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Establishing the need for the last mile. Making the case for a dedicated freight rail link from Acacia Ridge to the Port of Brisbane

Deloitte Access Economics


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Peter Keyte
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Dear Peter

Final Report: Establishing the need for the last mile. Making the case for a dedicated freight rail link from Acacia Ridge to the Port of Brisbane

In accordance with our work proposal dated 12 February 2018, this Final Report provides the findings of extensive consultation and economic analysis to develop the case for a dedicated freight rail link from Acacia Ridge to the Port of Brisbane ("the project"). This Final Report also incorporates additional feedback from the board.

Restrictions on report use

This report may be relied upon by Port of Brisbane Pty Ltd in describing the economic, social, environmental and strategic case for the project. Deloitte disclaims all liability to any party other than Port of Brisbane Pty Ltd for all costs, loss, damage, and liability that the third party may suffer or incur arising from or relating to or in any way connected with the provision of deliverables to a third party without our written consent. You have agreed that you will not amend the report or distribute the report to outside parties without prior written approval from Deloitte. If others choose to rely on the report in any way they do so entirely at their own risk. Also, the information provided by those we consulted with should be treated as confidential and not be disclosed to any third parties.

Basis of our work

We have based this on our economic research and analysis of publically available data, relevant studies, and information provided by the Port of Brisbane Pty Ltd as well as our own economic analysis which includes assessment of the potential benefits of the project as well as modelling the potential economic impacts on the Port of Brisbane Catchment area. To the extent that these key information and data change, the results of the economic analysis and impact assessment are likely to change.

For all enquiries on this report please contact Steve Kanowski. Steve's contact details are skanowski@deloitte.com.au or 0477 727 754.

Yours sincerely,

Steve Kanowski
Partner

Deloitte Access Economics Pty Ltd

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"Freight connections with the Port of Brisbane are critical in supporting south-east Queensland's continued economic growth and development"

Michael McCormack,
Deputy Prime Minister and Minister for Infrastructure and Transport

Executive summary

This report describes the **economic, social, and environmental case** for a dedicated freight rail link from Acacia Ridge to the Port of Brisbane.

Queensland is growing. Nation-leading net interstate migration growth is fuelling economic activity, putting pressure on infrastructure capacity and ultimately, the liveability of the region.

When a region's population grows, so too does the freight task required to support that growth.

The Port of Brisbane, Queensland's largest multi-cargo port and a critical infrastructure asset for the region, recorded 10.2% growth in containerised freight in FY18 – faster than both Port of Melbourne and Port Botany.

That freight task will continue to grow into the future, from 1.35 million TEUs (twenty-foot equivalent shipping containers) in FY18 to over 5 million TEUs by 2050, requiring almost 13 million truck movements annually. Crucially, how that freight is moved around the region will be central to protecting liveability and driving continued economic growth.

Currently, just 2.5% of containerised freight at the Port of Brisbane is moved by rail. This is partly because freight trains share the passenger rail network, leading to operational limitations and inefficiencies, including delays and long transit times. Furthermore, much of the regional network has suffered significant under-investment over the past decade or more. A rail modal share of 2.5% pales in comparison to Sydney and Melbourne ports, with both currently approaching 20% while targeting 30%.

In Brisbane, this means around 97.5% of containerised import and export freight is moved by trucks on the road network. In the absence of well-planned and targeted rail investment, this extreme reliance on road freight will worsen over time. This will lead to increasing levels and spread of traffic congestion, increased road safety risks, rising emissions, and increased cost pressures for Queensland businesses.

Through extensive research and stakeholder consultation, this report outlines why achieving separation of the freight and passenger rail networks and a Dedicated Freight Rail Connection to the Port of Brisbane is key to the sustainability of the region and critical to Queensland's ongoing economic success.

Consider this: a 30% rail modal share of container trade at the Port of Brisbane by 2035 **could remove around 2.4 million trucks from the road network including a significant reduction in long distance trucks movements.** It could deliver around **$820 million annually in economic social** and **environmental benefits,** including on average around **1,200 new jobs** annually.

It would free up **$155 million annually that is currently being spent on road maintenance** to be reinvested, and it would protect the region's environment, **with freight rail movements 16 times 'cleaner' than road freight.**

It would ensure that freight trains, which currently travel through up to 50 suburban stations depending on the route, will minimise urban impacts and **save freight transport costs in the order of, on average, $130 per TEU,** leading to more investment and **more jobs for Queenslanders.**

Ultimately, this report concludes that a Dedicated Freight Rail Connection to the Port of Brisbane as part of a wider network enhancement could **increase GRP in the region by around $5.4 billion** over the period from 2018 to 2045.

With both Cross River Rail and Inland Rail projects well advanced, now is the time to future-proof the region's freight network and deliver wide-ranging community benefits through the inclusion of a Dedicated Freight Rail Connection to the Port of Brisbane.

There are a number of **economic, social, and environmental** benefits and **positive economic impacts** associated with a dedicated freight rail link from Acacia Ridge to the Port of Brisbane.

Reduced heavy vehicles on the road network driven by a switch to rail could eliminate **over 2.4 million total truck movements including 12.8 billion ntks* associated with long distance truck movements alone**

Reduced freight transport costs (around **$115 million annually or around $130 savings per TEU****), increased reliability as well as considerable scope for increased availability

Reduced congestion costs around **$195 million annually** through removing heavy vehicles from the road network

Reduced road maintenance costs, around **$155 million annually**, in urban and regional locations, due to fewer heavy vehicles on the road network

Indirect transport cost savings of around **$45 million annually** including benefits to upstream/downstream supply industries

Separation of freight and passenger operations will lead to fewer 'conflicts', **improving freight reliability**. This is increasingly important given the implementation of Cross River Rail, Inland Rail, introduction of new generation rollingstock and other network developments planned

Dedicated link and network separation initiatives (including optimal sequencing of projects) will increase capacity and **enable growth in passenger services** across the network in support of population and economic growth

Increased **employment impacts**, creating almost **1,200 FTE jobs**, on average each year over the period 2018 to 2045

Reduction in road crashes and accident cost savings associated with the road to rail switch, around **$90 million annually**

Savings from reduced greenhouse gas emissions and other pollution associated with a road to rail switch, around **$215 million annually**

A more efficient supply chain will lead to enhanced global competitiveness and growth of trade volumes at the port with potential additional exports (i.e. grain, cotton, pulses, fruit and vegetables, meat products, processed agricultural products etc.). Total international exports value could grow by **around $210 million** by 2045

Note: Numbers presented above correspond to the 30% container trade rail share scenario.
* ntks refers to net tonne kilometres and measures the total distance of (i.e. average 500km one-way for long distance movements) truck movements eliminated as a result of a switch to rail. The above numbers focus on the benefits driven by reduced truck movements based on a scenario driven approach that assumes the rail network has the capacity to handle such an increased task. As a result, this should be seen as indicative of such benefits subject to update from further detailed modelling (e.g. traffic modelling). ** The freight cost saving per TEU is estimated to be in the range of $80 to $220 per TEU with a weighted value of $133 'on average' per TEU applied in the economic appraisal.

Direct economic benefits

- Freight cost savings
- Reduced congestion
- Reduced road damage
- Indirect transport cost savings
- Increased reliability

Up to $510 million annually

Social benefits

- Reduced crashes and accident costs
- Enhanced amenity from reduced urban separation effects

Up to $95 million annually

Environmental benefits

- Reduced greenhouse gas emissions
- Reduced pollution

Up to $215 million annually

Note: The upper bound estimate for the benefits corresponds to the 30% containers on rail share scenario.

Economic impacts

A dedicated rail freight link from Acacia Ridge to the Port of Brisbane could increase GRP in the Port of Brisbane Catchment area by around **$5.4 billion in present value terms** over the period from 2018 to 2045.

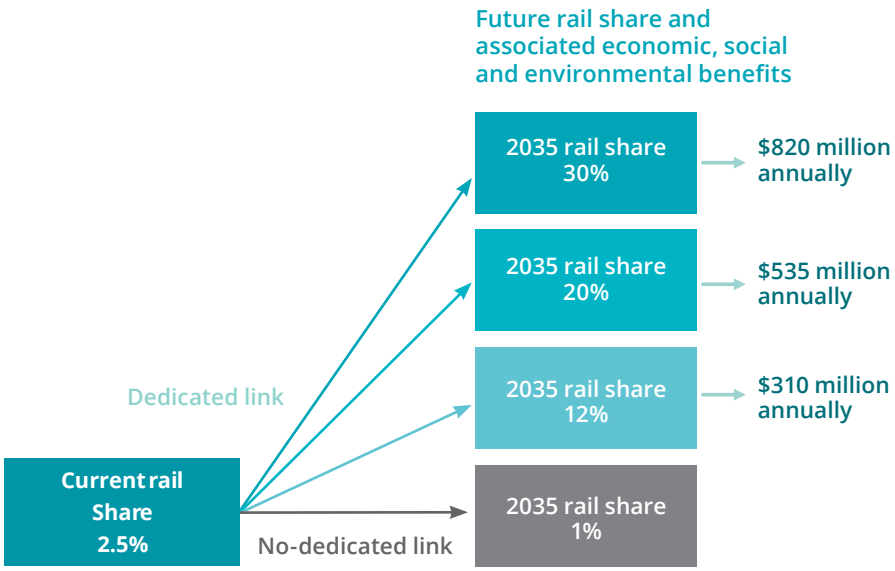
A dedicated link could stimulate **employment growth across a range of industries including agriculture, manufacturing, trade, transport, construction and services** in the Port of Brisbane Catchment area, **peaking at around 1,900 FTE jobs** during the construction phase.

A dedicated port rail link as part of an enhanced rail freight network would **facilitate a greater rail share**, leading to a range of economic, social and environmental benefits.

Rail's market share of containers hauled to/from the port using the Brisbane Multimodal Terminal (BMT) is significantly lower than existing levels for Melbourne and Sydney (both circa 20%) and less than one-tenth of the targets for these cities of around 30%. Moreover, whilst this share is **very low, it is dropping; from 12% over a decade ago to below 3% today.**

Without a dedicated rail freight link, this trend will likely continue, potentially declining to around 1% by 2035 (if current levels of around 30,000 TEUs are assumed to continue and based on container trade forecasts for the port).
However, establishing a dedicated freight port rail link (as part of an enhanced freight rail network) has the potential to significantly increase rail's share to between 12% - 30% by 2035 (if not sooner), driving a range of significant economic, social and environmental benefits.

Potential improvements in rail share of container movements and associated benefits



Key quotes – rail and Inland Rail

"Never has it been more important to the regional communities and vital industries of southern Queensland for Governments at all levels to take a long term view on the future of freight rail. Utilising the existing corridors, involving the private sector and looking to ultimately separate passenger and freight tracks and interfaces offers the opportunity to reap significant economic, environmental and safety benefits for many years to come"

Chris Hood, GrainX

"Freight connections with the Port of Brisbane are critical in supporting south-east Queensland's continued economic growth and development"

Michael McCormack, Deputy Prime Minister and Minister for Infrastructure and Transport

"There is a one off opportunity for all levels of government to work together in this country to ensure this project is delivered in an efficient, cost effective and timely manner"

Denis Wagner, Brisbane West Wellcamp Airport
(Regarding Inland Rail)

"I want to see it happen as soon as possible because it will take pressure off the coastal route, it will take pressure off the road network it will improve productivity and it will create jobs in regional Australia. The planning has been done. It's time to stop talking and get on with it"

Anthony Albanese, Federal Member for Grayndler
(Regarding Inland Rail)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"Any freight rail solution to the port should be one where passengers and freight don't share the same tracks"

Sam Fisher, New Hope

01
Background

This study presents the case for a dedicated rail freight link from Acacia Ridge to the Port of Brisbane including considerations of broader network implications.

1.1 Purpose

Deloitte Access Economics was engaged by Port of Brisbane Pty Ltd (PBPL) to examine the economic, social and environmental case for a dedicated freight rail link from Acacia Ridge to the Port of Brisbane ("the project"). The purpose of this Report is to present the findings of this analysis.

1.2 Scope

Specifically, the scope of works was as follows:

- Review of the current Inland Rail Business Case (IRBC), particularly in regards to terminating the project at Acacia Ridge (e.g. network implications)
- In addition to through traffic, identify freight flows amenable to rail for the Port of Brisbane's catchment area, particularly agricultural freight
- Identify potential trades and any infrastructure impediments to achieving full trade potential over the short, medium and long term
- Assess expected modal shares implied in current trade forecasts (short, medium and long term)
- Provide a view on potential modal shift between rail and road and identify influencing factors
- Assess the strategic, economic and commercial implications of a failure to provide a dedicated freight rail corridor from Acacia Ridge to the Port of Brisbane, addressing a range of economic, social and environmental issues and interactions with other infrastructure including Inland Rail, Cross River Rail and other relevant developments.

Whilst supportive of the Inland Rail Project, PBPL remains fundamentally concerned that the decision to terminate at Acacia Ridge will severely compromise the solution being offered and adversely impact a range of stakeholders. As part of Deloitte Access Economics' investigations, stakeholders were engaged to ascertain industry views on the project and any relevant implications it may pose. Specifically, Deloitte Access Economics consulted with more than 20 stakeholders including rail operators, infrastructure owners, shippers/consolidators and other key regional stakeholders in the port catchment. A detailed list of key stakeholders consulted as part of the study is provided in Table 1.1. The consultation questions and findings are presented in Appendix A.

Table 1.1: List of stakeholders consulted

Rail operators	Aurizon, Genesee & Wyoming Australia, SCT Logistics
Infrastructure owners	Department of Transport and Main Roads (TMR), Queensland Rail (QR)
Shippers/ consolidators	Food Leaders Australia, GrainCorp, GrainX, Namoi Cotton, New Hope, Olam, Orica, Teys Bros, Yancoal
Others	Balonne Shire Council and Goondiwindi Regional Council, Brisbane City Council, Cross River Rail Development Authority (CRRDA), Department of State Development, Manufacturing, Infrastructure & Planning (DSDMIP), InterLinkSQ, Toowoomba Surat Basin Enterprise, Wagners/Brisbane West Wellcamp Airport, Western Downs Council

Note: Over 25 organisations were contacted, however not all were able to commit to a telephone or *face-to-face* interview at the time including Pacific National (PN) and Australian Rail Track Corporation (ARTC).

1.3 Report structure

The remainder of this report is structured as follows:

- **Section 02** provides the strategic context to this study including analysis of trends in trade at the Port of Brisbane, as well as an overview of the trade outlook. This section finishes with a discussion of trends in the share of containerised movements by rail which provides an important context to the assessment of the economic, social and environmental case for the project.
- **Section 03** considers some of the key reasons for why the rail share of containerised freight is so low at the Port of Brisbane, including discussion of current and future network issues. The section also gives context to changes in the rail freight share since 2014, such as the decision to proceed with Cross River Rail, rail freight capacity developments and operations.
- **Section 04** discusses the implications of low rail model share for truck congestion, road safety, emissions and cost/network considerations.
- **Section 05** considers a dedicated link from Acacia Ridge to the Port of Brisbane and the 'drivers' of road to rail modal choice considerations.
- **Section 06** discusses the strategic case and potential economic, social and environmental benefits of such a project and in the context of the IRBC.
- **Section 07** provides discussion on the economic, social and environmental benefits associated with a dedicated freight link assessed within a broad cost benefit analysis framework. This section focuses on range of "order of magnitude" benefits.
- **Section 08** provides the findings of an economic impact assessment using the Deloitte Access Economics' Computable General Equilibrium (CGE) model - DAE-RGEM.
- **Section 09** provides concluding remarks. These include a summary of key findings from the analysis of the strategic, economic, social and environmental benefits of a dedicated rail line for freight. This also includes discussion of potential economic impacts of such a project over the construction and operations phase in the Port of Brisbane regional catchment economy. Some key themes arising from the industry consultation are also summarised in this section.

Additional analysis has also been provided as an Appendix to this report vis-à-vis Inland Rail to Gladstone and related issues (see Appendix B).

"An upgraded standard gauge line out to Thallon would unlock many opportunities for exporters, particularly for grain, cotton and pulses; however, this requires cooperation and funding across various levels of government"

Graeme Scheu, Goondiwindi Regional Council

02

Trade and infrastructure overview

This section provides an overview of key trade trends at the Port of Brisbane in terms of containerised trade, bulk commodities and rail utilisation.

The section also contains analysis of the trends and 'drivers' in context with the Port of Brisbane and rail infrastructure connections and provides a network perspective. The key trades and commodities that potentially stand to benefit from upgraded rail infrastructure are discussed including containerised trades involving key agricultural commodities such as grains, cotton and pulses, including chickpeas.

2.1 Overview

The Port of Brisbane is a large-scale, multi-modal import-export facility providing for bulk (dry and liquid), general cargo (break bulk) and container trades. The Port of Brisbane is the third largest, and one of the fastest growing container ports in Australia, handling product worth around $50 billion each year.[1]

This represents circa 15% of Queensland's Gross State Product (GSP) and circa 50% of Queensland's international trade by value[2]. Further to this, the port handles over 95% of Queensland's import and export containers and motor vehicles, 50% of Queensland's agricultural exports and most of Queensland's meat exports.

The Port of Brisbane is an integral part of Queensland's freight and logistics system, reaching across the whole of the State.

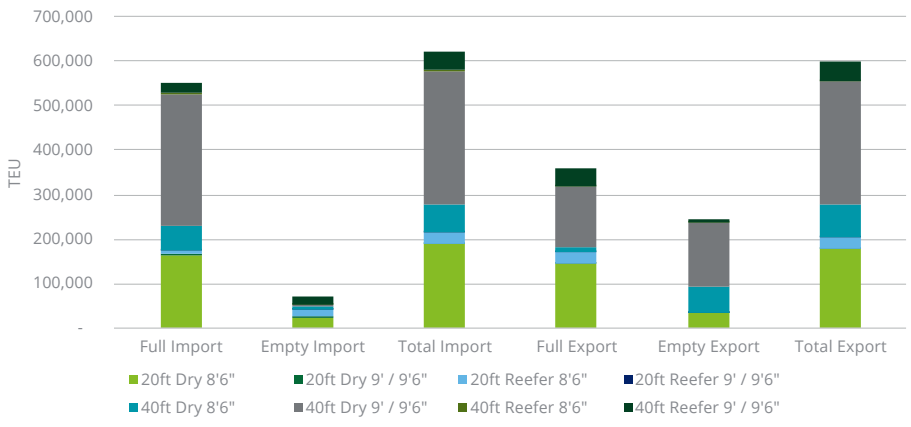
Queensland's population is growing. As at 30 March 2018, the state's population was around 5 million, which is 20 per cent of the nation. Over the year to March 2018, Queensland experienced nation leading growth in terms of net interstate migration. Looking ahead, the state's population is projected to increase to 6.8 million by 2036 based on the latest Queensland Treasury medium series projections.[3] Population growth is a key driver of trade growth at the port, particularly imports.

2.2 Trade trends

There are a number of container types used to transport freight including Dry and Reefer. Height also varies – standard containers are 8 foot (ft) 6 inches (8'6") while high cube are typically 9 ft 6 inches (9'6"). The main types of containers handled through the Port of Brisbane are the 40 ft Dry (height 9'/9'6"), 20ft Dry (8'6"), and to a lesser extent, the 40ft Dry (8'6") and 20ft Reefer (8'6"), as detailed in Chart 2.1.

Many modern ships are built with cells (or slots) that are only suitable for high cube (for example, some new Maersk line vessels calling into Australia). Accordingly, there has been a shift from standard shipping containers (height 8'6") to high cube (9'6") for both 20ft and 40ft containers over the decade – see Chart 2.2.

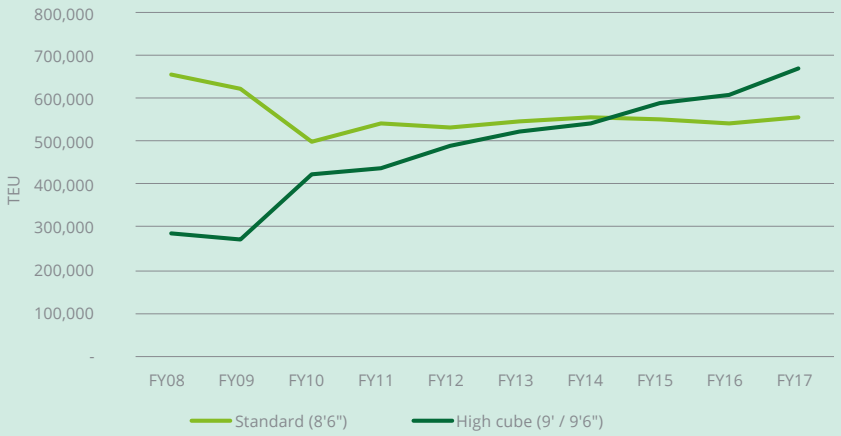
Chart 2.1: Container type at Port of Brisbane FY17



Source: PBPL

[1] Deloitte, 2013; QTLC, 2013
[2] Port of Brisbane, 2013
[3] http://www.qgso.qld.gov.au/products/reports/qld-govt-pop-proj/qld-govt-pop-proj-2015-edn.pdf

Chart 2.2: Container type at Port of Brisbane, FY08 to FY17 (full and empties)

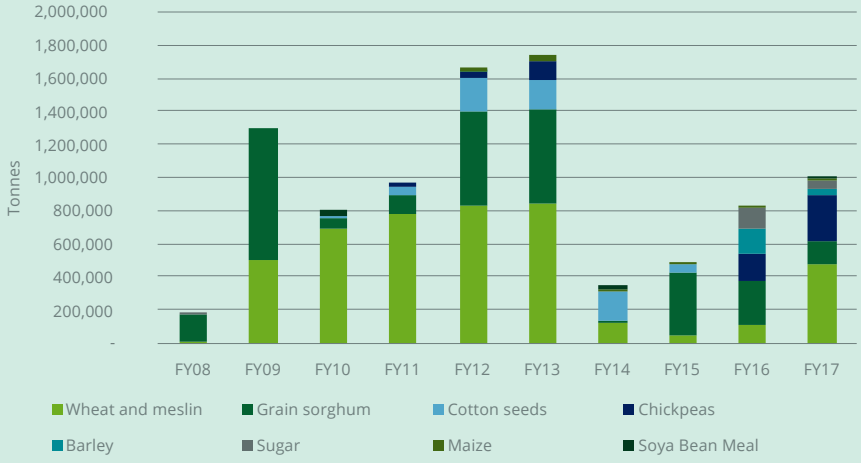


Source: PBPL

The volatility of non-coal bulk commodity exports over the decade is highlighted in Chart 2.3. Wheat, sorghum and meslin grain, which account for the majority of exports, have fluctuated over the decade owing to changes in commodity prices and weather impacts. More recently, chickpeas have experienced a marked increase in exports in bulk to over 227,000 tonnes in FY17, driven by higher prices.

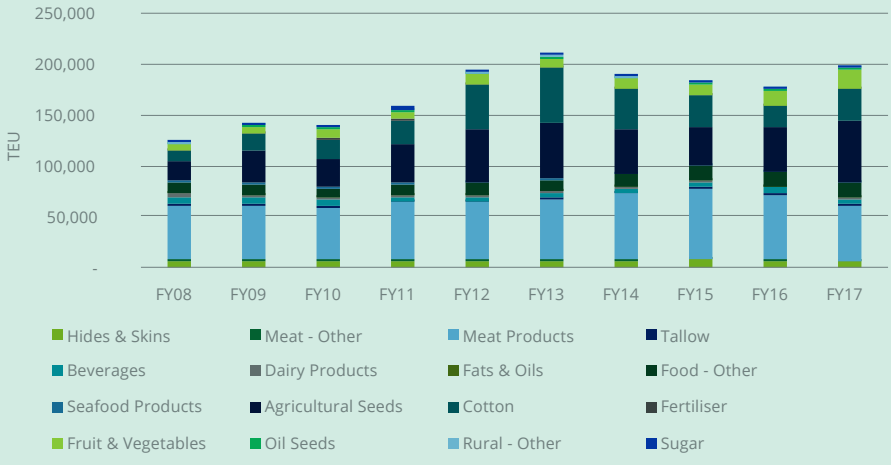
It is important to note that increasingly some of the key dry bulk commodity exports, particularly agriculture, are shifting to containerisation (see Chart 2.4).
The major agricultural export commodities at the Port of Brisbane include seeds, meat products, cotton and cereals. In some years, the combined container volume of agricultural seeds and cotton alone have totalled over 100,000 TEUs. Consultations as part of this study identified the potential for these types of commodities to switch to rail from key parts of the Port's catchment area (including Darling Downs/South West and border regions) if a cost effective and reliable rail solution can be provided.[4]

Chart 2.3: Bulk agricultural commodity exports via the Port of Brisbane, FY08 to FY17



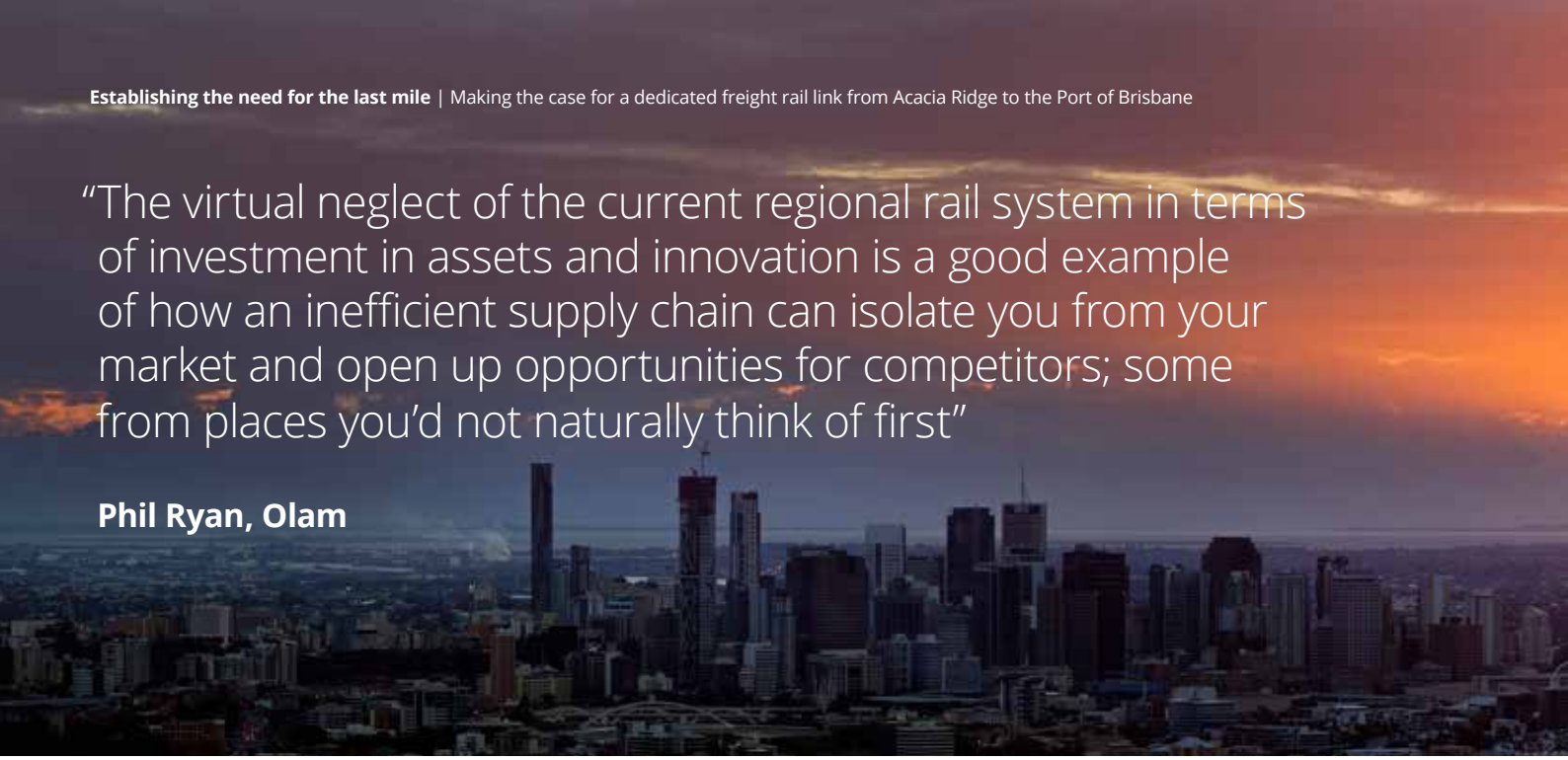
Source: PBPL

Chart 2.4: Containerised agricultural commodity exports via the Port of Brisbane, FY08 to FY17



Source: PBPL

[4] Namoi Cotton railed containerised cotton from Goondiwindi for over two decades to late 2014 until high-cube containers were adopted. These are not able to safely traverse by rail the eleven low clearance tunnels of the Toowoomba and Little Liverpool Ranges. QR currently has work underway to increase tunnel clearances to accommodate high cube containers. This project is due for completion in late 2019.

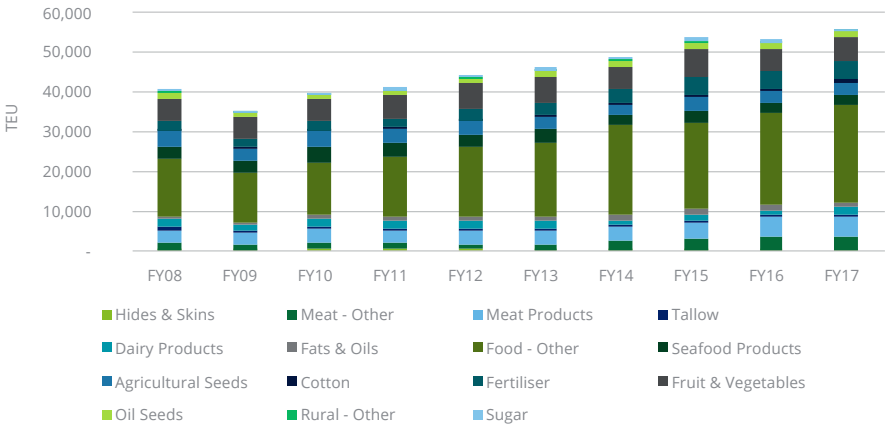


"The virtual neglect of the current regional rail system in terms of investment in assets and innovation is a good example of how an inefficient supply chain can isolate you from your market and open up opportunities for competitors; some from places you'd not naturally think of first"

Phil Ryan, Olam

Containerised imports through the Port of Brisbane has been steadily growing over the decade with the largest commodity imported being "Food - Other", as detailed in Chart 2.5.

Chart 2.5: Containerised agricultural commodity imports via the Port of Brisbane, FY08 to FY17



Source: PBPL

2.3 Rail share of container movements

The Brisbane Multimodal Terminal (BMT) is significantly underutilised with rail's share of containerised freight to/from the Port of Brisbane already low and dropping. For instance, the share has dropped from 12% in FY03 to 2.5% in FY17 – see Chart 2.6. During FY04 and FY05 approximately 40,000 TEU of rock for the Port of Brisbane expansion was transported from Beaudesert by rail. Given that these containers were not exported over the wharves, removing these additional 40,000 TEUs brings the share down to around 12%, similar to the shares in FY03 and FY06, as detailed in Chart 2.6.

2.4 Trade outlook and forecast modal share

As highlighted previously, the share of containerised freight on rail has been steadily declining over the past decade or more at the Port of Brisbane and is well below levels at other East Coast capital city ports. In contrast, the number of truck movements has been growing rapidly and is forecast to increase at a high rate over the next 25 years. Specifically, 1.35 million TEUs were handled at the port in 2017-18, which generated almost 4 million 'local'[5] truck movements alone in 2017-18. This is on top of many tens of thousands of long haul truck movements involving loaded and empty container movements.[6]

Based on recent forecasts, containers handled at the port are forecast to increase to over 5 million TEUs by 2050, with 'local' truck movements expected to increase to around 13 million movements over the same period - see Chart 2.7.

This highlights increasing pressures on the transport system from rapidly rising heavy truck movements based on recent forecasts by the PBPL. Investments in rail infrastructure are required to increase rail's competitiveness to encourage a switch from road to rail and reduce heavy vehicle movements in Brisbane, adjoining regions and arguably more importantly, to/from regional terminals and via towns and cities across the State.

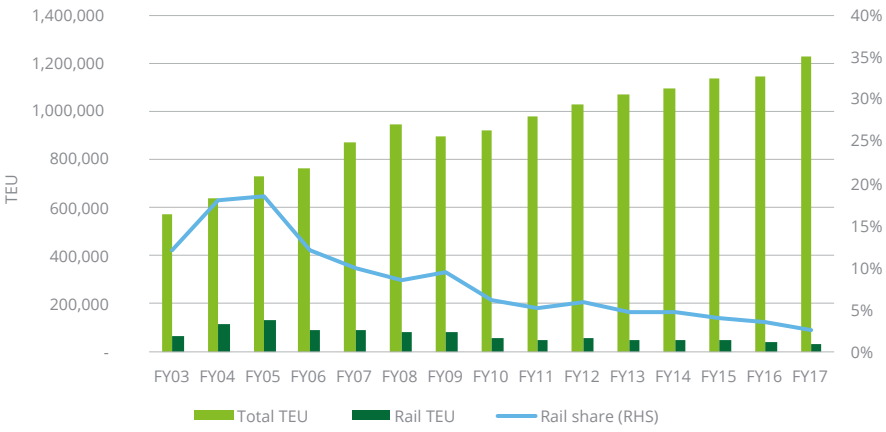
If the trend of declining rail share continues, this current share of under 3% of rail container movements will get even lower over the long term. This will have significant economic, social and environmental implications. New rail freight infrastructure is required to address the current modal imbalance, and support future trade growth with 5 million TEUs forecast to be handled through the port by 2050, up from 1.35 million in 2017-18.[7]

[5] 'Local' equates to within the port precinct and nearby areas within Greater Brisbane and surrounds

[6] It has been conservatively estimated that for containerised exports from the port a round trip of circa 800-1,000km per container is involved on average

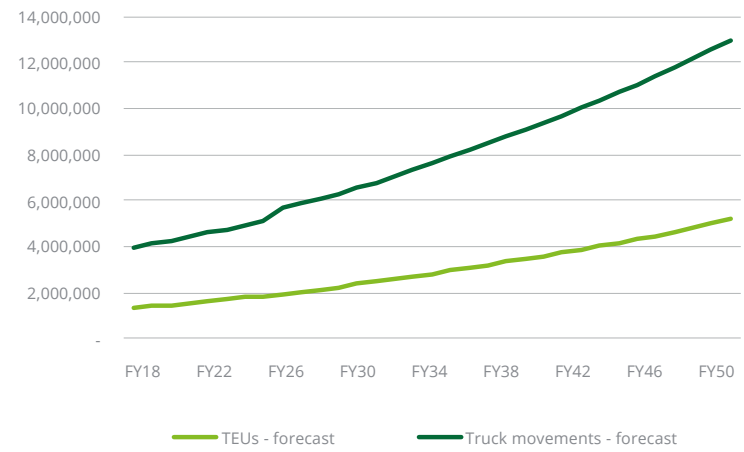
[7] Port of Brisbane Business Review 2018

Chart 2.6: Rail utilisation to/from the Port of Brisbane, FY03 to FY17



Source: PBPL

Chart 2.7: Projected containerised trade and truck movements, 2018-2050



Source: PBPL

"Never has it been more important to the regional communities and vital industries of southern Queensland for Governments at all three levels to take a long term view on the future of freight rail. Utilising the existing corridors, involving the private sector and looking to ultimately separate passenger and freight tracks and interfaces offers the opportunity to reap significant economic, environmental and safety benefits for many years to come."

Chris Hood, GrainX

03

Why is rail modal share so low?

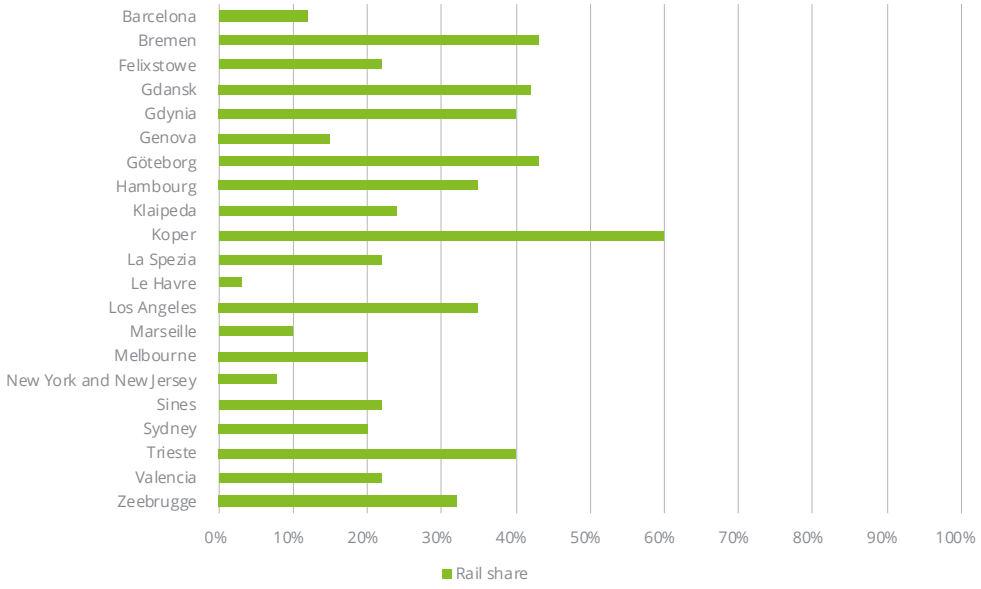
This section highlights that the separation of freight and passenger services would increase the reliability and availability of rail freight services. This includes reduced delays for cargo trains into the port that are currently resulting in underutilisation of assets and economic losses.

3.1 Overview

Rail mode share at the Port of Brisbane lags behind other major ports in Australian capitals, including Sydney and Melbourne. This section highlights the contributing factors to the observed decline in rail mode share that has occurred at the port. Comparatively, rail mode share at the port represents only one-tenth of the desired targets articulated for both Port Botany and the Port of Melbourne – around 30%. In 2015, Sydney and Melbourne had approximately a 20% share on rail, with Sydney targeting 30% by 2025.[8]

This is also low by international standards. Selected ports across Europe, the United Kingdom, United States of America as well as Australia, for example, have significantly higher rail shares, five of which exceed 40% - see Chart 3.1. This demonstrates a higher rail share is achievable when considered in a national and international context.

Chart 3.1: Estimated rail modal share in selected international and national ports (container throughput)



Source: Adapted from Pastor, 2015 and Deloitte estimates

[8] ARTC, 2015

Rail has been unable to compete with the preference for the use of heavy vehicles for the containerised freight task (including A Double – Type 1 Road Trains with 11 axles and B Doubles in 7, 8 and 9 axle configurations[9]), driven largely by competitive pricing, reliability and transit time.

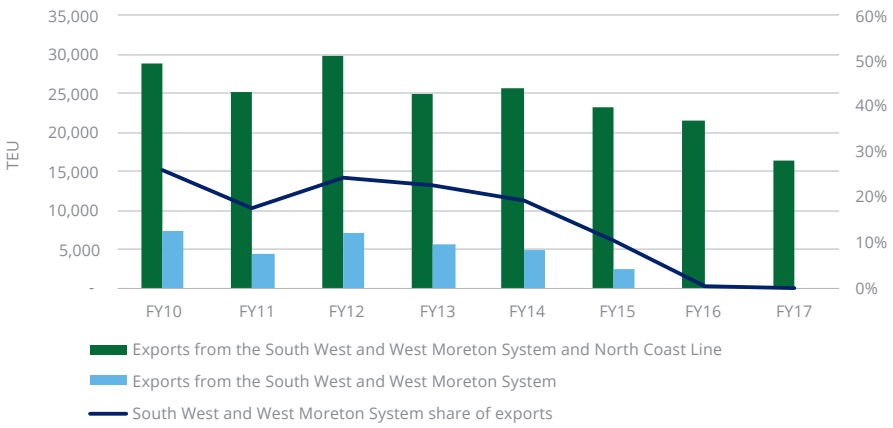
The significant absence of capital investment in rail freight infrastructure in Queensland has seen freight shippers switch from rail to road; further contributing to low rail modal share. The absence of investment has led to significant network issues, including conflicts between passenger and freight rail operations.

Export containers carried by rail have historically entered the Port of Brisbane from a range of origins, utilising the South Western and Western/West Moreton systems, as well as the North Coast Line. Since 2010, the amount of containerised exports moving from the South West and Western/West Moreton rail systems has been declining, and more recently, this has fallen from 26% in 2010 to 0% as of 2016.

In other words, 100% of the export containers currently on rail to the Port of Brisbane are coming via the North Coast Line; in particular, from Rockhampton and locations further north.

As noted earlier (see footnote 4), Namoi Cotton moved containers of cotton from Goondiwindi in the past along the South Western line for over 20 years before moving to high cube boxes, which are unable to fit through tunnels between Toowoomba and Ipswich. There was also containerised grain in the past freighted from western locations including Oakey and Dalby.

Chart 3.2: Origin of containerised exports to the port by rail, FY10 to FY17



Source: PBPL

[9] An A Double Type 1 Road Train heavy freight vehicle can operate carrying four empty 20' containers or two empty 40' containers or two 20' and one 40' container. When loaded on roads in much of Queensland they can haul two 20' loaded containers of grain or pulses (at say a payload of circa 23-25 tonnes) or two 40' containers laden with cotton at circa 26-28 tonnes each, for example. See https://www.nhvr.gov.au/files/201409-0155-classes-of-heavy-vehicles.pdf

Without investment in rail freight infrastructure, low rail modal share will be subject to future network issues induced by major rail projects such as Cross River Rail and Inland Rail. The need to sequence and plan major rail projects so that the rail freight modal share does not decline further over the long term is also discussed.

"The current colonial network doesn't enable good unit costs for shippers, and inefficient infrastructure ultimately drives costs up providing sub-optimal outcomes"

John McArthur,
Gennesse & Wyoming Australia

3.2 Current network issues in SEQ

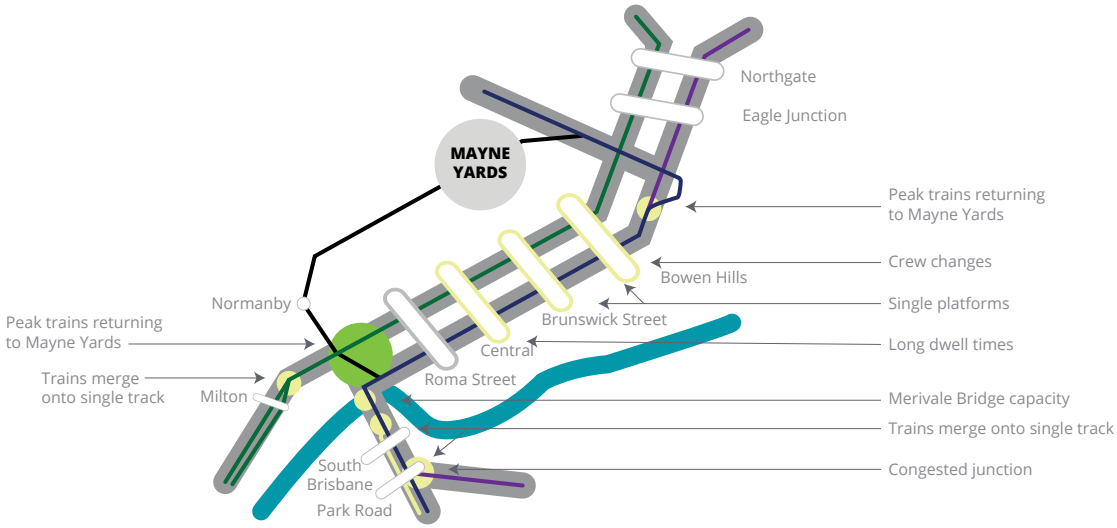
South East Queensland's (SEQ) rail network is complicated. The system supports both passenger services (suburban, peri-urban and long distance) and freight services (bulk and intermodal). Operation of services involves numerous crossing points with interactions between freight and passenger trains. The radial nature of the network with ten lines converging on the Central Business District (CBD) core involves significant at-grade railway-to-railway junctions and interfaces with the road network (e.g. level-crossings). For further details and background information on the rail network, see Appendix C.

The Brisbane CBD core has a combined current maximum capacity of just over 40 trains each way per hour (i.e. 80+ trains per hour in total). Currently, the vast majority (circa 80%+) of these paths are utilised in delivering the AM one-hour morning peak timetable, implying, cet par, that were there sufficient train sets available (as could well be the case once all New Generation Rollingstock is commissioned), additional services could be provided.

There are a number of key inner city constraints associated with the rail network set out below (and in part illustrated in Figure 3.1). Whilst in the main, these impact passenger services they do hold implications for freight operations that operate to/from the Port of Brisbane and to/from Acacia Ridge and terminals at Moolabin and Clapham that share significant parts of the network on the north, western and southern sections:

- Two bi-directional tracks across the Merivale Bridge – used by express services from the Gold Coast line as well as Beenleigh line and Cleveland line services (and some freight trains loaded and empty)
- Park Road Junction – an at-grade junction used by Gold Coast line, Beenleigh line and Cleveland line services
- Single platform faces at Fortitude Valley and Bowen Hills – limits maximum number of trains per hour
- Merging of trains into a single track south of the CBD – inbound Ipswich services and Richlands trains merge west of Milton onto a single through-running track, with crossing conflicts with outbound services
- Longer dwell times in the CBD, in particular at Central
- Crew change practices impacting dwell times at Bowen Hills.

Figure 3.1: Key Inner City Constraints – Rail Network



Source: Deloitte based on unpublished data

There are also network constraints outside the inner city parts of the network including:

- Single track sections on the Gold Coast line (between Coomera to Helensvale), the Cleveland line (between Manly and Cleveland) and on the Shorncliffe, Doomben and Airport lines
- Shared tracks between trains of differing operating speeds on the North Coast Line and on the Gold Coast and Beenleigh lines
- Locations where inbound suburban trains cross main lines e.g. between Eagle Junction and Northgate
- Locations where outbound trains to Doomben, Brisbane Airport and Shorncliffe cross the path of inbound services
- Operational conflicts at Park Road for services on the Cleveland and Gold Coast lines
- Limited overnight stabling facilities and station platform capacity.

The relationship between passenger and freight services was noted by the Coordinator-General as recently as June 2017, in deliberations with respect to the Cross River Rail project:

"Currently rail operations in SEQ involve interdependencies and crossing movement between the passenger and freight sectors, which impacts and constrains the rail network capacity, as well as service reliability. Freight rail services use the Brisbane suburban network to access key freight destinations including the Port of Brisbane, Acacia Ridge freight terminal and the North Coast Line. Passenger services are prioritised over freight during peak periods, while the efficiency and performance of non-peak passenger rail operations are often affected by the need to schedule freight", (page 51)[10]

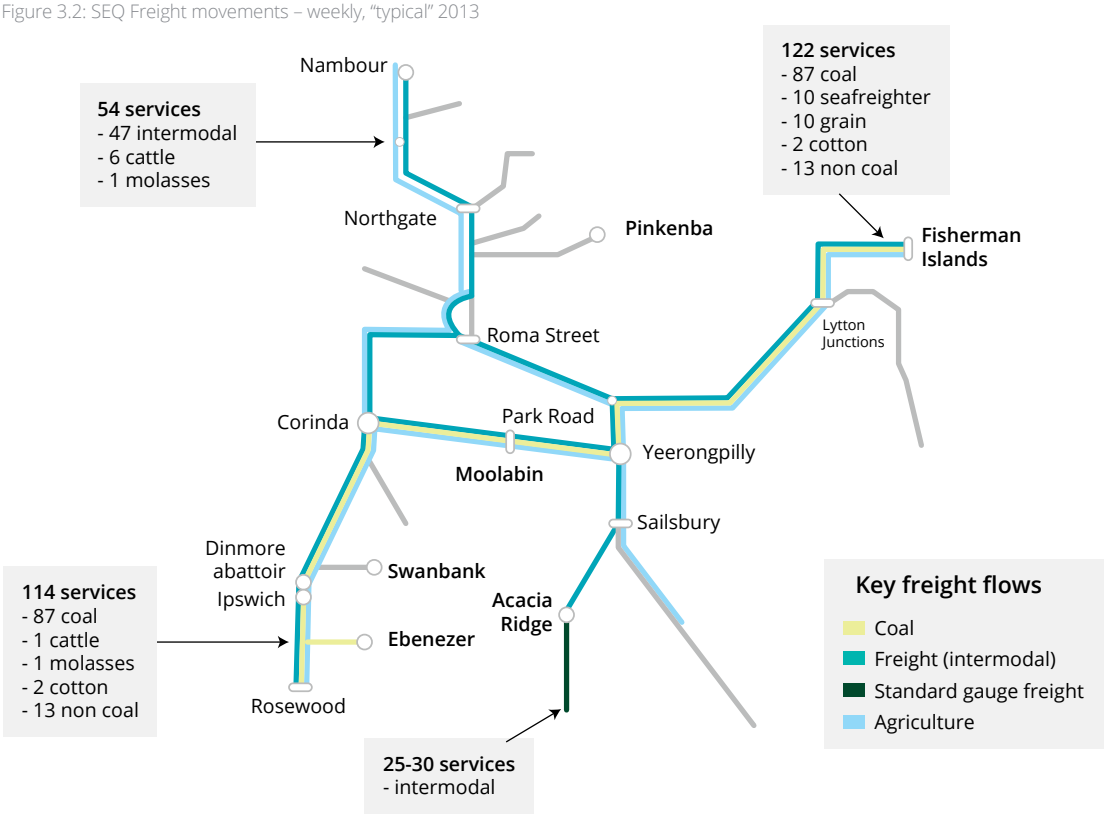
Coordinator-General

[10] See https://www.statedevelopment.qld.gov.au/resources/project/cross-river-rail/crr-cg-change-report.pdf

3.2.2 Urban Freight and passenger service interactions

Freight operations to the Port of Brisbane and other key locations and from generators in SEQ share various parts of the network with suburban and inter-urban passenger services. Whilst these can vary from week-to-week and due to seasonal demand patterns, the graphic, Figure 3.2, provides an indication of what a 'typical week' could be like. The graphic is based on available freight train paths and allocations 5 years ago (and what it could be like if rail's share of the transport task rises) – when coal traffic was higher and many other commodities were hauled by rail. These freight services, typically operated outside of commuter peak periods.

Figure 3.2: SEQ Freight movements – weekly, "typical" 2013



Source: Deloitte Access Economics based on unpublished data

Freight operations through the suburban network

The following examples of freight movements illustrate the operational practices currently 'typical' across the network:

a. A North Queensland bound intermodal freight train leaving the Pacific National (PN) facility at Moolabin will typically travel via Corinda, Roma Street west, the Exhibition Loop then on the northern suburbs lines (Caboolture, Shorncliffe and Redcliffe Peninsula line corridors) to Petrie and onto the North Coast line from Caboolture

b. A southbound intermodal PN train from North Queensland comes down the reverse way to Roma Street but then typically proceeds via Dutton Park and Yeerongpilly to the Moolabin freight terminal

c. Aurizon intermodal freight trains[1] from Central and North Queensland to the Port of Brisbane travel down the Caboolture line to Petrie and then on to the northern suburbs lines (Caboolture, Shorncliffe and Redcliffe Peninsula line corridors) onto the Exhibition Loop via Mayne Yard down the Ipswich line to Corinda across on the freight link via Tennyson to Yeerongpilly (onto the dual gauge line) out along the Cleveland line to Lindum and then off to the port. Services from the port to Central and North Queensland typically travel on a route that is in the reverse order. Aurizon freight trains from Central and North Queensland to Acacia Ridge travel similar routes – as with port services, depending on the time of day (e.g. peak and off-peak times and other operational requirements) but with a southern leg via Yeerongpilly transiting through Moorooka/Clapham, Rocklea and Salisbury to/from the freight terminal

d. Aurizon bulk coal trains from mines west of Toowoomba enter the suburban system at Rosewood on the Ipswich corridor and travel via almost 20 suburban stations until moving east to Yeerongpilly and onto the dual gauge line via Park Road and other stations on the Cleveland line to Lindum and then onto the port. Empty trains operate in the reverse order (although it is not uncommon for empty coal trains to operate on the electrified tracks as operational requirements necessitate).

These various Aurizon and Pacific National freight train operations each involves traversing almost one quarter to one third of all suburban passenger stations in the SEQ network, that is, up to 50 suburban stations of the circa 150+ stations of the SEQ passenger network in the 'loaded' and 'empty' direction.

[1]Aurizon is selling its Queensland intermodal business to Linfox – subject to Federal Court approval (as at 12 October 2018).

The situation with respect to freight train operations currently is much 'quieter' than it was in 2013. In 2017, a 'typical' weekly operation of freight trains across the suburban system with trains to/from west of Brisbane involved on average 89 return coal trains (including 7 from Ebenezer), 2 return Westlander services and between 1 and 5 return bulk grain trains and some very infrequent livestock trains. Intermodal trains operating via the North Coast Line averaged 84 services per week in 2017 – most of which did not originate or terminate at the port but operated to/from terminals on the south-side of Greater Brisbane.

For the six months to end June 2018, just over 3,500 coal trains (1,876 loaded and 1,761 empty or approximately 10 trains each way every day) came to/from Toowoomba[11] to Fisherman Islands for haulage of coal for export. In the 'loaded' direction, the average actual transit times were just under 10 hours and in the unloaded direction they were just under 6 hours.

Additional detailed analysis of freight trains across the SEQ network is presented in Appendix D.

3.3 Feasibility of short-haul rail and the challenge for containerised rail in Goondiwindi

This section highlights that short-haul rail is feasible in a number of jurisdictions in Australia including Victoria and New South Wales. These regions also produce a similar range of agricultural commodities that are exported through the Port of Brisbane including cotton, grains, pulses and other agricultural goods from regions such as the Darling Downs including Goondiwindi (but also more broadly across the state including from Rockhampton and further north). This highlights that there is an opportunity for short-haul rail in Queensland given a similar mix and abundance of agricultural commodities that are demanded by growing national and international markets. However, to realise this opportunity requires the right infrastructure investment to support freight rail competitiveness in Queensland.

3.3.1 The feasibility of short-haul rail

The feasibility of short-haul rail has been demonstrated by the substantial investments in short-haul rail in southern States. New South Wales (NSW) has invested in the duplication of the Port Botany Rail Line and Victoria in the Port Rail Shuttle project.

A significant proportion of goods going out of the Port of Brisbane originate from Southern Queensland, and with strong growth projected in the freight task paired with an underutilised Brisbane Multimodal Terminal (BMT), there are opportunities to derive benefits from the use of short-haul rail services. Using rail (rather than road) to move freight can result in benefits including reduced congestion, road maintenance and pollution, along with increased safety.

Generally, trucks are lower cost for the movement of freight over short distances, however a Bureau of Infrastructure, Transport and Regional Economics (BITRE) (2016b) report titled 'Why short-haul intermodal rail services succeed' highlights that rail is feasible for distances much shorter than rail's 'sweet spot' (i.e. >1,000km hauls), particularly when the following three elements are satisfied:

- "Minimised road access and egress - drayage - costs between hinterland and intermodal terminal
- Low rail line haul costs and high road costs
- Interest groups with motivations to encourage short-haul and viable hinterland terminals"

In a nutshell, "value-adding hinterland terminals can secure the traffic volumes that are required for short-haul rail to have competitive linehaul costs. That relative competitiveness is strengthened when there are deficiencies in truck haulage. A coalition of diverse interest groups may seek, and thus support, vibrant terminals and complementary rail services"[12].

There are a number of examples of feasible short-haul rail services currently operating in NSW and Victoria – see Tables 3.1 and 3.2.

[11] These trains haul coal from Cameby Downs Mine near Chinchilla and New Acland Mine near Jondaryan.
[12] BITRE, 2016b

Table 3.1: Short-haul to Port of Botany

Origin	Distance to Port Botany	Containerised products
Trangie	603km	Cotton
Wee Waa	598km	Cotton
Warren	575km	Cotton
Narrabri	567km	Cotton, grain, chick peas
Dubbo	468km	Refrigerated meat
Manildra	395km	Processed grain
Bathurst	250km	Logs

Source: BITRE, 2018

Table 3.2: Short-haul to Port of Melbourne

Origin	Distance to Port of Melbourne	Containerised products
Donald	338km	Chick peas, faba beans, other pulses
Deniliquin	320km	Rice
Dooen	320km	Grain, hay
Warrnambool	265km	Mixed agriculture
Tocumwal	247km	Grain
Shepparton	177km	Milk products

Source: BITRE, 2018

Goondiwindi region – The challenge for rail

Whist there are in excess of a dozen short-haul rail freight operations in Victoria and NSW, the case of containerised agricultural products from around Goondiwindi and Thallon represent a 'lost opportunity' to rail haulage. The issue of higher clearances for high-cube (9'6" high) containers is being met by the State Government with a tunnel lowering project due for completion in 2019.

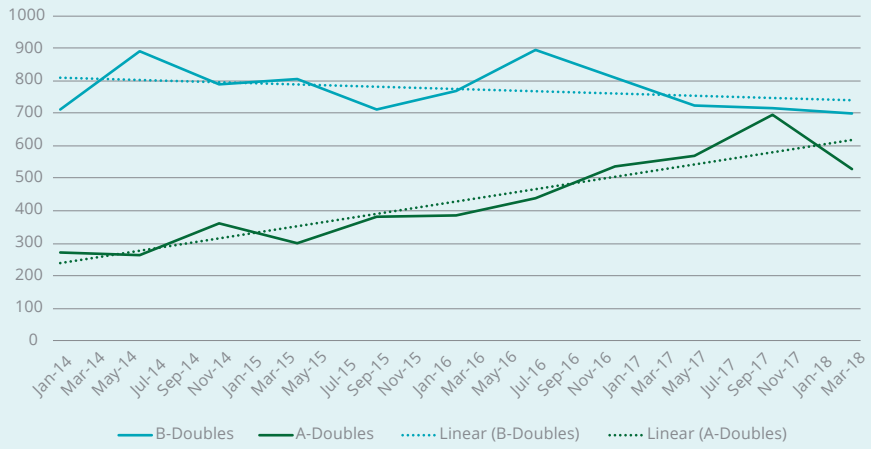
However, there are a number of physical, operational and commercial challenges that rail needs to address to improve competitiveness which would result in significant economic, social and environmental benefits, such as:

Lower road haulage charges – road movements of containerised cotton (typically, in 40' containers) and grains and pulses (typically, in 20' containers) have 100% of the market share for such containerised commodities exported via the Port of Brisbane and produced and consolidated on the Darling Downs/ Maranoa/Border regions. A-Double Type 1 Road Trains and B-Doubles dominate the haulage task. Currently, road rates including pick-up and delivery charges (including drop off of empty containers) from Goondiwindi to the Port of Brisbane are circa $1100-1300 per 40' container or circa $38-47 per tonne for cotton.

Rail axle load limits and highly efficient trucks – the regional railway network servicing the Port of Brisbane is mostly 15.75 tonnes (20 tonnes in urban and peri-urban areas and North Coast Line) severely limiting wagon carrying capacity. For example, a four axle wagon 'maxes out' at 63 tonnes gross with a payload of circa 48 tonnes. This means that trains using 40' flat container-carrying wagons cannot accommodate two loaded containers of grain (typically, loaded into 20' containers with circa 25 tonne payload with 2.25 tonnes tare weight of the container).

However, two loaded 20' containers of grain (gross circa 28t per container) or two loaded 40' containers of cotton (gross circa 32t per container) can be hauled by an A-Double Road Train. The A-Double which can access the port from Goondiwindi and Thallon and into northern NSW (e.g. Moree and Narrabri) is becoming a significant part of the agriculture exports supply chain via the port (refer chart below).

Truck Configurations on Port of Brisbane Motorway



Source: PBPL
Note: Data – based on weekly counts January 2014 to May 2018 – weekday traffic (daily average – both directions)

Slower transit times - road transit time to/from Goondiwindi for an A-Double or B-Double of around 5 hours compared with in excess of 12 hours for rail. The rail route from Goondiwindi to the port is around 140km further and average speeds much lower than trucks.

"Take-or-Pay" rail haulage contracts – much of the agricultural traffic is seasonal, but also subject to the vagaries of weather and climatic conditions. Shippers find it very challenging to lock into 'take-or-pay' contracts with a rail haulier in such an operating environment. Shippers who can provide year-round loading can manage the vagaries and fixed cost challenges, however few can accommodate the sort of challenges presented by prolonged and widespread drought. Even when allowing for the fact that much of the agricultural commodities exported via the port come from irrigated land; a very large proportion remains dry-land production based.

Issues to note include:

Cotton is seasonal with the bulk moved between April and October (grain is also seasonal with summer and winter crops).

The vagaries of crop production were highlighted by the Walgett GrainCorp site in NSW which did not open this year, after receiving about 440,000 tonnes of grain in the previous year.[1]

Take-or-pay contracts are a challenge with seasonality. A small crop outlook will mean existing take-or-pay rail contracts will challenge GrainCorp over the next 12 months and the company said lower than anticipated volumes would mean take-or-pay rail contracts will present "a significant challenge".[2]

[1] See https://www.afr.com/business/graincorp-counts-cost-of-takeorpay-rail-contracts-and-small-harvest-20180511-h0zy18
[2] See https://www.railexpress.com.au/take-or-pay-deals-could-cost-graincorp/

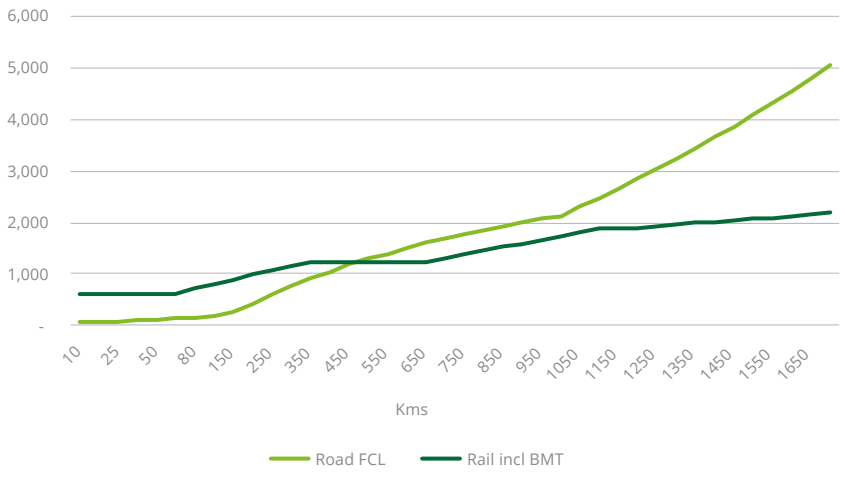
In New South Wales and Victoria there are 13 short-haul agriculture-based rail freight origination stations – 7 in NSW to Port Botany and 6 in Victoria to Port of Melbourne. The NSW services include four locations loading cotton (three exclusively cotton) and 3 loading grain, pulses and meat. The average rail distance to port is approx. 490km (roughly the same as Goondiwindi to Port of Brisbane by rail today) with a range of 250km to 603km. In Victoria, the average haulage distance is even lower – at around 280km (range 177km to 338km).

These findings are consistent with analysis of rail and road haulage charges (including 'pick-up and delivery' charges and port movements charges as appropriate) that indicates a 'switching point' around 450-500km haulage distance - see Chart 3.3. As distance increases, cet par, rail's natural advantages over road come to the fore.

There are a number of factors that may improve the prospects of rail as a competitive mode for commodities from the Darling Downs/Maranoa and Border regions including:

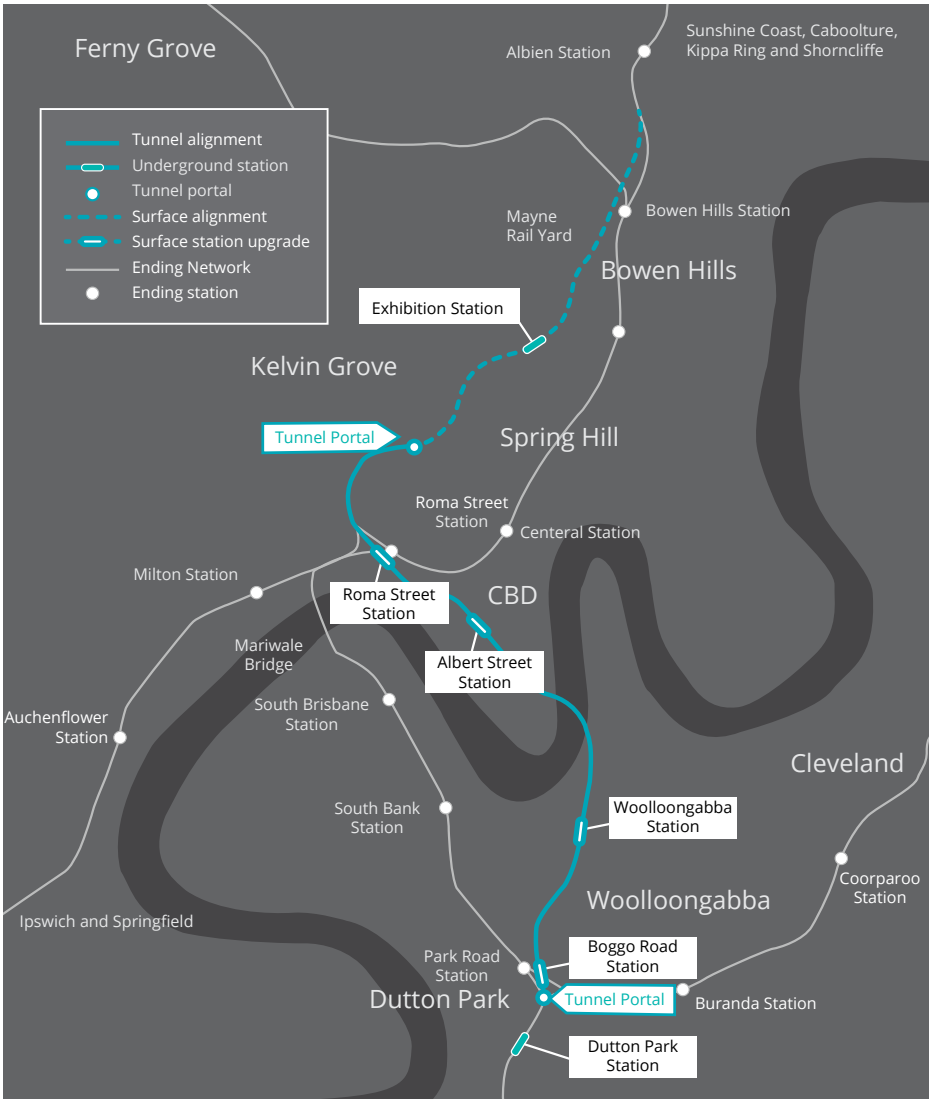
- offering by the Inland Rail project including:
  - track upgrades and reduced haulage distance making available higher payloads per haul
  - faster cycle times, better rollingstock and crew utilisation and productivity leading to lower unit operating costs and therefore charges per tonne or container hauled.
- Increased road haulage costs associated with increased urban network congestion and direct costs associated with increased use of toll roads.

Chart 3.3: Indicative Cost of Road and Rail Haulage - $ per TEU



Source: PBPL and Deloitte Access Economics modelling derived from pers. comms. with shippers and hauliers and DAE rail v road cost model.
Note: FCL = full container road and BMT = Brisbane Multimodal Terminal (where rail incurs costs of transfers).

Figure 3.3: Cross River Rail



Source: Building Queensland

3.4 Future network issues

The impacts of future projects should be considered from a network perspective, considering the interdependence of such projects. Two major projects that will have a profound impact on the network are Cross River Rail and Inland Rail.

3.4.1 Cross River Rail

First proposed in 2010, the Cross River Rail Project is the Queensland Government's highest priority infrastructure project and is deemed as a High Priority Initiative by Infrastructure Australia. The project is being implemented by the Cross River Rail Delivery Authority with funding from the Queensland Government. The circa $5.4 billion project involves a 10.2km north-south rail line from Dutton Park in the south to Bowen Hills in the north with 5.9km twin tunnels crossing under the Brisbane River and CBD – see Figure 3.3.

Driven by population and employment growth in the region, demand for passenger rail services is forecast (arguably) to double from 2015 to 2026 and nearly triple by 2036; well beyond the capacity of the existing system to effectively handle growth – see Chart 3.4.

Pressure on inner-city rail and bus networks will intensify as demand grows.[13] Brisbane's metropolitan rail system, which already experiences periodic overcrowding in key corridors, is forecast to need to cater for an additional 52,000 passengers in the morning two-hour peak period by 2026. By 2036, an extra 95,500 AM peak period passengers will need to be moved, equivalent to 212 full train loads.[14]

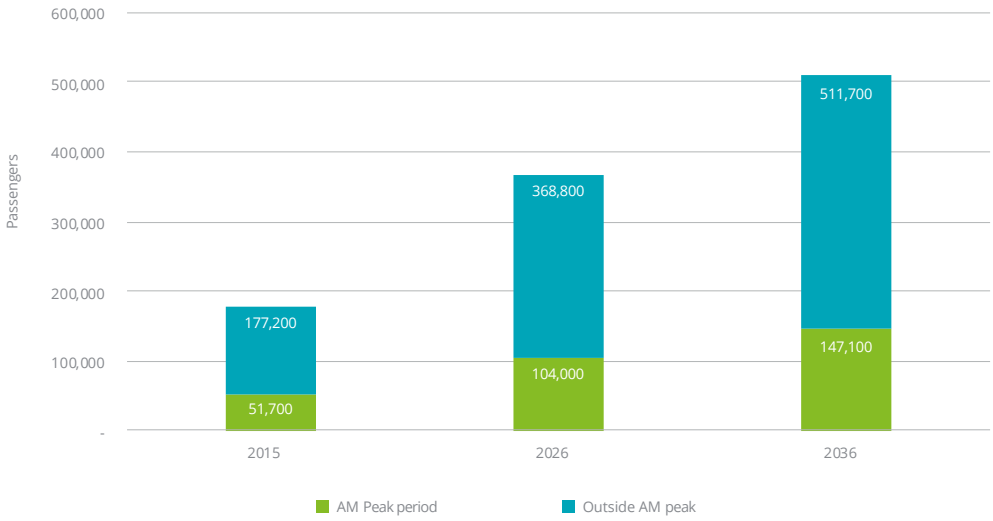
As demand for passenger services grows, rail freight operations could get increasingly challenged in terms of available paths, network capacity and service reliability. When freight operations are shared with passenger services, as is the case with the current link from Acacia Ridge to the port (and elsewhere across the greater suburban network), priority is given to the passenger operations in the case of any conflict.

The separation of freight and passenger services would increase the reliability and availability of rail freight by reducing congestion, whilst also improving the efficiency of both types of rail services. A dedicated freight link, and ultimately a network of dedicated freight lines connecting the port and freight terminals to allow for exclusive passenger and freight operations respectively would remove network tensions that currently exist between the two services.
For example, of the 198 loaded intermodal container trains from Central and North Queensland to the port in 2017 carrying produce for export, 34 (17%) were delayed into the port by over 2 hours and another 69 (35%) were delayed into the port by between 1 hour and 2 hours.

Half of these export cargo trains arrived late into the port resulting in underutilisation of assets worth several millions of dollars on each occasion.[15]

[13] Brisbane City Council has proposed a bus-based so-called Metro project to address growth and other issues. www.brisbane.qld.gov.au/traffic-transport/public-transport/brisbane-metro
[14] CRR Business Case, 2017
[15] Data sourced from Port of Brisbane, June 2018. The capital cost of a train consist (a set of locomotives and wagons) used for these services would be circa$15-20 million.

Chart 3.4: Forecast demand for passenger rail services



Source: Building Queensland

3.4.2 Inland Rail

Australian Rail Track Corporation (ARTC) developed the Inland Rail Business Case for a 1,700km freight rail connection between Brisbane and Melbourne. The precise alignment from the NSW Border to Toowoomba has not yet been finalised. However, it is currently envisaged that the Queensland section of Inland Rail will involve circa 400km of new and upgraded track to Acacia Ridge:

- North Star in northern NSW across the McIntyre River to just east of Goondiwindi and on to Yelarbon (37km new track plus 48km existing track/track upgrades)
- Yelarbon to Inglewood (existing track/track upgrades)
- Inglewood to Millmerran (new track)
- Millmerran to Oakey (mix of new track and upgrades to existing track)
- Oakey to Gowrie (11km of upgraded track)
- Gowrie to Rosewood (82km new and upgraded including 5km tunnel near Toowoomba)
- Total distance between NSW border and Rosewood – circa 280km including 116km of new track between the NSW border and Oakey)
- Calvert to Kagaru (53km of new track).

The line in Queensland will be dual gauge (that is, both narrow – 1,067mm and standard – 1,435mm) which means that grain and other trains on the existing Queensland Rail system will be able to operate as now.

Inland Rail will be built to high operating speeds (max. freight operating speed of 115km/h at 21 tonne axle loads and 80km/h at 25 tonne axle loads). Initially, Inland Rail will be built to accommodate 1,800 metre train lengths (noting current freight trains in the region average circa 650 metres maximum length).

The design of Inland Rail will mean that trains from other parts of the southern Queensland network may be able to benefit from some efficiency gains. For example, potentially longer trains operating from locations such as Thallon and Goondiwindi and on the western line from locations such as Dalby and Miles.

A dedicated link from Acacia Ridge to the Port of Brisbane will help reap the benefits of a nationally connected Inland Rail link from Melbourne to Brisbane. It was identified through consultation that to maximise the benefits of a dedicated link from Acacia Ridge to the Port of Brisbane:

- There needs to be a dedicated freight link from source areas all the way through Toowoomba to Miles (at least) and to Goondiwindi and Thallon
- Other bottlenecks and conflicts need to be eliminated (including the impacts of new lines and increased passenger service frequencies)
- Government at all levels and industry need to work together to maximise the value of Inland Rail for the nation as a whole including the connection through to the Port of Brisbane and effective integration with existing networks.

3.5 The role of coal in the Inland Rail Business Case

The economic merit of the 2015 Inland Rail Business Case relies to a considerable extent on the ability to "significantly increase coal volumes from the current 8 million tonnes to 19.5 million tonnes." Furthermore, on a tonne per kilometre basis, around 25% of Inland Rail traffic is coal and most, if not all, is expected to be sourced from Southern Queensland. The highest level of coal exports from the region to date was around 8.6 million tonnes in FY13. The region is also known to have significant reserves, particularly in the Surat Basin.[16]

The ability to effectively haul 19.5 million tonnes of coal for export from the region would require significant upgrade of the export coal supply chain. In particular, the rail network, including an upgraded railway west to the source mines (particularly in the Miles/Wandoan area). Consultation with coal mining companies conducted as part of this study highlighted that an effective rail network was crucial to achieve such coal haulage volumes and noted the following:

- While the existing mines are relatively low cost (new mines are anticipated to achieve efficiency gains due to new technology and economies of scale), transport costs can effectively increase the cost of the mine from quartile one to four; based on the use of existing train configurations and current track standards and performance.[17]
- A freight rail solution to the port where passenger and freight services do not share the same tracks will be important. With appropriate investment in existing and new mines, and the port, coal can play a major role in contributing to the financial viability of Inland Rail and the Port of Brisbane.

[16] See https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0011/238079/coal-mines-advanced-projects.pdf

[17] Currently, trains of less than 700m in length with payloads of around 2,000 tonnes are used on track with low (15.75 tonnes) axle load restrictions on a system with numerous performance limitations (e.g. speed restrictions in various locations). This compares poorly with the Central Queensland coal network, for example, where trains are up to 3 to 4 times longer and 4 to 5 times heavier, operate on a network with substantially higher axle loads (e.g. 26.5 tonnes) at higher average speeds with significant parts that are duplicated and in parts, utilise electric traction. See https://www.aurizon.com.au/what-we-deliver/network https://www.aurizon.com.au/news/news/record-136-wagon-train-to-new-coal-port

Cross River Rail changes in specification and implications for Inland Rail, Cross River Rail and the Dedicated Rail Freight Link

The original Cross River Rail project comprised an 18km link from Salisbury to Bowen Hills including 10km of tunnel from Yeerongpilly under the Brisbane River and Central Business District. In late 2016, the Queensland Government lodged an application for project changes including reduction in proposed extent of the tunnel from 10km to 5.9km as well as changes to southern and northern portal locations. This includes relocation of the southern portal from Yeerongpilly to north of the existing Dutton Park Railway station, removing proposed works at Yeerongpilly, Rocklea, Moorooka and Salisbury stations. The Coordinator-General approved the revised $5.4 billion investment in June 2017[1]. However, this report highlighted a number of key issues from the public notification period as part of the EIS report *"including the impact on the existing freight network due to the change in project length".*

This is important because the Inland Rail Business Case was finalised in 2015 and as a result only ever considered the implications of the Cross River Rail project in terms of its original design with the longer link and tunnel. As highlighted on page 30 of the 2015 Inland Rail ARTC Business Case *"A key issue is when the new dedicated freight link to the port will be needed. With Inland Rail in operation, a staged investment of $54 million (strategic, $2014-15, excluding escalation), commencing in 2022–23 when the Calvert/ Rosewood to Kagaru section of Inland Rail is completed, could lift the capacity of the existing route, enabling it to meet demand for some years to come, especially if the full Cross River Rail proposal is delivered. Modest expenditure on the existing route is included in the Inland Rail economic evaluation to enable the demand estimate of 19.5 million tonnes of coal per annum to be realised".*

Furthermore, this Business Case highlights that *"even with these upgrades, at some point in the future, a new, dedicated route will be required. Passenger services will inevitably grow over time and progressively 'squeeze out' freight paths on the shared network".*

Given these statements were made when with Cross River Rail was defined by a longer tunnel and link, this raises significant strategic concerns regarding the validity of the previous modelling and conclusions with regard to the timing and need for the dedicated link to Brisbane.

The current Cross River Rail (Short Tunnel) Project surfacing at Dutton Park will direct current and future growth of passenger rail services onto the Dutton Park to Yeerongpilly Corridor; notionally from 2023. In the period between commencement of Inland Rail, (assumed 2024) to 2040, freight traffic from Inland Rail to the Port of Brisbane is anticipated to travel over the Dutton Park to Yeerongpilly Corridor, competing with passenger services – which are anticipated to increase in density associated with increased peak and off-peak operations across the suburban passenger network. This again highlights the question of sufficient capacity on the Dutton Park to Yeerongpilly Corridor to accommodate the combined demand of Cross River Rail passenger services, impacts of full implementation of the New Generation Rolling stock order and Inland Rail freight services is one yet to be satisfactorily resolved. Congestion on the Dutton Park to Yeerongpilly corridor, from sub-optimal coordination could force an extension of the tunnel or construction of the alternative alignment to the port.

Furthermore, as highlighted by a submission from Engineers Australia[2] to the Queensland Government, there are a number of key issues with the project change to Cross River Rail including:

- The project change reported an anticipated 5-year construction period (2018-2023) with a target demand rail plan for 2026. They highlight that there is little discussion about the implications for the 2036 target demand or the implications that arise from the outcomes of South East Queensland Regional Planning. Furthermore, they highlight that the proposed project scope should be presented as a first stage of a larger scheme that is proposed to be incrementally operated over time. *"Only in this way can the community and industry have the confidence that the proposed current investment is sound in the longer term; appropriate future proofing has been incorporated; strategic network expansion is being planned to meet future planning needs and that the appropriate land use and transport requirements have been considered".*
- Engineers Australia also point out that while the *"content of the change deals with passenger rail requirements, these cannot be addressed in isolation". They highlight that passenger and freight rail shares a significant proportion of the SEQ rail network. They point out that the "somewhat brief discussion for a reduction in forecast freight demand seems at odds with other marketplace data (such as that being used to justify the national inland rail project investment) and concludes that the existing track demand conflicts between Dutton Park and Salisbury should remain for the future. This results in continuing the existing constraints on Port of Brisbane operations in peak commuter periods; reliance on possible solutions by ARTC (potentially rendering the Dutton Park flyover as redundant infrastructure); and strategic constraints on passenger trains conflicts between all stations and express service patterns over this section. It appears that such significant strategic issues are insufficiently addressed".*

[1] See http://www.statedevelopment.qld.gov.au/resources/project/cross-river-rail/crr-cg-change-report.pdf
[2] See https://www.engineersaustralia.org.au/sites/default/files/resources/Public%20Affairs/Cross%20Rover%20Rail%20Change%20Report%20(QLD%2C%20March%202017).pdf

3.6 Implications of major proposed projects – Inland Rail and Cross River Rail

The Queensland Government has committed to funding Cross River Rail and the Federal Government has commenced funding for the Melbourne to Brisbane Inland Rail project. These projects are now at a stage where the implications for the existing network and current (and future) service requirements (e.g. responses to growing demand as well as mode shift to rail for both passengers and freight) are being considered. It is understood, the Cross River Rail Delivery Authority has to ensure that the development and operation of Cross River Rail does not negatively impact on the current level of freight train activity nor the infrastructure used to deliver these services.

There does not appear to be consideration of the implications of increased rail freight demand and traffic.

Sub-optimal coordination of the sequencing and delivery of these projects has the potential to result in a poor application of funds and poor outcomes for the community – the public, users, operators and the economy at large. To date, these projects have, in the main, been developed independently of, and without significant consideration of, how each project will affect or be affected by the other. Recent developments such as the ARTC/TMR-sponsored Acacia Ridge to Port of Brisbane alignment feasibility study and the commissioning[19] of an SEQ focussed 10 year rail strategy by TMR would indicate that developments and research of the requisite kind are starting.[20]

The current Cross River Rail Project surfacing at Dutton Park (i.e. short tunnel compared with the original proposal), will direct current and future growth of passenger rail services onto the Dutton Park to Yeerongpilly Corridor; notionally from 2023. Inland Rail is anticipated to commence delivering freight services through to the Port of Brisbane onto this same corridor by around 2024.[21] In the period between the commencement of Inland Rail (assumed 2024) to 2040, freight traffic from Inland Rail to the Port of Brisbane is anticipated to travel over the Dutton Park to Yeerongpilly Corridor. Subject to any new track or alignments being developed that would compete with passenger services; the latter are anticipated to increase in density associated with increased peak and off-peak operations across the suburban passenger network.

The question of sufficient capacity on the Dutton Park to Yeerongpilly Corridor to accommodate the combined demand of Cross River Rail passenger services, impacts of full implementation of the New Generation Rollingstock order and Inland Rail freight services is anticipated to be resolved by the recently commissioned TMR 10-year strategy.

It is considered likely that, given current system priorities, the greatest potential detrimental effect is to be on Inland Rail freight traffic as Cross River Rail and other passenger traffic will have priority under current rail traffic prioritisation rules.

It is noteworthy that the original Cross River Rail project involved a long tunnel design and it is conceivable that a future development/expansion of the current project could be the construction of either:

- An extension of the Cross River Rail (short tunnel) from its initial surfacing point at Dutton Park, to Yeerongpilly; or
- Construction of the alternative alignment to the port.

[19] June, 2018

[20] The scope of the 10-year strategy includes: a series of staged concept rail timetables ramping up between 2019-29, a fleet and depot strategy (including maintenance and stabling), an infrastructure strategy (including the rollout of European Train Control System - ECTS) and a staged implementation proposal. The aim of the Strategy is to develop future service plans and clarify the investments (and their staging) required to enable the rail network to function coherently, delivering a seamless and customer-focused service that maximises the investment in Cross River Rail.

[21] Noting that current plans for Inland Rail have it terminating at Acacia Ridge and traffic to/from the port assumed to use the existing shared suburban network for some 15+ years.

A possible solution could come from alternative project sequencing; a proposition that fits well with what ought to be a key network goal – segregation of passenger and freight operations in the greater South East Queensland rail network.

With a view to facilitating the efficient operation of both a Cross River Rail and Inland Rail, an alternative project sequencing as follows could be considered:

- Preserve land requirements for a Cross River Rail (long tunnel) surfacing at Yeerongpilly and for future additional surface tracks to Salisbury
- Progress Cross River Rail (long tunnel) surfacing at Yeerongpilly
  - capacity on the surface network will have been released for freight services, as some passenger services are transferred to the Cross River Rail (long tunnel)
- Undertake detailed capacity modelling to determine the need for additional tracks to Salisbury at this stage in order to accommodate demand for freight services from Inland Rail (including existing Queensland origin freight) and growth of passenger services. This will aid in determining whether construction of additional tracks can be delayed until additional capacity is needed for future services from the Salisbury to Beaudesert Corridor. Inland Rail freight services to the port would at this point be running on the surface tracks
- When demand indicates, construct first stage of the Salisbury to Beaudesert Passenger Rail Project (S2B), connecting into the network at Salisbury with services operating on the surface and through the Cross River Rail (long tunnel) providing a more direct and attractive route to the City (if not required already, additional tracks from Yeerongpilly to Salisbury will be required at this time)
- As determined by demand growth, construct an alternative alignment to the port, removing Inland Rail freight from the surface network and creating additional available capacity on the Dutton Park to Salisbury section.

The timing of the latter two steps is uncertain. However, over the period from the commencement of the Cross River Rail (long tunnel) and Inland Rail Project towards the commencement of services from the Salisbury to Beaudesert corridor, the observable growth in freight and passenger demand will provide clear indicators of necessity and will aid in timing deliberations.

Well-coordinated and effective sequencing of the ultimate design (i.e. Cross River Rail – long tunnel and dedicated freight line to the port), avoids redundancy and construction re-establishment costs and allows the various projects to be progressed more logically and as required to accommodate growth in demand.

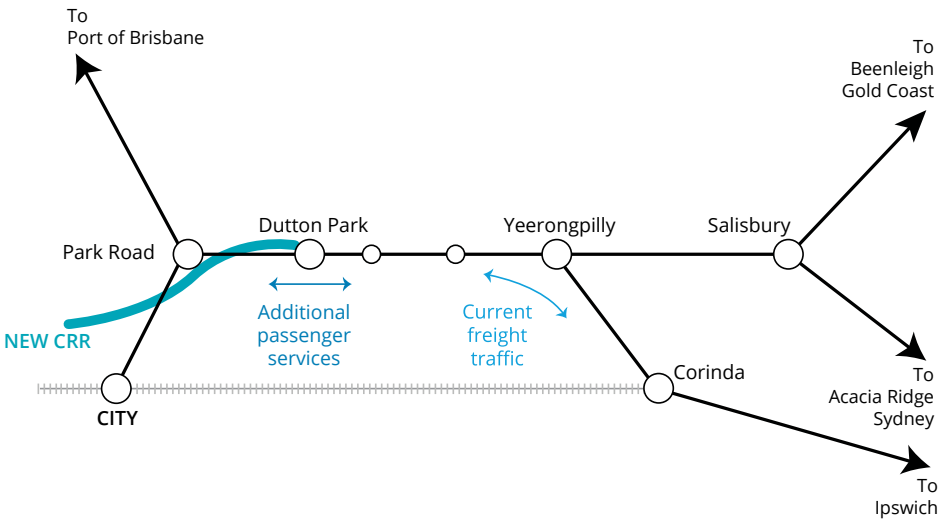
In conclusion, there appears the potential for significant risk that the cumulative impact of Cross River Rail (short tunnel) and Inland Rail, as currently proposed, could result in greater numbers of passenger services (initial and growth) and freight services (initial and growth) required to operate on the rail corridor between Dutton Park and Salisbury (with particular effect on Dutton Park to Yeerongpilly sections) than the available and effective capacity of the corridor.

Sequencing of Rail Projects

The following graphics provide an illustration of the issue and offers some possible concepts for consideration (dates are assumed and indicative in the main). A possible ultimate network goal is illustrated in the last graphic where the system, in 15 to 20 years, has Cross River Rail with a long tunnel configuration, a dedicated sub-surface line from Acacia Ridge for freight to the port and a line linking Salisbury and Beaudesert for passenger operations.

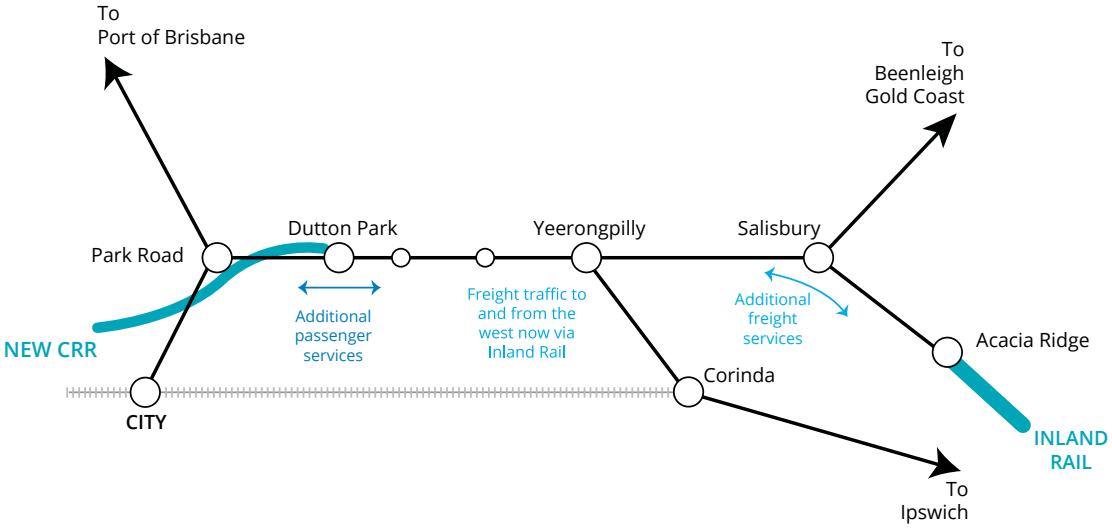
Project Sequence 1 – 2023

Cross River Rail (Short tunnel surfacing at Dutton Park)



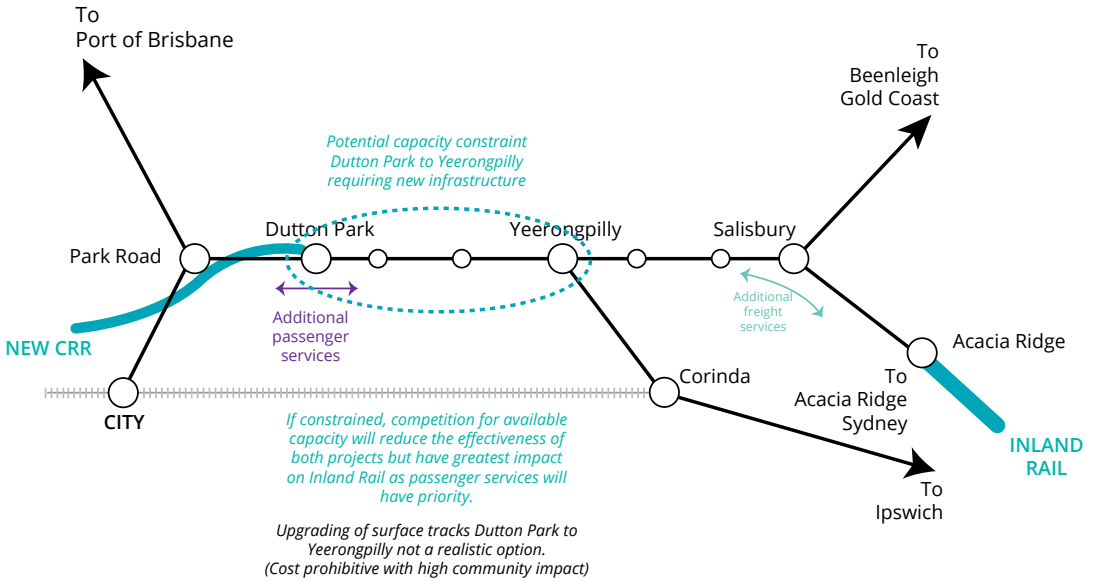
Project Sequence 2 – 2024

Inland Rail (Connecting at Acacia RIdge)



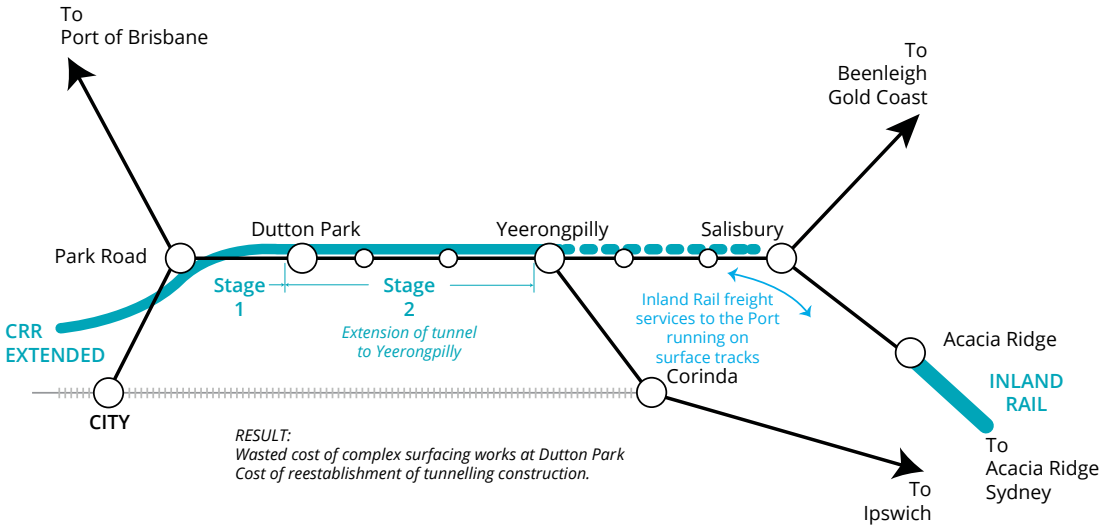
Combined Effect – Post 2024

Cross River Rail (Short Tunnel) and Inland Rail (connecting at Acacia Ridge)



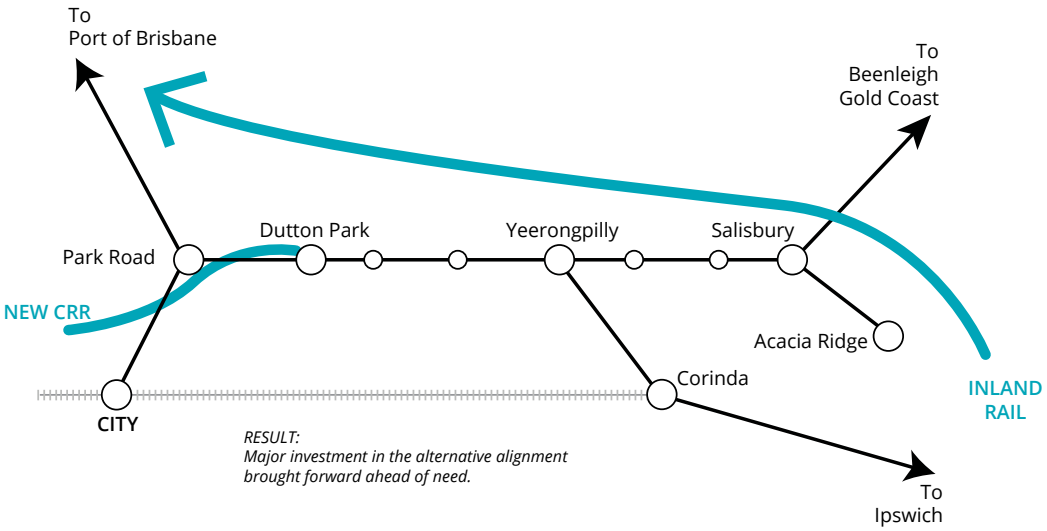
Scenario 1

Extend CRR tunnel from Dutton Park to Yeerongpilly with additional surface tracks to Salisbury



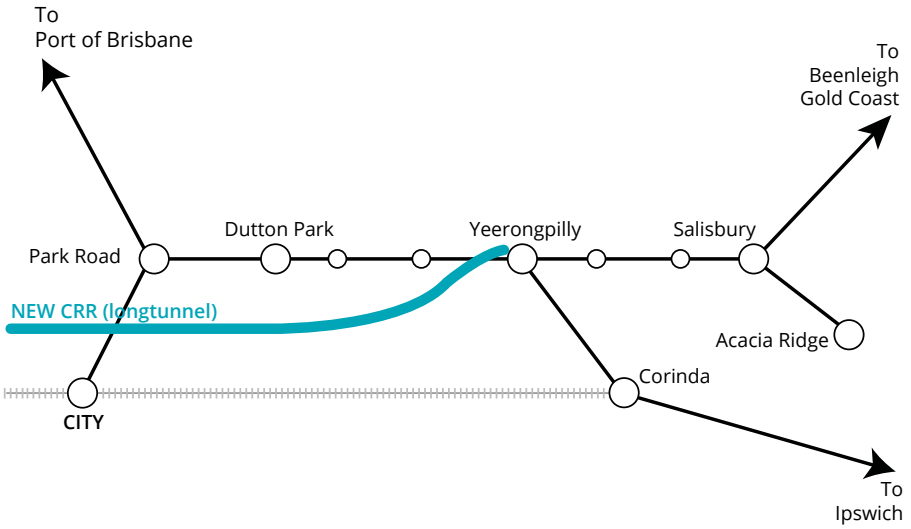
Scenario 2

Bring forward Alternative Alignment to Port of Brisbane



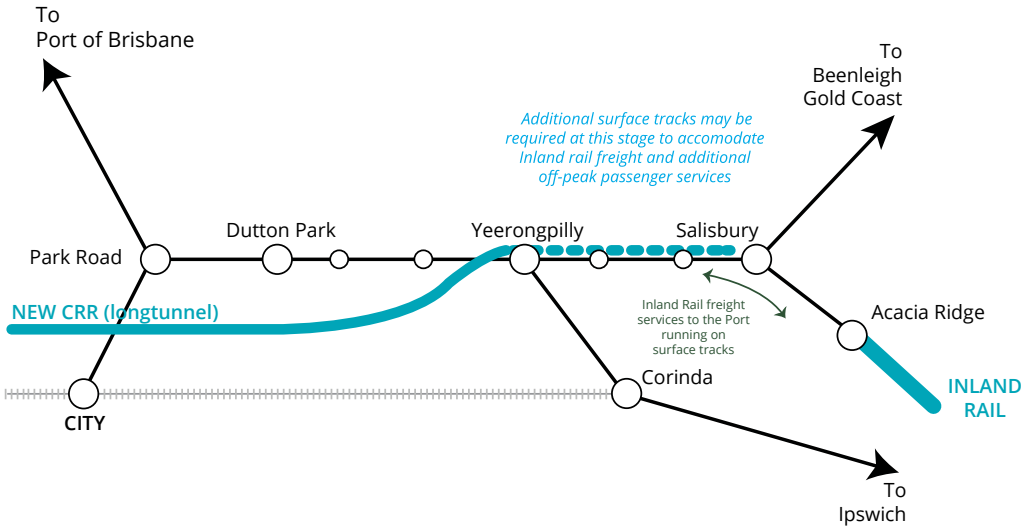
Project Sequence 1 – 2023

Cross River Rail to Yeerongpilly

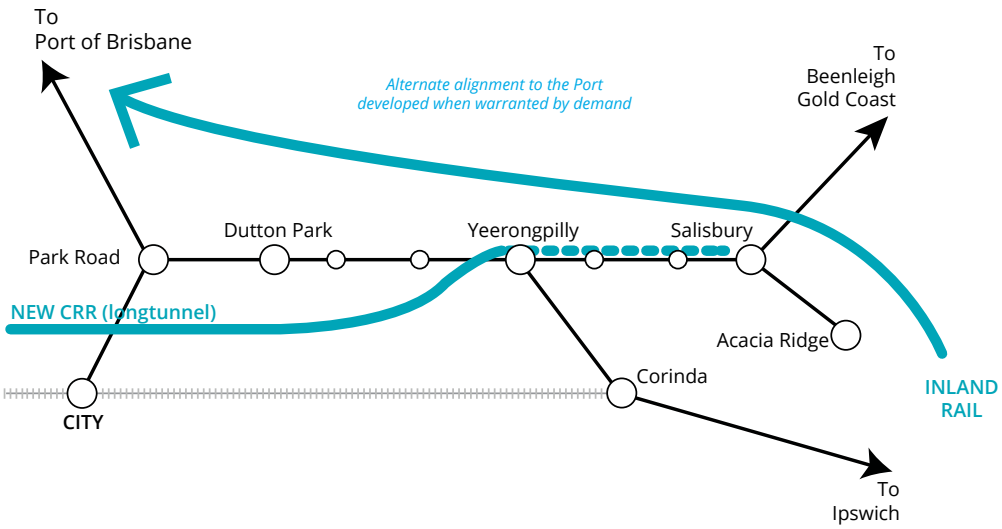


Project Sequence 2 – 2024

Inland Rail to use surface tracks from Acacia Ridge to the port

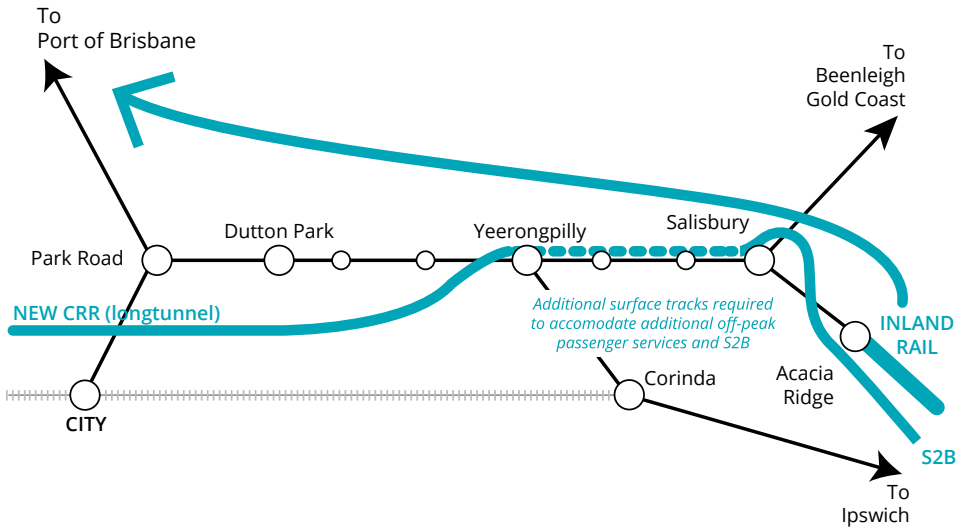


Proposed Sequencing 3 – 2024+



Future - 2036 + Alternate

With direct connection to the Port of Brisbane



"The virtual neglect of the current regional rail system in terms of investment in assets and innovation is a good example of how an inefficient supply chain can isolate you from your market and open up opportunities for competitors; some from places you'd not naturally think of first"

Phil Ryan, Olam

04

Impact of low rail modal share

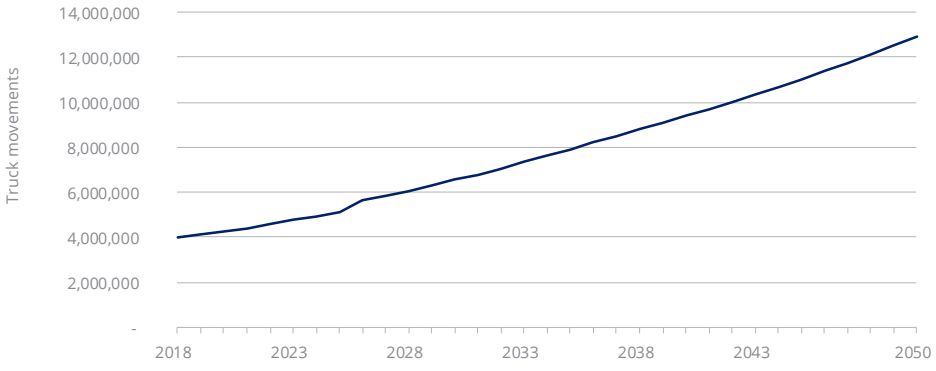
The key impacts of low rail modal share include truck congestion, road safety, pollution (including emissions) and cost/supply chain considerations.

4.1 Truck congestion

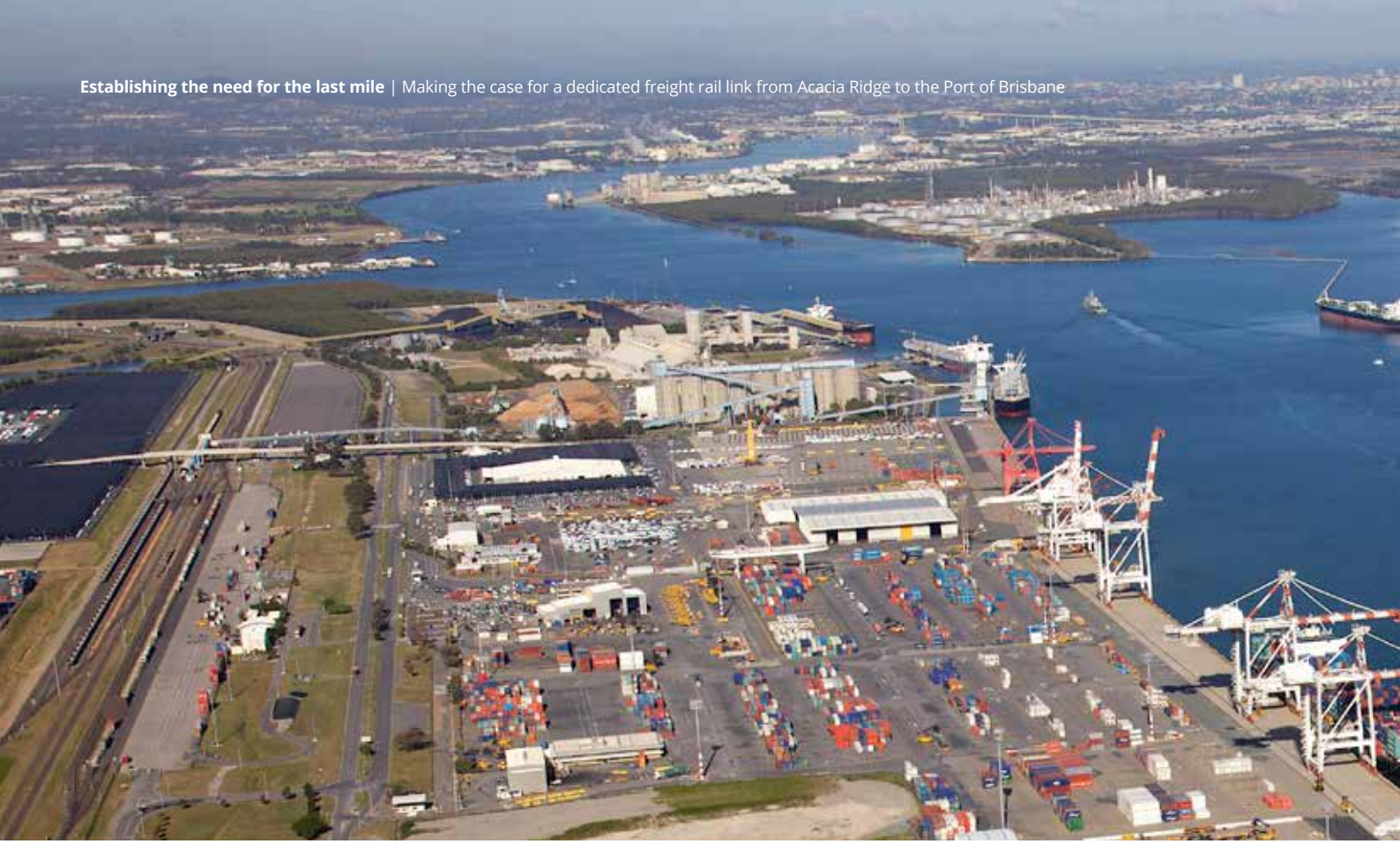
As highlighted previously, approximately 97.5% of the port's total container trade is presently handled by road with rail share consistently declining over the past decade due to a range of factors including current network issues and lack of investment in rail freight infrastructure.

Future trade growth in containers and trucks movements highlights that without rail freight investment, heavy truck movements on increasingly congested roads can be expected to rise from 4 million movements in 2018 (circa 1.35 million TEUs or around 3 movements per TEU on average in 2018) to 13 million movements by 2050 (circa 5 million TEUs or around 2.5 moves per TEU in 2050) as shown in Chart 4.1.

Chart 4.1: Port related truck movements



Source: PBPL



The Port of Brisbane Motorway (PoBM) is the key road corridor connecting the port to the National Highway system. It connects the Gateway Motorway to Port Drive and services a number of adjacent industrial areas. While the PoBM is a vast improvement on the previous access to the Port of Brisbane (i.e. along Lytton Road), traffic congestion is already being seen at the south-bound confluence with the Gateway Motorway.

Analysis of historical data highlights that heavy vehicle traffic has outpaced total traffic growth in the key roads to the port. In fact, over 2004 to 2017, the growth in heavy vehicles more than doubled the growth rate in total traffic.

On the PoBM in 2017, almost 50% of traffic is heavy vehicles (around 4,600 heavy vehicles recorded in average annual daily traffic[21]) , which is very high relative to the network average of 15% on state controlled roads in Queensland based on the 2017 traffic census.

Furthermore, key regional highways that bring trucks to/from the port, as detailed in Table 4.1, have also experienced growth in trucks with some having a high share of heavy vehicles (Warrego and Cunningham) as well as high numbers of heavy vehicles (Bruce Highway).

This analysis demonstrates that the PoBM has a significantly higher share of heavy vehicles than some of the key highways in Queensland. This also highlights, that the number of trucks into the Port of Brisbane each day is over triple the number of trucks on the Warrego (at Dalby) and under half the number on the Bruce Highway and M1 (at Caboolture and Yatala respectively).

Table 4.1: Analysis of truck traffic movements for key highways that feed the Port of Brisbane, 2017

Highway	Average annual daily traffic	% heavy vehicles	No. of heavy vehicles
Warrego (Dalby)	5,520	26.1%	1,441
Cunningham (Goondiwindi)	2,492	30.4%	758
Bruce (Caboolture)	110,488	10.7%	11,822
M1 (Yatala)	157,018	8.2%	12,875

Source: Deloitte Access Economics analysis using Queensland Government traffic census data, Department of Transport and Main Roads (DTMR)

[21] This was recorded in the TMR traffic census at site ID 136238 and WiM site Lytton

Key findings from the recent enquiry into Australia's rail industry (2017) by the Rural and Regional Transport References Committee highlighted the need for a national plan for rail.

Specifying that a switch from road to rail brings with it a range of the benefits, including:

- **Road congestion** – one passenger train takes 525 cars off the road and one freight train takes 110 long haul trucks off the roads
- **Economic and social costs** – less congestion, fewer accidents and reduced road maintenance
- **Emissions** – by producing lower carbon emissions compared to road transport
- **Commuting times and liveability** in growth corridors and in our regions
- **Social inclusion, health and amenity.**

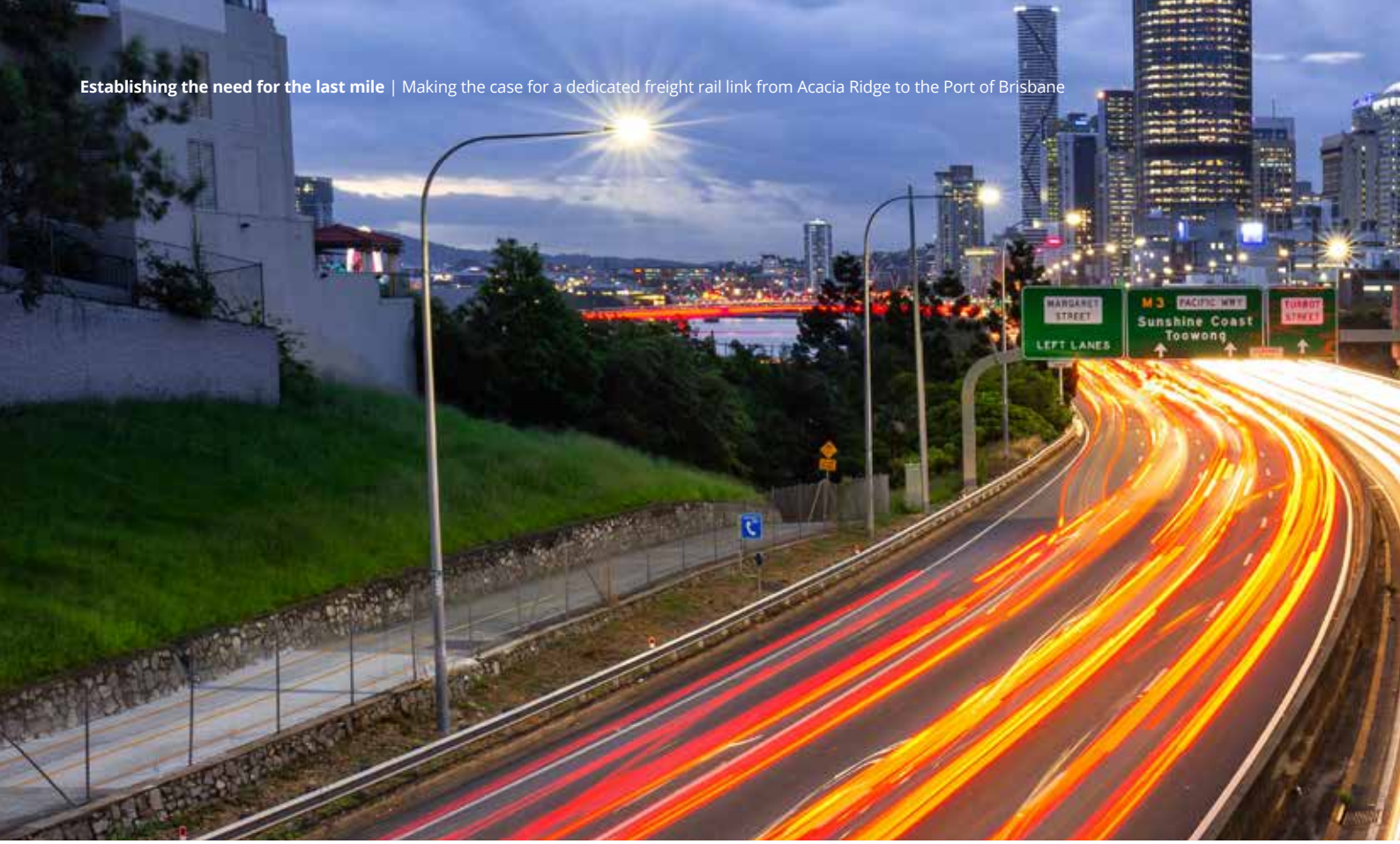
Improvements in rail freight productivity have the potential to lower the cost of moving freight and contribute to increased national economic output. It was also noted that increasing the use of freight rail at ports can reduce costs and increase the competitiveness of export supply chains.

Daniel Broad, CEO of the Australian Rail Authority (ARA), also highlighted the need for a national solution since "between the federal and state governments, investment in both passenger and freight rail projects is likely to exceed $100 billion over the next 15 to 20 years". As noted earlier, Queensland lags behind other states such as Victoria (which was highlighted as 'Australian best practice') on investment in rail, with considerably lower spending (proportionally). This is key because it effectively reduces the competitiveness of rail in favour of road in Queensland.

The Productivity Commission also note that heavy vehicle road freight users do not incur the full maintenance costs that they impose on road networks, and under-recovery of these costs has been estimated at between $7,000 and $10,500 per truck each year in 2006-09.

The ARTC argue that governments should be focussing on ways to lower the unit cost of rail freight transport and improve efficiency and productivity across the sector. They make the point that "technology will continue to play a key role in improving freight rail efficiencies". However, in the absence of well-targeted capital investments across the system including rail, it's difficult to lower unit costs and you could probably expect this disparity between road and rail to persist in Queensland.

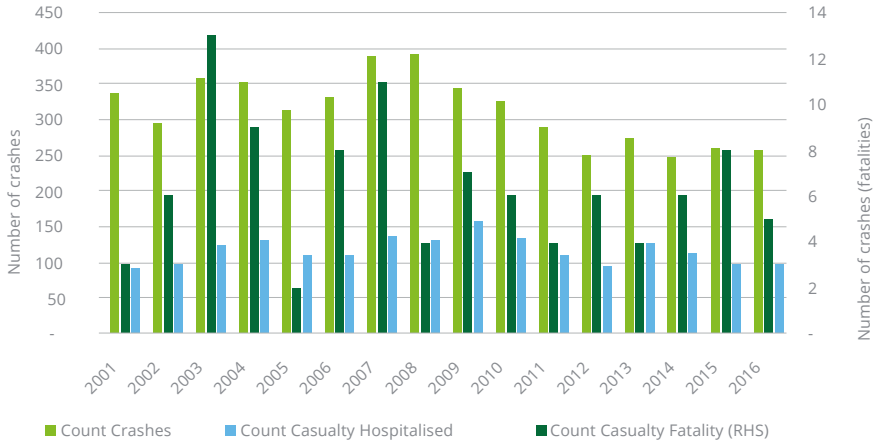
Source: Rural and Regional Affairs and Transport References Committee, 2017, Australia's Rail Industry



4.2 Road safety/crashes

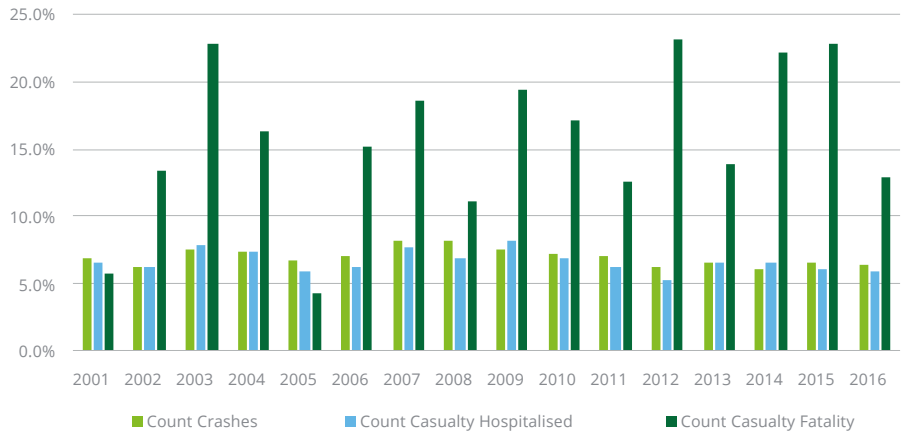
The number of crashes involving trucks in Brisbane accounted on average for around 7% of total crashes in the region from 2001 to 2016. Over the same period, approximately 16% of crashes involving trucks in Brisbane resulted in fatalities. This indicates projects that lead to reductions in truck movements on the road network are likely to have significant safety benefits. Specific data is presented in Charts 4.2 and 4.3.

Chart 4.2: Number of crashes caused by trucks, Brisbane, 2001 to 2016



Source: Deloitte Access Economics analysis of DTMR data by vehicle type
Notes: This excludes crashes that caused property damage only

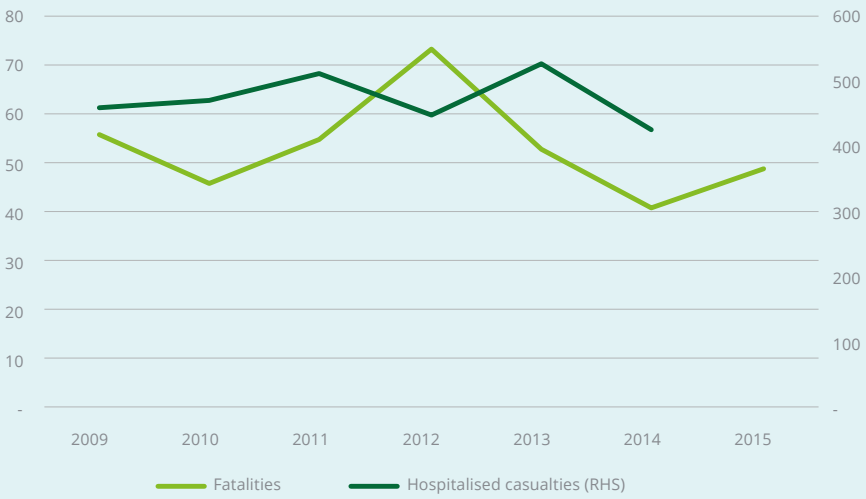
Chart 4.3: Share of crashes caused by trucks in Brisbane, 2001 to 2016



Source: Deloitte Access Economics analysis of DTMR Crash data by vehicle type
Notes: This excludes crashes that caused property damage only

At the State level in 2015, there were 49 road fatalities involving heavy freight vehicles, representing 20% of the road toll.

Fatalities and hospitalised casualties involving heavy freight vehicles 2009-2015, Queensland



Source: TMR

Furthermore, as highlighted by Deloitte Access Economics 2017 Value of Rail report, it is estimated that road freight crash costs are 14 times more per tonne kilometre than rail.

4.3 Pollution (emissions)

Road freight produces 16 times more carbon pollution than rail freight per tonne kilometre.[22] Moving a single loaded 20' container by rail instead of road can save up to $345 in carbon costs for movements between Australia's major cities. Furthermore, every net tonne kilometre of freight moved from road to rail results in a reduction in carbon pollution costs of around 0.78 cents. For example, for a 40' container of cotton with a payload of 28.5 tonnes from Goondiwindi to the Port of Brisbane (travelling 495km on rail instead of circa 390km by road), the value of the reduction in carbon pollution costs is potentially up to $110.

4.4 Cost/inefficiency

An inefficient rail network significantly reduces rail's competitiveness relative to other transport modes, particularly road. The lack of competition between modes increases the use of road to deliver freight, which subsequently leads to higher costs/inefficiency for producers, including relatively higher freight costs (direct and indirect). An inefficient supply chain also worsens international competitiveness and inhibits Queensland's ability to compete on the global stage. There are also broader costs to the community, including higher road maintenance as a result of more heavy trucks on the road.

On top of increasing pressure on road maintenance, there are also potential capital cost implications. The significant increase in heavy truck movements on the road network supporting exports and imports via the Port of Brisbane will increasingly place pressure on the need to upgrade capacity in particular areas. Whilst the key factor influencing road capacity enhancement is total vehicle volumes, particularly in the peak periods, as determined, in the main, by volume/capacity (V/C) ratio. Other factors are considered, including the proportion of heavy vehicles in the flow and accident history. Physical characteristics and design elements of the road network such as topography, 'at grade' crossings and development contiguous to the network are also considered. These latter factors bring a 'safety' element in consideration particularly in locations where a significant proportion of the traffic is heavy vehicles mixing with local traffic.

This situation, is for example, not uncommon on the Warrego Highway (Ipswich to Toowoomba) which is a major route used for both bulk and containerised agricultural exports destined for the Port of Brisbane. The Warrego Highway is a national highway under the jurisdiction of TMR. It is the second highest trafficked rural national highway outside of South East Queensland, after the Bruce Highway. It also serves as Queensland's principal east-west freight route extending west 714km from Brisbane to Charleville. It has connections to the Cunningham Highway and the New England Highway which provide access into New South Wales and the Burnett. Continued strong growth in South East Queensland, Toowoomba region, Darling Downs – Maranoa and border regions along with the development of the Surat Basin energy province are predicted to generate significant traffic growth over the next 20 years.[23]

Whilst the State has a long term plan for the Warrego Highway[24] – the Warrego Highway Upgrade Strategy – the increase in heavy vehicle traffic combined with population growth driven private vehicle traffic at rates higher than those envisaged in this long term plan (20 years from 2012) may result in projects identified as, for example, required in 11-20 years' time being brought forward. This results in additional funding costs to both the State and Federal governments. In the absence of a significant switch of freight from road to rail, the likelihood of the need to 'bring forward' projects such as additional lanes, over-taking lanes and grade separation of intersections on the Warrego Highway and other significant highways, is material.

[22] Deloitte Access Economics, 2017, *Value of Rail* report
[23] TMR Project Brief, DSW 43-17, January 2018
[24] https://www.tmr.qld.gov.au/About-us/Corporate-information/Publications/Warrego-Highway-Upgrade-Strategy.aspx
Note: This strategy was prepared at a time when rail hauled just over twice the proportion of total containers handled by the Port of Brisbane than it does today.

"A standard gauge line enables better utilisation of rollingstock to facilitate better efficiencies, and address seasonality, which ultimately encourages above rail investment"

Bruce McConnel, Food Leaders Australia for TSBE

05

Dedicated link from Acacia Ridge to the Port of Brisbane

This section provides an overview of the options for a dedicated rail freight link and discussion of road to rail considerations.

5.1 Options for a dedicated rail freight link

Currently, just 2.5% of containerised freight at the Port of Brisbane is moved by rail which is considerably lower than Sydney and Melbourne ports (both currently around 20%). In Brisbane, this means around 97.5% of containerised import and export freight is moved by trucks on the road network.

This highlights that the port is characterised by an over-reliance on the transport of freight by road. Furthermore, the vast majority of port-bound container freight is currently transported by road through metropolitan Brisbane, increasing congestion, accidents and emissions. Key rail corridor problems are highlighted in Figure 5.1.

Queensland and Australian Government infrastructure investments over the past decade have seen substantial improvements to the road network, including connections to the Port of Brisbane. Investments in freight rail infrastructure however, have been minimal and furthermore, freight rail does not have effective 24/7 access to the port.

ARTC considered four potential rail corridors in 2014[25] - see Figure 5.2, including upgrading the existing corridor. Engineering and environmental risk assessments were used to supplement previous studies and pre-feasibility materials.

"The initial analysis undertaken by ARTC in 2014, identified two corridor options as suitable for further development. These options were then assessed through a second phase of study, held in March 2015.

- ***Eastern Freight Rail Corridor:*** *This option proposes a dedicated freight line from the interstate standard gauge line south of Acacia Ridge intermodal terminal to the Port of Brisbane, including in two tunnels (of 4.8 kilometres and 4.4 kilometres) or below natural ground level, plus some ground-level and elevated structures. This option broadly follows the Gateway Motorway and passes in tunnel beneath urbanised areas.*
- ***Long Tunnel:*** *This option proposes a dedicated freight line from the intermodal terminal at Acacia Ridge to the Port of Brisbane. Adopting a more direct, north-easterly route to the port, this option is mostly in a 17 kilometre tunnel.*

Both options were initially examined as double track 'ultimate' solutions and compared with two other corridor options that were discarded as a result of the initial multi-criteria analysis.

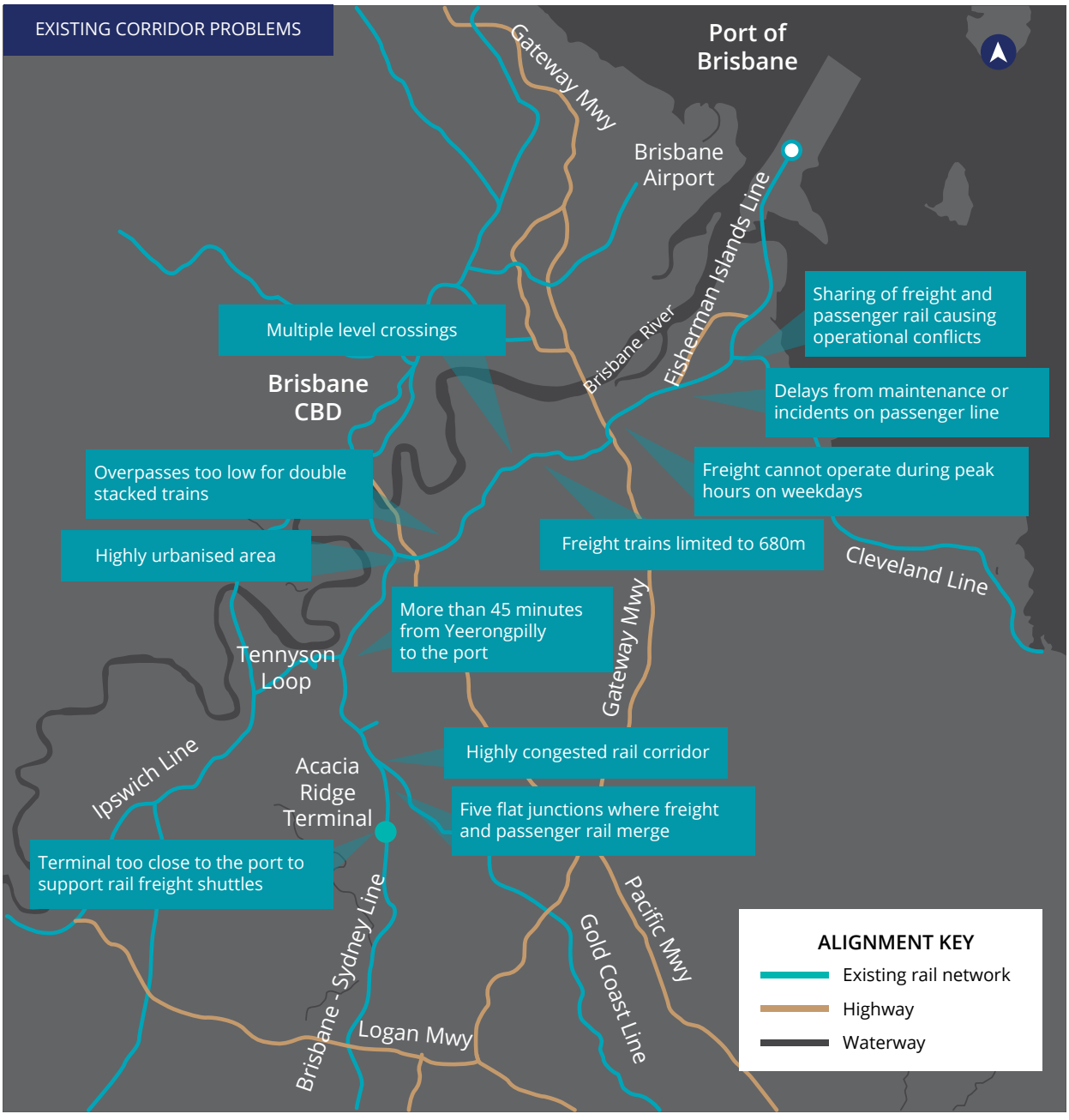
- ***Upgraded Existing Corridor:*** *Upgrading the existing corridor was rejected as an ultimate, double track alignment as it passes through dense, inner-city residential communities, making it technically difficult to construct and socially unacceptable. Large numbers of properties would be resumed and numerous major arterial road structures would be completely rebuilt, causing huge logistical challenges. The cost would be high, yet the end product would not meet best practice, with too many substandard curves and gradients.*
- ***Electrified Tunnel:*** *Constructing a 26 kilometre electrified tunnel from Larapinta to the Port of Brisbane was also investigated and rejected. The proponent of this tunnel put it forward as a single-track proposal. The cost of future-proofing this option, allowing scope for double track, is prohibitive. The requirement to swap between diesel and electric locomotives also limits its carrying capacity, while increasing its operational complexity. The location of the southern portal within the environmentally significant Larapinta Glider Forest was also of concern.*

The Eastern Freight Rail Corridor was found to be more cost effective than the Long Tunnel and presents opportunities for greater operational flexibility and future staging. The multi-criteria analysis showed that cost was not the only factor favouring this option. It also has less social and quality of life impacts, and ecological impacts were found to be manageable.

The Long Tunnel remains a feasible alternative but it carries increased cost and more significant risks than the Eastern Freight Rail Corridor. No diesel-operated freight tunnel of this length has been constructed beneath an urbanised area before. It is also evident that adopting a route in tunnel does not eliminate community and environmental impacts. While potential noise, vibration and air quality impacts require more thorough investigation to predict accurately, the study indicated that they could prove substantial".

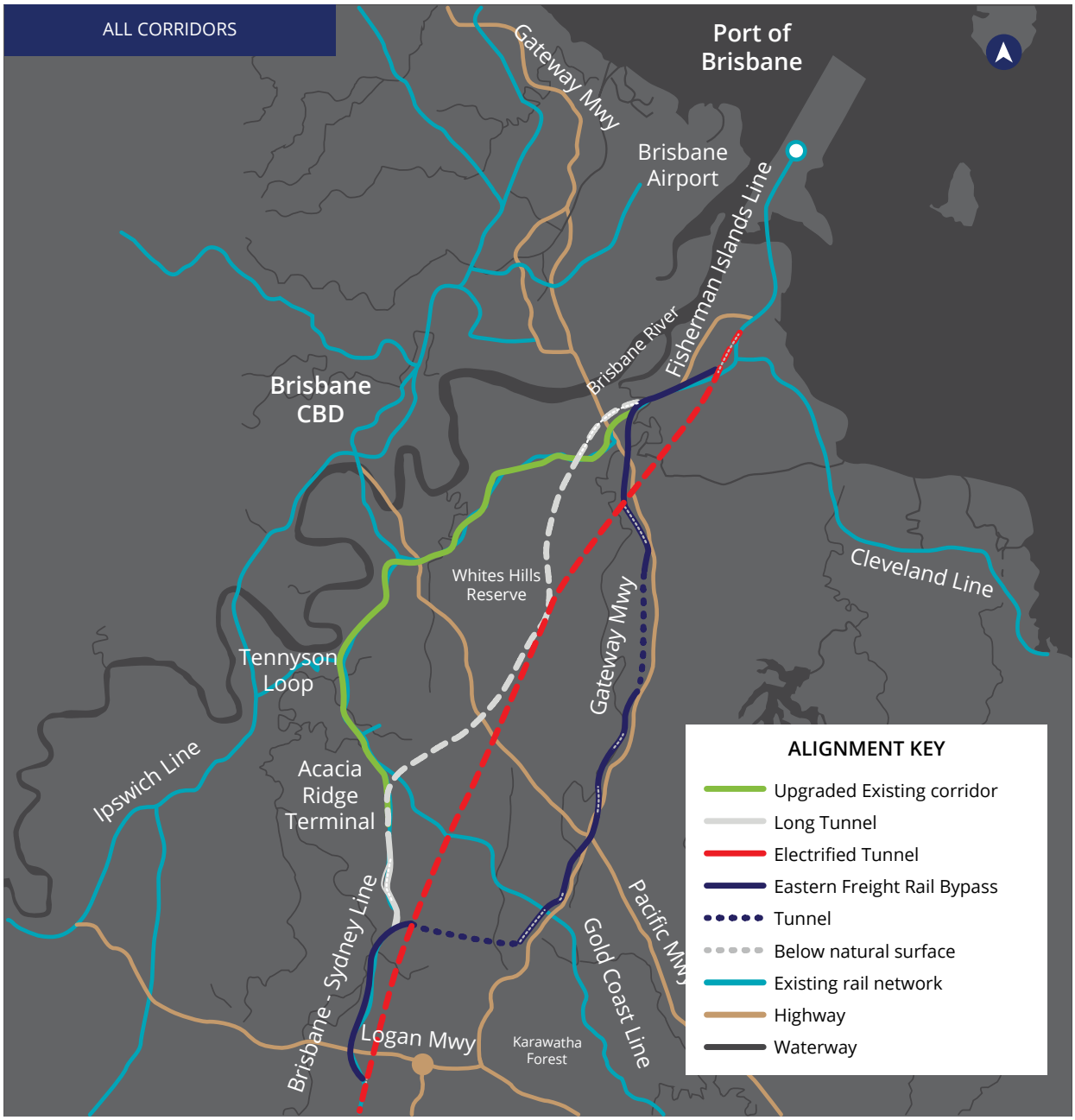
[25] see Inland Rail Business Case, ARTC 2015

Figure 5.1: Corridor problems to the Port of Brisbane



Source: ARTC, 2015

Figure 5.2: Eastern Freight Rail Bypass port connection



Source: ARTC, 2015

5.2 Eastern Freight Rail Bypass port connection

At the time, ARTC identified that the most appropriate option as the Eastern Freight Rail Corridor. The indicative capital expenditure for the Eastern Freight Rail Corridor estimated at the time of the study was circa $2.5 billion in 2014-15 (nominal).

In April 2018, the Queensland and Federal Governments issued a Terms of Reference for a Port of Brisbane Strategic Rail Access Study to be managed by the Department of Transport and Main Roads. It is understood that this work commenced in June 2018, and will be completed to Preliminary Evaluation level by mid-2019.

5.3 Road to rail considerations

Investment in rail infrastructure projects that enable switching transport tasks from road to rail (where it is cost effective for industry and the supply chain to do so), can yield economic, social and environmental benefits. A number of factors influence the decision between road and rail, including cost, transit time, service reliability and availability.

Price is the primary driver for virtually all traffic, particularly in the general freight market. There may be situations where specialist handling requirements (e.g. HAZCHEMS) and/or major bulk movements dictate requirements that impact on the influence of price in the choice of mode.

Transit time is factored into overall delivery times to customers. Similarly, reliability is important as operators often need to work to tight labour and operational time 'windows'. Furthermore, this impacts on pickup and delivery costs (i.e. trucks waiting longer than expected incur additional costs). Rail is perceived as less reliable than road because when a train gets delayed the impact is much greater. This is particularly true when freight is shared with passenger lines, as is the case with the current link from Acacia Ridge to Port of Brisbane (and across the much of the South East Queensland rail network), and priority is given to the passenger operations in the case of any conflict. This is especially important if rail freight grows given the potential effects of Cross River Rail and other planned rail projects as well as the expected growth in passenger services on key parts of the rail network. Increased off-peak passenger train frequencies in particular will act to place further pressure on the already declining rail mode share for containerised cargoes at the port. There will also be implications for bulk agricultural cargoes on rail that are currently at historically low levels.

Unlike trucks that can operate around the clock (effectively 24/7 or 100% availability), rail freight can only be transported during particular times, with operational restrictions limiting transport of freight during peak commuting hours (circa 25-40% of the effective available time). As a result, rail freight has a much lower availability compared to road freight.

Decoupling freight and passenger services through establishing a dedicated freight link from Acacia Ridge to Port of Brisbane (especially when considered as part of a dedicated freight link from source areas all the way through to the Darling Downs and border regions) would deliver a combination of lower costs, better transit times, better reliability and much enhanced operational availability. Taken together, these factors would act to facilitate a marked switch from road to rail to levels much closer to (and over time, maybe greater than) those currently experienced at ports in Sydney, Melbourne and Fremantle. In this context, it is worth noting that at the State level in 2015, there were 49 road fatalities involving heavy freight vehicles, representing 20% of the Queensland road toll.

Discussions with some key agricultural 'players' in the port's catchment area indicated an appetite to switch from road to rail freight for some of the longer distance movements over the import-export supply chain. This potential was identified for agricultural products such as cotton (lint and seed), grains and pulses as well as products such as processed meat, fertilisers and fuel.

In summary, a dedicated rail freight connection to the Port of Brisbane as part of Inland Rail will help address the current modal imbalance, and also support future trade growth with 5 million TEUs forecast to be handled through the port by 2050, up from 1.35 million in 2017-18.

"The expansion of Thallon Grains is rapidly emerging as arguably our number one economic development priority for Balonne Shire"

Mathew Magin, Balonne Shire Council

06

Strategic case and potential benefits

There are a number of strategic factors including reduced congestion, improved productivity, social and environmental benefits.

This section explores the strategic issues and service need implications of a dedicated link. This informs the identification of a range of potential economic, social and environmental benefits that such a project could provide for industry, government and the community as a whole. This analysis is also provided in context of the Inland Rail Business Case and other strategic issues including the need to consider the implications of Cross River Rail and the implementation of New Generation Rollingstock program for rail freight capacity in Queensland.

6.1 Strategic issues and benefits of a dedicated rail freight link to Port of Brisbane from Acacia Ridge

Such a project could help address a number of strategic issues, problems and opportunities including:

- *Urban congestion in Brisbane as well as truck congestion discussed in Section 4*
- *Lack of rail freight investment in Queensland and modal implications*
- *Productivity benefits from a road to rail freight switch*
- *Other benefits from such a switch including social and environmental*
- *Trade catchment implications and industry competitiveness.*

6.1.1 Urban congestion in Brisbane

According to the BITRE (2016a), the costs of congestion in Brisbane are expected to increase at a faster rate than both Sydney and Melbourne.

Brisbane's congestion costs are expected to grow at 8.6% per annum between 2016 and 2030, which compares with 7.1% and 6.4% for Melbourne and Sydney respectively over the same period.

Chart 6.1: Avoidable congestion costs, historical and forecasts, to 2030

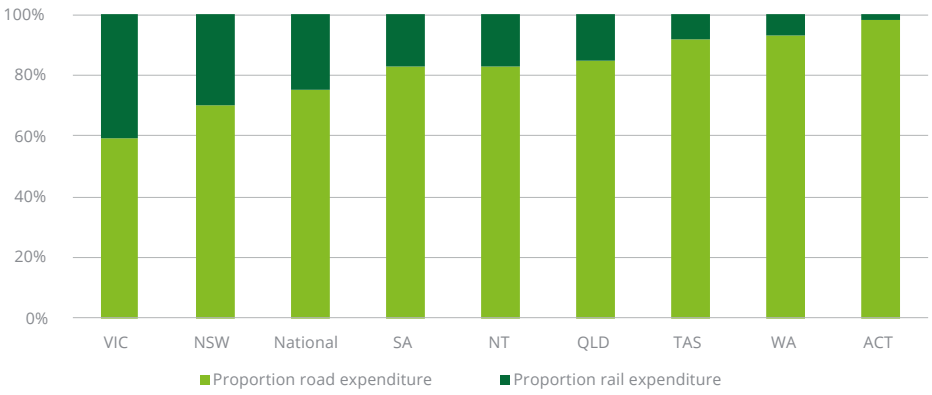
Source: BITRE 2016a

Transport modelling completed for the 2013 submission[26] to Infrastructure Australia, shows that by 2031 the South East Queensland transport network will be severely congested in peak periods. Furthermore, this congestion will be primarily confined to key freight routes including the Gateway Motorway/Bruce Highway north of the Brisbane River; the Gateway Motorway/Port of Brisbane Motorway/Pacific Motorway in the south; and the Logan Motorway/Ipswich Motorway/Warrego Highway to the south-west. The implications being that unless there is investment in new infrastructure that shifts road based freight onto rail, the forecast by BITRE for the costs of congestion in Brisbane are likely to become a reality.

6.1.2 Lack of investment in rail infrastructure in Queensland

Queensland is investing considerably less in rail infrastructure compared to other states. Over the 15 years to 2015, expenditure on road has dominated rail in Australia. Furthermore, Queensland's proportional expenditure on rail is at the lower end compared to other states including Victoria, NSW, South Australia and the Northern Territory, and considerably less than the national average as a whole - see Chart 6.2.

Chart 6.2: Split by state, rail and road expenditure, average 2000 to 2015



Source: Deloitte Access Economics, 2017

The biggest rail investment currently planned in Queensland is Cross River Rail (circa $5.4 billion and focused on passenger services). Current plans for the Inland Rail link to the Port of Brisbane are years away (i.e. ARTC noted a view that this link may not be needed until circa 2040). This highlights rail freight infrastructure investment and opportunities to enhance supply chain efficiency via rail upgrades are not a current focus of infrastructure planning in Queensland (see highlights box overleaf for exceptions). Previous examples where the State has been slow to adopt investment include the proposed Beerburrum to Nambour upgrade on the North Coast Line.[27]

This changed earlier this year, with the Federal Government announcing a $390 million commitment in the May 2018 Budget while the Queensland Government committed $161 million over four years in its June 2018 Budget.[28] The project had been deemed not to be required until Cross River Rail is delivered[29]; but subsequently will benefit freight operators despite the primary focus on passenger service frequency uplifts. A lack of investment in rail freight infrastructure enabling better service performance is a barrier to increasing the competitiveness of rail freight. However, projects such as Beerburrum to Nambour will make a positive contribution in this regard, albeit only for shippers north of Brisbane.

When looking at other states, in particular, NSW and Victoria, there are a number of rail infrastructure projects including rail freight projects currently underway – see Table 6.1.

[26] This refers to analysis by Sinclair Knight Merz included in the Deloitte 2013, DFRC Submission to Infrastructure Australia.

[27] Protection of a future rail corridor from Beerburrum to Landsborough occurred in 2011 following studies in the mid-to-late 2000s.

[28] See https://www.tmr.qld.gov.au/Projects/Name/B/Beerburrum-to-Nambour-Rail-Upgrade-Project, https://www.railexpress.com.au/beerburrum-nambour-to-get-390-million-in-budget/ and https://budget.qld.gov.au/files/Budget2018-19_Highlights.pdf

[29] *"It is important to remember that none of these proposed new rail lines will work without Cross River Rail to open up the network. The only way extra capacity on the Sunshine Coast can work is if there are no bottlenecks further down the line. The way you ensure that is with Cross River Rail, and we are getting on with the job and building it."* - Minister Mark Bailey. See http://statements.qld.gov.au/Statement/2018/3/9/statement-from-transport-and-main-roads-minister-mark-bailey

Table 6.1: Selected rail investment in NSW and VIC

Project	Estimated Costs	General Freight Investment
New South Wales		
Port Botany freight rail duplication	*$400 million*	✓
Development of the Moorebank Intermodal Terminal	*$1.8 billion*	✓
Maldon - Dombarton Railway Line	*$800 million*	✓
The Lower Hunter Freight Rail Corridor	*Not available*	✓
Northern Sydney Freight Corridor	*$5 billion*	✓
Inland Rail	*$3 to $4 billion in NSW (of $9.9 billion in total)*	✓
Southern Sydney Freight Line upgrade	*$80 million*	✓
Western Sydney Freight Line and Intermodal Terminal access	*$2.2 billion*	✓
Victoria		
Regional rail revival project	*$1.7 billion in Victoria*	✓
Inland Rail (Victoria component)	*Not available*	✓
Murray Basin Rail Project	*$440 million*	✓
Western Interstate Freight Terminal	*Not available*	✓
Port-Rail shuttle (proposed)	*$58 million*	✓

Source: Deloitte Access Economics; Transport for Victoria, 2018

Toowoomba Range tunnel upgrade

Queensland Rail has commenced work on an upgrade along the Toowoomba and Little Liverpool Ranges. The $48 million government investment involves increasing the height of 11 heritage-listed rail tunnels, enabling the transport of high cube (9'6) containers on rail from the Darling Downs and South West regions directly to the Port of Brisbane. This will create the clearance necessary to transport high cube shipping containers via rail, which are increasingly being used to export goods, particularly cotton lint and meat and increasingly, grains and pulses.

This project has the potential to help reduce the quantity of heavy vehicles required to transport freight on the road network of Southern Queensland to the port, improving safety and reducing the impact on roads. Construction started in April and it is anticipated the work will be completed by the end of 2019.

West Moreton rail system upgrade

The Queensland Government will invest almost $28 million to upgrade 18 ageing rail bridges on the West Moreton rail network between Ipswich and Chinchilla. The upgrade works which commenced in March are expected to be completed by 2020 and will significantly reduce time and costs spent on maintenance and inspections.

Fixing Country Rail – New South Wales

The NSW government is planning to spend over $137 million on rail upgrades in regional centres as part of its 'Fixing Country Rail' program aimed at boosting rail freight efficiency. This is part of a full program valued at $400m.

The rail investment will allow for heavier trains with up to 25 tonne axle loads and carrying double-stacked containers at faster speeds - from 50km/h to 80km/h. These upgrades, including improved passing loops and sidings, level crossings and strengthening bridge structures, are expected to shift more than 200,000 tonnes of road freight to rail.

Referring to the upgrades on the South Coast Line from Berry to Bomaderry, Mark Owens, Manildra Group national transport and logistics manager said "this upgrade from Class 2 to Class 1 will remove capacity bottlenecks and improve freight movements for the entire network."

See https://www.transport.nsw.gov.au/projects/programs/fixing-country-rail

6.1.3 Productivity benefits from a road to rail freight switch

In the case of freight rail, four main areas of productivity benefits can be considered. Firstly, existing rail users benefit from new rail infrastructure as it delivers operational efficiencies which in turn reduces the average cost of transporting goods. The value of these savings is estimated based on the saving per tonne or TEU for transporting goods using the new and/or enhanced infrastructure.

Secondly, the provision of new and/or upgraded rail infrastructure can lead to some goods which were formerly transported by road to become cheaper to transport by rail, resulting in additional freight cost savings (refer to box on DAE Road/Rail cost model).

Thirdly, as more goods are transported by rail, this will lead to reduced road congestion and other externality costs. To calculate the value of this benefit, the change in net tonne kilometres of cargo hauled by trucks as a result of mode shift is used to estimate the proportionate change over time. Published parameter values for unit rates of various benefit categories (typically measured as cents/ntkm) sourced from transport project appraisal guidelines are applied to changes in vehicles movements and kilometres performed and traffic volumes (tonnes or TEUs).

Finally, the provision of rail infrastructure can bring previously excluded goods to the export market; resulting in increased export revenue. Such interactions and broader flow-on impacts to the economy were modelled (as discussed in Section 8) using the Deloitte Access Economics in-house regional Computable General Equilibrium (CGE) model - DAE-RGEM.

DAE – Road/Rail Cost Model

Deloitte Access Economics has a Rail/Road cost model that incorporates a range of data and assumptions to estimate comparative rail and road haulage costs for given tasks – in this case, containerised agricultural cargoes.

The rail module of the model involves development of a 'reference train' relevant to the task being considered. For example, a 'reference train' for the South Western lines was made up as follows:

- 2 locomotives (max. tonnes – 94t each)
- 35 flat wagons capable of hauling one loaded TEU of grain with 25 tonne payload or one FEU of cotton lint with a payload of 28 tonnes
- two crew operation
- loaded in one direction only.

Various inputs such as run, load and unload, train provisioning and other dwell times were sourced from QR's network data and PBPL data. Fuel consumption rates as well as fixed and variable maintenance costs for locomotives and wagons were based on data collected by DAE from various sources including rail operators. Asset lives were sourced from operator and track owner Annual Reports.

The model can accommodate operation of new or second-hand rollingstock - capital costs sourced from recent published procurements and industry consultations (e.g. new locomotive - $5m and second hand locomotive $2m; new wagon $120,000 and second hand wagon $80,000). A 'spare cover' for rollingstock of 10% is adopted. A commercial borrowing rate of 5% is applied. Track access rates were sourced from public and private sources.

The model has a road vehicle module where fixed and variable costs are developed along similar lines based on a mix of A-Double and B-Double vehicle operations.

Current market rates for both rail and road haulage were sourced from a number of shippers and were used to 'sense check' the modelled results.

Port handling costs are included.

The model produces the following output metrics:

- Total annual costs for the task disaggregated as follows:
  - Crewing
  - Fuel
  - Track access/Registration/Insurance etc
  - Locomotive/Truck maintenance and capital
  - Wagon/Trailer maintenance and capital
  - Total locomotives and wagons or combination vehicles required for the task
- Cost per net tonne kilometre
- Cost per net tonne
- "Above rail" cost per net tonne
- "Below rail" cost per tonne
- Cost per container (TEU/FEU as appropriate)

In order to estimate 'order of magnitude' transport haulage (freight) savings, an average distance of 495km rail and circa 390km road (equivalent to Goondiwindi to the port on the current networks) and current rail operating parameters (e.g. train lengths, speeds, payloads etc) were adopted as 'indicative'.

It is worth noting that Inland Rail will enable much longer and heavier trains at higher average speeds. Therefore, given that Inland Rail will be of a higher standard with a shorter route length through the South West to the port (e.g. circa 420km Goondiwindi to the port), this approach represents a conservative estimate of likely savings for switching to rail as 'rail economics' will be much better than currently available on the existing network servicing the port.

6.1.4 Other economic, social and environmental benefits of a road to rail freight switch

In addition to productivity benefits, additional benefits will accrue from the reduction in negative externalities associated with reducing heavy truck movements to transport containerised freight. These include a range of environmental benefits such as reduced air pollution, less greenhouse gas emissions, less noise pollution and less water pollution as a result of run-off from roads and other factors. Other social benefits such as reduced urban separation effects and improved amenity and liveability are also considered.

Default externality values were sourced from the Australian Transport Council guidelines and inflation adjustments were incorporated to arrive at present day values. This process of estimation of benefits is discussed in further detail in Section 7.

6.1.5 Trade catchment implications and industry opportunities

With global population growth and rising incomes in key trading partners such as countries in Asia driving ever increasing demand for food supplies, Queensland and Australia's agricultural export industry will become increasingly important to the long term economic growth of the nation. However, the agricultural industry can only prosper if it has an efficient route to market. Traditionally, this has been through a balanced road and rail offering. However, with the rail system linking the Port of Brisbane with key agricultural growing areas being of such poor current quality, it has become inefficient to utilise rail transport to port meaning the region's agricultural industry is now almost entirely beholden to a road based transport solution.

The construction of a dedicated rail freight link to the Port of Brisbane from Acacia Ridge would be a key catalyst for a more efficient transport offering to the region's agricultural export industry. Having a viable route to market to accommodate current and increased production is critical to capitalising on export opportunities and growth in Australia's agricultural industry that comprise the Port of Brisbane's trade catchment area. There are considerable volumes of goods moving through the port, which historically had a much higher proportion on rail as illustrated in Table 6.2.

Table 6.2: Mode share for containerised trade to the Port of Brisbane, 2005, 2012 and 2017

Product	Volume in 2005	Landside arrangements in 2005	Volume in 2012	Landside arrangements in 2012	Volume in 2017	Landside arrangements in 2017
Intermodal	0.7 million TEU	23% rail, 77% road	1.0 million TEUs	5% rail, 95% road	1.2 million TEUs	2.5% rail, 97.5% road

Source: Deloitte, 2013, submission to Infrastructure Australia and updated analysing using PBPL statistics and information

The rail share of containerised cotton movements in Queensland historically has been significantly lower compared with other states such as NSW and Victoria – see Figure 6.1. This underscores the level of opportunity that exists associated with an increase in the competitiveness of rail in Queensland.

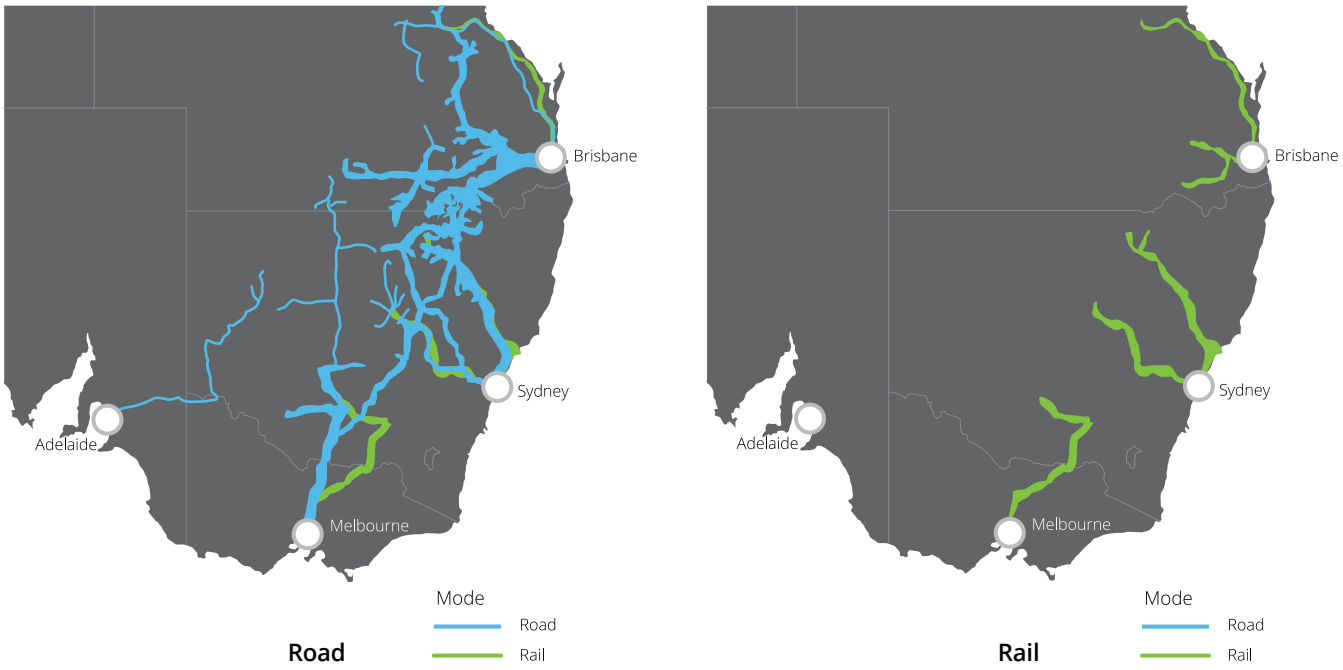
Over the medium term, the market outlook for the value of Australian exports for some key commodities produced in the port's catchment is generally positive with forecast increases in the value of exports of grains, cotton, oilseeds, wheat and meat on average to 2022-23 as shown in Chart 6.3.

Furthermore, the Darling Downs Maranoa region which comprises a key part of the port catchment area in Queensland is estimated to have produced around 3.3 million tonnes cotton, wheat, grains, sorghum and chickpeas alone in 2017-18. This is estimated to equate to around 50,000 TEUs of cotton and 107,000 TEUs of grains and chickpeas. This totals over 156,000 containers (export only from the region to Port of Brisbane) and shows considerable supply side potential to support increased rail freight transport through to the Port of Brisbane as shown in Table 6.3.

This should be considered a conservative estimate since the Port of Brisbane has the potential to source other commodities and products as well. For example, chemicals and fertilisers as well as fuel on rail as specifically discussed on page 56.

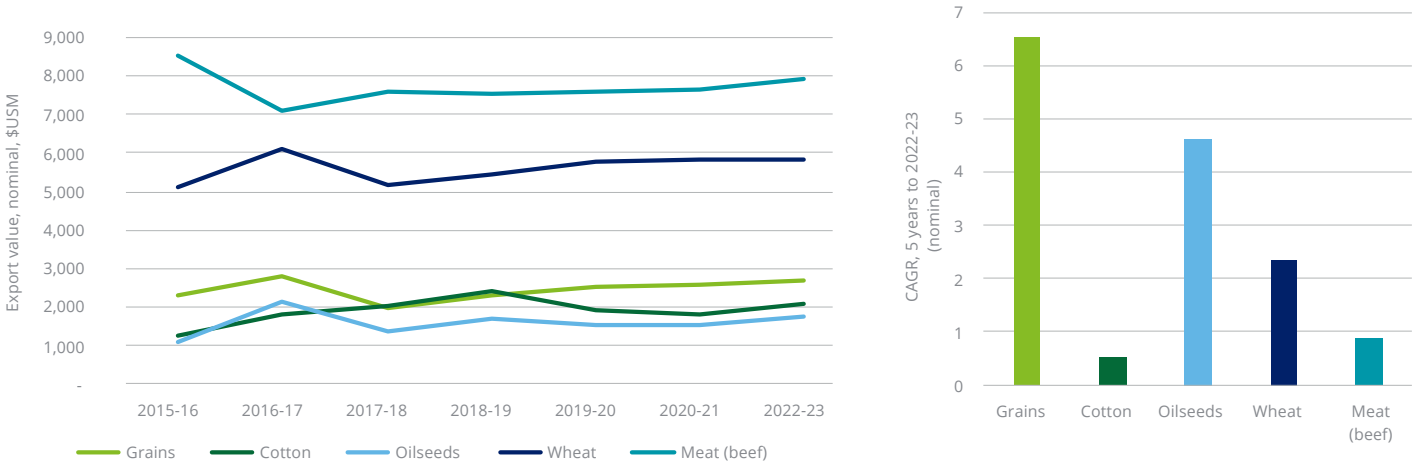
Consultation also identified the potential for increased agriculture export trades to use rail to the Port of Brisbane via the North Coast Line. This relates to commodities produced in the port catchment area going north from the Sunshine Coast to Cairns and including Wide Bay, Fitzroy, Mackay, Townsville and inland areas. The port catchment area is estimated to produce around 2.38 million tonnes of fruit and vegetables, meat, wheat, sorghum, chickpeas and cotton. This is estimated to equate to the around 12,400 TEUs of cotton and 86,000 TEUs of fruit and vegetables, meat, wheat, sorghum and chickpeas. This totals over 98,000 containers (export only from the region to Port of Brisbane) and shows considerable supply side potential to support increased rail freight transport through to the Port of Brisbane from the northern areas of the State.

Figure 6.1: Historical cotton transport volumes, separated by mode



Source: Adapted from BITRE estimates

Chart 6.3: Australian export outlook by value (US$M), nominal to 2022-23



Source: Deloitte calculations using ABARES Outlook data

Table 6.3: Estimated agricultural production levels for key commodities of interest in Queensland and the Darling Downs Maranoa region (2017-18)

Year	Forecast volumes in Queensland in 2017-18 (tonnes)	% produced in Darling Downs Maranoa	Estimated production Darling Downs Maranoa (tonnes)	TEU equivalent (26t net per container)^	TEU (25t net per container)	Total TEU (export only)	Total TEU (loaded and empty)
Cotton lint	322,000	80%	257,600	19,815	-	-	-
Cotton seed	484,000	80%	387,200	29,785	-	-	-
Wheat	1,137,000	80%	909,600	-	36,384	-	-
Sorghum	1,425,000	80%	1,140,000	-	45,600	-	-
Chickpeas	776,000	80%	620,800	-	24,832	-	-
Total	**4,144,000**	**-**	**3,315,200**	**49,600**	**106,816**	**156,416**	**312,832**

Source: Deloitte estimates using ABS regional agricultural census data and Queensland Department of Agricultural and Fisheries AgTrends Report.
Note: ^ FEU is expressed as TEUs for cotton lint and cotton seed.

Table 6.4: Estimated agricultural production levels for key commodities produced in the regions near the North Coast Line

Year	Volumes produced in port catchment area in (tonnes)	TEU equivalent (25t net per container)	TEU (26t net per container)^	Total TEU (export only)	Total TEU (loaded and empty)
Fruit and Vegetables	1,113,391	42,015			
Meat	437,184	17,487			
Wheat, Sorghum and Chickpeas	667,600	26,704			
Cotton lint and seed	161,200		12,400		
Total	**2,379,375**	**86,206**	**12,400**	**98,606**	**197,212**

Source: Deloitte estimates
Notes: ^ FEU is converted to TEU equivalent for cotton lint and cotton seed.
Fruit and vegetable production – 2015-16, ABS regional agricultural census data
Meat production is based on Meat and Livestock Australia estimates for 2017
Wheat, sorghum, chickpeas, cotton lint and seed are 2017-18 forecast production volumes based on the Queensland Department of Agricultural and Fisheries AgTrends Report. Fruit and vegetables normally require the use of reefer containers

Fuel on Rail

An alternative to transporting fuel by road is to transport it on rail. This possibility has been examined in the past including the greenfield Galilee Basin region which is discussed in this case box. This provides useful context given that coal is supplied to, and exported from the Port of Brisbane, and the longer-term potential associated with coal in Queensland including the Surat Basin.

A study prepared for the Department of State Development, Infrastructure & Planning[1], estimated that fuel demand for proponents across the Galilee Basin is substantial at approximately 61 heavy vehicle truck loads per day of diesel fuel (and approximately 26 truckloads per day of other petroleum products such as lubricants, jet fuel, gasoline etc.). The study also noted that the supply of diesel to mine operators in the future could require investment by either the oil industry or third party infrastructure investors including "above rail" and port operators (or proponents) as existing infrastructure is geared toward road transportation.

There are potentially significant opportunities for the Port of Brisbane to supply fuel by rail following the development of dedicated freight link to the port. This could potentially supply agriculture producers and coal mines in Western/South Western Queensland.

It is estimated that this could be up to 40 million to 50 million litres per year being railed out to Western Queensland. If 50 million litres switched to rail this could lead to 2,500 less large long distance truck movements on the road network (based on an average of 40,000 litres per truck loaded in one direction). For example, it is understood that Cubbie Station near Dirranbandi alone currently uses around 8 million litres of fuel annually and there are two coal mines in the region that have significant fuel needs (at 7 Mtpa of production) and this could be higher as aggregate production levels could increase given the long term potential of the Surat Basin.

Four options were considered in the previous study to carry fuel by rail namely isotainers, tanks trains, conventional rail tank cars, road tanker trailers carried on wagons:

- Isotainers – Isotainers historically 20-24,000 litre capacity inside 20' container footprint and are commonly used in Australia for multi modal bulk liquid distribution i.e. Sea/Rail. Isotainers service relatively low volume bulk liquids into isolated areas e.g. Torres Strait.
- GATX TankTrain – The cars are lightweight; the undercarriage comprises bogies only. A strengthened tank frame floor forms the undercarriage. There are currently TankTrain operations hauling Sulphuric Acid between Sun Metals Zinc Refinery in Townsville and Incite Pivot Mt Isa and Phosphate Hill. The estimated payload per wagon is about 55,000 litres of fuel
- Conventional Rail Tank Cars – These have standardised design globally and have to be individually loaded so can take 5 times longer to load than a TankTrain. Up to 52 tank cars (wagons) per 750 metre train: 2.9 million litres or 2.4 thousand tonnes per train. There is a higher capital set up cost (per wagon and in numbers of wagons) due to design
- Road Tanker Trailers on Trains – A further option for the transport of fuel on rail requiring evaluation is the method of carrying fully loaded road tanker trailers on flat bed rail wagons. Shell have operated this method successfully in the Northern Territory on the Adelaide – Darwin railway for several years in supply to The Granites Gold Mine; a trip of approximately 1,800km each way.

Further evaluation needs to be conducted on the best approach to rail fuel out to Southern and South Western Queensland with a number of possible options. However, the development of a dedicated rail freight link increases the opportunity for fuel by rail. Critically, if the same platform i.e. a 40' capacity flat wagon can be utilised for both export and import movements the economics of rail haulage improves significantly. Other traffics for consideration should include fertilisers and machinery.

[1] Fuel on Rail Galilee Basin Study, Feb 2015

"Brisbane has lots of potential in the export supply chain of the country, and the rail link from Acacia Ridge to Port of Brisbane is pivotal. There is a huge opportunity to better manage the assets but if an efficient freight rail isn't put in place, it will not be possible to maximise the value of Inland Rail"

Josh Connell, GrainCorp

07

Economic assessment

This economic assessment highlights that if a 30% container rail share scenario is achieved by 2035, the economic, social, and environmental benefits could be up to $820 million per annum.

7.1 Overview

This section presents a discussion of the economic, social and environmental benefits associated with establishing a dedicated rail freight link from Acacia Ridge to the Port of Brisbane as part of an enhanced rail freight network. This has been developed using a cost benefit analysis framework and as such provides "order of magnitude" benefits that are subject to update in line with new information and more detailed analysis (e.g. traffic modelling, engineering and corridor studies etc.).

This analysis takes a broader 'network' approach to estimating potential benefits. It should be noted that this is a partial economic assessment building on previous work which points to the significant benefits associated with such a project. This section focuses on:

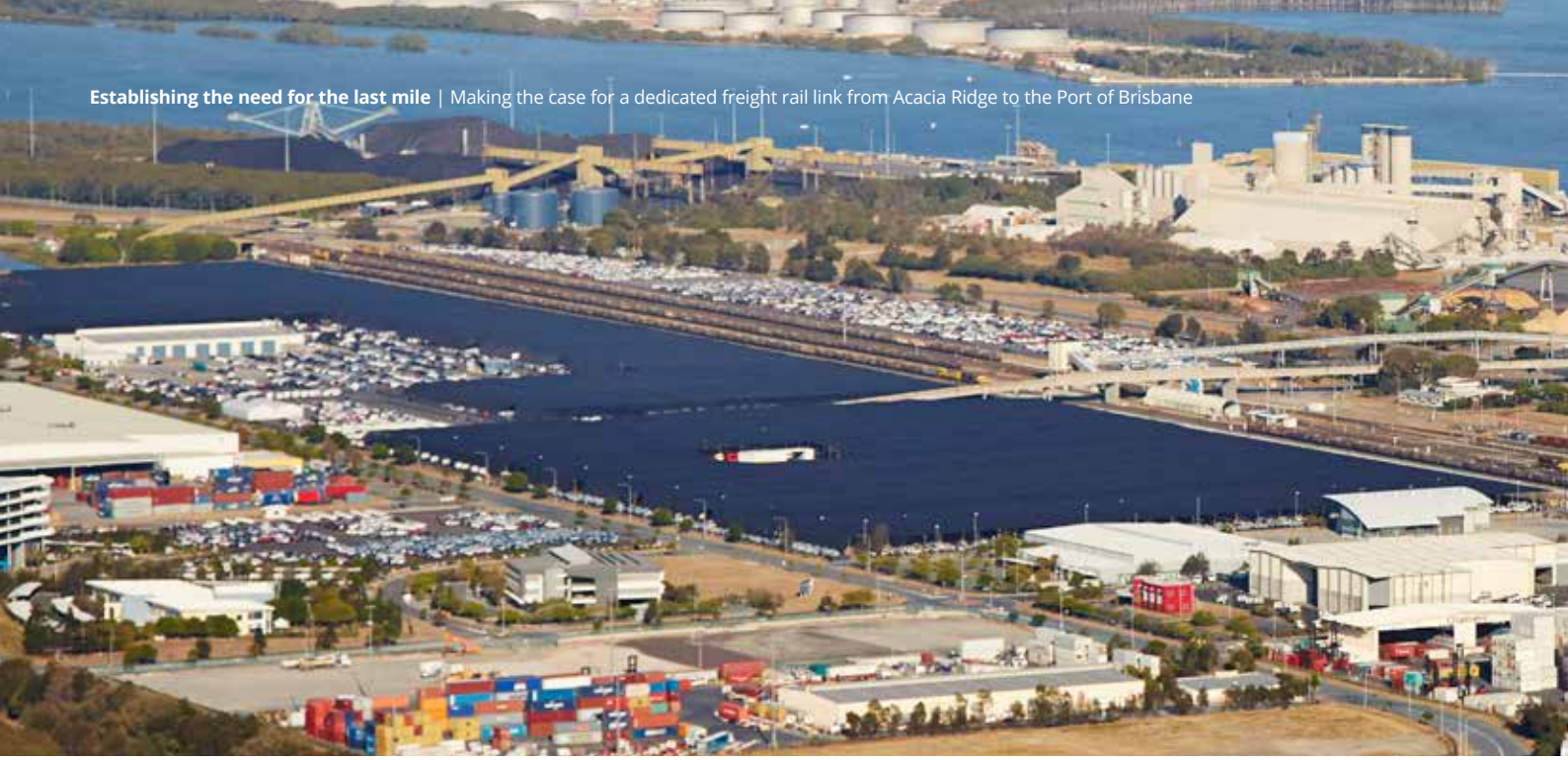
- Road to rail freight scenarios which provide a range of potential outcomes that drive the economic, social and environmental benefits
- Discussion of the economic benefits with a focus on the type of benefits using standard transport unit rates and parameter values sourced from published transport project appraisal guidelines to calculate "order of magnitude" estimates of benefits and cost savings
- Discussion of costs including potential capital costs from previous studies.

7.2 Scenario rationale and definition

To measure the potential for such benefits, this study developed three key scenarios including 12%, 20% and 30% container rail share scenarios at the Port of Brisbane. The 30% scenario is in line with benchmarks for some ports globally as well as some domestic target levels, for example Melbourne and Sydney (Botany). The 12% scenario is a share achieved at the port over a decade ago. The 20% container rail share scenario is broadly in line with current levels at ports in other East Coast capitals in Australia. Furthermore:

- **Scenario 1 – 12% rail share achieved by 2035** – this case assumes 12% of total TEUs forecast at the Port of Brisbane by 2035 are moved by rail which equates to around 350,000 TEUs in total or 320,000 TEUs incrementally given the current level of 30,000 TEUs moved by rail are assumed to continue under 'business as usual' (i.e. without road to rail switch)
- **Scenario 2 – 20% rail share achieved by 2035** – this case assumes that by 2035, 20% of total TEUs (around 590,000) are moved by rail and 560,000 TEUs incrementally
- **Scenario 3 – 30% rail share achieved by 2035** – this case assumes that by 2035, 30% of total TEUs (around 880,000) are moved by rail and 850,000 TEUs incrementally.

In all of these scenarios, the numbers of TEUs switching to rail are assumed to ramp up to reach 12%, 20% and 30% from around 2026 onwards.



7.3 Road to rail assumptions

The magnitude of potential economic, social and environmental benefits is largely driven by the degree of road to rail switch for containerised cargoes. Stakeholder consultation identified an appetite for a road to rail switch where rail was competitively priced, including, in some case, for the "last mile".

To explore the potential economic benefits, scenario analysis of a range of potential increases in containerised agricultural freight using rail instead of road (for trips to/from the Darling Downs, South West and Border region parts of the catchment area of the Port of Brisbane) has been conducted. Stakeholder consultation highlighted that a dedicated link and cost effective rail freight transport solutions are required to induce such a switch. In FY17, there were just over 30,000 TEUs transported to/from the Port of Brisbane using rail, and future potential increases in TEUs using rail are measured incrementally to current levels. It has also been assumed that the capacity at the Brisbane Multimodal Terminal (BMT) is in excess of 250,000 TEUs per annum. Furthermore, the PBPL has reserved a heavy transit corridor from the BMT extending to the end of Fisherman Island, enabling a future expansion up to circa 850,000 TEUs per annum capacity. The analysis in this report focuses on the benefits of mode shift/increased rail share of containerised trade, and does not consider the cost of expansion of the BMT nor the positive economic impacts such a capital project would have on the regional economy.

Assumptions incorporated in this analysis are based on data provided by PBPL (e.g. forecast growth in containers and trucks) and consultation as follows:

- An assumed 2.9 truck movements per TEU on average for all truck movements (i.e. short and long distance) using data provided by PBPL.
- Each long-haul road trip movement is a two-way trip assuming one movement empty and one movement loaded
- 500km is the assumed average distance of each one-way movement for heavy vehicles removed from road for long distance movements (e.g. Brisbane to Goondiwindi is around 390km, Brisbane to Thallon is over 500km and Brisbane to Dalby is around 210km) or 1000km for an average two-way trip
- 15 tonnes per TEU is assumed to be the average weight of the agricultural commodity TEU switched from road to rail (based on 25 tonnes net loaded and 2.2 tonnes empty)
- As well as long haul movements, there is also assumed to be short-haul movements as TEUs are loaded/unloaded at various points in the import-export supply chain
- Based on the same TEU load, the average distance of short-haul trips is assumed to be 50km for a return trip or average 25km one-way.

There will still be some road trips required in certain parts of the import-export supply chain and the focus here has been on the potential for reductions in the longer haul/truck trips of heavy vehicles from the cotton, pulses, and grains producing regions in Darling Downs and South West Queensland and other areas of the catchment.

This analysis also takes into account the potential for reduced short-haul truck trips as outlined previously. The key assumptions are summarised in Table 7.1.

The modelling assumes that competitive rail prices along with enhanced reliability, reduced transit/cycle times and significantly improved operational availability (i.e. close to or at 24/7 operational supply chain) from the provision of enhanced/upgraded rail infrastructure including the dedicated rail freight link will induce a road to rail switch.

Table 7.1: TEUs and reduced truck movements in the 12%, 20% and 30% container rail share scenarios achieved by 2035

	12%	20%	30%
Number of incremental TEUs switched to rail	322,353	557,256	850,884
Long distance truck movements	460,505	796,080	1,215,548
Net tonne kilometres (long-haul, billions)	4.8	8.4	12.8
Short distance truck movements	459,414	794,193	1,212,668
Net tonne kilometres (short-haul, billions)	0.2	0.4	0.6
Total truck movements	**919,919**	**1,590,273**	**2,428,216**
Total net tonne kilometres (billions)	**5.0**	**8.8**	**13.4**

Source: Truck movements based on assumptions provided by PBPL including average truckloads
Note – numbers are rounded

7.4 Benefits

There are a range of economic, social and environmental benefits associated with establishing a dedicated rail freight link from Acacia Ridge to the Port of Brisbane and broader network improvements - see Figure 7.1.

Figure 7.1: Potential economic, social and environmental benefits

Economic benefits

- Freight savings
- Reduced congestion
- Reduced road damage
- Indirect transport cost savings
- Increased reliability

Social benefits

- Reduced accidents
- Enhanced amenity/liveability

Environmental benefits

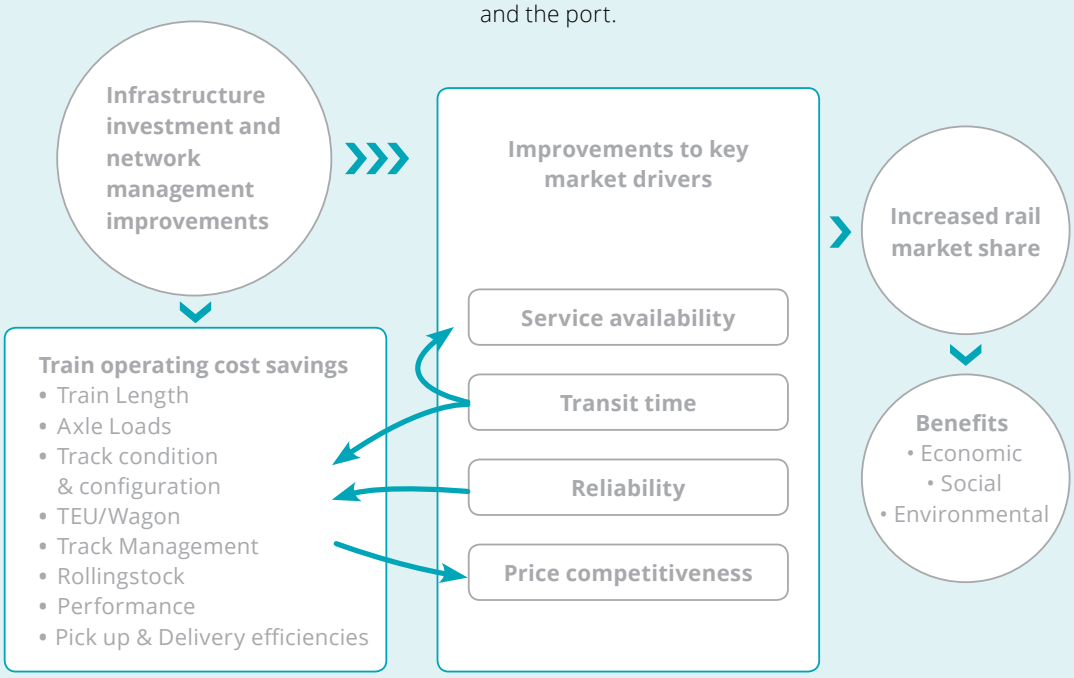
- Reduced greenhouse gas emissions
- Reduced pollution (noise, air and water)

Triple bottom line (economic, social and environmental benefits)

Source: Deloitte Access Economics

Development of a dedicated freight rail network linking the Port of Brisbane to its catchment is increasingly important as pressures from increased urbanisation and rail-based public transport rise. Furthermore, effective rail transport of a significant share of the region's import and export trades will deliver major economic, social and environmental benefits.

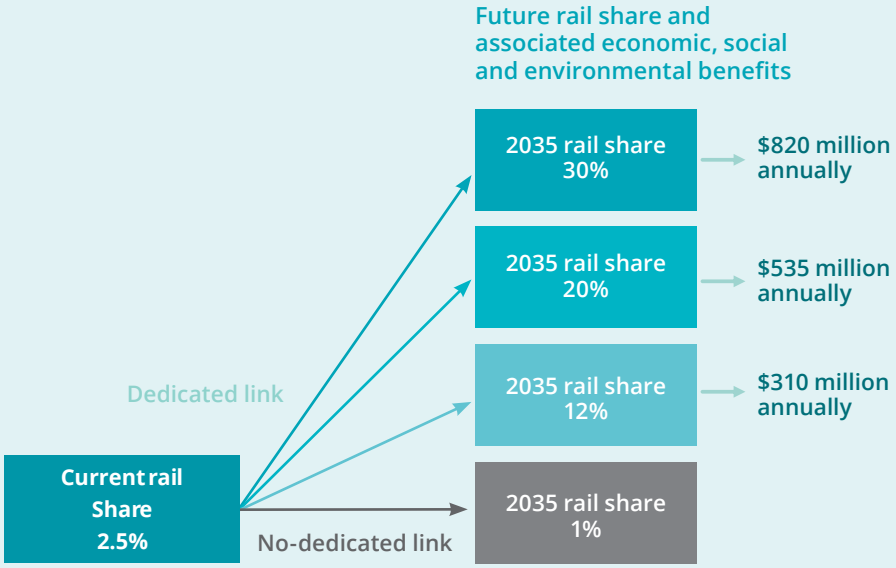
Targeted infrastructure investment and network management improvements can drive increases in rail's market share, such as separating passenger and freight operations through a dedicated freight link. Rail's competitiveness is influenced by the overall package of price and service characteristics which are a function of 'below rail' and 'above rail' factors, and cost savings, which enable price reductions, and are critical to achieving market share improvements on the regional rail network serving Brisbane and the port.



Rail's market share at the Brisbane Multimodal Terminal is significantly lower than current shares at Sydney and Melbourne (at circa 20% each) and only one-tenth of stated east coast capital targets of around 30%. Moreover, this share is dropping; it was 12% over a decade ago and is now below 3%.

Without a dedicated rail freight link, this trend is likely to continue, potentially declining to around 1% by 2035 (if the current level of around 30,000 TEUs is assumed to continue and based on container forecasts at the port). However, establishing a dedicated freight rail link has the potential to significantly increase rail's share to between 12% - 30% by 2035 (if not sooner), delivering to industry and the community a range of economic, social and environmental benefits.

Potential improvements in rail share of container movements and associated benefits



The benefits of rail freight are recognised by Governments in Australia, including Victoria and Western Australia.

Victoria's Mode Shift Incentive Scheme

The Victorian Government's Mode Shift Incentive Scheme (MSIS) aims to encourage the use of rail freight and relieve congestion on Port of Melbourne and regional roads. The aim of the scheme is to increase efficiency and cost effectiveness in the freight sector and reduce congestion on roads in and around freight and port precincts. The incentive program (with roots back to 2007) encourages industry to increase the amount of freight carried on rail by providing incentives to move containerised freight movement from road to rail.

The scheme has provided funding to six companies to shift around 50,000 containers (or the equivalent of 65,000 truck trips) to and from the Port of Melbourne by rail instead of road. The containers being moved on rail include products such as containerised grain, meat, dairy, fruit and wine.

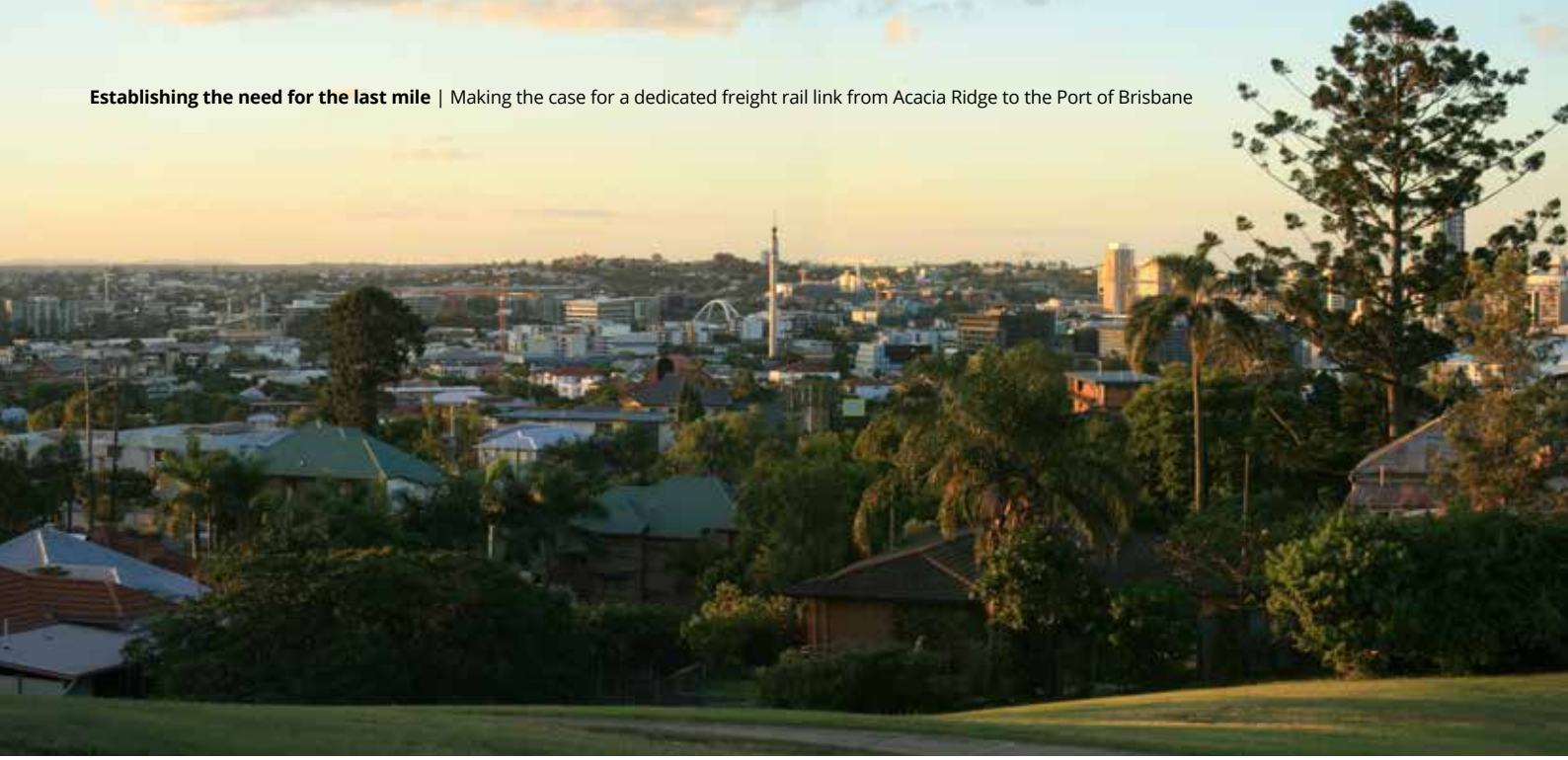
A scheme of this type highlights the potential benefits that can be realised by developing a dedicated rail freight link to the Port of Brisbane, which would see a switch from road freight to rail freight.

Source: See https://www.rdv.vic.gov.au/__data/assets/pdf_file/0011/1164872/RDV-Reg-Rail-Final-22-Nov-13-FINAL.pdf, https://wongm.com/2015/09/subsidising-rail-freight-victoria/

Fremantle Container Rail Subsidy

The Western Australia government increased the Fremantle Port rail subsidy scheme as part of its plan to combat congestion by taking heavy trucks off the road and increasing rail share to a targeted 20%. From January 1, 2018, the subsidy paid per eligible TEU was increased to $50 (it was previously $30). Fremantle Port currently has a rail mode share for container traffic of circa 15%.

Sources: See https://www.transport.wa.gov.au/mediaFiles/Freight-Ports/Freight_P_FremantleContainerRailSubInfographic.pdf, http://roadsonline.com.au/fremantle-port-rail-subsidy-increased/, https://www.mediastatements.wa.gov.au/Pages/McGowan/2017/12/Subsidy-increased-to-increase-freight-on-rail.aspx, https://www.mediastatements.wa.gov.au/Pages/McGowan/2017/12/Subsidy-increased-to-increase-freight-on-rail.aspx



A range of accepted parameter values sourced from State and Federal transport project evaluation guidelines were used to derive estimates of the value of benefits. In estimating these benefits, it was assumed that road trips eliminated involved 15% urban movements for each total trip for relevant categories where this applies. Adjustments were also made for rural externality values based on Deloitte Access Economics analysis of these parameters. Input values and parameters are set out in Tables 7.2 and 7.3.

The quantum of benefits is 'driven' by the level of road to rail switch, that is, additional containers carried on rail as presented in the scenarios outlined in section 7.2. As the number of additional containers (both 20' and 40') switching from road to rail increases, so too do the associated benefits – social, environmental and economic. The freight transport cost savings for producers are, in the main, lower direct transport operating costs from use of a more efficient rail-based supply chain, particularly in the agricultural sector.

It is estimated that freight transport cost savings in the range of $80 to $220 per TEU, depending on volumes, are achievable. As additional TEUs transfer from road to rail this removes more trucks from the road network leading to greater savings associated with traffic congestion relief, reduced crashes and reduced emissions and lower road pavement damage costs. An average freight saving of circa $130 per TEU[30] has been adopted for economic appraisal purposes.

Table 7.2: Economic, social and environmental benefits (including externalities) of a road to rail switch

	Urban		Urban/Rural
	Road (c/ntkm)	**Rail (c/ntkm)**	
Congestion costs reduced	9.686564	0	Urban
Road damage savings	1.150279	0	Urban and rural
Accident cost reductions	0.695816	0.034791	Urban and rural

Source: Deloitte analysis based on Transport for New South Wales guidelines.

[30] Based on the DAE Rail v Road cost modelling noted earlier. In this case, an average freight saving per TEU has been estimated based on a comparison of the movement of containers for export from the South West. This average per TEU freight savings has been applied to the total volume of containers that switch to estimate of benefits shown in Table 7.3. For example, the $74m Freight savings under Scenario 2 is based on 557,256 TEUs switching to rail with a benefit of, on average, circa $130 per TEU associated with direct transport cost savings. This value is a 'weighted average' across a number of plausible distances and annual haulage tasks (tonnes and/or containers both 20' and 40').

Not all costs and benefits can be readily quantified. In cases such as this, a qualitative assessment and indication of whether these costs and/or benefits are expected to materially change the result is helpful. For example, another benefit of this project was identified as increased reliability of freight.

A dedicated freight link that leads to fewer 'conflicts' with passenger lines and services would increase reliability, which is important to shippers and transport operators. Furthermore, less variability in transit times increases customer confidence and may even lead to lower operating costs (e.g. fuel consumption and costs associated with elements such as labour over-time payments).

Table 7.3: Economic, social and environmental benefits (including externalities) of a road to rail switch and urban and rural weights

	Urban		Rural		Weights	
	Road ($/ntkm)	**Rail ($/ntkm)**	**Road ($/ntkm)**	**Rail ($/ntkm)**	**Urban**	**Rural**
Air pollution	0.02632	0.00425	0.00236	0	0.15	0.85
Greenhouse gas emissions	0.00586	0.00044	0.00586	0.000440	0.15	0.85
Noise pollution	0.00439	0.00185	0.00044	0	0.15	0.85
Water pollution	0.00395	0.00011	0.00158	0.000110	0.15	0.85
Nature and landscape	0.00043	0.00109	0.0044	0.001090	0.15	0.85
Urban separation	0.00293	0.00109	0	0	0.15	0
Indirect transport costs - upstream/downstream	0.02343	0	0.02343	0	0.15	0

Source: Deloitte analysis based on Transport for New South Wales guidelines.

"Over the last decade Australia has fallen from 23rd to 95th in the World Bank's ranking for trade across borders"

Adrian Dwyer, IPA

7.4.1 Summary of scenarios

This section summarises the results across the scenarios. A sensitivity analysis on freight costs savings is shown in Appendix E.

The total estimated indicative benefits across the scenarios are presented in Table 7.4. These range between $310 to $820 million per annum in real terms, depending upon the degree of road to rail switch. These benefits are driven by a range of economic, social and environmental factors demonstrated in Table 7.4 and Chart 7.1 (focusing on the 30% container rail share scenario).

7.5 Costs

Indicative data on costs were obtained from PBPL's submission to Infrastructure Australia on the Dedicated Freight Rail Corridor, 2013. Specifically, the capital, operating and maintenance expenditure profile for the proposed Eastern Freight Rail Bypass (EFRB) port connection component of the project was used. The proposed EFRB would extend from the existing Fisherman Island rail line and broadly follow the alignment of the Gateway and Logan Motorways to a junction with the Interstate Standard Gauge Line, a total of 37km.

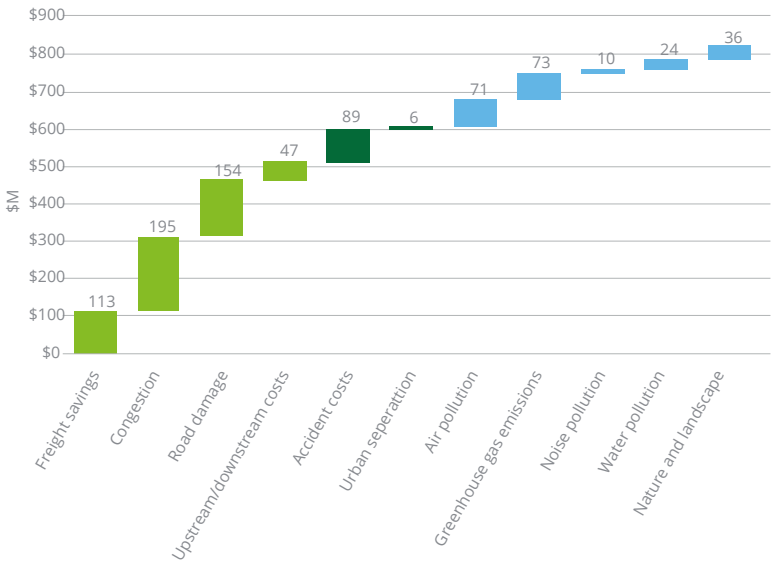
The indicative capital expenditure profile of the EFRB presented in Chart 7.2 (which is presented in real terms) is based on estimated expenditure of circa $2.5 billion in 2014-15 (nominal) over the construction phase, with the majority occurring in the later years from 2023 to 2025. The operating and maintenance expenditure associated with the EFRB component was estimated to be $0.8 million annually. No residual value of the project was incorporated.

Table 7.4: Benefits by scenario by 2035, $M2016-17

	Scenarios – Rail share containerised trade at Port of Brisbane		
	Scenario 1 – 12%	**Scenario 2 – 20%**	**Scenario 3 – 30%**
Benefits			
Economic	**$193**	**$333**	**$509**
Freight savings	$42.9	$74.1	$113.2
Congestion	$73.8	$127.5	$194.7
Road damage	$58.4	$101.0	$154.2
Indirect transport costs - upstream/downstream	$17.8	$30.8	$47.1
Social	**$36**	**$62**	**$94**
Accident costs	$33.6	$58.0	$88.6
Urban separation	$2.2	$3.9	$5.9
Environmental	**$81**	**$141**	**$215**
Air pollution	$27.0	$46.7	$71.2
Greenhouse gas emissions	$27.5	$47.6	$72.6
Noise pollution	$3.8	$6.6	$10.1
Water pollution	$9.3	$16.0	$24.5
Nature and Landscape	$13.8	$23.8	$36.4
Total	**$310**	**$536**	**$818**

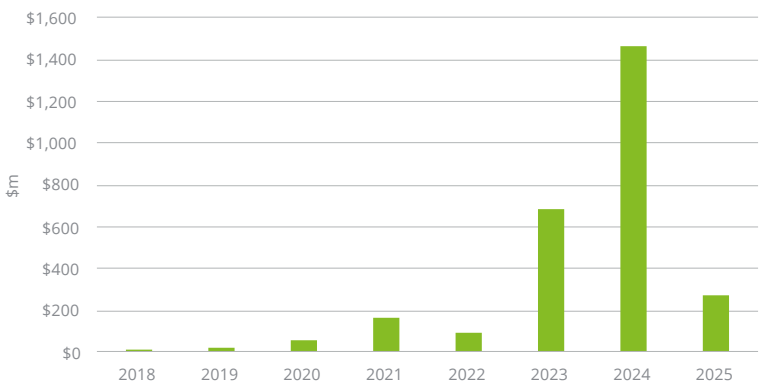
Source: Deloitte Access Economics.

Chart 7.1: Distribution of economic, social and environmental benefits ($millions), by 2035, Scenario 3 – 30% rail share



Source: Deloitte Access Economics
Notes: Economic benefits are shaded in light green, social benefits are dark green and environmental benefits are light blue

Chart 7.2: Indicative capital expenditure profile, EFRB



Source: Deloitte, 2013.

Illustrating the economic benefits of reduced damage by taking trucks of the road through a mode switch to rail

Road damage refers to the costs associated with road maintenance (including to fix pavement damage) and fewer truck kilometres induced by a mode switch to rail will lead to cost savings.

Recent research on road damage highlights that a fully loaded B-Double can cause, per kilometre travelled, 20,000 times the road wear and tear that a family car does (Laird 2017). The annual saving is significant as the average one-way distance for 'long haul' truck trips to the port of Brisbane is estimated to be 500km.

A 30% switch to rail freight could result in a reduction in the road freight task in Queensland and reduced road damage. The steps to estimate these benefits are provided below:

Steps:

1. The reduction in the road freight task is determined in net tonne kilometres (ntks)
2. The reduction in the road freight task in ntks is multiplied by the road damage saving ($/ntks) to get the annual savings as a result of reduced truck movements.

Reduction in ntks (total road haulage task) = TEUs * average weight per TEU (tonnes) * average distance one way (short and long haul) (km) * number of return trips

Estimate: 850,884 * 15*525*2 = **13.4 billion ntks**

Road damage cost savings = Reduction in ntks * reduction in road damage costs

Estimate: 13.4 billion ntks* $0.0115/ntks = **$154 million**

Source: Based on the Transport for NSW Guidelines
Laird, 2017, Trucks are destroying our roads and not picking up the repair cost, https://ro.uow.edu.au/eispapers1/332/

7.6 Discussion

This study considers the potential benefits and key costs associated with a dedicated rail freight link from Acacia Ridge to the Port of Brisbane (ideally, as part of a significantly segregated greater urban network). Analysis has focused almost exclusively on the southern catchment that potentially stands to benefit most from the dedicated freight link. However, there could also be more benefits associated with mode shift to rail for trades able to utilise the North Coast Line to access the port.

This analysis clearly identifies that the potential for significant benefits warrants further investigations on enhanced rail-based supply chain efficiency associated with the port. It is expected that more detailed consideration and evaluation of such developments will be part of the work associated with the recent announcement by the Queensland and Federal Governments to conduct a feasibility assessment of a dedicated rail freight link to the port from Acacia Ridge and TMR's recently commissioned 10-year SEQ rail strategy.

"The RTBU would also like to understand how operation of the Project post construction will impact on rail freight reliability and capacity going forward. The rail freight industry is facing significant challenges maintaining modal share and construction impacts and post construction limitations on operations may have a significant detrimental impact on rail freight operators using this section of the network and their customers."
(With respect to the Cross River Rail project currently being delivered)

Rail Tram and Bus Union (Qld branch)

08
Economic impact analysis

This section highlights that the economic impacts of a 30% container rail share scenario could increase real GRP in the PoB catchment by around $5.4 billion in present value terms.

8.1 Overview

This section presents the economic impacts of establishing a dedicated freight rail link from Acacia Ridge to the Port of Brisbane. It should be noted that this section is focussed primarily on the economic impact of the 30% container trade rail scenario including economic output, employment, industries and also exports. More detail on the modelling assumptions, data and also some additional detailed results are provided in Appendix F.

8.2 Economic impacts of a dedicated rail freight corridor

Economic impacts are reported as incremental changes in key regional economic variables such as real gross regional product (GRP) (at the state and national level this is the same as gross state product/gross domestic product), full time equivalent (FTE) employment, real industry gross value added (GVA) and exports. To predict the longer term impacts of the project, the modelling simulation is run out to 2045 (or around 20 years of operations).

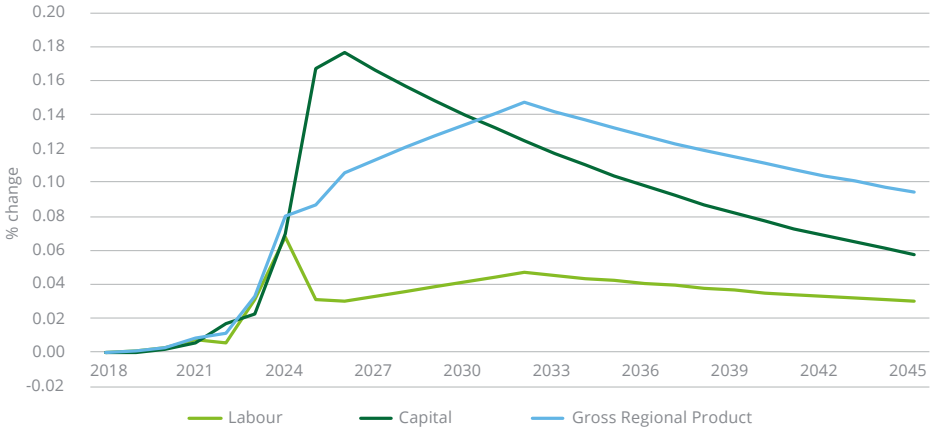
8.2.1 Economic output

The modelling indicates that a dedicated rail freight link from Acacia Ridge to the Port of Brisbane as previously proposed would increase gross regional product (GRP) in the Port of Brisbane Catchment area by $5,350 million in present value (PV) terms over the period from 2018 to 2045, relative to base case[31]. While the expenditure occurs in the Port of Brisbane Catchment, there are some minor impacts in the rest of Australia because of the regional economy's links with the national economy.

Gross domestic product (GDP) in Australia is modelled to be $5,395 million higher over the period 2018 to 2045, in PV terms. This is marginally higher than the Port of Brisbane Catchment. Over the operations phase, the productivity benefits act to increase overall GRP in the rest of Australia. It is important to note that there could be some broader productivity benefits as a result of maximising the value of the Inland Rail all the way from Melbourne through to Brisbane. While the data is not available to explicitly model these potential broader benefits, this modelling is subject to update as further corridor studies are developed including the interactions between the dedicated link and the broader transport system as a whole.

To provide some context to the scale of the predicted economic impacts in the Port of Brisbane Catchment area, the percentage deviation in real GRP and the primary factors of production (labour and capital) relative to the 'business as usual' is shown in Chart 8.1. It shows that real GRP increases to reach about 0.16% higher than the 'business as usual' case over the long run and settles to be around 0.10% above 'business as usual' by the end of the simulation period (i.e. 2045). The growth in real GRP over time is supported by an increase in aggregate capital stock and employment initially and is driven largely by productivity over the longer run.

Chart 8.1: % Change in real GRP, labour and capital (relative to business as usual)



Source: Deloitte Access Economics.

[31] All PV figures are calculated using a 7% real discount rate.

The deviation in economic output (in levels) in the Port of Brisbane Catchment area and rest of Australia is shown in Chart 8.2. The impacts over the medium term are driven by increased capital expenditure, particularly from 2021 as the construction phase is assumed to ramp up. There is some degree of crowding out in the rest of Australia over the initial construction phase as increased demand for labour in the Port of Brisbane Catchment pushes up the real wage and resources are reallocated from rest of Australia to the region, although this is only temporary. Once the dedicated freight link comes online in 2026, the impacts are supported by the freight transport cost savings, particularly in the agricultural industry and transport industry costs savings to business and commercial users due to lower congestion, particularly in Brisbane.

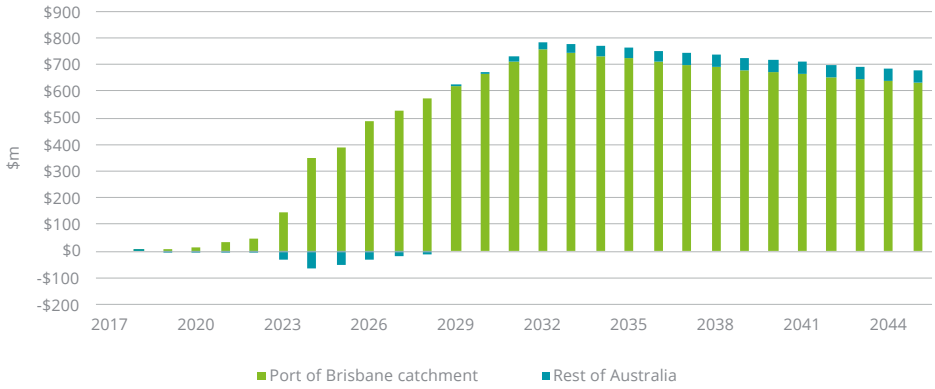
8.2.2 Aggregate employment

The modelling indicates that a dedicated rail freight link to the Port of Brisbane of the nature and scale as previously proposed would result in the gain of 1,175 FTE jobs annually on average over the period 2018 to 2045 in the Port of Brisbane Catchment area (compared to base case). Employment impact peaks at over 1,880 annual FTE jobs over the construction phase in 2024 based on the modelled construction profile (this is subject to update in line with new information).

The profile of FTE employment is shown in Chart 8.3, which highlights that employment is stimulated over the initial labour intensive construction phase. Again, there is some degree of crowding out evident over the construction phase as resources (i.e. labour) are reallocated between sectors in the Port of Brisbane Catchment Area and the average real wage in the region rises as the demand for labour increases relative to supply, and furthermore as construction is relatively labour intensive.

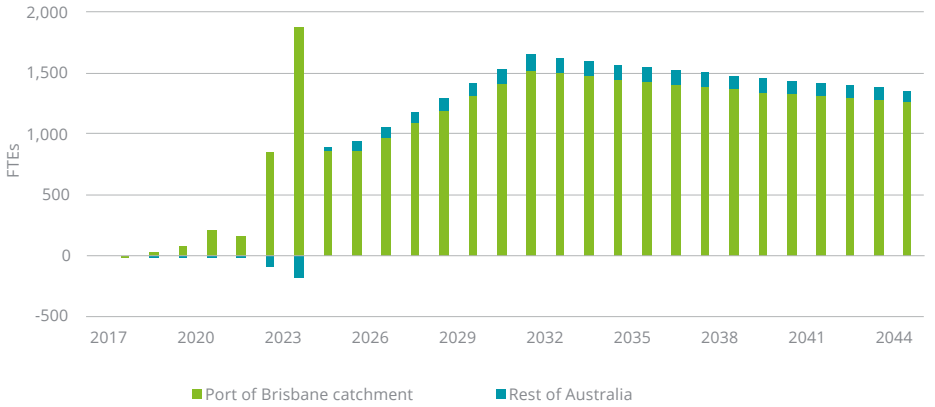
During the operations phase, aggregate employment increases to support expansion in the Port of Brisbane Catchment as the project comes on line. However, growth in labour is more moderate as labour has become more productive (meaning less is required in aggregate) and a large amount of investment (over the construction phase) translates to capital stock that supports the output growth in the Port of Brisbane Catchment area. Furthermore, the increase in supply of capital in the economy results in a fall in the price of capital relative to the price of labour (in the Port of Brisbane Catchment area) which acts to moderate the growth in aggregate employment.

Chart 8.2: Deviation in economic output by region, $M2016-17



Source: Deloitte Access Economics.

Chart 8.3: Deviation in FTEs employment by region



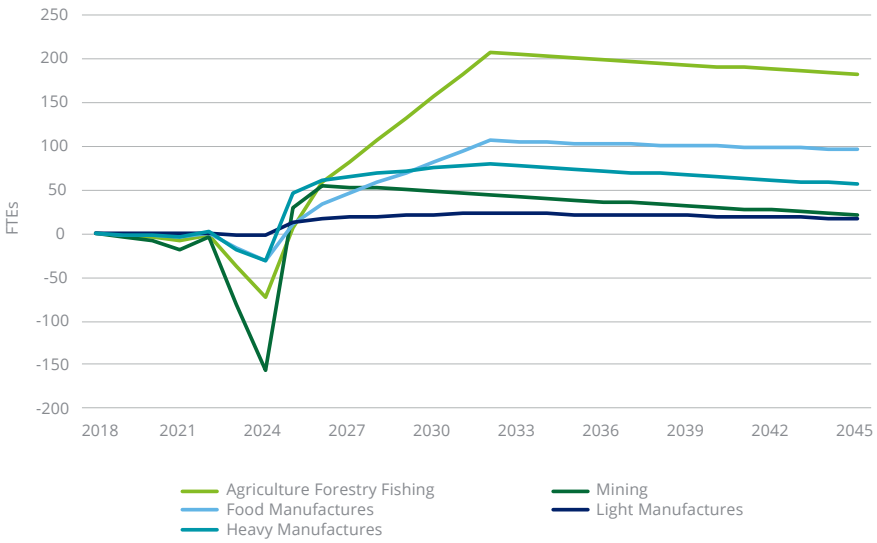
Source: Deloitte Access Economics.

The development of the project has impacts on employment levels across different industry sectors in the Port of Brisbane Catchment area.

Specifically, employment increases across primary industries such as agriculture as well as manufacturing (which is related to both food processing and manufacturing inputs to construction including heavy manufactures) as shown in Chart 8.4. It also demonstrates that during the peak of the construction phase, employment falls in these sectors as there is a reallocation of activity (and hence employment) to the construction sector.

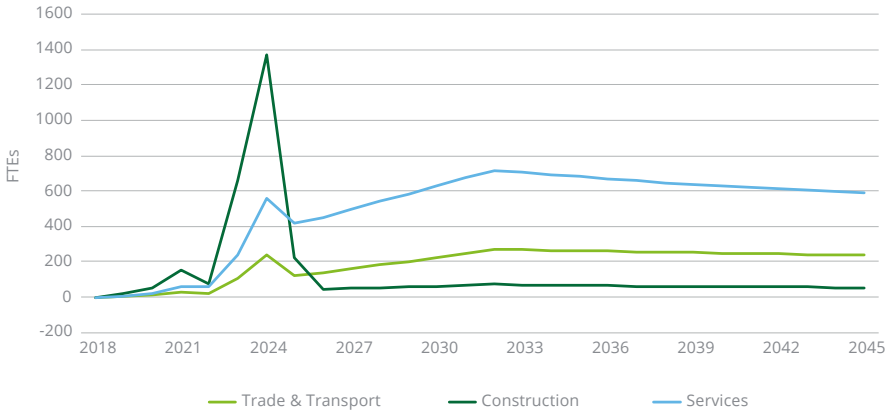
This is illustrated in Chart 8.5 below, which highlights growth in trade and transport (mainly driven by trade) and also growth in employment in the remaining services sectors as services industries (e.g. finance, property and business services), have a relatively higher labour intensity compared to other sectors and they also benefit through supply chain impacts.

Chart 8.4: Deviation in FTEs Primary industries and Manufactures



Source: Deloitte Access Economics.

Chart 8.5: Deviation in FTEs Construction, Transport and Trade and Services



Source: Deloitte Access Economics.

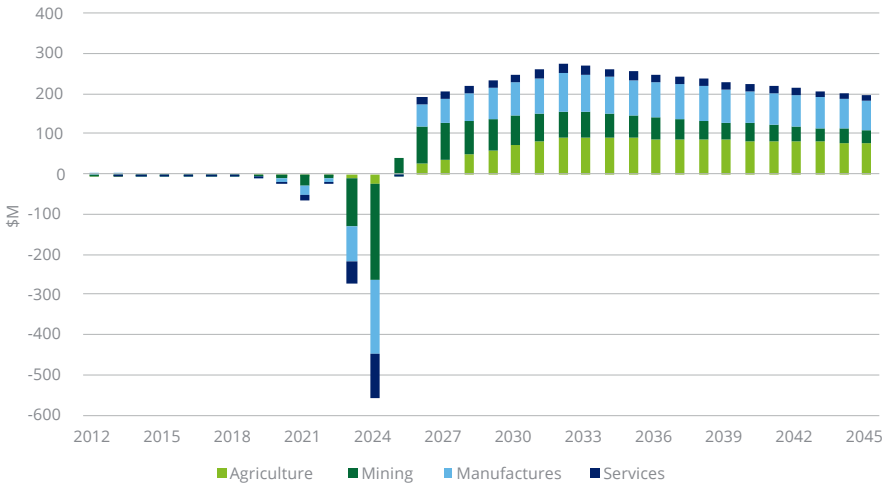
8.2.3 International exports

The increase in competitiveness of the Port of Brisbane Catchment area translates to an increase in international exports. This includes both agriculture commodities and manufactures.

The reduction in the supply price of export commodities makes exports that are produced in the region relatively cheaper for overseas buyers and this results in an increase in international exports as the region is relatively more competitive internationally over the long run.

The modelling indicates that real international exports in these industries from the Port of Brisbane Catchment could increase to around $210 million (above base case) by 2045.

Chart 8.6: Change in real international exports, Port of Brisbane Catchment, $M2016-17



Source: Deloitte Access Economics.

8.2.4 Sectoral impacts

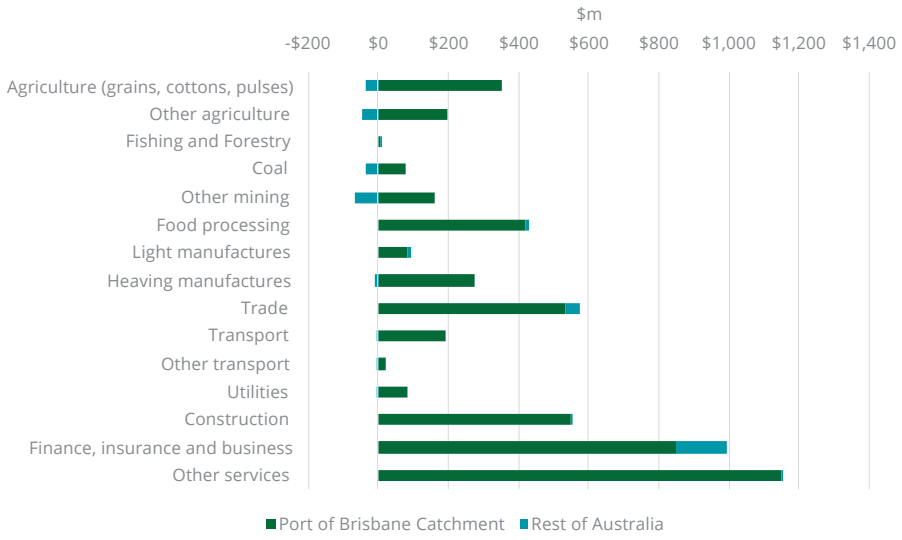
This section discusses the deviation in Gross Value Added (GVA) across sectors in the Port of Brisbane Catchment and the rest of Australia.

The capital expenditure to construct a dedicated freight rail link directly stimulates activity in the construction sector in the Port of Brisbane Catchment area. This in turn creates additional demand in industries that supply the construction industry with intermediate inputs, including transport, heaving manufactures, finance, insurance, business and other services.

Some industries, however, experience crowding out over the initial construction phase (relative to base case). That is, the expenditure leads to reduced activity in some parts of the economy as it draws productive resources away from them (either directly, or through increased demand for inputs from other industries).

Although there are decreases in GVA in some industries initially, these are only temporary in the Port of Brisbane Catchment, with the modelling indicating an increase in GVA across all industries by 2045.

Chart 8.7: PV of deviation in GVA by industry in Port of Brisbane Catchment, 2018-2045, $M2016-17



Source: Deloitte Access Economics.

8.3 Headline economic impacts by scenario

This section presents the economic impacts for the three scenarios, namely:

- **Scenario 1** – 12% rail share achieved by 2035
- **Scenario 2** – 20% rail share achieved by 2035
- **Scenario 3** – 30% rail share achieved by 2035

As the road to rail switch increases and a greater rail share is achieved, the associated economic impacts similarly increase, including gross regional/ domestic product and employment - see Table 8.1.

Table 8.1: Headline economic impacts by scenario

	12% scenario	20% scenario	30% scenario
Port of Brisbane Catchment			
GRP ($M2016-17)	3,780	5,075	5,360
Employment (FTEs)	735	1,085	1,175
Australia			
GDP ($M2016-17)	3,710	5,120	5,395
Employment (FTEs)	775	1,155	1,250

Source: Deloitte Access Economics
Note: GRP/GDP is in PV terms using a 7% discount rate over the period 2018 to 2045 and employment (FTE) is in average annual terms over the same period.

"There is a one off opportunity for all levels of government to work together in this country to ensure this project is delivered in an efficient, cost effective and timely manner"

Denis Wagner,
Brisbane West Wellcamp Airport

09
Conclusion

This study identified a number of benefits and positive economic impacts associated with a dedicated rail freight link from Acacia Ridge to the Port of Brisbane.

A dedicated freight rail link from Acacia Ridge to the Port of Brisbane has the potential to provide significant economic, social and environmental benefits. The quantum of benefits is 'driven' by the level of road to rail switch. As the number of additional TEUs switching from road to rail increases, so too do the associated benefits. Furthermore, as additional TEUs are switched from road to rail, this removes more trucks (in particular, long distance truck movements), leading to greater savings associated with traffic congestion relief, reduced crashes, reduced emissions and lower road pavement costs as well as some broader social and environmental benefits.

To measure the potential for such benefits, this study developed three rail mode share scenarios – 12%, 20% and 30% at the Port of Brisbane. Under the 30% container rail share scenario, the total economic, social and environmental benefits are up to $820 million annually relative to business as usual over the long term (refer to Chart 7.1 for the detailed breakdown). This share is in line with benchmarks for some ports globally as well as some domestic target levels. Even for the 12% container rail share scenario (which was achieved at the port over a decade ago), benefits are up to $310 million annually over the long term. The total benefits for the 20% container rail share scenario are up to $535 million annually over the long term (broadly in line with current levels at Sydney and Melbourne).

However, for these benefits to be fully realised, a network approach is required due to the dependencies of this link with key transport projects including Inland Rail and Cross River Rail, as well as the requirement for broader upgrades across the rail system in Southern Queensland to maximise productivity gains and enhance the whole supply chain – from paddock/packing plant/consolidation terminal to port.

The long term benefits are summarised for the 30% container rail share scenario as follows:

Economic benefits

Reduced heavy vehicles on the road network driven by a switch to rail could eliminate around 2.4 million total truck movements and over 13.4 billion net tonne kilometres annually. There is a strategic need to develop solutions to help increase rail share of the containerised import/export freight task in Queensland (which is considerably lower than other East Coast capitals).

As a result of such a switch to rail, there will be reduced freight transport costs (around $115 million annually or around $130 savings per TEU), increased reliability as well as considerable scope for increased availability.

Reduced congestion costs in Brisbane, which are forecast to have faster growth in avoidable congestion costs (to around $8 billion by 2030) than both Sydney and Melbourne. By removing heavy vehicles from the road network, this is estimated to save around $195 million annually.

Considerable scope for reduced road maintenance costs in regional and urban locations. These benefits are estimated at around $155 million annually, due to fewer heavy vehicles on the road network.

Indirect transport cost savings of around $45 million annually including benefits to upstream/downstream supply industries.

Social benefits

Crashes involving heavy vehicles account for around 15% of total crashes causing fatalities in Brisbane. Reduction in road crashes and accident cost savings associated with the road to rail switch of around $90 million annually. A further $5 million in urban separation benefits (which adds to the total social benefits) as a result of this switch from road to rail in urban areas.

Environmental benefits

Savings from reduced GHG emissions, other pollution and nature and landscape more broadly associated with a road to rail switch could lead to total environmental benefits of up to $215 million annually over the long term.

Other benefits and impacts (including strategic and qualitative benefits and broader economic impacts)

Increased rail freight competitiveness to help retain global competitiveness, aid in capitalising on increased agricultural and resource export market opportunities and create a true national freight network and increased port competition.

Separation of freight and passenger operations will lead to fewer 'conflicts', improved freight reliability and improved asset utilisation. This is increasingly important given the implementation of Cross River Rail, Inland Rail, introduction of New Generation Rollingstock and other network developments planned for SEQ.

Increased trade potential with consultations identifying the potential for the Port of Brisbane to grow trade volumes from its established catchment area capturing key commodities (i.e. grain, cotton, pulses, fruit and vegetables and meat products) via supply chain efficiencies. Total international exports could grow by around $210 million in real terms by 2045.

Consultations with key stakeholders confirmed the potential for considerable benefits to be realised by a dedicated rail freight link from Acacia Ridge to the Port of Brisbane. Furthermore, a number of stakeholders also highlighted the need for governments across all levels to leverage the value such rail infrastructure projects can provide to the economy when these are optimally co-ordinated and sequenced.

Consultation also highlighted that to maximise the benefits of a dedicated link from Acacia Ridge to the Port of Brisbane a range of initiatives need to be implemented, including:

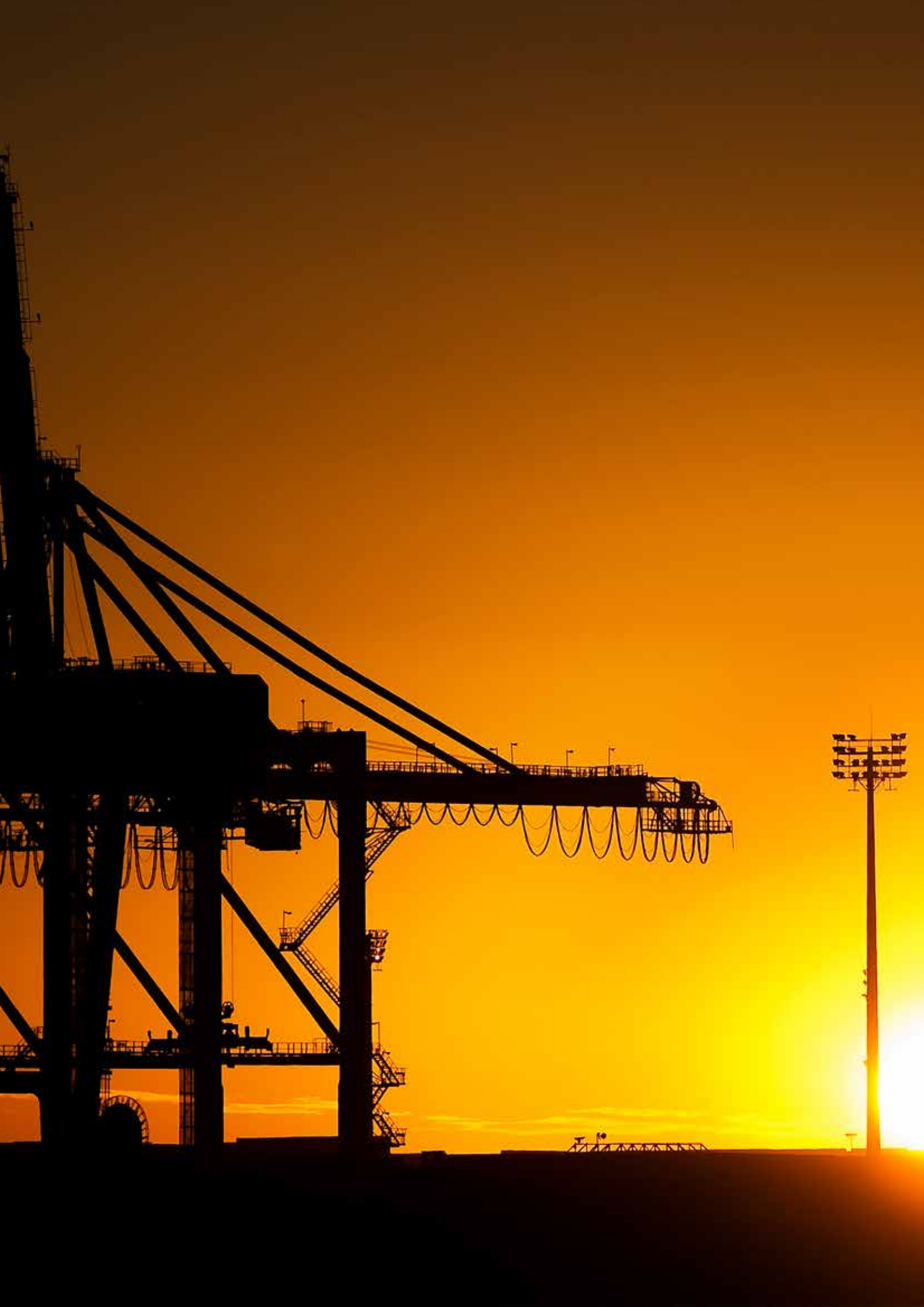
- This project needs to be part of a dedicated freight network from source areas such as around Toowoomba, Dalby, Miles, Roma, Warwick, Goondiwindi and Thallon
- Other bottlenecks and conflicts need to be eliminated (e.g. minimising the ongoing issue of conflicts with passenger and rail freight impacting the competitiveness of rail freight in Queensland including the implications for rail freight capacity from the upcoming passenger-oriented projects in southern Queensland)
- Treating an Acacia Ridge to the port dedicated link as very much an Inland Rail issue with a strategic need to maximise the full extent of economic, social and environmental benefits from a true national connection all the way through to Melbourne and into regional Victoria, across NSW and to Brisbane and connecting key agricultural areas within the Port of Brisbane trade's catchment area including areas such as the Darling and Western Downs and Border regions.

In terms of economic impacts in the Port of Brisbane Catchment region, such a dedicated rail freight link as previously proposed has the potential to:

Stimulate around $5.4 billion in economic activity over the period 2018 to 2045. This is driven by the construction phase initially and then ongoing productivity benefits as these flow through the economy over the long term with operations.

Increased employment of circa 1,900 FTEs at the peak of the construction phase. Furthermore, there will be an ongoing positive impact on regional employment, investment and exports which is driven by a sustained increase in economic activity to 2045.

Economy-wide modelling also highlighted that a range of industries stand to be stimulated by a dedicated rail freight link including agricultural industries, manufacturing, trade, transport, construction and service industries more broadly.



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Appendix A: Stakeholder consultation

Overview

This section presents the findings of consultations (either via telephone or face-to-face) with over 20 stakeholders across the rail freight supply chain, including rail operators, infrastructure owners, shippers/consolidators as well as other key stakeholders.

A selection of quotes from key stakeholders and a summary of findings are presented overleaf. The full consultation questions and detailed consultation findings are also presented in this appendix.

Figure A1: Conceptual view of the key stakeholders in the rail freight supply chain contacted for consultation

Figure A1: Conceptual view of the key stakeholders in the rail freight supply chain contacted for consultation

Rail operators
Aurizon, Genesee & Wyoming Australia, SCT Logistics

Infrastructure owners
Department of Transport and Main Roads, Queensland Rail

Shippers/consolidators
Food Leaders Australia, GrainCorp, GrainX, Namoi Cotton, Olam, Orica, New Hope, Teys Bros, Yancoal

Other key stakeholders
Balonne Shire Council and Goondiwindi Regional Council, Brisbane City Council, Cross River Rail Development Authority (CRRDA), Department of State Development, Manufacturing, Infrastructure & Planning (DSDMIP), InterLinkSQ, Toowoomba Surat Basin Enterprise, Wagners/Brisbane West Wellcamp Airport, Western Downs Council

Source: Deloitte Access Economics

Key quotes

In relation to rail in general and/or Inland Rail

"Freight connections with the Port of Brisbane are critical in supporting south-east Queensland's continued economic growth and development"

Michael McCormack,
Deputy Prime Minister and Minister for Infrastructure and Transport

"Any freight rail solution to the port should be one where passengers and freight don't share the same tracks"

Sam Fisher, New Hope

"Brisbane has lots of potential in the export supply chain of the country, and the rail link from Acacia Ridge to Port of Brisbane is pivotal. There is a huge opportunity to better manage the assets but if an efficient freight rail isn't put in place, it will not be possible to maximise the value of Inland Rail"

Josh Connell, GrainCorp

"The virtual neglect of the current regional rail system in terms of investment in assets and innovation is a good example of how an inefficient supply chain can isolate you from your market and open up opportunities for competitors; some from places you'd not naturally think of first"

Phil Ryan, Olam

"Business needs certainty to invest, and all levels of government across all regions must be on the same page, establishing a vision and being transparent in providing information on how this is going to be achieved (such as changes in regulation) to decrease uncertainty and encourage private sector investment"

Blair Batts, Interlink SQ

"A standard gauge line enables better utilisation of rollingstock to facilitate better efficiencies, and address seasonality, which ultimately encourages above rail investment"

Bruce McConnel,
Food Leaders Australia for TSBE

"Never has it been more important to the regional communities and vital industries of southern Queensland for Governments at all three levels to take a long term view on the future of freight rail. Utilising the existing corridors, involving the private sector and looking to ultimately separate passenger and freight tracks and interfaces offers the opportunity to reap significant economic, environmental and safety benefits for many years to come"

Chris Hood, GrainX

"An upgraded standard gauge line out to Thallon would unlock many opportunities for exporters, particularly for grain, cotton and pulses; however, this requires cooperation and funding across various levels of government"

Graeme Scheu,
Goondiwindi Regional Council

"Last year the Queensland Government announced it would fully fund and deliver the Cross River Rail Project and work has already started. Clearly, we need to understand what these projects will mean for the movement of rail freight. I expect that freight flows may change as a result of these network-shaping projects and increased interactions with the suburban passenger network"

Mark Bailey, Queensland Minister for Transport and Main Roads

"There is a one off opportunity for all levels of government to work together in this country to ensure this project is delivered in an efficient, cost effective and timely manner"

Denis Wagner,
Brisbane West Wellcamp Airport

"The current colonial network doesn't enable good unit costs for shippers, and inefficient infrastructure ultimately drives costs up providing sub-optimal outcomes"

John McArthur,
Gennesse & Wyoming Australia

"The expansion of Thallon Grains is rapidly emerging as arguably our number one economic development priority for Balonne Shire"

Mathew Magin,
Balonne Shire Council

"Over the last decade Australia has fallen from 23rd to 95th in the World Bank's ranking for trade across borders"

Adrian Dwyer, IPA

"The RTBU would also like to understand how operation of the Project post construction will impact on rail freight reliability and capacity going forward. The rail freight industry is facing significant challenges maintaining modal share and construction impacts and post construction limitations on operations may have a significant detrimental impact on rail freight operators using this section of the network and their customers." (With respect to the Cross River Rail project currently being delivered)

Rail Tram and Bus Union (Qld branch)

"I want to see it happen as soon as possible because it will take pressure off the coastal route, it will take pressure off the road network, it will improve productivity and it will create jobs in regional Australia. The planning has been done. It's time to stop talking and get on with it.

Inland Rail will speed up the passage of freight down the eastern coast, taking thousands of trucks off the roads and making it easier for agricultural producers to get their goods to market."

Anthony Albanese,
Federal Member for Grayndler

Summary of findings

The key themes from the stakeholder consultations are presented below. These include:

- Supply chain efficiencies
- Removal of constraints
- Investment in rail
- Modal considerations
- Integrated infrastructure planning
- Maximising benefits of a dedicated freight link

Figure A2: Summary of findings

Removal of constraints

A more efficient freight rail system will deliver lower costs to producers and ultimately enhance productivity in the economy

Supply chain efficiencies

A dedicated port link and an increasingly segregated network provides the opportunity for rail to capture market share and deliver significant community benefits and cost savings to industry

Investment in rail

Investment in rail in Queensland will enhance rail's competitiveness. Efficient supply chains can bring businesses closer to markets and open up opportunities for growth

Maximising benefits of a dedicated link

There are significant economic, social and environmental benefits to be gained from establishing a dedicated port rail freight link as part of a more efficient transport system

Modal considerations

There are a number of factors that influence the road or rail choice decision, with price competitiveness a key driver, along with other factors such as transit time, reliability and service availability. Each mode has a role to play in the export supply chain

Integrated infrastructure planning

Integrated planning on a network-wide basis will aid in maximising benefits and capitalising on economic growth opportunities

Source: Deloitte Access Economics consultations

Supply chain efficiencies

A dedicated port rail link with increased network-wide segregation could provide the opportunity for shippers to make better informed choices and may result in the shift to rail of many haulage tasks better suited to it from a supply chain efficiency perspective as well as from a broader economic, environmental and social benefits perspective.

Investment in rail and removal of constraints

Only with well-designed and efficiently operated infrastructure and services will Queensland producers continue to be globally competitive in many of the markets they operate in.

Significant network upgrades are needed to increase rail's competitiveness and unlock the full economic potential of the regions and infrastructure owners such as the State and the PBPL.

Targeted investment in freight rail has the potential to deliver a significant enhancement in export supply chain competitiveness. Efficient supply chains can effectively bring businesses closer to markets and open up new opportunities for producers and supply chain participants.

Queensland's proportional spending on rail is considerably lower than other states including Victoria and NSW and is potentially constraining growth opportunities in export supply chains. In addition, Victoria's Mode Shift Incentive Scheme (MSIS), for example, has improved rail's competiveness through encouraging industry to shift more containerised freight from road to rail as has a scheme operated in Western Australia associated with Fremantle Port.

Investment in the regional rail system in terms of assets and innovation, is a good example of how an increasingly efficient supply chain can enhance international competitiveness. It can also bring producers effectively closer to markets and open up opportunities. Although Queensland is a significant agriculture exporter and comparatively close to many key import destination countries, our competitiveness will erode if transport inefficiency is a characteristic of our export supply chains.

Modal considerations

There are a number of factors that influence the road or rail mode choice decision, with price competitiveness a key 'driver', along with factors such as transit time, reliability and service availability.

Stakeholders indicated an appetite to switch to rail freight transport if the infrastructure is sound and the price is competitive. In fact, cost was consistently cited as the driving factor in deciding between road and rail, along with other elements of the 'package' of attributes comprising a service offering.

Integrated infrastructure planning

Inland Rail and other network shaping projects need to be planned and considered together from a network-wide perspective.

With a number of announced projects now moving to implementation phase which are likely to facilitate an increase in the volume of peak and off-peak passenger train movements across the SEQ network, and potentially lead to more 'conflicts' across the rail network, constraining freight movements and reducing operational reliability, there is a clear need to ensure planning is undertaken from a network-wide perspective and in an integrated way.

The Queensland Minister for Transport and Main Roads, Mark Bailey, announced last year that the Queensland Government would fully fund and deliver the Cross River Rail project and initial work has already started. The Minister also acknowledged the need to understand the implications of this large project for the movement of rail freight, as freight flows may change as a result of this major network-shaping project and increase interactions and potential for conflicts with the suburban passenger network.

Maximising benefits of a link

There are a range of potential economic, social and environmental benefits to be gained from establishing a dedicated port rail freight link. Without a dedicated link, the use of rail will be increasingly challenging for many shippers.

An over-reliance on road freight is an issue as an expanding export trade puts more pressure on the road networks (in the absence of an efficient and commercially attractive rail alternative). For many origin-destination pairs, road is currently more competitive but not sustainable over the long term as the export opportunities continue to expand. Increased use of road transport will lead to significantly higher levels of congestion in the future, particularly in the area surrounding the Port of Brisbane.

The economic, social and environmental benefits associated with a road to rail switch include more reliable freight and lower transport costs, less congestion, increased safety, less road damage, and lower emissions/air pollution.

The main perspectives that emerged from a wide range of industry stakeholders included reinforcing the need to capture potential benefits and the need to develop a dedicated rail freight link to the Port of Brisbane as part of a longer term goal of a significantly segregated greater suburban rail network.

Consultation questions

Our stakeholder consultations focused on the following key areas and questions:

- Please describe the nature of your business operations and your links with the Port of Brisbane?
  - In what respect does extending Inland Rail from Acacia Ridge to the Port of Brisbane impact your business operations?
  - How are the commodities your business produces transported to the Port of Brisbane? Is the mode of transport predominantly road freight or rail freight?
  - Have you ever switched from road freight to rail freight for moving your goods? If so, could you comment on the differences between the two modes in terms of your business operations?
- In addition to through traffic, have you identified any freight flows (as part of your business operations) that are amenable to rail for the Port of Brisbane's catchment area, particularly agriculture?
- What effect would a dedicated rail link to the Port of Brisbane have on traffic volumes in the Port of Brisbane Catchment area? How important is it to have a dedicated freight link as activity at Port of Brisbane grows in the future? What are the implications of not building the dedicated freight link?
- Please provide a view on potential modal shift between rail and road and identification of influencing factors? Could you explain the choice for your business in terms of road versus rail, what drives that decision (e.g. cost, reliability, other factors)?
- What are some of the potential productivity benefits associated with building a dedicated rail link to the Port of Brisbane?
- Have you identified any constraints to activity over the short, medium and long term in the absence of having a dedicated rail link?
- If relevant from your perspective, could you discuss any potential interaction of the dedicated freight rail corridor from Acacia Ridge to the Port of Brisbane with other infrastructure projects including the Cross River Rail Project
- Are you aware of any social or environment impacts that could potentially be associated with the delivery of the dedicated freight link?

Detailed consultation findings

This section provides details of consultation findings under organisation category and key topic areas.

Rail operators

The key rail operators that were contacted as part of the consultation process included SCT Logistics, Aurizon and Genesee & Wyoming Australia. These companies are responsible for 'above' rail operations, including the operation of the trains and rollingstock.

Nature of operations and link with the Port of Brisbane

SCT Logistics is a national, multi-modal transport and logistics company. They are one of the largest East/West freight forwarders in Australia, and offer a suite of transport and logistic services (including rail and road line haul services, warehousing and contract distribution). They are currently running four national services per week from Victoria to Bromelton (near Brisbane) with trains up to 1.5km in length.

Flows amendable to rail

SCT Logistics have the facilities available with their Bromelton intermodal terminal, but noted that the issue is establishing the last mile to the port. In light of Sydney's challenges around growing congestion and freight crossing over with passenger lines, there is an opportunity for Brisbane to significantly expand its catchment south into Northern NSW by establishing the "last mile". It was suggested that the catchment could even expand as far down as Parkes, which is a huge grain capital. This product could travel up to the Bromelton facility to be consolidated and transported via rail to the Port of Brisbane.

Constraints in the absence of a link

It is difficult to achieve efficiencies given the lack of investment in below rail infrastructure. The current network in Queensland is largely constrained by low tonne axle loads and other infrastructure constraints, such as 11 low tunnels near Toowoomba preventing movement of high cube. This makes Queensland uncompetitive compared to NSW in terms of unit costs. The fact that some key agricultural commodities in northern NSW are leaking south (including via rail), despite Brisbane's closer proximity, highlights this.

Rail investment

Queensland's investment in rail, compared to other states such as NSW and Victoria, has been minimal. For example, investment in NSW has been aimed at driving greater volumes through the port on rail, while Victoria have the Mode Shift Incentive Scheme, to incentivise a switch from road to rail.

SCT indicated that they would like to see more volume on rail, but noted that investment has been disproportionately geared towards road, hindering rail's competitiveness. There has not been sufficient consideration by government around a long term network view on what investment is needed to improve freight rail competitiveness. Queensland's proportional spending on rail is considerably lower than other states including Victoria and NSW. In addition, Victoria's Mode Shift Incentive Scheme (MSIS) has improved rail's competiveness through encouraging industry to shift more containerised freight from road to rail.

Infrastructure

Queensland Rail and the Department of Transport and Main Roads were consulted as part of this study and they are responsible for 'below' rail operations, including track management.

Dedicated freight link

The Australian and Queensland governments are funding a $1.5 million joint study for the Port of Brisbane. The study will be aimed on improving rail freight connections from Acacia Ridge to the Port of Brisbane, and will take into account current and future demand and existing infrastructure capacity for rail freight to and from the port. Deputy Prime Minister and Minister for Infrastructure and Transport, Michael McCormack, noted that freight connections with the Port of Brisbane were critical in supporting south-east Queensland's continued economic growth and development. Moreover, Infrastructure Australia identified a dedicated rail freight line servicing the Port of Brisbane as a high priority initiative.

Mr McCormack noted that significant analysis was undertaken as part of the 2015 Inland Rail Business Case (by ARTC in 2015), which found the existing line could continue to service the port until 2040. However, the new joint study will now assess a range of immediate and long-term options to ensure freight continues to move efficiently. The outcomes of the study will help to inform the need for a future business case and corridor protection, if required.

Rail investment

The BMT has great potential, but is currently underutilised. Instead, there is an overreliance on roads, which is not sustainable and adds unnecessary pressure to the roads. This is because rail has lost competiveness over time compared to road (such as A-Doubles or Road Trains) due to a lack of investment (including above and below rail). Longer trains were identified as an option to increase the efficiency of rail, particularly on longer trips. The Inland Rail alignment from the NSW border into Queensland has not yet been confirmed. In light of this uncertainty, there are no plans to upgrade rail given the risk of certain assets becoming 'stranded' following the delivery of Inland Rail. This uncertainty constrains investment in the rail freight network.

Inland Rail interaction with other projects

Queensland Minister for Transport and Main Roads, Mark Bailey, acknowledged that last year the Queensland Government announced it would fully fund and deliver the Cross River Rail Project and work has already started. Clearly, he said, we need to understand what these projects will mean for the movement of rail freight, as freight flows may change as a result of these network-shaping projects and increased interactions with the suburban passenger network.

Another theme captured across stakeholders was that Inland Rail should be planned together with Cross River Rail; however, optimal sequencing of the two projects has not been considered, and this is a missed opportunity and potentially has big implications for Queensland.

On the proposed bypass to Gladstone

The Inland Rail alignment has to be to Brisbane given that the bulk of freight is domestic to Brisbane and the largest export facilities are at the Port of Brisbane. Containerised agricultural commodities are not going to switch back to bulk, and balancing exports and imports is another important consideration.

Shippers/consolidators

A number of shippers/consolidators were contacted for the consultation process, including Olam, Namoi Cotton, GrainX, GrainCorp, New Hope, Yancoal, Teys Bros, JBS, Food Leaders Australia and Orica. These companies utilise the 'above' and 'below' rail operations (which competes with other modes of transport, such as road and air in some cases) to move product to market. Of particular interest to the Port of Brisbane Catchment are coal and key agricultural commodities (including grains, cottons and pulses) and from the perspective of shippers/consolidators.

Nature of operations and link with the Port of Brisbane

GrainCorp moves bulk grain along the South Western line. A typical season yields circa 750,000 tonnes of bulk and circa 250,000 tonnes of containerised freight. However, yields vary by season and can range anywhere from nothing up to 2,000,000 tonnes. Approximately half of this freight is transported by rail. They draw product from as far as Walgett and Narrabri (road from Walgett to Fisherman Islands – circa 500km by road). Double handling was identified as an issue, with significant savings to rail bulk to the port and then packing at or near the port than to pack 'up country' and haul in containers. The narrow gauge and low axle loading are key issues as they are only able get one 25 tonne box TEU on a 40-foot wagon on rail. Therefore, it is better for GrainCorp to use their bulk assets and avoid the double handling of containers.

Namoi Cotton transport all of their product from Goondiwindi to the Port of Brisbane by road, including cotton (circa 3,500 FEU), chickpeas and grain (circa 4,000 TEU). Namoi Cotton previously railed containers from Goondiwindi for over two decades until 2014 when they moved to high-cube containers that are not able to safely traverse the 11 low clearance tunnels of the Toowoomba and Little Liverpool Ranges. They source product from Northern NSW including Moree and North Star. It was noted that the cost to reach the Port of Brisbane was similar to the Port of Botany. Chickpea production has risen in recent times, with 1,000,000 tonnes last year, and 2,000,000 tonnes the year prior. As chickpeas are more of winter crop it does not take up too much cotton country.

The 60% Indian tariff on chickpeas is viewed by industry as an issue, leaving Pakistan and Bangladesh as key export markets. However, Olam noted this could be a short term issue as Indian domestic production is very volatile. Olam are a major packer and trader of cotton (lint and seed) and pulses (chickpeas and mung beans), all of which travel by road to the port. Export volumes total circa 12,000 TEU on average, but can range from 8,000 TEU to 16,000 TEU. Cotton is sourced from Dalby and Cecil Plains, while pulses come from Pittsworth and Mount Tyson. Product is also pulled from the South West, Northern NSW and as far as Central West NSW.

New Hope rail coal to the Port of Brisbane from their New Acland (circa 4.5-5 mtpa) and Jeebropilly mines (circa 0.6-1 mtpa, but operations are likely to cease end of 2019). If New Hope's New Acland Stage 3 mining lease goes ahead (which they have been trying to get for over a decade), production could increase to circa 5.2-7.5 mtpa. If the mining lease is not approved, investment options could be explored elsewhere. This would have implications for Queensland, not only in terms of lost investment and employment, but New Hope currently wears a lot of the cost of the Western rail. If they exited the market, it is unlikely that Yancoal, who exports coal from Cameby Downs, could wear the additional cost in the absence of significant government subsidies. New Hope have recently been exploring options interstate, purchasing Rio Tinto's 40 per cent share in the Bengalla Coal Mine in the Hunter Valley.

Yancoal transports between 2.1-2.5 mtpa of coal to the Port of Brisbane from the Cameby Downs mine. Through changing the rail construct, including line upgrades (from Toowoomba to Miles) and a dedicated link to the port, tonnages could increase to circa 10mtpa. Key issues are short trains and low tonne axle loads, currently hindering efficiencies.

Orica currently rail Cyanide out of Gladstone to the BMT, and this also goes beyond Brisbane to other states including Victoria, South Australia and Western Australia.

Constraints in the absence of a link

Many stakeholders shared the view that a dedicated rail freight link from Acacia Ridge to the port was essential. This presents a great opportunity for Queensland to take the lead, but needs to efficiently integrate the regional network. A dedicated link would allow access to the port during peak periods (increased reliability of services) and improves the efficiency of the rollingstock.

Seasonality is a key issue, and the further west the more seasonal it gets, and this could be an issue for the grain industry. Moreover, the take-or-pay contracts on rail are not ideal for these seasonal commodities. Queensland needs a system that is able to function year round but seasonality means it is hard to keep trains operating all year – the bigger the network the better as you can move resources around. If you are going to credibly invest in rail rollingstock, you need year round services. There are currently only 4 trains consistently available in Queensland for grain – 1 in Central Queensland and 3 in Southern Queensland (used to be 20 sets of wagons in the 1980s of various types and performance). It was noted that a network could take account of seasonal effects. Standardisation would lead to much more efficient use of the rail system with Inland Rail. Seasonality of crops means these come

on at different times and rollingstock could get a year around operation in different areas depending on the time of the year (i.e. Cotton in Emerald in February and Mildura in October). This would also help to alleviate the bottlenecks.

The risk of losing key agricultural exports in the Northern NSW part of the catchment (including Grain from Goondiwindi and containers from Narrabri) was also highlighted if the Inland Rail alignment is not established and terminates at Goondiwindi. From an economic development perspective, Queensland wants to capture northern NSW exports. Given Inland rail and a dedicated freight link to the Port of Brisbane, this then becomes the most efficient option for many exporters, which would result in an expanded catchment.

Rail investment

A common theme mentioned by a wide range of stakeholders was the lack of rail investment in Queensland compared to road. Moreover, Queensland's proportional spending on rail is considerably lower than other states including Victoria and NSW. Many stakeholders highlighted that other states are much more proactive about getting containerised freight off road and onto rail, for example NSW Clearways Strategy.

Rail networks west of Toowoomba are underutilised/not being used – spending lots to maintain the track, but not actually improving the network/solving issues (e.g. low TAL). The issue is spending all this rail money (maintaining tracks) but not actually increasing capacity or solving the rail-road issue.

The virtual neglect of the current regional rail system in terms of investment in assets and innovation is a good example of how an inefficient supply chain can erode international competitiveness and isolate you from your market and open up opportunities for competitors; some from places you'd not naturally think of first. Although Queensland has a big wheat crop, competitiveness is reducing because we are not as competitive in the transport supply chain. Producers in countries like Eastern Europe (e.g. Ukraine) are competing for agricultural exports and winning shares in our near Asian markets leveraging off their much more efficient movement from farm to ship and giving them an increasing edge.

It was also discussed that it makes it hard to invest in new rollingstock when the lines are aged and inefficient (i.e. supports low TAL, 11 low tunnels near Toowoomba preventing movement of high cube). There is a trend towards decentralisation of the grain industry, going out to independent millers, meaning increased local storage, ultimately reducing the need for larger containers. This hinders efficiency as the same scale can't be achieved cet par. This is a challenge for the rail industry in terms of getting bulk supply.

Consultation has highlighted that mining approvals are increasingly difficult to obtain, and rail costs (both above and below) in Queensland are more expensive compared to other states such as NSW by a factor of about 2. While upgrading your line would increase your below rail costs, it would more than offset the above rail costs with longer trains, leading to better economies of scale. An Inland rail link could make mines more competitive and even more so with a Toowoomba to Miles connection.

The domestic market is often serviced by road as few customers are well placed and have facilities to handle rail. Rail is a useful 'backbone' service, while road is more responsive and often used for surges. It takes a larger amount of truck movements to achieve the same task when moved by rail.

Road and rail considerations

Road transport has become increasingly competitive in recent times, while rail's competitiveness has been decreasing. The road model has taken a significant share from rail over the past 10 years and the road model has taken containerised freight away from rail. 'Above rail' operators are not compelled to be competitive. There is no investment in below rail, nothing in above rail for rollingstock.

However, stakeholders have indicated an appetite to switch back to rail if the infrastructure is sound and the price is competitive. In fact, cost was consistently cited as the driving factor in deciding between road and rail. Cost barriers – driven by the efficiency of rollingstock and what a below rail asset can deliver are critical decisions in choosing between road and rail freight. Other key considerations included transit time, reliability and service availability.

New Hope sees opportunity over the longer term (i.e. in Miles and Wandoan) if rail is improved and a link is established, noting that you could get circa 20mtpa (a key assumption made in Inland Rail Business Case). However, the cost of access would need to be lowered, a dedicated link established (given issues with sharing tracks with commuters currently) and upgrade to the western system (currently efficiencies are constrained by low axle loads 15.75 TAL).

New Hope are not currently experiencing issues with reliability since they are running off-peak and don't often miss their slot. They also don't see curfews as too much of a risk given that residents get used to the noise. Moreover, this noise can also be addressed by new rollingstock (it's currently 2 stroke) and there are options to reduce wheel squeal.

Inland Rail interaction with other projects

A common theme among stakeholders was the need for Inland Rail to be considered in conjunction with other projects. The bottleneck associated with freight and passenger services sharing routes is only set to worsen given expected growth in passenger services from projects such as Cross River Rail and the New Generation Rollingstock, which represents a significant increase in the passenger fleet, further exacerbating the congestion issues in the absence of dedicated freight routes. This underscores the need to consider the broader 'network' impacts and to separate passenger and freight movements.

It was suggested that inland ports (in country customs clearance for goods, particularly perishable goods), could also act to relieve some of the bottleneck issues in Brisbane. Food Leaders Australia are currently in talks with China to go from Toowoomba to China, and do quarantine in country.

Potential benefits of a dedicated freight link

An overreliance on road freight is an issue, as growing business and more export volumes puts more pressure on the road networks (in the absence of a viable rail solution). Road is currently more competitive, but not sustainable over the long term (i.e. congestion, safety, road damage). Moreover, pressure on availability of trucks (particularly with good yields) – shortage of drivers (going to become more of an issue – with aged drivers) over time and a dedicated rail link would help to alleviate some of these issues. There is also increasingly reputational pressure for companies to be greener, which a road to rail switch helps to achieve (i.e. through lower emissions).

Sovereign risk

Stakeholders/shareholders in other countries are observing the current conditions/government including difficulties and time delays with getting major projects started (in some cases even after approvals are finalised) and this is not viewed favourably for foreign investment. They can see a lot of political risk (and sovereign risk), which limits the foreign investment potential in Queensland.

Other key stakeholders

Other key stakeholders that were contacted for consultation included DSDMIP, Toowoomba Surat Basin Enterprise, Wagners/Brisbane West Wellcamp Airport, Brisbane City Council, InterlinkSQ and Western Downs Council, Balonne Shire Council and Goondiwindi Regional Council.

Nature of operations and link with the Port of Brisbane

Wagners/Brisbane West Wellcamp Airport only currently have a very small amount of product going on rail. Currently, they operate a total of around 90 flights.

The Thallon area is a large and consistent producer of cotton and grain, with almost all of this production currently moving to export by road. It was noted that a more efficient and reliable rail service could potentially provide the 'base load' transport role, with road used for additional services and overflow.

Flows amendable to rail

Wagners/Brisbane West Wellcamp Airport is exploring the feasibility of an intermodal facility (including road, rail and air) to bring perishable product from down south and airfreight this to Asia. They currently have a weekly air service from Wellcamp to Hong Kong. They see Toowoomba as a significant container port and bulk loading and unloading facility, with the potential to handle a lot of grain.

Road and rail considerations

Interlink have indicated that a competitive rail price could result in a gradual, but significant, switch from road to rail for key agricultural commodities. Global trade, and key agricultural exports, are moving towards high cube, and a lot of merchandise ships into Queensland and Australia more broadly are only assessable for high cube. This is a problem along the Toowoomba and Little Liverpool Ranges where there are 11 tunnels that high cubes can't traverse. However, work has commenced on increasing these tunnels along the Toowoomba and Little Liverpool Ranges, enabling the transport of containerised freight from Darling Downs and South West regions directly to the Port of Brisbane. It is anticipated that the work will take approximately 12 months to complete. While the axle load is relatively low for the South Western Line, there is capability to move bulk grain and cotton

along this line as there is currently little traffic on this railway providing potential for freight.

Constraints in the absence of a link

Consultation identified that a broader dedicated line out to the South West with heavier axle loads was needed to gain efficiency. A critical part of Inland Rail is along the Western line and out to Miles, and ensuring that this is efficiently linked to the Port of Brisbane. It was identified that significant network upgrades are needed to unlock export opportunities (including coal from Wandoan and agriculture). It was also highlighted that the cost of maintaining the rail in Queensland was significantly higher than the national average by a factor of about 3.

The need to be active in establishing the Queensland Inland Rail alignment was also discussed by multiple stakeholders. While Victoria and NSW have made some progress on this, Queensland has not. It was noted that if the final alignment is delayed and fails to provide an efficient link to the port, Queensland risks losing exports south to the Port of Botany or Port of Newcastle. It was highlighted that there are already some agricultural exports in Moree that have started to leak down south, essentially shrinking the Port of Brisbane Catchment area through inaction. Once these begin to drift south, it could be difficult to recover these key exports.

Various stakeholders also noted the importance of protecting the corridors, even if they aren't used in the immediate term, as this preservation acts to reduce future construction costs.

Inland Rail interaction with other projects

Consultation highlighted that Inland Rail and Cross River Rail have been planned and considered in isolation, despite the need to consider their impacts on the network together. In regard to the delivery of the Cross River Rail project, this is expected to increase the amount of peak and off-peak passengers and ultimately lead to more conflicts, squeezing freight movements and worsening reliability.

Potential benefits of a dedicated freight link

The economic, social and environmental returns of trucks off the network (i.e. less congestion, freight cost savings, increased safety, lower emissions) would make it a worthwhile investment, and this is a long term investment. Sydney have spent a large amount of money on separating freight and passenger services (such as the Clearways Strategy), however the same amount of importance has not been placed on this in Queensland.

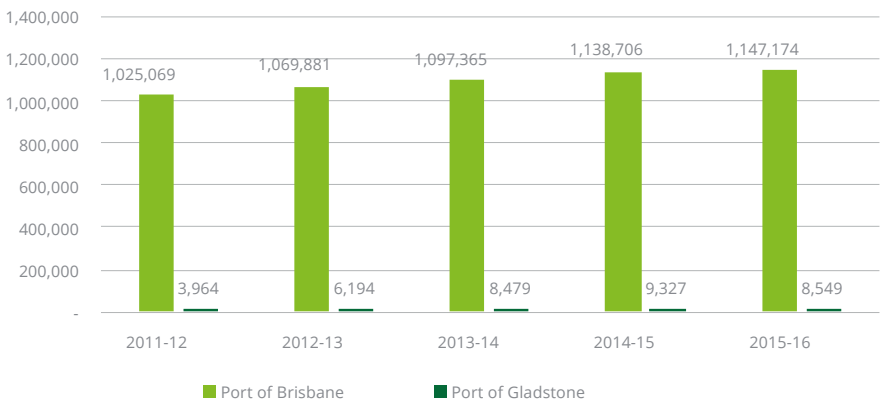
Appendix B: Inland Rail to Gladstone

This Appendix presents the findings of high-level analysis regarding the potential economic merit of an extension of the currently proposed Inland Rail from a location west of Toowoomba near Miles to Gladstone, including:

- Costs associated with road haulage of product back to Brisbane if domestic cargo was moved by a route that bypassed Brisbane to Gladstone
- Indicative capital cost estimates and potential impact of building a rail extension linking the currently proposed Inland Rail to Gladstone
- Indicative costs to create new facilities to and in Gladstone including rail terminals, infrastructure, wharves and wharf facilities, that meet environmental requirements and other planning requirements
- Supply chain costs by commodity e.g. bulk coal and grain, containerised agricultural commodities and a determination of comparative and "cheapest route" to market.

Before presenting these findings, a comparison of these ports is provided in terms of total TEUs to put this analysis into context. This highlights that the Port of Gladstone handles only a very small volume of total TEUs compared to the Port of Brisbane (see Chart below). Gladstone is a globally significant industrial port. In 2015-16, the Port of Gladstone handled 93 million tonnes of export cargo and 23 million tonnes of imports (domestic and international); just over one-third of all of Queensland's sea-borne trade. Almost two-thirds of Gladstone's trade volume was coal for export. Container trade in 2015-16 was a mere 0.2% of the total tonnage handled. Furthermore, freight forwarders and supply chains are well developed in Brisbane to move freight to markets and population centres and along established supply chain links, particularly so with respect to containerised goods and commodities.

Chart B1: Total TEUs, Port of Brisbane and Port of Gladstone



Source: TMR Port statistics

Growth in containerised cargo imports, in particular and movements of contents of imported containers is fundamentally 'driven' by growth in population and economic activity; where in the case of Queensland the south-east corner centred on Brisbane dominates in this regard – and will continue to do so for decades to come.

Indicative costs associated with road haulage of products

The following assumptions have been used to estimate these costs:

- Brisbane to Gladstone via road is 514km
- Around 9 cents per tonne kilometre for road freight based on BITRE (2017, Freight Rates in Australia)
- The 2015 Inland Rail Business Case estimates around 4.7 million tonnes of intermodal freight between Brisbane and Melbourne is carried via road and rail with around 1.2 million tonnes currently on rail. This is predicted to increase to 4.6 million tonnes in the opening year of Inland Rail (2025).

These costs are estimated to be in the order of between $55 million and $210 million per annum if it is assumed between 1.2 million and up to 4.6 million tonnes of product are moved back to Brisbane if domestic cargo was moved by a route that bypassed Brisbane to Gladstone. However, given a projected three quarters of Queensland's population is expecte to reside south of Gladstone by 2026[32], a more realistic estimate is in the range of $40 million to $155 million.

Indicative capital cost estimates and potential impact of building a rail extension linking from Inland Rail to Gladstone

The indicative link in this analysis assumes utilisation of sections of the Moura system and also the Western Line corridor as well as a greenfield connection from Surat to Banana and upgrades to Miles. The length of this link in total is estimated to be around 600km with order of magnitude capital costs of around $3.0 billion (see Table B1) based on 26.5 tal brownfield and greenfield upgrades.

The existing Moura system is narrow gauge (1067mm). For Inland Rail, it is assumed this will be dual gauge from the NSW border (1435mm and 1067mm). As a result, this analysis assumes upgrades, including to the existing Moura system, would need to be dual gauge to accommodate containers from NSW and elsewhere and to deliver some scale economies to the 20 mtpa of coal assumed in Inland Rail. The 20mtpa is based on the current 6-7 mtpa from New Acland and Cameby Downs as well as an indicative assumption on potential developments in in the Wandoan area/ Surat Basin.

Specifically, the following assumptions have been used to estimate costs:

- **Upgrade of the track from near Oakey to Miles – existing 15.75 tal:** The West Moreton line from Toowoomba to Miles is a 210km single narrow gauge line with restrictive axle limits of 15.75 tonnes. Oakey to Miles is estimated to be around 180km (with the Oakey to Toowoomba section estimated at 30km). This assumes upgrade to dual gauge.
- **Replacement of the abandoned Miles to Wandoan section (Miles to Wandoan Branch):** Miles to Wandoan is a 69km link that is currently disused. These upgrades are also assumed to be to dual gauge
- **Greenfield development of a new track (heavy haul) from Wandoan to the Moura system:** Under this upgrade, coal is assumed to be railed to the WICET terminal and containers to a new terminal at Gladstone. Based on a 2010 EIS, the greenfield Surat Basin rail link is a circa 215km rail link between Wandoan and Banana to provide access for coal mines in the Surat Basin to the Gladstone port via the Moura system
- **Upgrade existing Moura system to include a dual gauge line:** this assumes upgrades from Banana to Gladstone from narrow to dual gauge.

[32] Queensland Government Population Projections, 2015 Edition; ABS Population by age and sex regions of Australia, 2014 (ABS Cat.no 3235.0)

Table B1: Indicative capital cost estimates

Section of works	Distance (km)	Indicative cost ($M) (26.5 tal)	Indicative cost ($M) (32.5 tal)
Oakey to Miles (B)	180	846	972
Miles to Wandoan (B)	69	324	373
Wandoan to the Moura system (near Banana) (G)	215	1,290	1,462
Moura system upgrades (Banana to Gladstone) (B)	130	611	702
Total	**594**	**3,071**	**3,509**

Source: Indicative study assumptions

These estimates are based on the following costs per track kilometre for dual gauge configurations for both brownfield (upgrades to existing lines) and greenfield (new tracks e.g. Wandoan to Banana section).

Table B2: Indicative track costs per kilometre

Track type	Brownfield (B)	Greenfield (G)
26.5 tal dual gauge	$4.7 M/km	$6.0 M/km
32.5 tal dual gauge	$5.4 M/km	$6.8 M/km

Source: Indicative study assumptions

Indicative costs to create new facilities in Gladstone including intermodal terminal, "above and below rail", infrastructure, wharves and wharf facilities, dredging, environmental and EIS costs/issues etc.

This section is based on indicative information on costings and timings to develop new port facilities including intermodal terminals, infrastructure, wharves and wharf facilities and other related costs. This data was provided by PBPL and provides 'order of magnitude' costs to develop such facilities. The Port of Brisbane is one of the last ports in Australia to develop new berths and wharves and are still currently doing so. As such, this information provides a useful 'order of magnitude' for considering the indicative costs to create such facilities as well as indicative timings in the case of Gladstone.

Indicative costings

- 300m long container wharf (similar to Brisbane including rockwall) = $60M
- 25Ha site reclamation (assume 5m deep) = $35M
- Seawalls for 25Ha site (assume 1600m) = $20M
- 25Ha wicking and surcharging (wicking + 8m high surcharging) = $50M
- 25Ha terminal development = $38M
- Terminal buildings (office + workshops) = $12M
- Gantry cranes ($15M x 2) = $30M
- Auto Stacking cranes ($8M x 3) = $24M
- Rail access ($40M per km) (assume 5km) = $200M
- Principal's costs (design, approvals, insurance, etc.) + 20%
- No allowance for berth or channel dredging (other than supply of fill as per above)

In total, the costs to create such new facilities at the port are estimated to be in the order of magnitude of $560 million.

Indicative timings

- EIS and approvals – 36 months
- Seawalls – 12 months
- Fill and surcharge (depends on source, assume dredging) – 24 months
- Terminal development – 18 months (noting wharf is assumed to generally run concurrently with terminal, though not entirely)

In summary, the indicative timeframe to develop new facilities at Gladstone including rail terminals, infrastructure, wharves and wharf facilities is estimated to be at least 5 to 6 years in total.

Current Gladstone Port Master Planning

The Queensland Government is leading master planning for the priority Port of Gladstone in accordance with the Sustainable Ports Development Act 2015 (Ports Act).

From 28 August 2017 to 9 October 2017 the draft Master Plan for the priority Port of Gladstone was released for public consultation.

The draft Master Plan was the first to be prepared and issued for comment under the Ports Act, representing a major milestone in the State Government's priority port master planning program. The draft master plan also delivers key port-related actions of the Reef 2050 Long-Term Sustainability Plan (Reef 2050). It is understood that the master plan is still a draft only.

Of the several baseline and background reports prepared to inform the draft master plan the following commentary vis-à-vis container trade development was found:

> *There is potential for other agricultural products, such as containerised agricultural products, horticulture, oil seed, cotton, meat, and live cattle to be exported through the port. The Queensland Government is currently investigating supply chain requirements both within and outside of the MPA to determine the viability of future agricultural exports via the Priority Port of Gladstone.*[33]

[33] See http://www.statedevelopment.qld.gov.au/industry-development/draft-master-plan-for-the-priority-port-of-gladstone.html

Supply chain costs by commodity e.g. bulk coal and grain, containerised agricultural commodities and a determination of comparative and "cheapest route" to market

Freight rates are a key factor influencing road freight choice and the costs of freight-reliant business sectors such as mining, agriculture, manufacturing, construction and trade.

Bulk agriculture and grains

While grain and cotton are produced in the Central Queensland region, it is currently mainly transported through to Brisbane from the Darling Downs/Maranoa/western regions of Queensland. The Darling Downs Maranoa region accounts for around 80% of cotton and grain produced in Queensland per annum on average (noting this is volatile and dependant on weather conditions). The export of bulk grain from Central Queensland has declined dramatically in recent years from around 350 kts in 2011-12 and 2012-13 to around 145 kts in 2013-14 and 2014-15 to 90 kts in 2015-16. This link is unlikely to attract significant bulk agricultural demand given the location of production areas (and given most of this freight is moved from the Darling Downs Maranoa region to Brisbane).

Coal

A rail link may facilitate additional coal exports to the Port of Gladstone. However, it is worth noting with coal assumed to be railed to the WICET terminal and costs of development to support such an expansion; this would place upward pressures on costs and competitiveness. As a result, this would likely need significantly higher coal prices as well as the other issues addressed such as EIS approvals, infrastructure development etc. However, whilst for much of the targeted production, haulage distance could be greater and the scale economies of a higher standard track (e.g. axle loads, section run times etc.) utilising longer/heavier trains could be crucial.

Concluding remarks

In summary, this Appendix provides an economic and community narrative to position PBPL to robustly and rationally challenge this concept of linking Inland Rail to Gladstone. This is based on:

- It would be extremely costly to develop the capital required to support such a rail link with order of magnitude estimates of around $3 billion for development of the track alone including upgrades to be consistent with Inland Rail (including allowing for 25 tonne axle load limits at 80km/hr)
- It is also unlikely that substantial volumes of freight volumes would be attracted to the Gladstone link. This is particularly the case given international and national trade is likely to remain centred around the deep and extensive supply chain infrastructure including freight forwarders and logistic operations at the Port of Brisbane. Furthermore, this also raises the question of how attractive this would be to lines calling in at Gladstone, which may necessitate a North Coast Line up upgrade and/or introduction of coastal shipping.
- As a result, current and likely intermodal trade volumes are unlikely to support the case for the capital investment required to develop a connection from Inland Rail to the Port of Gladstone
- Furthermore, there would be other additional costs such as:
  - The costs of road (or rail) haulage of products back to Brisbane from Gladstone if domestic cargo was moved by a route that bypassed Brisbane to Gladstone is likely to be significant. Furthermore, this also does not help solve Brisbane issues including growing congestion. Additional costs would potentially be passed through to customers, industry and wider community in terms of both financial costs and more negative externalities.
  - The costs to develop new facilities in Gladstone to support such a rail link including rail terminals, infrastructure, wharves and wharf related facilities are also significant. These costs are estimated to be in the order of $560 million. The indicative time frame to develop new facilities is estimated to be 5-6 years at a minimum. This includes the estimated timeframes for EIS and approvals, seawalls and terminal development
- From a supply chain perspective, these additional costs are also likely to be challenging for key industries in the region including bulk agriculture (particularly exports). Although there is long term potential for coal, this is likely to be a much longer term opportunity given the additional costs required to develop such a link all the way through from rail capital costs through to infrastructure and terminal upgrades and other associated costs at the port.

Appendix C: Port of Brisbane infrastructure

Rail network infrastructure overview

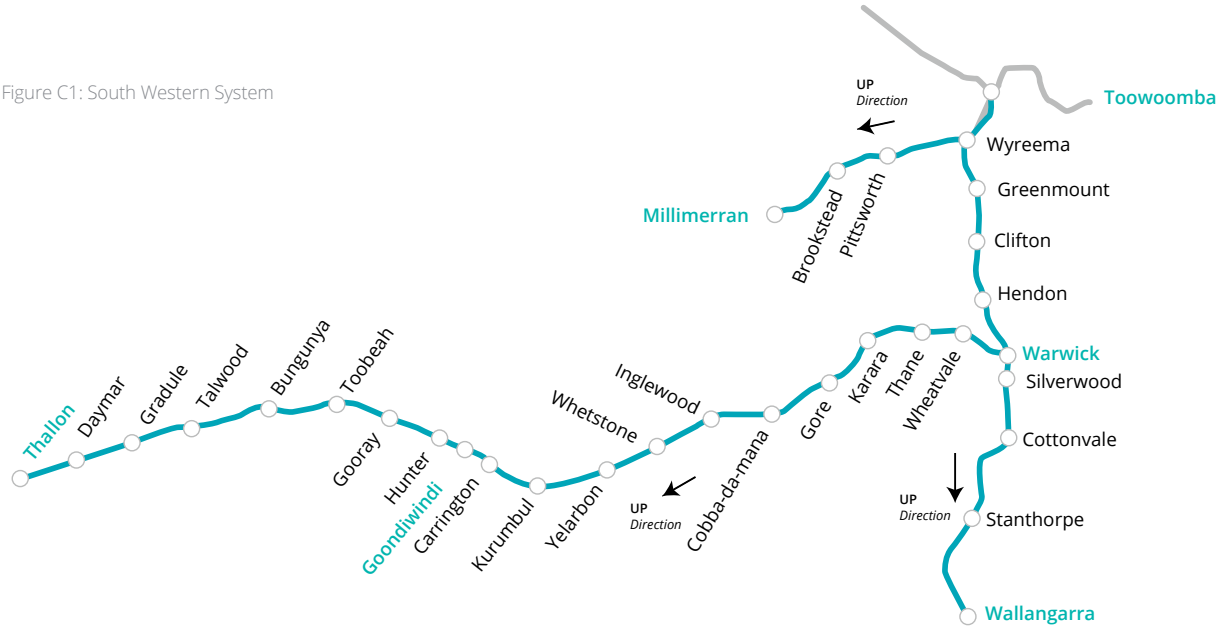
This section provides an overview of the rail network infrastructure relevant to this study, specifically:

- South Western, Western and West Moreton Systems
- North Coast Line
- Urban passenger rail system .

South Western, West and West Moreton System

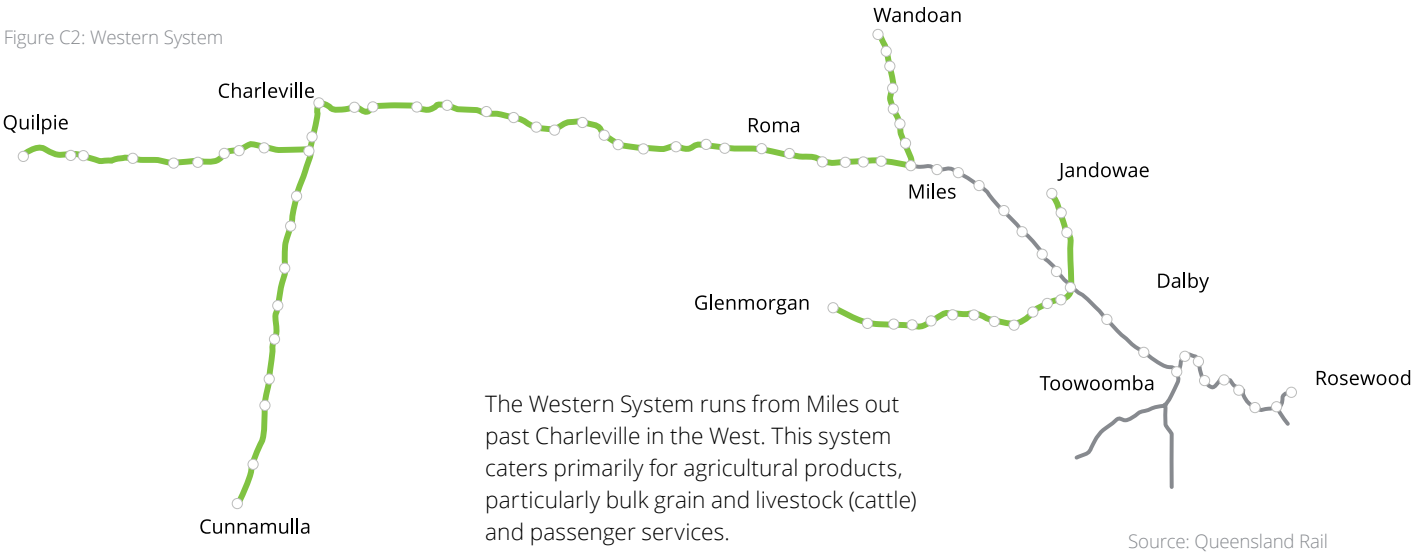
The South Western System operates to Thallon in the west from Warwick in the east and from Toowoomba in the north to Wallangarra in the south. Whilst this system caters to all types of traffic, traditionally, it has carried grains, cotton lint and cotton seed.

Figure C1: South Western System



Source: Queensland Rail

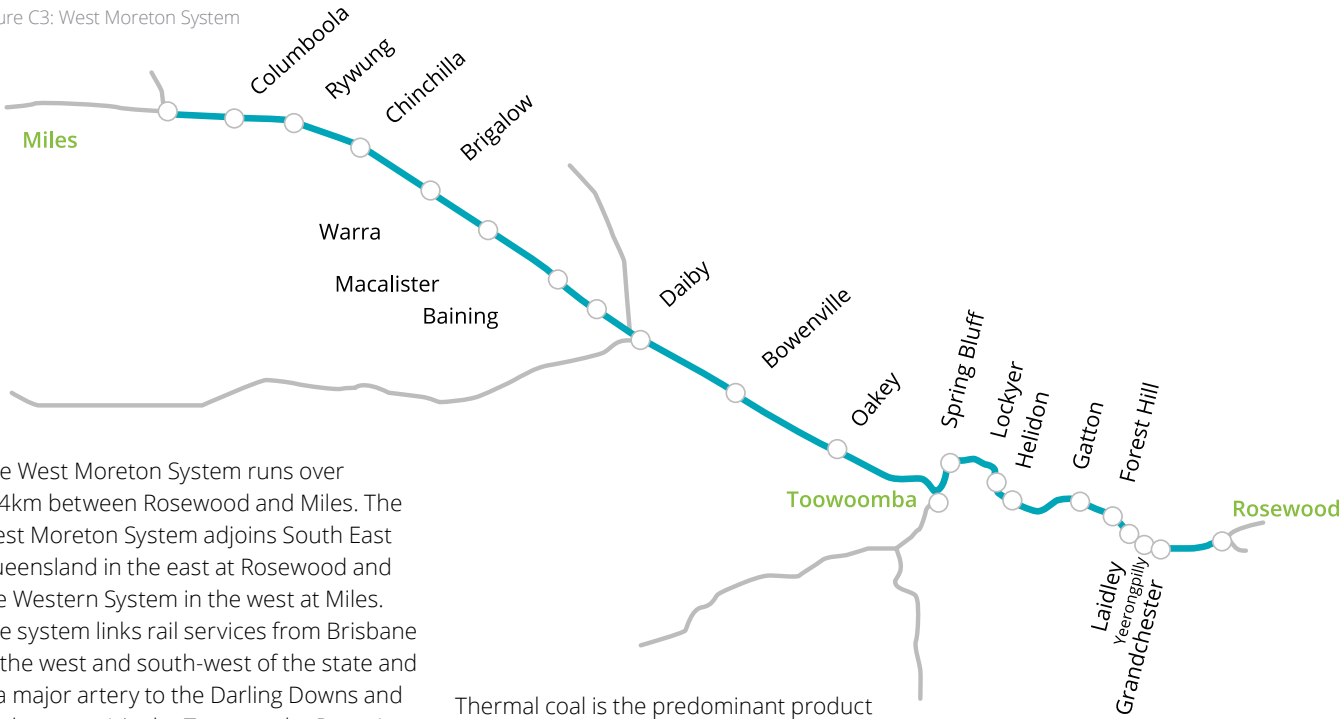
Figure C2: Western System



The Western System runs from Miles out past Charleville in the West. This system caters primarily for agricultural products, particularly bulk grain and livestock (cattle) and passenger services.

Source: Queensland Rail

Figure C3: West Moreton System



The West Moreton System runs over 314km between Rosewood and Miles. The West Moreton System adjoins South East Queensland in the east at Rosewood and the Western System in the west at Miles. The system links rail services from Brisbane to the west and south-west of the state and is a major artery to the Darling Downs and further west (via the Toowoomba Range).

Historically, the system catered for passenger, livestock, general freight and agricultural products (e.g. grain and cotton) with the first section of railway line in Queensland, between Ipswich and Grandchester, opening in 1865.

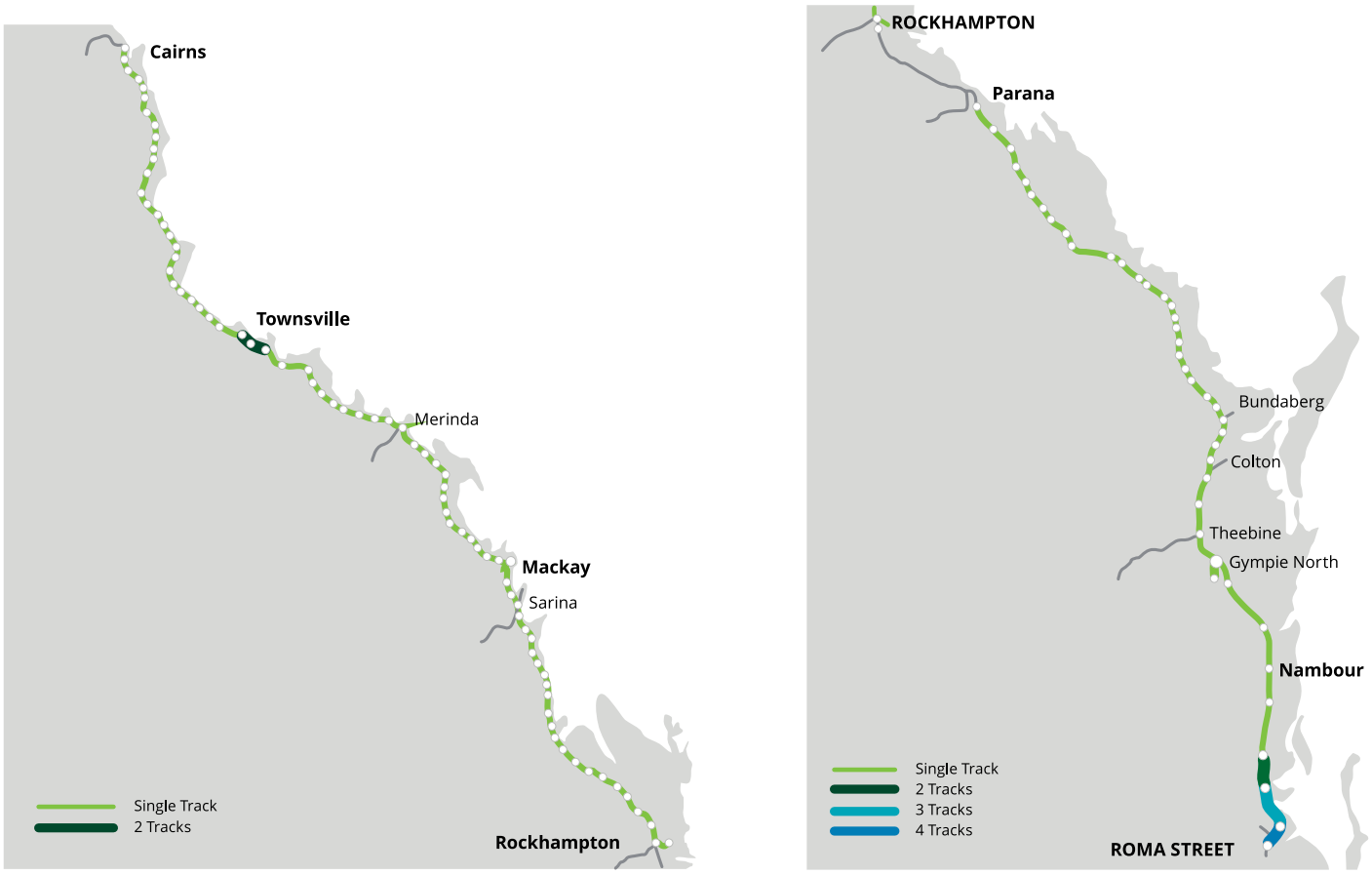
Thermal coal is the predominant product originating from and hauled on the West Moreton System. Grain also originates from and is hauled on the system. For example, in 2014-15, almost a quarter of a million tonnes of grain was hauled from several locations across the region (including from Jondaryan, Brookstead, Dalby, Talwood, Goondiwindi and Thallon) for export via the Port of Brisbane coming from both the Western and South Western systems' catchments.

There are challenges, identified through reviewing publically available information and consultation with key stakeholders, to delivering freight in the longer term, including both "above" and "below" rail issues. With respect to "above rail" issues, increasing network congestion and operational 'conflicts' with passenger services (peak and off-peak) means that freight movements are increasingly constrained. This is expected to increase, particularly with future developments, such as the delivery of Cross River Rail. Below rail issues include poor alignment, low axle load (15.75 TAL)[34], and low tunnel heights along parts of the network.

Source: Queensland Rail

[34] TAL – tonnes axle load

Figure C4: North Coast Line (north and south systems)



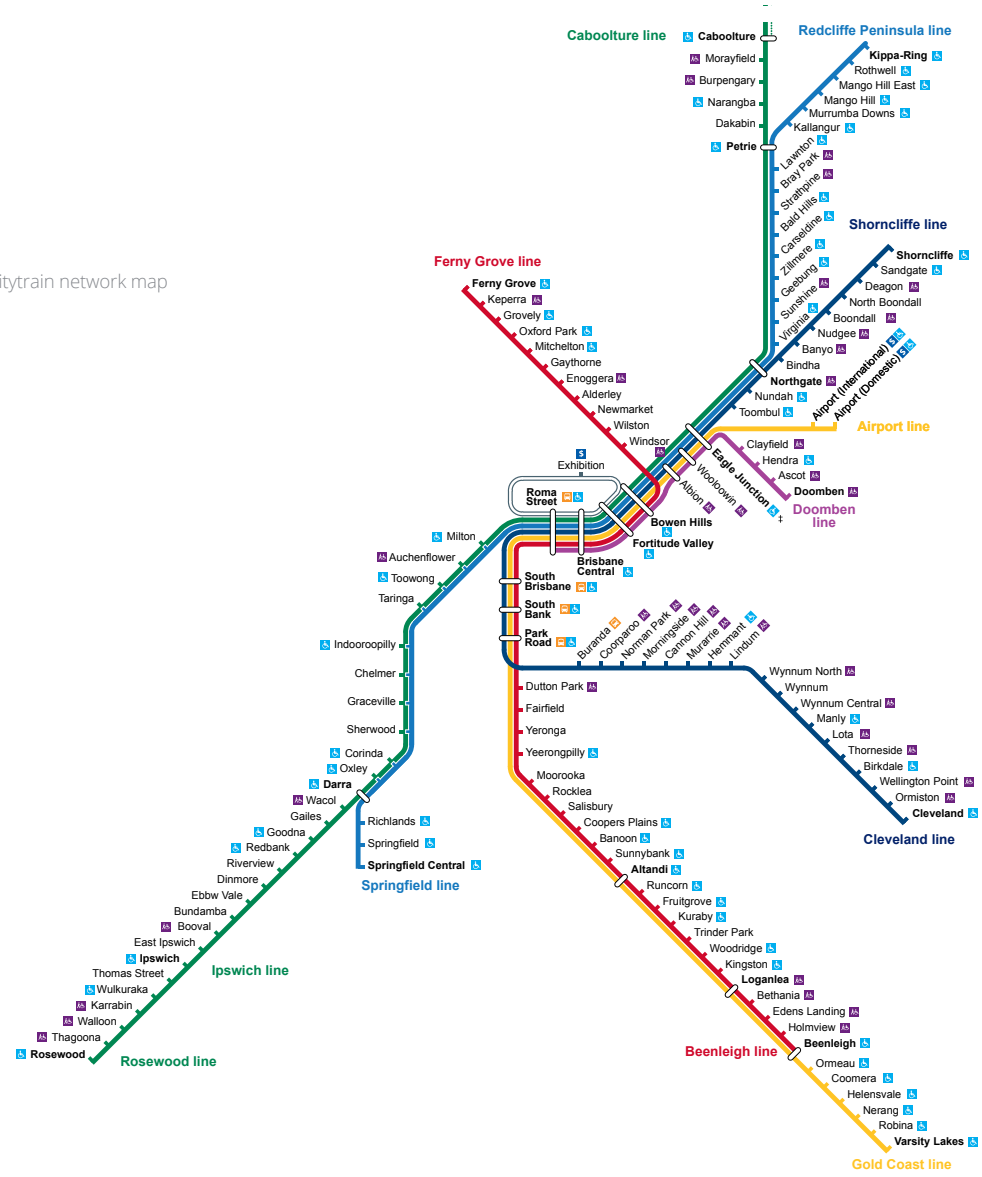
Source: Queensland Rail

North Coast Line

The North Coast Line is located the length of coastal Queensland between Cairns and Brisbane, extending approximately 1600km. The North Coast line adjoins the Brisbane Metropolitan System between Roma Street and Nambour. The section between Rockhampton and Gladstone is owned by Aurizon.

This system carries various freight products, such as containerised and industrial freight, minerals, livestock and bulk commodities including sugar and grain. These services operate between Brisbane and major centres and North Queensland, such as Rockhampton, Mackay, Townsville and Cairns.

Figure C5: Citytrain network map



Source: Queensland Rail

Urban passenger rail system

The Citytrain network is an integrated passenger and rail access service that extends from the centre of Brisbane, south to Beenleigh and Varsity Lakes on the Gold Coast, north to Ferny Grove, Shorncliffe, Doomben, Caboolture, Gympie and Kippa-Ring, east to Cleveland and west to Richlands, Ipswich and Rosewood, and Springfield. There are just over 150 passenger stations on the shared (passenger and freight services) network.

Appendix D: Freight train delays in SEQ

QR has indicated[35] that from 1 July, 2018, there will be 56 contracted return coal paths on the Toowoomba Range out of a capacity of 97 return paths (per week basis). There are also 14 non coal/general freight non contracted return paths and 2 contracted passenger return paths per week that are preserved under the Transport Infrastructure Act. There have been no containerised cotton trains since late 2014 and molasses trains to/from Far North Queensland to locations on the Darling and Southern Downs no longer run on the network.

For the six months to end June 2018, just over 3,500 coal trains (1,876 loaded and 1,761 empty or approximately 10 trains each way every day) came to/from Toowoomba[36] to Fisherman Islands for haulage of coal for export. In the 'loaded' direction, the average actual transit times were just under 10 hours and in the unloaded direction they were just under 6 hours.

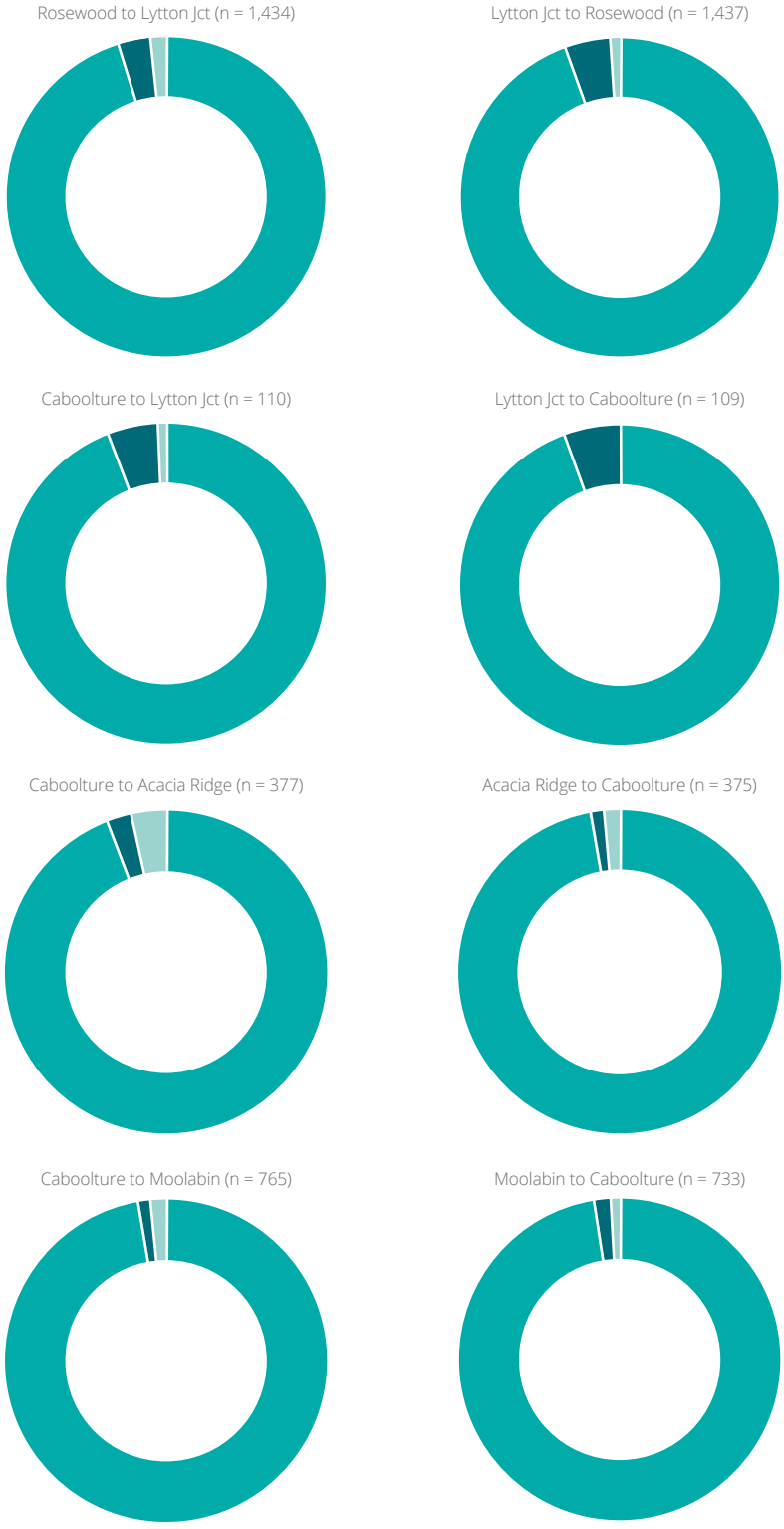
Additional detailed analysis of freight trains across the SEQ network is presented for four key sections including:

- Rosewood to Lytton Junction;
- Caboolture to Lytton Junction;
- Caboolture to Acacia Ridge; and
- Caboolture to Moolabin.

This highlights that some of the largest delays (i.e. arrived more than 60 minutes late) are on the section from Caboolture to Acacia Ridge on a proportional basis.

[35] Emails of 27th and 29th June, 2018 from Manager, Business Operations South.
[36] These trains haul coal from Cameby Downs Mine near Chinchilla and New Acland Mine near Jondaryan.

Chart D1: Freight train delays



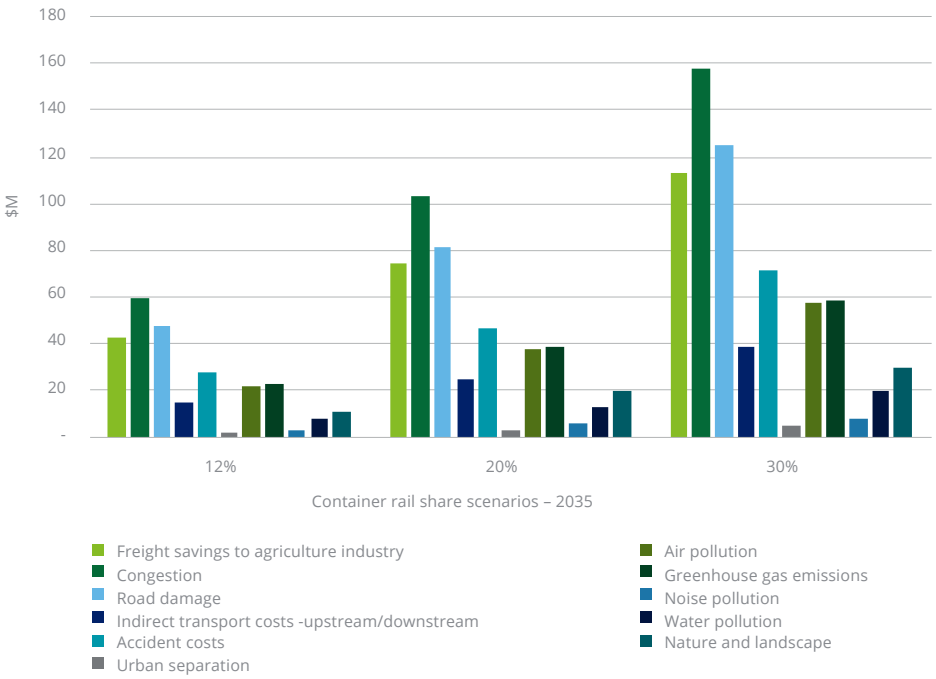
Source: QR Data

Appendix E: Scenario and sensitivity analysis

This appendix presents a summary of the economic scenarios and the effect of varying the cost savings per TEU of containerised freight switched to rail.

- **Scenario 1** – 12% rail share achieved by 2035
- **Scenario 2** – 20% rail share achieved by 2035
- **Scenario 3** – 30% rail share achieved by 2035

Chart E1: Annual benefits by scenario, $M2016-17



Source: Deloitte Access Economics.

A summary of the results (under the 30% scenario) are presented below. The scenarios presented in the economic assessment assume a cost saving per TEU of $130. When this is assumed to be $220, the freight transport cost savings increases to $187 million and the economic benefits, increases from $583 million (and total benefits $892 million), cet par. When this is assumed to be $80, the economic benefits decrease to $464 million and total benefits to $773 million.

Table E1: Sensitivity analysis, benefits by 2035, 30% scenario

Savings per TEU ($)	**$80**	**$133**	**$220**
Economic ($m)	$464	509	$583
Social ($m)	$94	$94	$94
Environmental ($m)	$215	$215	$215
Total ($m)	**$773**	**$818**	**$892**

Source: Deloitte Access Economics.

Appendix F: Economic modelling framework

Model theory

The Deloitte Access Economics regional general equilibrium model (DAE-RGEM) is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium model of the world economy with bottom up modelling of Australian regions. The model allows policy analysis in a single, robust, integrated economic framework. This model projects changes in macroeconomic aggregates such as GDP, employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports and employment are also produced.

The model is based upon a set of key underlying relationships between the various components of the model, each which represent a different group of agents in the economy. These relationships are solved simultaneously, and so there is no logical start or end point for describing how the model actually works. However, they can be viewed as a system of interconnected markets with appropriate specifications of demand, supply and the market clearing conditions that determine the equilibrium prices and quantity produced, consumed and traded.

DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key assumptions underpinning the model are:

- The model contains a 'regional consumer' that receives all income from factor payments (labour, capital, land and natural resources), taxes and net foreign income from borrowing (lending).
- Income is allocated across household consumption, government consumption and savings so as to maximise a Cobb-Douglas (C-D) utility function.
- Household consumption for composite goods is determined by minimising expenditure via a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and imported sources. In the Australian regions, households can also source goods from interstate. In all cases, the choice of commodities by source is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption for composite goods, and goods from different sources (domestic, imported and interstate), is determined by maximising utility via a C-D utility function.
- All savings generated in each region are used to purchase bonds whose price movements reflect movements in the price of creating capital.
- Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Composite intermediate inputs are also combined in fixed proportions, whereas individual primary factors are combined using a CES production function.
- Producers are cost minimisers, and in doing so, choose between domestic, imported and interstate intermediate inputs via a CRESH production function.
- The supply of labour is positively influenced by movements in the real wage rate governed by an elasticity of supply.
- Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. A global investor ranks countries as investment destinations based on two factors: global investment and rates of return in a given region compared with global rates of return. Once the aggregate investment has been determined for Australia, aggregate investment in each Australian sub-region is determined by an Australian investor based on: Australian investment and rates of return in a given sub-region compared with the national rate of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.
- Prices are determined via market-clearing conditions that require sectoral output (supply) to equal the amount sold (demand) to final users (households and government), intermediate users (firms and investors), foreigners (international exports), and other Australian regions (interstate exports).
- For internationally-traded goods (imports and exports), the Armington assumption is applied whereby the same goods produced in different countries are treated as imperfect substitutes. But, in relative terms, imported goods from different regions are treated as closer substitutes than domestically-produced goods and imported composites. Goods traded interstate within the Australian regions are assumed to be closer substitutes again.
- The model accounts for greenhouse gas emissions from fossil fuel combustion. Taxes can be applied to emissions, which are converted to good-specific sales taxes that impact on demand. Emission quotas can be set by region and these can be traded, at a value equal to the carbon tax avoided, where a region's emissions fall below or exceed their quota.

Below is a description of each component of the model and key linkages between components.

Households

Each region in the model has a so-called representative household that receives and spends all income. The representative household allocates income across three different expenditure areas: private household consumption; government consumption; and savings.

The representative household interacts with producers in two ways. First, in allocating expenditure across household and government consumption, this sustains demand for production. Second, the representative household owns and receives all income from factor payments (labour, capital, land and natural resources) as well as net taxes. Factors of production are used by producers as inputs into production along with intermediate inputs. The level of production, as well as supply of factors, determines the amount of income generated in each region.

The representative household's relationship with investors is through the supply of investable funds – savings. The relationship between the representative household and the international sector is twofold. First, importers compete with domestic producers in consumption markets. Second, other regions in the model can lend (borrow) money from each other.

- The representative household allocates income across three different expenditure areas – private household consumption; government consumption; and savings – to maximise a Cobb-Douglas utility function.
- Private household consumption on composite goods is determined by minimising a CDE (Constant Differences of Elasticities) expenditure function. Private household consumption on composite goods from different sources is determined is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption on composite goods, and composite goods from different sources, is determined by maximising a Cobb-Douglas utility function.
- All savings generated in each region is used to purchase bonds whose price movements reflect movements in the price of generating capital.

Producers

Apart from selling goods and services to households and government, producers sell products to each other (intermediate usage) and to investors. Intermediate usage is where one producer supplies inputs to another's production. For example, coal producers supply inputs to the electricity sector.

Capital is an input into production. Investors react to the conditions facing producers in a region to determine the amount of investment. Generally, increases in production are accompanied by increased investment. In addition, the production of machinery, construction of buildings and the like that forms the basis of a region's capital stock, is undertaken by producers. In other words, investment demand adds to household and government expenditure from the representative household, to determine the demand for goods and services in a region.

Producers interact with international markets in two main ways. First, they compete with producers in overseas regions for export markets, as well as in their own region. Second, they use inputs from overseas in their production.

- Sectoral output equals the amount demanded by consumers (households and government) and intermediate users (firms and investors) as well as exports.
- Intermediate inputs are assumed to be combined in fixed proportions at the composite level. As mentioned above, the exception to this is the electricity sector that is able to substitute different technologies (brown coal, black coal, oil, gas, hydropower and other renewables) using the 'technology bundle' approach developed by ABARE (1996).
- To minimise costs, producers substitute between domestic and imported intermediate inputs is governed by the Armington assumption as well as between primary factors of production (through a CES aggregator). Substitution between skilled and unskilled labour is also allowed (again via a CES function).
- The supply of labour is positively influenced by movements in the wage rate governed by an elasticity of supply is (assumed to be 0.2). This implies that changes influencing the demand for labour, positively or negatively, will impact both the level of employment and the wage rate. This is a typical labour market specification for a dynamic model such as DAE-RGEM. There is other labour market 'settings' that can be used. First, the labour market could take on long-run characteristics with aggregate employment being fixed and any changes to labour demand changes being absorbed through movements in the wage rate. Second, the labour market could take on short-run characteristics with fixed wages and flexible employment levels.

Investors

Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. The global investor ranks countries as investment destination based on two factors: current economic growth and rates of return in a given region compared with global rates of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.

International

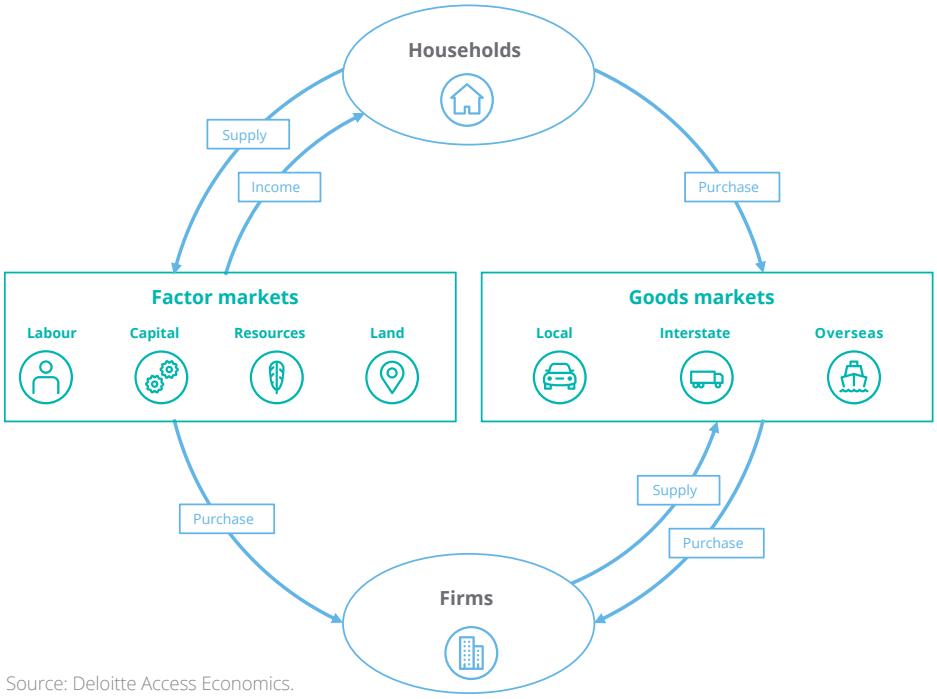
Each of the components outlined above operate, simultaneously, in each region of the model. That is, for any simulation the model forecasts changes to trade and investment flows within, and between, regions subject to optimising behaviour by producers, consumers and investors. Of course, this implies some global conditions that must be met, such as global exports and global imports, are the same and that global debt repayment equals global debt receipts each year

Methodology

Computable general equilibrium (CGE) modelling is the framework that is best suited to modelling the impact of large projects or policies on the economy. In this framework, it is possible to account for resourcing constraints and opportunity costs, and to model changes in prices and the behaviour of economic agents in response to changes in the economy. DAE-RGEM represents all economic activity in the economy, including production, consumption, employment, taxation and trade.

The stylised diagram below illustrates the circular flow of income and spending that occurs in DAE-RGEM. To meet demand for products, firms purchase inputs from other producers and hire factors of production (labour and capital). Producers pay wages and earn (factor income) which accrue to households. Households spend their income on goods and services, pay taxes and put some away for savings.

Figure F1: Stylised diagram of DAE-RGEM

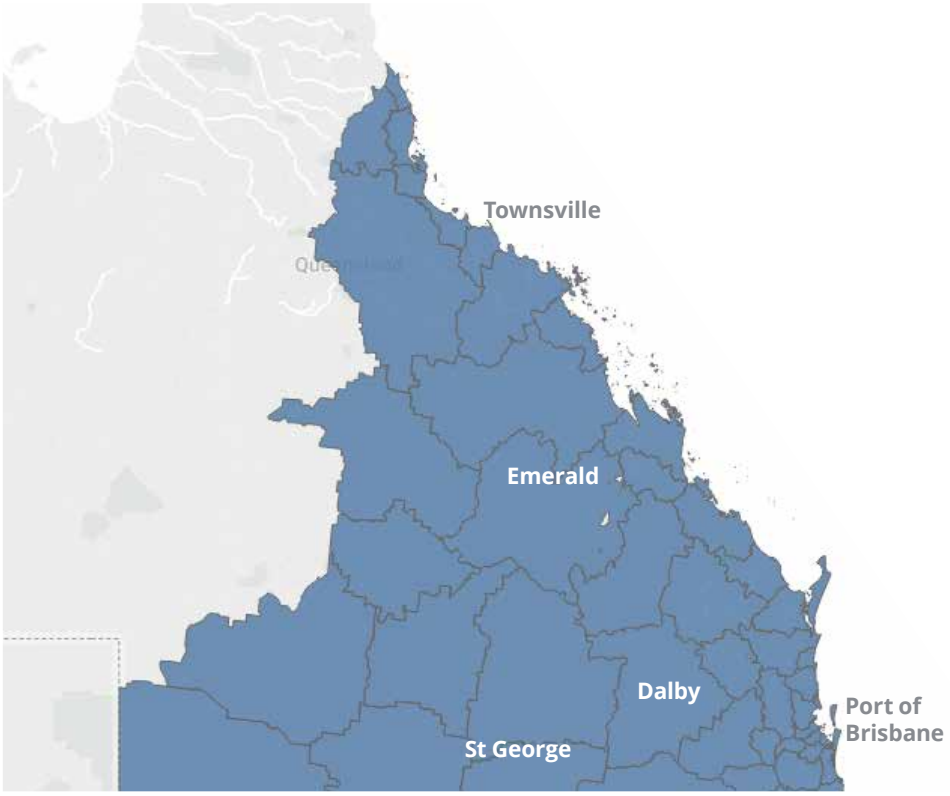


Source: Deloitte Access Economics.

A customised version of the model was developed for this study that identifies the key regional areas and industries of interest. This applied a catchment perspective that includes the surrounding areas that are linked to the Port of Brisbane. The southern part of the catchment is largely in Queensland, but also extends into northern NSW. Stakeholder consultation identified the opportunities to expand the catchment size into northern NSW (including key agricultural exports) provided rail can improve its competitiveness compared to road. This consultation also identified that a dedicated rail freight link was key to this as well as maximising the full value of Inland Rail. The model identifies 15 key industries of interest to this study including:

- Agricultural crops (grains, cottons, pulses)
- Other agriculture
- Fishing and Forestry
- Coal
- Other mining
- Food processing
- Light manufactures
- Heaving manufactures
- Trade
- Transport (road and rail)
- Other transport
- Utilities
- Construction
- Finance, insurance and business
- Other services.

Figure F2: Port of Brisbane Catchment area (local government areas)



Source: Deloitte Access Economics

Data and modelling assumptions

Indicative data was obtained from PBPL's submission to Infrastructure Australia on the Dedicated Freight Rail Corridor, which was prepared in part by Deloitte in 2013. Specifically, the capital expenditure profile for the proposed EFRB port connection component of the project was used for illustrative purposes to indicate the quantum of economic impacts that could accrue from a project of this scale. The EFRB extends from the existing Fisherman Islands rail line and broadly follows the alignment of the Gateway and Logan Motorways to a junction with the Interstate Standard Gauge Line, a total of 37km. As discussed previously, the estimated capital cost of the project was estimated at circa $2.5 billion in 2014-15 (nominal).

Direct costs savings or 'benefits' that flow through to impact productivity and the economy are discussed as follows:

- A reduction in transport costs to agricultural producers as a consequence of utilising the more efficient rail-based supply chain incorporating a dedicated freight rail link to the Port of Brisbane. The extent of cost savings is contingent on the degree of the road to rail switch, and the uptake profile.
- Reduced road traffic congestion in the proximity of Port of Brisbane.

The costs savings associated with the project commence in 2026 after completion of construction and then ramp up in line with the uptake profile. These productivity impacts then remain at a 'steady state' level until the end of the modelling period, which is 2045. These assumptions are subject to update in line with new information and modelling in the future including corridor studies, alignments, traffic modelling and other relevant information.

Chart F1: Direct transport and congestion costs savings due to the dedicated rail freight corridor (30% switch to rail), $M2016-17

Source: Deloitte Access Economics

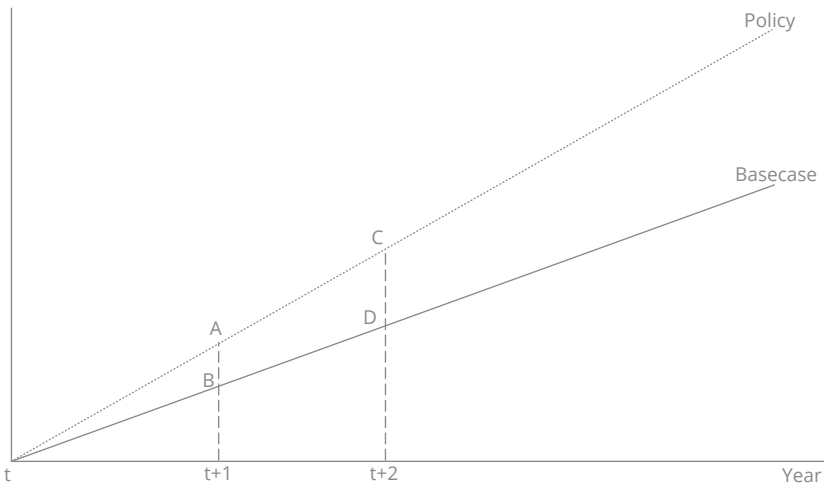
Measurement of impacts and development of shocks in DAE RGEM

The measurement of the economy-wide impacts of the dedicated rail freight corridor in DAE-RGEM is measured relative to a 'baseline' or 'base case forecast' of the economy that factors in an underlying trend rate of economic growth in the Port of Brisbane Catchment area and the rest of the Australian economy (including Queensland, NSW and Victoria of which the Inland Rail project passes through). The measurement of impacts in DAE-RGEM is shown below. The model is a dynamic model and captures the impacts associated with a project both over time and spatially.

In DAE-RGEM, the change in economic variables (e.g. real GSP, or full time equivalent employment) can be represented in both percentage change and level terms. The preceding diagram shows that in response to a policy shock (in this case: the construction and operation of the dedicated rail freight corridor) the impact at time t+1 is equal to (A-B). By time t+2 the impact is equal to (C-D) and the additional impact is equal to the difference between (C-D)-(A-B).

DAE-RGEM captures the direct and flow-on impacts of a project over time and importantly these are net impacts measured relative to a base case forecast of the economy that excludes the impacts of the project or policy being modelled (in this case, the dedicated rail freight corridor as previously noted).

Figure F3: Measurement of impacts in DAE-RGEM over time



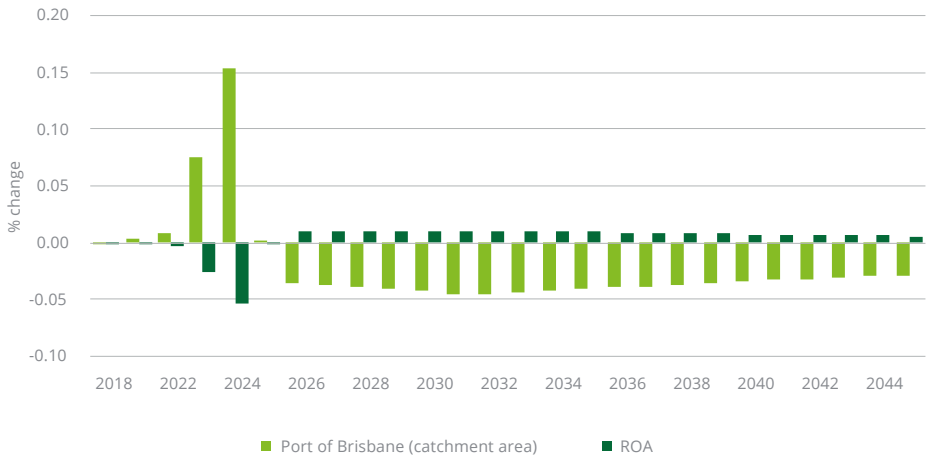
Source: Deloitte Access Economics

The direct shocks have been modelled as follows in DAE RGEM:

- **Capital investment:** The capital investment of the project is directly shocked in the model through increasing real investment in the Port of Brisbane Catchment area over the construction phase. During the operations phase the growth in real investment remains close to its business as usual level of growth.
- **Lower transport costs to agricultural producers:** The reduction in transport costs to agricultural producers (as rail is assumed to have lower direct operating costs on a per tonne or per TEU basis) has been modelled as a direct productivity improvement to output (on average) to proxy a reduction in transport costs per unit of agricultural output. The main agricultural industries that are expected to benefit include grains, cotton, pulses and other processed agricultural products including meat and horticulture as well as some inputs such as fertilisers.
- **Lower congestion costs to business and commercial users:** The reduction in congestion costs is modelled as improvement in labour productivity across industry sectors (on average) as 'business and commercial' road users are able to achieve 'travel time savings' as removing trucks from the road reduces road congestion for freight and commercial road users.

This Appendix also provides additional detailed results including discussion of competitiveness effects.

Chart F2: % Change in the gross regional product price deflator



Source: Deloitte Access Economics

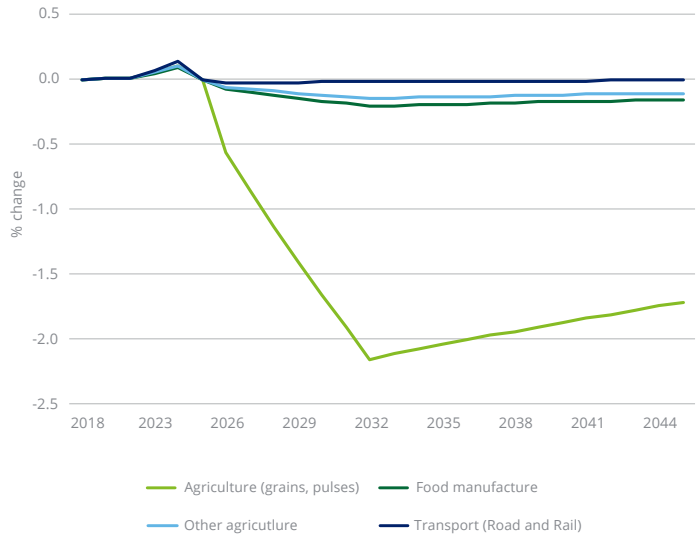
Competitiveness effects

A dedicated rail freight link would act to increase the efficiency with which goods are transported to the port, which has positive competitiveness effects – mainly in the Port of Brisbane Catchment area. Furthermore, the project increases productive capacity, reduces transport costs for agriculture producers and also reduces road congestion. It should be noted that consultation with stakeholders also identified the vital importance of the price and competitiveness of supply chain costs such as transporting goods to ports and markets overseas as being vital to the long term competitiveness of export-intensive industries. A number of stakeholders highlighted that competitors on the world stage are increasingly benefiting from lower supply chain costs and that there is a need to ensure supply costs are also competitive, with efficient and effective rail solutions and infrastructure being vital to ensure Queensland and Australia continues to remain competitive and capture global trade and export market opportunities.

In the CGE model over the long run, this translates to lower prices at the aggregate level (as proxied by the gross regional product deflator[37]). It also results in industries becoming more efficient, which is reflected through relatively lower costs of production and through a lower supply price of goods and services. In the short run, there is an increase in the GRP deflator due to the large increase in construction activity and resource constraints, which pushes up the prices of labour. However, in the long run, the GRP deflator falls as the project creates efficiencies that are translated through to lower prices in the region, making the region more competitive.

The project lowers the average cost of production and supply prices for agriculture, food processing and slightly for transport (road and rail) over the long run and particular benefits agriculture producers in the Port of Brisbane Catchment area.

Chart F3: % Change in Supply Price – Agriculture and Transport, Port of Brisbane Catchment



Source: Deloitte Access Economics

[37] The gross regional product deflator measures the cost of production of all goods and services produced within the Port of Brisbane Catchment area (as defined in this study) and excludes imported goods and services. It therefore provides a measure of domestic production costs.

Limitation of our work

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