-27.834705	152.929320	Artefact Scatter	45 m
KB-0014-1	-27.834696	152.929452	Artefact Scatter	55 m
KB-0013-1	-27.834551	152.929544	Artefact Scatter	50 m
KB00000437	-27.810961	152.946687	Artefact Scatter	60 m
KB:C87	-27.971182	152.925320	Artefact Scatter	75 m

There were 240 sites identified within 1 - 3 km of the corridor. While a majority of these sites are artefact scatters, there are also instances of isolated finds, story places, scarred and carved trees, resource areas, quarries, and earthen arrangements. Limited information is provided as to the extent and condition of these sites.

No Aboriginal cultural heritage artefacts or areas were located during a field survey of the corridor in 2018.

Landscape features, specifically waterways, frequently associated with Indigenous cultural heritage sites are present within the corridor. In a majority of cases the landscape surrounding these features has been disturbed to a degree that limits risk of damage to Indigenous cultural heritage to low. However, two (2) waterways present a high risk (see **Section 6.3.5.1**).

Consultation and cultural heritage management procedures will be managed through the Cultural Heritage Management Plans already in place and to be negotiated between ARTC and the relevant Aboriginal Parties.

5.2.3.2. Non-Indigenous Heritage

The region from Acacia Ridge to Bromelton was settled in the 1820s – 1840s and was known for a mixture of hardwood timber, cattle and sheep runs, dairying and poultry farms as well as market gardens (CGQ, 2015). In 1921 a Federal Royal Commission proposed a standardised rail gauge system link independent of existing networks via Kyogle, terminating at South Brisbane (Laird, 2009). The *South Brisbane Kyogle Grafton Act 1924* was passed with a proposed track of 111 km, terminating at the Border Tunnel over the MacPherson River. This would be the only standard gauge railway in Queensland. The Queensland Government commenced construction on the line in 1925 and it opened to traffic in 1930, with goods and passenger services using the line from 1932. Within the corridor there were sidings/stations located at Greenbank and Kagaru (Webber, 1997:106). The proximity of Acacia Ridge to the interstate railway line was augmented in the early 1980s with the addition of transmission and marshalling yards attached to the industrial estates east of the railyard (CGQ, 2015). The rail freight facility was relocated from Roma Street to Acacia Ridge in 1991 to facilitate the increasing mechanisation of freight handling (CGQ, 2015).

Searches of the corridor were undertaken on the Australian Heritage Database (including National Heritage List, Commonwealth Heritage List, and the archive of the Register of National Estate), Queensland Heritage Register,

Brisbane City Plan 2014 heritage register, Logan City Plan 2015 heritage register, and the Scenic Rim Local Council Local Heritage Register (**Table 5-6**).

Table 5-6 List of registered Non-Indigenous sites in the Study Area.

Source	Result	Notes
Australian Heritage Database	National Heritage List – Nil **Commonwealth Heritage List – 1 place** **Register of the National Estate – 1 place**	Greenbank Military Training Area (part) (CHL) Middle Road, Greenbank (RNE)
Queensland Heritage Register	Nil	NA
Local planning schemes	Brisbane - Nil Logan - Nil Scenic Rim - Nil	NA

Three unregistered sites with potential built heritage values were identified within the corridor as part of the 2018 survey (**Table 5-7**).

Table 5-7 List of unregistered sites with potential built heritage values in the corridor

LOCATION	SITE	PHOTOGRAPH
Larapinta Loop	**Concrete foundations** Two (2) small concrete foundations containing large stone inclusions, suggesting it is of some age. One of the foundations remains *in situ*, while the other has eroded out and subsequently moved from its initial position. Given their location at either side of a bends apex it is possible these foundations are associated with an otherwise dismantled signalling system.	
Middle Road / Greenbank Loop	**Wooden arrangements** Two (2) wooden arrangements constructed from rail sleepers and rail spikes located at 955.020 km. These structures were likely erected during the initial construction of the railway and used to rest construction materials on.	

LOCATION	SITE	PHOTOGRAPH
Middle Road / Greenbank Loop	**WWII-period structures** A group of three structures located within corridor east of the rail track at 955.550 km. The larger of the two structures is constructed of asbestos fibrous concrete sheeting walls, treated wood structural components, and corrugated iron roofing with concrete slab and concrete pole foundations. Adjacent to this structure is a small corrugated water tank. A weatherboard outhouse with a corrugated iron roof is located next to the water tank. The materials and style of the structures suggest construction likely occurred during the World War 2 period and may reflect the contemporary increase in rail traffic along the Brisbane-Sydney Interstate Rail Line.	 

A number of bridges and railway features were also identified at Kagaru, adjacent to the corridor (**Table 5-8**).

Table 5-8 List of unregistered sites with potential built heritage values adjacent to the corridor

LOCATION	SITE	PHOTOGRAPH
Kagaru	**Wyatt Road Timber Road Bridge** A 'single road' timber log girder bridge, likely constructed from hardwood timber. The design is consistent with early timber bridge designs from the 1920s as it uses logs that had greater durability and strength than squared timber.	
Kagaru	**Teviot Brook Steel Railway Bridge (northern span)** Bridge built from concrete piers and solid steel girders between Kagaru and Teviot Brook. The northern bridge spans a short section of floodplain and a minor creek.	

LOCATION	SITE	PHOTOGRAPH
Kagaru	**Teviot Brook Steel Railway Bridge (southern span)** Bridge built from concrete piers and solid steel girders between Kagaru and Teviot Brook. The southern bridge includes approach spans north and south of Teviot Brook, with a single span bridge deck over the creek proper.	
Kagaru Station (former)	**Water columns** Two steel water columns are located on the section of Kagaru alignment at an approximate 400 m interval. This area is also the location of the former Kagaru station and crossing loop, with the columns likely used for filling steam locomotive water tanks.	
Kagaru	**Undullah Road Timber Road Bridge** This timber road bridge is of a similar configuration to the Wyatt Road timber bridge and is therefore likely to be contemporaneous.	

5.3. Built Environment

The Kagaru to Acacia Ridge and Bromelton corridor utilises an existing railway. Land adjacent to the corridor (encompassing the Study Area) is comprised of a variety of different land use types which range from urban to rural, such as for residential, commercial, industrial and agricultural uses.

Several areas are identified as containing major infrastructure that intersect with the Kagaru to Acacia Ridge corridor and may require a specific design response and/or specific measures be undertaken during construction and operation to ensure adverse impacts do not occur to these assets, primarily through consultation with relevant infrastructure owners. These include:

- Petroleum Pipeline License (PPL) 1 – Moonie to Brisbane Oil Pipeline: Held by Moonie Pipeline Company Pty Ltd. Although the pipeline was decommissioned on July 2007, the infrastructure remains in-situ and there are no plans for its removal or to recommence operation.
- PPL2 – Roma to Brisbane Pipeline: Held by APT Petroleum Pipelines Pty Limited. Natural gas pipeline constructed in 1969 and still operational today.

- The Southern Regional Water Pipeline (the pipeline) extends from the Cameron's Hill Reservoir at Mt Crosby to the existing Helensvale to Molendinar pipeline network and allows for the transport of potable water around SEQ. The pipeline was completed in November 2008 and crosses the Kagaru to Acacia Ridge corridor in the vicinity of New Beith. Engagement with the pipeline provider (SEQ Water) is recommended to determine suitable measures where undertaking works in proximity to the infrastructure.
- Three-phase power infrastructure is identified as crossing the corridor intermittently over the length of the corridor between Kagaru and Acacia Ridge.

There are no major infrastructure assets identified in proximity to the Kagaru to Bromelton corridor.

5.4. Traffic and Transport

A network of State Controlled and regional arterial roads service the Kagaru to Acacia Ridge and Bromelton Project. Beaudesert Road, Logan Motorway and Beaudesert –Boonah Roads are State-controlled roads that run perpendicular to the corridor.

The Kagaru to Acacia Ridge and Bromelton corridor is primarily located within State land held in perpetual lease for transport purposes.

5.5. Land Use and Tenures

5.5.1. Key Local and Regional Land Uses

5.5.1.1. Land Use

Existing land use within and adjacent to the Project is predominantly rural and becomes urban as the corridor traverses northward through LCC and BCC, to its terminus at Acacia Ridge. This portion of the corridor is adjacent to the Greenbank Training Area, a Commonwealth owned property, located to the west.

The Kagaru to Bromelton alignment proceeds southwards into the Bromelton State Development Area (SDA). The Bromelton SDA was declared in 2008, occupying an area of approximately 15,610 ha (DSDMIP, 2018c). The Project is a major driver for the establishment of difficult-to-locate industrial and rail dependent industries within this area.

5.5.1.2. Key Resource Areas

Key Resource Areas (KRA) are designated areas containing quarry materials or extractive resources in order to protect them from becoming inaccessible by urban growth (BU, 2017). KRA No. 61 is located in the vicinity of Bromelton, south east of the corridor. The KRA Reports and Maps: April 2016 (DILGP, 2016b) identifies that KRA 61 is identified as a source of quarry rock.

5.5.1.3. Agricultural Uses

Agricultural uses are predominantly located at the southern extent of the corridor and is utilised for purposes including grazing and cropping. It is highlighted that the corridor is an existing railway line and will have minor impact on the agricultural uses by way of changes to hydrology, groundwater, noise and air quality.

5.5.2. Key Local and Regional Land Tenures

Land tenure within the Study Area is predominantly freehold, with some parcels being easement, lands lease, reserve, State or Federal land. Specifically, the corridor is an existing rail corridor under lands lease.

5.5.3. Native Title

There are currently four registered or determined Native Title claims over the Study Area.

The overlapping Yugara/Yugarapul People and Turrbal People claims were registered over the area of Brisbane from Dayboro in the north to Acacia Ridge and Sunnybank Hills in the south. These claims were finalised in 2015 (QCD2015/001) with the determination that Native Title does not exist.

A new Yuggera Ugarapul People claim (QC2017/005) was accepted for registration in 2017 and extends west from Acacia Ridge to Toowoomba and south to The Head. A neighbouring claim by the Danggan Balun (Five Rivers) People (QC2017/007) was also accepted for registration in 2017 and extends from Underwood south to the QLD-NSW border and is bounded to the east by a line roughly between Beenleigh and Canungra. The corridor crosses the boundary between these two claims at multiple locations.

5.6. Planning Instruments, Government Policies and State Development Areas

5.6.1. Regional Plans

The South East Queensland Regional Plan 2017 (ShapingSEQ) is a statutory regional planning document to manage regional growth and set planning direction for sustainable growth, global economic competitiveness and high-quality living within the region. Five key themes underpin the vision (DSDMIP, 2017). The Project aligns with Theme 3: Connect which seeks to "move people, products and information efficiently" (DSDMIP, 2017, pp. 30).

5.6.2. Local Planning Schemes – Land Use Designations

The applicable planning schemes for the Project are as follows (refer to **Figure 3-1**):

- For Scenic Rim Regional Council:
  - Beaudesert Shire Planning Scheme 2007;
  - Boonah Shire Planning Scheme 2006; and
  - Ipswich Planning Scheme 2006.
- Logan Planning Scheme 2015; and
- Brisbane City Plan 2014.

Land use zoning progresses from urban to rural uses as the corridor progresses southwards, and includes the following land use designations:

- Residential - low, medium and high density;
- Rural residential - larger lot subdivision;
- Community uses - hospitals, schools and worship;
- Military;
- Commercial/Business;
- Industrial;
- Agricultural/Rural;
- Conservation/Forest;
- Open space – parks and recreation; and
- Easement.

As the corridor is existing, it is considered that the project upgrades to the rail infrastructure are appropriate from a land use planning perspective.

5.6.3. Bromelton State Development Area

The Bromelton State Development Area (Bromelton SDA) was declared by regulation in August 2008 as identified in Figure 5-4.

According to the Bromelton SDA Planning Scheme, the strategic vision is outlined below:

1. The vision for the Bromelton SDA is to:
    a) Establish the Bromelton SDA as a major industrial area for industrial development of regional, State and national significance
    b) Encourage industrial development and support services to take advantage of the access to key rail and road networks
    c) Maximise opportunities for the clustering and co-location of synergistic developments, including supporting infrastructure
    d) Maximise the utilisation of the rail network by establishing multi modal freight and logistics operations, manufacturing and warehousing facilities, and industries that are reliant on rail access
    e) Encourage activities that require large lots, separation distances or other specialist needs
    f) Protect the continued operation and future development of existing industrial activities, appropriately located rural activities and the regionally significant extractive resources within the Bromelton SDA from incompatible development and encroachment and
    g) Leverage the opportunities created by the proximity of the Bromelton SDA to the Beaudesert centre, by fostering synergies between industry and business activity clusters.
2. The strategic vision is supported by the overall objectives for development and preferred development intents of development precincts within the Bromelton SDA.

The Bromelton SDA has six defined precincts as identified in Figure 5-4.

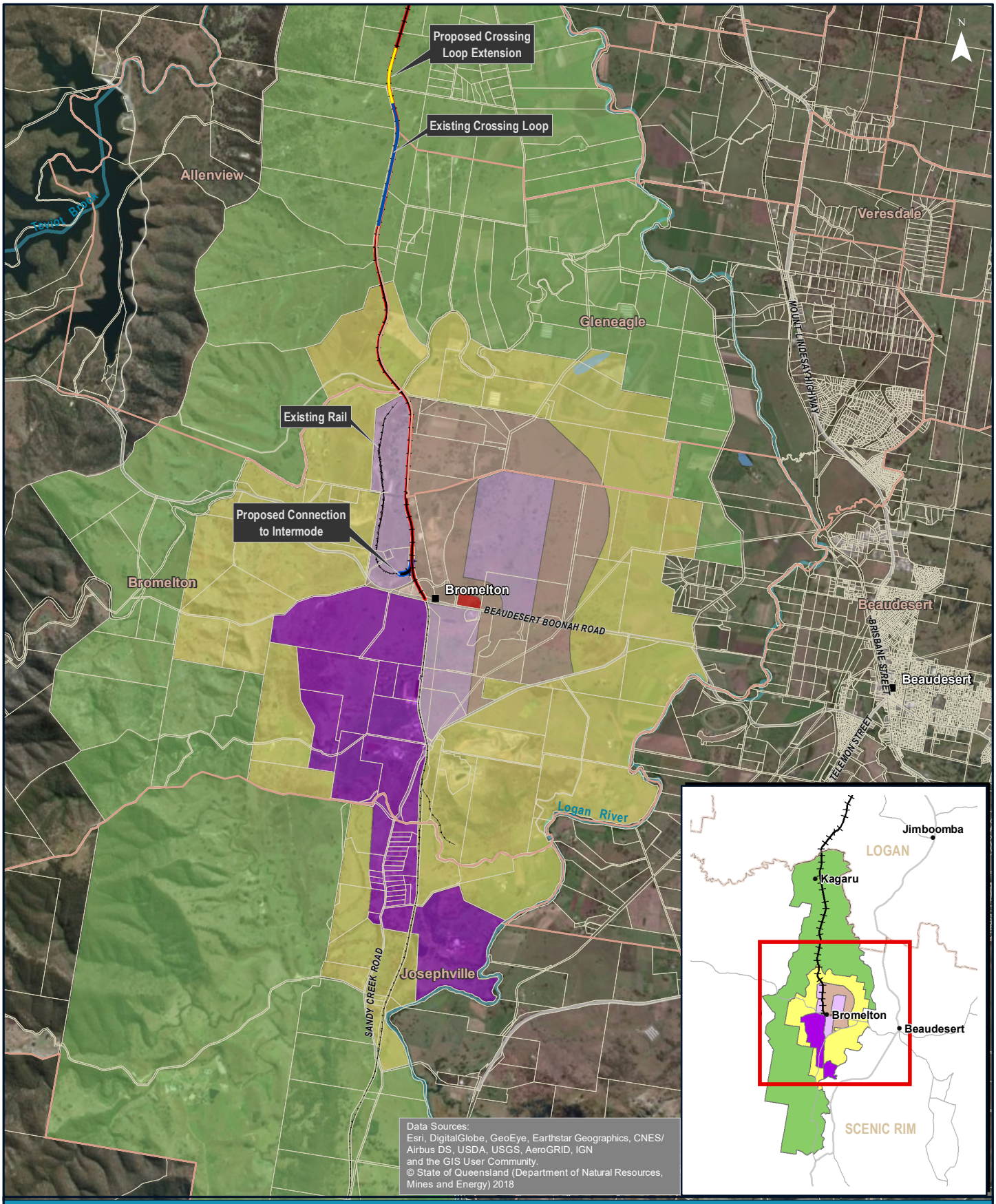
Figure 5-4 Bromelton State Development Area Industry Precincts

The precincts are listed below and each precinct has a preferred development intent subject to SDA assessable development:

1. Rail Dependent Industry Precinct;
2. Medium – High Industry Precinct;
3. Special Industry Precinct;
4. Bromelton Local Service Centre Precinct;
5. Transition Precinct; and
6. Rural Precinct.

The Kagaru to Acacia Ridge and Bromelton project is consistent with the preferred development intent of the respective industry precincts.

Figure 5 4 Bromelton SDA



BROMELTON

STATE DEVELOPMENT AREA - Development Precinct Map

0 1 2 Km

Coordinate System: GDA 1994 MGA Zone 56

Date: 15/03/2019 Paper: A4
Author: IR GIS Scale: 1:75,000

- Existing Rail Corridor
- Cadastral Boundary
- Suburb Boundary

Bromelton SDA Precincts

- Bromelton Local Service Centre Precinct
- Medium – High Impact Industry Precinct
- Rail Dependant Industry Precinct
- Rural Precinct
- Special Industry Precinct
- Transition Precinct

INLAND RAIL ARTC

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

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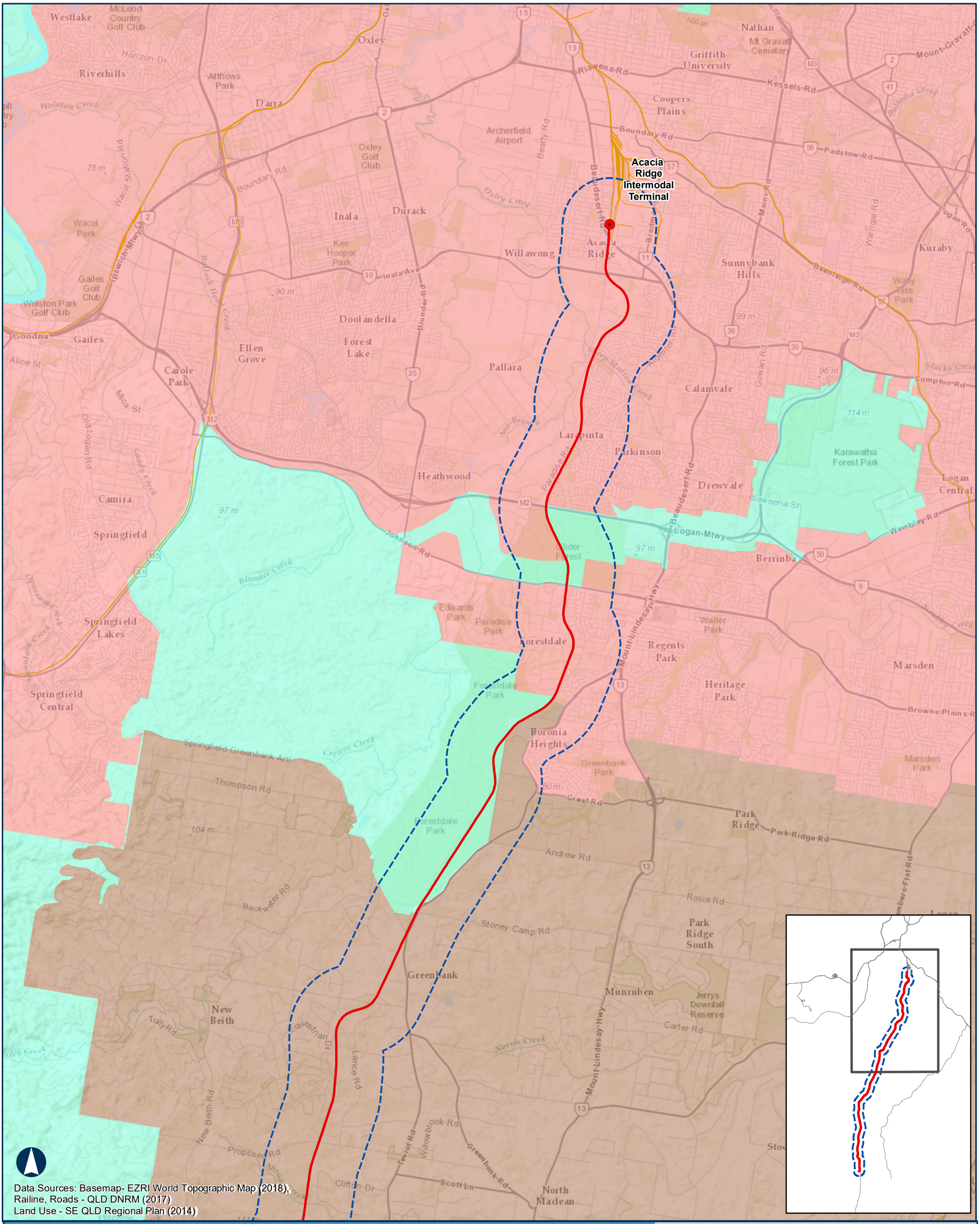
Figure 5-5 Land Use

Figure 5 5 Land Use



KAGARU TO ACACIA RIDGE AND BROMELTON Land Use

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Highway
- Watercourse

Land Use Category

- Mt Lindesay/North Beaudesert Study Area
- Regional Landscape and Rural Production Area
- Urban Footprint

Figure 5-5 Map 1 of 2

ARTC InlandRail

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

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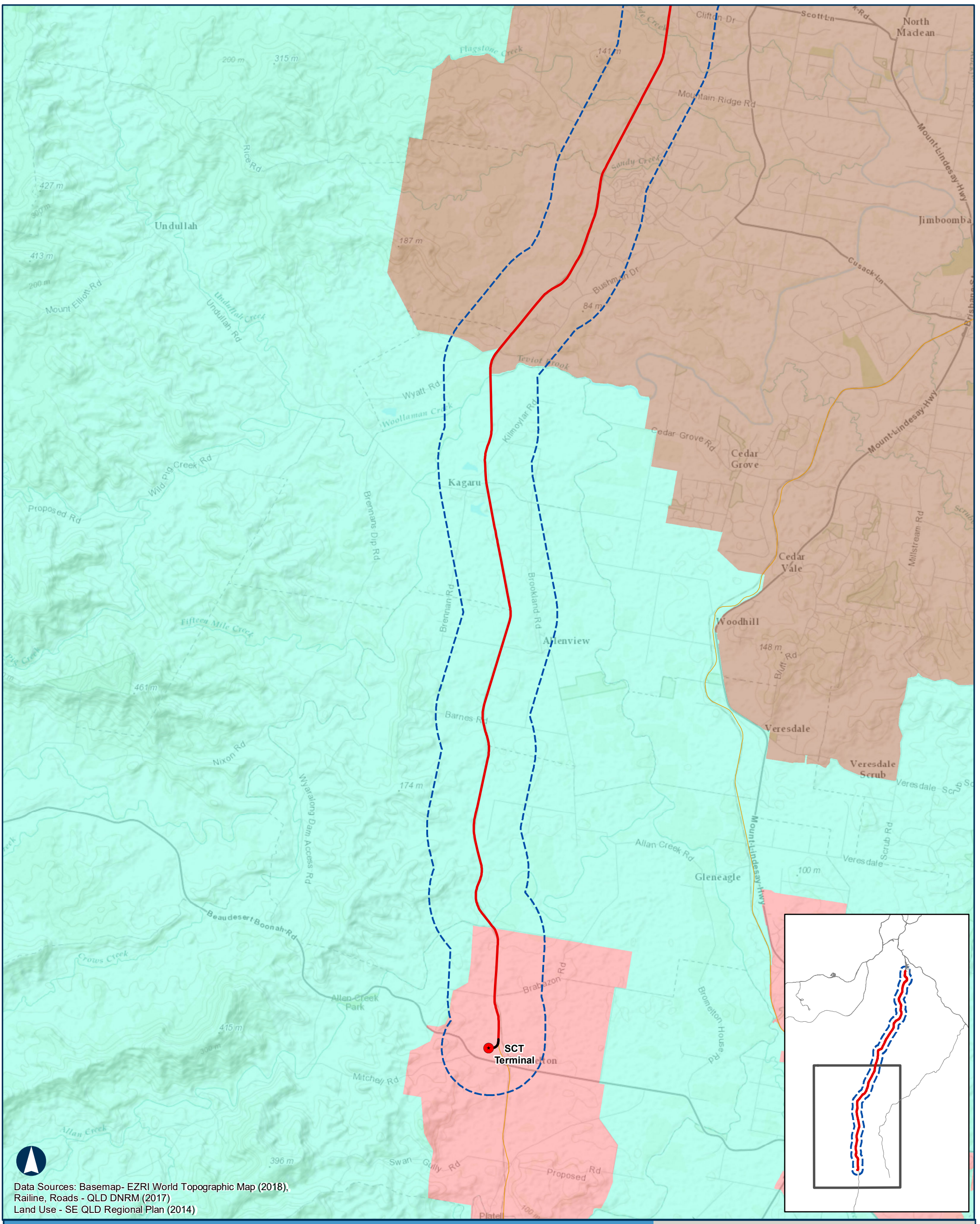

Data Sources: Basemap- EZRI World Topographic Map (2018),
Railine, Roads - QLD DNRM (2017)
Land Use - SE QLD Regional Plan (2014)

KAGARU TO ACACIA RIDGE AND BROMELTON Land Use

Figure 5-5 Map 2 of 2

2Km

Coordinate System: GDA 1994 MGA Zone 56

Paper: A3 Scale: 1:75,000
Date: 20/11/2018
Author: DR

LEGEND

- K2ARB Project Limits
- Study Area
- Corridor
- Proposed New Rail Line
- Highway
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Land Use Category

- Mt Lindesay/North Beaudesert Study Area
- Regional Landscape and Rural Production Area
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6. POTENTIAL IMPACTS

The Project utilises an existing railway. Accordingly, potential impacts are commensurate with those expected in an existing brownfield site and associated impacts upon existing sensitive uses; including urban and rural residential areas, industrial, commercial and recreational land uses. While it is not anticipated that any permanent works will need to occur outside of the corridor, where temporary works or access is required, these will be arranged appropriately.

6.1. Natural Environment

6.1.1. Land Use

The construction and operation of the Project has the potential to indirectly impact upon adjacent land use 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 Project in both the construction and operation phases relate to:

- Potential air quality, noise and visual impacts to urban and rural residential land uses during construction and operation; and
- Potential severance and access impacts arising from the construction and operation of a linear 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.

6.1.2. Geology and Soils

The variable geology along the Kagaru to Acacia Ridge and Bromelton corridor generates a number of potential impacts to the design, construction and operational stages of the Kagaru to Acacia Ridge and Bromelton 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 soils and cracking clays. Cracking may also result from the removal of vegetation with roots in these soils;
- Soils being impacted by the lowering of groundwater, causing the soils to change properties and release contaminants;
- 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; and
- Quantities of material import and export - due to the poor founding characteristics of alluvial soils.

There are land uses within and adjacent to the corridor that pose a known or possible risk of contamination. It is noted that all lots forming the corridor are listed as having a Hazardous Contaminants, with the exception of Lot 2 on RP43893 which is listed as having been used as a Railway Yard.

Slight UXO potential was identified at four lots, resultant from previous military activities, however the Department of Defence considers it inappropriate to assess it as substantial. Five lots adjacent to the corridor were also identified as having potential to contain UXO, however there is unlikely to be high degree of risk associated with works in these areas. Given that works will be located primarily within the existing rail corridor, it is deemed to be unlikely that there will be impacts to the Project.

6.1.3. Water

6.1.3.1. Surface Water

The Kagaru to Acacia Ridge and Bromelton Project Alignment crosses two mapped watercourses as defined under the *Water Act 2000*.

Potential impact on water quality is likely to occur 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 sediment 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 Project may generate sediments or pollutants which may be transported into local drainage lines and watercourses

Assessment of potential impacts will be undertaken as part of the EIS process.

6.1.3.2. Flooding

Under a 1 % 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. There will be minimal flood impact on the Kagaru to Acacia Ridge corridor. It is noted that the Kagaru to Bromelton corridor is partially located within a Flood Hazard Area and further assessment and modelling will be undertaken as part of the EIS process.

6.1.3.3. Groundwater

The impacts to groundwater elevations from earthworks and bridge 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.

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.

Potential groundwater risks that should be considered and mitigated throughout the construction phase include avoiding groundwater contamination.

6.1.4. Air Quality

6.1.4.1. Operational Air Quality Impacts

The primary operational pollutants of concern are products of combustion (particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, volatile organic compounds) from train locomotives. Some fugitive particulate

emissions from loaded freight or from wheel-generated dust from rail line ballast may also occur; however, these are expected to be relatively minor.

Potential air quality impacts associated with the Project will be assessed as part of the EIS and management measures developed where required to mitigate potential impacts.

6.1.4.2. Construction Air Quality Impacts

The Project utilises an existing, functional rail line. Additional air impacts will arise from construction air quality impacts primarily relating 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 PM10. Potential air quality impacts associated with the Project will be assessed as part of the EIS and management measures developed where required to mitigate potential impacts.

6.1.5. Ecosystems

An existing rail corridor is utilised for the Kagaru to Acacia Ridge and Bromelton Project. Potential impacts to ecosystems will be the result of proposed vegetation clearing, which is minimised through sensitive site selection. As described in **Section 5.1.4.4**, four Regional Ecosystems have been ground-truthed within the Study Area. For likely impacts on the TEC present in the corridor, refer to **Section 6.6.2**.

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. Potential for train strikes leading to mortality during construction and operation are the key potential impacts to fauna as a result of the Kagaru to Acacia Ridge and Bromelton Project. However, as the Project relates to an existing rail corridor, minimal flora and fauna impact is expected.

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; and
- 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

6.3. Noise and Vibration

6.3.1.1. Ambient Noise Environment

Noise and vibration caused by the proposed enhancements works and the increased rail operations has the potential to impact sensitive receptors. There are approximately 12,600 properties within the K2ARB Study Area (i.e. 1km radius from the rail centre line). There are approximately 3,000 dwellings that fall within 250 m of the existing rail alignment. Land uses adjacent to the track comprise a mixture of industrial, commercial, retail, state forest, military, community and residential uses. Areas adjacent to the existing rail corridor are considered to be most sensitive to noise and vibration impacts. These are summarised below:

- Residential dwellings at Acacia Ridge, Pallar, Algester, Parkinson, Forestdale, Hillcrest, Boronia Heights, Greenbank, New Beith, Jimboomba, Undullah and Kagaru;
- RSL Care Carrington Retirement Community, Blairmount St, Parkinson;
- Registered Aged Care, Middle Road, Boronia Heights; and
- Greenbank Library and Community Preschool and kindergarten at the Greenbank Community Centre on Teviot Road.

The background acoustic environment at can be described as follows:

- At the northern end of the alignment at Acacia Ridge, the land use consists of primarily industrial and retail uses inter-dispersed areas of low – medium density residential. The ambient acoustic environment comprises low level levels of industry noise, noise from heavy vehicle movements on public roads and local light vehicle movements.
- Through the centre – northern section of the alignment, at suburbs such as Algester, Parkinson and Hillcrest the land usage is primarily low density residential with low set dwellings. The background acoustic environment consists primarily of local traffic movements and distant road traffic noise from the arterial road networks.
- Through the centre-southern section of the alignment at suburbs such as Greenbank and New Beith, the land usage is low density residential with low set dwellings on larger blocks. The background noise environment typically consists of local road traffic and wildlife.
- At the southern end of the alignment at suburbs such as Jimboomba and Kagaru, the land usage is rural residential. The background acoustic environment comprises of wildlife noise and local traffic passbys.

6.3.1.2. Construction

Construction plant and equipment may potentially impact the local ambient noise environment 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 in proximity 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.

6.3.1.3. Operation

Operational noise emissions will be associated with the movement of rollingstock along the rail line. Detailed modelling will be undertaken as part of the EIS to determine the potential impacts on sensitive receptors.

6.3.2. Landscape and Visual

The landscape transitions between rural and urban and contains minimal infrastructure. As the corridor is a brownfield site, being an existing railway, and improvement works involve the lowering of the track, there will be minimal visual impact of the Project to its surrounds.

The use of lighting during construction where works occur outside of daylight hours may result in light spill which would impact neighbouring properties.

6.4. Social Environment

The 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. The following sections identify the potential social impacts associated with the project.

6.4.1. Amenity and Social Cohesion

Concerns about real and perceived impacts of the different phases of the Project may lead to social stress and confusion in affected communities.

There are likely to be amenity impacts to residential, rural residential and rural land uses near the Project during construction and operation.

6.4.2. Community Health and Safety

Community health and safety risks related to the operation of the Project include safety risks associated with pedestrian access, and the type of materials (e.g. hazardous goods) that are transported on the rail line. As the Project is an existing railway, there will be minimal change in impacts.

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

6.4.3. Access

During construction there may be reduced connectivity between key locations along the corridor as a result of road network disruptions, however given that the works relate to an existing rail corridor, these impacts are expected to be minimal.

No changes are expected once Inland Rail is operational, as an existing rail corridor is to be utilised.

6.4.4. 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.

6.4.5. Cultural Heritage

6.4.5.1. Indigenous Heritage

There are no registered Aboriginal cultural heritage sites located within the corridor. There are a large number of registered sites located within 1-3 km of the corridor. No Aboriginal cultural heritage sites were located during the field survey of the corridor. However, a majority of the area surveyed had limited ground surface visibility.

It is anticipated that the proposed activities within the corridor will have nil to minimal impact on Aboriginal cultural heritage. Refer to **Section 7.3** of this report for specific recommendations for the management of Aboriginal cultural heritage within the corridor.

6.4.5.2. Non-Indigenous Heritage

No registered non-Indigenous heritage sites are located within the corridor. The northern extent of the Middle Road/Greenbank Study Area and southern extent of the Larapinta Loop extend into the Commonwealth registered Greenbank Military Training Area (part), although the rail corridor is specifically excluded from this listing.

Three (3) sites with low heritage value were located during the field survey. These include two World War 2 period structures at Middle Road/Greenbank, two wooden arrangements at Middle Road/Greenbank, and two concrete foundations in the Larapinta Loop. Sporadic evidence of the continued use and construction of the Sydney – Brisbane Inland Railway, including piles of wooden sleepers, ceramic insulation from power lines, and surface scatters of metal track chairs/fasteners and rail spikes, is also present throughout the Study Area. The proposed activities within the Study Area are likely to impact these sites and features, resulting in either partial or complete removal.

A number of timber road bridges, steel rail bridges, water columns and foundations have been identified in a desktop assessment by Niche (2016). It is noted that these have not formed part of the scope of this assessment. If works are to occur at or in close proximity to these structures, they should be assessed prior to Project activities commencing.

6.5. Economic Effects

As a major infrastructure project, the 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 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; and
- 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 Kagaru to Acacia Ridge and Bromelton Project.

6.6. Built Environment

6.6.1. Transport Infrastructure Impacts

During construction, the 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 State controlled roads 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; and
- 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.

6.6.2. 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 will 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.

6.7. Matters of National Environmental Significance

The EPBC Act identifies MNES that are protected by the EPBC Act. MNES reflect nationally and internationally significant flora, fauna, ecological communities and heritage.

A preliminary assessment of MNES has been carried out for the Project and indicate that the Project is not likely to have a significant impact on MNES. A summary of the key MNES as they relate to the Kagaru to Acacia Ridge and Bromelton Project is summarised in the following sections.

A referral to the Commonwealth Minister for the Environment for an assessment of matters protected under the EPBC Act will be made at a future time.

6.7.1. World Heritage Properties and National Heritage Places

No World Heritage Properties or National Heritage places have been identified as occurring within or near to the Study Area.

The Gondwana Rainforests of the Main Range National Park, recognised as both a world heritage property and a national heritage place, is approximately 40 km south east of corridor (at its closest point). No direct or indirect impacts to this place are anticipated as a consequence of this project.

6.7.2. Threatened Ecological Communities

As identified in **Section 5.1.4.6** three TECs were predicted to occur within 10 km of the corridor, however field surveys did not find any evidence of TECs. This may be attributed to the Project being an existing brownfield site, involving the upgrade of some portions and addition of crossing loops only.

6.7.3. EPBC Act Listed Threatened Fauna

As discussed in **Section 5.1.5.2**, the desktop assessment identified 59 EPBC Act and NC ACT listed threatened fauna species likely to occur or are known to occur within the Study Area, however field surveys did not find evidence of the presence of any listed threatened species. Despite this, potential habitat occurs within the Study Area.

It is unlikely that there will be a significant impact on fauna listed under the EPBC Act.

6.7.4. EPBC Act Listed Threatened Flora

As identified in **Section 5.1.5.1**, the desktop assessment identified 53 EPBC Act and NC ACT listed threatened flora species likely to occur or known to occur within the Study Area. However, field surveys conducted in 2016 did not find evidence of the presence of any listed threatened species.

It is unlikely that there will be a significant impact on flora listed under the EPBC Act.

6.7.5. 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 SEQ. 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.

6.7.6. Wetlands of International Importance

No wetlands of international importance occur in or near the Study Area.

The closest wetland of international importance to the project is the Moreton Bay Ramsar Wetland, which is situated approximately 40 km to the east of the Study Area (at its closest point).

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 Project. Further consideration of potential land impacts (severance, access, direct impact, and amenity) will be undertaken during subsequent project phases. 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.

7.1.2. Water

Due to the linear nature of a railway, it is often not possible to avoid crossing and impacting waterways. This is evidenced in the existing rail corridor traversing across a number of waterways.

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; and
- 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

Environmental management during construction and operation shall be guided by the requirements of future project approvals and permits, relevant legislation, regulations, policies and guidelines, in conjunction with the ARTC's Environmental Management System and existing operational guidelines. Noise and air quality investigations undertaken during the EIS will inform the required management and mitigation measures that will be employed.

7.1.3.1. Construction

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

During construction of the rail project, ARTC will take all reasonable and practical management and mitigation measures to prevent or minimise environmental harm (which includes environmental nuisance) from construction noise, ground vibration and air emissions.

AIR Emissions

Key impacts to air quality likely to result from the construction of K2ARB Project are summarised below:

- Vegetation clearing and grubbing – Particulate levels may exceed air quality and dust deposition objectives at sensitive receptors during construction.
- Civil earth works – During topsoil and substrate stripping, cut and fill operations, particulate levels may exceed air quality and dust deposition objectives at sensitive receptors during construction.
- Emissions from operating vehicles, plant and equipment – Increase in the level of combustion emissions during construction.
- Stockpile management – Dust generation from topsoil stockpiles resulting in particulate levels exceeding air quality and dust deposition objectives at sensitive receptors during construction.
- Fuel and Chemical Storage – Odour emissions and gaseous chemical release;
- Haul vehicle operation – Dust emissions from haul roads, access tracks resulting in particulate levels exceeding air quality and dust deposition objectives at sensitive receptors during construction.
- Blasting (if required) - Particulate levels may exceed air quality and dust deposition objectives at sensitive receptors during construction.

During the detailed design phase the construction methodology will be refined and reasonable and practical mitigation measures will be developed.

Noise Emissions

The construction of the K2ARB Project has the potential to generate noise emissions that could cause environmental nuisance at nearby sensitive receptors. Likely sources of significant noise generating activities would include:

- Vegetation clearing and grubbing – Emissions from the operation of plant and equipment;
- Civil earth works (e.g. cut / fill / topsoil stripping) – Emissions from the operation of plant and equipment;
- Vibratory rollers & hydraulic hammers – Ground borne vibrations during operation of equipment; and
- Piling – Installation of piles required for bridge construction;
- Truck / Vehicle Movements – Increased truck and light vehicle movements through regional / urban centres, excessive use air brakes and reverse beepers;
- Track laying – Installation of rail formation, ballast, sleepers, new standard gauge rail line and the installation of required rail infrastructure; and

- General construction activities.

Noise mitigation strategies follow a hierarchy of controls, such that measures to reduce noise impacts are focused so that the large number of sensitive receivers are prioritised over more localised mitigation measures. The hierarchy as follows:

1. Treatment at the source (e.g. rolling stock or track modifications);
2. Treatment in the intervening noise transmission path (e.g. noise barriers or noise mounds); and

Some guidance may be obtained from the Queensland Department of Transport and Main Roads Transport Noise Management Code of Practice: Volume 2 – Construction Noise and Vibration (July 2016) which is a published standard (Section 9 (b) of the *Transport Infrastructure Act 994*) Compliance with the Code including the preparation of a Noise and Vibration Management Plan (NVMP) are deemed to comply the General Environment Duty.

7.1.3.2. Operation

The EIS will assess further potential operational noise and air impacts and propose relevant mitigation measures, if required. The control and management of the freight rolling stock is responsibility of the independent Rail Operators. ARTC will enter into commercial agreements with these operators to ensure that appropriate management measures, to control noise and air emissions are implemented. Accredited railway operators that operate under an Access Agreements with ARTC are required to provide an Operational Environmental Management Plan that deals with environmental effects of operating trains on the ARTC network. Acoustic investigations and assessments will be undertaken during the EIS to determine locations that may require the provision of noise mitigation. This may include the following typical mitigations:

1. Treatment at the source (e.g. rolling stock or track modifications);
2. Treatment in the intervening noise transmission path (e.g. noise barriers or noise mounds); and
3. Treatment at the receiver (architectural treatments to dwellings or upgraded property fences).

In relation to the management of coal dust, there are recognised treatment measures that have been adopted throughout Queensland. ARTC will work with the coal supply chain to minimise coal dust emissions by utilising a combination of measures including managing coal moisture contents, surface veneering, improved wagon designs and monitoring. These measures will reduce coal loss during loading, unloading and in transit to the export terminals. Design features of wagons can reduce the coal hang up to be shed from the wagon at the loading and unloading points.

Specific dust mitigation measures have been implemented by coal miners and supply operators. Load profiling involves the reshaping of the loaded coal surfaces to create a low profile, garden bed shape to reduce production of dust emissions during transport and to establish the best possible coverage of coal during the veneering process. Vaneering involves the spraying of a bio-degradable, non-toxic binding agent onto the surface of the coal at the time of loading. The veneering solution binds to the surface layer of the coal together forming a flexible layer which reduces the potential for coal dust lift off during transportation.

7.1.4. Ecosystems and Flora and Fauna

Management plans will be prepared as appropriate to detail impact mitigation actions where there are additional impacts as a result of track works for areas outside the existing railway corridor. Measures of key importance are likely to include the following:

- 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 move from works areas.
- 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, if required.
- Where possible, schedule construction to minimise potential impacts to protected fauna species during breeding season.

7.1.5. Landscape and Visual

The Project involves an existing brownfield railway, minimal additional landscape and visual impact will result from the Project. 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 corridor.
- 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.

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 Project will interact with existing infrastructure including road, rail, pipelines and utilities in the Study Area. Key mitigation for these impacts will be detailed in future design stages but will include:

- Consultation with stakeholders including State and local authorities and utility providers to discuss potential Project impacts and design options to avoid or mitigate impacts.
- Design development to determine options for minimising impacts.
- Additional survey to identify all utilities and services (including minor utilities etc.) so that they can be considered in design development.

Appropriate approaches to 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 within, and in close proximity to, the Study Area, as well as high risk landscape features such as creeks, indicate that there is a high potential for Aboriginal cultural heritage to 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 with the relevant Aboriginal parties to identify Aboriginal and/or historical cultural heritage objects and places.
- Continued implementation of existing Cultural Heritage Management Plans with relevant Aboriginal parties.
- Development of new Cultural Heritage Management Plans under Part 7 of the Aboriginal Cultural Heritage Act 2003 to establish agreed procedures for the investigation, conservation and management Aboriginal cultural heritage with relevant Aboriginal parties.

The Kagaru to Acacia Ridge and Bromelton Project will require an assessment of Native Title within the Study Area. Where Native Title may continue to exist, the Project may also require consultation with affected Native Title parties under the *Native Title Act 1993* (Cth).

7.4. Non-Indigenous Cultural Heritage Management

Despite the presence of built heritage reflecting the construction and use of the railway throughout much of the corridor, none of the sites assessed during the field survey are considered to be of high significance. No further work is recommended regarding these sites or features.

Should Project activities impact the adjacent timber and steel bridges and water columns, it is recommended that they be assessed to determine their significance prior to the commencement of Project works, and management recommendations specific to each be developed and implemented.

7.5. Greenhouse Gas Management

Construction of the Project will generate greenhouse gases (GHG) through the transport of materials, embodied energy of materials used for construction and the consumption of electricity and other fuels during construction (earthworks).

During operation the key contribution to GHG emissions include diesel consumption from locomotives and electricity consumption required for tunnel operation. The Project will also have a significant beneficial impact in GHG generation due to the transfer of freight transport from road to rail. On average, road transport has significantly greater 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 Project, including:

- 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 Environment and Sustainability Policy (ARTC, 2018) commits to 'protect the environment by minimising the environmental footprint' through measures including 'reduce greenhouse gas emissions and minimise waste'. This policy is broadly consistent with the waste and resource management hierarchies of the National Waste Policy (EPHC, 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 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 Study Area during the construction phase are expected to drive design development and construction approaches.

7.7. Hazard and Risk, and Health and Safety

A risk assessment will be undertaken for the Project and effective mitigation measures will be developed to manage identified hazards and risks. It is noted that the Project relates to the existing railway corridor and therefore, minimal additional risks will result from the Project.

Hazards and risks to health and safety as part of the 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 local 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 Environment and Sustainability Policy (ARTC, 2018) which is available on the ARTC website (www.artc.com.au) and Environmental Management System. The ARTC Environment and Sustainability Policy provides a framework for continual improvement of an Environmental Management System (EMS) 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.
- Improved community relationships.
- The EMS also provides a structure for staff training, measuring environmental performance, environmental auditing and managing non-conformances.

The 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 of environmental impacts has been a key factor in the route selection processes for the Project. As the 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 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 Project would be developed based on the potential environmental impacts of the 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 existing railway corridor and where required identify additional land for temporary use during construction.

During construction the laydown areas will be progressively decommissioned and rehabilitated. This is likely to include the following actions:

- Demountable or mobile buildings will be removed progressively, and concrete slabs broken up if utilised. 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 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

Existing access tracks and roads will be used where they are available and suitable for use. Access roads and tracks that will no longer be used following construction will be decommissioned. Decommissioning of any 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

Further approvals are likely to be required under separate approvals processes. Furthermore, other post-approval management plans may be required to progress implementation of the Project.

Table 8-1 summarises the approval and permit requirements likely to be applicable to the 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/ PROVISION	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, will have 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. It is unlikely that the Project will have a significant impact on Matters of National Environmental Significance.	Independent.
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 Kagaru to Acacia Ridge and Bromelton 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	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
				progressed in relation to all works within this area.	
Native Title Act 1993 (Cth)	National Native Title Tribunal	Where an interest is required on land where native title has not been extinguished, the requirements of the *Native Title Act* must be met before tenure can be granted.	Works within areas where Native Title exists.	The Kagaru to Acacia Ridge to Bromelton Project will require an assessment of Native Title within the corridor, and may require consultation with registered Native Title parties under the *Native Title Act.*	Independent
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 Kagaru to Acacia Ridge and Bromelton Project will require a Cultural Heritage Management Plan/Agreement if an EIS is undertaken for the Project.	Coordinated
Planning Act 2016 (Qld)	Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP)	Development Permit for Material Change of Use, Operational Work, reconfiguring a Lot and/or Building Work (as defined	Development that is assessable development requires a development permit.	Requirement for development approvals will depend on the final form of the project.	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
		under Schedule 2 of the Planning Act). Development assessed against applicable instruments, which may include applicable State planning policy, relevant State Development Assessment Provisions (SDAP) codes.	The Act contains a number of exemptions, including development that cannot be made assessable by a planning scheme Schedule 6 of the Planning Regulation 2017.		
Environmental Protection Act 1994 (Qld)	Department of Environment and Science (DES)	Section 424 Disposal Permit	Disposal of contaminated material from a site listed on the Environment Management Register (EMR) or Contaminated Land Register (CLR) and/or making a material change of use of premises if all or part	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

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
			of the premises is on the EMR or CLR.		
		Environmental Authority	Undertaking an Environmentally Relevant Activity (ERA) listed under Schedule 2 of the Environmental Protection Regulation 2008 (EP Regulation).	Potential ERAs associated with construction to be confirmed in future project phases and may include: • Chemical storage • Extractive and screening activities • Crushing, milling, grinding or screening material • Regulated waste storage/transport	Coordinated
Fisheries Act 1994 (Qld)	Department of Agriculture and Fisheries (DAF) and DSDMIP	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 corridor.	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 corridor 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	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
				the design and nature of creek crossings and whether crossings can comply with self-assessable codes for permanent or temporary works.	
Vegetation Management Act 1999 (Qld) (VM Act)	Department of Natural Resources, Mines and Energy (DNRME) and DSDMIP	Operational works permit for clearing remnant native vegetation (and possibly regrowth vegetation pending changes to the VM Act).	Removal of native vegetation that is assessable development.	The Project will require the clearing of mapped remnant native vegetation. Potential exemptions may be applicable to the Kagaru to Acacia Ridge and Bromelton Project under Schedule 10 of the Planning Regulation 2017. Extent of native vegetation clearing and applicability of exemptions to be confirmed in future project phases.	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
Nature Conservation Act 1992 (Qld) (NC Act)	DES	Protected Plant Clearing Permit Protected Plant Exemption Notification.	Clearing of protected plants under the NC Act, or within 100m of protected plants Clearing of vegetation within the high-risk flora trigger area.	Not applicable as not within the High-Risk Flora Survey Trigger Area.	Coordinated
Queensland Heritage Act 1992 (Qld)	DES 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 no Queensland Heritage places and local heritage places within the corridor. 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)	DNRME and DSDMIP	Riverine Protection Permit unless the Riverine protection permit exemption requirements	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	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
		(DNRME, 2018b) can be complied with.		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 Kagaru to Acacia Ridge and Bromelton Project.	
		Water license/allocation associated with the taking or interfering with water for construction.	Taking or interfering with water.	Taking or interfering with water for construction purposes is likely to be required for the Kagaru to Acacia Ridge and Bromelton Project. Construction entities may take water without an allocation, subject to conditions prescribed under a regulation. Creek diversions may also require licenses under the Water Act and development permits.	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
Transport Infrastructure Act 1994 (Qld) (TIA)	Queensland Rail	Approval to interfere with a railway (s255)	Crossing of existing rail line or works within existing rail corridor	Subject to detailed design and consultation with Queensland Rail.	Coordinated
	Department of Transport and Main Roads (DTMR)	Road corridor permit for works within a State Controlled Road (s50). Access to State Controlled Road (s62/66).	Works within a State Controlled Road. Access to the Warrego 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 Policy	DES	Offsets Management Plan	An environmental offset may be required as a condition of approval where—following consideration of avoidance and mitigation measures—the activity is likely to result in a significant residual impact on prescribed environmental matters.	The Kagaru to Acacia Ridge and Bromelton Project is likely to have an impact on matters of state environmental significance (MSES). The significance of the residual impact would need to be confirmed in future project phases to determine offset requirements.	Coordinated

ACT/ PROVISION	RESPONSIBLE / ADMINISTERING AUTHORITY	APPROVAL / PERMIT	TRIGGER	APPLICABILITY	COORDINATED / INDEPENDENT
City of Brisbane Act 2010 *Local Government Act 2009*	Local Government	Work on a local government-controlled road permit.	Construction works within a local government-controlled road.	The corridor intersects a number of local roads. Construction works are likely to occur within local roads.	Independent

9. COST AND BENEFITS SUMMARY

9.1. Local, State and National Economies

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

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

In summary, the benefits expected to arise from the Kagaru to Acacia Ridge and Bromelton Project include:

- During the construction phase it is anticipated that the workforce will primarily be derived from local and regional sources depending on the nature of the skills required, creating local and regional job opportunities. Workforce numbers and their source will be determined once a construction methodology has been finalised and would be quantified as far as possible in the EIS.
- Job creation has the potential to create flow-on economic benefits in regional centres in the Study Area.
- Regional communities along and adjacent to the Inland Rail Corridor would benefit through more efficient and effective freight rail access to metropolitan and international markets. Subject to the location of freight terminals, Inland Rail will enable farmers to move grain and cotton more efficiently for export to port.
- Provision of rail transport for freight potentially delays the need for road infrastructure investment and reduces the congestion and safety issues on existing transport routes into the existing Acacia Ridge terminal.
- The Kagaru to Acacia Ridge Project cost is expected to be in the order of $87 million. The business case demonstrates that operating revenues would cover operating costs (including maintenance), meaning that once delivered, Inland Rail would not require on-going taxpayer support.

Economic costs to the local and state economy may include:

- Local and temporary access disruption during construction with potentially negative effects on businesses in the region.
- The scale of the Kagaru to Acacia Ridge and Bromelton Project may affect availability of resources and personnel for other significant rail projects in the region, at peak periods given the requirement for possession working in existing rail corridor.

It is anticipated that the Inland Rail Kagaru to Acacia Ridge and Bromelton Project will also bring economic benefits to the local and state economy, including:

- Increase to property demand and associated value during construction period.
- Increased business opportunities associated with the provision of temporary accommodation, catering and construction support services.

9.2. National 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 and supports regional agricultural business by providing improved access to freight services.

The Kagaru to Acacia Ridge and Bromelton Project will have both temporary and longer term environmental and social impacts requiring management during construction and operation, including:

- Clearing of regulated vegetation and fauna habitat for species listed under State and National legislation;
- Air quality and noise impacts during construction and operation;
- Potential flooding impacts and impacts to watercourses due to crossing of floodplains and watercourses; and
- 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 Kagaru to Acacia Ridge and Bromelton Project that are described previously.

Environmental and social impacts will be subject to further assessment in future project phases and mitigation and management measures detailed. There is also an opportunity for design refinement in future phases to minimise or remove some of the impacts identified.

10. COMMUNITY AND STAKEHOLDER CONSULTATION

ARTC have commenced consultation with key stakeholders and the outcomes of these initial consultations have informed the concept assessment phase. ARTC will implement an extensive public consultation program for the Project as part of the Inland Rail Program.

There has been a wide range of consultation undertaken for the Inland Rail program, and specifically for the Project between 2015 and October 2018. Consultation undertaken for the project to date has included consultation with local councils, businesses, the general community and adjoining landholders.

Consultation with the following stakeholder groups is ongoing:

- State and Commonwealth representatives, departments and agencies;
- Local Councils;
- Business stakeholders (e.g. local Chamber of Commerce);
- Environmental and natural resource management stakeholders;
- Service providers (e.g. community, medical);
- Community groups; and
- Wider community.

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

10.1. Peak Body Consultation

Specific issues raised during preliminary consultation with peak bodies are outlined in **Table 10-1**.

Table 10-1 Issues across the Kagaru to Acacia Ridge and Bromelton

STAKEHOLDER	ISSUES and OPPORTUNITIES	STATUS
Brisbane City Council Scenic Rim Regional Council Logan City Council	**Flooding** Concerns about contribution of rail infrastructure to flooding impacts **Coal transport** Brisbane Lord Mayor raised concerns regarding the transport of coal and associated air quality impacts	Interested to make sure enhancement work does not increase flood risk, change flow paths or increase emergency response times. Interested in understanding mitigation measures to be used.
Scenic Rim Regional Council	**Works at SCT Bromelton** Information sought about works at SCT Bromelton, including the straightening of the creek channel (which may be extended northwards alongside the rail line and into Allen Creek)	General consensus that the culverts will need to be extended to accommodate the proposed K2ARB turnout.

STAKEHOLDER	ISSUES and OPPORTUNITIES	STATUS
	and the four large culverts underneath the existing rail turnout.	

10.2. Community Information Sessions Consultation

Advertised community information sessions were held in July 2017. Direct mail invitations were distributed to landowners in a 500-metre radius to the corridor. The following general issues were raised:

- Noise impacts and proposed mitigation measures.
- Vibration impacts and proposed mitigation measures.
- Potential for coal transport to result in air quality issues.
- Concern about location of proposed Larapinta crossing loop.
- Noise impact from trains accelerating and decelerating.
- Property devaluation as a result of increased train numbers.
- Impacts on fauna in Parkinson Bushland and the Glider Forest.
- Status of the Department of Transport and Main Road's Salisbury to Beaudesert passenger rail study.

10.3. Elected Representatives

Elected representative briefings have been held to provide project updates, identify key issues to be addressed during the environmental assessment process, identify opportunities to create additional value for the project and project stakeholders and, provide an initial indication of the potential social license and risks. Key issues raised included:

Table 10-2 Summary of issues raised by elected representatives

STAKEHOLDER	ISSUES
Logan City Council Cr Laurie Smith Cr Trevina Schwartz Cr Cherie Dalley (Acting Mayor) Cr Phil Pidgeon	Noise and vibration impacts, and associated mitigation
	Increased train numbers on the Sydney to Brisbane Line
	Property values decreasing from higher train numbers, and the impacts of the project on developments in Flagstone, Yarrabilba and Greenbank
	Coal dust and associated mitigation
	Increased truck numbers travelling from Bromelton
	The impacts of the increased train numbers on parks and green spaces along the line
Brisbane City Council Cr Angela Owen	Noise mitigation and assessment, the time it would take for trains to pass and at what times they would travel
	Increased train numbers on the Sydney to Brisbane Line

STAKEHOLDER	ISSUES
	Coal dust and associated mitigation
State MPs Leeanne Enoch Charis Mullen Linus Power	Concern that there has been a lack of consultation with the local community.
Federal Member for Rankin Jim Chalmers	Noise impacts and mitigation
	Air quality concerns
	The number of trains travelling on the interstate line and potential impacts on the Glider Forest.
Federal Member for Moreton Graham Perrett	The number of trains travelling on the interstate line, in particular coal transport
Federal Member for Oxley Milton Dick	Noise impacts and associated mitigation
	Coal transport on the line and associated health concerns from dust

*Please note only elected representatives who have raised concerns with ARTC have been included here.

10.4. Broader Stakeholder Engagement

Briefings have been held from early 2017 and continue to be held with stakeholders about the project alignment and environmental investigations required. These briefings and meetings have been primarily to inform the stakeholders of the design and provide a forum for the stakeholders to provide feedback and ask questions about the Project. Broader stakeholder engagement details are included in **Table 10-3**.

Table 10-3 Summary of issues raised by elected representatives

STAKEHOLDER GROUP	
Elected representatives	• Federal Member for Oxley, Milton Dick • Federal Member for Wright, Scott Buchholz MP • Federal Member for Rankin, Jim Chalmers MP • Federal Member for Moreton, Graham Perrett MP • Federal Member for Forde, Bert van Manen • Qld Member for Logan, Linus Power MP • Qld Member for Algester, Leeanne Enoch MP • Qld Member for Scenic Rim, Jon Krause MP • Qld Member for Jordan, Charis Mullen MP • Qld Member for Stretton, Duncan Pegg MP • Qld Member for Toohey, Peter Russo MP • Brisbane City Council Mayor Cr Graham Quirk • Logan City Council Acting Mayor Cherie Dalley • Scenic Rim Regional Council Mayor Greg Christensen
Agencies	• Qld Department of Transport and Main Roads • Queensland Rail • Federal Department of Infrastructure, Regional Development and Cities
Other stakeholders	• Logan Chamber of Commerce • Beaudesert Chamber of Commerce • Peet • Regional Development Australia
Community Groups	• Inland Rail Action Group (IRAG) • Karawatha Forest Protection Society • Oxley Creek Catchment Association • Forestdale Neighbourhood Watch • Hillcrest Neighbourhood Watch

10.5. Emerging Themes

Emerging themes and issues captured for the Project through various consultation channels including from Councils, peak bodies, impacted landowners and the broader community are summarised in **Table 10-4**.

Table 10-4 Summary of issues raised by elected representatives

ISSUE THEMES	ISSUE DESCRIPTION
Train numbers	• The current figures estimate approximately 45 train movements per day by 2040 (from Business Case) however this next phase of investigations will include detailed operational modelling to provide updated figures based on market requirements. • This figure does not take into account the new Kagaru to Bromelton section. • Community members are concerned about the impacts from the increased train numbers.

ISSUE THEMES	ISSUE DESCRIPTION
Noise and vibration	• The community has expressed concerns that noise and vibration will negatively impact their communities. • The Kagaru to Acacia Ridge and Bromelton project area and surrounds consist of both residential and industrial properties, as well as farming properties. • Properties from Acacia Ridge down to Greenbank have been constructed next to the corridor with properties sharing a fence line with the rail corridor. • Residents have advised that they currently experience vibrations from trains on the line.
Coal dust management	• It is anticipated that Inland Rail will introduce coal transport along this line. • Concerns about the health risks associated with coal dust are an issue for this community. • ARTC intends to maintain the current management plans in place in QLD • These plans are seen as inadequate by the community and there have been calls for coal wagons to be covered.
Air quality	• Community members are concerned about the impacts from increased numbers of diesel powered trains and coal transportation.
Crossing loops	• The location of the crossing loops is primarily the concern of the Forestdale community as the new Larapinta loop will be constructed on the western side of the existing track closest to their neighbourhood. • Their concerns centre around the noise and diesel fumes from trains waiting in the crossing loop.
Property value	• There are concerns that the increased train numbers and associated impacts (noise, vibration, dust) will negatively impact on property values. • As the project remains within the corridor the assumption is there will be no requirement for additional land acquisition.
Lack of community benefits	• There are concerns that the project does not contribute to local communities and economies and will impact negatively on lifestyle and amenity.
Salisbury to Beaudesert (TMR)	• The Salisbury to Beaudesert Rail Corridor Study is planning for a corridor that accommodates two passenger rail lines and two freight rail lines plus stations, pedestrian and cycle facilities, electrical and other infrastructure. • This project area overlaps with the K2ARB project between Salisbury and Kagaru. • As DTMR's consultation process has yet to commence there is some confusion in the community about both projects. • The Kagaru to Acacia Ridge and Bromelton project team has been working with DTMR to align our consultation processes where possible.

Further opportunities for formal and informal public consultation will be undertaken to support the delivery of approvals, and to capture relevant information for consideration in project design and assessments.

10.6. Community Consultative Committee

A Community Consultative Committee (CCC) has been created for the Project. The CCC will be Chaired by Mr John Brent, who was nominated by the Federal Member for Wright, Scott Buchholz. Members were appointed following a

publicly advertised nomination period, with all nominations assessed against a set of criteria by an independent party (Brisbane-based consultancy Three Plus). Candidates for appointment were accordingly recommended to ARTC, and ARTC formally appointment the Chair and Committee Members. The first meeting was held on 12 November. The Committee will meet no less than quarterly, with meeting summaries and minutes to be publicised on the Inland Rail website, along with Member details and the Charter governing the CCC.

10.7. Aboriginal Parties

The Study Area crosses a number of registered native title claim areas, including the Yuggera Ugarapul People and Danggan Balun (Five Rivers) People. ARTC commenced consultation with the Yuggerra Ugarapul People and have an approved, executed Cultural Heritage Management Plan that covers part of this project. It is anticipated that further consultation will be required and with a possible amendment to the CHMP to include this project. No consultation has been undertaken with the Danggan Balun (Five Rivers) People at this time but initial consultation will commence shortly in line with the requirements set out in *the Aboriginal Cultural Heritage Act 2003*.

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12. GLOSSARY, ACRONYMS AND ABBREVIATIONS

TERM	ACRONYM/ABBREVIATION
Aboriginal Cultural Heritage Act 2003	ACHA
Acid Sulfate Soils	ASS
Advanced Train Management Systems	ATMS
Annual Exceedance Probability	AEP
Australian Height Datum	AHD
Australian Rail Track Corporation	ARTC
Benefit-Cost Ratio	BCR
Brisbane City Council	BCC
Capital Expenditure	CAPEX
Contaminated Land Register	CLR
Community Consultative Committee	CCC
Department of Aboriginal and Torres Strait Islander Partnership (State)	DATSIP
Department of Environment and Science (State)	DES
Department of the Environment and Energy (Commonwealth)	DEE
Department of Natural Resources, Mines and Energy	DNRME
Department of Transport and Main Roads (State)	DTMR
Environment Protection and Biodiversity Conservation Act 1999	EPBC Act
Environment Protection License	EPL

TERM	ACRONYM/ABBREVIATION
Environmental Impact Statement	EIS
Environmental Management Register	EMR
Environmental Management System	EMS
Greenhouse Gases	GHG
Gross Domestic Product	GDP
Impact Assessment Report	IAR
Initial Advice Statement	IAS
Inland Rail Alignment Study	IRAS
Key Resource Areas	KRA
Local Government Area	LGA
Logan City Council	LCC
Matters of National Environmental Significance	MNES
Matters of State Environmental Significance	MSES
Nature Conservation Act 1992	NC Act
New South Wales	NSW
Petroleum Pipeline License	PPL
Protected Matters Search Tool	PMST
Queensland	QLD
State Development Area	SDA

TERM	ACRONYM/ABBREVIATION
Scenic Rim Regional Council	SRRC
South East Queensland	SEQ
Southern Freight Rail Corridor	SFRC
State Development and Public Works Organisation Act 1971	SDPWO Act
Threatened Ecological Community	TEC
Unexploded Ordnance	UXO
Wider Economic Benefits	WEB

APPENDIX A - REVIEW OF THE MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE (MSES)

Matter	Relevance	Beaudesert Rd	Learoyd Rd	Johnson Rd	Larapinta Loop	Middle Rd /Greenbank Loop	Pub Lane	Kagaru Loop	Bromelton Loop	SCT Terminal
Prescribed regional ecosystems (endangered) located in a category B area on the regulated vegetation management map	There are two endangered RE types mapped within the work areas: 11.3.3 (0.2ha) and 12.9-10.12 (0.01ha)	-	-	TBC	✓	-	-	-	-	-
Prescribed regional ecosystems (of concern) located in a category B area on the regulated vegetation map	There are two of concern RE types mapped within the work areas: 12.9-10.3 (<0.001ha) and 12.9-10.7 (0.08ha)	-	-	TBC	-	-	-	✓	-	-
Prescribed regional ecosystems (intersecting a wetland on the vegetation management wetlands map – to the extent of the intersection)		-	-	-	-	-	-	-	-	-
Prescribed regional ecosystems (within defined distance of relevant watercourse)		?	?	-	-	-	-	-	-	-
Prescribed regional ecosystems (intersecting essential habitat for EN or VU species)	The Glider Forest is mapped as Essential Habitat	-	-	✓	✓	-	-	✓	-	-
Connectivity area that is a regional ecosystem										
Wetlands and watercourses (wetland protection area)		-	-	-			-	-	-	-

Matter	Relevance	Beaudesert Rd	Learoyd Rd	Johnson Rd	Larapinta Loop	Middle Rd /Greenbank Loop	Pub Lane	Kagaru Loop	Bromelton Loop	SCT Terminal
Wetlands and watercourses (high ecological significance)		-	-	-			-	-	-	-
Designated precinct in a strategic environmental area	There are no strategic environmental areas associated with the work areas.									
Protected wildlife habitat (flora survey trigger map)	There are no areas mapped on the flora survey trigger map within the work areas.									
Protected wildlife habitat (EN, VU or SLC species)				✓	✓	✓	-	✓	-	-
Protected area estate	There are no national parks, conservation parks or protected areas under the NC ACT within the work areas.									
Marine park	There are no marine parks associated with the work areas.									
Fish habitat area	There are no fish habitat areas associated with the work areas.									
Waterway providing fish passage		-	-	-						-
Marine plants	There are no marine plant communities within the work areas.									
Legally secured offset areas	There are no legally secured offset areas within the work areas.									

APPENDIX B – LIKELIHOOD OF OCCURRENCE ASSESSMENT FOR THREATENED FLORA SPECIES

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
PLANTS								
Acacia acrionastes			NT		-		Unlikely	Species unlikely to be dependent on habitat within the work areas.
Acacia saxicola	Mt. Maroon wattle		E	Y	BL	N	Unlikely	No heath habitat within the work areas.
Agiortia cicatricata			NT		BL		Unlikely	1 record within 10km of the Bromelton Loop dated 1987. All other records in Queensland located close to the NSW-Queensland border.
Arthraxon hispidus	Hairy-joint grass	V	V	Y	-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Arundinella grevillensis			V	Y	BL	N	Unlikely	No mountain peaks within the work areas.
Banksia conferta			V	N	BL	N	Unlikely	2 records within 10km of the Bromelton Loop dated 1987. Current profiles identify populations restricted to only a few locations in Queensland – none intersecting the corridor
Bosistoa transversa	Three-leaved bosistoa	V		Y	-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Bulbophyllum globuliforme	Miniature moss-orchid	V	NT	Y	-	N	Unlikely	Nearest known population in Queensland at Cainbable Creek in Lamington national Park.
Callitris baileyi	Bailey's cypress		NT	Y	BL	N	Unlikely	No suitable habitat was recorded in the corridor.
Clematis fawcettii		V	V	N	BL	N	Unlikely	1 record within 10km of the Bromelton Loop dated 1987. No vine thicket recorded within the work areas.
Comesperma breviflorum			NT	Y	BL	N	Unlikely	1 record within 10km of the Bromelton Loop dated 1987. All other records further southwest in forest reserves. No heathland within the work areas.
Coopernookia scabridiuscula	Coopernookia	V	V	N	BL	N	Unlikely	1 record within 10km of the Bromelton Loop dated 1987. Known from Mount Maroon/Mount Barney area
Corchorus cunninghamii	Native jute	E	E	N	-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Cryptocarya foetida	Stinking cryptocarya	V	V	Y	-	N	Unlikely	No coastal sands within the corridor.
Cryptostylis hunteriana	Leafless tongue-orchid	V		Y	-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Cupaniopsis shirleyana	Wedge-leaf tuckeroo	V	V	N	BR	N	Unlikely	No suitable habitat within the corridor.
Cupaniopsis tomentella	Boonah tuckeroo	V	V	N	BL	N	Unlikely	No suitable habitat within the corridor.
Cycas ophiolitica		E	E	Y	-	N	Unlikely	No cycads were observed during field investigations within the work areas.
Dichanthium setosum	Bluegrass	V		Y	-	Y	Possible	
Eucalyptus curtisii	Plunket mallee		NT		BR	N	Unlikely	No suitable habitat within the corridor.
Fontainea venosa		V			-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Gossisa gonoclada	Angle-stemmed myrtle	E	E		BR	N	Unlikely	No suitable habitat within the corridor.
Grevillea venusta	Grevillea		V		BR		Unlikely	Species unlikely to be dependent on habitat within the work areas.
Hakea maconochieana		V	V		BL		Unlikely	Outside range of the species.
Hernandia bivalvis	Cudgerie		NT		-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Hibbertia hexandra	Tree Guinea flower		NT		BL		Unlikely	Outside range of the species.
Hibbertia monticola	Mountain guinea flower		NT		BL	Y	Possible	
Leionema elatius subsp. beckleri			E		BL		Possible	Little known of the requirements for this species.
Lenwebbia prominens			NT		BL		Possible	
Lilaeopsis brisbanica			E		BR	N	Unlikely	No suitable habitat within the corridor.
Macadamia integrifolia	Macadamia nut	V	V	Y	BR	N	Unlikely	No suitable habitat within the corridor.
Macadamia tetraphylla	Rough-shelled bush nut	V	V		BR	N	Unlikely	
Marsdenia coronata	Slender milkvine		V		BR, BL, GB, KL	N	Unlikely	No suitable habitat within the corridor.
Marsendia longiloba	Clear milkvine	V	V		BL		Unlikely	
Maundia triglochinoides			V		BR, GB		Unlikely	

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Melaleuca irbyana			E		BR, BL, GB, KL	N	Unlikely	No suitable habitat within the corridor.
Notelaea ipsviciensis	Cooneana olive	CE			-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Notelaea lloydii	Lloyd's olive	V			-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Parsonia tenius	Slender silkpod		V		BL	N	Unlikely	No rainforest habitat within the work areas.
Phaius australis	Lesser swamp-orchid	E			-	N	Unlikely	No previous records in the corridor. No suitable habitat within the corridor.
Phlegmariurus varius			V		BL	N	Unlikely	No rainforest habitat within the work areas.
Planchonella eerwah	Shiny-leaved condoo	E			BL	N	Unlikely	No suitable habitat within the corridor.
Plectranthus habrophyllus		E	E		GB, KL	N	Unlikely	No suitable habitat within the corridor.
Pultenaea whiteana	Mt. Barney bush pea		V		BL		Unlikely	Population restricted to Mount Barney.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Ricinocarpos speciosus			V		BL		Possible	
Samadera bidwillii	Quassia	V			-	Y	Possible	
Solanum callium	Brush nightshade		V		BL	Y	Possible	
Sophora fraseri	Brush sophora	V	V		-	N	Unlikely	No suitable habitat within the corridor.
Symplocos harroldii	Hairy hazelwood		NT		BR	N	Unlikely	No suitable habitat within the corridor.
Thesium australe	Austral toadflax	V			-	N	Unlikely	No suitable habitat recorded within the corridor.
Wahlenbergia scopulicola			V		BL		Unlikely	
Westringia blakeana			NT		-		Unlikely	
Zieria furfuracea subsp. gymnocarpa		E			BR	N	Unlikely	No suitable habitat within the corridor.

*Records has per desktop searches undertaken February 2018 for specific work areas.

Work areas: BR = Beaudesert Road and Learoyd Bridge; BL = Bromelton Loop; GB = Greenbank Loop, Middle Road Bridge and Pub Lane Bridge; KL = Kagaru Loop; JR = Johnson Road

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
EPBC Australian Conservation Status: • conservation dependent (CD) • critically endangered (CE) • endangered (E) • extinct (EX) • extinct in the wild (XW) • vulnerable (V)					NCA Queensland Conservation Status: • extinct in the wild (PE) • endangered (E) • vulnerable (V) • near threatened (NT) • special least concern (SL) • least concern (C).			

APPENDIX C – LIKELIHOOD OF OCCURRENCE ASSESSMENT FOR THREATENED FAUNA SPECIES

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
BIRDS								
Anthochaera Phrygia	Regent honeyeater	CE	E	Y	BR	N	Unlikely	~No suitable habitat within the corridor
Apus pacificus	Fork-tailed swift	M	SL	Y	BL, GB, KL	N	Unlikely	Almost exclusively aerial. Does not breed in Australia and habitat within work areas unlikely to be important for the species.
Arctitis hypoleucos	Common sandpiper	M	SL	Y	-	N	Unlikely	Species unlikely to be dependent on habitat within the work areas. No wetlands are mapped within the corridor and no wetland habitats observed.
Botaurus poiciloptilus	Australasian bittern	E	-	Y	-	N	Unlikely	~No suitable habitat within the corridor
Calidris acuminata	Sharp-tailed sandpiper	M	SL	Y	BL	N	Unlikely	Species unlikely to be dependent on habitat within the work areas. No wetlands are mapped within the corridor and no wetland habitats observed.
Calidris ferruginea	Curlew sandpiper	CE, M	SL	Y	-	N	Unlikely	Species unlikely to be dependent on habitat within the work areas. No wetlands are mapped within the corridor and no wetland habitats observed.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Calidris melanotos	Pectoral sandpiper	M	SL	Y	-	N	Unlikely	Species unlikely to be dependent on habitat within the work areas. No wetlands are mapped within the corridor and no wetland habitats observed.
Calyptorhynchus lathami	Glossy black-cockatoo		V	Y	BR, GB, KL	N	Unlikely	~Foraging habitat may occur within the entire alignment however targeted field surveys detected only sub-optimal habitat for the species in the form of small patches of *Allocasuarina litoralis* regrowth within the work areas.
Charadrius leschenaultii	Greater sand plover	V, M	V	N	BR	N	Unlikely	Rail corridor outside of the species known range. No suitable habitat within the work areas.
Charadrius mongolus	Lesser sand plover	E	E	N	BR	N	Unlikely	Rail corridor outside of the species known range. No suitable habitat within the work areas.
Charadrius veredus	Oriental plover	M	SL	N	BL	N	Unlikely	Rail corridor outside of the species known range. No suitable habitat within the work areas.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Cuculus optatus	Oriental cuckoo	M	SL	Y	BL, GB	Y	Possible	Potential habitat resources occur within the work areas. Species has broad habitat requirements foraging on trees and bushes as well as on the ground. Unlikely to be dependent on habitats within the work areas.
Dasyornis brachypterus	Eastern bristlebird	E	E	N	-		Unlikely	~Project corridor outside of species known range. Occurs in three disjunct, localized coastal populations (none within the vicinity of the corridor) (DoE, 2018)
Erythrotriochis radiatus	Red goshawk	V	E	Y	BR	N	Unlikely	~No suitable habitat within the corridor
Falco hypoleucos	Grey falcon		V	Y	GB	N	Unlikely	~No suitable habitat within the corridor
Gallinago hardwickii	Latham's snipe	M	SL	Y	BR, BL, KL	N	Unlikely	Species unlikely to be dependent on habitat within the work areas. No wetlands are mapped within the corridor and no wetland habitats observed.
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	Y	-	N	Unlikely	Species unlikely to be dependent on habitat within the work areas.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Grantiella picta	Painted honeyeater	V	V	Y	-	Y	Unlikely	Species unlikely to be dependent on habitat within the work areas.
Hirundapus caudacutus	White-throated needletail	M	SL	Y	BR, BL, GB, KL	N	Unlikely	Almost exclusively aerial species. Does not breed in Australia and habitat within work areas unlikely to be important for the species.
Lathamus discolor	Swift parrot	CE	E	Y	BR, GB	N	Unlikely	~No suitable habitat within the corridor
Myiagra cyanoleuca	Satin flycatcher	M	SL	Y	BL, GB	Y	Possible	May occur in eucalypt habitats
Monarcha melanopsis	Black-faced monarch	M	SL	Y	BR, BL, GB, KL	N	Unlikely	There are no rainforest ecosystems (including vine thickets) within the work areas.
Monarcha trivirgatus	Spectacled monarch	M	SL	Y	BR, BL, GB, KL	N	Unlikely	There are no moist forest ecosystems within the work areas.
Motacilla flava	Yellow wagtail	M	SL	Y	-	N	Unlikely	No tussocks have been recorded within the work areas.
Ninox strenua	Powerful owl		V	Y	BR, BL, GB, KL	Y	Possible	~May occur periodically when hunting prey in corridor as part of larger home range
Numenius madagascariensis	Eastern curlew	CE, M	E	Y	BR	N	Unlikely	~No suitable habitat within the corridor

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Numenius minutus	Little curlew	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas.
Numenius phaeopus	Whimbrel	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas.
Pandion cristatus	Eastern osprey	M	SL	Y	BL	N	Unlikely	No suitable habitat within the work areas.
Philomachus pugnax	Ruff	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas.
Plegadis falcinellus	Glossy ibis	M	SL	Y	BR, BL, GB, KL	N	Unlikely	No suitable habitat within the work areas.
Pluvialis fulva	Pacific golden plover	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas. There are no wetlands mapped within the corridor.
Podargus ocellatus plumiferus	Plumed frogmouth		V	Y	BR	N	Unlikely	There are no moist forest ecosystems within the work areas.
Poephila cincta cincta	Southern black-throated finch	E	E	Y	-	N	Unlikely	~No suitable habitat within the corridor
Rhipidura rufifrons	Rufous fantail	M	SL	Y	BR, BL, GB, KL	Y	Possible	Species has been recorded in a wide range of habitats and as such potential habitat may occur within the work areas.

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Rostratula australis	Australian painted snipe	E	V	Y	-	N	Unlikely	~No suitable habitat within the corridor
Tringa glareola	Wood sandpiper	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas. There are no wetlands mapped within the corridor.
Tringa nebularia	Common greenshank	M	SL	Y	KL	N	Unlikely	No suitable habitat within the work areas. There are no wetlands mapped within the corridor.
Tinga stagnatilis	Marsh sandpiper	M	SL	N	BL	N	Unlikely	No suitable habitat within the work areas. There are no wetlands mapped within the corridor.
Turnix melanogaster	Black-breasted button-quail	V	V	Y	BR	N	Unlikely	~No suitable habitat within the corridor
FISH								
Maccullochella mariensis	Mary River cod	E		Y	-	N	Unlikely	~No previous records south of the Sunshine Coast. No suitable habitat within the corridor
AMPHIBIANS								
Adelotus brevis	Tusked frog		V	Y	BR, BL, GB, KL	Y	Likely	Potential habitat associated with ponding water in the corridor

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Crinia tinnula	Wallum froglet		V	Y	BR, GB	Y	Likely	Potential habitat assessment with ponding water in the corridor
Mixophyes iteratus	Giant barred frog	E	E	Y	-	N	Unlikely	No suitable habitat within the corridor
INSECTS								
Argynnis hyperbius inconstans	Australian fritillary	CE	E	Y	-		Unlikely	Species unlikely to be dependent on habitat within the work areas.
Ornithoptera richmondia	Richmond birdwing		V	Y	BR,	N	Unlikely	No suitable habitat within the corridor
MAMMALS								
Chalinolobus dwyeri	Large-eared pied bat	V	V	Y	-	N	Unlikely	No suitable habitat within the corridor
Dasyurus hallucatus	Northern quoll	E		Y	-	N	Unlikely	No suitable habitat within the corridor
Dasyurus maculatus	Spot-tailed quoll (southeastern mainland population)	E	V	Y	BR, BL, GB, KL	Y	Likely	Species is likely to accessing the corridor when moving between habitats or along wildlife corridors that cross the rail corridor

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Ornithorhynchus anatinus	Platypus		SL	Y	BR, BL, GB, KL	Y	Possible	May occur in permanent waterways or wetlands in the corridor. No wetlands mapped within the work areas however waterways are mapped.
Petauroides volans	Greater glider	V	V	Y	BR, GB, KL	Y	Likely	Species is likely to be accessing or flying across the corridor when moving between habitats or along wildlife corridors that cross the rail corridor, especially where the corridor traverses the Glider Forest Conservation Area
Petrogale penicillata	Brush-tailed rock-wallaby	V	V	Y	BL, GB, KL	N	Unlikely	No suitable habitat within the corridor
Phascolarctos cinereus	Koala (combined populations of Qld, NSW and the ACT)	V	V	Y	BR, BL, GB, KL	Y	Likely	Scratch marks observed on feed trees immediately outside the corridor. Species is likely to be accessing the corridor when moving between habitats or along wildlife corridors that cross the rail corridor
Potorous tridactylus	Long-nosed potoroo	V	V	Y	-	N	Unlikely	No suitable habitat within the corridor
Pteropus poliocephalus	Grey-headed flying-fox	V		Y	-	N	Unlikely	No suitable habitat within the corridor

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
Tachyglossus aculeatus	Short-beaked echidna		SL	Y	BR, BL, GB, KL	Y	Possible	Potential to occur when moving across the landscape
REPTILES								
Delma torquata	Collared delma	V	V	Y	-	N	Unlikely	Suitable habitat RE types are not mapped within the work areas.
Furina dunmalli	Dunmall's snake	V	V	Y	-	N	Unlikely	Species unlikely to be dependent on habitat within the work areas.
Saiphos reticulatus	Three-toed snake-tooth skink	V		Y	-	N	Unlikely	No suitable habitat within the corridor

*Records has per desktop searches undertaken February 2018 for specific work areas.

Work areas: BR = Beaudesert Road and Learoyd Bridge; BL = Bromelton Loop; GB = Greenbank Loop, Middle Road Bridge and Pub Lane Bridge; KL = Kagaru Loop; JR = Johnson Road

Scientific Name	Common Name	EPBC Status	NCA Status	Work areas within the distribution /range	Record within 10km*	Habitat within Work Areas	Likelihood of Occurrence	Comment
EPBC Australian Conservation Status: • conservation dependent (CD) • critically endangered (CE) • endangered (E) • extinct (EX) • extinct in the wild (XW) • vulnerable (V)					NCA Queensland Conservation Status: • extinct in the wild (PE) • endangered (E) • vulnerable (V) • near threatened (NT) • special least concern (SL) • least concern (C).			

APPENDIX D – FIELD VERIFIED VEGETATION COMMUNITIES AND CORRESPONDING FAUNA HABITATS

Vegetation Community Description	Habitat Type	Habitat Description	Field Observation
Non-remnant cleared mixed exotic/ native grassland with very sparse regrowth	Modified open grasslands	This habitat type was observed to be at varying levels of ground disturbance and weed infestation. It holds limited habitat values for most native fauna species, although it may provide periodic foraging habitat for birds and frogs, and potential basking and foraging habitat for reptiles. It also presents predatory opportunities for birds of prey such as the Red Goshawk and Grey Falcon.	The modified open grasslands are mainly associated with cleared non-remnant vegetation within the rail corridor that is regularly maintained to allow vehicle access. At the southern end of the Project corridor it is associated with livestock (cattle) grazing land use. It is the main habitat type within the Project corridor. There are approximately 49.9 ha of modified open grassland within the Project corridor, which is a relatively small proportion of similar habitats that are found throughout the Study Area and wider locality.
Non-remnant mixed *Eucalyptus* spp. *Acacia* spp. regrowth	Low shrubby regrowth	The low shrubby regrowth habitat ranges from relatively sparse to sense stands of regrowth vegetation and is representative of former woodland, open forest and riparian forest vegetation. If allowed to continue developing into the future this low shrubby regrowth habitat would become either woodland, open forest or riparian forest habitats. At present this habitat type provides habitat values for small to medium sized, birds, reptiles and amphibians. It may also provide periodic foraging and sheltering habitat for Koalas.	The majority of the Project corridor has been cleared within the last 10 years. A low shrubby regrowth habitat has now become established in some of these formerly cleared areas. There are approximately 52.8 ha of modified open grassland within the Project corridor, which is a relatively small proportion of similar habitats that are found throughout the Study Area and wider locality.
Non-remnant *Melaleuca spp.* fringing low open forest surrounding wetland	Low shrubby regrowth		
Non-remnant *Melaleuca viminalis* and/or *M. quinquenervia Acacia* spp. fringing low open forest with *Lomandra longifolia* and exotic pasture grasses along drainage lines	Low shrubby regrowth		
Eucalyptus moluccana open forest woodland	Woodlands	The woodland habitats contain tall mature trees that are provide hollow bearing resources for	Woodland habitats are the most widespread habitat type throughout the Study Area.

Vegetation Community Description	Habitat Type	Habitat Description	Field Observation
Eucalyptus racemosa open forest woodland	Woodlands	arboreal mammals such as the Greater Glider, and nesting resources for a variety of native bird species. Koala feed and shelter trees are abundant in the woodland habitats. In most instances it was observed to contain a relatively dense understory that provides shelter, cover and foraging resources for small woodland birds and reptiles. Varying levels of fallen woody debris, and coarse and fine leaf litter was observed and is generally a function of the land use, frequency of fire, grazing that is taking place in the habitat.	It was observed to be in varying levels of condition and quality, as a result of either being located in conservation areas or in association with agricultural land holdings or other land uses where frequent anthropogenic disturbances occur, such as vehicular access and dumping of domestic rubbish. There are approximately 7.2 ha of woodland habitats within the Project corridor, which is a relatively small proportion of similar habitats that are found throughout the Study Area and wider locality.
Eucalyptus tereticornis, Eucalyptus siderophloia open forest on alluvial plains	Riparian forests	The riparian forest habitats also contain large trees and stags that provide hollow bearing resources for arboreal mammals such as the Greater Glider, and nesting resources for a variety of native bird species. Koala feed and shelter trees are also abundant in the riparian forest habitats. Moreover, the lower understory of the riparian forest habitats was also observed to be relatively dense with invasive weeds such as Lantana camara and exotic grass species present, thus reducing the suitability of the understory habitats for many native flora and fauna species. Varying levels of fallen woody debris, flood debris, and coarse and fine leaf litter was observed, with the availability of leaf litter sheltering habitat inhibited by exotic grass infestations.	The riparian forest habitats were primarily associated with Stream Order 3 and above watercourses. In most instances the riparian forest habitats are relatively narrow and are essentially fringing the stream bank and were rarely extending much further than the top of bank. There are approximately 0.5 ha of riparian forest habitats within the Project corridor, which is a relatively small proportion of similar habitats that are found throughout the Study Area and wider locality.

Vegetation Community Description	Habitat Type	Habitat Description	Field Observation
Eucalyptus tereticornis open forest with *E. siderophloia* and *Lophostemon suaveolens* on sedimentary rocks	Open forests	The open forests contain large trees and stags that provide hollow bearing resources for arboreal mammals such as the Greater Glider, and nesting resources for a variety of native bird species. Koala feed and shelter trees are abundant in the open forest habitats, especially those exhibiting the palustrine wetland characteristics. The lower understory was observed to be relatively dense with invasive weeds such as Lantana camara and exotic grass species present, which reduces the suitability of the understory habitats for many native flora and fauna species. Varying levels of fallen woody debris, and coarse and fine leaf litter was observed, with the availability of leaf litter sheltering habitat inhibited by exotic grass infestations.	The open forest habitats within the Study Area were primarily associated with alluvial terraces or flood plains and in some areas presented as swampy palustrine wetland habitats. There are approximately 0.2 ha of open forest habitats within the Project corridor, which is a relatively small proportion of similar habitats that are found throughout the Study Area and wider locality.

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Acrocephalus australis	Australian Reedwarbler	Marine	**Low** No suitable habitat in Project Corridor.
Apus pacificus	Fork-tailed Swift	Migratory	**Low** No suitable habitat in Project Corridor.
Ardea alba modesta	Eastern Great Egret	Marine	**Low** No suitable habitat in Project Corridor.
Ardea ibis	Cattle Egret	Marine	**Moderate** Known to occur in locality. May occur periodically in the Project Corridor
Cuculus optatus	Oriental Cuckoo	Migratory	**Low** No suitable habitat in Project Corridor.
Gallinago hardwickii	Latham's Snipe	Migratory	**Low** No suitable habitat in Project Corridor.
Hirundapus caudacutus	White-throated Needletail	Migratory	**Low** No suitable habitat in Project Corridor.
Merops ornatus	Rainbow Bee-eater	Marine	**Known** Recorded during survey in 2016.
Monarcha melanopsis	Black-faced Monarch	Migratory	**Low** No suitable habitat in Project Corridor.
Monarcha Trivirgatus	Spectacled Monarch	Migratory	**Low** No suitable habitat in Project Corridor.
Motacilla flava	Yellow Wagtail	Migratory	**Low** No suitable habitat in Project Corridor.

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Myiagra cyanoleuca	Satin Flycatcher	Migratory	**Low** No suitable habitat in Project Corridor.
Pandion cristatus	Eastern Osprey	Migratory	**Low** No suitable habitat in Project Corridor.
Rhipidura Rufifrons	Rufous Fantail	Migratory	**Moderate** May occur opportunistically within the Project corridor.
Plegadis falcinellus	Glossy Ibis	Migratory	**Moderate** May occur opportunistically where the Project corridor traverses through agricultural land.
Tringa nebularia	Common Greenshank	Migratory	**Low** No suitable habitat in Project Corridor.

APPENDIX F – BIOSECURITY ACT 2014 INVASIVE SPECIES

Scientific Name	Common Name	Biosecurity Act Category
Fauna		
Felis catus and Prionailurus bengalensis x Felis catus	cat	3,4,6
Canis lupus familiaris	dog	3,4,6
Capra hircus	Goat	3,4,6
Dama dama	feral fallow deer	3,4,6
Cervus elaphus	feral red deer	3,4,6
Axis porcinus	hog deer	2,3,4,5,6
Rusa timorensis, syn. Cervus timorensis	feral rusa deer	3,4,6
Rusa unicolor, syn. Cervus unicolor	sambar deer	2,3,4,5,6
Oryctolagus cuniculus	European rabbit	3,4,5,6
Sus scrofa	feral pig	3,4,6
Vulpes vulpes	European fox	3,4,5,6

Scientific Name	Common Name	Biosecurity Act Category
Flora		
Alternanthera philoxeroides	alligator weed	3
Annona glabra	pond apple	3
Anredera cordifolia	Madeira vine	3
Asparagus aethiopicus, A. africanus and A. plumosus	asparagus fern	3
Asparagus asparagoides	bridal creeper	2,3,4,5
Cabomba caroliniana	cabomba	3
Chrysanthemoides monilifera ssp. monilifera	boneseed	2,3,4,5
Chrysanthemoides monilifera ssp. rotundifolia	bitou bush	2,3,4,5
Cryptostegia grandiflora	rubber vine	3
Dolichandra unguis-cati	cat's claw creeper	3
Eichhornia crassipes	water hyacinth	3

Scientific Name	Common Name	Biosecurity Act Category
Genista monspessulana	Montpellier broom	3
Hymenachne amplexicaulis and hybrids	hymenachne or olive hymenachne	3
Lantana camara	lantana, common lantana	3
Prickly pears:		
• *Opuntia microdasys*	Bunny ears	2,3,4,5
• *O. stricta syn. O. inermis*	common pest pear, spiny pest pear	3
• *O. monacantha syn. O. vulgaris*	drooping tree pear	3
• *O. elata*	prickly pear	2,3,4,5
• *O. aurantiaca*	tiger pear	3
• *O. tomentosa*	velvety tree pear	3
• *Westwood pear*	Westwood pear	3
Parkinsonia aculeata	parkinsonia	3
Parthenium hysterophorus	parthenium	3
Mesquites:		
• *Prosopis glandulosa*	honey mesquite	3
• *Prosopis pallida*	mesquite or algarroba	3
• *Prosopis velutina*	Quilpie mesquite	3
Rubus anglocandicans, Rubus fruticosus aggregate	blackberry	3
Sagittaria platyphylla	Sagittaria	3
all *Salix spp.* other than *S. babylonica, S. x calodendron* and *S. x reichardtii*	willows	3
Salvinia molesta	Salvinia	3
Senecio madagascariensis	Fireweed	3
Solanum elaeagnifolium	silver-leaf nightshade	3