Resources Rail Lines Phase 2

Final Report

Freight Partnerships | September 2015

Photo Location: Louis Dreyfus Commodities Rail Siding, Yamala. Central Queensland.

Queensland Government

Executive Summary

Executive Summary

Study Overview

This study investigates the economic viability of an intermodal facility as proposed at Yamala by examining the potential supply chain effects of a standardised logistics platform. It also explores the potential indirect benefits an intermodal facility can generate for local residents, industry and the wider state economy.

Project Objective

The objective of the proposed Intermodal facility at Yamala is to improve supply chain efficiency between key origins and destinations incentivising greater utilisation of rail freight, preserving the level of service on state controlled roads and which provides benefits to the wider community.

Facility Overview

The preferred site is strategically located in relation to key supply chain operators and existing infrastructure linkages. Located approximately 22.2km east of Emerald. The facility would ultimately include additional rail and road infrastructure as well as hardstand and storage facilities.

Demand Analysis

A demand forecasting model has been developed to estimate the likely changes to containerised freight transport to and from Central Queensland to the Port of Gladstone associated with the opening of an intermodal facility at Yamala. The objective is to illustrate the volume and mode share impacts of the facility and the associate welfare benefits that may be generated.

The demand model and associated analysis indicates a forecast saving of approximately 236m net tonne kilometres in road based freight movements in 2020 alone and a forecast mode share of around 16%, on average, for contestable rail freight.

Economic Profile

The proposed intermodal facility at Yamala has the potential to be a pivotal component of a number of economic supply chains across Central Queensland. The analysis indicates that the facility has the potential to act as a catalyst for growth and innovation in both the mining and agriculture sectors.

CBA Results

The results of the conceptual CBA demonstrates that the project returns a net economic benefit in excess of indicative project costs and should be further considered for detailed analysis. The project has a positive indicative NPV, at the 6% discount rate of **$42.23m**, which is substantiated by an indicative BCR of **3.3** and an IRR of **17.9%** which is above the prescribed hurdle rate of 6 per cent.

Indirect Benefits

The Project will promote greater efficiency and provide additional capacity to agricultural and primary industries which most need it. It allows for the co-location of complementary industries and services such as bulk storage and logistics support. The construction of the facility, likely to cost around $20m, would potentially support 60 FTEs over the construction period.

Conclusions

In summary, the development of the intermodal facility at Yamala does demonstrate a preliminary benefit to users, government and the community. Accordingly, preliminary analysis indicated that the project may ultimately lower transport costs and encourage greater rail mode share for contestable freight volumes providing benefits to users.

Engagement with the community and industry stakeholders confirmed the need for the project highlighting the facility as a feasible and an important infrastructure requirement to unlock transport constraints in the region. A preliminary assessment of indirect benefits identifies the role the facility can play in promoting agglomeration of firms, increasing competitive markets, labour market impacts and jobs creation.

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Chapter 1 – Project Overview and Context

1.1 Introduction and Context

Introduction

Overview

A key priority of the Queensland Governments' Moving Freight Strategy for more efficient freight movements (TMR, December 2013) is for more efficient freight movement to improve regional rail transport for agriculture and general freight.

Page 35 of the Moving Freight Strategy outlines that:

In regional Queensland, growth in mining inputs and agricultural exports provides an opportunity for further rail terminal development, and hence support a potential mode shift for these tasks from road to rail. In particular, growing demand for mining inputs to the Bowen and Galilee basins provides the opportunity to develop rail terminal handling capability between the ports of Mackay and Gladstone and areas such as Emerald and Alpha. This opportunity has the ability to deliver a range of freight system benefits such as:

- *Getting freight on rail*
- *Enhancing rail investment*
- *Providing a direct connection to sea freight markets*
- *Increasing rail competition (by attracting new rail operators)*
- *Developing regional distribution facilities*
- *Reducing heavy vehicles on the road network.*

However, further investigation is necessary to determine potential terminal locations that complement the logistics requirements of these types of tasks.

The Resources Rail Lines Final Report (Project Phase 1) reflected the results of extensive stakeholder consultation including Central Highlands Regional Council (CHRC), fuel importers, agricultural producers, third party terminal operators and area land owners.

The phase 1 report concluded that potential increases in demand for the transport of significant mining input material to the Bowen and Galilee Basins, coupled with further potential increases in underlying demand by the agricultural and constructions industries warrant investigation and understanding of the economic potential of a greenfield "inland port facility" in Central Queensland.

This Report is the continuation and second phase of the Resource Rail Lines project and outlines key economic considerations of the potential development of an intermodal facility (also known as an inland port) at Yamala, 22.1 kilometres east of Emerald. This location has been selected for evaluation due to its alignment with the Central Highlands Strategic Framework (Future Directions for Land Use Planning 2031) document and recommendations contained within the Phase 1 report.

Global market conditions have significantly slowed the momentum of new mine development activities in the Galilee basin. This has the potential to delay or lessen the short to mid-term opportunities described in this report.

Phase 2 investigates the economic viability of an intermodal facility as proposed at Yamala by examining the potential supply chain effects of a standardised logistics platform. It also explores the potential indirect benefits an intermodal facility can generate for local residents, industry and the wider state economy.

Study Context

Study Objectives

The Resources Rail Lines: Phase 2 project aims to assess the efficiency impacts generated for freight in Central Queensland through a strategically planned and innovative inland intermodal facility at Yamala, east of Emerald.

This study is focused on achieving the following objectives:


Identifying the function provided by an intermodal facility in Central Queensland


Providing a robust assessment of the economic impacts generated by a proposed intermodal terminal at Yamala


Identifying the potential supply chain efficiencies derived by a standardised logistics platform.


Providing an assessment of the direct and indirect economic benefits which could be derived from an intermodal facility in Central Queensland;


Contributing to building network resilience by providing an assessment that captures the benefits of building long term road capacity as well as encouraging mode shift to rail; and


Supporting and strengthening local industry, particularly agriculture through supply chain efficiency.

Study Outputs

This study report provides an assessment of the following:

Chapter 1

- An overview and introduction to Queensland's freight challenge;
- An overview of function provided by intermodal facilities in delivering solutions to meet emerging demands;
- An overview of the wider supply change impacts that intermodal facilities may generate;
- An outline of the proposed facility at Yamala;
- An overview of successfully implemented intermodal facilities in Australia including a dissemination of the key characteristics of successful facilities; and
- A summary of the potential freight future for Yamala, drawn through a series of quantitative analysis activities.

Chapter 2

- Key themes emerging from the targeted stakeholder engagement and their implications;

Chapter 3

- An overview of the existing economic environment;
- An assessment of the potential economic viability of the proposed facilitate based on the demand assessment and order of magnitude investment cost requirements; and
- An outline of the potential beneficiaries of intermodal facility development as well as the types and quantum of economic benefits generated by the potential facility at Yamala;
- An overview of the potential indirect benefits of the facility including the potential for agglomeration, competition and labour market impacts.

Chapter 4

- Summary of the report and key next steps for further investigation.

Queensland's Freight Challenge

Freight Demand

Producers, distributors and suppliers within well established supply chains will continue to demand greater efficiency in the transportation of commodities and general goods throughout the state. The quality and reliability of supply chain operations will be imperative to achieving key productivity improvements and reaching economic growth imperatives; particularly given the underlying resource opportunities in the Galilee Basin in Central Queensland.

Queensland has a very large freight task with a total freight volume in 2010-11 of 871 million tonnes. This task is expected to increase by 2026 to between 1,643-1,741 million tonnes.

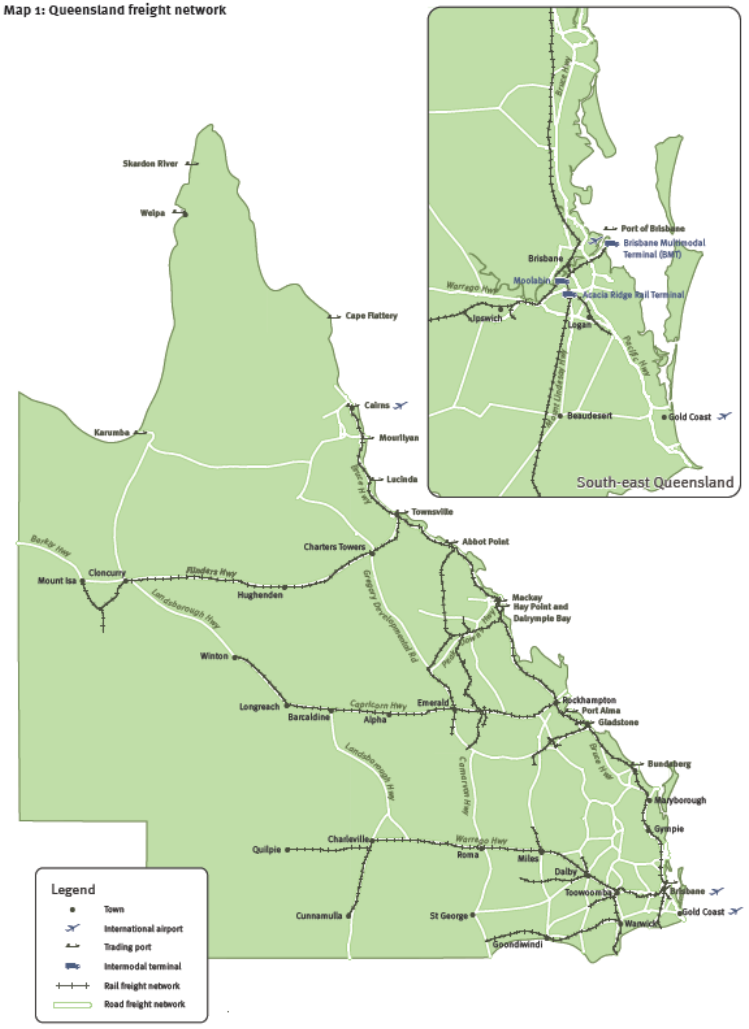
Currently, the movement of agricultural commodities and livestock in Central Queensland is largely skewed towards road with between 70% and 100% of the total task being transported by road. This represents a greater share than the state average of 69%. In 2010-11, rail moved 29% of freight with most of this attributable to bulk freight such as coal, minerals, bauxite, cement, grain and sugar. The remaining 2% of freight was moved by sea and air.

Queensland supply chains are benefited by strategic transport improvements that provide savings in end to end transit time and total transit costs. Where efficiencies can be generated throughout the supply chain, cost savings can ultimately be passed on to the end customer.

Intermodal facilities along the supply chain contribute to the intermodal movement of freight by providing efficient transfer of goods from one mode of transport to another. Facilities may range from transfer points that provide a limited set of services, to purpose built terminals that are specifically designed for transfers, storage, distribution and a range of associated services. Intermodal facilities are where the commercial and operational needs of parties to an individual cargo movement come together.

It is anticipated that a facility at Yamala will contribute to alleviating Queensland's freight challenge into the future.

Map 1: Queensland freight network



Source: Department of Transport and Main Roads (2013)

Sustainable Rail Freight Transport

Freight Capacity

The limited contribution of rail freight to total freight activity is generally caused by a higher cost of and access to, rail freight relative to road transport and the reduced service quality. Although there is latent capacity across some sections of the rail network with the ability to support growing freight demand, it is necessary to ensure the system offers adequate access, reliability and flexibility in order to increase its use.

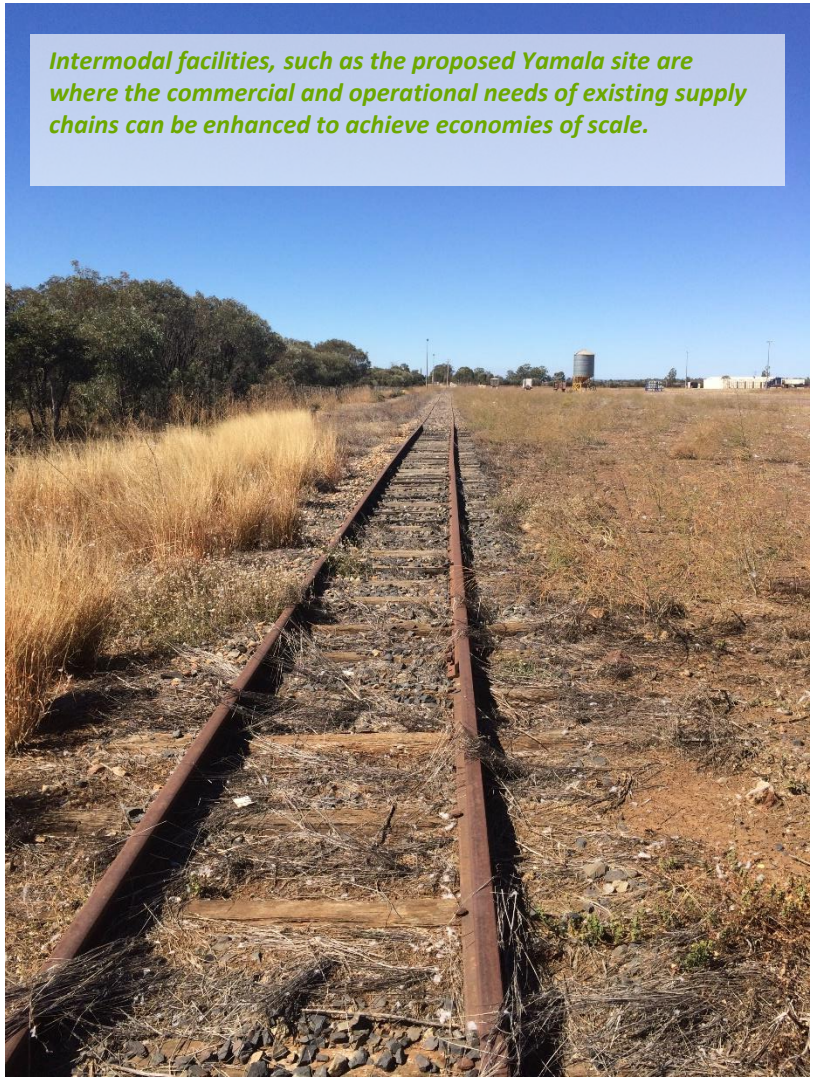
Seasonality

The seasonality of agricultural and primary industries will continue to have an impact on rail demand. Seasonal fluctuations in production require careful planning and management of the agricultural supply chains. The Australasian Railway Association identified that:

There are major costs associated with having freight transport available to meet peak production periods. If freight services are not utilised efficiently and to their full capacity, this reduces the overall efficiency of supply chains, and has a negative impact on costs – with consequential negative impacts on competitiveness and producer returns.

It is understood that agricultural and primary industries rely on bulk rail freight activities for approximately 4 months of the calendar year; meaning that for two thirds of the year, the facility could be underutilised without greater diversification of the user base to facilitate containerised grain and cotton movements by rail.

This seasonality of production and utilisation of rail freight must be considered when determining the overall level of State Government or other level of commitment required to ensure that it remains financially beneficial for producers compared to traditional road freight alternatives. This contribution may result as a modification to the existing Transport Services Contract for Regional Freight and Livestock services in regional Queensland.



Sustainable Rail Freight Transport

Pricing

Price is the predominant consideration in decisions between mode choices for freight transport. When rail is not price competitive with road or there are significant bottlenecks downstream, the provision of rail capacity and the improvement of handling capacity will not automatically incentivise greater rail use and may lead to these assets being underutilised.

The proximity of key producers to the Blackwater line provides an opportunity to introduce an intermodal transport alternative in Central Queensland that ensures products are transported to market using the most efficient supply chain. Whilst the provision of a common user intermodal may improve handling and loading costs, existing pricing approaches including take or pay contracts issued by above rail operators often unnecessarily burdens the customer with an unacceptable level of price risk. Whilst outside the scope of this project, new approaches to pricing may need to be considered in conjunction with industry.

Industry and New Markets

Sustainable rail freight transport requires an active and diverse customer market across industry sectors to provide the certainty required of above rail providers to invest in the required rollingstock, equipment, maintenance and operate at efficient prices. Ironically, new and emerging industries (particularly new non-bulk agriculture products) require sustainable alternative transport modes including rail to complete their supply chains, unlock business viability and lower total transport costs. This symbiotic relationship should drive new opportunities for freight customers and flatten seasonal variation in transport demand. This however is rarely achieved in practice, but could be supported by the introduction of greater transport choices such as those derived through the development of an intermodal facility at Yamala.

Complementary Freight Sources

It is often difficult in historically resource and mining intensive regions to identify and isolate the opportunities for alternative sources of complementary freight which could assist in supplementing existing demand for rail services. Emerald in particular is a multi-dimensional economy and while it still continues to support the mining sector, it has a rich agricultural base, primarily producing grain and cotton. Whilst these commodities are, in the main, transported in bulk from CQ at present, emerging sources of contestable freight have been identified which would provide a significant source of complementary freight volumes. These include; fuel, meat products and new and emerging agricultural products.

Key Considerations

The House Standing Committee on Transport and Regional Services noted that the sustainability of regional intermodal facilities can be promoted by meeting the following:

1. Sufficient volume of freight (at least 10,000 Twenty Foot Equivalent Units (TEUs) per annum);
2. Strategically located in the region and with regards to infrastructure;
3. Have efficient connections to transport networks and ports that boost regional skills and productivity;
4. Operate as a business entity and provide adequate financial returns to attract private investment and operators;
5. Have appropriate access arrangements;
6. Complementary freight sources (not entirely reliant on seasonal cargo);
7. Address community amenity and environmental issues by going beyond minimising negative impacts, such as noise levels, traffic congestion, and environmental issues; and
8. Add to core terminal functions, storage, distribution and a range of associated value-adding services.

1.2 Project Overview

Intermodal Facilities

What is an Intermodal Facility

Intermodal facilities are generally planned to improve the efficiency of logistics chains by providing a purpose built hub for the transfer of freight from one mode to another. Broadly speaking, it is a multi-functional facility that contributes to the effective transit of goods and materials.

Enabling shifts in mode is particularly important for rail transport, where a siding is required to allow for the efficient loading/unloading from upstream or downstream processes typically where direct rail access is prohibitive.

These facilities can therefore contribute to optimising supply chains, easing the burden on ports, state and local roads by improving the cost effectiveness of rail freight transport in regional and remote economies.

What is the function of an Intermodal Facility

Intermodal facilities have a key role in the connectivity of the supply chain, allowing freight to be transported efficiently to meet the differing requirements and commercial needs of customers.

Intermodal facilities, particularly those located inland, will also often provide a critical link to ports, by receiving, processing, inspecting, sorting, storing and consolidating containerised freight movements.

The underlying assumption for intermodal terminals is that goods can be containerised and transferred easily and quickly between road and rail, road and ship, rail and ship and other modes of freight transportation.

Another criteria for driving efficiencies in supply chains is the co-location of complimentary service providers and businesses which when located in industrial sites within close proximity solidify demand and reduce their internal transport and handling costs. These agglomeration effects are important economic drivers.

All parts of a businesses production process, must be connected in an efficient, cost-effective and integrated way to minimise handling, packaging and transportation costs to maximise their returns.

Yamala Intermodal Facility Project Objectives

The objective of the proposed Intermodal facility at Yamala is to improve supply chain efficiency between key origins and destinations incentivising greater utilisation of rail freight, preserving the level of service on state controlled roads in the region.

It is expected that the facility itself will:

- Provide a suitable location for loading and unloading of commodities and general goods consistent with local government planning and policy;
- Support the development of new supply chains – particularly for industries and operators that support the agriculture and resource industry;
- Provide a suitable rail connection to facilitate efficient transfer of freight from road to rail – and vice versa.
- Provide opportunities for private sector investment in intermodal terminal development and operation;
- Allow for the expansion of existing and emerging industries which indirectly benefit from improved access and industry clustering;
- Support export activities from the Port of Gladstone and other east coast ports; and
- Provide an incentive to drive greater efficiency in freight movements through the potential standardisation of the logistics platform including containerisation, vehicle and rollingstock configurations.

It is expected that the inclusion of an intermodal facility at Yamala will have a positive impact on broader business productivity that operate within regional supply chain networks.

Site Location

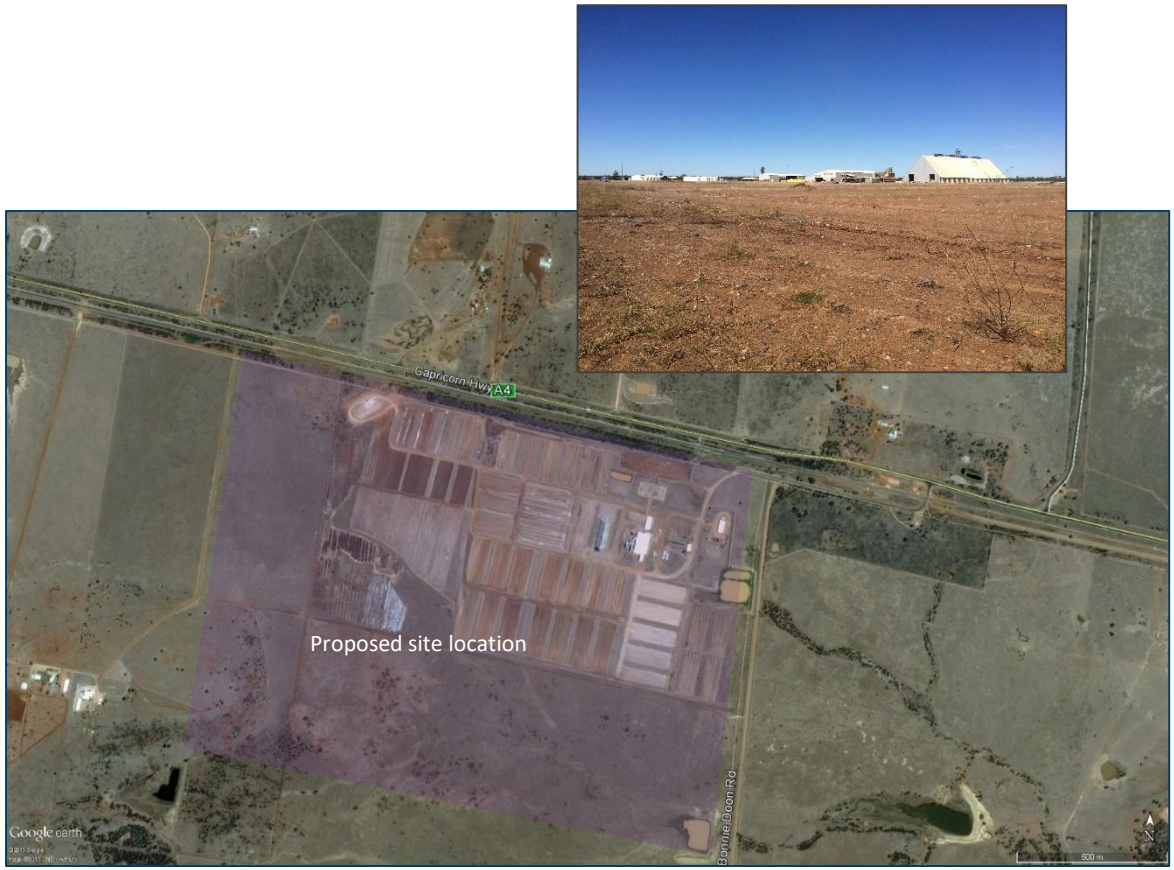
The Resources Rail Lines Final Report (Project Phase 1) identified a preferred intermodal site at Yamala given its immediate proximity to existing large grain and cotton export facilities, and its proximity to potential new mine developments. The site at Yamala is provided in the figure below.

Access to the site is via Bonnie Doon Road from the Capricorn highway. Rail sidings, currently unused and constructed with timber sleepers, are located at northern boundary of the facility. This line has the potential to be utilised as part of the proposed Yamala facility.

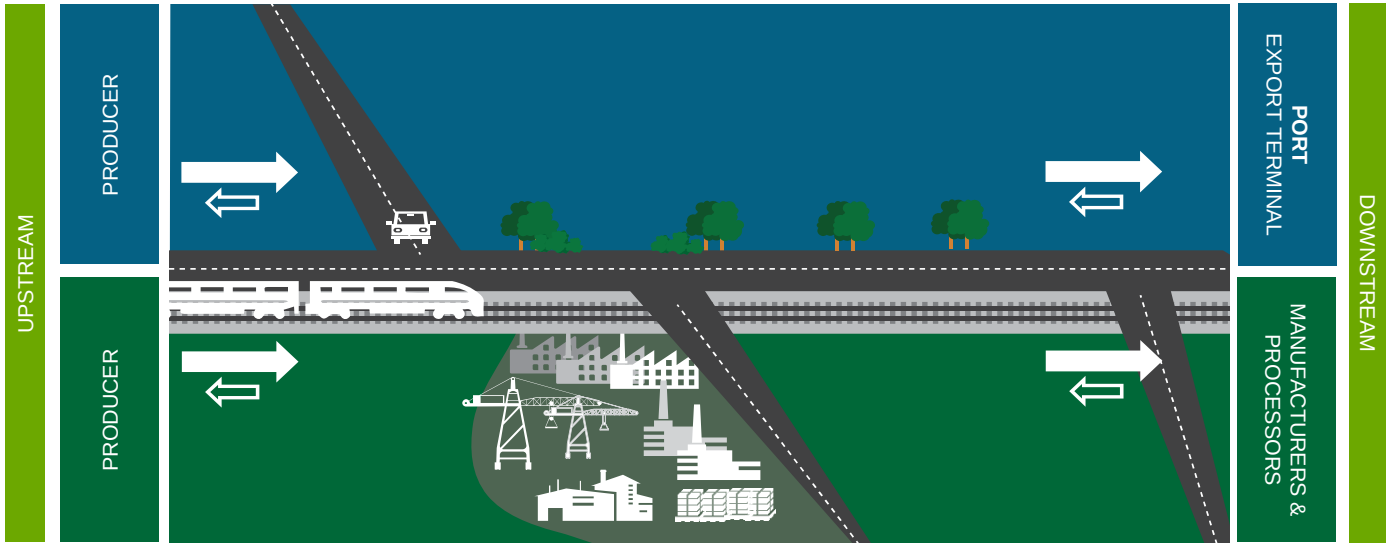
The site currently supports a cotton gin owned by Louis Dreyfus commodities who have confirmed their interest in intermodal services should they be developed. Additionally, GrainCorp has lodged a Development Application with Central Highlands Regional Council proposing the development of new bulk grain facilities adjacent to the site.

The land at the southern boundary of the site, behind the Louis Dreyfus facility, is also earmarked for future development to support supply chains in the region.

In close proximity to the preferred site are significant agricultural land holdings that produce a varied supply of agricultural commodities to market.



Supply Chain Impacts



The impacts of intermodal facilities are not only realised at the facility itself, but by both upstream and downstream businesses in the supply chain.

IMPACTS

UPSTREAM	INTERMODAL FACILITY AND LINKAGES	DOWNSTREAM
Who: producers, local communities	**Who:** local communities, transport and logistics companies, processing and manufacturing businesses, road users, Queensland Government.	**Who:** Manufacturers and processors, exporters
Impacts: • Integrated logistics options • Provides storage/lay-up areas • Co-location of support Industries • Road fleet size optimisation • Improved supply chain performance and security	**Impacts:** • Improved community amenity • Job creation • Supports modal shift • Improves heavy vehicle productivity (PBS combinations) • Reduces the impacts of road freight movements	**Impacts:** • Provides supply chain flexibility • Increases access to export containers • Greater certainty of demand • Integrated logistics service • Access to new export markets

Potential Beneficiaries

Road Freight Customers

Road freight users are likely to benefit from the intermodal facility as, over time, increases to rail freight activity preserves capacity and levels of service on the road network for express freight. The increased connectivity to rail infrastructure also supports a higher productivity benefit through increased containerisation of freight, allowing road transport companies to minimise their investment risk with a standard fleet of container (Skeleton frame) trailers. This action is likely to optimise the mix of transport modes across supply chains and improve general freight efficiency rather than adversely impacting the road freight industry.

Rail Freight Customers

Rail freight customers could expect that the development of the intermodal facility may result in lower prices per net-tonne kilometre transported as a result of greater efficiencies in the logistics chain. The intermodal facility may promote regional innovation and the ability to get cost-effective and reliable integrated services at competitive rates. In turn this may assist regional freight customers to optimise their supply chains and reduce costs through improved planning, reduced stock holdings, storage and demurrage costs.

Community

The Central Queensland community, as well as visitors to the region, are likely to benefit from improved levels of service and safety along the road network with the anticipated modal shift towards rail freight resulting from the intermodal facility development. A reduction in heavy vehicle movements will also minimise damage to road surfaces which will also contribute to improved road safety and prolong the life of the asset. The community will also benefit indirectly, from the generative and complementary economic effects borne from the intermodal facility, which are discussed further in this report.

Rail Service Providers (above and below)

It is anticipated that the intermodal facility will help to create concentrated rail freight flows with high levels of planning repetition. This results in a stable and consistent operating plan with a high utilisation rate that is required to make rail systems competitive and financially viable. Consistent patterns of demand will also assist provide rail service providers with certainty, allowing for investment in new technologies and innovative rolling stock combinations.

Government

The facility will support infrastructure and asset utilisation in the region including existing rail lines and regional ports. Additionally, the facility will provide redundancy in the transport network to accommodate future demand by preserving road capacity for Over Size Over Mass freight movements for developments such as mining activities in the South Galilee Basin.

Furthermore, the facility will assist with long term planning activities and complement local and regional planning schemes. Central Highlands Regional Council has earmarked the Yamala site as an industrial activity centre where heavy industry can operate around the clock without impacts on the broader community.

Agricultural and Primary Industry Producers

Providing an integrated rail freight service in central Queensland would provide new opportunities for containerised exports of Grain, Cotton and other perishable goods. Improving regional logistics will also result in greater market returns for producers. Furthermore, the development of containerised freight options will allow producers to expand into new markets in the Far East and South East Asia.

1.3 Case Studies

Intermodal Facilities in Australia

A review of a range of intermodal facilities across Australia has highlighted that there are a number of features that are common across successfully implemented facilities. In addition, there are a number of potentially realised benefits that are common across these existing facilities.

The following facilities were investigated to develop a summary of key features and benefits of successful intermodal facilities:

- *Yennora, NSW*
- *Macarthur, NSW*
- *Dynon, Vic*
- *Altona/Lindhurst, Vic*
- *Acacia Ridge, Qld*
- *Moorebank, NSW*
- *Sommerton, Vic*
- *Forrestfield, WA*
- *Shepparton, Vic*

Yennora, NSW

- Yennora distribution centre is located in western Sydney housing tenants of significant size such as the Australian Wool Exchange.
- The Yennora distribution centre operates as an intermodal rail terminal with nearly 7km of rail sidings and is connected to main western rail line out of Sydney.
- The Distribution Centre is one of the largest of its kind in the southern hemisphere with just under 300,000m² under roof and a further 62,000m² of dedicated container hardstand.
- The location allows direct rail access from Port Botany wharf terminals to Yennora Intermodal Terminal.
- The site houses AQIS services and Customs Bonded Facility.

Macarthur, NSW

- The Macarthur intermodal terminal is located in Minto, south-west of Sydney.
- The terminal caters for FCL, LCL and reefer containers.
- One 390m long siding (54 TEUs) that is connected to the main southern rail corridor.
- The facility is managed by QUBE, offering the following key services.
  - Container repair and cleaning.
  - AQIS and customs services.
  - Bulk pack and unpack.
  - Locomotive repairs.

Dynon, VIC

- Dynon Intermodal Terminal and Dynon Empty Park are located in close proximity to each other at the Port of Melbourne.
- The terminal is managed by QUBE, offering the following key services:
  - Port logistics services
  - Rail services
  - Fuelling station
  - Container parks
  - Container hire and sales
  - Container freight station

Altona / Lindhurst, VIC

- The constructions of intermodal terminals at Altona and Lindhurst will complete the Metropolitan Intermodal System (MIS).
- It would consist of three terminals strategically located next to rail infrastructure. Somerton Terminal in the north, Altona Terminal in the west and Lindhurst Terminal in the south-east.
- The aim of the system is to increase the percentage of freight transported by rail across Victoria, to address road congestion and overuse of trucks.
- Lindhurst is located midway between the Port of Melbourne and the Port of Hastings.
- The delivery will be through an alliance between Qube and Salta.

Intermodal Facilities in Australia

Key Features:

1. *A location at the intersections of transport corridors. This ensures market demand exists and the terminal is cemented into supply chains.*
2. *Ability to capture market power to ensure profitability and return of investment. This facilitates the attraction of large operators such as Qube Logistics.*
3. *Container depot services including full insurance, washing and repair and AQIS/DPI/Customs inspections facilities.*
4. *A delivery that meets economic and social objectives of the government and the community.*

Acacia Ridge, QLD

- Acacia Ridge is home to the Brisbane Multi-User Terminal (BMUT). It is the largest SEQ rail/road intermodal terminal and is located in SEQ's key industrial western corridor, 14 km south of Brisbane.
- The BMUT houses 2 rail terminals. A standard-gauge terminal, owned by QR but leased to Pacific National and a narrow-gauge terminal, operated by Aurizon.
- It is the main facility for freight to be transferred from the interstate standard gauge system to the narrow gauge system that services Queensland.
- The standard-gauge terminal handles the majority of interstate container traffic moved by rail between Brisbane-Sydney and Brisbane-Melbourne.
- Narrow-gauge terminal handles a large volume of the container freight moving north to a number of Queensland destinations.
- The facility itself is operated by Qube Logistics who provide port logistics, rail and transport services.
- The intermodal terminal caters for general, hazardous and reefer containerized cargo.
- At the same location Qube also operates the Acacia Ridge Distribution Centre. The centre provides the following services: Transport, Warehousing & Distribution and Supply Chain Management.
- The following services are also provided: Container Packing & Unpacking; Pallet Handling; Pallet Storage; Cross Docking; Carton Picking; Order Scheduling; Inventory Management.

NOTE: There are currently intermodal planning studies underway in Southern Queensland to ensure key rail freight corridors are protected from urban development. Master planning of existing facilities can be the catalyst for both industrial and commercial renewal.

Moorebank, NSW

- The Moorebank Intermodal Facility is currently being developed by Moorebank Intermodal Company and is intended to be implemented mid-2015.
- Located in South-west Sydney which ensures that it has:
  - Proximity to key transport corridors including the Southern Sydney Freight Line (SSFL), the Hume Highway, and the M5 and M7 motorways.
  - Proximity to the industrial centres in Sydney's west and southwest including, Moorebank, Bankstown, Preston and Ingleburn.
- Rail/Road facility including a rail yard, trucking terminal and warehouses.
- The Moorebank Intermodal Terminal will include:
  - An import-export (IMEX) terminal to manage shipping containers moving between Port Botany, and west and south-western Sydney. The IMEX terminal is ultimately expected to handle 1.2 million twenty foot shipping containers per year.
  - An interstate terminal linked to the national rail freight network via the Southern Sydney Freight Line. The proposed capacity for the interstate terminal is 0.5 million twenty foot containers per year.
- The facilities will be open access, enabling all freight users to participate.
- The Moorebank Intermodal Terminal is expected to create opportunities for organisations involved in building, operating and financing freight logistics infrastructure, as well as related facilities including warehousing and distribution centres.

Intermodal Facilities in Australia

Key Benefits:

1. *Reduction of the percentage of freight carried by road. This lowers congestion, road maintenance costs and the number of road accidents.*
2. *Increased productivity through a reduction in travel time of goods and the ability to access economies of scale.*
3. *New options in supply chains are making new development attractive in areas that are in the catchment of the amended transport corridor. An example of this concept, is the successful development of a new IKEA distribution centre located near the Altona/ Lindhurst intermodal facility.*

Somerton, VIC

- Somerton Intermodal Terminal is located next to Curly Sedge Creek in Victoria, Australia. The terminal offers six tracks of 750 meters in length (4 dual gauge and 2 standard gauge), providing for efficient and flexible train operations.
- The facility is linked by rail to the Port of Melbourne which is 20km away.
- The rail operations comprise of Port Shuttle trains between the Port of Melbourne and Somerton and Interstate trains connecting Somerton and all state Capital cities and major regional rail terminals on the ARTC National Standard Gauge Rail and the Victorian broad gauge rail network.
- The Somerton terminal incorporates a modern container park facility with a 10,000 TEU capacity designed to handle both full and empty containers.
- Access to the terminal is managed through a state of the art gatehouse facility incorporating three B-triple weighbridges, and incorporates a Rail Terminal security system controlled from the gatehouse ensuring integrity and security of product stored on site.
- Australian Quarantine and Inspection Services (AQIS) and Customs services are available on site providing an efficiency for processing and freight activities.

Victorian Government – Mode Shift Incentive Scheme

The Mode Shift Incentive Scheme (MSIS) is an incentive program that encourages industry to shift more containerised freight from road to rail. 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. In the 2014-15 State Budget, the Victorian Government invested $20 million over four years to continue the scheme.

Forrestfield, WA

- Located south-east of Fremantle within in the industrial area of Forrestdale in WA, in close proximity to the airport and interstate rail terminals.
- Managed by Intermodal Group who also manage the North Quay rail terminal and the container park at Forrestfield.
- Key features of the facility:
  - Controlled entry and exit
  - Connectivity to the Fremantle wharves through the rail link
  - Direct access to major rail and road transport links
  - Road train access for heavy vehicle combinations (up to 36.5 metres)
  - Fumigation facilities
  - Transit storage from approximately 1,000 TEU
- The Forrestfield container park is the largest inland container park in Australia.

Shepparton, VIC

- Located 180km north of Melbourne and 5km outside of Shepparton at the Mooroopna rail yard.
- The intermodal facility is run by Toll Group.
- Most of the facilities throughput heads to Melbourne for export, with the remainder heading to West Australia as domestic trade.
- The facility averages 10 trains per week which are limited to length to 480 metres.

1.4 Demand Projections

Approach

Demand forecasting model

A demand forecasting model has been developed to estimate likely changes to containerised freight transport to and from Central Queensland to the Port of Gladstone, associated with the opening of an intermodal facility at Yamala.

The forecasting approach involved estimation of total demand for contestable imports and exports, and then forecasting the share of total demand to be transported by rail and road (mode share) for a given scenario and year.

The forecasts of total demand volumes and mode share include:

- High and Low scenarios (with or without Galilee Basin);
- Base case with no facility;
- Project case with facility at Yamala; and
- Forecast years 2015, 2020, 2030 and 2050.

Nine commodity categories have been considered within the model, as follows:

Imports	Exports
• Fuel and Petroleum Products • Chemicals • Cement and Flyash • Quarry Materials • Store Goods and General Merchandise • Building and Construction Materials	• Agriculture - Broad acre Crops • Pastoral Products • Other Agriculture

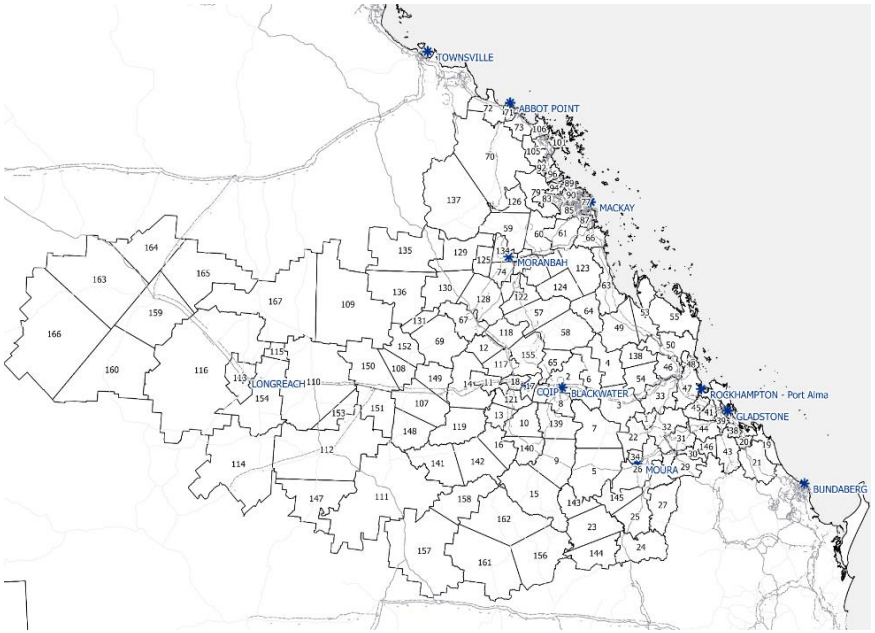
Zone system

The study area has been divided into 167 unique freight demand zones across Central Queensland, as shown below.

The development of the zones draws on existing ABS geographic classifications with modifications to account for:

- current and proposed transport infrastructure; and
- distribution of export origins, and import destinations.

The zones were also modified to ensure they are appropriately sized for travel time modelling.

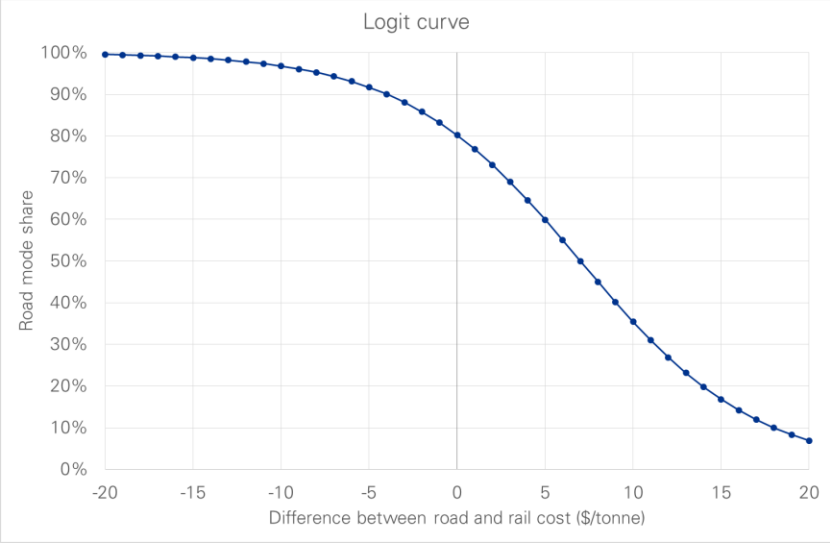


Source: ABS, 2014 and Consultant analysis

Assumptions and limitations

Mode choice

The containerised rail mode share forecasts are based on a logit model for determining individual freight operators' choice of mode, based on the comparative costs of road and rail for each journey option.



The logit function reflects a behavioural preference of freight operators towards road based journeys. Interpreting the above graph - if there is no difference between rail and road costs, the function determines 80% of operators will choose to send their containers by road (on B-Doubles).

As the rail costs (per tonne) decrease over longer distances, road mode share decreases, and rail mode share increases accordingly.

Generalised costs

Rail + Pick up and Delivery (PUD) - Generalised costs for containerised rail are based on analysis of rail operating cost per net tonne kilometre (NTK), plus pick-up and delivery costs (PUD by Road), plus Rail interchange handling costs. Where:

- Rail operating cost = $ 0.019 per NTK.
- Pick-up and delivery (PUD costs = Road vehicle operating cost * PUD distance (i.e. from the intermodal facility to final destination).
- Handling costs at rail interchange = $ 0.13 per tonne.
- Trip distances between model zones is estimated by Google maps API software and internal analysis.

Road - Generalised costs for road freight were based on analysis of operating costs of B-Double class vehicles per net tonne kilometre (NTK), and Trip distance. Where:

- Vehicle operating cost = $ 0.042 per NTK.
- Trip distances between zones was estimated using Google Maps API and GIS analysis.

TEU to Tonne conversion factors

The demand forecast mode assumes a conversion factor of 14.3 tonnes per TEU (on average) to convert tonnage projections into container terminal throughput projections (TEU), based on data provided by stakeholders and Sydney Ports Corporation.

Limitations

The rail mode shares are calibrated (conservatively) against 'Optimistic Rail Market Share' volume estimates sourced from Resources Rail Lines Report, TMR 2014. In principle the rail mode share model would be better validated by a stated preference survey from likely freight customers and operators.

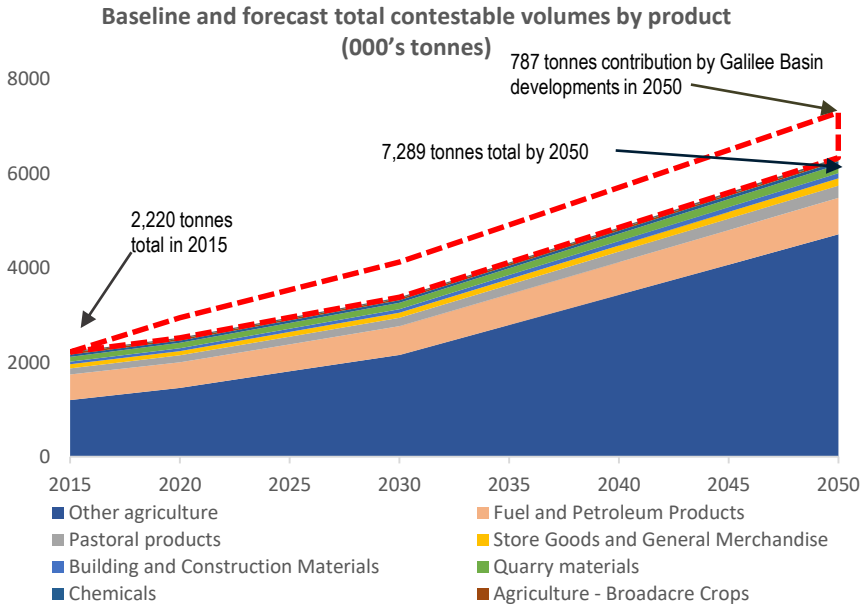
Freight volume inputs

Containerised freight volume projections

The following illustrates the contribution each product has toward total contestable volume demand across the projection period. Note, the demand generated by developments in the Galilee Basin have been isolated to show their respective impact on the total.

The commodity volumes are based on available data sources including:

- the Resources Rail Link Phase 1 report (RRL report);
- agricultural and mining production from the Queensland Government (Queensland AgTrends 2013-14, Department of Agriculture, Fisheries and Forestry); and
- population data from the Australian Bureau of Statistics.



Containerised freight composition

The volume share each product has toward total contestable demand across the projection period is outlined in the table below. Fuel and petroleum make up the largest import commodity, and 'Other agriculture' (citrus fruits, woodchips and forestry products) drives the export market.

Product	Composition	Import share	Export share
Fuel and Petroleum Products	• Diesel (in tanktainers) • Packaged Additives, Lubricants and Oils • LPG Cylinders	63.6%	-
Chemicals	• Explosives, Acids/Paints/Solvents • Fertilisers, Pesticides, Herbicides • Powders/solids	5.3%	-
Cement and Flyash	• Packaged Cement • Packaged Lime • Packaged Additives and Powders/solids	2.5%	-
Quarry Materials	• Gypsum/Talc/Powders/ Phosphate • Packaged Additives	11.8%	-
Agriculture – Broadacre Crops	• Grains – Barley, Maize, Sorghum, Wheat, Oats • Lupins/Pulses - Chickpeas, Mung Beans, Navy beans, Soybeans • Oilseeds – Sunflower, Canola, Peanuts • Cottonseed and Cotton fibre	-	2.9%
Pastoral Products	• Wool, Chilled Meat, Frozen Meat • Animal By-products – hides etc.	-	9.8%
Other Agriculture	• Logs & forestry Products • Woodchip • Citrus	-	87.3%
Store Goods and General Merchandise	• Foods/Groceries • Furniture/Removals • Appliances/white goods • Brown goods, electronics • Alcohol/cigarettes • General Merchandise	9.8%	-
Building and Construction material	• Brick, Tiles, and Pavers, • Concrete Products	7.1%	-

Source: Resources Rail Link Phase 1, TMR Queensland, June 2014

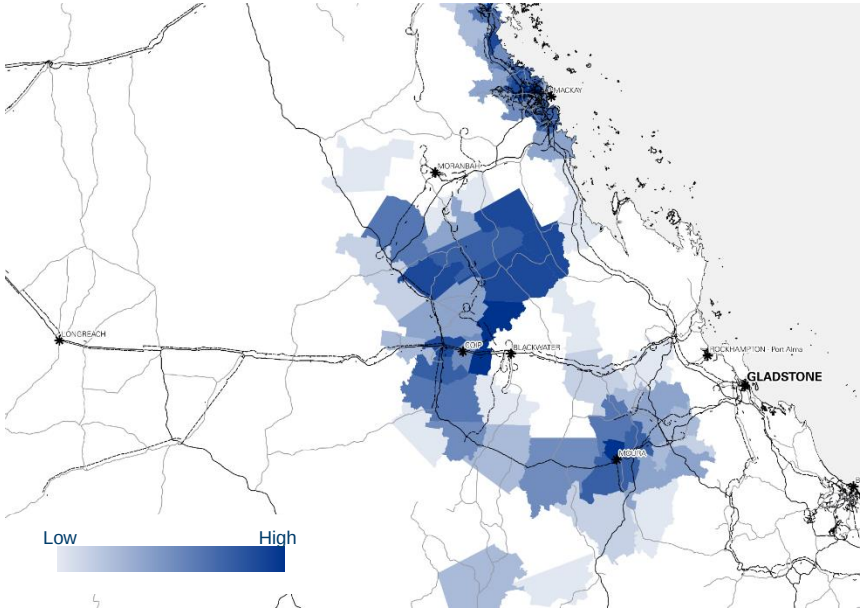
Freight volume distribution 2015

Exports - 2015

This map shows the distribution of origins of total road-rail contestable export volumes. This includes 1,374 tonnes in 2015 growing to 5,007 tonnes in 2050 consisting of the following commodity categories:

- Other agriculture (1,200 – 4,709 tonnes).
- Pastoral products (134 - 261 tonnes).
- Agriculture – Broadacre crops (40 tonnes).

Agricultural export regions are concentrated in and around Emerald and directly North towards Moranbah. The distribution pattern for exports remains constant within the demand forecasting model for all projected years (2015 to 2050).

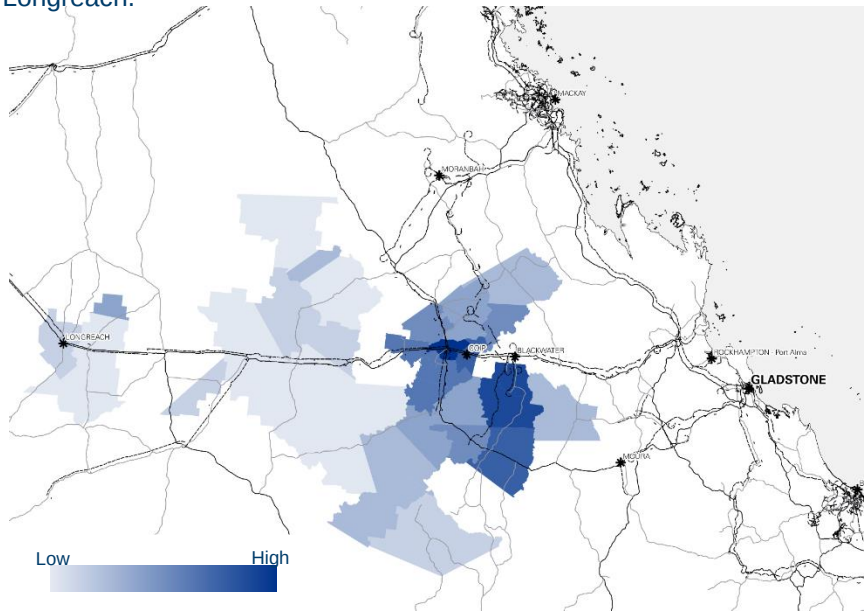


Imports - 2015

This map shows the baseline (2015) destinations of total road-rail contestable import volumes (High scenario). This includes 849 tonnes consisting of the following commodity categories:

- Fuel and Petroleum Product (540 tonnes).
- Quarry materials (100 tonnes).
- Chemicals (45 tonnes).
- Store Goods and General Merchandise (83 tonnes).
- Building and Construction Materials (60 tonnes).
- Cement and flyash (21 tonnes).

Import regions in 2015 are concentrated in mining areas around the proposed Yamala facility, and to a lesser extent to the West towards Longreach.



 Sources: Resources Rail Link Phase 1, TMR Queensland, and Australian Bureau of Statistics

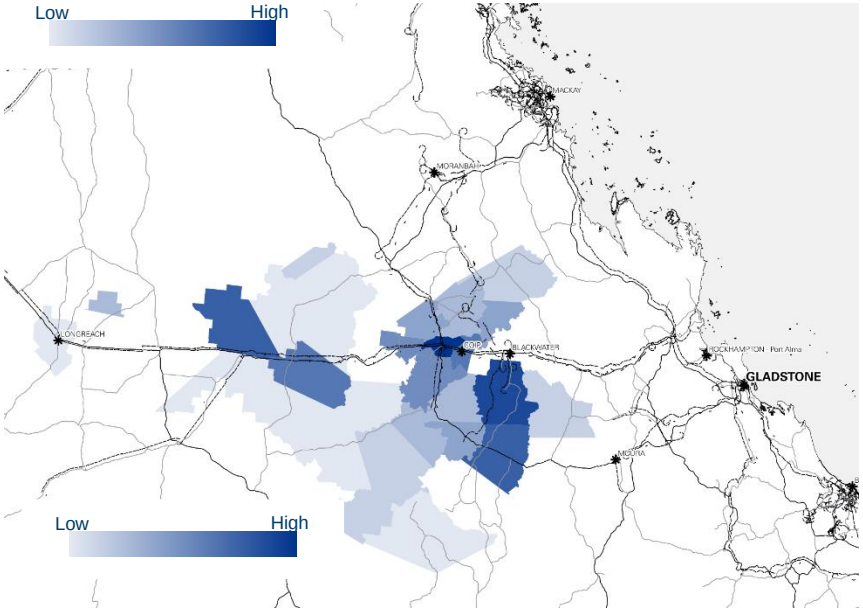
Freight volume distribution 2050

Imports – 2050 with No Galilee Basin

This map shows the forecast (2050) destinations of total road-rail contestable import volumes (Low scenario). This includes 1,495 tonnes of the following commodity categories (See Appendix for forecast assumptions):

- Fuel and Petroleum Product (938 tonnes)
- Quarry materials (185 tonnes)
- Chemicals (68 tonnes)
- Store Goods and General Merchandise (153 tonnes)
- Building and Construction Materials (111 tonnes)
- Cement and flyash (39 tonnes)

Import regions in 2050 are concentrated in mining areas to the immediate west and south of the proposed Yamala facility, and further west towards

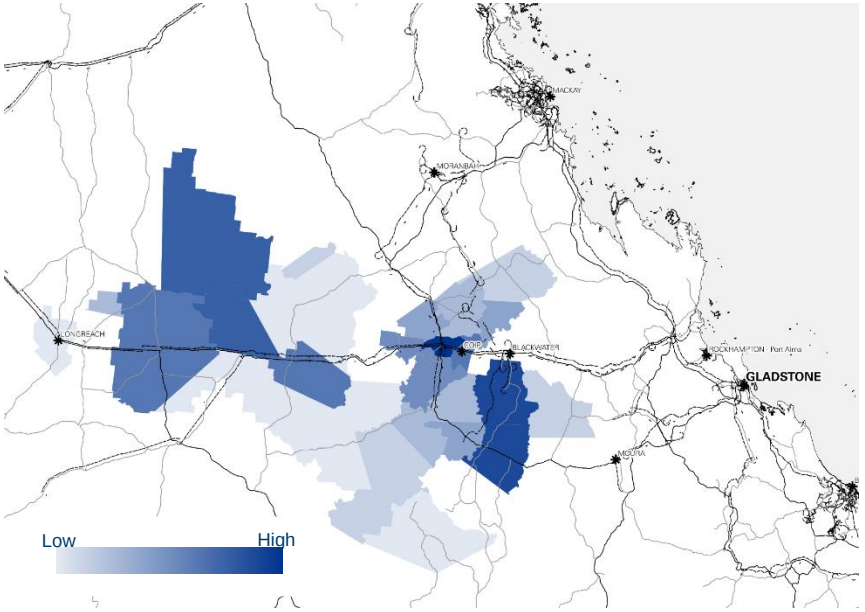


Imports – 2050 with Galilee Basin

This map shows the forecast (2050) destinations of total road-rail contestable import volumes (High scenario).This includes 2,281 tonnes of the following commodity categories (See Appendix for forecast assumptions):

- Fuel and Petroleum Product (1,644 tonnes)
- Quarry materials (185 tonnes)
- Chemicals (149 tonnes)
- Store Goods and General Merchandise (153 tonnes)
- Building and Construction Materials (111 tonnes)
- Cement and flyash (39 tonnes)

Import regions in 2050 with Galilee Basin are concentrated in further west in mining areas towards Longreach, and to the immediate west and south of the proposed Yamala facility.



Sources: Resources Rail Link Phase 1, TMR Queensland, and Australian Bureau of Statistics

Containerised rail mode share

Derived rail mode shares have been applied equally to imports and exports

This map shows the percentage of trips allocated to rail modes, for trips to or from the Port of Gladstone.

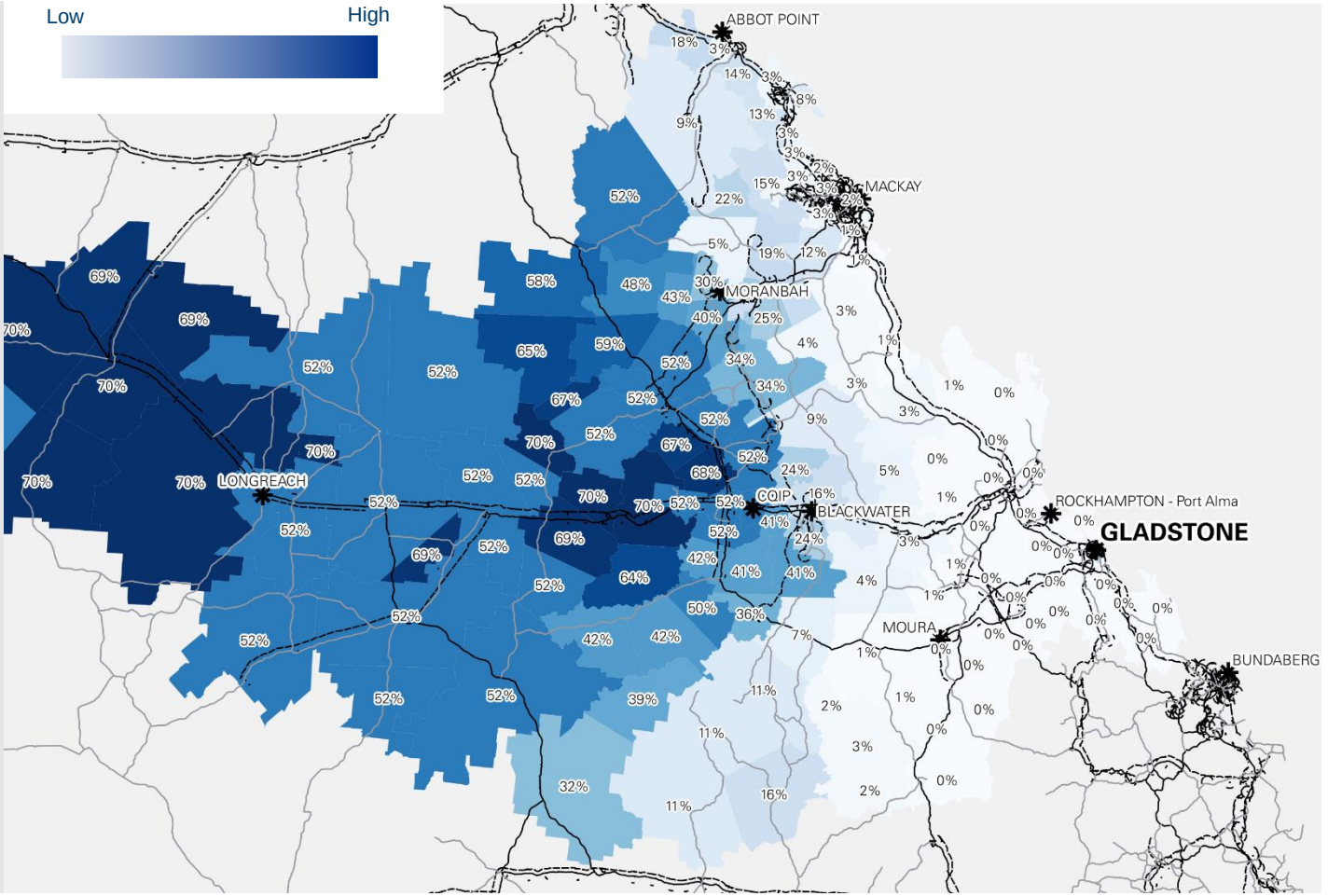
This amounts to the catchment for containerised rail.

- *Rail costs includes a combination of Rail and pickup and delivery (PUD by road).*

The mode shares are assumed to be:

- *Constant throughout the projections period*
- *Equivalent for each commodity*

Rail mode share are apparent to the West of Yamala where cost efficiencies of rail become apparent for freight journeys over 300km.



TEU Projections

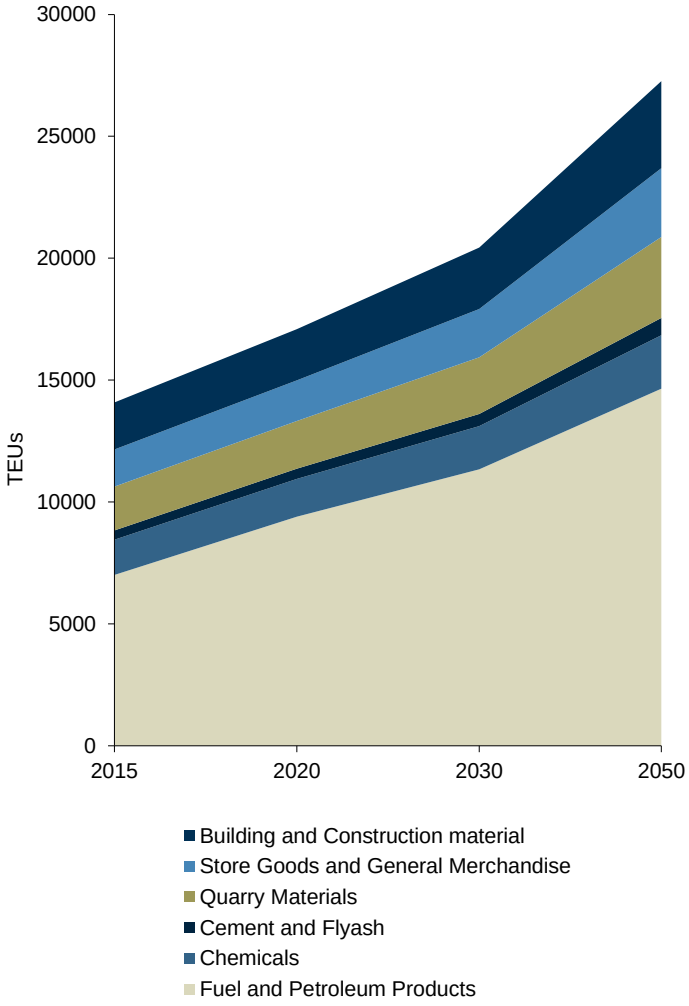
The number of import TEUs forecast on the CQIP network relies heavily on the uptake of fuel and petroleum products being utilised on rail using tanktainers / isotainers.

Export TEUs are made up mainly of Other agriculture (including citrus, forestry/timber and woodchips).

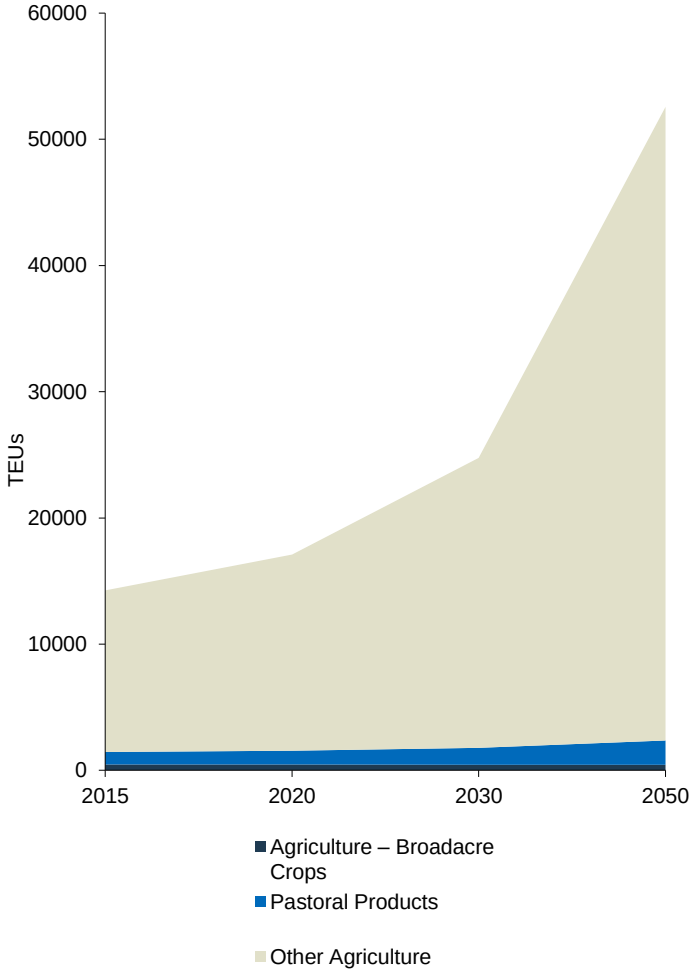
Increases over time are driven purely by increases in total volumes of import and exports. A capacity constraint to the number of services on the network has not been assumed.

Volume increases equate to a service increase from 4 to 7 trains per week (2015-2050) for imports, and from 4 to 14 trains per week for exports, each running 90 TEUs per train.

Imports – No Galilee Basin



Exports – No Galilee Basin



Chapter 2 – Stakeholder Engagement

2.1 Stakeholder Engagement

Stakeholder Engagement

Introduction

As part of this phase of the project a number of stakeholders we interviewed to validate project assumptions and obtain their insights into the viability of the proposed facility. Stakeholders were identified by their potential influence and interest in the Project and included the following:

- Operators – Rail and Road
- Customers
- Land owners
- Government – Local and State

It should be noted that a large number of stakeholders have been engaged throughout the course of TMR's investigation of the inland port facility, not all of which have been engaged during this phase of the project.

For the purposes of the Phase 2 investigation, each identified stakeholder was interviewed in person, where practicable. For those who could not be interviewed in person, a questionnaire was either provided to them verbally, or in softcopy.

The purpose of stakeholder interviews was twofold (1) to determine the type and commitment of interest held in the facility and; (2) to test and validate assumptions made in the analysis undertaken in the report.

Interviewees

- ✓ Aurizon
- ✓ Louis Dreyfus Commodities
- ✓ Wagners
- ✓ Scott Corporation
- ✓ Jebsens International
- ✓ Central Highlands Development Corporation
- ✓ Central Highlands Regional Council
- ✓ Oil Tanking Asia Pacific
- ✓ Pacific National
- ✓ Grain Growers/Farmers
- ✓ Port of Brisbane

Interview topics

The following key themes were discussed with each stakeholder:

A. Overview of Project and objectives
B. Nature of their Business
C. Interest in the facility – customer/operator etc.
D. Product type, existing transport characteristics
E. Volumes generated/transported/exported/imported
F. Transport and production costs
G. Key challenges for rail and road transport in Central Queensland
H. Key opportunities for rail and road transport in Central Queensland

Stakeholder Engagement (cont.)

Key stakeholder themes by group

A summary of stakeholder engagement results are provided by group as below:

Operators – Road and Rail

- Track condition still a concern – particularly for QR network.
- Demand reliant on uncertainties in adjacent south galilee basin projects. GVK/Adani corridors etc.
- Current rail contracts – take or pay transfer too much risk onto the customer particularly given the seasonality and uncertainty of future production.
- Road transport still provides a significant cost saving over rail. moreover – the reliability and frequency of service provides for a more efficient transport option.
- Innovation required in contracting approaches to more appropriately balance risk between customer and operator/ joint access contracts.
- Road operators have indicated that the biggest bottleneck involves access of multi-combination vehicles through emerald and eastward towards Rockhampton/Gladstone.

Customers

- Agricultural producers do see merit in the initiative, when combined with upgrades to existing road network, in particular all weather access along Bonnie Doon Road and appropriate access back on to the Capricorn Highway.
- Other potential customers include fuel, cement and explosives providers who would send fully laden ISO-tanks to Emerald when the Southern Galilee Basin resource projects begin development.

Land Owners

- Louis Dreyfus Commodities (LDC) who currently own the Cotton Gin within the project area have previously expressed their interest in the project. Furthermore, there is an old rail siding within their boundary that could, with minor upgrades, be used as a first stage of the proposed facility. LDC have previously expressed a willingness to discuss the potential for subleasing part of their property to facilitate the commercial development of an intermodal facility.
- Other land owners, such as a private developer who owns a significant land parcel behind the LDC facility and GrainCorp who have expressed interest in their own facility adjacent to the LDC site have been separately engaged by TMR.

Government

- The Department of Agriculture, Forestry and Fisheries are supportive of the project and note the significant opportunity to expand agriculture in the region based on the availability of export containers to capitalise on emerging trade opportunities.
- The Central Highlands Regional Council were also consulted and have expressed their support of the project, particularly given the potential synergy with a newly proposed meat processing facility west of Emerald.

Chapter 3 – Economic Analysis

3.1 Economic Profile

Economic Profile

Introduction

It is important to understand the potential impact that the Yamala facility may have on the region's economy. The economic profile of the Central Queensland region is explored in this section of the report.

Profile Geography

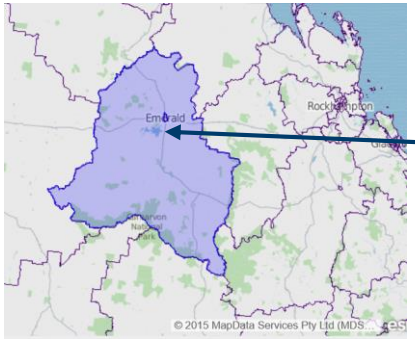
For the purpose of this exercise, *Australian Bureau of Statistics* (ABS) data has been used. This analysis draws upon '*Place of Usual Residence*' data from the 2011 Census. In addition to Census data, this analysis draws upon regional profile reports generated via the *Queensland Office of State Revenue* (OESR).

The specific areas of focus for this analysis include:

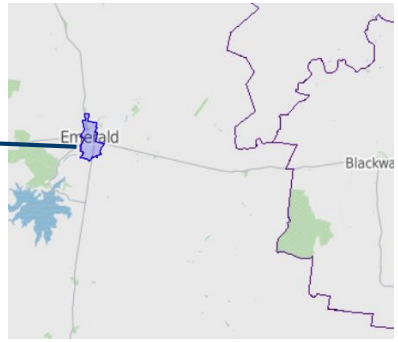
- Emerald (SLA/SA2) – Central Highlands (LGA)
- Gladstone (SLA/SA2) – Gladstone (LGA)
- Alpha (UL) – Barcaldine (LGA)

The Yamala facility is proposed to be located near to Emerald and service supply chains originating in Alpha and extending through to Gladstone Port.

A regional comparison has been undertaken using Local Government Areas (LGAs) to provide context to the regional profile of specific locations long the Yamala supply chain.

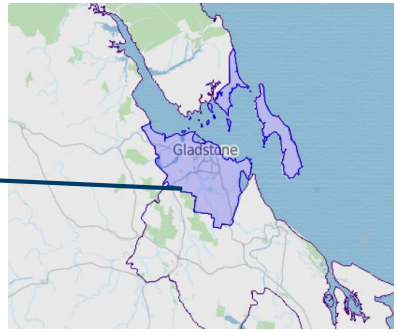


Central Highlands LGA

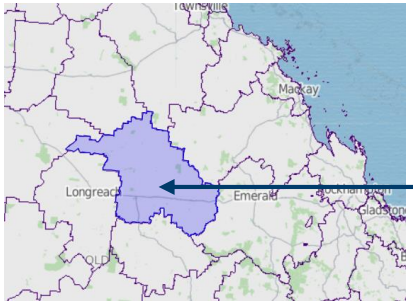


Emerald SLA/SA2

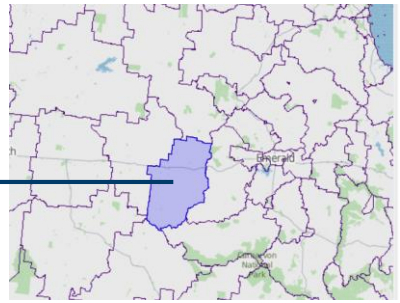
Gladstone LGA



Gladstone SLA/SA2



Barcaldine LGA


Alpha UL

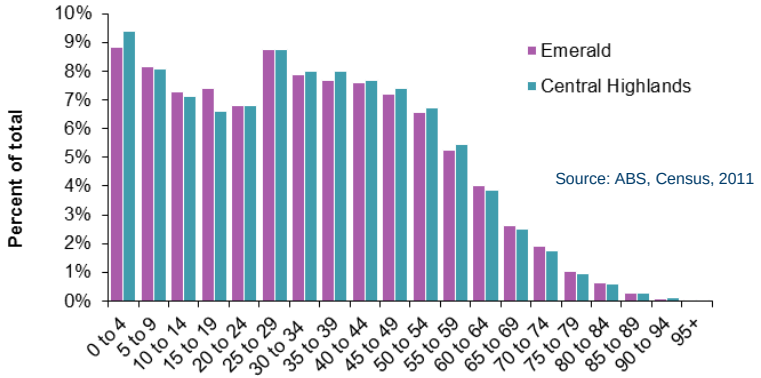
Economic Profile

Emerald – Central Highlands

Emerald is a small city located approximately 900km North-West of Brisbane situated within the Central Highlands region. The city lies on the Nogoa river, and is approximately 300km from the coast and 270km west of Rockhampton. Central Highlands is a local government area covering 53,677 square kilometres in Central Queensland. Other significant towns within the region include Blackwater, Springsure, Tieri and the location of Yamala. Emerald is a service town for a number of industries in the area, including extensive coal mining operations, cotton, grape, citrus and grain.

The proposed intermodal facility is to be located at Yamala meaning that services, suppliers and the community of Emerald are likely to support its development and ongoing operation.

Age Profile



EMERALD

21% Total employment in the Mining Sector

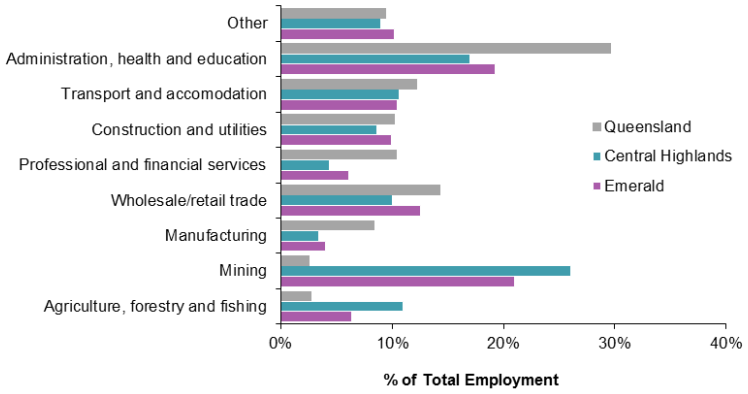
19% Total employment in the Administration, Health & Education Sector

CENTRAL HIGHLANDS

26% Total employment in the Mining Sector

17% Total employment in the Administration, Health & Education Sector

Industry of Employment



Source: ABS, Census, 2011

Businesses by turnover	$0 to less than $100k		$100k to less than $500k		$500k to less than $2m		$2m or more		Total
Region	count	%	count	%	count	%	count	%	count
Emerald	477	33.4	567	39.7	248	17.4	137	9.6	1,429
Central Highlands	1,260	37.5	1,196	35.6	617	18.3	290	8.6	3,363

Source: ABS, Census, 2011

Total annual family income	Less than $31,200		$31,200 to $77,999		$78,000 to $155,999		$156,000 or more		Median ($/year)
Region	count	%	count	%	count	%	count	%	$
Emerald	160	5.1	472	15.0	1,326	42.0	749	23.7	128,856
Central Highlands	584	8.2	1,316	18.4	2,716	38.0	1,492	20.8	117,312
Queensland	149,707	13.0	373,050	32.5	363,201	31.6	125,205	10.9	75,556

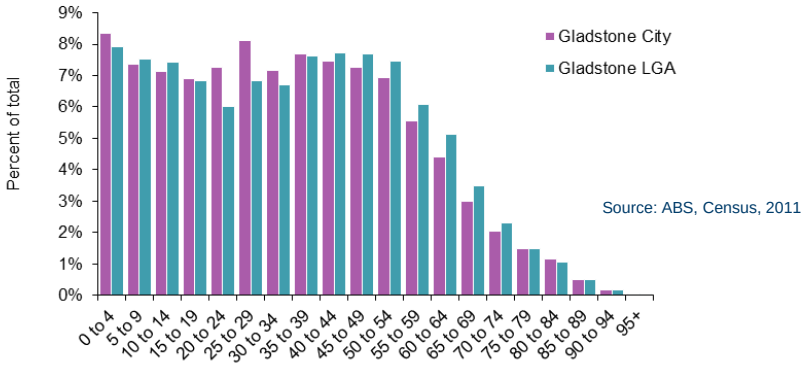
Source: ABS, Census, 2011

Economic Profile

Gladstone

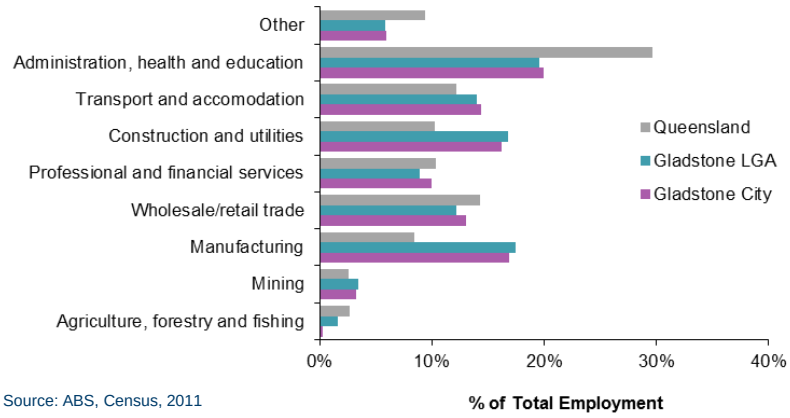
Approximately 500 km north of Brisbane, the City of Gladstone is less than an hour by plane. The Gladstone Regional Council is made up of Calliope Shire, Gladstone City, and Miriam Vale and covers an area of 10,500 km2. The region has two of the world's largest alumina refineries, the largest multi commodity port in Queensland and has recently been expanding into the LNG industry with relatively well developed infrastructure and services. There is also a strong retail and service sector in Gladstone City with tourism, beef, and timber as the other key industries.

Age Profile



Source: ABS, Census, 2011

Employment by Industry



Source: ABS, Census, 2011

GLADSTONE (CITY)

16% Total employment in the Construction & Utilities Sector

20% Total employment in the Administration, Health & Education Sector

GLADSTONE (LGA)

17% Total employment in the Construction & Utilities Sector

20% Total employment in the Administration, Health & Education Sector

Businesses by turnover	$0 to less than $100k		$100k to less than $500k		$500k to less than $2m		$2m or more		Total
Region	count	%	count	%	count	%	count	%	count
Gladstone City	213	26.5	282	35.0	195	24.2	115	14.3	805
Gladstone LGA	2,898	44.2	2,293	34.9	997	15.2	375	5.7	6,563

Source: ABS, Census, 2011

Total annual family income	Less than $31,200		$31,200 to $77,999		$78,000 to $155,999		$156,000 or more		Median ($/year)
Region	count	%	count	%	count	%	count	%	$
Gladstone City	180	12.4	383	26.3	475	32.6	241	16.6	89,596
Gladstone LGA	2,105	11.0	4,353	22.8	6,951	36.4	3,197	16.9	97,500
Queensland	149,707	13.0	373,050	32.5	363,201	31.6	125,205	10.9	75,556

Source: ABS, Census, 2011

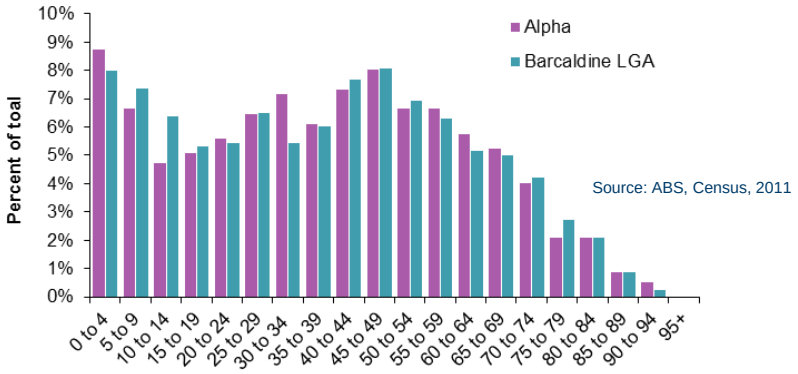
Economic Profile

Alpha – Barcaldine

Alpha is a small rural town comprised of 571 residents located in Central West Queensland, sitting within the Barcaldine LGA. The Capricorn Highway and the Great Northern Railway pass through the town.

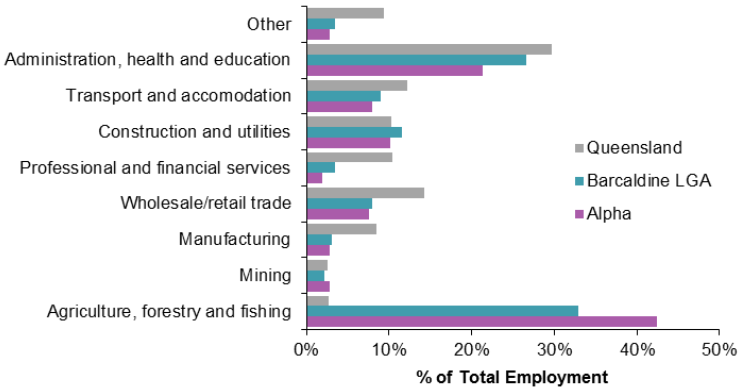
Alpha is located in the Galilee Basin. The Galilee Basin, was declared a State Development Area in 2014. The basin is 247,000 square kilometres in size and is rich in coal seam gas, conventional oil, tight oil and shale gas. Currently there are nine mines in either the proposal or approval phase within the Basin region.

Age Profile



Source: ABS, Census, 2011

Employment by Industry



Source: ABS, Census, 2011

ALPHA

42% Total employment in the Agriculture, Forestry & Fishing Sector

BARCALDINE

33% Total employment in the Agriculture, Forestry & Fishing Sector

Economic Profile

Employment

Unemployment is a key indicator of economic strength and stability for a given region. The unemployment rate is significantly lower in Barcaldine, Gladstone and Central Highlands LGAs compared to Queensland as a whole as well as the national rate. An outline of the employment statistics is shown in the table below:

Unemployment			
Region	**Unemployed**	**Labour force**	**Unemployment rate**
Barcaldine LGA	32	2,166	1.50%
Gladstone LGA	1,503	35,971	4.20%
Central Highlands LGA	690	19,049	3.60%
Queensland	160,271	2,501,392	6.40%
Australia	769,600	12,400,000	6.20%

Source: Australian Government Department of Employment, Small Area Labour Markets Australia

Theoretically, higher rates of employment indicate less friction in the workforce in these locations, as well as growing regional economies. As such, it can be surmised that the study region was in 2011, in a position of economic strength. Given however, the recent fall in commodity prices coupled with the Regions' leverage in mining related employment, weaker employment statistics may be more representative than those reported above.

Labour Force

The age profiles of each area indicate a higher percentage of working age and young persons, and a lower percentage of persons aged 65 or over compared the national Australian distribution. This is especially true in Emerald where the proportion of persons employed in the mining industry is much higher.

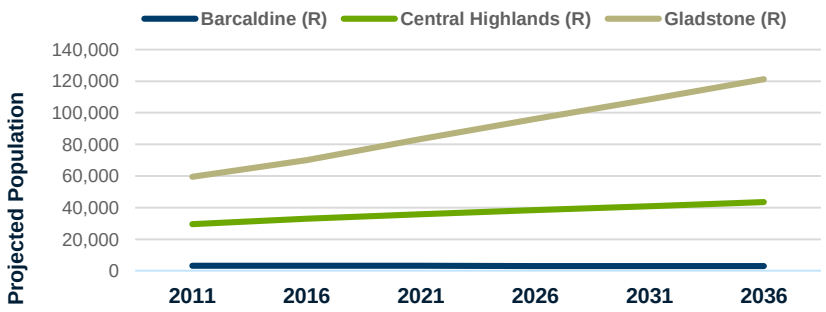
Population Growth

The table below shows the forecasted population growth for these regions compared to Queensland as a whole. For the analysis the three regions have been aggregated into one series using data from the Queensland Government Population Projections, 2013.

Population Growth	Combined regions		Queensland
Year	**persons**	**rate %**	**rate %**
2016	106,374	2.9%	2.0%
2021	122,445	2.9%	2.1%
2026	137,586	2.4%	1.9%
2031	152,515	2.1%	1.7%
2036	167,652	1.9%	1.6%

Source: Queensland Government Population Projections, 2013 edition

The forecasted growth rate for the local government regions is consistently higher over the estimates to 2036. It is conceivable that the growth rates may be much higher again if the proposed mining developments in the Southern Galilee Basin are to go ahead.



Economic Profile – Key Generators

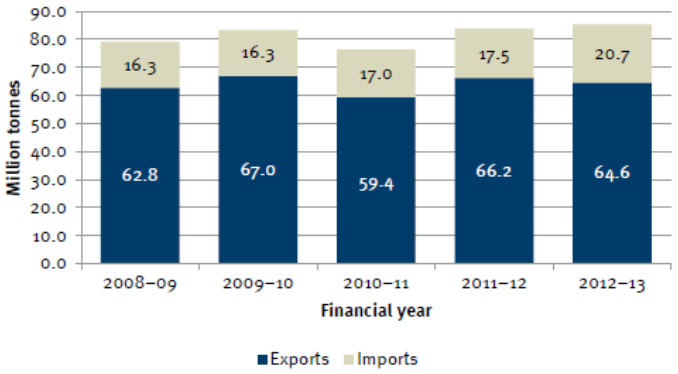
The Galilee Basin

- The Galilee Basin, with 27,750 million tonnes of coal in the region has been earmarked as one of the largest coal basins in the world.
- According to the Qld Department of State Development, Infrastructure and Planning, proposed mining projects within the basin have the potential to attract investment of more than $28billion and could provide approximately 15,000 jobs during construction and more than 13,000 operational jobs.
- Development in the region faces obstacles such as lower coal prices, legal challenges to approvals and opposition from organisations such as Greenpeace.
- Unlocking the Galilee Basin, and in turn, generating key benefits to the Queensland economy, will require effective infrastructure connectivity to ensure products reach their intended markets.

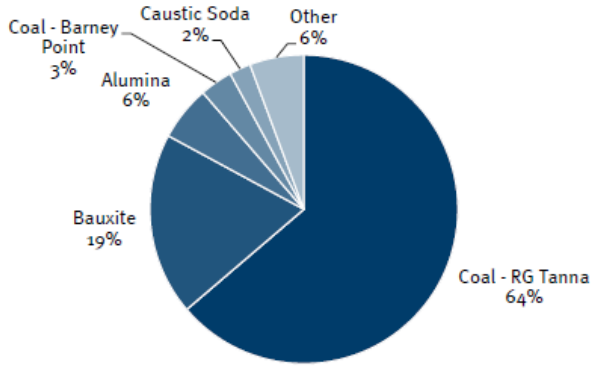
The Port of Gladstone

- The Port of Gladstone is Queensland's largest multi-commodity port, housing the world's fourth largest coal export terminal (by throughput).
- Coal continues to be the port's largest traded commodity, representing 67.2% of the total cargo throughput in 2012–13.
- In 2012–13, total trade through Gladstone was 85.29 million tonnes, a small increase of 1.8% or 1.5 million tonnes over 2011–12 figures.

Port of Gladstone - Total Throughput



Port of Gladstone - Throughput by Commodity



Source: *Dept. Transport and Main Roads – Trade Statistics for Queensland Ports – 5 years ending 30 June 2013*

Economic Profile – Summary

- Key economic generators such as the Port of Gladstone, Galilee Basin and large agricultural producers are and will continue to be key drivers of future freight activity and diversity in the region.
- The regional economy has historically been heavily reliant on mining which has generated significant activity for the construction industry. This trend in the future however will be contingent on the future development of the southern Galilee Basin. The future of the proposed mines in the region (Adani) will directly impact the volumes of commodities being exported from the region.
- There is currently low unemployment across the region. Should the projects in the Galilee Basin progress, labour will likely need to be sourced from outside of the region. Demand will also be generated within supporting industries such as fuel and spare parts – these supporting activities have the potential to benefit from the proposed facility at Yamala.
- While annual population growth rates are expected to decline in years to 2036, growth is still anticipated.
- The specific nature of key nodes along the supply chain serviced by the future Yamala facility each have specific economic and social profiles which ensures a level of economic diversity in the region. This is likely to reduce long term risk in seasonal freight volumes with key agricultural and mining contributors utilising the logistics chain.
- The long term sustainability of the region will also be benefitted by an intermodal facility by supporting growth and innovation in the agriculture sector. Improving the efficiency and effectiveness of agricultural freight transport in the region will diversify the potential long term users of rail freight by encouraging growth in other sectors. The proposed development of an abattoir near Emerald will also benefit from the proposed facility and assist to diversify the potential customer base.
- The potential for a diversified industry structure in the region is important for the long term sustainability and growth of the region. A diversified industry structure must be supported by diversified logistics offerings to be successful to best optimise supply chains and drive savings for producers.
- It is important to recognise the impact that a diversified economy will have on employment in the region. To ensure that diversification of the economy is supported by workforce planning for key industries will be critical.

The proposed intermodal facility at Yamala has the potential to be a pivotal component of a number of economic supply chains across Central Queensland and the state more broadly. The facility will contribute to improved freight efficiency in the region which will ultimately assist in the management of projected commodity volumes for the region. The facility has the potential to act as a catalyst for growth and innovation in both the mining and agriculture sectors.

3.2 Economic Appraisal

Background and purpose

Background and purpose

The purpose of the economic appraisal is to quantify the impacts to the freight and logistics sector and the broader economy of the potential intermodal terminal at Yamala. The analysis considers locations and service configurations, each with varied suitability and impact to the intermodal, interstate rail and road logistics sector.

Over the next 20 years, significant growth is expected in Australia's freight task. Specifically:

- Road freight is expected to increase by 50 percent.
- Rail freight is expected to increase by 90 percent.
- The number of container movements through Australian ports is expected to increase by 5.4 percent per year.

Bureau of Transport and Regional Economics, Port Level Forecasts of Container and Ship Movements in Australia: 2004-05 to 2024-25.

The planned growth in freight is expected to place pressure on existing infrastructure impeding national productivity and competitiveness. Queensland's future economic prosperity is linked to its ability to meet changing infrastructure demands and embrace new opportunities that these create.

Transportation of freight by rail however is not without significant challenges and there is growing sentiment amongst industry that road transport provides a more cost effective and efficient service. As a result, there is great interest by all levels of government to improve rail freight mode shares particularly where there is latent capacity. Both, *Report No. 45 by the Transport, Housing and Local Government Committee* and *TMR's Moving Freight Strategy* note, in association with other recommendations, the significant improvement strategically located freight terminals can play in encouraging freight transport to rail.

The *Moving Freight Strategy* notes:

In regional Queensland, growth in mining inputs and agricultural exports provides an opportunity for further rail terminal development, and hence support a potential mode shift for these tasks from road to rail. In particular, growing demand for mining inputs to the Bowen and Galilee basins provides the opportunity to develop rail terminal handling capability between the ports of Mackay and Gladstone and areas such as Emerald and Alpha.

To further complement these views, the objective of the Cost Benefit Analysis (CBA) is to bring together demand and user and non-user benefits and costs to assess the social, economic and environmental merits of the proposed initiative. As a result the CBA will identify those members of society who benefit and those who do not; whether they be government, the private sector, road user or producer. Ultimately the purpose of the economic appraisal is to provide an indication as to the economic viability of the proposed solution for further investment consideration and analysis.

Methodology

The approach and the parameters used in the CBA are consistent with relevant project evaluation guidelines for transport projects including:

- Department of Transport and Main Roads, 2011. *Cost Benefit Analysis Manual: Road Projects.*
- Transport and Infrastructure Council, 2006 and 2015. *National Guidelines for Transport System Management.*
- Infrastructure Australia, 2013. *Better Infrastructure Decision-Making Guidelines.*
- Transport for New South Wales, 2013, *Principles and Guidelines for the Economic Appraisal of Transport Initiatives.*
- Austroads, 2014, *Updating Environmental Externalities Unit Values.*

Consistent with the relevant guidelines and best practice, preparation of the CBA involves the following:

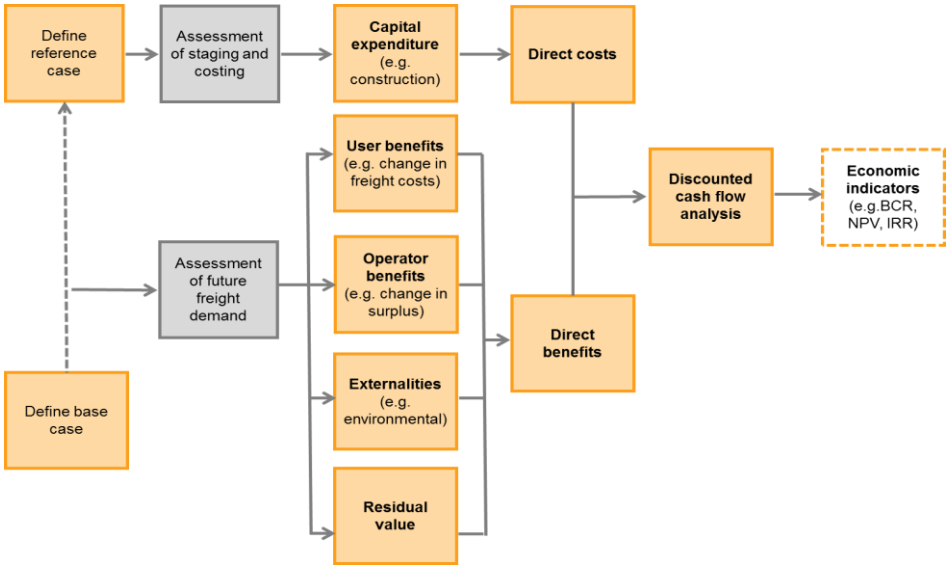
- Articulation of the base case (or 'Do-minimum') scenario and the project options.
- Identification of relevant economic, social and environmental costs and benefits.
- Quantification of the identified costs and benefits.
- Comparing and contrasting the quantified costs against the benefits over an appropriate timeframe).
- Generating performance measures such as the NPV and BCR to rank the economic returns expected across proposed options.
- Undertaking sensitivity analysis to assess the sensitivity of performance measures to changes in key variables.

The performance measures are defined as follows:

- **Benefit Cost Ratio (BCR):** a measure of the efficiency or value for money of the project, equal to the present value of benefits divided by present value of costs.
- **Net Present Value (NPV):** a measure of the magnitude of net benefit to society from the project, equal to the present value of benefits less the present value of costs of the project.

Projects that yield a positive NPV indicate that the benefits of the project exceed the costs over the evaluation period. A BCR greater than one indicates that project benefits exceed project costs over the evaluation period, however, a higher BCR is usually required to ensure contingency against unforeseen increases in capital costs, project delays or scope expansion.

An overview of the approach to undertaking the CBA is illustrated in the following diagram.



Assumptions

Key parameters used in the economic evaluation are summarised in the table below.

Item	Assumption
Discount rate	A 6% per annum real discount rate is applied in the evaluation to calculate present values of costs and benefits. Sensitivities are undertaken at both 4% and 10%.
Price Year	All costs and benefits in the evaluation are presented in 2015 Australian prices.
Evaluation period	The evaluation period covers 30 years from July 2018 (i.e. a notional date of construction completion) to June 2047.
Construction Period	It is anticipated, notionally that construction could commence from FY2016/17 and be completed within 24 months. A national capital expenditure has been estimated and has been apportioned, 60% in the first year and 40% in the second.
Demand Forecasts	Demand forecasts have been prepared for the appraisal using a mode share model which estimates total demand for contestable imports and exports, and then forecasts the share of total demand to be transported by rail and road for a given scenario and year. The forecasts of total demand volumes and mode share include: • High and Low scenarios (with or without Galilee Basin); • Base case with no facility; • Project case with facility at Yamala; • Forecast years 2015, 2020, 2030 and 2050.

Item	Assumption
Transportation methods	• Road • Rail

Benefit Categories	• Road and rail operating costs, comprising:
	  • Truck driver/ train crew time
	  • Truck/ 'above rail' operating costs (e.g. fuel, vehicle maintenance)
	  • Terminal container transfer costs (for rail)
	• Environment
	• Crash Costs
	• Maintenance – road and 'below rail'

Key Parameter Sources	• **Road Operating Costs** – Transport and Infrastructure Council: *National Guidelines for Transport System Management (NGSTM)* (2015) • **Rail Operating Costs** – Transport for New South Wales (TfNSW): *Principles and Guidelines for the Economic Appraisal of Transport Initiatives* (2013) • **Environmental externalities** – Austroads: *Updating Environmental Externalities Unit Values* (2014) • **Crash costs -** ARTC: *Melbourne-Brisbane Inland Rail Alignment Study* (2010) • **Road and Rail Maintenance** – TMR Maintenance costs and ARTC: *Melbourne-Brisbane Inland Rail Alignment Study* (2010)

Base and Project Cases

Base Case

The base case provides a fixed point of reference against which to measure the incremental costs and benefits of the proposed project. In this instance the base case is defined as the ‘do nothing case’.

The ‘do nothing’ case can simply be defined as the business as usual scenario which practically equates to an ongoing requirement to maintain the existing asset at prevailing service levels.

- In this instance, the terminal facility is not constructed and there exists no intermodal facility at Yamala.
- Freight continues to be hauled primarily by road from western regions through to key export destinations including the Port of Gladstone and Brisbane

Project Case

The project case includes the capital investment required for the project, in this case the terminal facility as well as ongoing operating and maintenance expenditure. in this instance, changes to maintenance expenditure include those which occur to the state controlled road network.

The project case includes:

- The construction of the terminal (hardstand and storage locations)
- Infrastructure Upgrades including:
  - A new rail siding and passing loop.
  - Associated road upgrades including upgrades to the rail crossing from the Capricorn Highway and Bonnie Doon Road

Demand and Volume Forecasts

Commodity Volumes (000's of tonnes) forecasts

	Base Case – Road-all-the-way				Project Case - Rail				Project Case – Remain on road			
	2015	2020	2030	2050	2015	2020	2030	2050	2015	2020	2030	2050
Total Exports	1,374	1,646	2,373	5,007	248	298	431	914	1,126	1,348	1,942	4,093
Other agriculture	1,200	1,459	2,156	4,709	222	270	399	871	978	1,189	1,757	3,837
Pastoral products	134	147	178	261	18	20	24	35	116	128	155	227
Agriculture – Broadacre crops	40	40	39	37	8	8	8	7	32	32	31	29
Total imports	849	961	1,131	1,495	250	311	374	500	599	650	757	995
Fuel and Petroleum Product	540	625	733	938	127	177	216	280	413	447	517	659
Quarry materials	100	109	130	185	33	36	42	60	67	74	88	125
Chemicals	45	48	55	68	22	24	27	34	23	24	28	35
Store Goods and General Merchandise	83	90	107	153	32	35	42	60	50	55	65	93
Building and Construction Materials	60	66	78	111	29	31	37	53	31	34	41	58
Cement and flyash	21	23	27	39	7	8	9	13	14	15	18	26

Source: *Consultant modelling forecasts*

Commodity volume forecasts illustrate the effect of the facility has on the choice of transport mode to 2050. this is then converted to Net Tonne Kilometres travelled as below.

Net Tonne Kilometres (000's) forecasts

	Base Case - All Road				Project Case - RAIL				Project Case - PUD				Project Case - Overflow to Road			
	2015	2020	2030	2050	2015	2020	2030	2050	2015	2020	2030	2050	2015	2020	2030	2050
Total Exports	593,249	711,318	1,027,526	2,174,463	86,632	103,953	150,391	319,135	63,054	75,869	110,306	235,900	452,115	541,775	781,740	1,651,208
Other agriculture	524,570	637,710	942,460	2,058,459	77,559	94,288	139,346	304,350	58,321	70,899	104,781	228,856	396,488	482,003	712,344	1,555,854
Pastoral products	51,193	56,320	68,165	99,853	6,238	6,862	8,306	12,167	2,602	2,863	3,465	5,075	42,823	47,111	57,019	83,526
Agriculture – Broadacre crops	17,486	17,289	16,901	16,151	2,835	2,803	2,740	2,618	2,131	2,107	2,060	1,969	12,805	12,660	12,376	11,828
Total imports	316,188	381,201	456,230	605,964	87,197	108,714	130,692	174,486	21,014	34,754	44,205	59,061	205,560	232,931	274,978	361,908
Fuel and Petroleum Product	185,517	238,596	287,242	369,416	44,333	61,989	75,478	97,642	10,826	23,548	30,861	40,363	138,899	160,251	188,864	241,238
Quarry materials	50,467	55,112	65,725	93,477	11,374	12,421	14,813	21,068	6,611	7,220	8,610	12,246	32,768	35,784	42,675	60,694
Chemicals	16,706	18,148	20,564	25,455	7,736	8,362	9,464	11,778	577	711	828	898	8,483	9,148	10,347	12,910
Store Goods and General Merchandise	30,627	33,446	39,887	56,729	11,346	12,390	14,776	21,015	847	925	1,103	1,568	18,567	20,276	24,180	34,390
Building and Construction Materials	22,274	24,325	29,009	41,257	9,988	10,908	13,008	18,501	745	814	971	1,381	12	13	15	22
Cement and flyash	10,598	11,574	13,802	19,630	2,420	2,643	3,152	4,483	1,407	1,536	1,832	2,606	6,832	7,461	8,897	12,654

Source: *Consultant modelling forecasts*

Freight Movements

Rail Containerised Freight Movements – Project Case

The table below highlights other key demand model outputs including the total number of containerised rail freight movements over time in the 'with project' scenario and the minimum number of trains required to accommodate demand for containerised rail. Importantly however, the demand model assumes that no capacity constraints exist on the rail network.

	2015	2020	2030	2050
Exports	192	231	334	709
Imports	194	241	290	387
Total trains required annually	**386**	**472**	**624**	**1096**
Yamala > Gladstone services per week	**4**	**4**	**6**	**14**
Gladstone > Yamala services per week	**4**	**5**	**6**	**7**

Source: *Consultant modelling forecasts*

Road Containerised Freight Movements

The total number of trips by transport mode is provided below. As the model assumes fixed demand, the total number of trips between base and project cases remain constant however in the project case a greater number of road trips shift to pick up and delivery services. It demonstrates the minimum number of B-Double trips required to accommodate demand for containerised rail.

TRIPS	Imports to				Exports from			
	2015	2020	2030	2050	2015	2020	2030	2050
Base Case TRIPS- ALL on Road	19,742	22,354	26,316	34,780	31,968	38,292	55,213	116,501
Project Case TRIPS - PUD Component to Yamala	5,809	7,243	8,707	11,624	5,771	6,925	10,019	21,261
Project Case TRIPS - overflow on Road	13,933	15,112	17,610	23,155	26,197	31,366	45,194	95,240

Source: *Consultant modelling forecasts*

Costs

Capital and Infrastructure Costs

Conceptual cost estimates have been provided in part by a rail operator and confirmed by TMR for the proposed facility. Conceptual cost estimates include:

- Infrastructure upgrades to the existing rail lines to include an additional rail siding, passing loop and signalling.
- The construction of additional hardstand and laydown areas adjacent to the new rail siding.

As the cost estimate is conceptual, cost estimates have not been derived for any additional road construction required to the facility including intersection widening, turning lanes or any upgrades to the rail crossing to the proposed entrance on Bonnie Doon Road.

Accordingly, it is estimated that the facility would cost in the vicinity of $20m. It has been assumed that the construction would occur over two years commencing in FY2016.

Cost Estimate	2015/16	2016/17
Construction Cost	$12m	$8m
% of Total Capex	60%	40%
Total Conceptual Cost	$20m	

Source: *Conceptual Capital Costs provided by Stakeholders and confirmed by TMR*

Benefits

Benefits generated by intermodal facilities

Benefits generated by intermodal facilities could generally be categorised by traditional measures of efficiency improvements, including transit time, safety, incremental maintenance and operating cost savings derived by reductions in total costs of freight transport. Importantly however, it is recognised that other indirect forms of benefits can be derived from these types of facilities – some which may or may not be captured in conventional cost benefit analysis.

Incentivising mode shift

Intermodal facilities can provide freight customers with an incentive to utilise rail freight as part of an integrated logistics solution that includes short haul, high productivity road freight services and short term storage. Rail freight offers scalable capacity compared to road freight and can therefore provide the 'critical mass' for producers and suppliers to utilise rail freight for high volume, long haul, freight movements. This has the effect of preserving road capacity for other cargo that cannot be accommodated on rail, and provides a way to lower investment risk in bespoke road transport equipment such as B-double fuel tankers.

Short distance road linkages between key agricultural and resource producers, ensure that intermodal facilities can generate sufficient economies of scale for upstream producers. As a result, the benefits of increased throughput from these upstream producers may be transferred through to other supply chains.

Transit time

Intermodal facilities can generate increased efficiency in the handling and transportation of goods, including a reduction in travel time for goods targeted at export markets. The use of rail can generate significant time savings compared to heavy vehicle transport due to the reduced number of line interruptions in the supply chain and the top speed of locomotives undertaking point-to-point trips.

Rail freight is generally considered a faster mode of transport over long distances, however the loading and unloading of goods for rail transportation can be timely. The containerisation of goods transported should be explored as a necessary investment to improve longer term and larger scale transportation efficiency.

Safety

The reduction of heavy road freight vehicles on key road networks contributes to the improvement of road safety by reducing the number of potential incidents as well as the severity of each potential accident.

Operational costs

Should the project encourage or incentivise greater use of rail as opposed to road, the total number of services required to carry a given freight task will be significantly less than the equivalent road method. As a result, the costs of rail operation compared to road may provide a net cost saving.

In addition, the terminal handling costs benefits derived through the standardisation of freight infrastructure are significant and driven by loading and unloading efficiencies through decreased handling.

Land Use Change and Community Impacts

Intermodal facilities, and the precincts in which they are located, can be the catalyst for significant land use change and intensification, as well as the trigger for both economic and community growth in local areas. Such land use change can result in the creation of agglomeration economies and trigger investment in improved infrastructure and services in the local area to support communities and further growth.

Land use change and community impacts can be realised across the full supply chain and benefit from induced investment in infrastructure improvements.

It is important that intermodal facilities operate efficiently so that any gains made from improvements in infrastructure are not lost. To ensure the success of any intermodal facility it in necessary to design the correct service mix that maximises the intermodal exchange and value at the terminal.

Benefits

The economic benefits of the project are provided in the following tables. Each table identifies the savings (or economic benefit) for freight by road (all the way) and rail via Yamala. For each benefit stream, the undiscounted and present value (discounted at 6%) of total benefits over a 30-year appraisal period are presented.

Savings in road and rail operating costs

The provision of the intermodal terminal will mean that some freight will transfer from road to rail. Therefore, relative to the Base Case, fewer road freight vehicles will be required to cater for the remaining road freight task.

Savings in road and rail operating costs were calculated from the change in the number of net tonne kilometres (NTK)* travelled by road and rail. Operating costs for rail were valued using parameters given in TfNSW (2013) and for road using the NGTSM (2015).

Rail operating costs are lower than those for road, largely due to driver costs – a train from Yamala to Gladstone could carry up to 90 TEUs with a two-man train crew, whereas a B-Double can only carry 3 TEUs, and therefore 30 drivers would be needed to carry the same number of TEUs.

However, rail freight requires a road leg to transfer freight to/from Yamala, and requires an operator to lift a container from the road vehicle onto the train (and vice versa). Therefore, rail will not be cheaper than road in every instance.

** Tonne kilometres are calculated by the weight of a train or truck and the distance it runs. This can be expressed as the total weight of a train or truck (gross tonne kilometres or GTK) or the weight of the cargo (net tonne kilometres or NTK).*

For both road and rail freight, total operating costs include:

- fuel costs
- driver/crew wages
- truck/rolling stock maintenance
- truck/rolling stock depreciation
- truck/ rolling stock return on capital costs ('above rail' costs).

For rail users, operating costs also include the cost of road to rail transfers, comprising the operating costs of a reach stacker and driver at the Yamala terminal.

Overall, the operating cost for road movements is approximately 4.2 cents per NTK and for rail movements (including terminal handling costs) between 2 and 2.5 cents per NTK.

The table below shows the total operating cost savings for the project. Over 30 years, the present value of operating cost savings is estimated to be $11.6m.

Savings in road and rail operating costs	Total benefits (undiscounted)	Present value of total benefits (discounted at 6%)
Road-all-the-way	$1,071m	$235m
Rail (including road transfers and terminal handling costs)	-$1,028m	-$223.8m
Total	**$43m**	**$11.6m**

Benefits are presented relative to the Base Case, savings are positive. Benefits presented in Q1 $2015 and counted over 30 years from project opening.

Benefits

Environmental externality savings

Environmental externalities comprise greenhouse gas emissions; air, noise and water pollution; nature and landscape impacts; and biodiversity impacts.

Savings in environmental externality costs were calculated from the change in the number of gross tonne kilometres (GTK) (comprising mass of freight and the mass of the truck/train) travelled by road and rail. These were valued using rates per GTK given in Austroads (2014).

Overall, the environmental externality cost for road movements is approximately 1.2 cents per GTK and for rail movements approximately 0.9 cents per NTK – a difference of 0.3 cents.

The table below shows the total environmental externality savings for the project. Over 30 years, the present value of operating cost savings is estimated to be $21.8m.

Savings in environmental externalities	Total benefits (undiscounted)	Present value of total benefits (discounted at 6%)
Road-all-the-way	$375m	$82m
Rail (including road transfers)	-$265m	-$60.3m
Total	**$109.8m**	**$21.8m**

Benefits are presented relative to the Base Case, savings are positive. Benefits presented in Q1 $2015 and counted over 30 years from project opening.

Crash cost savings

A diversion of freight from road to rail (as a result of the project) will result in a reduction in road truck trips, resulting in a reduction in road crash costs.

Savings in crash costs were calculated from the change in net tonne kilometres travelled by road and rail. These were valued using rates per NTK given in NGTSM (2006), which were also used for the Melbourne-Brisbane Inland Rail Alignment Study (2010).

Overall, the crash cost for road movements is 0.45 cents per NTK and for rail movements 0.05 cents per NTK – approximately ten times lower.

The table below shows the total environmental externality savings for the project. Over 30 years, the present value of operating cost savings is estimated to be $12.6m.

Savings in crash costs	Total benefits (undiscounted)	Present value of total benefits (discounted at 6%)
Road-all-the-way	$99m	$22m
Rail (including road transfers)	-$43m	-$9.2m
Total	**$55.8m**	**$12.6m**

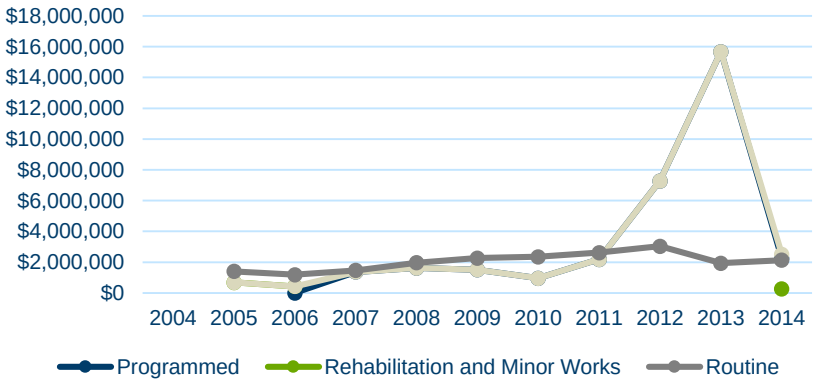
Benefits are presented relative to the Base Case, savings are positive. Benefits presented in Q1 $2015 and counted over 30 years from project opening.

Benefits

Maintenance cost savings

A diversion of freight from road to rail (as a result of the project) will result in a reduction in road trips, resulting in a reduction in pavement repair costs. Historically, TMR's road maintenance expenditure on the Capricorn Highway has been consistent as demonstrated below.

Historical Maintenance Expenditure - Capricorn Highway



As illustrated above, on average road maintenance expenditure on the Capricorn Highway alone equates to an annual equivalent of around $4m p.a for programmed and $2m for routine maintenance.

However, the increased numbers of trains between Yamala and Gladstone will result in an increase in 'below rail' maintenance costs.

Savings in maintenance costs for road were calculated from the change in the number of net tonne kilometres (NTK) and for rail from the change in gross tonne kilometres (GTK).

Mode	Maintenance Cost ($/ntk)
Road	0.0089
Rail	0.0021

Road maintenance costs were valued using a rate of 0.9 cents per NTK given in the Melbourne-Brisbane Inland Rail Alignment Study (2010) and rail costs using a rate of 0.21 cents per GTK taken from TfNSW (2013).

The table below shows the total maintenance savings for the project. Over 30 years, the present value of operating cost savings is estimated to be $14.7m.

Savings in maintenance costs	Total benefits (undiscounted)	Present value of total benefits (discounted at 6%)
Road-all-the-way	$193m	$42.4m
Rail (including road transfers)	-$128m	-$27.7m
Total	**$65.0m**	**$14.7m**

Benefits are presented relative to the Base Case, savings are positive. Benefits presented in Q1 $2015 and counted over 30 years from project opening.

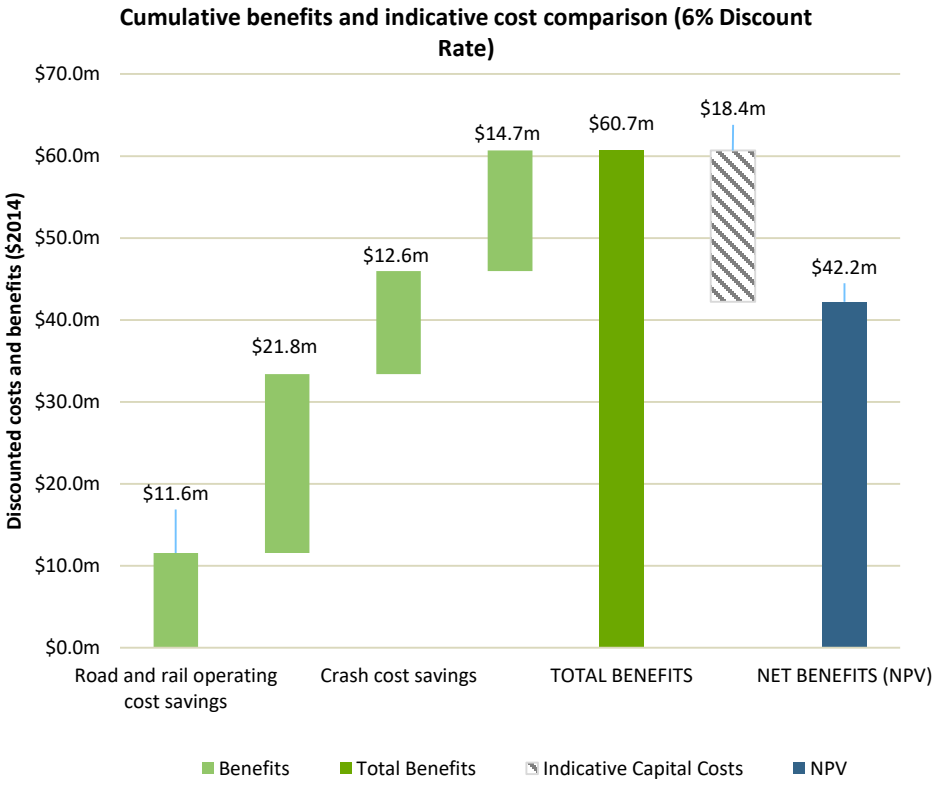
Summary of Results

The overall results from the conceptual CBA for the Yamala Intermodal facility are presented in in the adjacent chart, which shows the cumulative benefits of the project compared against what could be considered as an appropriate cost benchmark for the development of a facility of this type and nature.

The NPV is positive at **$42.2m**, which is substantiated by a BCR of **3.3** and an IRR of **17.9%** which is above the prescribed hurdle rate of 6%. The FYRR of the project is **16.4%**, which is greater than the adopted discount rate indicating that the project should be undertaken in the near term and not deferred.

The majority of project benefits comprise road and rail freight operating and maintenance cost savings at approximately 43% of total benefits. This is due to the transfer of freight from road to rail and rail having lower operating costs per net tonne km.

Whilst these results are encouraging, it should be noted that given the conceptual and indicative nature of the cost estimates; the results indicate the magnitude of economic benefit that could be generated from the intermodal facility and the potential investment which could be spent on the facility which does not compromise the economic benefit to the community i.e. up to $60m in present value.



Economic Performance Measures Summary	
Indicative NPV (6%)	$42.23m
Indicative BCR (6%)	3.3
IRR	17.9%
FYRR	16.4%

Sensitivity Analysis

Sensitivity testing is a relatively simple way to assess the uncertainty around the CBA results. By changing one input variable at a time to observe the resultant change in the BCR or NPV, it is possible to assess how sensitive input parameters are to the CBA results.

The results of the sensitivity analysis (shown in the adjacent table) indicate that the project options remain viable under most altered scenarios, except those where rail operating costs increase markedly. The lower operating cost of rail (compared to road) is the primary reason for the estimated shift in demand from road to rail. Therefore, the demand model and CBA model are particularly sensitive to increases in rail costs.

Importantly, given the significant uncertainty around the capital cost estimate of the facility, a test which doubles (Capex +100%) the cost of the facility to approximately $40m results in a positive BCR of 1.6 or $23m in NPV. This illustrates that in the event that costs rise significantly above the conceptual estimate, the project remains viable.

Furthermore, given the proximity of the potential facility to the southern Galilee Basin, it is important to identify the incremental benefit which could be generated in the event that identified mining projects were constructed. Whilst this is not a study on the viability of those projects nor an assessment of the capacity of the rail line, the 'Galilee Basin online' scenario captures the forecast additional demand (of over 25%) and results in an increase in NPV and BCR of the project to $53.2m and 3.9 respectively.

Sensitivity tests which alter discount rates result with BCR's remaining over 1 and positive NPVs.

Sensitivity Test	BCR	NPV
1. Base Estimate	3.3	$42.2m
2. Discount Rate 4%	4.4	$63.8m
3. Discount Rate 10%	2.0	$18.0m
4. Capex +100%	1.6	$23.8m
5. Capex -20%	4.1	$45.9m
6. Rail operating costs +50%	1.0	-$0.7m
7. Rail operating costs +100%	-1.4	-$43.6m
8. Road operating costs -20%	1.9	$16.5m
9. Galilee Basin online	3.9	$53.2m

3.3 Indirect Benefits

Indirect Economic Benefits

Indirect Benefits

Intermodal transport hubs in regional centres may also benefit local economies, not only through creation of jobs, but through growth in associated industries such as construction, housing, commercial and retail sectors. These indirect benefits, are typically not directly captured in traditional transport economic appraisal can be additive.

In addition to the direct economic benefits which may be derived from the facility, it is anticipated that additional indirect benefits from the facility will:

- Facilitate mixed use and provide additional capacity to agricultural and primary industries which most need it, thereby optimising the value of any potential facility.
- Allows for the co-location of complementary industries and services such as bulk storage and logistics support. The agglomeration of complementary industries optimises supply chains and improves regional economic activity through enhanced knowledge transfer and reduced supply and transaction costs.
- Provide a cost effective solution to a clear regional economic need. The infrastructure required to support and develop an intermodal facility requires less capital investment and is often simpler to design and construct that a single purpose facility.
- Diversify the potential customer base as an asset owner. It will maximise the number of potential customers and improve operational flexibility by minimising any unwarranted pricing power.
- Expansion of existing businesses as reduced transport costs result in greater profitability. This in turn leads to increase employment opportunity potential across the full supply chain.

The degree to which these indirect benefits can be attributed to the specific development – such as the one proposed at Yamala – is dependant on determining the future drivers of industry expansion should the facility not eventuate.

Indirect Benefits

Agglomeration and clustering

Agglomeration is illustrated by increased productivity and economic output when businesses locate close to one another. The existence of agglomeration is inherently obvious when considering that businesses decide to locate in city centres despite higher labour, property and transport costs.

Research on the topic of agglomeration indicates that agglomeration benefits result from three specific market orientated externalities which include:

- **Input sharing (Backward Linkages)** – Occurs when firms locate close to their markets – including individuals but more specifically other firms. This depends on the existence of economies of scale. Opportunity to source intermediate inputs from a larger number of suppliers through scale economies leads to lower cost (better quality inputs at the same price or same quality inputs at a lower price).
- **Knowledge spillovers** – This occurs when businesses benefit from other business' knowledge without needing to pay for it. This occurs when information is exchanged between businesses without an accompanying financial transaction. This tacit sharing of knowledge can occur through business collaboration and joint ventures, through workers switching jobs over time (and bringing knowledge and experience from previous jobs) and organised networking and chance encounters. There is significant evidence in literature that highlights that knowledge sharing occurs more frequently and is of higher value when undertaken amongst agents or firms that are located close together.
- **Output sharing (Forward Linkages)** – Occurs when businesses are located close to their suppliers. Economies of scale from output sharing occur when purchasers of goods can choose from a range of sellers (supplementary goods) and sellers of goods are able to capitalise on customers attracted by other sellers (complementary goods).

Agglomeration and the proposed Yamala facility

In the case of the proposed Yamala facility, agglomeration benefits are likely to be enhanced by the master planned intermodal facility which includes participation from all existing parties.

As such, it is likely that clustering of firms will likely occur, particularly given the potential for industrial development behind the facility. Industries may include local suppliers or attract new businesses of interest including:

- Mining related supplies
  - Fuel, heavy equipment manufacturers, cement, explosives
- Agricultural supplies and producers
  - Fertiliser, processing, equipment manufacturers and storage facilities for producers
- Logistics/freight companies
  - Container suppliers, logistics operators, freight forwarders.

Indirect Benefits

Increased competition in local markets

Any transport project which makes an area significantly more accessible has the potential to increase market competition. Significant enhancement in accessibility and therefore reduction in transport cost allows new firms to enter the market and effectively compete with incumbent firms.

The theory states that reducing transport costs opens up areas to increased competition, driving production efficiencies, which in turn results in lower prices for consumers. Increased competition from transport infrastructure improvements can therefore occur from one or both of:

- a reduction in generalised costs of transport causing more sellers to enter the market
- Improved access for consumers and businesses to other firms.

Given the more remote and rural setting of the Yamala facility, a new intermodal facility therefore may improve the constraints on the inflow/outflow of goods and services, promoting increased competition. This could include opening up of previously uncompetitive and new industries such as seed crushing and other agricultural products.

Labour market impacts

Additional economic welfare impacts from the proposed Yamala intermodal facility which are not captured as part of the CBA may result from changes in the labour market. In this instance, labour market deepening could be brought about by labour movements towards more productive jobs.

In this instance increased employment opportunities may transpire from changes in the location of firms in response to changes in accessibility.

For firms, moving operations to areas that offer superior accessibility reduces transaction costs in dealing with suppliers and distributors, as well as improving access to much needed workforce skills. Given the significant transport costs impeding efficient business operation in Central Queensland, it is plausible to suggest that this benefit maybe realised.

Jobs creation

As a result of additional spending in the local and regional economies from the development of the proposed facility, additional employment impacts will likely transpire during construction and in operation of the facility. Queensland Treasury estimate that for every $1m spent on construction, 3 FTE's could be potentially supported during construction. The preliminary construction estimates of approximately $20m would see an additional 60 FTE's supported through construction.

Scenario	Potential supported employment (FTEs)
Construction – circa $20m capital investment	60 FTEs over the duration of construction
Construction – circa $30m capital investment	90 FTEs over the duration the construction period
Operations – facility operation	Preliminary estimate of approx. 12 FTEs based on stakeholder interviews

Chapter 4 – Next Steps

Next Steps

In summary, the development of the intermodal facility at Yamala demonstrates a conceptual benefit to users, government and the community. Accordingly, preliminary analysis indicates that the project may ultimately lower transport costs and encourage greater rail mode share for contestable freight volumes providing benefits to users.

At present however, poor coordination between the interested parties on the future development of the facility is hampering further progress on the project. As such, the following section outlines key next steps designed to assist interested parties in the delivery of this facility.

1. **Common ground and acceptable commercial framework**

- Currently the development of the intermodal facility at Yamala is constrained by the interests of several parties including adjacent landholders. To deliver the most optimal outcome for all parties including TMR and Local Government, a negotiated commercial framework should be developed so that, acting in good faith, an agreement can be made on the form and function of the proposed facility.
- This agreement would act to provide the platform for discussions so that all who stand to benefit are also those who contribute to its development. This cannot be developed in a vacuum and needs to have equal representation from landholders, state and local government, potential users and rail operators.
- This framework could then be used in any discussions on the financing of the initiative.

2. **A commitment by users and by rail operators**

- Once an acceptable commercial framework is developed and agreed by all parties, a commitment then needs to be sought from potential intermodal users. This would also include those parties or firms who may wish to relocate to the area.
- In-principle support and commitment to the initiative will be required for users and further assist in gaining the commitment of rail operators.

3. **A detailed plan – feasibility study**

- To encourage future commitment of users, operators and associated finance, a detailed feasibility study would provide government with sufficient detail to endorse the project. The feasibility study would complement work to date and further both the design of the facility, rail and road infrastructure requirements including detailed cost estimates as well as any planning approval requirements.

4. **A well defined governance structure**

- Given the quantum and disparity of interests in the future development of the facility, a defined governance structure will help steer and propel the facility from concept to reality. To date, much of investment in knowledge, time and resourcing has been provided by TMR.
- From this point however, local government, specifically, the Central Highlands Regional Council may be better placed to act as project owner as they can best manage the diversity of interests among interested parties and take the concept through the procurement phase.
- TMR along with other state agencies should continue to play an important advisory role through the development process and ensure the design characteristics and impacts meet the individual requirements of these agencies.

Appendix

Baseline Volumes

The following table describes the methodology and sources used to develop contestable volume outputs for each of the modelled products.

Product	Approach to calculating volume output	Notes on approach
Fuel and Petroleum Products (imported)	Drew on estimates of fuel market size from Resources Rail Lines (Project Phase One) Final Report (RRL report). Assumed origin point is Port of Gladstone.	The RRL report notes that most bulk supplies are drawn from stocks at the Port of Gladstone. The estimates in the report draw primarily from port data.
Chemicals (imported)	Drew on estimates of chemical market size from Resources Rail Lines (Project Phase One) Final Report (RRL report).	The RRL report notes that materials come from Gladstone/Bajool/Port Alma area, with some also arriving from Brisbane. We have assumed that all market products identified in the RRL report travel through / arrive at Gladstone.
Cement and flyash (imported)	Volume distributed on the basis of populations for the Central Highlands, Barcaldine, Longreach Regions and Winton Shire areas.	Matched the approach adopted in the RRL report. RRL report assumes 1 tonne per capita cement and flyash consumption across particular market areas.
Quarry materials (imported)	Volume distributed on the basis of populations for the Central Highlands, Barcaldine, Longreach Regions and Winton Shire areas.	Matched the approach adopted in the RRL report. RRL report assumes 7.9 to 9.5 tonnes per capita quarry material consumption across particular market areas.
Store Goods and General Merchandise (imported)	Drew on estimates calculated in the RRL report. Assumed origin point is Port of Gladstone. Assumed destination point is Emerald	Used the mid-point of volume range calculated and displayed in the RRL report. The report notes the lack of data for use in estimating the volume of retail product. The RRL report develops the estimates using a simple bottom up model.
Building and Construction Materials (imported)	Drew on estimates calculated in the RRL report. Assumed origin point is Port of Gladstone. Assumed destination point is Emerald	RRL report drew on Queensland Government Statistician's Office data to develop building and construction material volumes.
Agriculture - Broad acre Crops (exported)	Volume distributed based on the proportion of important agricultural land in each zone. The agricultural land from the target area is aggregated and divided by the amount of that land in each zone to get the proportion split values.	Important agricultural land' data collected from the Queensland Agricultural land audit - see http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={A99EC761-C888-486C-9DA2-74B789346A2E} . The RRL report notes that approximately half the volume should be attributable to the Central Highlands area. This corresponds well with the land
Pastoral products (exported)	Volume distributed based on the number of cattle within cattle feedlots located within the zoned area.	Cattle feedlots' data collected from the Queensland Agricultural land audit - see http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={B443A9EE-861C-46BC-AE7C-D2E023E477EA} .
Other agriculture (exported)	Volume distributed based on the proportion of important agricultural land in each zone. The agricultural land from the target area is aggregated and divided by the amount of that land in each zone to get the proportion split values.	Important agricultural land' data collected from the Queensland Agricultural land audit - see http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={A99EC761-C888-486C-9DA2-74B789346A2E} . The RRL report notes that approximately half the volume should be attributable to the Central Highlands area. This corresponds well with the land

Projected Volumes

The following table describes the assumptions and sources that were used to develop the growth rates used to forecast contestable volumes for each modelled products.

Product	Approach to calculating long-term volume forecast	Notes on approach to calculating long-term volume forecasts
Fuel and Petroleum Products	Drew on forecast average annual rate of growth for coal production in Queensland by the Bureau of Resources and Energy Economics (BREE) for the period up to 2049-2050.	Source of forecast is the November 2014 report by BREE titled, Australian Energy Projections to 2049-50. Report develops forecasts based on projections of future global demand for coal by particular industries / developing economies.
Chemicals	Drew on forecast average annual rate of growth for coal production in Queensland by the Bureau of Resources and Energy Economics (BREE) for the period up to 2049-2050.	Source of forecast is the November 2014 report by BREE titled, Australian Energy Projections to 2049-50. Note, the forecasted growth in Chemical volumes is linked to mining output given most current demand is for explosives used by the mining sector - see RRL report for further discussion of this point.
Cement and flyash	Developed long-term forecast rate based on historical change in population for Fitzroy and Mackay regions in Queensland.	Estimated residential population (ERP) data collected from the Australian Bureau of Statistics (ABS) population data. Data can be accessed through the ABS Stat beta software at:http://stat.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY
Quarry materials	Developed long-term forecast rate based on historical change in population for Fitzroy and Mackay regions in Queensland.	Estimated residential population (ERP) data collected from the Australian Bureau of Statistics (ABS) population data. Data can be accessed through the ABS Stat beta software at:http://stat.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY
Store Goods and General Merchandise	Developed long-term forecast rate based on historical change in population for Fitzroy and Mackay regions in Queensland.	Estimated residential population (ERP) data collected from the Australian Bureau of Statistics (ABS) population data. Data can be accessed through the ABS Stat beta software at:http://stat.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY
Building and Construction Materials	Developed long-term forecast rate based on historical change in population for Fitzroy and Mackay regions in Queensland.	Estimated residential population (ERP) data collected from the Australian Bureau of Statistics (ABS) population data. Data can be accessed through the ABS Stat beta software at:http://stat.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY
Agriculture - Broad acre Crops	Developed long-term forecast rate based on historical rate of growth in production volumes of major cereal grains in Queensland.	Data drawn from the Queensland Government Department of Agriculture, Fisheries and Forestry AgTrends report. Published data is available from 1996-97 up to present. The report can be found at: https://www.daff.qld.gov.au/business-trade/agtrends
Pastoral products	Long-term forecast rate based on historical rate of growth in production volumes of cattle, calves and live exports in Queensland.	Data drawn from the Queensland Government Department of Agriculture, Fisheries and Forestry AgTrends report. Published data is available from 1996-97 up to present. The report can be found at: https://www.daff.qld.gov.au/business-trade/agtrends
Other agriculture	Developed long-term forecast rate based on historical rate of growth in production volumes of major fruits in Queensland.	Data drawn from the Queensland Government Department of Agriculture, Fisheries and Forestry AgTrends report. Published data is available from 1996-97 up to present. The report can be found at: https://www.daff.qld.gov.au/business-trade/agtrends

Demand forecasting assumptions

The following table describes the assumptions adopted in developing demand projections for the Yamala intermodal facility.

Assumption Category	Approach to calculating	Notes and Sources
Generalised costs for Rail	Generalised cost for rail freight is based on rail operating cost per net tonne kilometre (NTK), plus pick-up and delivery costs (PUD by Road), plus Rail interchange handling costs. Where: • Rail operating cost = $ 0.024 per NTK • Pick-up and delivery (PUD costs = Road vehicle operating cost * PUD distance (i.e. from the intermodal facility to final destination) • Handling costs at rail interchange = $ 1.4 per tonne • Trip distances between model zones is estimated by Google maps API software and internal analysis	Rail Operating costs based on Transport for NSW Transport Appraisal Guidelines
Generalised Costs for Road	Generalised cost for road freight is based on operating cost of B-Double class vehicles per net tonne kilometre (NTK), and Trip distance. Where: • Vehicle operating cost = $ 0.042 per NTK • Trip distances between zones was estimated using Google Maps API and GIS analysis	B-Double operating costs based on Austroads NGTSM, 2015 (PV2)
Contestable freight volume forecasts	Based on allocation of contestable freight tables by commodity: • Fuel and Petroleum Products•Chemicals • Cement and Flyash•Quarry Materials • Agriculture – Broadacre Crops •Pastoral Products • Other Agriculture •Store Goods and General Merchandise • Building and Construction material	Freight volumes sourced from Resources Rail Lines Report, Transport and Main Roads, 2014
Mode choice calculation	Mode choice calculation is based on a logit function which predicts the mode choice of freight users, using: • Generalised costs of road for each O-D pair • Generalised costs of rail for each O-D pair • Rail mode specific constant= (a parameter used to replicate freight users preference for road modes)	Logit function (x) = log(x/(1-x))
Rail Mode Share Forecast	Total rail mode share was calculated by multiplying rail mode choice percentages (above) with contestable freight volume forecasts, for each origin - destination pair in the model. This includes: • Export forecasts • Import forecasts • Forecast years (2015, 2020, 2030, and 2050) • Validated against optimistic forecast (mode share 53%) of rail freight demand	Rail mode share calibrated against Resources Rail Lines Report, TMR 2014

Benefit Categories

Direct Benefits	Evidence	Measurement
GOVERNMENT		
Road maintenance cost savings	Heavy road vehicles are the major contributor to road pavement deterioration. Consequently, savings in expenditures on road maintenance will occur with a reduction in heavy truck traffic following a switch to rail freight. Values have been sourced from a literature review, domestically and internationally.	Road maintenance cost forecasts
FREIGHT OPERATOR		
Vehicle operating cost savings	The provision of improved connections to rail infrastructure, fewer road freight vehicles will be required. Given that rail vehicle operating costs (per net tonne kilometre) are lower than road freight vehicles, the mode shift towards rail is anticipated to result in a net reduction to vehicle operating costs across the freight market.	• Fuel Cost • Vehicle Maintenance and Servicing Cost
Rail operating cost savings	Below and above rail operating and maintenance costs are to be estimated as per guidance provided by the National Guidelines for Transport System Management in Australia. Parameter values are currently being updated and are expected to be released in mid-2015.	Above and below rail operating charges –$ per net tonne km
COMMUNITY		
Reduced road accidents	A diversion of freight from road to rail as a result of intermodal facility will result in a reduction in road accidents as road congestion would be decreased.	Number of accidents – police records, hospital records
Environmental externalities	Environmental benefits include a reduction in noise, greenhouse gas emissions, fuel costs and other air pollution Specifically, environmental externalities and greenhouse gas emissions are lower for rail transport than road. Environmental impacts of transport use were quantified based on changes in road and rail mode splits for freight between the project options and the base case.	• Particulate testing • CO2 emissions • Noise monitoring
Employment creation in Central Queensland	During the construction and operation of the intermodal facility, jobs will be created.	• Potentially supported employment multipliers provided by Queensland Treasury

Benefit Categories

Direct Benefits	Evidence	Measurement
USER BENEFITS		
Transit time savings	This benefit reflects the modal shift to rail which reduces delays and costs for both cars and commercial vehicles hence benefiting the community and industry. Diversion of freight from road to rail (as a result of intermodal facility) will result in a reduction in road freight traffic on interstate routes to and from Central Queensland therefore reducing congestion on the network. Travel time savings are not inherent to these diverted trips, as rail travel times are often longer than road based modes for comparable distances, thus creating a dis-benefit. Rail journey times and distances were estimated from the Benefits were estimated from the Blackwater System Information Pack (Aurizon, 2015) which covers the line from Gladstone to Yamala. The rail distance is almost 350km and takes 5.8 hours. An additional 3 hours was added for loading and unloading of the train. Road journey times and distances (for both road-all-the-way and pick ups/deliveries to the Yamala terminal) were taken from Google Maps.	• Travel Time • Value of freight
Service quality improvements	This benefit reflects the savings achieved through improved travel times for the community and industry. Freight service reliability and availability will improve with the intermodal facility project and this will create benefits to freight transporters and/or consignees, depending on the industry market structure. The main effects of these changes will be to offer additional benefits to the rail freight market and to traffic diverting from road.	Captured in the value of transit time
Just-in-time Delivery	This benefit is achieved as a result of service quality improvements where the intermodal facility provides the optimal frequency of services, modal choice and increased reliability. Where this occurs the intermodal facility is likely to reduce the burden of inventory holding costs which directly improves the productivity of the freight system.	Captured in the value of transit time
Freight Efficiency and Maximising Utilisation	The increased efficiency of loading and unloading materials through the intermodal facility is likely to result in increased potential for increases in the volume of goods transported. This is expected to the complimented by decreased travel times. Downstream, it is likely that freight costs savings will be passed to consumers. The ability to support the mining and resource industry in the region, through the transportation of bulk fuels from the ports is another key benefit resulting from the intermodal facility. The opportunity exists to effectively utilise two-way freight journeys for both the agriculture/primary industry and resource/mining sector. While agricultural/primary industry products can be transported to the ports, the return journey by these freight trains can be used for the transportation of bulk fuels, mostly diesel. Other beneficiaries include downstream vendors, upstream producers and resource industry proponents.	• Tonnage throughput • $ value of freight • Transport time and variability

Economic Appraisal Parameters

Parameter Category	Assumption	Source
General Conversion factors	• Tonnes/TEU – 14.4 Tonnes • Container Tare – 2.18 Tonnes	• Aurizon/Pacific National/TMR
Road Vehicle Operating Costs	• B-Double with Trailer, including labour and oncosts, finance, fuel and oil, registration and insurance, Tyres, Maintenance, administration, HV accreditation and miscellaneous costs • $1.81/km	• Road Transport Contractor Driver Cost Model, Fair Work Commission (1 Jan, 2015) (http://www.rsrt.gov.au/index.cfm/research/research-on-contractor-driver-costs/#costmodel)
Rail Operating Costs	• Locomotive Capex – $4.9m • Wagon Capex - $120,000 per unit • Asset Life – 25 years • Access charges $248,250 • Fuel Costs - $5.56/km • Locomotive Maintenance - $1.75/km • Wagon Maintenance - $0.06/km	• Transport for New South Wales, March 2013, Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives • National Guidelines for Transport System Management (NGTSM)(2014)
Rail Handling Costs	• Containers to be moved per train cycle – 90 nits • Number of forklifts at each node - 1 • Time to load/unload each train at each node – 5 minutes • Load time per container – 5 minutes • Unload time per container – 5 minutes	• TMR internal advice (September 2015)

Parameter Category	Assumption	Source

Rail Handling Costs (Continued)	• Capex Cost for forklift and reach stacker - $1m per unit
	• Economic life – 15 years
	• Forklift driver wage
	  • Minimum rate - $40
	  • Work cover – 4.7%
	  • Superannuation – 9%
	  • Other overhead – 10%
	• Number of staff required at Yamala – 3.5 FTEs
	• Forklift VOC
	  • Forklift fuel consumption – 15l/hr
	  • Fuel rebate - $0.38/l
	  • Fuel price per litre - $0.73/l
	  • Fuel cost per hour - $10.94/hr	

Driver Time	• Rail ($/vehicle-hr)- $302.71 • Road ($/vehicle-hr) – $27.78	• NGSTM (2014) • Melbourne Brisbane inland Rail Alignment Study, Appendix L Financial and Economic Appraisal Methodology -page 27