CHAPTER 02

Project Rationale

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

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2. Project Rationale

2.1 Introduction

This chapter describes the rationale for the Inland Rail New South Wales (NSW)/Queensland (QLD) Border to Gowrie Project (B2G) (the Project) and the broader Inland Rail Program and provides discussion on:

- Existing freight network between Melbourne and Brisbane and the future demands that are forecast to be placed on this network
- History of Inland Rail
- Comparison of freight movement alternatives as a solution to the projected freight network capacity constraints
- Benefits of proceeding with Inland Rail and the Project
- Consequences of not proceeding with Inland Rail and the Project
- Strategic options considered in determining the route for Inland Rail
- Alignment options assessed through the reference design process
- Relationship to other projects.

This chapter has been updated in accordance with the additional information requested by the Coordinator-General following the public notification stage of the draft Environmental Impact Statement (EIS) and Section 6.7 and Section 10.1(e) of the EIS Terms of Reference.

During the assessment and preparation of the revised draft EIS, in October 2022, Dr Kerry Schott AO was appointed by the Australian Government to undertake an independent review of Inland Rail to consider the scope, schedule and cost of the Inland Rail Program and assesses options for new intermodal terminals in Brisbane and Melbourne, and improved links to the ports in those cities. That independent review (Schott, K., 2023), which included the opportunity for the community and other key stakeholders to make submissions, was completed by Dr Schott and submitted to the Australian Government in early 2023.

In April 2023, the Australian Government released the findings of the independent review, which included 19 recommendations to improve the delivery of Inland Rail, as well as also confirming Inland Rail as an important project to meet Australia's growing freight task, improve road safety and to help decarbonise our economy. At the same time, the Australian Government also released its response to the independent review, accepting all 19 recommendations made by Dr Schott AO, either in principle or in full.

The recommendations, which are publicly available, included a subsidiary company be established to deliver Inland Rail, a revised program that stages delivery, as well as further assessment of the scope and cost of individual segments of Inland Rail.

On 7 July 2023, the Australian Government announced the establishment of the new Inland Rail Pty Ltd subsidiary, Chair, Board members and interim Statement of Expectations outlining the objectives and expectations for the Australian Rail Track Corporation (ARTC) and the future delivery of Inland Rail. As a subsidiary of ARTC, Inland Rail Pty Ltd will operate with its own governance and delivery arrangements in line with the review. Where relevant to the B2G Project, the outcomes of the review were considered when preparing this revised draft EIS. For the purposes of some technical assessments in the revised draft EIS, assumptions have been made about the timing for delivery.

2.2 Justification for Inland Rail

The *Inland Rail Programme Business Case* (ARTC, 2015c) set out freight demand forecasts in scenarios with and without Inland Rail. This is covered extensively in Chapter 7 (Demand) of the Business Case. There are several key points to make in relation to forecast freight demand and the role of Inland Rail. These are summarised in Tables 7.1 to 7.5 of the Business Case:

- The fastest growing population regions in Australia are metropolitan Melbourne, metropolitan Brisbane and South East Queensland.
- Melbourne remains the premier destination port in Australia for imports and also the primary manufacturing centre for Australia (e.g. major food and beverage production).
- Inland Rail will grow the total freight market as more efficiency and cost-competitiveness will encourage greater freight movement:
  - this growth is set out clearly in Table 7.2, which shows an increase of 1.7 million tonnes per annum (Mtpa) (9.2 per cent) by 2069–70 in movement of inter-capital freight between Brisbane and Melbourne with Inland Rail compared to without Inland Rail.

- Inland Rail will lead to a very significant modal shift from road to rail on the key Melbourne to Brisbane route. Table 7.2 shows that Inland Rail will effectively reverse the predicted rail versus road market share by 2069–70 compared with a scenario without Inland Rail.
- Inland Rail is forecast to remove all Melbourne to Brisbane freight from the current coastal route, thereby freeing up that route for more localised freight and passenger services.
- Table 7.5 forecasts that approximately 1.8 million tonnes of agricultural product will be diverted to Inland Rail in year 1 of operation, increasing to 2.8 Mtpa by 2069–70, with 26 per cent of this volume being diverted from road onto Inland Rail.
- The Project will be dual-gauged to help agricultural producers in northern NSW and South East Queensland be able to take advantage of this significant time saving. It is more cost effective for grain growers in northern New South Wales to send grain by rail to the Port of Brisbane than to Newcastle.

Domestic freight in Australia is dominated by road and rail. The *Australian Infrastructure Audit 2019* (Infrastructure Australia, 2019) states that 'Air freight represents a small proportion of Australia's freight task by mass, a mere 1.5 million tonnes or 0.1 per cent of freight moved in 2016–17'. The report notes that Australia's ports are internationally uncompetitive and that stevedoring costs increase at a disproportionately high rate, further reducing the incentive to use coastal shipping for freight movement (possible exception being east–west).

The audit notes that Australia's geography poses significant issues for efficiency of agricultural supply chains with regional road and rail infrastructure often under-utilised for significant periods of time, reducing the incentive for governments to invest appropriately. The greater safety aspect of rail versus road is also a factor to consider in favour of Inland Rail. The Australian Infrastructure Audit also notes that, "*Road freight has the highest fatality rate of any industry in Australia, and the highest rate of serious injury claims…. During the 12 months to the end of March 2019, 163 people died from 147 fatal crashes involving heavy trucks.*" In comparison, the number of deaths as a result of vehicle crashes with trains at level crossings is very low as the Centre for Accident Research & Road Safety - Queensland (2020) reported:

> "*In Queensland between 2016–2017, there were 185 near misses with road vehicles and 87 near misses with pedestrians reported at level crossings… Across the rest of the country, in the financial year 2016/2017, there were 30 level railway crossing collisions: 27 between trains and road vehicles and three between trains and pedestrians, resulting in four fatalities. The majority of collisions involved heavy rail passenger trains."*

2.2.1 Existing rail network constraints

At present, there is no continuous inland rail link between Melbourne and Brisbane. Interstate rail freight travels between Melbourne and Sydney via Albury, and then between Sydney and Brisbane, generally along the coast. Transit times and the existing network cannot accommodate highly efficient, long, double-stacked trains. In addition, the existing route relies on rail that is also used by passenger trains in metropolitan areas, which are typically given right-of-way during daily peak travel times.

The demand for urban transport infrastructure is projected to increase significantly. The *2021 Australian Infrastructure Plan* (Infrastructure Australia, 2021a) has a key recommendation on transport and a vision of how freight will move in 2036. There is a clear objective in the plan for seamless freight networks. Freight represents 5 per cent of the retail costs of doing business in Australia. Freight services will need to rise to the challenge of the *Australian Government's Modern Manufacturing Strategy* (Department of Industry, Science and Resources, 2020) and the $100 billion agriculture sector ambition of *Delivering Ag2030* (Department of Agriculture, Water and the Environment, 2022a). World-class, end-to-end supply chains will support Australian businesses so they can easily connect with domestic and overseas markets. Major investment in Inland Rail, intermodal terminals and a broader integrated freight network will enable Australian producers to access global markets. Businesses should work in partnership with government, urban communities and port operators to benefit from seamless links to major export gateways. Quiet and zero-emission heavy vehicles and micro-freight deliveries will co-exist with sensitive land uses such as housing, without curfews or other constraints.

The Australian Government and State and Territory governments should collectively plan, prioritise and manage freight and passenger transport infrastructure so it connects seamlessly across jurisdictional borders. Australian Government and State and Territory transport ministers have endorsed and are overseeing implementation of an overarching *National Freight and Supply Chain Strategy* (Transport and Infrastructure Council, 2019).

The *National Freight Strategy* (Standing Council on Transport and Infrastructure, 2013) identified a number of existing challenges facing road and rail freight including the rise in congestion from increasing numbers of passenger vehicles and the priority given to passenger vehicles over freight vehicles in urban transport. The 2013 strategy outlined how increasing congestion can adversely impact on the efficiency of freight vehicle movement, especially for routes such as the Pacific and Ipswich Motorways, and the Hume, Newell and Warrego highways.

In 2019, the *National Freight and Supply Chain Strategy* (Transport and Infrastructure Council, 2019) was released to supersede the previous document. This strategy, stands as a revision of Australia's existing freight network, presents a strategy for coordinated action to improve freight systems and supply chains. This 2019 revision identifies additional challenges for rail and road freight including:

- Australia's freight and supply chains need to build resilience to meet emerging issues related to community safety, natural disasters and climate risk, and environmental outcomes
- Technological advances and changes in the way goods are made, purchased and distributed need to be considered to improve freight productivity and costs
- Australia's freight productivity costs had plateaued in the last two decades. Australia needs to maintain international competitiveness in international markets to meet export demands for quality minerals and agricultural products.

The *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a) indicates that:

- There are likely to be capacity constraints on the existing coastal railway unless significant capital works are undertaken
- The coastal railway between Sydney and Brisbane, a route shared by freight and passenger trains, would reach capacity around 2052.

The *Australian Infrastructure Audit 2019* (Infrastructure Australia, 2019) also reports there are significant congestion constraints facing Australia's domestic freight markets:

- Growing congestion on our roads and railways, particularly in our major cities, impacts the timeliness and costs of moving freight. This problem is only set to worsen with the forecast doubling of Australia's freight task over the next 20 years. Most congestion of our urban transport networks occurs on infrastructure that is shared between passenger and freight transport, with passenger cars and trains taking up the vast majority of network capacity.
- About 80 to 90 per cent of freight transported in our cities is carried by road. This means freight needs to share road space with cars and buses. The roads around container ports are increasingly congested. Many major cities have historically developed around their port, spreading along the coast or inland from that point of early European settlement. This means capital city ports are often based near parts of the city that have high employment and population densities and, therefore, busy roads.

Much of the infrastructure on the existing regional rail systems is old and has maintenance and renewal issues and, as such, has restrictions on axle loads and tonnages that can be transported. Poor maintenance of rail lines leads to network availability issues and speed constraints. When combined, these existing rail network constraints are resulting in an increasing reliance on freight transportation by road, thereby imposing additional maintenance and safety burdens on the affected road asset managers (Infrastructure Australia, 2015).

A summary of key characteristics of the Melbourne to Brisbane road and rail network, including constraints, is shown in Figure 2-1.

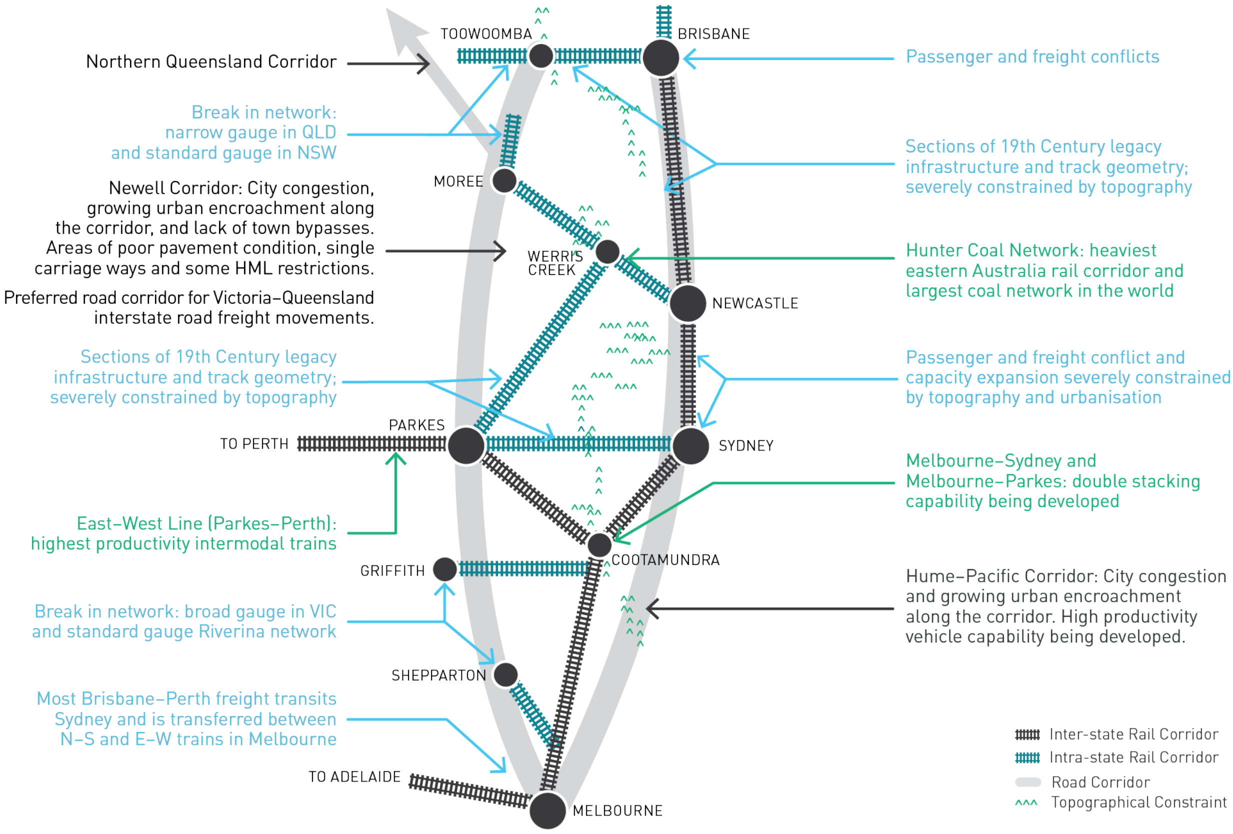


FIGURE 2-1 SUMMARY OF KEY CHARACTERISTICS OF THE MELBOURNE TO BRISBANE ROAD AND RAIL NETWORK

Source: 2015 Melbourne–Brisbane Inland Rail Report (Inland Rail Implementation Group (IRIG), 2015)

Inland Rail is expected to take all the Melbourne to Brisbane rail freight from the coastal route (freeing up capacity through Sydney for Melbourne to Sydney and Sydney to Brisbane rail freight, as well as rail passenger services) and increase rail freight's share of that market by 18 percentage points compared to the base case (2029–30). This is approximately 50 per cent more volume carried on rail from Melbourne to Brisbane. Overall, the tonnage on rail and road moved between Melbourne to Brisbane is estimated to be 6.5 million tonnes in 2024–25 and 7.6 million tonnes in 2029–30, with Inland Rail capturing 3.2 million tonnes in 2024–25 and 4.0 million tonnes in 2029–30. By 2049–50, Inland Rail is forecast to carry 8.3 million tonnes of containerised non-bulk goods between Melbourne and Brisbane.

Regional freight between points along the route consists mainly of grain, cotton, pulses and other agricultural products, with some non-bulk (containerised) freight between regional New South Wales (predominantly from the Ettamogah Rail Hub in Albury), Toowoomba and Brisbane, including:

- 0.6 million tonnes of grain from northern New South Wales (Moree and the area to its north) is expected to travel to Brisbane on Inland Rail, diverting from rail and road to the Port of Newcastle
- 0.4 million tonnes of containerised cotton and cottonseed from Narrabri is expected to divert from road to rail for its export via the Port of Brisbane
- The grain production in the Darling Downs is predominantly moved by road to the Port of Brisbane. Cost savings generated by Inland Rail, which will require upgrades to branch lines and the Port of Brisbane Extension, could increase rail mode share to 40 per cent, consistent with rail's share of exports in other east coast ports
- This movement would increase grain and pulses freight to one million tonnes on Inland Rail in 2024–25, increasing current rail volumes by 0.6 million tonnes of diverted road freight
- The Darling Downs and Maranoa produce some 0.3 million tonnes of containerised cotton products and approximately 0.2 million of this is expected to use Inland Rail to be exported via the Port of Brisbane. This would see a doubling of the current rail use for cotton export.
- Approximately 0.4 million tonnes of freight is expected to travel from the Charlton Wellcamp freight precinct to the Port of Brisbane on Inland Rail. This freight is likely to include consolidated agricultural freight from the Toowoomba and Darling Downs regions, and manufactured goods from the onsite industrial precinct.

2.2.2 Future freight demand

In 2011–12, the Bureau of Infrastructure, Transport and Regional Economics estimated that the Australian domestic freight task totalled almost 600 billion tonne kilometres—equivalent to about 26,000 tonne kilometres of freight moved for every person in Australia (ACIL Allen Consulting, 2014). Of this volume, the domestic rail freight task totalled 261.4 billion tonne kilometres, accounting for approximately 46 per cent of total domestic freight. This represents an increase of 91 per cent since 2000–2001 (Infrastructure Australia, 2015).

The *Australian Infrastructure Audit* (Infrastructure Australia, 2015) noted that:

- The national land freight task is expected to grow by 80 per cent between 2011 and 2031
- Demand for freight rail infrastructure is expected to grow, particularly for resource bulk commodity haulage in Western Australia, Queensland and New South Wales
- There is an opportunity for freight rail to play a growing role in the movement of goods between ports and inland rail freight terminals, and in the movement of containerised and general freight over longer distances.

The Melbourne to Brisbane corridor is one of the most important general freight routes in Australia, supporting key population and employment precincts along the east coast and inland New South Wales. The current volume of non-bulk and complementary freight moving within the corridor is approximately 21 Mtpa. This is expected to increase to 40 million tonnes of freight per annum by 2050, consisting of manufactured (non-bulk) products, bulk steel, paper, agricultural and mining products (Infrastructure Australia, 2016). Rail has been losing mode share to road freight since 2003 on shorter hauls, such as Melbourne to Sydney and Sydney to Brisbane (ACIL Allen Consulting, 2014).

Inland Rail would help to ease the burden placed on roads by this additional volume of freight by providing an alternative means for transporting the equivalent of more than 200,000 truck movements annually from 2049–50 (ARTC, 2015c).

The eastern States of Australia comprise 18 million residents (79 per cent of Australia's population), nine million jobs (78 per cent of Australia's national employment) and contributes $1.1 trillion in gross State product (75 per cent of the share freight contributes to gross domestic product). Interstate freight transport is projected to increase by 70 per cent between 2015 and 2030, to 140 billion tonne kilometres. The Melbourne to Brisbane corridor already supports 17 per cent of these interstate movements (ARTC, 2015c).

With the population of the eastern States forecast to increase by 60 per cent over the next 40 years, the need for efficient and effective freight transport will continue to increase. Strong forecast population growth, accompanied by comparable employment growth, is likely to place significant pressure on existing infrastructure and services (ARTC, 2015c). Without the increased use of rail, the growth in freight demand is likely to increase pressure on the road network, resulting in:

- Increased freight costs
- Lost economic opportunities
- Increased frequency of safety incidents
- Increased road maintenance
- Increased pressure to expand the road network.

Inland Rail will intersect the east–west rail corridor at Parkes, better connecting all State mainland capitals and will serve a variety of freight markets, not just Melbourne to Brisbane, with significant demand from regional commodities and interstate freight. Inland Rail will also be a catalyst for other complementary investments in the supply chain, including new multimodal terminals, processing facilities and distribution centres along the supply chain (ARTC, 2018b).

In 2008, the then Australian Minister for Infrastructure, Transport, Regional Development and Local Government announced a second study, the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a). The purpose of this study was to analyse the likely economic and commercial benefits of an inland rail route between Melbourne and Brisbane, such as reducing the supply chain costs by a reported $10/tonne. The outcome was a determination of a preferred alignment, based on consideration of the economic benefits and key commercial considerations. This study is discussed further in Section 2.8.2.

In November 2013, the then Australian Minister for Infrastructure and Regional Development announced $300 million in funding for Inland Rail, to be used for activities such as detailed corridor planning, environmental assessments and community consultation. The Minister also announced that a high-level Implementation Group would be formed to drive Inland Rail.

In 2014, ARTC developed a *Melbourne to Brisbane Inland Rail Concept Business Case* (2014) as a precursor to a more detailed Programme Business Case. The *Melbourne to Brisbane Inland Rail Concept Business Case* outlined key scope and scheduling assumptions, identified key risks and environmental and planning considerations, and preliminary updates to demand, economic and financial analysis. Areas identified for further consideration and/or analysis including demand, costs and economic analysis, risks, technical and operational requirements were subsequently addressed within the *Inland Rail Programme Business Case* (ARTC, 2015c).

The *Inland Rail Programme Business Case* was developed in 2015 to provide a detailed assessment of why Inland Rail is needed and how it could be delivered. The viability, benefits, costs and risks associated with the Inland Rail Program were all assessed (ARTC, 2015c). This study is discussed further in Section 2.8.4.

2.3 History of Inland Rail

The development of an inland railway between Melbourne and Brisbane has been considered for more than a hundred years, first being formally considered in 1902 (ARTC, 2015b). The current Inland Rail Program was initiated in 2006, as a safe, sustainable solution to the freight challenge that will transform the way freight is moved around the country. The Inland Rail Program has been the subject of significant analysis for the following reasons:

- The existing north–south coastal railway will reach capacity in the next three decades. Additional capacity is required to accommodate increasing demand for interstate and regional rail freight in the future.
- The quality of service provided by the existing coastal route is adversely impacting on freight productivity and transport costs.
- The existing north–south coastal railway is trafficked by passenger and freight trains. This is impacting on the reliability of rail freight and is constraining opportunities for the expansion of passenger services.

In the absence of a continuous inland rail link between Melbourne and Brisbane, transporting freight by road has a competitive advantage over rail. This makes it difficult for rail freight to increase its market share. Transporting freight by road has associated safety, congestion and environmental risks (ARTC, 2015b).

Since 2006, two major studies have been commissioned in relation to the development of an inland rail route between Melbourne and Brisbane. The first study, the *North–South Rail Corridor Study* (ACIL Tasman & Hyder Consulting, 2006) examined the adequacy of the existing Melbourne to Sydney to Brisbane rail corridor to meet future freight demand. The study also examined different options for an enhanced, existing coastal route or alternative inland routes. Key issues identified in the study included infrastructure links, engineering, environmental, urban and regional planning issues. A financial and economic analysis was also undertaken on each of the route options. The study identified the ‘Far Western Sub-corridor’ through Parkes as the preferred corridor.

In 2008, the then Australian Minister for Infrastructure, Transport, Regional Development and Local Government announced a second study, the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a). The purpose of this study was to optimise the Far Western Sub-corridor route, and to analyse the likely economic and commercial benefits of an inland rail route between Melbourne and Brisbane. The outcome was the determination of a preferred alignment, based on consideration of the economic benefits and key commercial considerations.

It provided the government and private sector with information that would help guide future investment decisions, including likely demand, estimated construction costs, and a range of possible private financing options. The report recommended the Inland Rail should be considered again in the future as new details became available of the cost of coastal railway upgrade proposals, the capacity and reliability improvements they provide, and/or demand achieved.

The Australian Minister for Infrastructure and Regional Development announced funding for the Inland Rail Program in November 2013 to be used for activities such as detailed corridor planning, environmental assessments and community consultation, and the formation of a high-level Implementation Group to drive Inland Rail.

In 2014, ARTC developed *a Melbourne to Brisbane Inland Rail Concept Business Case* (ARTC, 2014) as a precursor to a more detailed Inland Rail Programme Business Case. The *Melbourne to Brisbane Inland Rail Concept Business Case* outlined key scope and scheduling assumptions, identified key risks and environmental and planning considerations, and preliminary updates to demand, economic and financial analyses.

The *Melbourne to Brisbane Inland Rail Concept Business Case* (ARTC, 2014) identified key areas for further consideration and/or analysis. These areas included demand, costs, risks, technical and operational requirements, and refined financial and economic analysis, which were subsequently addressed within the *Inland Rail Programme Business Case* (ARTC, 2015c).

The *Inland Rail Programme Business Case* was developed in 2015 to provide a detailed assessment of why Inland Rail is needed and how it could be delivered. The viability, benefits, costs and risks associated with the Inland Rail Program were all assessed (ARTC, 2015c). The *Inland Rail Programme Business Case* (ARTC, 2015c) sets out freight demand forecasts in scenarios with and without Inland Rail, which is summarised in Section 2.2.

2.4 Alternatives to rail freight

Alternative freight transport solutions with the potential to address Australia's current and future freight challenges were considered by the *Inland Rail Programme Business Case* (ARTC, 2015c) and the *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015).

Three capital investment options were assessed by the *Inland Rail Programme Business Case* (ARTC, 2015c), including:

- Progressive road upgrades
- Upgrading the existing east coast railway
- An inland railway.

These capital investment options were subjected to a rigorous assessment against seven equally weighted criteria consistent with the *Reform and Investment Framework* (Infrastructure Australia, 2014) as per the *Inland Rail Programme Business Case* (ARTC, 2015c), including:

- Capacity to serve future inter-capital and regional/bulk freight market needs on the east coast
- Foster economic growth through improved freight productivity and service quality (including improved reliability and resilience)
- Optimise environmental outcomes
- Alleviate urban constraints
- Enable regional development
- Ease of implementation
- Cost effectiveness.

Overall, constructing an inland railway was found to be the preferred option with an average 'high likelihood' of improving outcomes across all criteria. Progressive road upgrades and upgrading the existing east coast railway both had an average 'medium likelihood' of improving outcomes across all criteria.

In relation to individual criteria, progressive road upgrades outranked the inland railway option only in relation to ease of implementation and ranked equally with an inland railway in relation to enabling regional development outcomes. The inland railway option was found to be the best option across all other criteria.

The following alternatives were reviewed by the Inland Rail Implementation Group (IRIG):

- Maritime shipping
- Air freight
- Road freight
- Rail solutions.

The results of the review of alternatives undertaken by the IRIG are summarised below.

2.4.1 Maritime shipping

Maritime freight was examined as a potential alternative to Inland Rail based on two types of services, including:

- A dedicated service between Melbourne and Brisbane (coastal shipping)
- Using spare capacity on vessels calling at Melbourne and Brisbane as part of an international voyage.

The *2015 Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) concluded that:

- Shipping is unlikely to be a strong alternative to Inland Rail because it does not provide the level of service (transit time and service availability) required by much of the Melbourne to Brisbane interstate market
- Shipping still has a role to play, especially due to its strengths in transporting high-volume and long-distance cargo around the coast. Shipping can be used in conjunction with other modes such as an inland railway to meet Australia's future transport needs.

Australia's two largest container ports, Sydney and Melbourne, are near areas with very large volumes of passenger traffic (Sydney Airport and Melbourne central business district, respectively). Over 80 per cent of freight passing through both ports is transported to or from warehouses and terminals within their respective capital city, meaning urban congestion has a significant impact on the cost of moving freight. The *Australian Infrastructure Audit 2019* (Infrastructure Australia, 2019) illustrates congestion in 2016 around Port Botany and the Port of Melbourne, detailing very heavy congestion on key arterial access routes to the ports. Further, Infrastructure Australia's modelling shows the economic cost of increased congestion. Infrastructure Australia's updated modelling estimates that road congestion and public transport crowding cost the Australian economy $19.0 billion in 2016. Without continued infrastructure investment in our cities, this report suggests this cost will more than double by 2031 to reach $39.8 billion.

2.4.2 Air freight

Domestic air freight accounts for less than 0.01 per cent of total domestic freight movements in Australia by weight (IRIG, 2015). Most of these movements are comprised of newspapers and parcels between major cities, on either dedicated freight flights or on existing passenger flights. Air freight is highly specialised due to the inherent constraints on aircraft size and the nature of the goods that can be carried. The report concluded that:

- Air freight has a limited role to play in the transport of bulky or heavy goods on the Melbourne to Brisbane corridor, but will continue to play a crucial role for small, high-value and time-dependent goods
- Air freight is not a viable alternative for addressing Australia's freight requirements on the Melbourne to Brisbane corridor into the future.

2.4.3 Road freight

The role of road transport was considered as a potential alternative to Inland Rail. Road transport is the main mode of transport for most commodities produced or consumed in Australia. Along the north–south corridor, the main routes for road freight are on the Hume Highway (between Sydney and Melbourne), the Pacific Highway (for coastal transport between Sydney and Brisbane) and the Newell Highway (between Melbourne and Brisbane) (IRIG, 2015).

The identified issues and considerations relevant to road freight on these corridors include:

- The north–south road corridor will face significant local and regional capacity constraints for road freight in the medium to longer term
- The mix of local traffic, private vehicles, and freight vehicles on road transport corridors reduces reliability due to the different average travel speeds between cars and heavy vehicles, and increased accident rates
- Increased frequency of safety incidents between local traffic, private vehicles and freight vehicles on these corridors.
- Compared with rail, road freight results in additional environmental costs, including from air pollution, greenhouse gas emissions and water pollution. Improved sustainability is likely with an expected production of 750,000 fewer tonnes of carbon and one-third of the fuel when compared to road transport (ARTC, 2015c). Approximately 1,100 kilometres (km), or 70 per cent, of Inland Rail will use existing rail lines and corridors, making the best possible use of previous investments and minimising the impact on the environment and community (ARTC, 2019a).
- Road freight has the highest fatality rate of any industry in Australia, and the highest rate of serious injury claims compared to number of deaths as a result of vehicle crashes with trains at level crossings
- The cost to freight operators of congestion in urban areas due to reduced travel speeds and reliability for freight transport is estimated to be around $60 million per year for Melbourne to Brisbane inter-capital freight alone
- The Australian Government and State governments are investing in road infrastructure along the north–south corridor. However, this investment will be insufficient to alleviate all constraints on the road network. The productivity of road freight will continue to be vulnerable to road network constraints despite this investment.

The *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) concluded that:

- While road transport will continue to contribute to Australia's freight task, unless substantial additional investment is made in road infrastructure, it will be unlikely, by itself, to meet the longer-term needs for Australia's freight task due to significant local and regional capacity constraints
- If the Australian Government decides not to proceed with a rail solution, further investigation of road transport is required to determine its capacity to manage the future north–south freight task.

2.4.4 Rail solutions

The two main rail solutions considered by the IRIG were enhancement of the existing east coast railway and construction of a new inland railway.

The *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) noted that there are capacity, reliability and performance issues associated with the existing east coast railway. As shown in Section 2.2.1, the performance issues mainly relate to constraints associated with moving freight trains through the Sydney metropolitan rail network. The service offering constraints of the existing coastal rail route compared to Inland Rail are summarised in Table 2-1.

TABLE 2-1 COMPARISON OF EXISTING MELBOURNE TO BRISBANE COASTAL RAIL ROUTE TO INLAND RAIL SERVICE OFFERING

Service offering	Coastal rail (2014–15)	Inland Rail	Improvement with Inland Rail
Transit time	32 to 34 hours	Up to 24 hours	10 hours
Reliability[1]	83%	98%	15%
Availability[2]	61%	95%	34%
Relative price (to road)[3]	85%	57 to 65%	20 to 28%

Source: Inland Rail Programme Business Case (ARTC, 2015c)

Table notes:

1 Reliability is defined as the percentage of goods delivered on time by road freight, or available to be picked up at the rail terminal or port when promised.

2 Availability refers to the percentage of available departure and arrival services that are convenient for customers, which depends on cut-off and transit times.

3 Relative price is presented for non-bulk, inter-capital freight (door-to-door) indicating the range over the period 2024–25 to 2049–50.

As a sub-option of enhancing the existing east coast railway, the report noted that the proposed new Outer Sydney Orbital corridor would provide opportunities for a rail route that could ease freight congestion on Sydney freight networks. However, the main role of this corridor would be to address freight capacity constraints on other routes, such as those for intrastate and export freight. In addition, this option would not provide significant transit time savings for Melbourne to Brisbane freight, as the missing link between north–west New South Wales and southern Queensland would still be required, or the existing coastal line would need to be upgraded (IRIG, 2015).

The report concluded that:

- For Melbourne to Brisbane freight, the existing east coast railway would not be competitive with road in terms of cost or time, even with significant further investment. It is not a viable alternative to Inland Rail
- Inland Rail would meet Australia's future freight challenge and bring significant and positive national benefits by boosting national productivity and economic growth, while promoting better safety and environmental outcomes.

2.4.5 Summary of findings

Overall, in relation to the various alternatives to Inland Rail, the IRIG (2015) concluded that:

- While shipping and air will continue to play a role in the interstate freight market, they are not viable alternatives to rail
- Air freight is limited to transport of smaller goods and has a limited role in the transport of bulky or heavy goods
- Maritime shipping does not provide the level of service required by major interstate markets and has a significant impact on freight costs and urban congestion
- Although heavily used, productivity of road freight is vulnerable to road network constraints and is at increased likelihood of accidents. Road freight results in additional environmental costs, including from air pollution, greenhouse gas emissions and water pollution
- Road freight will be unable to meet the longer-term needs for Australia's freight task due to significant local and regional capacity constraints
- Without Inland Rail, road is the only mode capable of addressing the majority of the future freight task, with associated direct and indirect costs.

2.5 Benefits of proceeding with Inland Rail

Inland Rail presents a unique opportunity to establish a competitive freight system by providing trunk rail infrastructure that supports a network of intermodal terminals and local sidings for the distribution of commodities at the national, regional and local level.

As a component of the larger Inland Rail Program, the potential benefits of the Project cannot be separated from those that are attributed to the full Melbourne to Brisbane alignment. Therefore, the potential benefits of the Inland Rail Program and of this Project, as documented in the business case (ARTC, 2015c), are presented in this section.

Chapter 18: Economics and Appendix X: Social Impact Assessment provide detail of the benefits including strategic policy and planning of the Project. Appendix Y: Economic Impact Assessment includes a cumulative economic impact assessment which identifies the potential impact of cumulative stimulus to the economy resulting from a set of existing or planned projects within or adjacent to the study area (Figure 2-2). In addition, Appendix Y: Economic Impact Assessment outlines alignment to national, State and local government policy and planning such as the *Australian Infrastructure Plan*, *Queensland Freight Study* and the *Darling Downs Regional Plan*.

2.5.1 Direct benefits

Foreseeable direct benefits of Inland Rail and this Project are attributed to the Inland Rail Program, as identified by the *Inland Rail Programme Business Case* (ARTC, 2015c), are detailed below with further information provided in Chapter 18: Economics.

2.5.1.1 Improved access to and from regional markets

Inland Rail will improve access to and from regional markets through:

- Improved linkages to regional areas for inter-capital freight, such as via the direct connectivity that would be provided between the existing Queensland Rail (QR) South Western Line, Millmerran Branch Line and West Moreton Line. Inland Rail is expected to attract 2 million tonnes of agricultural freight from road to rail, with a total of 8.9 million tonnes of agricultural freight expected to be carried in 2050
- Improved access in agricultural areas to key local, regional and international markets, which will improve market drought resilience and the ability to move greater volumes of grain via rail
- A dedicated ARTC resource who works to grow new freight-on-rail business, including in regional areas. This involves building and maintaining relationships with potential customers, rail freight owners, terminal owners and industry stakeholders. Stakeholders along existing rail networks are engaged as possible users of Inland Rail where the existing regional network seamlessly integrates into the Inland Rail alignment
- The Project includes dual-gauged rail track, which will enable agricultural producers in northern New South Wales and South East Queensland to take advantage of this significant time-saving measure. It will provide a more cost-effective option for grain growers in northern New South Wales to transport their grain by rail to the Port of Brisbane, rather than to Newcastle.

2.5.1.2 Reduced costs for the market

Inland Rail will reduce costs to market through the efficiencies gained by the development of a dedicated freight rail system. Anticipated benefits include:

- Reduced inter-capital freight transport costs for the market are likely to result in lower prices for consumers (predominantly manufactured goods). This also presents an opportunity for flow-through of cost savings to reduce the cost of living for consumer households
- Inland Rail is likely to reduce lifecycle costs for infrastructure owners and operators on traditional road freight routes due to lower freight volumes on these assets. This would reduce maintenance costs and enable investments in capacity to be avoided or deferred
- Reduced transport costs may improve competitiveness of key markets and economic activity, particularly in the agricultural sector
- Inter-capital and agricultural freight currently travelling by road should benefit from reduced operating costs due to economies of scale in rail relative to road transport
- Reduced operating costs may improve the viability of some mines resulting in induced coal freight volumes that would not otherwise have occurred. There will be additional profits to mines, which Australian owners will retain, and additional taxes (company, royalties and payroll tax) for profits accruing to overseas owners (ARTC, 2015c).

2.5.1.3 Improved reliability and certainty of transit time

The dedicated Inland Rail freight system will deliver greater efficiencies in terms of reliability and certainty through the following measures:

- Improved reliability and certainty of transit time would result in productivity and economic efficiency due to operating cost savings, shorter transit times, improved availability and avoided road incidents on the coastal route
- Benefits associated with higher axle loads, longer trains, lower gradients and longer curves, resulting in shorter transit times
- Inland Rail would provide linkages between existing rail networks, such as the existing QR South Western Line, Millmerran Branch Line and West Moreton Line. Additionally, railway infrastructure within existing corridors used by Inland Rail would be subject to replacement and upgrade. New linkages and upgraded infrastructure would combine to enable faster transit time on existing journeys.

Freight customers have indicated they may be willing to pay for improved reliability and availability with Inland Rail. These benefits would induce additional freight volumes that would not have occurred in the absence of Inland Rail.

2.5.1.4 Increased capacity of the transport network

The capacity of the overall transport network will be enhanced by the development of Inland Rail via:

- Increased capacity would enable the opportunity to return unused freight routes to passengers in Sydney and Brisbane during off-peak periods (noting that passengers are already given absolute priority during peak periods on metropolitan networks)
- Improved customer outcomes for rail passengers between Sydney and Brisbane with unused freight schedule timeslots on the coastal route would be able to be returned to passenger services. The benefit of increased frequency of passenger services would reduce average wait time and provide greater reliability and certainty for passengers.
- Increased freight capacity would enable greater volumes of inter-capital freight to be moved via rail with a reduced reliance on existing State-controlled and local road networks
- By providing new linkages between existing rail networks, such as those operated by QR, Inland Rail would provide an option for alleviating future short-term or long-term capacity constraints on these railways
- Road traffic through Sydney will be relieved by allowing greater capacity for public transport, avoiding the need for capacity augmentation on existing routes
- Coal trains to use longer/heavier trains with better port access
- Agricultural freight, including grain to use rail in accessing key local and international markets.

2.5.1.5 Reduced distances travelled

Inland Rail will provide a shorter option for the transportation of freight, resulting in a reduced time between the point of source and the market for goods and produce. By providing new linkages between existing rail networks, such as those operated by QR, Inland Rail will provide a shorter route option for undertaking existing journeys.

2.5.1.6 Improved safety

In the context of road safety, the development of Inland Rail is expected to:

- Remove 200,000 long-haul truck movements from roads each year from 2049–50
- Reduce congestion and create capacity on existing road and rail networks in metropolitan Sydney
- Reduce burden on roads and improve safety
- Reduce truck volumes in over 20 regional towns
- Relocate mainline freight traffic from existing railways out of some town centres such as Inglewood, Pittsworth and Southbrook, providing for a safer environment with enhanced liveability
- Modernise global positioning system-controlled train movements through the Advanced Train Management System. Each train 'knows' where it is on the network and can be automatically braked if it exceeds speed or does not have permission to be on a section of track.

2.5.1.7 Improved sustainability

In the context of sustainability, the development of Inland Rail is expected to:

- Provide a long-haul freight solution that is time-competitive and cost-competitive compared to road freight. Consequently, Inland Rail will replace some of the long-haul road freight task, resulting in reduced road congestion and fewer vehicular carbon emissions

- Use one-third of the fuel compared to transporting the same volume of freight via the existing road route (ARTC, 2015c)
- Reduce environmental externality costs that represent reductions in air pollution and greenhouse gas emissions due to the Project. The majority of these benefits can be attributed to the mode shift from road freight to rail freight. Environmental externalities are assessed in Chapter 18: Economics, as part of the economic benefit assessment.

2.5.2 Indirect benefits

Foreseeable indirect benefits that cannot be directly attributed to the Inland Rail Program but rather arise through intervening factors or influences were also identified by the *Melbourne to Brisbane Inland Rail Concept Business Case* (ARTC, 2014). These indirect benefits are summarised below.

2.5.2.1 Create a step-change in the Australian freight network

Inland Rail offers significant performance advantages over the existing coastal rail route, including:

- Faster and more reliable transit times
- Shorter alignments
- More optimal grades
- The potential for double-stacking and longer and heavier axle load trains.

Inland Rail will improve the reliability and resilience of the freight network and improve access to export ports and urban freight destinations. Chapter 18: Economics quantifies the benefits to freight arising from the Project. This includes:

- Travel time savings
- Operating cost savings
- Improved availability
- Improved reliability.

These benefits will improve supply chain efficiency for society. These operational efficiencies will increase the role rail plays in the broader freight network and will allow rail to compete in the market as a viable alternative to road, increasing the overall network capacity and freight mode options available to the market. It will provide direct linkage to other ports, such as Sydney, through the East–West Line at Parkes as well as across to Perth, and Newcastle via Moree.

2.5.2.2 Act as a catalyst for growth

Inland Rail will futureproof Australia's freight task against road congestion associated with population growth and the projected increase in freight demand, allowing for increased productivity in major capital cities.

Chapter 18: Economics examines the flow-on effects arising from the Project on the broader economy and the multiplier effect. Determining flow-on effects on the broader economy includes modelling the additional direct and indirect jobs arising from the Project for the Darling Downs Maranoa, Queensland and Australian economies (Appendix Y: Economic Impact Assessment). The multiplier effect models the additional real gross regional product arising from the Project on the Darling Downs Maranoa, Queensland and Australia economies (Chapter 18: Economics). Inland Rail is expected to deliver 16,000 new jobs at the peak of construction, and an average of 700 additional jobs per year over the entire period. It is expected to increase Australia's gross domestic product by $16 billion during its construction and first 50 years of operation.

Inland Rail will improve the safety of the network with a better mix and separation of freight and passenger modes in urban and regional environments, providing options for movement of goods that do not require larger vehicles than is currently used throughout the passenger vehicle network. This separation will result in improved network efficiency by shorter journeys, lower fuel and maintenance costs, leading to supply chain efficiencies and reduced costs, which will ultimately benefit consumers.

At a regional level, the Project has the potential to catalyse development through:

- Opportunities to encourage, develop and grow Indigenous, local, and regional businesses through the supply of resources and materials for the construction works and operations stages of the Project (e.g. borrow and ballast materials, fencing, electrical installation (excluding rail systems) and instrumentation, rehabilitation and landscaping, cleaning and maintenance of construction and accommodation facilities)

- Opportunities in secondary service and supply industries (such as retail, hospitality and other support services) for businesses in proximity to the Project footprint (including opportunities to supply the three proposed accommodation facilities near to Millmerran, Inglewood and Yelarbon). The expansion in construction activity is also likely to support additional temporary flow-on demand and additional spending by the construction workforce in the local community.
- Flow-on effects arising from the Project on the broader economy, including household consumption, increased demand for workers and higher real wages lead to higher household consumption and living standards
- The potential of the Project to stimulate business and industry development at the Toowoomba Enterprise Hub in Wellcamp. By providing efficient transport access to intrastate and interstate markets, the Project may act as a catalyst for further private sector investment in this area, particularly for freight and logistics operations. The further development of the Toowoomba Enterprise Hub has the potential to unlock greater economic activity in the region, such as through promoting greater international export opportunities via Wellcamp Airport
- Upgrades and new dual-gauge track as a greenfield/brownfield development to create a more direct rail freight corridor for freight operators. As a critical link of the broader Inland Rail, the Project offers opportunities to support the local agricultural industry, by driving savings in freight costs, improving market access, and reducing the volume of freight vehicles on the region's road network.

2.5.2.3 Facilitate training and skills development

ARTC has a strong commitment to training local and Indigenous people. Appendix Y: Economic Impact Assessment outlines that recent statistics suggest with the introduction of the Project to the Darling Downs – Maranoa region, opportunities will arise in the labour market. These opportunities include recruiting, training and re-skilling available workforces. Gross Regional Product is projected to be approximately $410 million higher than the baseline during the construction works stage of the Project. These opportunities are further detailed in Appendix X: Social Impact Assessment. As a result of the Project, social benefits will primarily be in relation to employment, training and business supply. This includes training and career pathway development of young people, Indigenous people and unemployed people. Local agencies, recruitment, Technical and Further Education (TAFE), and advertising will be implemented to drive training and skills development. Training pathways and creation of opportunities for the development of skilled local and indigenous workers will be derived from the Project's construction works and operations stages.

Training pathways and the creation of opportunities for the development of skilled local and Indigenous workers through the Project's construction works and operations stages will be achieved by:

- Providing information about the nature of skills required with sufficient lead-time to enable local training programs to be customised
- Cooperating with high schools in the region and training providers to provide appropriate training and skill development, and identify available employment pathways
- Indigenous community networks, to encourage applications and increase the number of Indigenous people applying for jobs
- Key partners, to link training and development programs with other projects and local industries to provide the greatest regional benefit
- Queensland Government and Australian Government to provide long-term outcomes through training, mentoring and other support programs.

ARTC has established the Inland Rail Skills Academy, which is a collection of projects and partnerships with the aim to:

- Facilitate local employment and procurement opportunities regionally by 'priming the market' in each region in which Inland Rail would be constructed
- Make it easy for Inland Rail contractors to employ and procure trained and competent people locally
- Use the opportunity created by the Project to provide medium to long-term local and regional community benefits.

The Inland Rail Skills Academy comprises four pillars, including:

- Education: science, technology, engineering, maths and trades education in schools and university scholarships into Inland Rail related professions (e.g. engineering, project management)
- Skills and training: apprenticeships and traineeships, and gaining industry accreditation to support employment into Inland Rail projects as well as other major regional industries
- Business capacity building: for small-to-medium enterprises to understand and meet major projects' supply chain requirements and enhance the value proposition of local business chambers and business groups

- Inland Rail staff training and inductions: opportunities for individuals to increase skills in a range of areas, including safety and sustainability.

The Inland Rail Skills Academy, and its associated partnerships and projects, commenced in 2020 and will continue to deliver a range of programs and local training developed in cooperation with community, local councils and government stakeholders. ARTC's workforce development project, training partnerships and the Inland Rail Skills Academy will help to ensure that young people and Indigenous people in the region have the opportunity for skills training that will equip them for the construction industry and will be transferrable to future projects. It will also result in an increase in the skilled labour force in the Project region.

2.5.2.4 Enable complementary market-driven investments

The ultimate benefits of Inland Rail require interdependent and complementary investment in several other development opportunities and initiatives, and these will be coordinated across Inland Rail, including:

- Intermodal terminals, loading facilities and sidings for regional and agricultural freight
- Rollingstock investment in longer, heavier trains along with supporting train operations to take advantage of the improved rail offering (e.g. determination of arrival, departure and transit times) by train operators
- Double-stack terminal capacity in Melbourne and Brisbane and ability to accommodate 1,800 metre (m) trains
- Investment in connecting existing rail lines and rail sidings in south-west Queensland to the Port of Brisbane, for example, the South Western Line, the Millmerran Branch Line, the West Moreton Line and metropolitan Brisbane lines.

Chapter 18: Economics describes the workforce benefits of the project and potential long-term regional economic benefits arising from the operation of Inland Rail. This includes benefits arising from market driven investment in logistics, manufacturing and warehousing (examples are grain storage facilities, cotton handling facilities and regional airport expansions).

2.5.2.5 Benefits to communities, business and industry

The Project will benefit communities, business and industry during the following stages:

- Detailed design and pre-construction activities and early works:
  - detailed design and pre-construction activities and early works will result in a direct increase in employment and economic opportunities both locally and regionally. Community initiatives, partnerships and agreements will be established providing opportunities for local communities, business and industry.
- Construction works:
  - The Project's tendering process for the construction contract will enable competitive bidding for local procurement targets, incentivising the contractors to maximise local benefits. The total capital expenditure costs of construction and development for the Project and all the Queensland Inland Rail Projects are estimated to be $2.2 billion and $7.4 billion, respectively. This includes improvements in supply chain efficiency, tourism impacts, benefits to local businesses from procurement of construction materials and transportation and local service and supply business impacts.
- Operations:
  - The Project will benefit communities, business and industry during operation. Chapter 18: Economics describes the economic impacts and impacts to business and industry anticipated from the operations stage of the Project.
  - Analysis showed anticipated improvements in supply chain efficiency, tourism impacts, benefits to local businesses from procurement of construction materials and transportation and local service and supply business impacts. In addition, it is anticipated a mode shift from road freight to rail freight is likely to reduce the number of heavy vehicles travelling on the road network. As a result, the Project is expected to improve safety and environmental impacts, as detailed in Section 2.5. Opportunities provided by intermodal facilities to support mode shift is discussed in Section 2.7.7.2.
  - Improved productivity and economic efficiency as a result of operating cost savings, shorter transit times, improved reliability, improved availability, avoided incidents on the coastal route and an additional north–south rail option to avoid incidents.

Chapter 18: Economics qualitatively describes how the social costs and benefits will vary on an individual basis and are dependent on business opportunities, lifestyle, and amenity impacts. The economic benefits for businesses and industry arising from the Project includes benefits on the agricultural industry, tourism industry, mineral resource and petroleum industry and other local business. Benefits have been described qualitatively, and were applicable and information is readily available, have been described quantitatively. Appendix Y: Economic Impact Assessment summarises mitigation and management strategies to alleviate potential impacts on business and industry. All costs excluding capital expenditure are as per the *Inland Rail Programme Business Case* (ARTC, 2015c). Capital expenditure has been updated to be consistent with the 2020 ARTC Budget Reset, including the revision of figures to include up-to-date costs of landowner compensation, land acquisition costs, offsets, grade separations, noise mitigation, realignments and design refinements.

During construction works and operations stages of the Project, agricultural land and businesses existing operations may be disturbed.

The design development process used a combination of technical assessments and the ARTC multi-criteria analysis (MCA) tool, which is used across Inland Rail's program of works. An MCA assessment of the proposed alignment is further detailed in Section 2.9.1. Benefits derived from disturbances that may be caused by the Project on existing agricultural land and business, and acquisition of land and businesses are assessed in Chapter 8: Land Use and Tenure and Chapter 18: Economics.

2.6 Consequences of not proceeding with Inland Rail

Not progressing with Inland Rail would potentially constrain the future growth potential of the national economy. Without the increased rail efficiency and performance provided by Inland Rail, pressure on the road networks will continue to increase, freight costs will continue to rise, consumers would pay more for products, and productivity in important industrial sectors could decline.

Without Inland Rail, road will increasingly become the dominant freight transport mode, with rail becoming less relevant. A continued over-reliance on road transport to meet the future east coast freight task will increase the vulnerabilities to projected population growth that is, even today, driving shortages of long-distance truck drivers and increasing costs. Providing customer choice between competitive transportation modes will build resilience into the national freight network.

More specifically, if investment in the east coast/Inland Rail freight corridor is not undertaken to increase capacity and minimise supply chain costs, the following risks are highly likely to eventuate:

- National productivity and economic growth will be constrained
- Freight companies and the consumers of products transported along the corridor are expected to experience excessive freight costs
- There will be an increase in congestion on both rail and road networks, given the reliance on shared freight/passenger corridors
- There will be an increase in the number of trucks on urban and regional roads required to move the rising freight volumes
- Governments will be required to make significant investments in major arterial and regional roads to ensure they can support the increase in the number and size of heavy vehicles
- There will be a deterioration of safety on the road network with existing infrastructure not supportive of changes in vehicle mix
- Fuel used and emissions discharged from an increased number and size of heavy road vehicles will have greater environmental impacts when compared to rail
- An increase in freight road traffic will have major impacts on urban and regional communities on the freight route, such as congestion, amenity and noise, resulting in safety and environmental issues
- Significant economic impacts associated with the inability of the freight network to meet the demand for goods and services.

Chapter 8 to Chapter 22 of the revised draft EIS include impact assessment of the revised reference design and identify potential impacts which have been avoided or mitigated, and outline opportunities proposed by the Project. Chapter 18: Economics details benefits to community from crash reductions, reduced environmental externalities and road decongestion, and resulting improvements in freight productivity, reliability and availability benefits which will be achieved on operation of the Inland Rail Program.

2.7 Strategic planning context

This section identifies the national and State freight strategies and plans and discusses how the Project meets and supports their planning intent. Planning frameworks of relevance to the conceptual development of Inland Rail and the Project, addressed in this section include:

- *National Land Freight Strategy—A place for freight* (Standing Council on Transport and Infrastructure, 2013)
- *Toowoomba Region Sustainable Transport Strategy* (Toowoomba Regional Council (TRC), 2022b)
- *Reforms to meet Australia's future infrastructure needs 2021 - Australian Infrastructure Plan* (Infrastructure Australia, 2021a)
- *South East Queensland Regional Plan 2023* (*ShapingSEQ*) (Department of State Development, Infrastructure, Local Government and Planning (DSDILGP), 2023a)
- *Toowoomba Region Economic Development Strategy—Bold Ambitions 2038* (TRC, 2018a)
- *National Freight and Supply Chain Strategy* (Transport and Infrastructure Council, 2019)
- *Queensland Freight Strategy—Advancing Freight in Queensland* (Department of Transport and Main Roads (DTMR), 2019a)
- *Darling Downs Regional Transport Plan* (DTMR, 2019b).

For each of these strategies and plans, an overview is provided below, in addition to discussion on the relevance to the Project.

2.7.1 Australian Infrastructure Plan

2.7.1.1 Overview

The *2021 Australian Infrastructure Plan* (Infrastructure Australia, 2021) was developed by Infrastructure Australia as a long-term plan for infrastructure reform and investment in Australia. The *2021 Australian Infrastructure Plan* is guided by four aspirations:

- Productive cities, productive regions
- Efficient infrastructure markets
- Sustainable and equitable infrastructure
- Better decisions and better delivery.

Within the 'productive cities, productive regions' aspiration, the plan recognises that, at a national level, the efficient movement of freight into, out of, and across Australia is critical to the nation's ongoing productivity growth and competitiveness. The *2021 Australian Infrastructure Plan* identifies a number of challenges facing the freight network and supply chains, including constraints such as missing links, pinch points, operational restrictions, and first and last mile access challenges.

2.7.1.2 Relevance to the Project

The *2021 Australian Infrastructure Plan* replaced the 2016 plan (Infrastructure Australia, 2016) as a reform pathway in response to infrastructure challenges and opportunities identified in the updated *Australian Infrastructure Audit 2019* (Infrastructure Australia, 2019). In the interest of consistency and historical development of the Project's planning process, references to numbers and data supplied by historical versions of the *Australian Infrastructure Plan* and audit throughout this document will remain with the original referencing where applicable. All other references to these plans have been updated to the most recently published document versions.

The 2016 plan (Infrastructure Australia, 2016) detailed the importance of the Melbourne to Brisbane freight corridor in supporting population, production and employment precincts. The previous plan noted that the Inland Rail will improve the efficiency, effectiveness and safety of freight movements travelling along this corridor.

The *2021 Australian Infrastructure Plan* reinforces the importance of rail freight strategy with *Outcome 4.2.1: Maintain reliable access for supply chains under all conditions by coordinating technological, operational and infrastructure improvements delivered under the National Freight and Supply Chain Strategy*.

Recommendation 4.2 of the *2021 Australian Infrastructure Plan* is connecting regional and remote Australia and the key message states increasing the availability and use of freight rail is a high priority for governments, including optimising access to Inland Rail.

Inland Rail will improve the efficiency, effectiveness and safety of freight movements travelling along the Melbourne to Brisbane corridor supporting population, production and employment precincts. As both a greenfield and enhancement (brownfield) development, the Project will contribute to the realisation of these benefits, including improvements to the productivity and competitiveness of Australia's freight sector.

The *2021 Australian Infrastructure Plan* recommends strategic investment in freight transport infrastructure. To support business and economic growth and meet sustainability targets, Australia's freight transport industry needs to:

- Be given easier access to export gateways
- Leverage technological innovation
- Take advantage of the connectivity benefits of Inland Rail for certain commodities.

A major investment priority is ensuring easy connections to Inland Rail that extend the reach and benefits of this Project.

The *2021 Australian Infrastructure Plan* highlights the importance of multimodal solutions for freight journeys. Rail track operators should prioritise the separation of passenger and freight movements to improve the speed and reliability of regional rail services.

2.7.2 National Freight and Supply Chain Strategy

2.7.2.1 Overview

The *National Freight Strategy* (Standing Council on Transport and Infrastructure, 2013) was developed as a partnership between the Australian Government, State, Territory, local governments and industry to deliver a streamlined, integrated and multimodal transport and logistics system, capable of efficiently moving freight throughout Australia.

The objective of the strategy was to improve the efficiency of freight movements across infrastructure networks, minimise the negative impacts associated with freight movements and influence policy making relevant to the movement of freight.

In 2013, the strategy was revised and replaced by the *National Freight and Supply Chain Strategy* (Transport and Infrastructure Council, 2019) which was established in response to the following concerns:

- Australia's freight volumes are projected to grow by over 35 per cent between 2018 and 2040. Freight volumes are also changing, with urban freight forecast to increase by nearly 60 per cent from 2020 to 2040, in conjunction with growing population density pressures
- Australia's freight productivity and costs have plateaued, with little change in real freight costs since the 1990s. These trends impact the competitiveness of our exports, including minerals and agriculture travelling from our regions to international markets
- Changes in the way goods are made, purchased and distributed and technological advances, especially digitalisation, automation and electrification, have the potential to dramatically improve freight productivity and costs.
- Australia's freight and supply chains need to build resilience to meet emerging issues associated with natural disasters and climate risk, security and cyber threats and increasing community demands to improve safety and environmental outcomes.

In response to these concerns, the 2019 strategy sets an agenda for coordinated and well-planned government and industry action across all freight modes over the next 20 years and beyond. It sets a national vision for freight systems and supply chains to contribute to a strong and prosperous Australia through achieving the following goals:

- Improved efficiency and international competitiveness
- Safe, secure and sustainable operations
- A fit-for-purpose regulatory environment
- Innovative solutions to meet freight demand
- A skilled and adaptable workforce
- An informed understanding and acceptance of freight operations.

These goals guide governments and industry in considering strategic priorities for freight policy, programs and investment. The strategy determines that the goals will be achieved by taking national action across four critical areas:

- Smarter and targeted infrastructure investment
- Enable improved supply chain efficiency
- Better planning, coordination and regulation
- Better freight location and performance data.

2.7.2.2 Relevance to the Project

Inland Rail, and the Project, will deliver a fast, safe and reliable freight rail connection between Melbourne and Brisbane. It will also provide an efficient supply chain backbone, which will enable connections with regional and national rail lines, this is consistent with the goals of the *National Freight and Supply Chain Strategy* (Transport and Infrastructure Council, 2019). These connections will reduce costs and provide greater flexibility in the way producers are able to transport goods and freight to markets throughout Australia, including to ports in Queensland, New South Wales, Victoria, South Australia and Western Australia (ARTC, 2022a).

2.7.3 State Infrastructure Strategy

2.7.3.1 Overview

The *State Infrastructure Strategy* (DSDILGP, 2022a) aims to 'drive' collaborative State infrastructure planning to boost productivity, grow our economy and create jobs throughout the State. Infrastructure planning and delivery will leverage opportunities to improve the liveability of our communities and capitalise on innovation to build a strong, sustainable, and resilient Queensland.

The *State Infrastructure Strategy* (DSDILGP, 2022a) has four guiding objectives that have helped shape the 183 priorities. The objectives aim to:

- Encourage jobs, growth, and productivity: Investing in productive infrastructure to drive industry diversification and deliver a sustainable infrastructure pipeline
- Enhance sustainability and resilience: Reducing our environmental impact and improving infrastructure resilience and adaptation through better design and management of both built and natural assets
- Develop regions, places, and precincts: Creating thriving, resilient and liveable communities through place-based infrastructure planning and delivery
- Adopt smarter approaches: By focusing on innovation and using data and technology to improve productivity through infrastructure delivery, operation, and maintenance, including 'digital by default'.

2.7.3.2 Relevance to the Project

The *State Infrastructure Strategy* (DSDILGP, 2022a) highlights the importance for the State government of continuing to work with the Australian Government to maximise the benefits of Inland Rail in Queensland. The Project will support the delivery of the strategy by enhancing connections with producers and markets and creating new opportunities to deliver freight between Melbourne and Brisbane, and beyond to global markets.

2.7.4 Queensland Freight Strategy—Advancing freight in Queensland

2.7.4.1 Overview

The *Queensland Freight Strategy—Advancing freight in Queensland* (DTMR, 2019a) sets a shared vision for the State's freight system through a series of commitments that have the aim of guiding policy, planning and investment decision making over the next ten years:

- Build effective partnerships: Collaboration to deliver a freight system that advances customer, industry, and government interests
- Unlock economic opportunity: Optimise the use of existing freight infrastructure and target investment towards creating economic opportunities
- Smarter connectivity and access: Plan a freight system that provides Queensland business with smarter access to local, national and overseas markets
- A resilient freight system: Support the adoption of sustainable freight practices and resilient infrastructure
- Safer freight movements: Support safe freight movements across Queensland through technology and system planning.

The vision for Queensland is 'an integrated, resilient and safe freight system that supports the economy and community'.

The strategy makes a commitment to optimise existing freight infrastructure and target investment towards creating economic opportunities. The strategy also acknowledges the importance of smarter connectivity and access, identifying the role of competitive rail freight services in promoting the mode shift for freight from road to rail.

2.7.4.2 Relevance to the Project

The development of Inland Rail, and the Project, supports the strategic intent and direction of the strategy, by ensuring connectivity to existing operating lines, such as the South Western Line and the Millmerran Branch Line, to improve the efficiency of rail freight. The Project is projected to improve the productivity of regional and State supply chains and industry.

Direct benefits including improved access to markets, improved reliability, capacity and connectivity of transport networks, and improved safety presented in Section 2.5.1 and indirect benefits such as community, business and industry benefits, and connectivity to market and increased investments presented in Section 2.5.2 demonstrate that the Project is consistent with the intent of the *Queensland Freight Strategy* (DTMR, 2019b).

2.7.5 *South East Queensland Regional Plan 2023*

2.7.5.1 Overview

ShapingSEQ 2023 is a statutory regional plan for the South East Queensland region, setting a long-term vision for the growth of the region, together with a series of outcomes and actions to achieve this vision. *ShapingSEQ 2023* acknowledges the importance of infrastructure investments such as the Inland Rail Program to enable future connection of ports, such as the Port of Brisbane and the Toowoomba Wellcamp Airport, to an extensive freight network of major interstate rail and road connections, reinforcing South East Queensland as the apex of Australia's strategic freight network.

2.7.5.2 Relevance to the Project

The Project is located within the western sub-region of South East Queensland. *ShapingSEQ 2023* outlines the western sub-region's role as the Western Gateway in connecting South East Queensland to the rural areas of the Darling Downs and South Burnett and providing critical freight connections between northern NSW and the southern states. The sub-region is identified as an emerging national and global-oriented economy leveraging major investments in airport, logistics and freight infrastructure.

ShapingSEQ 2023 recognises the role of Inland Rail as a region-shaping infrastructure priority for the State. It identifies the Inland Rail Program as being able to support increased capacity to manage freight through South East Queensland generally, and provides specific opportunities in major enterprise and industrial areas in the Toowoomba local government area, such as the Toowoomba Enterprise Hub (Charlton–Wellcamp Enterprise Area). Furthermore, the Inland Rail Program has the potential to enhance the Western Gateway Regional Economic Cluster. This regional economic cluster supports significant agricultural and resource activities and priority sectors of manufacturing, transport and logistics, and health and knowledge.

2.7.6 Toowoomba Region Sustainable Transport Strategy

2.7.6.1 Overview

The *Toowoomba Region Sustainable Transport Strategy* (TRC, 2022b) is a plan for the future integrity and sustainability of the transport system in Toowoomba. It is TRC's guide for transport policy, transport planning and future transport investment to ensure transport supports the natural and built environment into the future while allowing economic growth and maintaining social services.

In 2022, TRC endorsed a refresh of the *Toowoomba Region Sustainable Transport Strategy 2014* in response to current and emerging challenges and opportunities and to ensure the transport system is fully integrated with the principles contained within TRC's Corporate Plan and other strategic planning documents for the Toowoomba. It seeks to achieve a desired sustainable transport future through the implementation of strategies that focus on the three key themes of people, place and prosperity.

The strategy provides the planning framework to improve the connectivity of the region, and has been developed to complement forthcoming infrastructure developments, including Inland Rail. Inland Rail is identified as a project that will significantly change how freight moves through the region.

2.7.6.2 Relevance to the Project

Under the 'prosperity' theme, freight is recognised as an integral part of Queensland's economy. The Toowoomba region is identified as playing a key role in the supply chain as a strategic link in the National Land Transport Network, transporting goods for key industries including agriculture, manufacturing and mining. The strategy identifies notes there is still more work to be done to improve connectivity to local, regional, national and international markets. The *Toowoomba Region Sustainable Transport Strategy* identifies that the Inland Rail project will solidify Toowoomba's role of national significance, serving as a major catalyst to achieve freight network efficiencies, supply chain investments and unlock new growth opportunities in our region. The strategy identifies an intention for TRC to leverage the potential of Inland Rail by working with the State Government and Inland Rail to provide connectivity to major freight generators such as the Western Trade Gateway and update land-use planning to pro-actively respond to current and future freight opportunities.

2.7.7 Toowoomba Region Economic Development Strategy—Bold Ambitions 2038

2.7.7.1 Overview

The *Toowoomba Region Economic Development Strategy* (TRC, 2018a) describes an ambition for the future economic position of the region. The vision states that by 2038 *'…the Toowoomba region has an internationally competitive, vibrant, diverse and inclusive economy that provides opportunities for employment, entrepreneurship and investment that enhance the region's lifestyle and environment*'.

The development of Inland Rail is included in the strategy as an opportunity to enhance the region's agricultural industry supply chain and increase the competitiveness of Toowoomba's agriculture in domestic and international markets. This is especially important in maintaining the region's role as an agricultural hub and pivotal freight and logistics centre. Industries such as food-product manufacturing, machine manufacturing, and freight and logistics will be able to capitalise on the freight link provided by the Project and the broader Inland Rail Program.

The strategy also mentions the opportunity for transport and logistics, and freight and warehousing business development as a result of major road, rail and infrastructure investment in the region.

2.7.7.2 Relevance to the Project

The Project alignment is adjacent to the Toowoomba Enterprise Hub, which includes the InterLinkSQ intermodal facility and Toowoomba Wellcamp Airport. Connecting the Project to this hub will enable the region to further capitalise on its export potential to Asia and other global markets out of the Toowoomba Wellcamp Airport. In addition, the *Economic Development Strategy* highlights the opportunity for further growth and development of these facilities as a result of Inland Rail. The Project has the potential to assist in facilitating greater intermodal opportunities and freight movements, in addition to supporting investment into these adjacent freight and logistics businesses.

2.7.8 Darling Downs Regional Transport Plan

2.7.8.1 Overview

The *Darling Downs Regional Transport Plan* (Darling Downs RTP) (DTMR, 2019b) outlines a shared direction for shaping the region's transport system over the next 15 years. The Darling Downs RTP sets out regional transport priorities and actions for developing the transport system in a way that supports regional communities, growth and productivity. The Darling Downs RTP details the economic importance of the relationship between infrastructure, transport and land use.

The Darling Downs RTP recognises the vital role of the freight network, particularly rail freight, across the Darling Downs in supporting future trade development and growth of the region's export-orientated industries. The Darling Downs RTP highlights the potential for Inland Rail to enable improvements in supply chains and freight productivity. Specifically, Inland Rail has been identified as an opportunity to improve access to export gateways and affords the region the opportunity to be the gateway for southern Queensland and north-western New South Wales to local, national and international markets.

2.7.8.2 Relevance to the Project

Overall, the Project, as part of the broader Inland Rail Program, will increase the attractiveness and competitiveness of rail freight, consistent with the planning intent of the Darling Downs RTP.

The direct and indirect benefits including optimised road network safety, improved reliability, efficiency and capacity of transport networks, improved access to markets and export gateways, facilitated training and skills development and overall community, business and industry benefits presented in Sections 2.5.1 and 2.5.2 further demonstrates that the Project is consistent with the intent of the Darling Downs RTP.

2.8 Strategic options assessment

This section is a discussion of the strategic option assessments for Inland Rail, from 2006 to 2015, and for the Project, from 2016 to early 2017.

Alternative routes for Inland Rail, between Melbourne and Brisbane, were initially considered through the following studies:

- *North–South Rail Corridor Study* (Ernst & Young, ACIL Tasman & Hyder Consulting, 2006)
- *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a)
- *2015 Melbourne–Brisbane Inland Rail Report* (IRIG, 2015)
- *Inland Rail Programme Business Case* (ARTC, 2015c).

Sections 2.8.1 to 2.8.4 summarise these studies, including a discussion of the route options assessed and the outcomes of the options analysis. The *2015 Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) and the *Inland Rail Programme Business Case* (ARTC, 2015c) culminated in the finalisation of the Inland Rail service offering and approval from the Australian Government to proceed to the concept planning stage for the Program. The Inland Rail service offering is discussed in Section 2.8.5. A discussion of the main corridor and alignment option assessments completed from early 2016 to late 2017 during the concept assessment stage of the Project is provided in Section 2.9.

A comprehensive review and assessment of potential alignment options was undertaken. The design development process used a combination of technical assessments and the ARTC MCA tool, which is used across Inland Rail's program of works. The option selection and design process considered the issues raised during consultation with relevant stakeholders, and the findings of environmental and engineering investigations. This included assessing alignments against best-case social, environmental and economic outcomes, in combination with the other criteria outlined below:

- Environmental impacts—12.5 per cent (including potential ecological, visual, noise and vibration, flooding and water impacts, and the effect on air quality and greenhouse gas emissions)
- Community impacts—12.5 per cent (including property impacts, Aboriginal cultural heritage and non-Aboriginal heritage, land use and economic impacts)
- Approvals and stakeholder engagement—12.5 per cent
- Technical viability—17 per cent
- Safety assessment—16.5 per cent
- Constructability and schedule—12.5 per cent
- Operations—16.5 per cent.

Furthermore, the Project alignment contained multiple alignment options within smaller sections that are described and illustrated in Section 2.9.1.

2.8.1 North–South Rail Corridor Study (2006)

The purpose of the *North–South Rail Corridor Study* (Ernst & Young, ACIL Tasman & Hyder Consulting, 2006) was to identify a route from Melbourne to Brisbane that would deliver the best overall outcome with consideration for:

- Market demand
- Operating efficiency
- Infrastructure requirements
- Environmental constraints.

The report considered:

- Route options (Section 2.8.1.1)
- Market assessment
- Projected demand
- Environmental issues
- Other transport infrastructure requirements
- Financial and economic impacts.

2.8.1.1 Options identified

Potential route options were identified within a 'north–south rail corridor', which was an elliptically shaped area defined by the standard gauge rail line along the New South Wales coast, and a broad arc west of Shepparton, Jerilderie, Coonamble, Burren Junction, Goondiwindi and Toowoomba. This area covered all sections of the existing rail network in Victoria, New South Wales and Queensland that currently form, or could potentially form, part of an Inland Rail freight route between Melbourne and Brisbane. The study area for the *North–South Rail Corridor Study* (Ernst & Young, ACIL Tasman & Hyder Consulting, 2006) is shown in Figure 2-2.

Within this corridor, four sub-corridors were identified, each of which could be combined with alternative routes between Melbourne and Junee, via Shepparton or via Albury. The four sub-corridors comprised:

- Far Western Sub-Corridor—linking Junee to Brisbane via Parkes, Dubbo and/or Narromine, Coonamble, Burren Junction, Narrabri and/or Moree, North Star, Goondiwindi, Warwick and/or Toowoomba

- Central Inland Sub-Corridor—linking Junee to Brisbane via any inland route that includes the Werris Creek to Armidale to Tenterfield rail links
- Coastal Sub-Corridor—following the existing coastal route between Junee and Brisbane (via Goulburn), through Sydney
- Hybrid Sub-Corridor—combining elements of an inland and coastal route, linking Junee to Brisbane via Muswellbrook and Maitland.

Within each of these sub-corridors, the feasibility of 136 possible route options was investigated. These options involved different combinations of new tracks and upgrades to existing tracks.

2.8.1.2 Analysis of options

The route options were compared using an optimisation model specifically developed for the study, based on the following criteria:

- Operating efficiency
- Infrastructure requirements
- Market demand
- Environmental constraints
- Financial and economic viability.

The study identified potential demand, financial issues, environmental issues and infrastructure costs relevant to the four sub-corridors. The analysis undertaken for the study concluded that the Far Western Sub-Corridor (via Albury and Parkes) was the best performing sub-corridor option, based on the following:

- Shortest and fastest transit journey from north to south, while avoiding the impact of Sydney rail traffic congestion
- This option was projected to require the lowest level of capital expenditure of the four sub-corridors
- In addition to carrying Melbourne–Brisbane freight, the far western sub-corridor had the potential to derive additional revenue from southern Queensland freight travelling to the western States and from Perth to the east coast. This additional revenue opportunity is specific to this sub-corridor.
- A rail freight line through the far western sub-corridor is expected to divert some of the freight that moves between regional areas and ports.

FIGURE 2-2 STUDY AREA FOR THE NORTH–SOUTH RAIL CORRIDOR STUDY, AS PUBLISHED IN THE NORTH–SOUTH RAIL CORRIDOR STUDY—DETAILED STUDY REPORT

Source: Ernst & Young, ACIL Tasman & Hyder Consulting, 2006

2.8.2 Melbourne–Brisbane Inland Rail Alignment Study (2010)

In 2008, Inland Rail was announced by the Australian Government to be led by ARTC. The *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a) was commissioned following this announcement. This study established the 'base case' alignment.

The purpose of the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a) was to determine the optimum alignment within the Far Western Sub-Corridor identified in the *North–South Rail Corridor Study* (Ernst & Young, ACIL Tasman & Hyder Consulting, 2006). The report considered:

- Market take-up
- Route development and high-level costings
- Capital cost vs transit time
- Financial and economic appraisal.

2.8.2.1 Options identified

The *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010a) shortlisted and analysed viable route options, through:

- Identification of the route—evaluation of the route options and preliminary analysis for the three main areas: Melbourne to Parkes, Parkes to Moree, and Moree to Brisbane
- Analysis of the route—the route was analysed in terms of capital cost, potential environmental impacts, journey time, as well as its preliminary economic and financial viability
- Development of the preferred alignment—the preferred alignment was developed considering environmental, social and engineering factors.

The study noted that, with the combination of numerous route options and sections, there were over 50,000 possible options for the route between Melbourne and Brisbane. As it was not feasible to analyse each option, two key criteria (i.e. capital cost and journey time) were used to establish a shortlist of route options in each of the three main areas. The shortlist included:

- Southern Section (Melbourne to Parkes)—two shortlisted options:
  - via Albury, using existing track from Melbourne to Parkes (with a possible new direct line from Junee or Illabo to Stockinbingal by-passing Cootamundra)
  - via Shepparton, using the existing broad-gauge Mangalore–Tocumwal line via Shepparton, the disused standard gauge line to Narrandera and a new direct connection through to near Caragabal, before re-joining the existing line to Parkes
- Central Section (Parkes to Moree)—four shortlisted options:
  - Parkes to Moree via Werris Creek, using existing track (with a new section of track at Binnaway and Werris Creek to avoid reversals)
  - Parkes to Moree via Binnaway and Narrabri, using existing track to Binnaway and then a new section connecting to the existing track near Emerald Hill or Baan Baa
- Parkes to Moree via Curban, Gwabegar and Narrabri, using existing track to Narromine, predominantly new track between Narromine and Narrabri, and existing track from Narrabri to Moree
- Parkes to Moree via Burren Junction, using existing track to Narromine, and predominately new track via Coonamble and Burren Junction to Moree
- Northern Section (Moree to Brisbane)—two shortlisted options:
  - the Warwick route—a new 'greenfield' route via Warwick to the existing standard gauge Sydney–Brisbane line
  - the Toowoomba route—a new corridor direct from Inglewood to Millmerran and Oakey, near Toowoomba, and then a new alignment down the Toowoomba Range. It was also proposed to use the Southern Freight Rail Corridor from Rosewood to Kagaru.

Each of these sections, and the options within them, are shown on Figure 2-3.

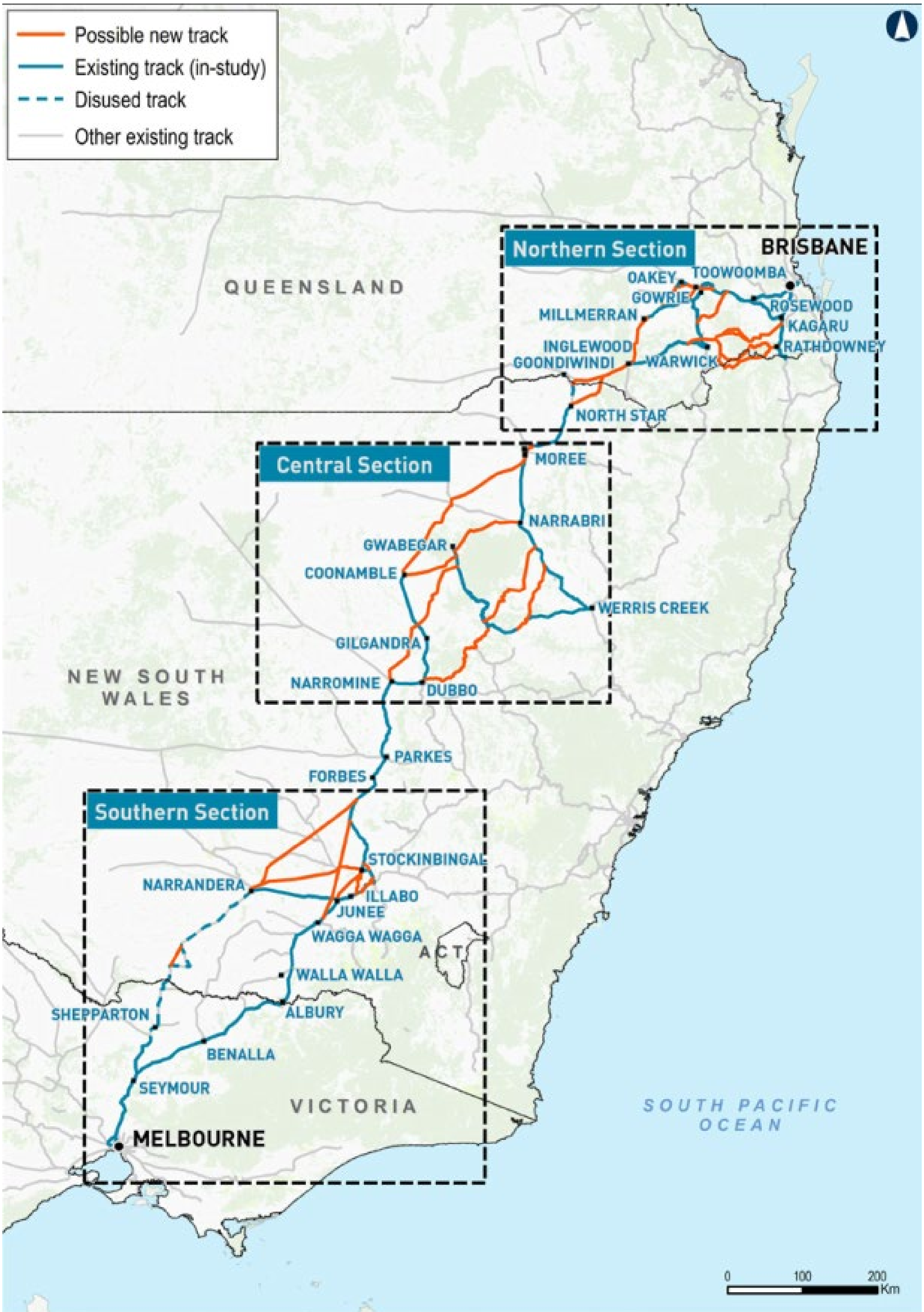


FIGURE 2-3 STUDY AREA FROM THE INLAND RAIL ALIGNMENT STUDY 2010

2.8.2.2 Analysis of options

A number of route options were evaluated in the southern, central and northern sections of the Far Western Sub-Corridor. The evaluation considered:

- Capital cost vs transit time
- Impacts on demand
- Financial and economic performance.

Optimal economic performance was a key decision criterion in the choice of the overall route and, in the key central sector, led to the recommendation of a shorter, faster Narromine to Narrabri direct greenfield route, rather than using existing corridors via Werris Creek.

The routes were assessed on the basis of their ability to attract contestable freight. Freight firms and customers were surveyed to understand how modal choices on contestable freight were made. For express and other just-in-time freight, minimum transit time and high reliability were identified as essential.

The report found that the:

- Southern Section offered the greatest opportunity to save money, as the Shepparton route was estimated to cost $900 million more than the Albury route (2010 dollars, not updated)
- Central Section offered the greatest opportunity to save time, saving more than 5 hours 30 minutes by not going via Dubbo and Werris Creek
- Northern Section offered the greatest opportunity to use existing protected rail corridors in greenfield sections.

On this basis, the final preferred alignment consisted of:

- Southern Section:
  - Tottenham–Albury–Illabo (existing corridor)
  - Illabo–Stockinbingal (greenfield)
  - Stockinbingal–Parkes–Narromine (existing corridor).
- Central Section:
  - Narromine–Narrabri (greenfield)
  - Narrabri–North Star (existing corridor).
- Northern Section:
  - North Star–Yelarbon (greenfield)
  - Yelarbon–Gowrie–Kagaru (greenfield plus existing corridors).

Some sections of the existing corridor were identified as requiring enhancement works, principally clearance improvements to accommodate double-stacked trains, while others were secondary lines requiring upgrading to full main line standards.

This work was later reaffirmed in the work undertaken in 2015 by the IRIG (Section 2.8.3) and formalised in the Inland Rail Service Offering (Section 2.8.4).

2.8.3 Melbourne–Brisbane Inland Rail Report (2015)

To progress Inland Rail, in late 2013 the then Deputy Prime Minister, the Hon Warren Truss MP, established the IRIG to lead the development of a 10-year delivery program for Inland Rail by ARTC and prepare the business case. Responsibilities included settling the alignment, determining construction priorities, commencing pre-construction and monitoring the development of the program. The IRIG was chaired by former Deputy Prime Minister, the Hon John Anderson AO, with senior representatives from the Australian, New South Wales, Queensland and Victorian governments, and ARTC.

In 2015, the IRIG prepared a report to the Australian Government, which set out a strategic analysis of the need for Inland Rail as one potential solution to the future freight task along the Melbourne–Brisbane corridor and included the main features of a business case for Inland Rail developed during 2014 and 2015 by ARTC. The report, *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015), also provided government with recommendations on the delivery of Inland Rail. The report was written to be read in conjunction with *Inland Rail Programme Business Case* (ARTC, 2015c) (Section 2.8.4).

In relation to the route for Inland Rail, the IRIG broadly agreed with the alignment identified in the *Inland Rail Alignment Study* (2010) (Section 2.8.2.2), but considered three sections in more detail:

- Albury vs Shepparton: The IRIG endorsed the route via Albury (as per the *Inland Rail Alignment Study* (2010) rather than Shepparton because freight values coming from Shepparton did not justify the added cost of between $1 billion and $2 billion (2015 dollars, not updated)
- North Star to Toowoomba: The IRIG noted that further hydrological and geotechnical assessments were needed between North Star and Toowoomba, which may result in a final alignment to the east or west of the alignment identified in the *Inland Rail Alignment Study* (2010)
- Toowoomba Range: The IRIG endorsed adoption of Queensland Transport's 2003 alignment between Gowrie and Grandchester.

The Inland Rail route endorsed by the IRIG is shown on Figure 2-4.

2.8.4 Inland Rail Programme Business Case (2015)

The *Inland Rail Programme Business Case* (ARTC, 2015c) was prepared to accompany the IRIG's *2015 Melbourne–Brisbane Inland Rail Report* (2015) (Section 2.8.3).

The Business Case provided a detailed assessment of why Inland Rail is needed and how it could be delivered. The viability, benefits, costs and risks associated with the Inland Rail Program were also assessed, although the Business Case acknowledged that further development of designs, costs and other technical and economic data was required as the Program progressed. The Business Case was developed to be submitted to the Australian Government for endorsement and approval in order to proceed with the delivery of the Inland Rail Program.

Extensive consultation with key market participants and other industry stakeholders was undertaken to develop the service offering and scope of the Inland Rail Program to ensure the infrastructure meets market needs in terms of service specification and performance. This consultation concluded that the proposed alignment endorsed by the IRIG (Figure 2-4) and scope of Inland Rail:

- Optimises the use of existing rail infrastructure
- Is compatible and interoperable with high-productivity train operations in the east–west corridor (to Adelaide and Perth)
- Bypasses bottlenecks on the congested metropolitan Sydney rail network
- Optimises connections with regional and local rail and road networks
- Maximises value for money in meeting the needs of the market.

2.8.5 Service offering

The Inland Rail service offering was established in parallel to development of the Business Case (ARTC, 2015c), in consultation with key market participants and other industry stakeholders. The service offering is central to the delivery and competitiveness of Inland Rail and reflects the priorities of freight customers. It represents the key elements to be addressed by Inland Rail to enable a competitive and complementary service offering compared to other modes, including road transport.

The key characteristics of the Inland Rail service offering are:

- **Reliability:** 98 per cent, defined as the percentage of goods delivered on time by road freight, or available to be picked up at the rail terminal or port when promised
- **Price:** cheaper relative to road transportation, as a combined cost of access to the rail network, rail haulage and pick-up and delivery
- **Transit time:** 24 hours or less from Melbourne to Brisbane
- **Availability:** services available with departure and arrival times that are convenient for customers, which depends on cut-off and transit times.

These service offerings are underpinned by the key technical characteristics that are particularly relevant to rail operators as these directly influence operating-cost structures and their own service offerings to the market. The key technical characteristics of Inland Rail and the Project are discussed in Chapter 5: Project Description.

While the service offering is specific to the rail network, terminals are a critical element and ARTC will work with terminal operators and proponents as Inland Rail progresses to enable connection opportunities.

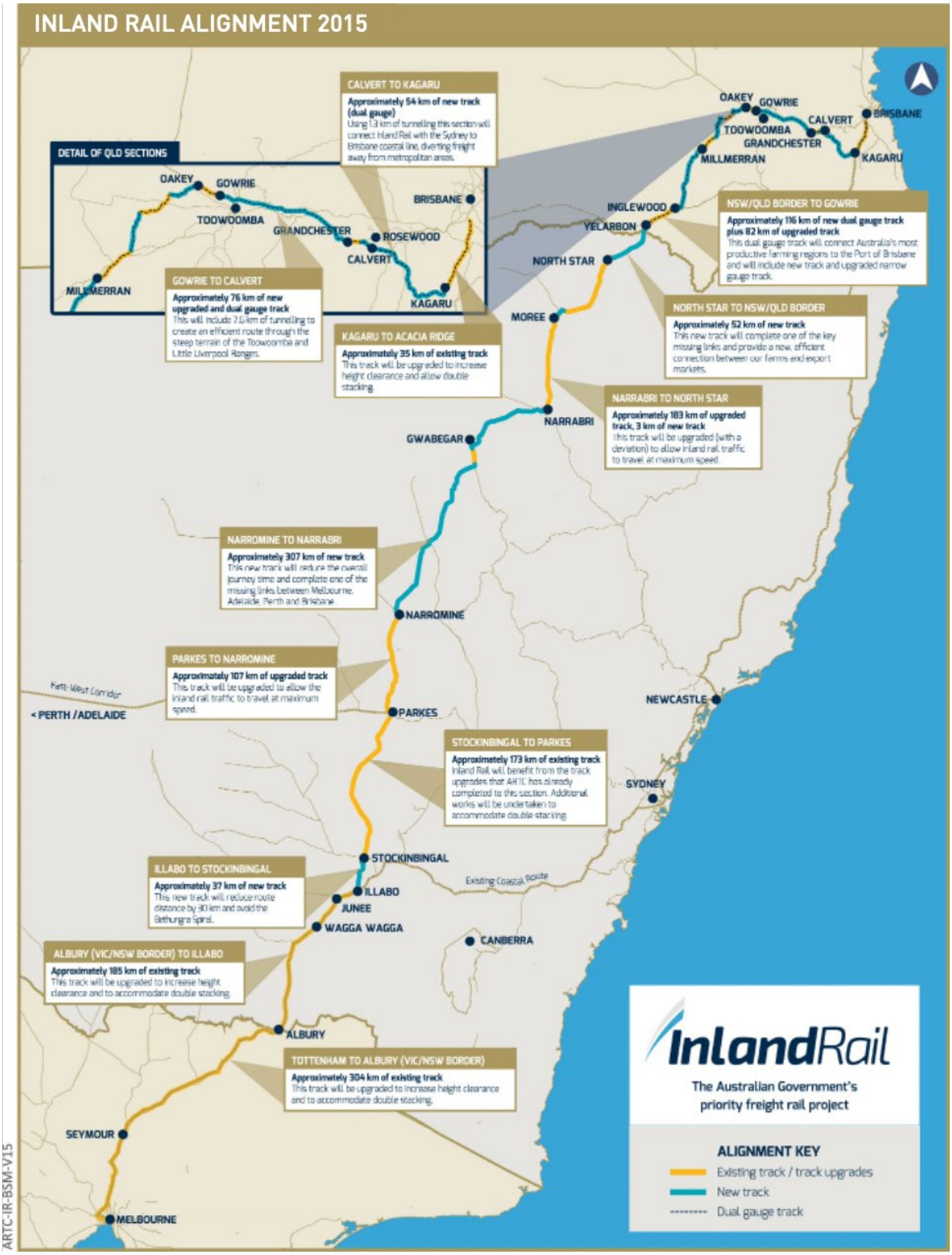


FIGURE 2-4 INLAND RAIL IMPLEMENTATION GROUP 2015 ROUTE

Source: ARTC, 2020b

2.9 Concept planning (2016–2017)

Following the *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) (Section 2.8.3), ARTC's task as the delivery agent for Inland Rail was to examine whether there were cost-effective opportunities to improve on the 2015 IRIG alignment to improve outcomes beyond the Inland Rail Service Offering (Section 2.8.5). An option was assessed to the point where it was determined that it was either too expensive or degraded the Service Offering.

ARTC classified the Inland Rail route into sections (projects) for staged delivery that could be described broadly as either brownfield (using existing rail track or corridors) or greenfield (sections requiring completely new corridors or track). The greenfield sections required assessment of options to determine alignment study areas within which the final rail corridor will be located. As a result, the alignment included in the *Melbourne–Brisbane Inland Rail Report* (IRIG, 2015) has undergone further refinement in a number of sections since 2015.

2.9.1 Multi-criteria analysis framework

There are three key considerations in selecting any route:

- Ability to enhance the Inland Rail Service Offering
- Construction and operating costs
- MCA.

The MCA framework, shown in Figure 2-5, seeks to ensure recommendations consider a wide range of criteria including:

- Engineering and technical factors
- Social and community impacts
- Number of properties directly impacted
- Environmental impacts
- Geotechnical and constructability related issues.

Within an MCA workshop the agreed weightings for each criteria are applied uniformly across all options considered in that workshop. The outcome of any MCA workshop is just one factor in choosing between competing route options and not a determining factor in its own right.

An MCA indicates whether a route option warrants further consideration, which is then assessed for its ability to enhance the Service Offering and whether its estimated construction and operating costs are appropriate for any perceived benefits. This route evaluation process is represented in Figure 2-6.

The following sections are a summary of the main corridor and alignment option assessments completed during the concept assessment stage of the Project, from early 2016 to late 2017. During the concept assessment stage, the NSW/QLD border to Yelarbon section of the Project was assessed separately to the Yelarbon to Gowrie section. Therefore, these alignment sections are discussed separately in Section 2.10.

IS A ROUTE VIABLE?

MULTI-CRITERIA ANALYSIS *

TECHNICAL VIABILITY (17%) considers the alignment, impact on public utilities, geotechnical conditions, impacts on existing road and rail networks, flood immunity and hydrology and future proofing.

ENVIRONMENTAL IMPACTS (12.5%) considers the ecological impacts (flora, fauna and habitats), visual impacts, noise and vibration impacts, flooding and waterway impacts and the effect on air quality and greenhouse gas emissions.

OPERATIONAL APPROACH (16.5%) considers the impact on travel time, reliability and availability, and network interoperability and connectivity including interfaces with rail terminals and network.

SAFETY ASSESSMENT (16.5%) considers construction safety, operational safety, public safety, road safety interfaces and emergency response response.

COMMUNITY AND PROPERTY IMPACTS (12.5%) considers property impacts, Indigenous and non-Indigenous heritage, heritage, impact on community, community response and current and future land use and links to economic impacts.

APPROVALS AND STAKEHOLDER ENGAGEMENT (12.5%) considers planning and approval requirements, State and Federal agency buy-in, Local government buy-in, other statutory and regulatory approvals and service authorities, such as utilities etc.

CONSTRUCTABILITY & SCHEDULE (12.5%) considers construction duration, access and complexity, resources, interface with operational railway and staging opportunities.

This is a broad range of qualitative and quantitative criteria that is considered as part of the Multi-Criteria Analysis (MCA). The MCA process is recognised as an industry standard and is widely used in Australia and internationally.

DOES IT ENHANCE THE SERVICE OFFERING?

Alternatives are compared on their ability to enhance the

SERVICE OFFERING

TRANSIT TIME (< 24 HOURS) requires a transit time from Melbourne to Brisbane of less than 24 hours.

RELIABILITY (98%) requires 98% reliability to freight customers.

COMPETITIVE PRICING requires competitive pricing for freight customers .

AVAILABILITY requires suitable train paths at the times that suit the needs of the market.

This is the minimum level of service required by rail operators and freight customers.

IS IT VALUE FOR MONEY?

Alternatives are compared on basis of

COSTS

CONSTRUCTION ESTIMATE

OPERATING COSTS

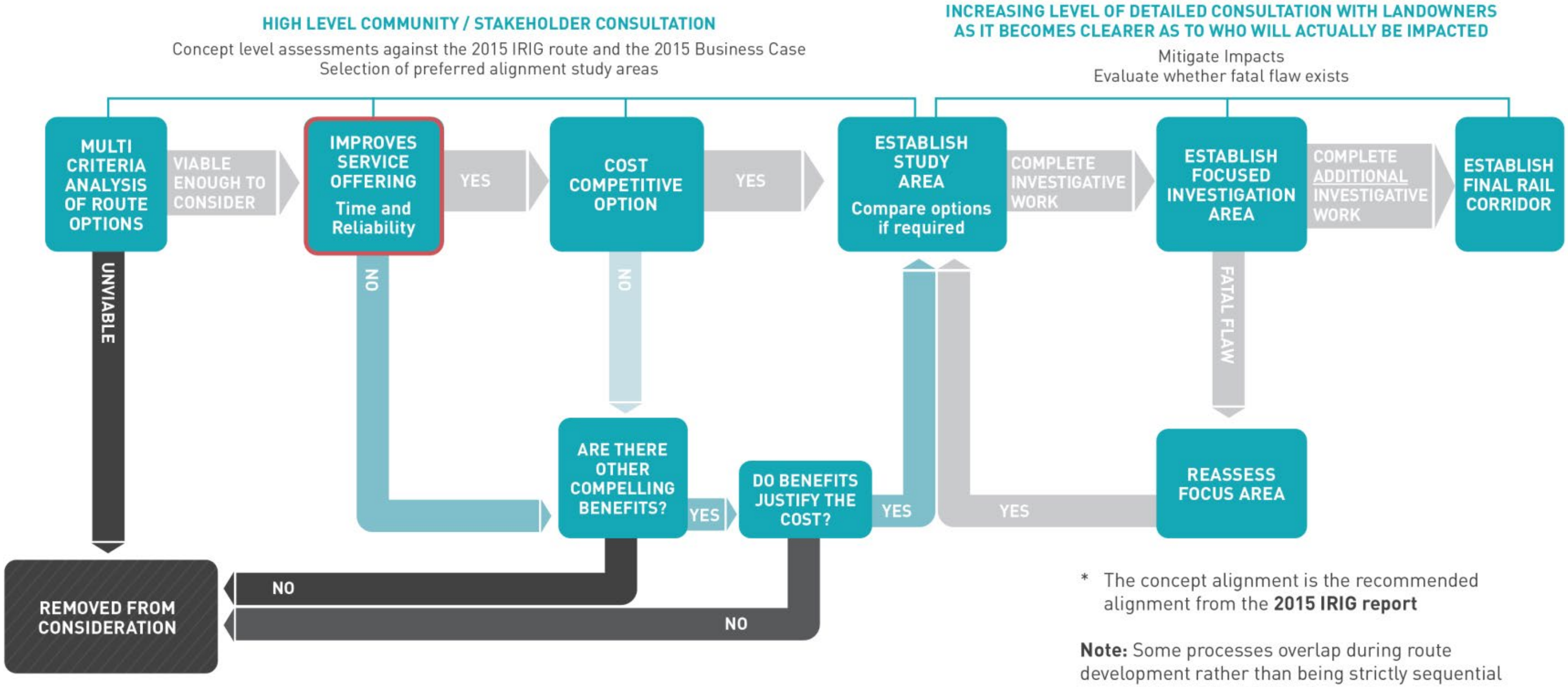
This is the construction estimate, and track maintenance and train operating costs for customers.

The final step in the process is that ARTC makes a recommendation to the Minister for Infrastructure and Transport through the Inland Rail Sponsors Group (Previously the Inland Rail Steering Committee).

* The criteria are weighted to reflect relative importance in decision making. However, different MCAs can have slightly different weightings reflecting the specifics of the options under assessment and taking into account any previous MCA results or other assessments undertaken in respect of the options being considered.

FIGURE 2-5 FACTORS AFFECTING ROUTE SELECTION SINCE 2016

Source: ARTC, 2020b



* The concept alignment is the recommended alignment from the **2015 IRIG report**

Note: Some processes overlap during route development rather than being strictly sequential as per this representative diagram.

FIGURE 2-6 PROCESS FOR ASSESSING ROUTE OPTIONS LEADING TO A FINAL RAIL CORRIDOR

Source: ARTC, 2020b

2.9.2 NSW/QLD border to Yelarbon

This section discusses the corridor and alignment options considered for the section of the Project that is located from the NSW/QLD border, on the Macintyre River, to Yelarbon.

2.9.2.1 Corridor selection

The IRIG alignment for Inland Rail was proposed to cross the NSW/QLD border to the south of Yelarbon; however, subsequent concept studies and discussions with local stakeholders led to the identification of four alternative route options, with different border crossing locations. These route options are shown on Figure 2-7 and described as follows:

- Base case alignment (IRIG alignment)
- Option 1—73 km (38 km of new track constructed in abandoned rail corridor or greenfield construction)
- Option 2—90 km (46 km of new track constructed in abandoned rail corridor or greenfield construction)
- Option 3—65 km greenfield alignment
- Option 4—65 km greenfield alignment.

These options were comparatively assessed using an MCA, which considered:

- Technical viability
- Safety
- Operational constraints
- Constructability and schedule
- Environmental constraints
- Community and property issues
- Approvals and stakeholder concerns.

FIGURE 2-7 EASTERN AND WESTERN ALIGNMENT OPTIONS FROM THE CONCEPT ASSESSMENT

The MCA was documented in the *2016 Verified Alignment Development Assessment Report* (WSP & Parsons Brinckerhoff, 2016) and concluded that:

- The base case alignment performed comparatively worse than the other route options due to hydrological challenges and interaction with the environmentally sensitive Yelarbon desert
- The projected journey time for Option 2 was not compatible with the objective total journey time for Inland Rail
- Option 3 resulted in greater land impacts than Option 4
- Option 1 and Option 4 could not be separated by the MCA and required more detailed comparative assessment.

Further comparative assessment of Option 1 and Option 4, and variants of each, was undertaken by implementing an MCA based on the outcomes of additional stakeholder and community engagement, geotechnical site investigation, flood modelling and more detailed quantity estimation and costing. This assessment identified a 6 km corridor around the western route option, Option 1, to be the preferred investigation corridor for the next stage of the Project as it scored favourably in relation to community and property issues, environmental constraints and approvals, and stakeholder concerns (WSP & Parsons Brinckerhoff, 2017).

The comparative assessment process for the east versus the west route options is shown in Figure 2-8 and the conclusions of the MCA process are summarised in Figure 2-9.

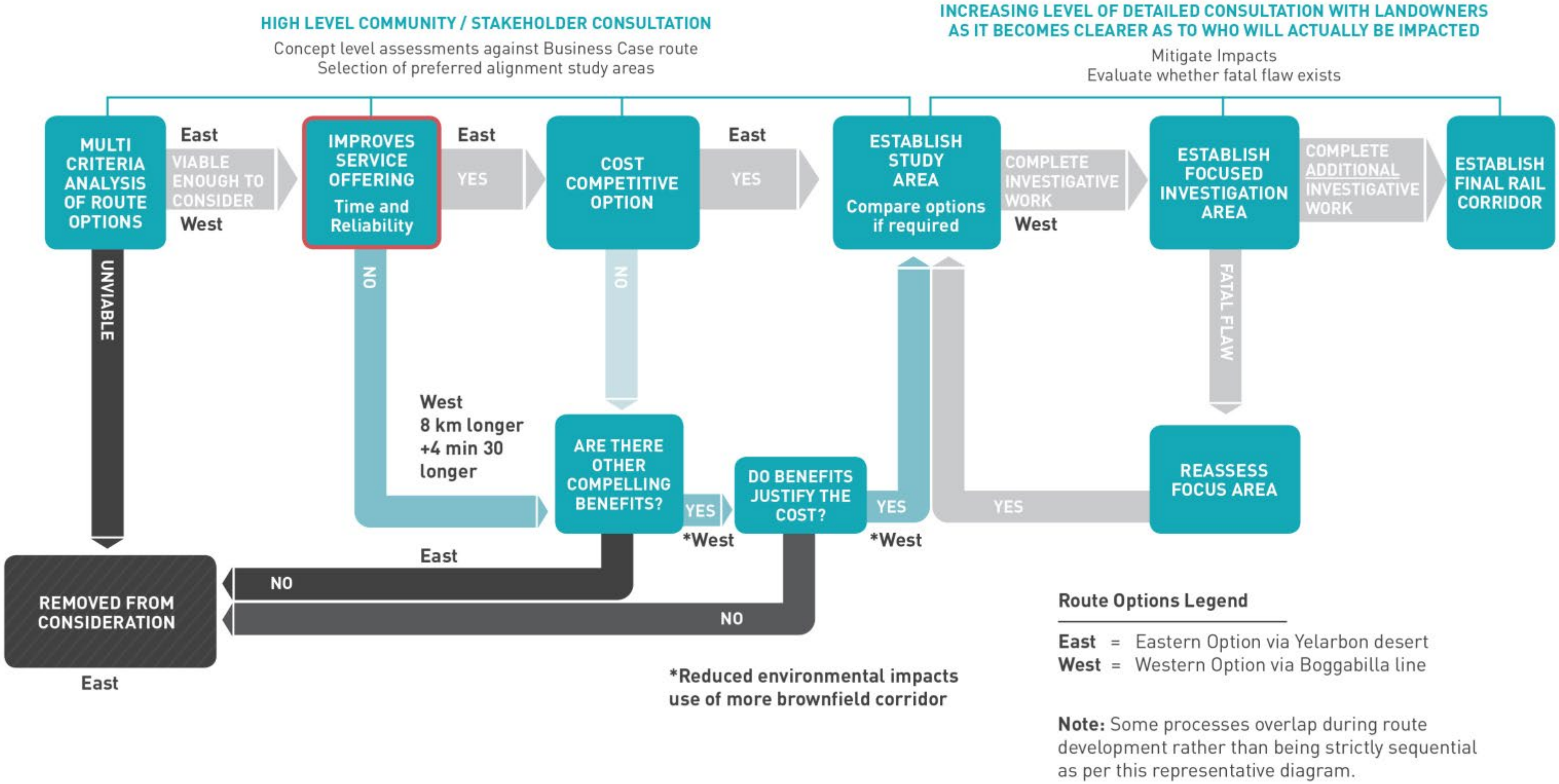


FIGURE 2-8 COMPARATIVE ASSESSMENT PROCESS FOR EAST VERSUS WEST ROUTE OPTIONS

Source: ARTC, 2020b

	East (Base Case)	West
Distance	65km	73km 8km longer
Service Offering / Transit time	-	4m 26s longer
MCA:		
Stakeholder/ community impact	Greater impact on greenfield stakeholders including compromising viability of organic certified business employing 40 people	Wide support for Western alignment
Flooding	Similar for both options	Similar for both options
Environmental	Multiple environmental impacts including crossing of Yelarbon desert	Reduced impacts on EPBC* and remnant vegetation, (104ha vs 133ha on eastern route) lower property impacts, reduced visual impact
MCA Score	0	+1.2
Construction Cost	$0m (for relativity)	+$29m/+6.5%
Recommended		✓

Favourable

Neutral

Unfavourable

Highly unfavourable

*EPBC – Environmental Protection and Biodiversity Conservation Act 1999

FIGURE 2-9 SUMMARY OF MULTI-CRITERIA ASSESSMENT OF EAST VERSUS WEST ROUTE OPTIONS

Source: ARTC, 2020b

2.9.2.2 Alignment selection

The preferred study area for this section of the Project was announced in February 2017 by the then Australian Minister for Infrastructure and Transport. After the preferred study area was announced, additional work was undertaken to refine the 6 km corridor around the proposed Macintyre River crossing to a 2 km wide corridor. This refinement work included:

- Additional flood studies
- Consultation with key stakeholders, including potentially affected landowners, elected representatives, industry groups and government agencies.

Consequently, six greenfield alignment options for crossing the Macintyre River and tying into the South Western Line were developed and assessed through an MCA. These options are shown on Figure 2-10. The MCA considered:

- Technical viability
- Safety
- Operational constraints
- Constructability and schedule
- Environmental constraints
- Community and property constraints
- Approvals and stakeholder concerns.

The MCA identified 'West Option D st1D' to be the preferred alignment due to:

- Reduced impacts on environment, utilities, land use and property
- Improved hydrological and flooding outcomes in the vicinity of Whalan Creek and the Macintyre River
- Improved safety outcomes for road users due to a reduction in the number of road–rail interfaces
- Opportunities to connect with regional transport and freight hubs in northern New South Wales.

As a result, alignment option 'West Option D st1D' has formed the basis for the reference design for this Project between the NSW/QLD border and the existing QR South Western Line.

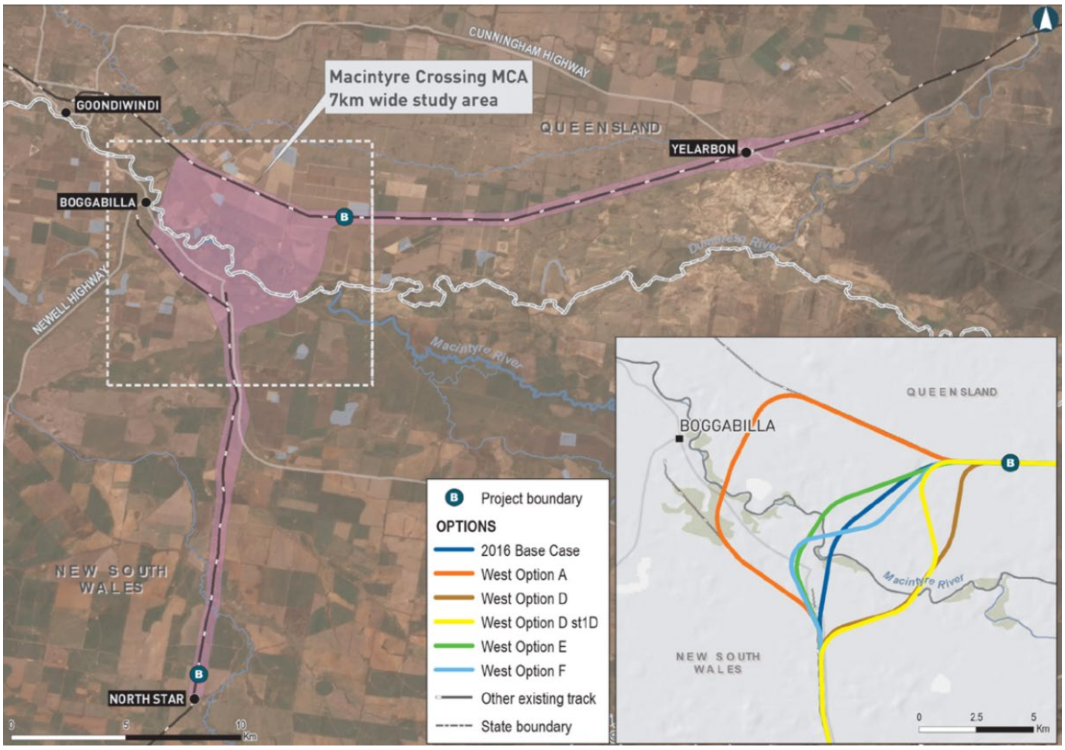


FIGURE 2-10 GREENFIELD ALIGNMENT OPTIONS FOR THE NORTH STAR TO YELARBON SECTION OF INLAND RAIL

Source: ARTC, 2020b

2.9.3 Yelarbon to Gowrie

This section discusses the corridor and alignment options considered for the section of the Project that is located from Yelarbon to Gowrie.

2.9.3.1 Review of the base case alignment

In 2016, ARTC revisited the base case alignment previously established in the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) (Section 2.8.2) to confirm the technical viability of the alignment and to undertake localised route optioneering. This review resulted in localised modifications to the alignment to achieve a route that was optimal in relation to engineering, environmental, social and economic constraints. The revised alignment was named the 'Base Case Modified' alignment.

As a component of this review, route options were considered that extended north from Whetstone, through the Whetstone State Forest, thereby bypassing to the west of Inglewood. In total, six State forest route options were identified and assessed against the base case. These six options are shown in Figure 2-11 and were as follows:

- **Option 3124**: North through Whetstone State Forest along the transmission line easement, across the Gore Highway and passing to the north of Millmerran, via Captains Mountain
- **Option 3125**: North through Whetstone State Forest along the transmission line easement, across the Gore Highway and extending to Commodore Mine, via Captains Mountain
- **Option 3126**: North through Whetstone State Forest along the transmission line easement, then extending east in parallel to the Gore Highway to Commodore Mine
- **Option 3127**: North through Whetstone State Forest along the transmission line easement, then extending east in parallel to the Gore Highway to the north of Millmerran
- **Option 3128**: North through Whetstone State Forest along the transmission line easement, then northeast to the western side of Millmerran Downs and parallel to the Gore Highway to Commodore Mine
- **Option 3129**: North through Whetstone State Forest along the transmission line easement, then northeast to the eastern side of Millmerran Downs and parallel to the Gore Highway to Commodore Mine.

The options were considered in a like-for-like manner against the Base Case Modified option, with consideration of the following factors:

- Alignment length
- Journey time
- Property impacts
- Environmental constraints
- Impacts with existing infrastructure
- Hydrological constraints
- Earthwork volumes
- Maximum vertical gradients.

This comparative assessment concluded that the Base Case Modified alignment performed better than the six alternative alignment options as it:

- Was between 10 km and 28 km shorter than the alternative alignment options
- Had a journey time between 3 and 18 minutes faster than the alternative alignment options
- Required substantially less earthworks than the alternative alignment options
- Avoided the steep vertical grades that were otherwise encountered by the State forest options
- Required between 19 and 37 fewer private access severances than the alternative alignment options
- Had fewer watercourse crossings than the alternative alignment options.

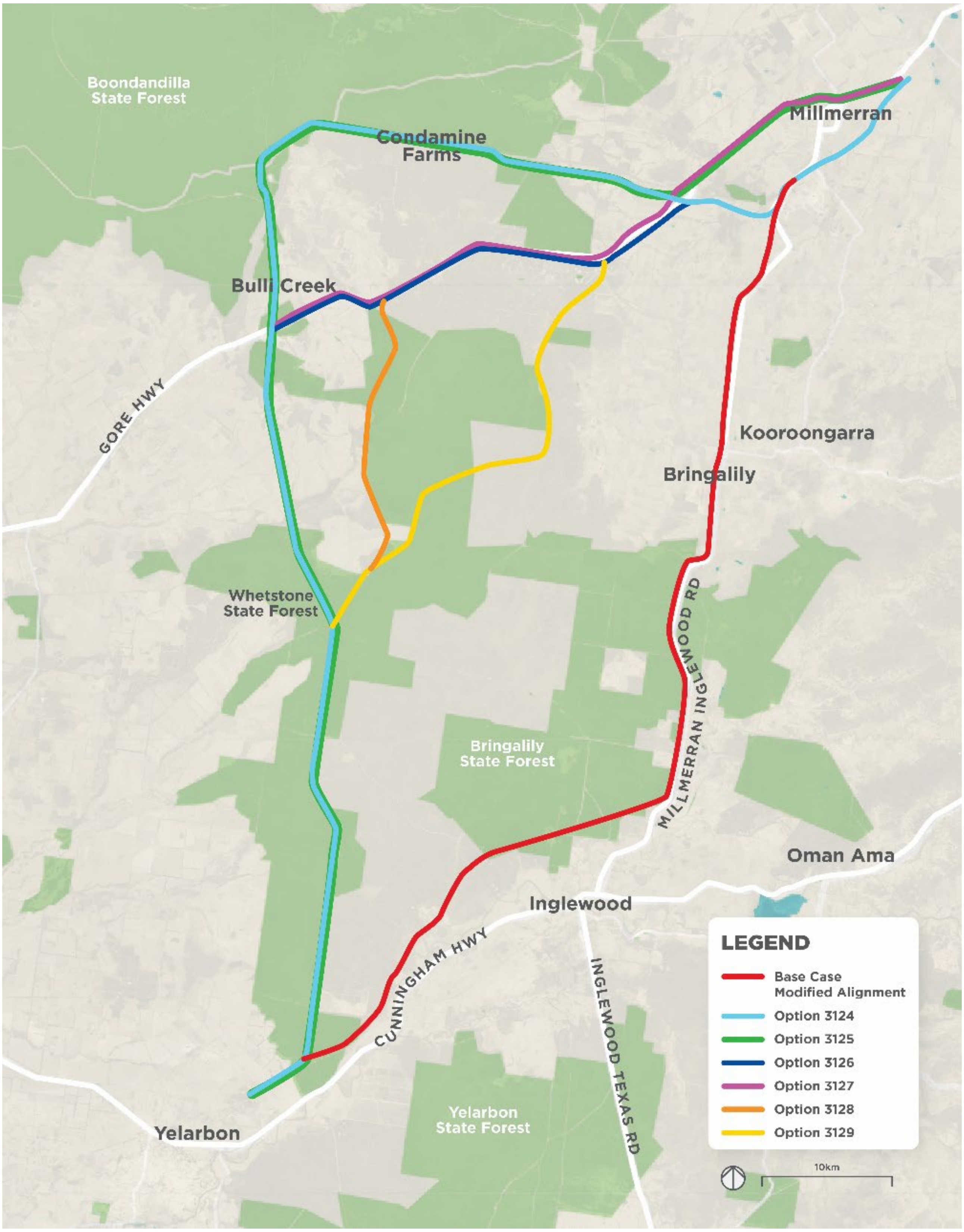


FIGURE 2-11 STATE FOREST ROUTE OPTIONS CONSIDERED DURING THE CONCEPT ASSESSMENT

2.9.3.2 Corridor Options Report

In late 2016, the Australian Government directed ARTC to investigate and comparatively assess three additional corridor options, between Inglewood and Gowrie, against the Base Case Modified alignment option. The Wellcamp–Charlton Industrial Precinct and Toowoomba Wellcamp Airport in November 2014 was one of the key drivers for this request, due to the economic growth opportunities that the airport introduced for the region.

The four options that were assessed (AECOM, 2017) were:

- **Corridor 1: Base Case Modified option.** This option followed Millmerran–Inglewood Road to Millmerran, and then extended through or close to Brookstead, Mount Tyson, Aubigny and Kingsthorpe. The corridor had a length of 181.3 km.
- **Corridor 2: Wellcamp–Charlton option.** This option followed Millmerran–Inglewood Road to Millmerran, and then extended through or close to Brookstead, Pittsworth, Southbrook and Wellcamp. The corridor had a length of 168.1 km.
- **Corridor 3: Karara/Leyburn option.** This option followed the existing South Western Line until Karara. It then extended through or close to Leyburn, Southbrook and Wellcamp. The corridor had a length of 171.9 km.
- **Corridor 4: Warwick option.** This option followed the existing South Western Line to approximately 20 km west of Warwick. The option then extended north through or close to Ellinthorp, Clifton, Nobby, Wyreema and Wellcamp. The corridor had a length of 208.3 km.

Each of these corridor options are shown on Figure 2-12.

The four routes use differing amounts of existing railway corridor, follow varying amounts of existing road transport corridor, or alternatively crossing a differing number of currently unaffected properties. Existing road transportation corridors and railways have traditionally led to development around these network corridors. Any substantive change is likely to affect communities and stakeholders to varying degrees, either as an incremental change or as a material change. Therefore, an additional driver for this study was to include the potentially affected communities and stakeholders with the purpose of ensuring that the process used in the assessment was rigorous and valid and to also provide local context and data input to assist with the assessment. A Project Reference Group was established and comprises of community representation organisations including farming peak bodies and organisations; Chambers of Commerce and business groups; environmental and conservation organisations; and community and progress associations with both local and more regional Darling Downs interests. The chairman for the Project Reference Group and Queensland Advisor, Mr Bruce Wilson AM, was appointed by the Australian Minister for Infrastructure and Transport, the Hon Darren Chester MP). Mr Wilson was supported in a secretariat role by staff from the Department of Infrastructure and Regional Development.

The corridor assessment process involved comparing the three alternative corridors against the Base Case. The methodology adopted to perform the like-for-like comparison was an MCA and comparative cost estimate. The three alternatives were compared against the Base Case Modified investigation corridor. The assessment in this report was controlled by the requirements of the ARTC MCA framework, criteria and weightings as provided by ARTC and used across the full extent of the Inland Rail Program. The Base Case MCA involved the following steps:

1. MCA of the four routes, considering:
   i) technical criteria:
      - Technical viability
      - Safety
      - Operational constraints
      - Constructability and schedule
   ii) non-technical criteria:
      - Environmental constraints
      - Community and property issues
      - Approvals and stakeholder concerns
2. Comparative construction cost estimates
3. Community consultation and validation of the transparency of the assessment process.

After each alignment had been developed and refined to comply with ARTC's design standards, each was assessed by a multi-disciplinary team to determine key metrics and values that would provide differentiators for the MCA and cost estimate.

FIGURE 2-12 CONCEPTUAL CORRIDOR ROUTES

A key component of the route option assessment was crossing the Condamine River floodplain and associated waterways. As with all sections of Inland Rail, the priority is to design a rail line that is safe. In this section, it also means a line that will not cause unacceptable flooding impacts, erosion risks or reduction in farmland productivity to landowners. To inform the results of the MCA, the *Corridor Options Report* (AECOM, 2017) was prepared. The report includes hydrological assessments, limited preliminary geotechnical investigations and community response assessments. The flooding assessment looked at the length of each route traversing land that would be flooded in 1% annual exceedance probability (AEP) events and flooded in 10% AEP events (Figure 2-13). Corridor 2 and Corridor 3 were rated more favourably than the Base Case Modified route (Corridor 1) and Corridor 4.

The limited preliminary geotechnical investigation scope and limitations included the following:

- Preliminary desktop assessment of the additional corridor routes using readily available data pertaining to geotechnical engineering parameters
- Preliminary reconnaissance of publicly accessible locations to make general observations of the engineering geology associate with the corridors
- No invasive geotechnical assessment was undertaken
- Observations from public places and roads only (no private property access was available)
- Field observations to complement and support the desktop assumptions included:
    - general geomorphology
    - existing road cuttings and erosional observations and weathering characteristics
    - general observations regarding strength characteristics
    - soil characteristics
    - general observations regarding material suitability for construction and/or borrow pit.

To drive the qualitative assessment of community responses, quantifiable aspects were identified. The key identifiers used to drive community response included loss or severance of agricultural land, potential for afflux caused by the Project, total length of each route option considered to be greenfield, impacts to residential and/or sensitive receptors along the alignment and landowners impacted by the route option.

The results of the MCA indicated that two of the alternative options scored closely to the Base Case Modified alignment option: the Wellcamp–Charlton route (Corridor 2) and the Karara–Leyburn route (Corridor 3). The third alternative option, the Warwick route (Corridor 4), did not score as closely and scored negatively when compared to the Base Case Modified alignment route. This negative score was a function of the extra length of the alignment, the interfaces with more local communities and sensitive receptors, and the requirement to modify the existing alignment to meet the ARTC design standards.

The process for comparative assessment of the four route options is shown in Figure 2-14. The outcomes of the MCA were documented in the *Corridor Options Report* (AECOM, 2017) and are summarised in Figure 2-15. The report, in combination with the cost estimate for each option, was provided by ARTC to the Australian Minister for Infrastructure and Transport for consideration.

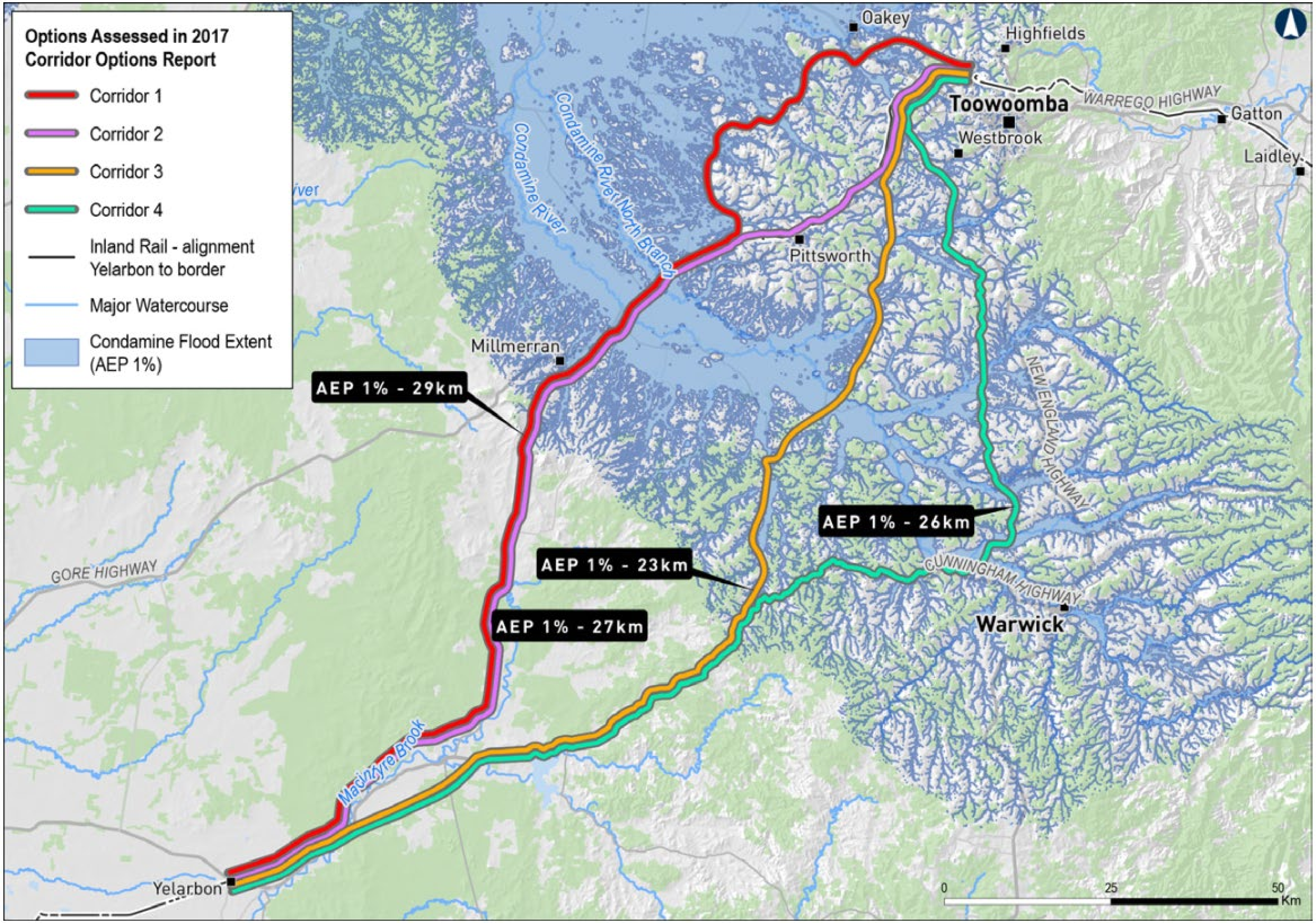


FIGURE 2-13 BORDER TO GOWRIE OPTIONS 2016–2017: LENGTH OF 1% AEP FLOODPLAIN CROSSED (TOTAL KM)

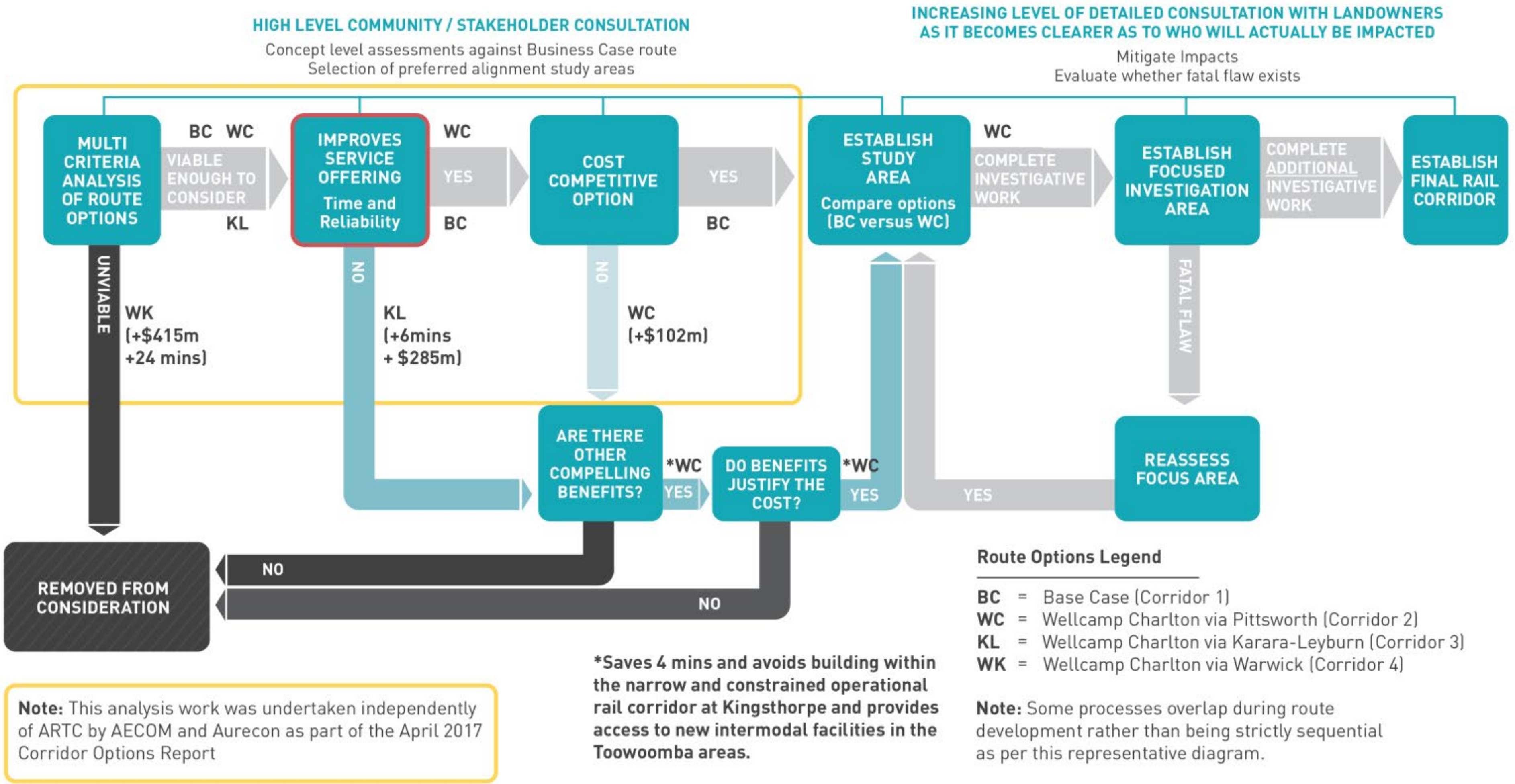


FIGURE 2-14 PROCESS FOR COMPARATIVE ASSESSMENT OF FOUR ROUTE OPTIONS

	Corridor 1 Base Case Modified		Corridor 2 Wellcamp-Charlton		Corridor 3 Karara, Leyburn & Felton		Corridor 4 Warwick	
Distance	181km	Neutral	168km 13km shorter	Favourable	172km 9km shorter	Favourable	208km 27km longer	Highly unfavourable
Service Offering / Transit time (northbound)	129min	Neutral	125 min 4 min saving	Favourable	135 min 6 min longer	Unfavourable	154 min 24 min longer	Highly unfavourable
No. of agricultural properties on alignment	242	Highly unfavourable	203	Unfavourable	156	Favourable	219	Unfavourable
No. of residences on alignment	35	Neutral	42	Neutral	69	Unfavourable	170	Highly unfavourable
MCA Technical Score	0	Neutral	−0.126	Neutral	−0.417	Neutral	−1.815	Highly unfavourable
MCA Non-technical Score	0	Neutral	−0.156	Neutral	+0.906	Favourable	−1.22	Highly unfavourable
Overall MCA Score	0	Neutral	-0.283	Neutral	+0.490	Neutral	−3.03	Highly unfavourable
Construction Cost	$0m (for relativity)		+$102m	Highly unfavourable	+$285m	Highly unfavourable	+$415m	Highly unfavourable
Strategic factors:								
Avoidance of constructing in an operational rail line and congested area at Kingsthorpe		Highly unfavourable		Favourable		Favourable		Favourable
Tap into strategic potential of Wellcamp-Charlton		Highly unfavourable		Favourable		Favourable		Favourable
Recommended				✓				

Favourable
Neutral
Unfavourable
Highly unfavourable

FIGURE 2-15 SUMMARY OF MULTI-CRITERIA ASSESSMENT OF THE CORRIDOR OPTIONS ASSESSMENT

Source: ARTC, 2020b

2.9.3.3 Forestry route, via Cecil Plains

In April 2017, an alternative route option was presented to ARTC by a representative of the Yelarbon to Gowrie Project Reference Group, which was referred to as the 'Forestry route, via Cecil Plains'. This alternative route extended north from Whetstone through Bringalily State Forest to Cecil Plains, then followed an existing rail corridor (the Cecil Plains Branch Line) to Mount Tyson and then to near Oakey where it joined with QR's West Moreton Line to Gowrie. This route option is shown in Figure 2-17 with the Base Case Modified alignment option for comparison.

Approach

The Inland Rail B2G Alternative Route Comparison Review report has been prepared by adopting the principles and framework for major project development and appraisal as set out in a range of documents including: the Australian Transport Assessment and Planning guidance notes, Infrastructure Australia Assessment Framework, as well as the Transport Appraisal Guidance (webTAG) resource, which has contributed to the development of Australia approach to the development of projects such as Inland Rail.

The review recognises that the Cecil Plains options do not have the same level of detail developed as the reference design, and therefore the like-for-like comparative analysis considers whether the method and data and assumptions used are the same, and if not whether they are a reasonable approximation given the purpose and intent of the comparison is to indicate relativities between the routes.

The review recognises that corridor identification and MCA have already been completed and do not need to be repeated. The comparative analysis now focuses on service offering and costs and ARTC has also undertaken analysis in other areas of relevance such as impacts on the number of properties affected, flood immunity and hydrology, and project delivery schedule. Table 2-2 details the content of the review.

TABLE 2-2 CONTENT OF FORESTRY ROUTE, VIA CECIL PLAINS REVIEW

Groups of factors affecting route selection since 2016	Forestry route, via Cecil Plains review
Does it enhance the service offering?	This review covers transit time, reliability and availability. It considers competitive pricing as driven by transit time, reliability, availability and operating cost.
Is it value for money?	This review covers operating cost and construction estimate.
Is the route viable?	Route viability was considered in the 2017 Corridor Options Report and 2015 Business Case. However, there are several factors that are carried forward in ARTC's comparative analysis that impact on service offering and costs: ▸ The number of properties impacted, which affects community buy-in and cost ▸ The number of roads and tracks impacted, which affects community buy-in and cost ▸ Flood immunity and hydrology, which impacts infrastructure requirements and hence cost ▸ Timeline, with completion timing impacted if the Cecil Plains options are chosen.

Process and consultation

The adopted process for the review is summarised by the following and as seen in Figure 2-16:

- It reflects the breadth and depth as discussed in the approach
- If focuses on methodology and data assumptions in arriving at an overall assessment outcome
- The assessment is undertaken in a spreadsheet tool with the results presented.

A description of the review process tasks, consultation and supporting investigations are detailed in Table 2-3.

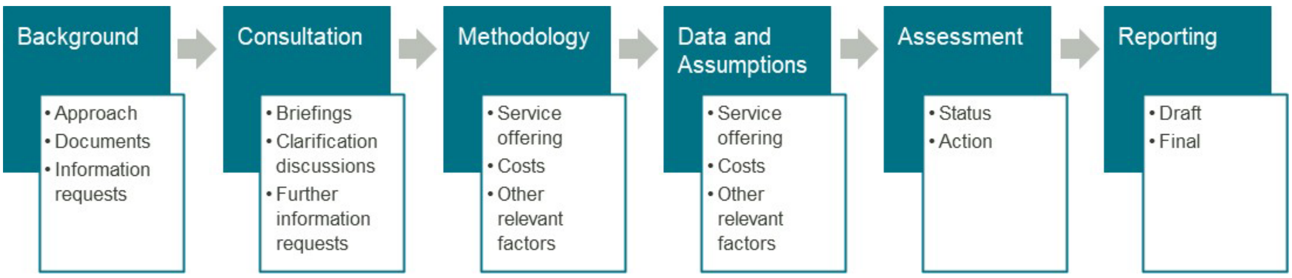


FIGURE 2-16 REVIEW PROCESS APPROACH

TABLE 2-3 REVIEW TASKS

Tasks	Description
1	Review of publicly available project information
2	Receipt and review of initial ARTC information package
3	Inception meeting with the Department of Infrastructure, Transport, Regional Development and Communications to confirm purpose, process, outcomes
4	Review of ARTC information
5	Meeting #1 with ARTC ▸ ARTC provide a briefing on the comparative assessment undertaken
6	Confirmation of the review approach and assessment tool
7	Request for further information from ARTC
8	Review of provided material and undertake preliminary assessment. Identify issues and questions and provide to ARTC for response
9	Meeting #2 with ARTC ▸ Clarified ARTC's information provided based on GTA Consultants review ▸ Requested additional information
10	Continue review, assessing methodology and data and assumptions
11	Draft report provided to the Department of Infrastructure, Transport, Regional Development and Communications
12	Discussion of draft report with Department of Infrastructure, Transport, Regional Development and Communications, review and respond to queries Further discussion and clarification based on additional information from ARTC
13	ARTC information paper dated 31 August 2020 provided inclusive
14	Prepare and submit final Inland Rail B2G Alternative Route Comparison Review report to the Department of Infrastructure, Transport, Regional Development and Communications

Review of alignment options

Following receipt of the alternative route option, ARTC undertook a key criteria comparative assessment between the Forestry route, via Cecil Plains, and the Base Case Modified alignment option (Figure 2-17). This comparative assessment concluded the Forestry route, via Cecil Plains to be 15 km longer than the Base Case Modified alignment option, resulting in an additional journey time of approximately 12 minutes (at an average speed of 84.08 kilometres per hour). The Forestry route, via Cecil Plains was also reliant on using an alignment through the State forest that traversed unfavourable topography, resulting in substantially greater earthworks (Figure 2-11 and associated discussion) and non-optimal operating gradients.

Based on these findings, it was concluded that the Forestry route, via Cecil Plains performed less favourably than the Base Case Modified alignment option in achieving the Inland Rail service offering and that the corridor assessment process documented in the *Corridor Options Report* (AECOM, 2017) did not need to be revisited.

On 21 September 2017, the Australian Government announced the Wellcamp–Charlton corridor via Brookstead, Pittsworth and Wellcamp (Corridor 2, Figure 2-12) to be the preferred corridor to take forward into the formal planning and approvals process.

By letter dated 29 June 2020, the Deputy Prime Minister confirmed to the Chair of the Millmerran Rail Group that the Deputy Prime Minister had:

> *…asked for an immediate review of the 'forestry route' via Cecil Plains in the Border to Gowrie section of Inland Rail against the selected [Inland Rail] route to assess its ability to meet the business case requirements including transit time, reliability, cost competitiveness and availability.*

The letter stated that the department would:

> *…engage an independent consultant to review the assessment process. The independent consultant will ensure that ARTC has used like-for-like methodologies when assessing the service offering attributes of the routes. Following this, the assessment will be presented to the Australian Government for consideration.*

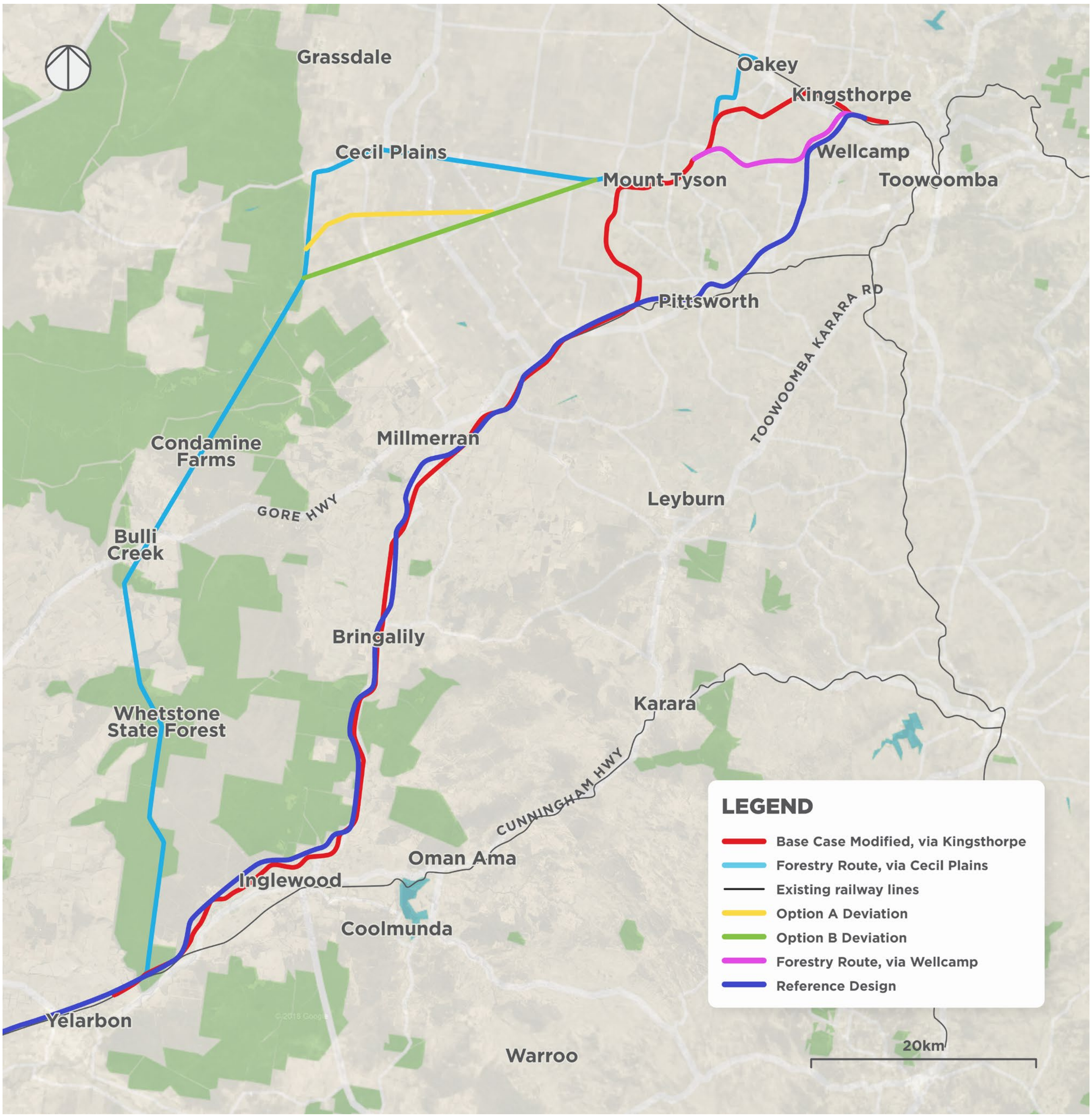


FIGURE 2-17 FORESTRY ROUTE, VIA CECIL PLAINS, WITH THE 'BASE CASE MODIFIED' ALIGNMENT OPTION AND REFERENCE DESIGN ALIGNMENT

For this review, potential route options via Cecil Plains were assessed against the reference design for the Project. Three routes via Cecil Plains were considered as possible alternatives to the reference design:

1. Via Cecil Plains, to join the existing QR West Moreton Line near to Oakey
2. Via Cecil Plains, to join the existing QR West Moreton Line near to Kingsthorpe
3. Via Cecil Plains then direct via a greenfield route to join the reference design route near Wellcamp.

These route options are shown in Figure 2-17.

From Cecil Plains, the route proposed to follow the current disused rail line and join the QR West Moreton system closer to Oakey would require construction within the constrained corridor at Kingsthorpe, which was identified as a significant issue in 2017. The route has a track length in the order of 7 km longer than the route that goes direct from Cecil Plains to Wellcamp and 5 km longer than that which joins the existing QR system closer to Kingsthorpe. It is also approximately 33 km longer than the reference design alignment. The route also impacted more private landowners than either of the other two routes via Cecil Plains, as a result of its proximity to the township of Oakey.

As a result of the above combined factors, the route via Cecil Plains to near Oakey was discounted from further assessment on the basis that the route offered no advantages compared with either of the other routes via Cecil Plains and was the least likely to meet the Inland Rail service offering.

The two remaining viable routes via Cecil Plains were assessed against the reference design in a like-for-like comparison. A summary of key comparative data for route options via Cecil Plains against the reference design is presented in Table 2-4.

TABLE 2-4 SUMMARY OF KEY COMPARATIVE DATA FOR ROUTE OPTIONS VIA CECIL PLAINS AGAINST THE REFERENCE DESIGN

Inland Rail Service Offering Metric	Reference Design	Via Cecil Plains and Wellcamp	Via Cecil Plains and Kingsthorpe
Distance	206.9 km	232.8 km	234.7 km
Distance difference	Baseline	+25.9 km	+27.8 km
Number of crossing loops	5	6	6
Transit time north (hours:minutes:seconds)[2]	02:49:37	03:08:49	03:06:49
Added transit time (north)	Baseline	+00:19:12	+00:17:12
Transit time south (hours:minutes:seconds)[2]	02:40:32	03:00:11	02:59:19
Added transit time (south)	Baseline	+00:19:39	+00:18:47
Length of all floodplains crossed	14.2 km	36.7 km	38.6 km
Length of Condamine River floodplain crossed	12.5 km	33.0 km	33.0 km
Length of Condamine River floodplain bridges	6.1 km	6.3 km	6.3 km
Length of Condamine River floodplain embankment (with culverts)	6.4 km	10.0 km	10.0 km
Construction cost[3]	Baseline	+$281.9 m	+$303.5 m
Operations cost[4]	Baseline	+$93.7 m	+$98.1 m
Number of residences within 200 m	104	134	234
Area of cropping land impacted (hectares (ha))—assumes 60 m wide rail corridor along length of route	407.7	222.6	197.5
Area of irrigated cropping land impacted (ha)—assumes 60 m wide rail corridor along length of route	32.8	89.4	83.2

Table notes:

1 Summary data represents a snapshot in time relative to development of reference design
2 Modelled from RailSys on the basis of Inland Rail Reference Train operating in 2040 when the network is at capacity
3 Includes 7.5 km spur line required on the route via Kingsthorpe to connect the existing QR line to Wellcamp at cost of $12.7 m per km—added cost of $95.3 m
4 Net Present Cost calculated for period to 30 June 2075. Economic cost of longer transit time is the freight value of time impacts to end customers over the period.

In addition to this comparison, ARTC considered whether there may be opportunities to 'improve' the route via Cecil Plains at the southern end in the vicinity of Inglewood or at the northern end in the vicinity of Cecil Plains.

Alignment selection

It was considered that there is no practical way to improve the proposed route to Cecil Plains at the southern end, as moving west would take the route into more undulating terrain while taking the route to the east would take it away from the State forest and effectively replicate the reference design route in this section.

At the northern end of the route to Cecil Plains, two different options for potentially improving the route were considered as shown in Figure 2-17:

a) A route that deviated from the 'forestry route' approximately 19.6 km south of Cecil Plains

b) A route that deviated from the 'forestry route' approximately 24.8 km south of Cecil Plains.

The alternative routes did reduce overall distance in comparison with the Forestry route, via Cecil Plains, by a distance of 7.6 km (route Option A as described in Table 2-5) and 10.9 km (route Option B as described in Table 2-5). Each route resulted in a slightly improved transit time relative to the Forestry route, via Cecil Plains as shown in Table 2-5 but the transit times on each route option remained slower than for the reference design route.

TABLE 2-5 RELATIVE TRANSIT TIME OF ROUTE OPTIONS CONSIDERED AGAINST THE ROUTE VIA CECIL PLAINS

Measure	Forestry Route via Cecil Plains	Option A Deviation (19.6 km south of Cecil Plains)	Option B Deviation (24.8 km south of Cecil Plains)
Distance	53.2 km	45.6 km	42.3 km
Transit time differential (north) versus route via Cecil Plains[1]	Baseline	-00:06:02	-00:08:40
Transit time differential versus reference design	+00:19:12	+00:13:10	+00:10:32

Table note:
Based on application of an average speed of 75.4 kph, which is the average speed for the route via Cecil Plains and Kingsthorpe

The direct comparison of key data indicates that the viable routes via Cecil Plains are longer than the reference design, have a greater journey time, require a longer section of track across floodplains and would result in greater construction and operational costs.

The Inland Rail B2G Alternative Route Comparison Review showed that an alternative route via Cecil Plains is more than 25 km longer, would add at least 17 minutes to the travel time, increase costs by more than $472 million and would reduce the reliability of the Inland Rail service.

On 2 November 2020 the independent assessment of the proposed alternative routes via Cecil Plains for the Border to Gowrie project was published. A copy of the Inland Rail B2G Alternative Route Comparison Review is available at: **200904-Q192590-B2G final updated report.pdf**.

2.10 Design development and refinement (2018–present)

This section provides a summary of the main alignment option assessments that were undertaken during the reference design and EIS development stage of the Project, from early 2018 to the present. Specifically, alignment option assessments were conducted during development of the reference design for the following extents of the Project:

- NSW/QLD Border to Kurumbul (QR South Western Line)
- Kurumbul to Whetstone (QR South Western Line)
- Whetstone to Millmerran
- Inglewood area
- Millwood area (Millmerran–Inglewood Road)
- Commodore Mine area
- Millmerran–Inglewood Road
- Brookstead
- Millmerran Alternative Alignment
- Yarranlea to Southbrook
- Southbrook to Athol
- Athol to Gowrie Mountain
- Warrego Highway to Gowrie Junction.

The extent of each of these areas is shown on Figure 2-12. The alignment options considered, and the outcomes of assessment, are discussed for each of these areas in Sections 2.10.1 to 2.10.15.

The main overarching principles that were applied in positioning the alignment for the reference design were:

- Maximise the use of existing rail corridors
- Outside of existing rail corridors, seek to maximise co-location with existing linear transport infrastructure.

Through considering and applying these principles, additional considerations needed to be optimised through the design process. These included, but were not limited to:

- Minimising severance to properties in greenfield areas
- Lessening impact to landowners, businesses and existing infrastructure
- Minimising the extent of alignment located within floodplain areas, due to cross-drainage and constructability issues

- Avoiding challenging topography to lessen earthworks and footprint impacts to stakeholders and surrounding infrastructure.

In all instances, the guiding principles of ecologically sustainable development have been factored into the assessment and selection of corridor and alignment options for the Project. These guiding principles, as established in the *National Strategy for Ecologically Sustainable Development* (Ecologically Sustainable Development Steering Committee, 1992), are as follows:

- Decision-making processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The global dimension of environmental impacts of actions and policies should be recognised and considered
- The need to develop a strong, growing and diversified economy that can enhance the capacity for environmental protection should be recognised
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised
- Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.

Decisions and actions should provide for broad community involvement on issues that affect them.

2.10.1 Study area definition

The study area that was identified during the concept planning stage of the Project and provided to the ARTC by the Australian Government was nominally 2 km wide. The study area formed the basis of ARTC's application to the Queensland Coordinator-General for gazettal of the Project as a 'coordinated project' under the *State Development and Public Works Organisation Act 1971* (Qld), as documented in the initial advice statement (IAS) (ARTC, 2018a).

In mid-2018, the community requested ARTC to provide more clarity about how the Project will impact landowners. In response to the community's request, ARTC identified the focused area of investigation from preliminary results of planning, environmental and engineering investigations. The focused area of investigation, although narrower than the 2 km wide study area in most parts, varied in width depending on the location, constraints and results from the initial design investigations.

Further, more detailed technical investigations enabled the final rail corridor to be identified (30 m minimum; however, it is wider, as required, to accommodate the earthworks associated with large cuts and fills, drainage works, rail infrastructure, access roads and fencing). If the Project is approved to proceed, it is ARTC's intention that the nominated rail corridor be gazetted as future railway land by the Queensland Government.

2.10.2 Environmental design

Environmental design requirements were considered and assessed through the corridor selection process for the Project. Corridor selection accounted for environmental constraints in the identification of options and subsequent multi-criteria analysis (Section 2.9.1).

For the revised reference design, criteria (Section 2.9.1 and Chapter 5: Project Description) were established to guide design development, while avoiding or minimising environmental and social impacts. Development of the revised reference design has progressed in parallel with the impact assessment process. As a result, design solutions for avoiding, minimising or mitigating impacts have been incorporated into the revised reference design as appropriate and where possible.

Potential impacts that have been avoided or mitigated through the development of the revised reference design are identified in the impact assessment discussions included in Chapter 8 to Chapter 22 of this revised draft EIS.

Environmental design requirements for the Project are presented in Chapter 24: Draft Outline Environmental Management Plan.

2.10.3 New South Wales/Queensland Border to Kurumbul (Queensland Rail South Western Line)

The following alignment assessments were undertaken with the overlapping project NSW/QLD border section of Inland Rail.

The preferred alignment was refined once more during the reference design stage, within an approximately 50 m wide corridor centred on 'Option D st1D'. Option D st1D was referred to as the 'base case' for the purpose of this analysis (Figure 2-18).

Six alternative greenfield alignments were developed and assessed using an MCA. The six greenfield alignments differ in terms of:

- Property severance and access
- Small variances in bridge lengths.

Small variances in potential environmental and cultural impacts based on currently available information.

The MCA identified Option 2.5 (shown in Figure 2-19) as the preferred alignment for the feasibility design stage, and development of the EIS. Key features of Option 2.5 include:

- Option 2.5 crosses Whalan Creek and the Macintyre River slightly east of the base case alignment (i.e. 'Option D st1D from Phase 2 preparatory works). This brings the Whalan Creek and Macintyre River crossings into closer proximity, thereby reducing the potential for waterway impacts.
- Option 2.5 aligns with the Eukabilla Road reserve north of the NSW/QLD border, which reduces the amount of farming land that would need to be acquired.
- A tighter radius curve is used to tie into the QR South West rail line, further reducing the amount of farming land that must be acquired. Option 2.5 intersects cultivated and irrigated paddocks; however, the impact is greatly reduced from the base case.
- Compared to Option 2.2, Option 2.5 impacts less regulated vegetation and the length of alignment within the floodplain is reduced.

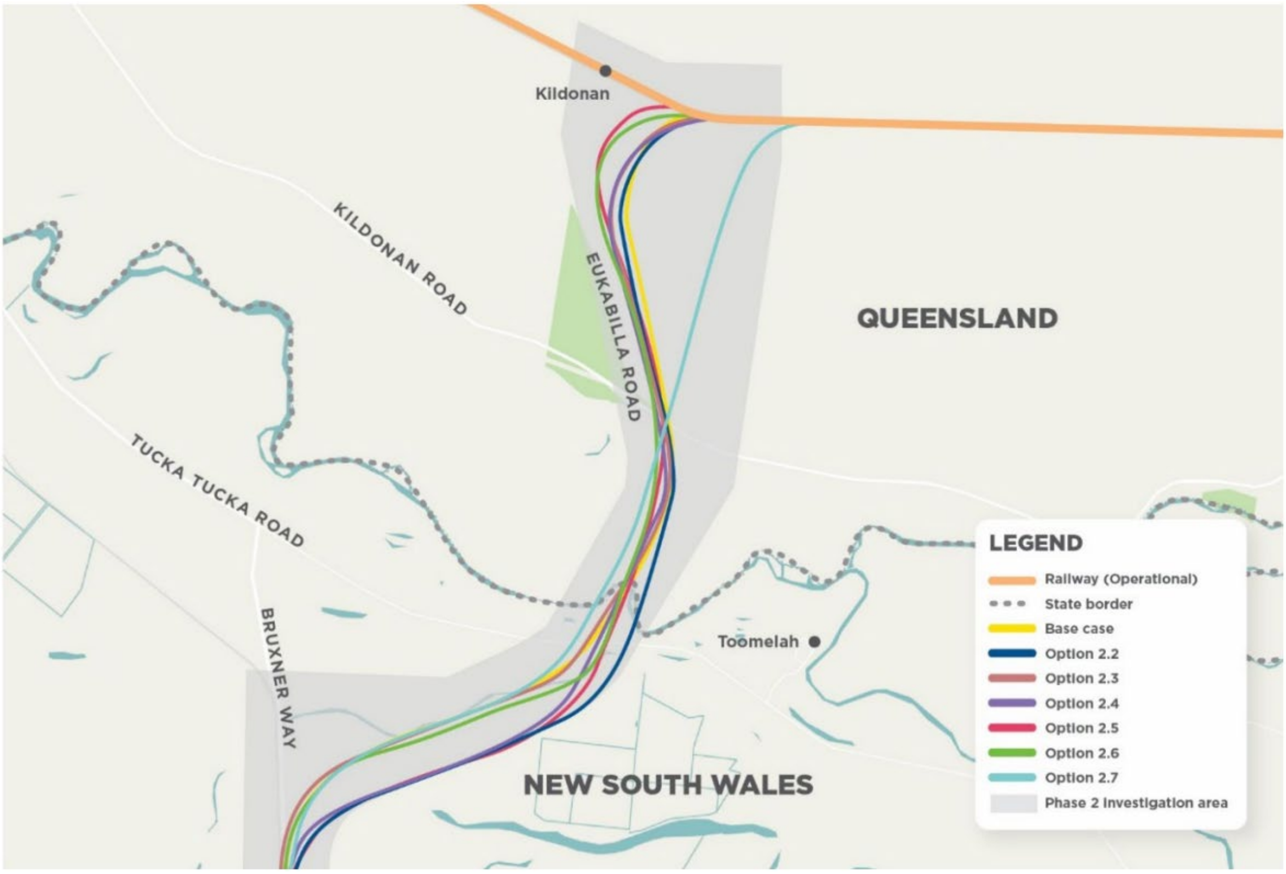


FIGURE 2-18 REFERENCE DESIGN STAGE ALIGNMENT OPTIONS BETWEEN NSW/QLD BORDER AND KURUMBUL (QUEENSLAND RAIL SOUTH WESTERN LINE)

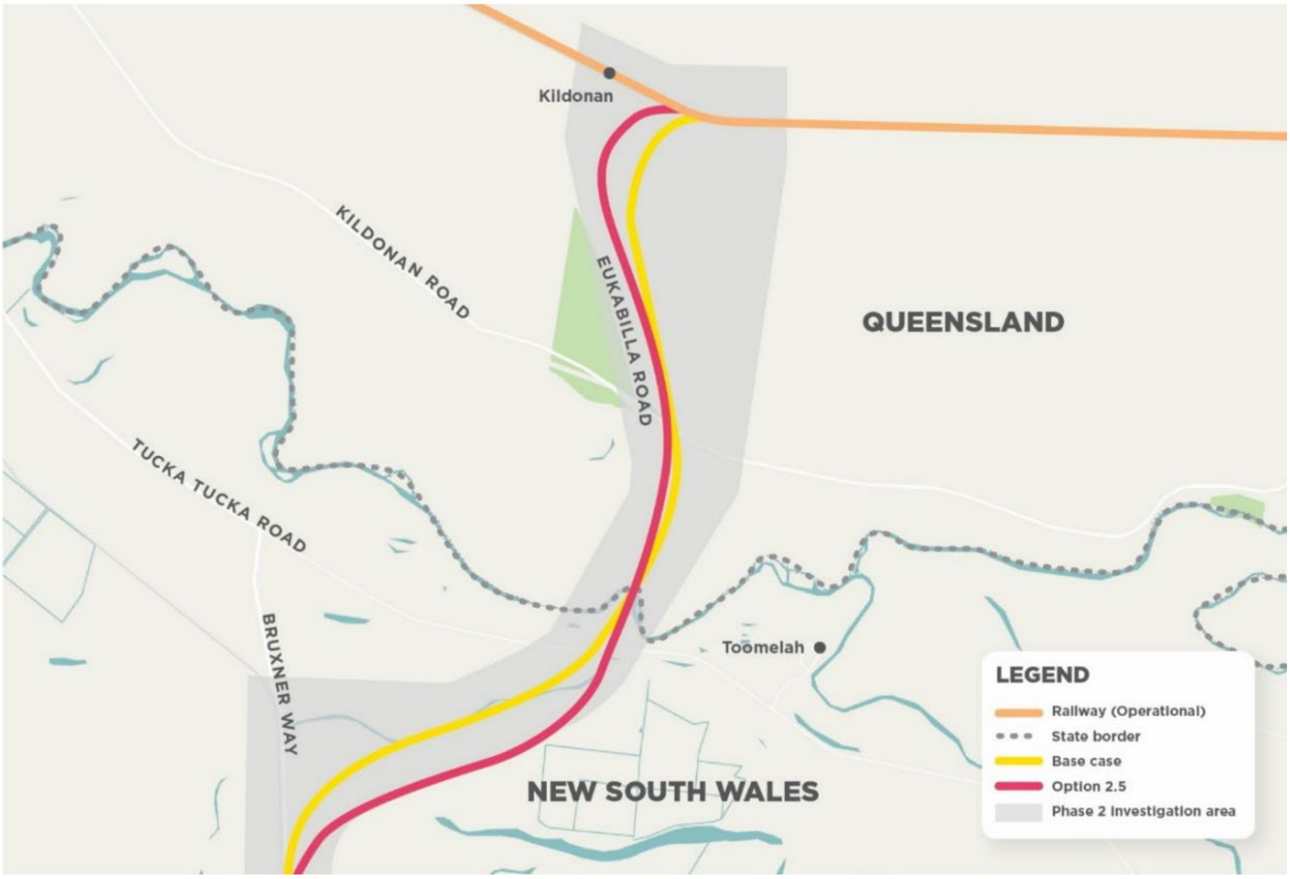


FIGURE 2-19 REVISED REFERENCE DESIGN ALIGNMENT OPTIONS BETWEEN NSW/QLD BORDER AND KURUMBUL

2.10.4 Kurumbul to Whetstone (Queensland Rail South Western Line)

The 2 km wide study area was centred around the existing operational QR South Western Line, primarily used for grain haulage. There were several constraints and considerations in developing the alignment:

- Turnout connection in the proximity of Kurumbul to ensure the QR line maintains interoperability between Kurumbul and Thallon
- Turnout connection in the proximity of Whetstone to ensure the QR line maintains interoperability between Whetstone and Warwick (and beyond)
- Several road rail interfaces including the Cunningham Highway
- Extent of 1% AEP hydrology considerations at Yelarbon and Whetstone
- Yelarbon community and surrounding road network
- Grain silos and other private infrastructure
- Whetstone State Forest.

Overall, following the existing QR corridor was found to be the most appropriate alignment, which aligns with the overarching principles specified within Figure 2-20 and Section 2.9.1. The benefits of using the existing corridor over greenfield alternatives included:

- Eliminates the need for two rail transport corridors in this area and complexities introduced with road–rail interfaces
- Minimised the loss of highly productive farmland
- Minimised the impacts, severance and fragmentation of agricultural land Class A and Class B
- Minimised access impacts and changes to existing farming practice
- Maximise and regenerate the use of a regional rail networks and reduce historical and legacy issues with the existing track
- Improve road infrastructure surrounding the existing interfaces and level crossings.

FIGURE 2-20 REFERENCE DESIGN ALIGNMENT OPTIONS BETWEEN KURUMBUL AND WHETSTONE

2.10.5 Whetstone to Millmerran

In July 2018, ARTC received a request from Goondiwindi Regional Council (GRC) for an alternative alignment option to be assessed—referred to as the Goondiwindi Regional Council State forest alignment option. This alignment option differed from the State forest route options considered during the concept planning stage (Section 2.9.3). It deviated from the Base Case Modified alignment option at Whetstone (Yarranbrook Feedlot) and extended northwards towards Millmerran through Bringalily State Forest, approximately 8 km to 10 km west of Millmerran–Inglewood Road. This alignment option is shown in Figure 2-21 as 'GRC Option 1'.

Following receipt of the alternative alignment option, ARTC undertook an initial feasibility assessment of the GRC State Forest alignment option. As part of this initial assessment, ARTC identified a shorter, modified version of GRC's nominated alignment for inclusion in a comparative options assessment. This alignment option is shown in Figure 2-21 as 'GRC Option 2'.

A key criteria comparative assessment between 'GRC Option 1', 'GRC Option 2' and the Base Case Modified alignment option was undertaken. This comparative assessment concluded that, while all three options were of comparable length, the alternative Goondiwindi Regional Council options were reliant on using an alignment through the State forest that traversed unfavourable topography, resulting in substantially greater earthworks (Table 2-6) and non-optimal operating gradients.

Based on these findings, it was concluded that the alternative Goondiwindi Regional Council options performed less favourably than the Base Case Modified alignment option in achieving the Inland Rail service offering. The conclusions of this comparative assessment were presented to Goondiwindi Regional Council on 22 August 2018. As an outcome, the Base Case Modified alignment was adopted for further progression through the reference design development process.

TABLE 2-6 SUMMARY OF COMPARATIVE ASSESSMENT OF ALIGNMENT OPTIONS BETWEEN WHETSTONE AND MILLMERRAN

Alignment option	Base Case Modified	GRC Option 1	GRC Option 2
Length	75.34 km	76.73 km	75.28 km
Earthworks: Total cut	2,740,000 m^3	12,750,000 m^3	10,760,000 m^3
Earthworks balance	- 220,000 m^3	+ 3,470,000 m^3	+ 2,810,000 m^3
Cost differential	0%	119%	94%

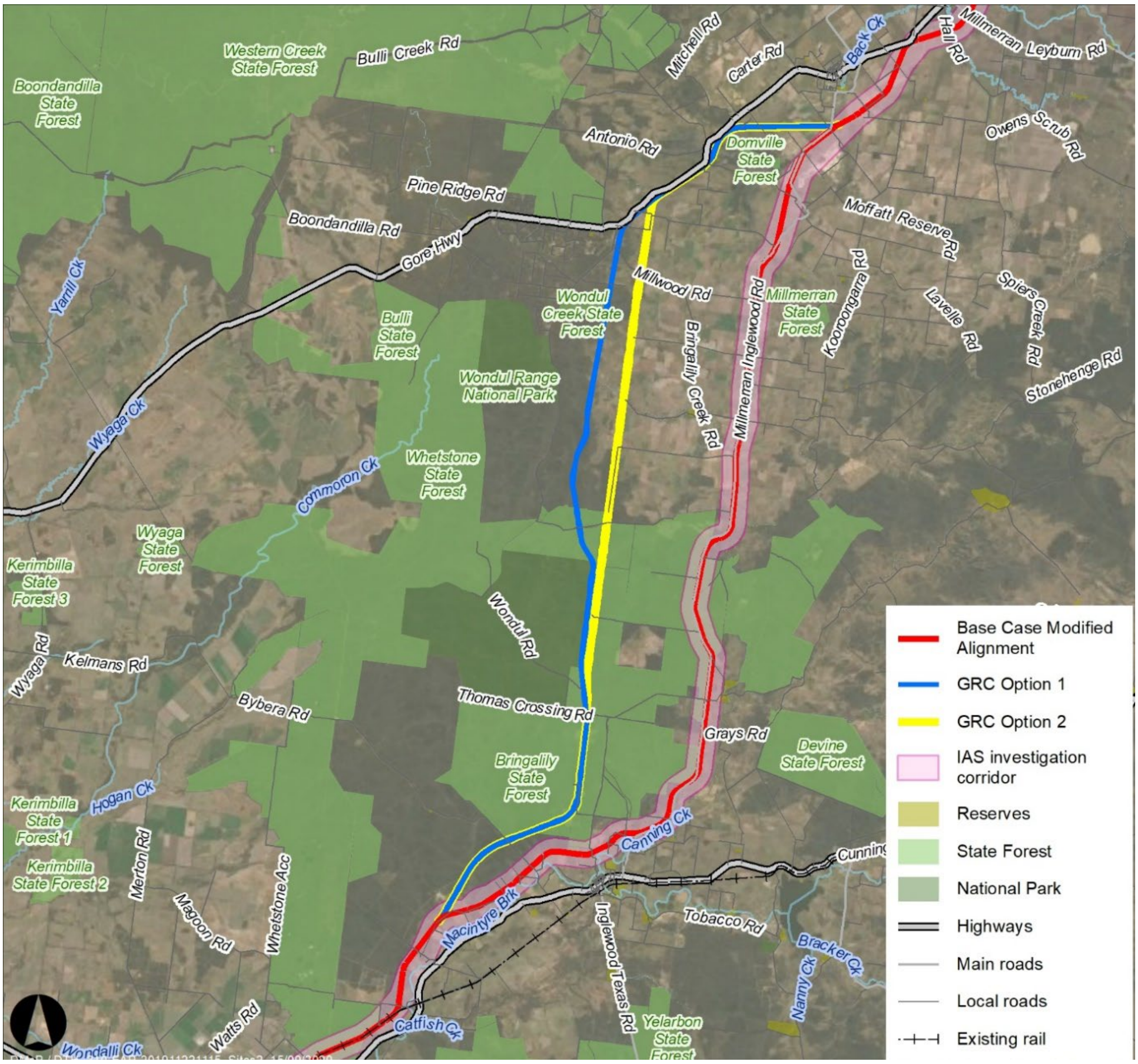


FIGURE 2-21 REFERENCE DESIGN ALIGNMENT OPTIONS BETWEEN WHETSTONE AND MILLMERRAN

2.10.6 Inglewood area

Four alignment options were investigated through this section of the Project, with the purpose being to minimise impacts and severance to properties along the banks of Macintyre Brook and Canning Creek. The four alignment options that were assessed are shown in Figure 2-22.

Three of the alignment options encroached, to varying degrees, on Bringalily State Forest. The need for revocation of State forest for these options and the process that this would trigger the Queensland Legislative Assembly consideration and assent by the Governor in Council was considered in the option comparison process.

Comparative assessment of the alignment options in this section concluded that OPT5, as shown in Figure 2-22, was the best performing option as it:

- Minimised the number of properties impacted
- Minimised the extent of severance impact to properties
- Minimised the area of impact to productive agricultural land
- Minimised the length of alignment within the 1% AEP associated with Macintyre Brook
- Was consistent with feedback received through stakeholder consultation, which highlighted a desire to have impacts to property and agricultural land minimised through this area.

The OPT5 alignment has been adopted for the Project's revised reference design and assessed for this revised draft EIS.

Map of the Inglewood area alignment options in relation to the IAS study area extent, forests and reserves.

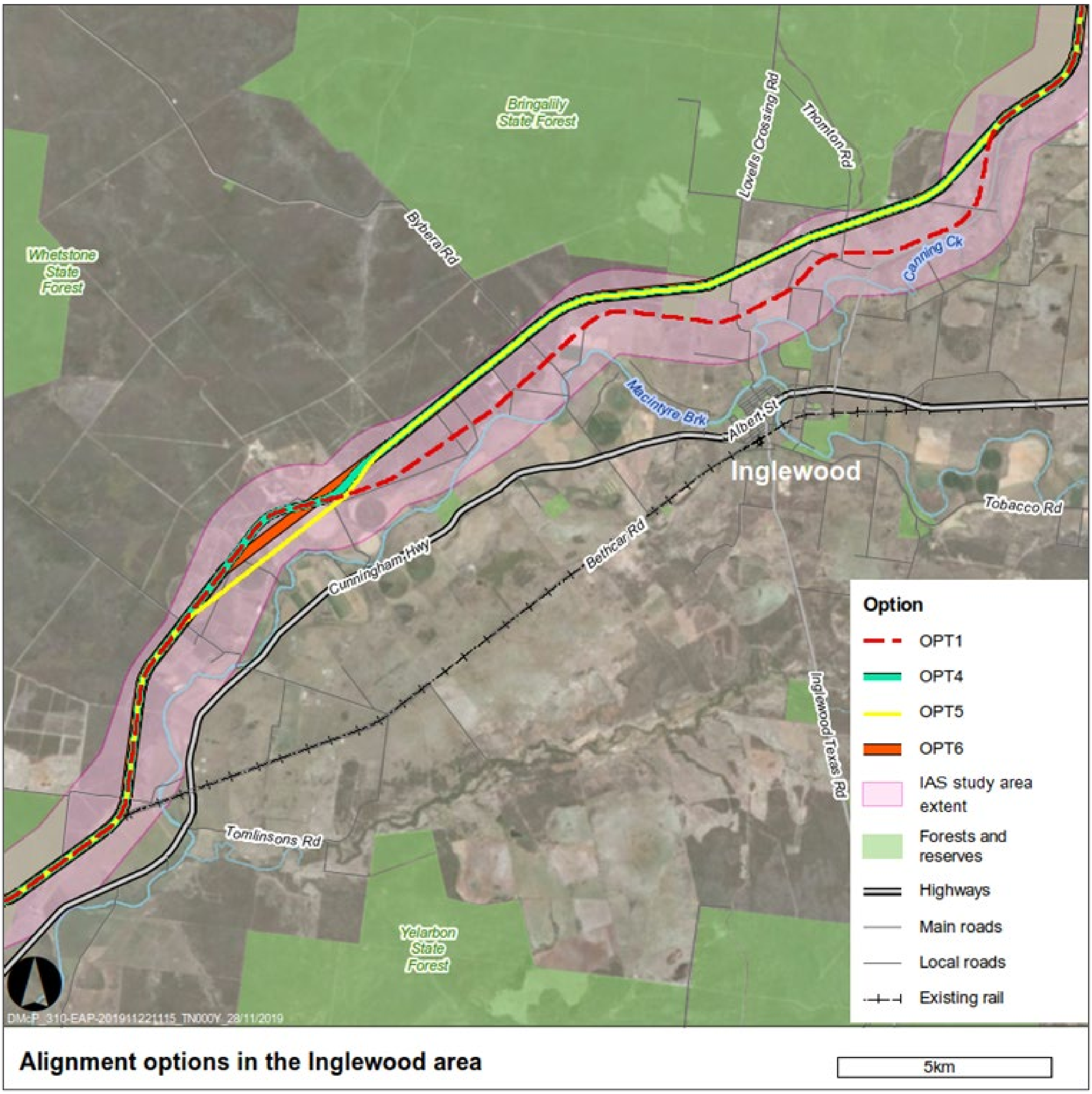


FIGURE 2-22 REFERENCE DESIGN ALIGNMENT OPTIONS IN THE INGLEWOOD AREA

2.10.7 Millwood area (Millmerran–Inglewood Road)

The Millmerran–Inglewood Road section of the Project, in the vicinity of Millwood, contains challenging topographical constraints, complex road intersections, as well as numerous property and creek interfaces. Seven alignment options were investigated through this section of the Project, with Option A ('OPTA') preferred to minimise impacts to properties and private accesses, as well as reduce the number of road intersections. The seven alignment options that were assessed are shown in Figure 2-23.

This design was to accommodate the geometry complexities and interface of the Commodore Mine. The alignment studies reveal significant stakeholder benefits, including:

- Fewest farms affected mid-block
- Fewest farm operations/dwellings within 200 m of alignment
- No direct impacts to feedlots
- Fewest residences within 200 m.

To achieve these benefits, ARTC selected the most technically optimal crossing location to minimise operation and construction impacts to Millmerran–Inglewood Road and impacts to the Bringalily State Forest. The crossing location along the Bringalily State Forest was implemented as part of the Millmerran-Inglewood Road alignment to minimise:

- Restriction of access
- Loss of flora and fauna
- Changes to bushfire management
- Weeds and pests
- Changes to drainage and minimising sediment and erosion
- Changes to interests on the State forests (e.g. apiaries permits, grazing leases and timber values with the forest).

From both a road and rail safety perspective, the overarching objective across Inland Rail is to, in so far as is reasonably practicable, minimise the number of level crossings across the alignment. This has resulted in two of the three interfaces with Millmerran Inglewood Road proposed to be grade separated as part of the Inland Rail scope.

In consultation with DTMR, the project team has undertaken extensive reviews and assessed design alternatives for the Millmerran–Inglewood road interfaces, which included alternative rail alignments and grade separations.

The two northern crossings are topography-based grade separations, where the rail height, governed by the vertical rail grades, is naturally higher than the existing road level (Appendix B1: Design Drawings Part 1, Sheet 42 and Sheet 46). The rolling hills of Millwood and Millmerran provide an opportunity for the rail line to bridge Millmerran–Inglewood Road, which falls within localised depressions in the landscape.

The most southern crossing of Millmerran–Inglewood Road, at Inglewood, did not meet a topography-based grade separation, nor any criteria triggering an automatic grade separation detailed Public Level Crossing Treatment methodology. Applying the Office of the National Rail Safety Regulator audited methodology, higher order treatments, such as grade separation, are not justified at this location as part of the Inland Rail scope, as the cost to grade separate is grossly disproportionate to the benefits.

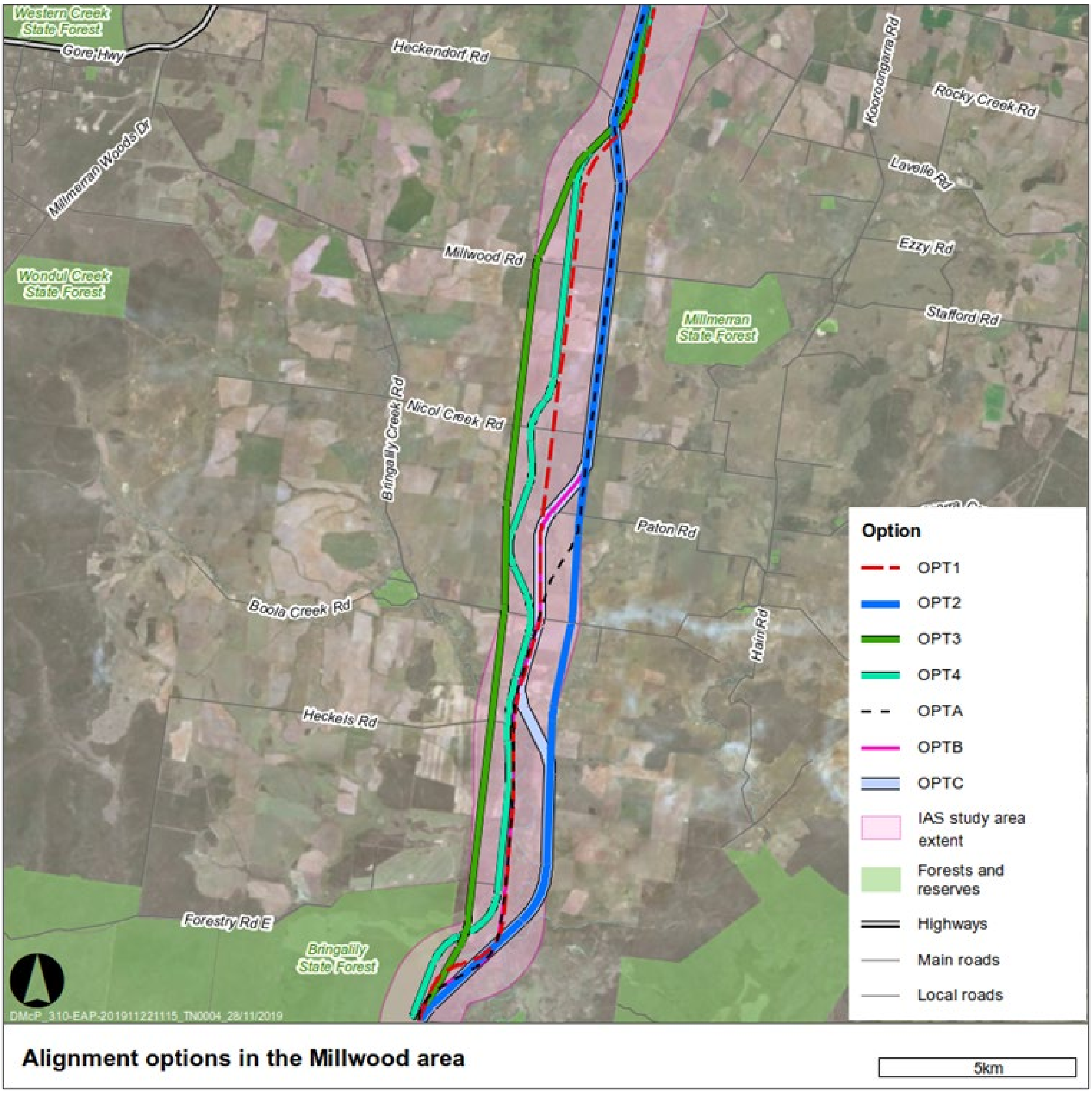


FIGURE 2-23 REFERENCE DESIGN ALIGNMENT OPTIONS IN THE MILLWOOD AREA (MILLMERRAN–INGLEWOOD ROAD)

2.10.8 Commodore Mine area

The Base Case Modified option (Figure 2-12) crossed Millmerran–Inglewood Road near the south-western end of the Commodore Mine then ran parallel to the eastern side of Millmerran–Inglewood Road and along the edge of the current Commodore Mine open-cut pit. InterGen, the operators of Commodore Mine and Millmerran Power Station, during early consultation expressed a desire to have alternative alignment options investigated in proximity to the mine to avoid or minimise impacts to current and future operations.

In response to this request, ARTC developed four alternative alignments located to the west of the Base Case Modified alignment. These four alignments are shown in Figure 2-24 in addition to the Base Case Modified alignment. These alternative alignments were developed to be located on land owned by InterGen or its subsidiaries, ensuring no direct impacts to new landowners. The alternative alignments were also developed with an appreciation of the following design constraints:

- The existing Powerlink 330 kilovolt (kV) transmission line extending west from Millmerran Power Station to Bulli Creek Substation
- The flow path of Back Creek
- Millmerran–Inglewood Road
- The Millmerran Power Recycled Water Pipeline
- The future operational plans for Commodore Mine.

A key criteria comparative assessment between the alternative alignment options the Base Case Modified alignment option was undertaken. This assessment considered:

- Technical viability
- Road network impacts
- Bridge and structural requirements for each option
- Interactions with utilities, such as the Powerlink 330 kV transmission line
- Environmental and social sensitivities
- Property impacts
- Rail operational factors
- Current and future Commodore Mine operations.

As a result of the technical assessment, community consultation and stakeholder engagement the OPT4 (Figure 2-24) was identified as the preferred alignment through the Commodore Mine area for the following reasons:

- Impacts to current mining operations are avoided
- Impacts to the current active mining lease (ML), ML 50151, are avoided
- Impacts to future mine expansion into the adjoining mineral development licence area, Mine Development Licence (MDL) 299, are minimised compared to other alternative options
- One less level crossing than the Base Case Modified alignment.

Consequently, the OPT4 alignment was adopted. This alignment option was subject to further refinement during design development to optimise the crossings of Schwartens Road and Millmerran–Inglewood Road. This refined OPT4 alignment has been adopted for the Project's revised reference design and assessed in this revised draft EIS.

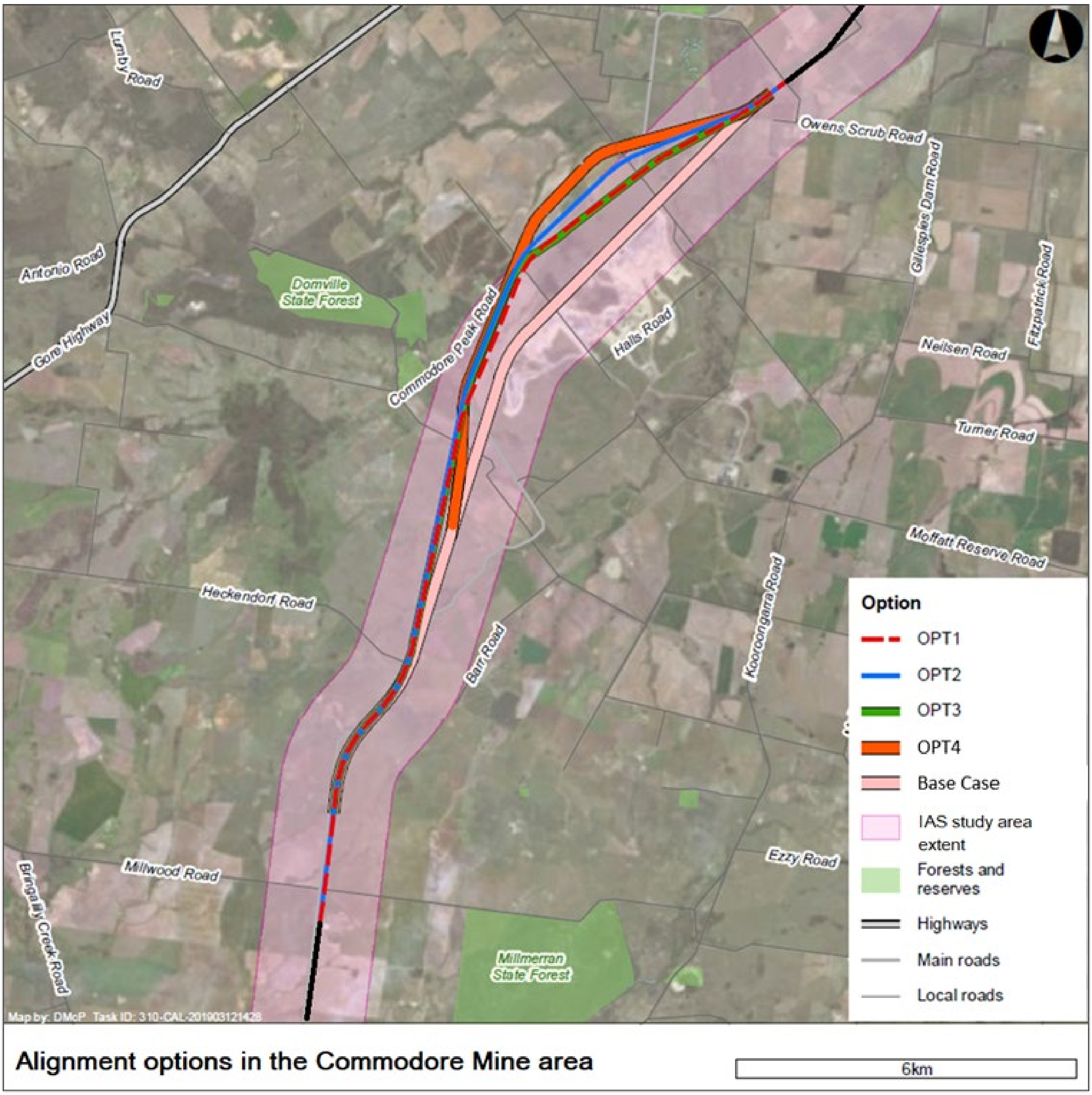


FIGURE 2-24 REFERENCE DESIGN ALIGNMENT OPTIONS IN THE COMMODORE MINE AREA

2.10.9 Millmerran Alternative Alignment

The Millmerran Alternative Alignment (Figure 2-25) has been based on ongoing consultation with local business and the community, as well as many public submissions provided to the Office of the Coordinator-General and ARTC relating to potential impacts on a major regional business and employers for the Millmerran community. In recognition of these potential impacts the revised reference design includes:

- Revised horizontal and vertical alignments for engineering design optimisation with reduced social impact
- Relocation of the Millmerran crossing loop to Chainage (Ch) 132 km to Ch 134 km without impacting the operational efficiency
- Road bridge over rail grade separation at Owen Scrub Road, rather than an active level crossing as previously proposed in the draft EIS
- Owen Scrub Road upgrade works to improve safety and increase design speeds in the approach to the rail crossing
- Removal of the Lindenmayer Road active level crossing, noting the design alignment no longer impacts this road.

Advantages of the revised reference design include:

- Completely avoids severing highly intensive animal and agricultural industries:
  - including avoidance of severing Class A, Class B and important agricultural areas (discussed in further detail in Chapter 8: Land Use and Tenure).
- Removal of two active crossings, increasing safety and travel benefits for the community
- Rail alignment traverses less area impacted by 1% AEP Condamine River floodplain event
- The new alignment indicates no change to 1% AEP Condamine River floodplain impact objectives on properties housing infrastructure for major regional employer's business infrastructure
- Reduces adverse economic and social impacts by:
  - creating greater separation between a major Millmerran regional employer's main business infrastructure, reducing potential impacts or risks
  - avoids direct impacts to future planned infrastructure.
- The access road on Lindenmayer Road no longer has any direct impacts to associated traffic for future operations.

Consultation with impacted stakeholders will continue to take place through the detailed design stage.

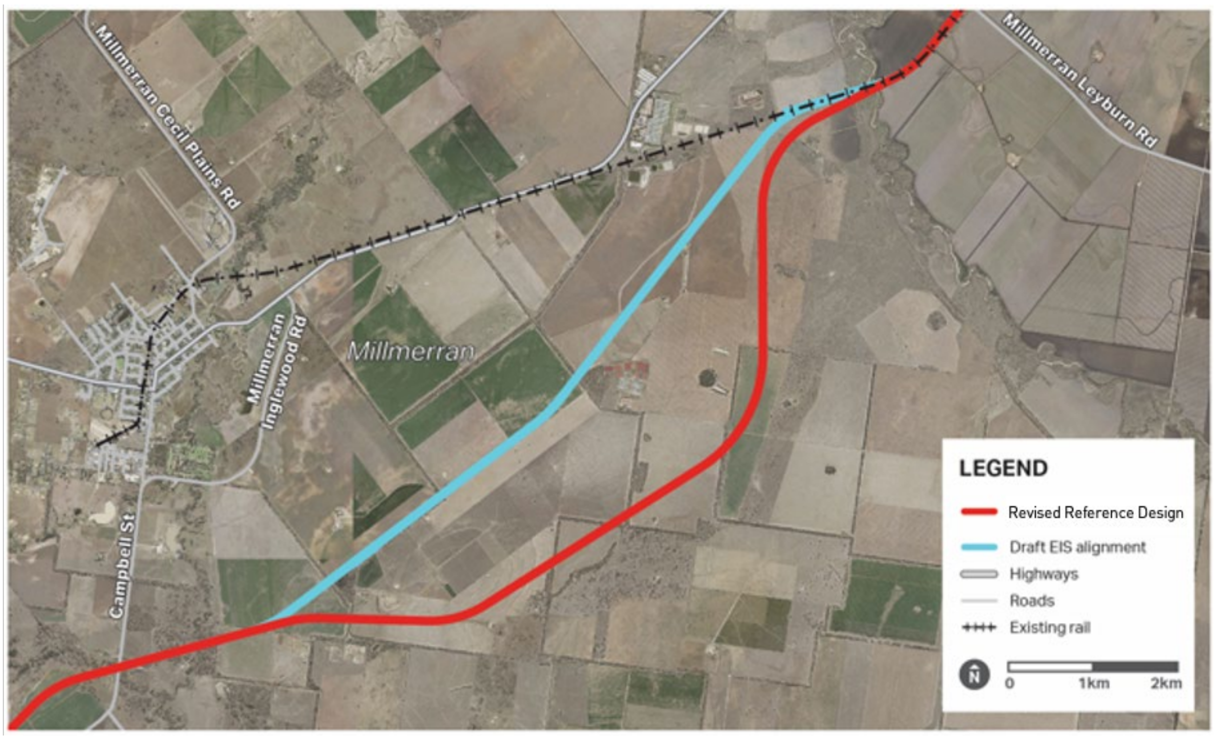


FIGURE 2-25 REVISED REFERENCE DESIGN MILLMERRAN ALTERNATIVE ALIGNMENT

2.10.10 Millmerran to Yarranlea

The 2 km wide study area was centred around the existing QR Millmerran Branch Line (Figure 2-26), which was wholly contained within the Condamine River floodplain. There were several constraints and considerations in developing the alignment:

- Turnout connection in the proximity of Hall Road to the QR line to maintain interoperability between networks
- Several road rail interfaces
- Extent of 1% AEP hydrology model
- Community and road network within the township of Pampas:
  - including Gore Highway
- Grain silos and other private infrastructure.

Overall, following the existing QR corridor was found to be the most appropriate alignment, which aligns with the overarching principles specified within Section 2.9.1, including maximising the use of existing rail corridor or co-locating linear to existing rail corridors, minimising severance of properties and greenfield (reducing impacts to landowners, business and existing infrastructure) and minimising the extent of the Project within floodplain areas. The benefits of utilising the existing corridor over greenfield alternatives included:

- Shortest route available within the study area to traverse the Condamine River floodplain
- Eliminates the need for two rail transport corridors in this area and complexities introduced with road rail interfaces
- Minimised the loss of highly productive farmland (assessed in Chapter 8: Land Use and Tenure)
- Minimised the impacts, severance and fragmentation of agricultural land classes A and B (assessed in Chapter 8: Land Use and Tenure)
- Minimised access and changes to existing farming practice (assessed in Chapter 8: Land Use and Tenure)
- Maximise and regenerate the use of a non-operational rail corridor and reduce historical and legacy issues with the existing track.

FIGURE 2-26 REVISED REFERENCE DESIGN CENTRED AROUND EXISTING QR RAIL LINE CONTAINED WITHIN THE CONDAMINE FLOODPLAIN

2.10.11 Brookstead

The Brookstead alignment was developed in consultation with the community inclusive of landowners and private businesses. Three alignment options are shown in Figure 2-27 and are described below:

- Base case—utilise the existing QR corridor (brownfield). Impacts existing GrainCorp Brookstead silos operations and prevents any future connectivity. Existing corridor through the silos is 12 m, which compromises ARTC safety, operations and maintenance to accommodate Inland Rail infrastructure.
- Option 1—pushes the alignment ~40 m south away from the existing alignment and the GrainCorp Brookstead silos. Minimal strategic cropping land is lost in this option; however, the alignment runs relatively close to the township of Brookstead. Existing residential properties are maintained.
- Option 2—pushes the alignment ~400 m south away from the existing alignment and the township of Brookstead limiting the impact to the community. This option separates a significant portion of strategic cropping land from the primary landholding.

Other constraints and considerations were:

- Gore Highway grade separation technical design
- Connectivity to GrainCorp sidings
- Local road realignments (Saal Road and Ware Street connection)
- Brookstead State School.

On balance against several competing criteria, Option 1 was adopted on the basis of:

- A reduced degree of severance and fragmentation of highly productive farmland against Option 2
- Moving further away from the township (compared to the existing corridor) to reduce noise and vibration from township community against the base case
- Connectivity to GrainCorp is maintained.

FIGURE 2-27 BROOKSTEAD ALIGNMENT OPTIONS, CONTAINED WITHIN THE INITIAL ADVICE STATEMENT (ARTC, 2018A) STUDY AREA

2.10.12 Yarranlea to Southbrook

The Yarranlea to Southbrook section of the Project contains:

- Challenging topography and geotechnical conditions
- Major linear infrastructure, such as with the Gore Highway and Millmerran Branch Line
- Major utilities, such as the TRC water reservoirs, Millmerran Recycled Water Pipeline and Santos Oil Transmission Pipeline
- Approved existing and future developments, such as solar farms and the Pittsworth Industrial Precinct Enabling Project
- Social sensitivities associated with the townships of Pittsworth and Southbrook
- Environmentally sensitive areas including but not limited to koala populations
- Connectivity requirements for a turnout connection to QR Millmerran Branch Line at Yarranlea.

Two alignment options were investigated through this section of the Project to minimise interactions with the constraints. A third alignment option (not shown) was ruled out due to unacceptable social impacts and constraints, which used the existing Millmerran Branch Line through the centre of Pittsworth. The two alignment options progressed for assessment are shown in Figure 2-28. These were subject to the MCA that detailed technical and non-technical comparative assessments including quantitative ecological assessments of impacts on flora, fauna and habitat for threatened species.

2.10.12.1 Option 1

This assessment concluded that OPT1 (base case) was preferred due to better technical viability and construction feasibility, and fewer impacts to properties and least impact on field verified ecological impacts including koala populations. Additionally, the OPT1 (base case) alignment was considered consistent with feedback received through stakeholder consultation, which highlighted a desire to:

- Maintain access for emergency services
- Maintain access to private properties
- Avoid or minimise impacts to water infrastructure and flow paths
- Minimise noise and vibration impacts to sensitive receptors, including schools
- Greater habitat for threatened flora species but avoided more regulated vegetation, koala habitat and areas with high densities of koala records.

The OPT1 (base case) alignment was adopted and subjected to further refinement during design development between Ch 178.0 km and Ch 182.0 km to reduce the number of properties impacted. This refined OPT1 (base case) alignment has been adopted for the Project's revised reference design and assessed in the revised draft EIS.

2.10.12.2 Option 2

The assessment found that Option 2 created significant challenge in balancing earthworks across this section. The alignment contained two sections of 30 m high (150 m wide) embankments, along with two additional sections of 40 m high (235 m wide), and 45 m high (255 m wide) cuttings. The earthworks material imbalance created an excess of material of 5.6 million cubic metres (Mm^3) and double the total cut and fill volumes compared to Option 1 (total: 10 Mm^3 cut and 4.4 Mm^3 of fill). Beyond significant schedule and cost impacts, progressing Option 2 would have generated other environmental impacts including:

- Excessive truck haulage to remove the balance of this material as spoil
- Challenging geotechnical designs for major embankments and cuttings:
  - greater risk of interrupting groundwater with very deep cuts intersecting aquifers (including impacts local bores)
  - increased risk for safety and ongoing maintenance in operations for significant cut depths and embankments heights of this size
- Most overland flow path crossings
- Larger rail corridor impacting land use, access and visual amenity
- Greatest number of severed farms
- Most residential dwellings impacted by the corridor
- Creates a larger area of private properties located between two major transport corridors: Gore Highway and Inland Rail corridor

- Less impact on threatened flora habitat but intersected with more remnant vegetation and associated koala habitat and records. Ecological impacts of Option 2 were considered greater than Option 1 and would have resulted in greater landscape fragmentation and biodiversity offset requirements.

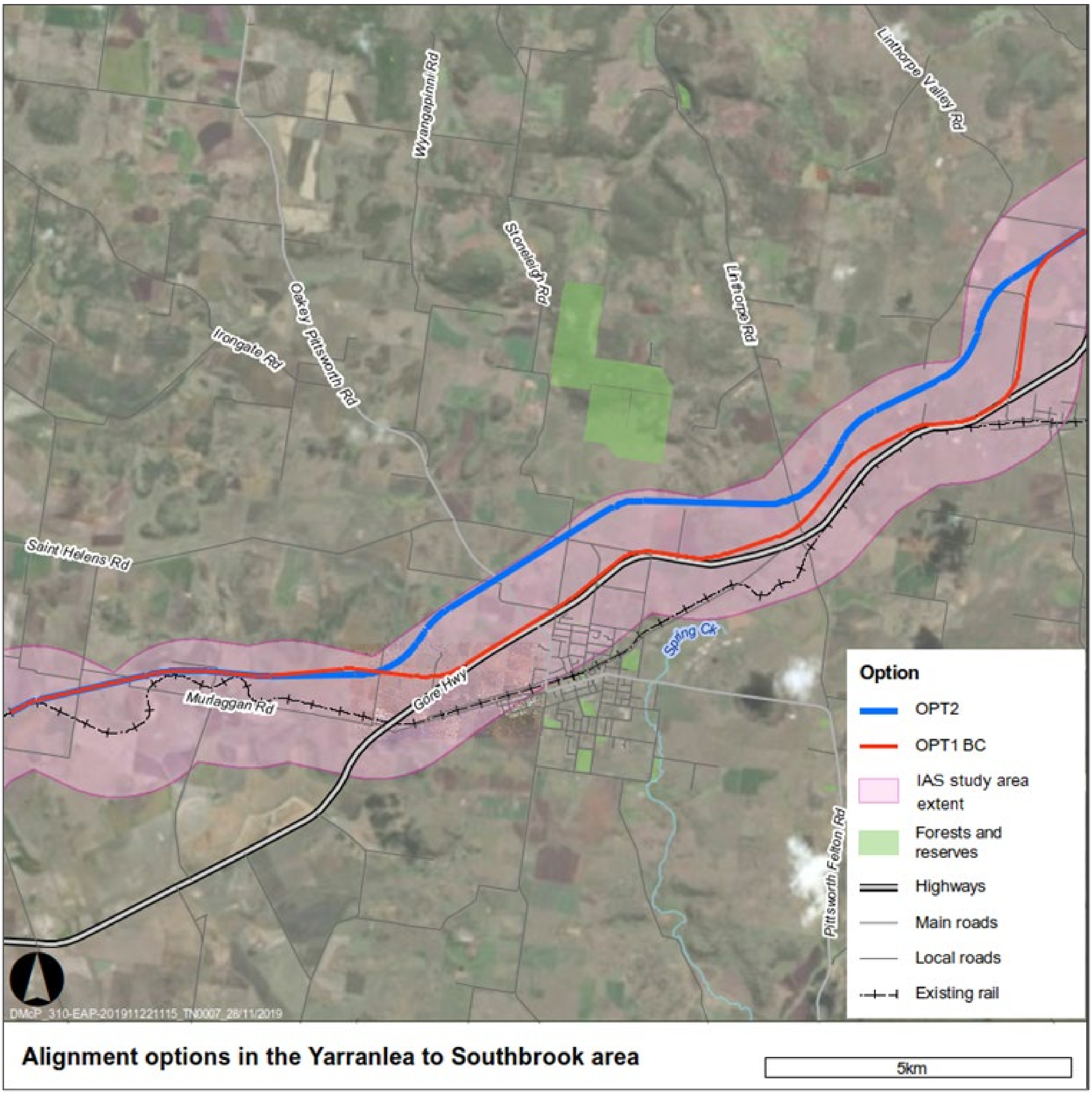


FIGURE 2-28 REFERENCE DESIGN STAGE ALIGNMENT OPTIONS IN THE YARRANLEA TO SOUTHBROOK AREA

2.10.13 Southbrook to Athol

The Southbrook to Athol section of the Project contains:

- Challenging topography and geotechnical conditions
- Major linear infrastructure, such as with the Gore Highway and Millmerran Branch Line
- Multiple freehold properties of non-uniform shape.

The overarching design principle for this section of the alignment was to parallel the Gore Highway as much as possible, thereby forming a multi-modal transport corridor. The primary reason for this approach was to minimise the extent of severance impact to freehold properties. Based on this principle, the Option 1 alignment through this section was established (Figure 2-29).

Consultation with potentially affected landowners, DTMR and TRC regarding the Option 1 alignment identified the following key themes:

- Interest in seeing the Project IAS study area moved
- Interest in the property valuation and compensation process for the Project
- Impacts to existing utility infrastructure

- Alterations to the existing road network
- Maintenance of access for emergency services
- Impacts to water infrastructure and flow paths
- Height of the alignment relative to the surrounding ground level
- Operational rail noise and vibration.

In response to this feedback, further alignment option assessment was conducted for this section of the Project.

An alternative alignment to the east of the Gore Highway would require two grade separations of the Gore Highway. This alternative is considerably more costly and would involve substantial disruption to the public road network and impact to a critical State-controlled road asset. An alternative alignment to the east of the focused area of investigation was therefore considered not to be technically viable.

An alternative alignment located further to the west would involve significantly greater severance impacts to freehold properties. As the topography rises relatively steeply to the west, an alternative alignment would also involve substantially increased earthworks volumes, impacting program, cost, constructability and sustainability objectives. An alternative alignment to the west of the IAS study area was therefore considered not to be technically viable.

As neither an eastern nor western alternative alignment was considered technically feasible, a modification to Option 1 was considered to reflect stakeholder feedback. The modifications resulted in the establishment of Option 2, which sought to:

- Decrease the offset distance from the Gore Highway, near to Purcell Road
- Straighten the alignment to run north–south coming up from the Gore Highway to reduce property impacts to three properties between Purcell Road and Athol School Road.

Option 1 and Option 2 are shown in Figure 2-29. Option 2 has been adopted for the Project revised reference design and assessed in this revised draft EIS.

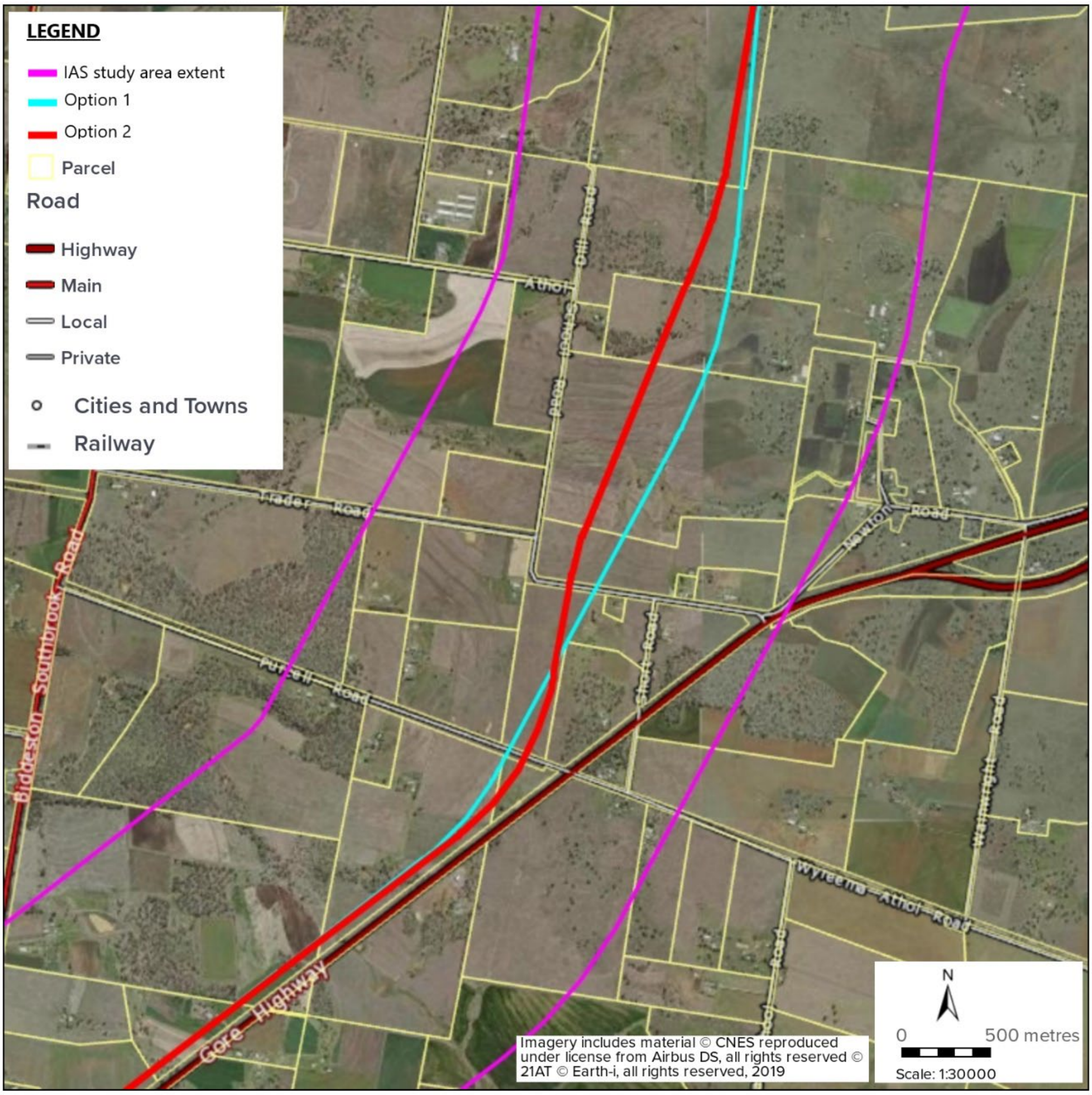


FIGURE 2-29 REFERENCE DESIGN STAGE ALIGNMENT OPTIONS IN THE SOUTHBROOK TO ATHOL AREA

2.10.14 Athol to Gowrie Mountain

The Athol to Gowrie Mountain section of the Project contains:

- Toowoomba Cecil Plains Road
- Warrego Highway
- Existing utilities (Powerlink, gas and water mains)
- Westbrook Creek and Dry Creek floodplains
- Brimblecombe Road
- Toowoomba Wellcamp Airport infrastructure and obstacle limitation surface (OLS) restrictions
- Challenging topography and geotechnical conditions.

The positioning of the alignment through this section sought to minimise the number of interface points between the Project and Dry Creek. In doing so, alignment options on either the western or eastern side of the creek were considered (Figure 2-30). Identification of these options were defined by the following considerations:

- Minimising impacts associated with the Westbrook Creek floodplain
- Adhering to OLS requirements of the Toowoomba Wellcamp Airport
- Optimising rail–road interface solutions at Toowoomba Cecil Plains Road and Brimblecombe Road

- Feedback from consultation with potentially affected landowners, DTMR, TRC, Toowoomba Wellcamp Airport, which identified the following key themes:
  - interest in seeing the IAS study area moved
  - interest in the property valuation and compensation process for the Project
  - impacts to the community of Gowrie Mountain
  - impacts to existing utility infrastructure
  - alterations to the existing road network
  - maintenance of access for emergency services
  - impacts to water infrastructure and flow paths
  - height of the alignment relative to the surrounding ground level
  - operational rail noise and vibration
  - separation distances between double-stacked trains and aircraft.

The Option 1 alignment, on the eastern side of Dry Creek, was found to have a longer crossing of the Westbrook Creek floodplain. Option 1 crossed 1,670 m of this floodplain and would require approximately 640 m of bridging across three defined channels. In addition, Option 1 crossed 340 m of floodplain attributed to Dry Creek, with a main channel crossing width of 20 m (Figure 2-31).

Rollingstock on Option 1 may also encroach on the OLS of Toowoomba Wellcamp Airport.

In comparison, Option 2 crosses Westbrook Creek to the east of its confluence with Dry Creek and thereafter is located on the western side of Dry Creek. This alignment traverses approximately 1,100 m of floodplain, with a main channel crossing of 40 m requiring a 180 m long bridge (Figure 2-31).

Following comparative assessment of the two alignment options, Option 2 was identified as being better performing due to:

- Being more cost effective due to a reduction of earthworks and drainage structures
- Requiring fewer level crossings
- Impacting fewer private properties
- Avoiding conflict with Toowoomba Wellcamp Airport OLS
- A shorter length within with Westbrook Creek and Dry Creek floodplains.

Based on the above, Option 2 has been adopted for the Project revised reference design and assessed in this revised draft EIS.

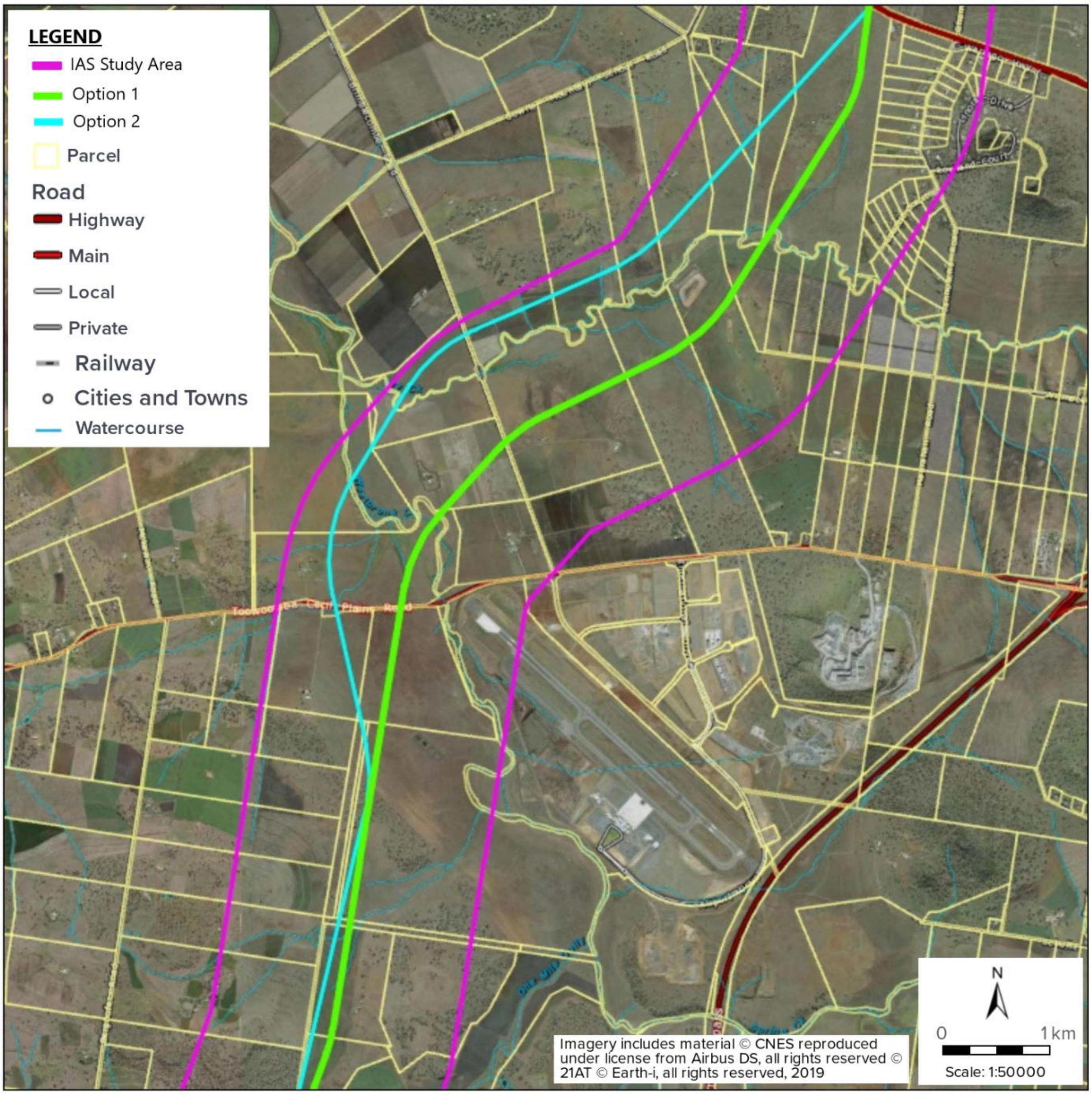


FIGURE 2-30 REFERENCE DESIGN STAGE ALIGNMENT OPTIONS IN THE ATHOL TO GOWRIE MOUNTAIN AREA

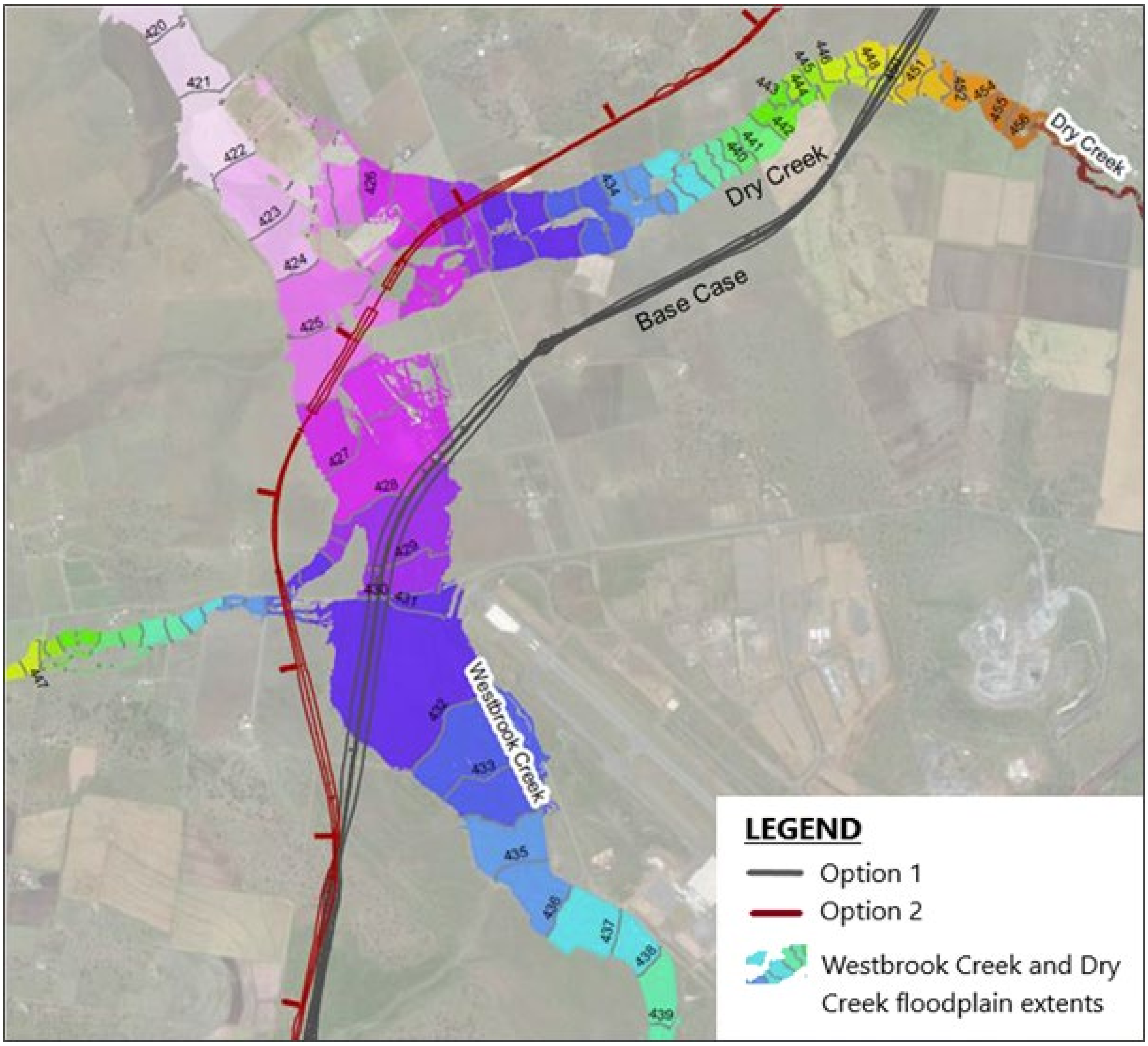


FIGURE 2-31 FLOODPLAIN EXTENTS FOR ALIGNMENT OPTIONS IN THE ATHOL TO GOWRIE MOUNTAIN AREA

2.10.15 Warrego Highway to Gowrie Junction

The final 4.5 km of the Project contains the following:

- Grade separation of the Warrego Highway, with associated topographical challenges
- Elevation change of 29 m along 1,300 m of alignment, from the Warrego Highway to Gowrie Creek
- Interfaces with critical utilities, including:
  - Roma to Brisbane APA Group high-pressure gas main
  - TRC potable water main.
- Gowrie Creek and associated floodplain
- QR West Moreton Line
- Tie-in with the Gowrie to Helidon Inland Rail project
- Interface with the InterLinkSQ development.

Four alignments were investigated through this section, as shown on Figure 2-32, which included:

- Option A—the Base Case alignment
- Option B—modified to cross north of Gowrie Creek to connect to the existing QR rail corridor for the West Moreton line
- Option C—a hybrid of Options A and D
- Option D—runs parallel to Robsons Road before connecting to the existing QR rail corridor.

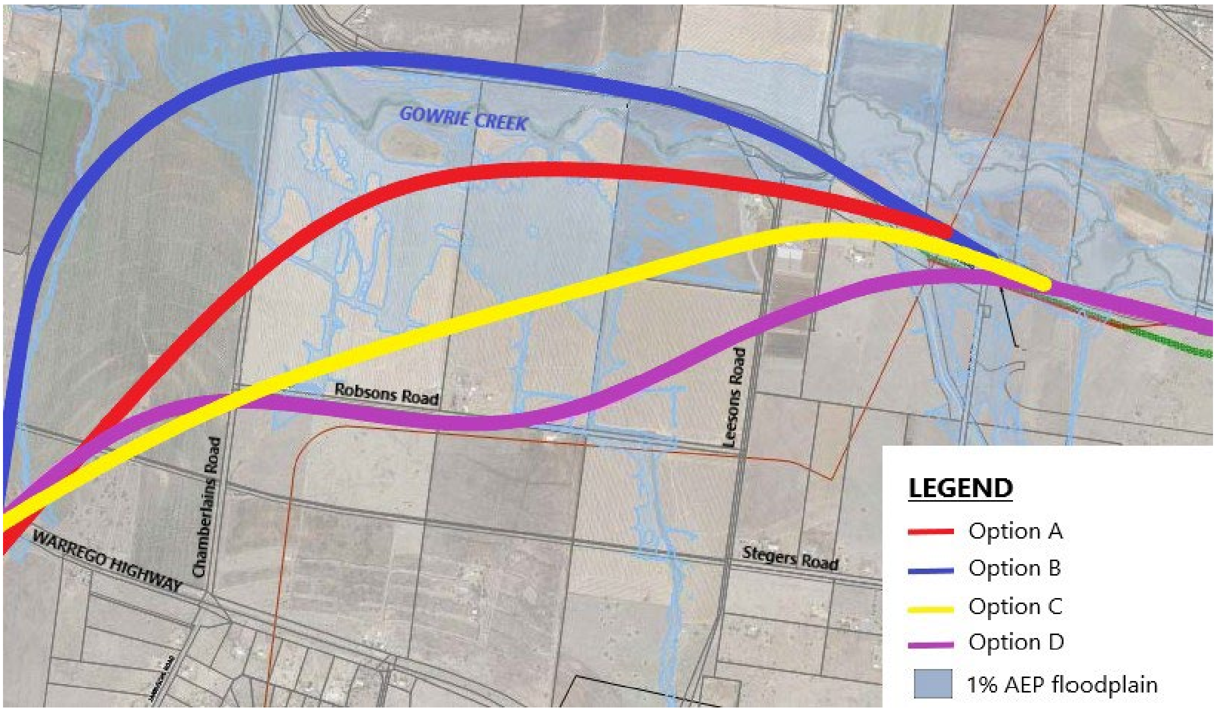


FIGURE 2-32 REFERENCE DESIGN STAGE ALIGNMENT OPTIONS IN THE WARREGO HIGHWAY TO GOWRIE JUNCTION AREA

After comparative assessment of the four options, Option A was selected as the optimal alignment solution through this area based on:

- Shorter (8.0 km) than Option B (8.8 km)
- Less of a hydrological impact than Option B
- Traverses fewer properties (six) than Option C (nine) and Option D (eight)
- Enables connection into the InterLinkSQ development, unlike Option C and Option D
- Requires fewer road interface design treatments than Option C and Option D.

As a result of these findings, Option A was progressed for further design development. Following further consultation with the potentially affected landowners in this area, it was apparent that additional optimisation of Option A was required to reduce the impact to agricultural operations while also balancing earthworks. The objective of this further alignment optimisation was to lessen the extent of diagonal impact across properties, thereby achieving more favourable outcomes for current land use. In doing so, a modified alignment, Option E, was developed. Option A and Option E are both shown in Figure 2-33.

Option E was considered to achieve better outcomes for continuity of existing land use within the area, as requested through landowner consultation. Consequently, Option E was adopted for the Project revised reference design and assessed in this revised draft EIS.

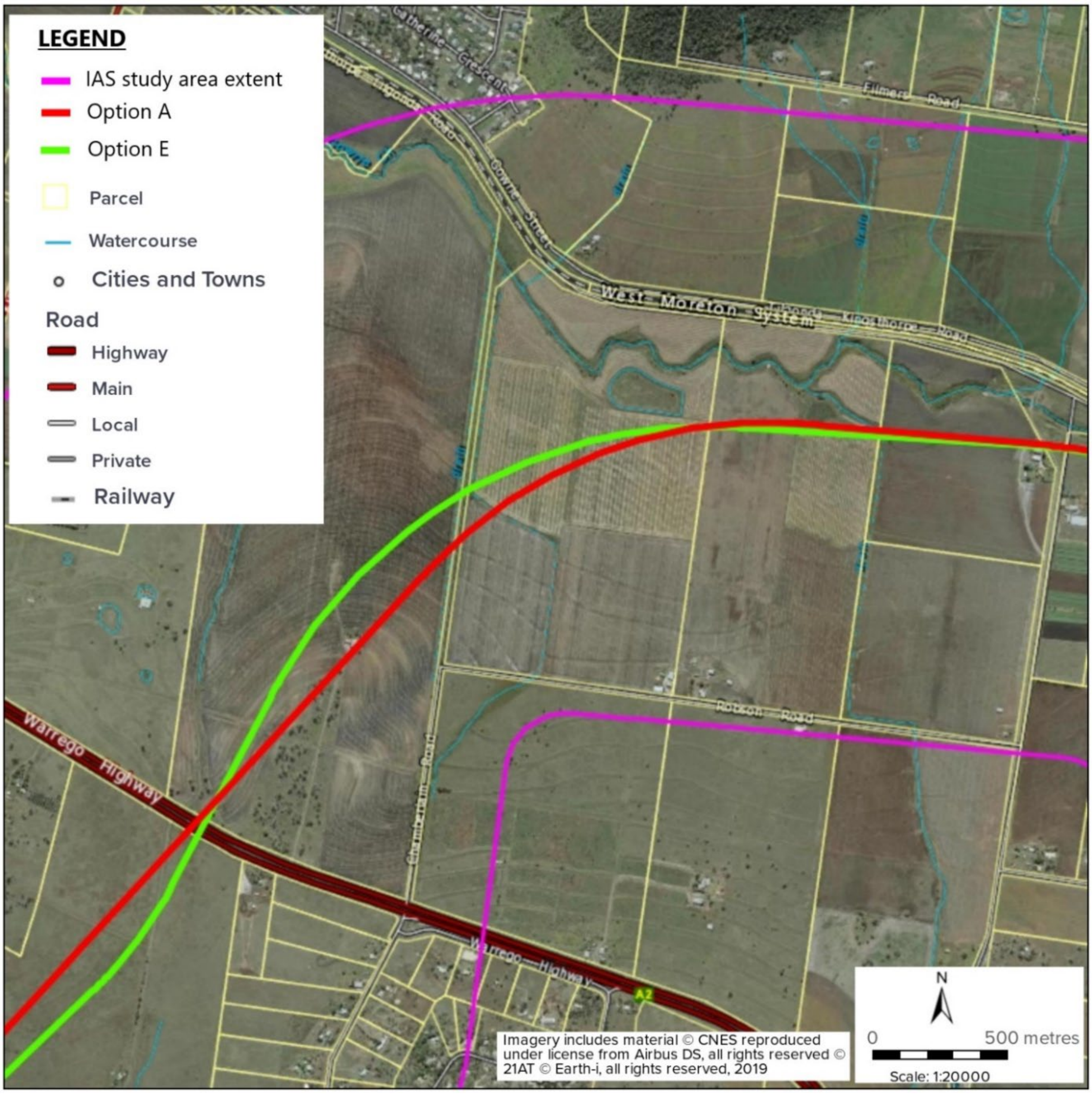


FIGURE 2-33 REFINEMENT OF ALIGNMENT OPTION BETWEEN THE WARREGO HIGHWAY AND GOWRIE JUNCTION

2.11 Relationship to other Inland Rail projects

The Inland Rail Program is divided into multiple projects. Inland Rail will be operational when all sections are complete; however, each of the sections of Inland Rail can be delivered independently with tie-in points to the existing national rail network.

This Project forms part of the overall Inland Rail Program and is one of the 'missing links' across the program. At the southern limit, on the NSW/QLD border, the Project will connect into North Star to NSW/QLD Border Project. The North Star to NSW/QLD Project has been declared as State Significant Infrastructure (application number SSI-9371) by the New South Wales Department of Planning and Environment. An Environmental Impact Statement has been prepared for the Project in accordance with Part 3 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW). The NSW Minister for Planning approved the North Star to NSW/QLD Border Project in February 2023.

At its northern limit, the Project will connect into the Gowrie to Helidon Project. The Gowrie to Helidon Project has been declared a coordinated project for which an EIS is required under the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act). Following public notification and receipt of additional information requests from the Coordinator-General, a revised draft EIS is currently being prepared for this project.

Two other Inland Rail projects, the Helidon to Calvert Project and the Calvert to Kagaru Project have been declared as coordinated projects for which an EIS is required under the SDPWO Act. Following public notification and receipt of additional information requests from the Coordinator-General, revised draft EISs are currently being prepared for each of these projects.

2.12 Relationship to other major projects

The Project does not have a direct relationship with any other coordinated projects, major projects and/or developments. However, the Project will provide more direct connectivity opportunities between the existing QR South Western Line, Millmerran Branch Line and the Charlton–Wellcamp Enterprise Area, including Toowoomba Wellcamp Airport.

The full suite of potential benefits associated with the Inland Rail Program, as discussed in Section 2.4.5, can only be realised once this Project is complete and operational, in addition to the other Inland Rail sections.

The potential for cumulative impacts due to the Project in combination with other coordinated projects, major projects and/or developments has been assessed as part of the revised draft EIS and is presented in Chapter 23: Cumulative Impacts.