Queensland Rail

Townsville Eastern Access Rail Corridor

Preliminary Evaluation: Economics and Market Sounding

Summary Report

12 January 2012

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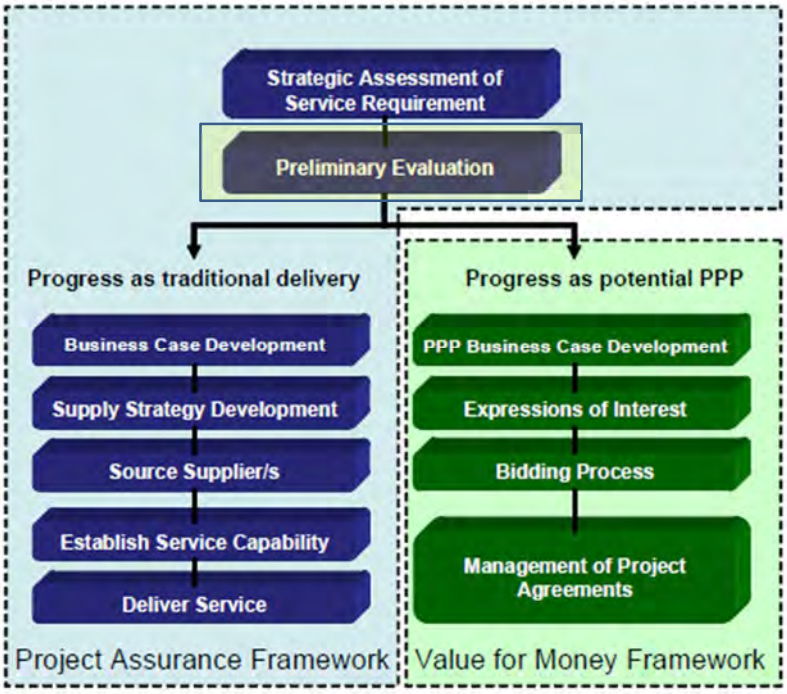
1. Introduction

1.1 Scope of this Preliminary Evaluation

This is the Summary Report of the *Townsville Eastern Access Rail Corridor, Preliminary Evaluation: Economics and Market Sounding* study (and report) which is associated with the proposed Townsville Eastern Access Rail Corridor (TEARC). The Preliminary Evaluation has been undertaken in a manner consistent with the Queensland Government's Project Assurance Framework (PAF) – presented in Figure S1.

Figure S 1: Steps in the Project Assurance Framework



Source: Queensland Treasury

Importantly, the Preliminary Evaluation deliberately focuses on:

- Tonnage demand projections based on anticipated changes to mining and port activity;
- Preliminary economic analysis using a benefit cost analysis framework; and
- Preliminary market sounding for private sector involvement and project delivery options.

The key reference documents that have been used as direct inputs to this Preliminary Evaluation are:

- Communicating the Imperative for Action (Infrastructure Australia 2011);
- Mount Isa Line Rail Infrastructure Master Plan 2012 – Consultation Draft, Nov 2011 (Queensland Rail 2011);
- Mount Isa System Rail Infrastructure Master Plan (QR Network 2009);
- Mount Isa System Information Pack (QR Network Access 2007);
- Port Development Plan 2010–2040 (Port of Townsville 2010);
- Townsville Port Eastern Rail Access Order of Magnitude Cost Estimate (Maunsell 2008); and,
- Townsville Port Access Impact Assessment Study – Environmental Assessment (Kinhill 2000).

Given the conceptual nature of these documents and because, in a number of cases, they are already dated or becoming increasingly dated, the Preliminary Evaluation includes a high-level desktop review as part of the preliminary risk analysis section. Furthermore, it should be noted that rail capacity simulation modelling, preliminary engineering design and cost estimation was not undertaken as part of the Preliminary Evaluation. Previous study reports and available information was utilised and adjusted to current values accordingly.

1.2 Strategic Context

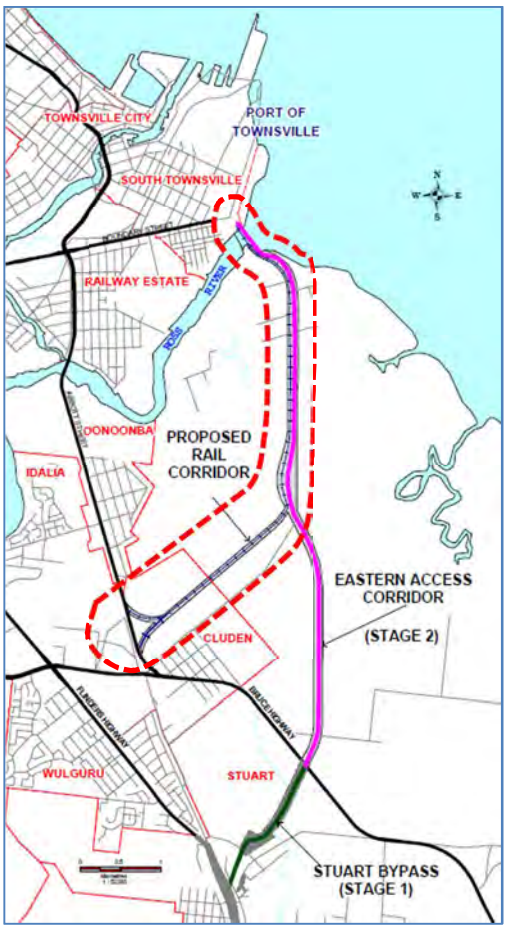
There are several overarching documents that set the strategic planning scene for TEARC. These documents are important in setting overall goals and strategic intentions for economic and social development in the Townsville region and identifying the strategic merit of TEARC.

- **Communicating the Imperative for Action:** Infrastructure Australia considers the Mount Isa – Townsville Rail Corridor (including Eastern Access Corridor) a "nationally significant issue or problem, but the identification or development of the right solution is at an early stage".
- **Mount Isa System Rail Infrastructure Master Plan:** The former QR Network identified low, medium and high growth scenarios to 2020 and identified TEARC as the 'capacity lynchpin' for the Port of Townsville. In late November 2011, Queensland Rail released a consultation draft of the Mount Isa Line Rail Infrastructure Master Plan for 2012. This consultation draft suggests TEARC is needed for the medium growth scenario of 20 million tonnes per annum (mtpa).
- **Queensland Infrastructure Plan:** identifies the Port of Townsville as a high priority, with the Townsville State Development Area strategically located in close proximity.
- **Port Development Plan:** outlines proposed short, medium and long term development needs and clearly identifies TEARC as an enabler for the Port's future development in the medium term.
- **Townsville Futures Plan** (still in draft): identifies the need to resolve the preferred rail route from the North West Minerals Province to ports at both Townsville and Abbot Point.
- **Townsville Economic Gateway:** provides an integrated strategic vision for the City of Townsville and identifies TEARC and a conveyor system linking the Port to the State Development Area.

1.3 Project Definition and Need

The proposed Townsville Eastern Access Corridor Project (TEARC) is an 8 kilometre rail line from Cluden through the Townsville State Development Area (TSDA) to the Port of Townsville as shown in Figure S2.

Figure S 2: TEARC proposed alignment



Following a review of previous studies and meetings with stakeholders, the service requirements for TEARC were defined as follows:

- Meet growing demand on the Mount Isa Rail System;
- Facilitate the use of 1400m long trains;
- Reduce bottlenecks in the Port of Townsville; and
- Improve urban amenity for suburbs of Townsville.

TEARC would form part of the existing Mount Isa to Port of Townsville rail system, which in total is over 1000 kilometres long (Figure S3). TEARC is expected to improve access for bulk freight traffic to the Port of Townsville by providing a direct and uninterrupted corridor. The current rail network assets on the Mount Isa to Townsville rail corridor are owned and managed by Queensland Rail (QR). Rail operators negotiate access to train paths on the corridor with QR. Users of the line pay access charges for train path allocations. Access charge rates are determined by investment returns on railways that are set by the Queensland Competition Authority (QCA).

Figure S 3: Mount Isa-Townsville Corridor

Source: Mount Isa System Rail Infrastructure Master Plan 2009

The region surrounding the Mount Isa rail system produces 75 per cent (by volume) of Queensland's non-coal mineral output, including copper, lead, zinc and fertiliser which are also the primary exports from the Port of Townsville.

Some of the key features of the Mt Isa Line are set out in Table S1.

Table S 1: Key Features – Mt Isa Line

Length	1032 kms – single track with passing loops
Rail	Mix of 41, 47, 50, 53 and 60 kg/metre
Axle load	20 tonne limit
Maximum line speed	80 kms per hour
Safeworking system	Direct Traffic Control
Gauge	Narrow – 1067 mm
Sleepers	75% concrete; 25% steel
Maximum train length	1000 metres
Seasonal conditions	Extreme heat and monsoonal rains in summer months
Products railed	Copper; Lead; Zinc; Magnetite; Sulphuric Acid; Cement; Livestock; Fuel; Sulphur; Fertiliser; passengers and General / Intermodal Freight

Source: Queensland Rail

The current level of activity and nominal volume capability of the Mt Isa Line beyond Stuart is set out in Table S2.[1] A number of factors impact on the 'nameplate' capacity including nature of the network design (e.g. length of sections between passing loops and operational run times over these sections), safeworking system requirements, implementation of temporary speed restrictions, unplanned maintenance interventions, variation in train performances and mix of cargoes.

Table S 2: Mt Isa Line (Sturat to Mt Isa / Phosphate Hill) – Current Traffic and Nominal Capacity

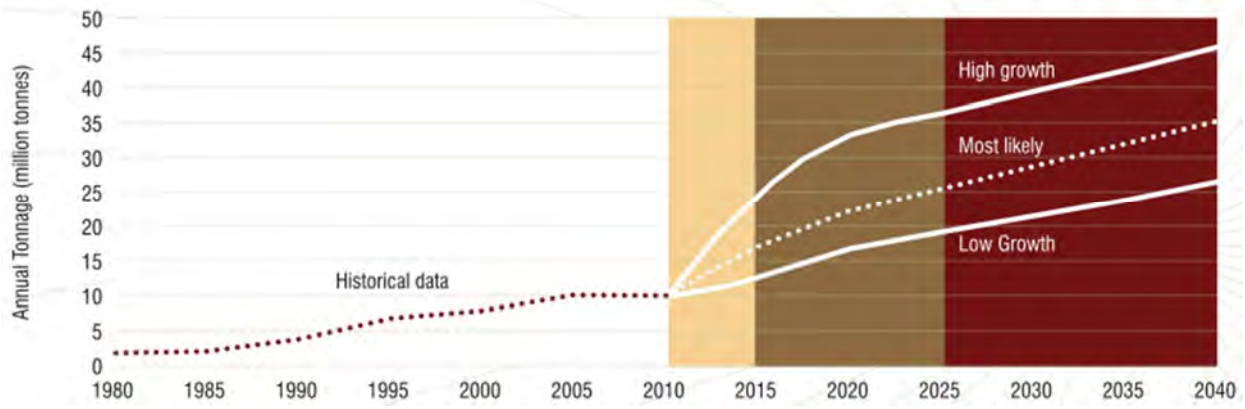
	Stuart to Hughenden	Hughenden to Cloncurry	Cloncurry to Flynn	Flynn to Mount Isa	Flynn to Phosphate Hill
Current usage (mtpa)	4.7	4.7	2.9	2.7	2.1
Nominal Capability (mtpa)	8.4	8.8	8.4	8.8	14.8
Nominal Capability with 100% concrete sleepers and heavy rail on entire line (mtpa)	12.0	13.6	13.0	13.6	14.8

Source: Queensland Rail

The Port of Townsville is Queensland's third largest multi-cargo port. In the 2010/2011 financial year, approximately 11 million tonnes of cargo was handled through the Port. The Port of Townsville Limited (POTL) manages a land and sea jurisdiction of more than 400 square kilometres, which includes more than 200 hectares of land used for port operations. A diverse range of cargoes are stored and handled at the Port of Townsville, including bulk minerals, sugar, fertiliser, oil, cement, molasses, refined metals, motor vehicles, containers, cattle and several other commodities. Figure S4 shows the Port of Townsville trade forecasts and Figure S5 shows the expected short term port configuration (2010-2015) as anticipated at the time of the Port Development Plan 2010-2040 (2009). It should be noted that within the period to 2015, it is unlikely that the reclamation and associated new berth development (i.e. berth 14) shown in this plan (Figure S5) will eventuate.

[1] The section between Stuart and the port (c. 10 kms on the North Coast Line – Caboolture to Cairns) has a higher aggregate traffic flow volume as it also handles north-south traffic such as sugar and imported nickel ore.

Figure S 4: Trade forecasts for the Port of Townsville



Note: Does not include possible coal exports

Source: Port Development Plan 2010-2040 (2009)

http://www.townsville-port.com.au/files/2010/POTL-Port_Development_Plan-August_2009-Final.pdf

Figure S 5: Short Term Port Vision (2010-2015)

Source: Port Development Plan 2010-2040 (2009)

http://www.townsville-port.com.au/files/2010/POTL-Port_Development_Plan-August_2009-Final.pdf

In consultation with the Port of Townsville and Queensland Rail, the following port capacity constraints have been assumed for the Preliminary Evaluation:

- Single track constraints in the port are located at the Jetty Angle, Saunders Street Overpass, Morey Street, and Benwell Road to the balloon loop.
- The main terminal operational parameters are:
    - Xstrata 600t/hour rotary tippler (10 hours per 50 wagons);
    - BHP Billiton 1200t/hour rotary tippler (3.5 hours per 52 wagons);
    - Incitec Pivot 1200t/hour bottom discharge tippler (2.5 hours per 51 wagons); and
    - Queensland Nickel (3 hours per 34 wagons).
- Berth 7 is used for mineral concentrates, ores and fertilisers with ship loading at 1000t/hour. The berth is close to 100 years old meaning a number of operational limits apply to ensure continued safe use of the berth. This berth is due for demolition in 2014 following relocation of Xstrata and IPL operations to an upgraded Berth 8 facility; the construction of which is currently underway and due for completion in mid-2013. The upgraded Berth 8 will offer approximately 2 mtpa additional capacity 'over and above' that of Berth 7.
- Berth 11 is the Outer Berth Mineral Concentrates Loading Facility and is used for lead and zinc concentrates with ship loading at 1350t/hour.

The current throughput and capacity (nominal) of the port is set out in Table S3 on a *berth-by-berth* basis for existing berths, now and with possible upgrades. The nominal capacity can vary in actuality due to many factors ranging from tidal conditions, available vessel draughts, mix of cargoes at particular berths, shiploading facilities and other operational features to seasonal weather interventions and other supply chain perturbations. It is noteworthy that no berth currently handles volumes in excess of c. 4 mtpa dry bulk cargo; the planned new berth 12 would have this level of capacity.

Table S 3: Port of Townsville Capacity

Existing Berths	Current Throughput (tonnes)	Current Port Capacity (tonnes)	Possible Capacity with Upgrades	Commodity Type
Berth 1	980,918	2,000,000	2,000,000	Dedicated wet bulk (pipeline)
Berth 2	3,719,695	4,000,000	5,000,000	Dedicated dry bulk (nickel ore imports)
Berth 3	1,326,583	1,500,000	2,000,000	General cargo / Break bulk
Berth 4	671,139	1,000,000	1,500,000	Combined Dry Bulk (Cement)/ Wet Bulk (Molasses) and General Cargo
Berth 7	2,700,000	2,700,000	-	Dedicated to Dry Bulk (Concentrates and Fertiliser) Exports
Berth 8	191,913	200,000	5,000,000	Dedicated to Dry Bulk (Concentrates and Fertiliser) Exports
Berth 9	1,312,727	1,500,000	1,500,000	Dry Bulk (Sugar) Exports (1/2 Year) and General Cargo
Berth 10	191,913	200,000	1,000,000	General Cargo / Break bulk
Berth 11	548,818	2,500,000	3,000,000	Dedicated to Dry Bulk (Concentrates) Exports
Total	11,643,706	15,600,000	21,000,000	

Source: Port of Townsville Limited

Additional berths at the port would have a substantial impact on available nominal capacity. The new berth 12 (including channel deepening stage 1) has necessary approvals in place and has a nominal capacity of 10mtpa. Proposed new berths 14 through to 19 (inclusive) as identified in the Port Development Plan could deliver an additional 35 million to 44 million tonnes dry bulk handling capacity per annum and 4 million tonnes per annum wet bulk handling capacity across two berths.[2] The Port Expansion Project has been declared a "significant project" and the Environmental Impact Statement (EIS) is currently underway.

There are a multitude of products, seasonal movements and terminal interactions that add to significant inefficiencies in the port. This is reflected by the Port of Townsville trade figures of 10.6mt (exports and imports in 2010/11) with 51% overall berth occupancy. By removing the single track constraints ($15.85 million) and upgrading terminal operations ($40 million) the "nameplate capacity" of the Port of Townsville is assumed to be 15mtpa. This latter upgrading would include for private-sector provided infrastructure for rail and cargo storage and handling facilities.

[2] Port of Townsville Limited, *pers comm*. 14th December 2011 (email)

It is assumed that “nameplate capacity” will rise to 25mtpa with the addition of Berth 12 wharf and associated balloon loop and channel dredging for Panamax vessels. This “nameplate capacity” aligns with the Short Term Port Vision and high growth trade forecast for 2015 (as shown in the Port Development Plan). This 10mtpa increase in “nameplate capacity” is sufficient to handle the incremental tonnage demand projected for the Mount Isa Line in the high scenario (excluding coal).

Berth 12 is capable of handling 5mtpa of dry bulk cargo with current channel depth. Approvals for Berth 12 wharf development (no dredging, current draught) have been completed. The Preliminary Evaluation assumes that Berth 12 wharf and associated balloon loop and channel dredging is part of the Base Case. Stage 1 deepening of the channel will enable Berth 12 to handle 10mtpa of dry bulk product if optimised using a single commodity export.

For trade volumes beyond 25mtpa, it is assumed that Berth 14 will be required as part of the Project Case for the preliminary economic analysis (in particular, for the coal trade sensitivity testing). At these trade volumes, there will be significant community amenity issues and level crossing delays with increasing train numbers using the existing North Coast Line to access the port[3].

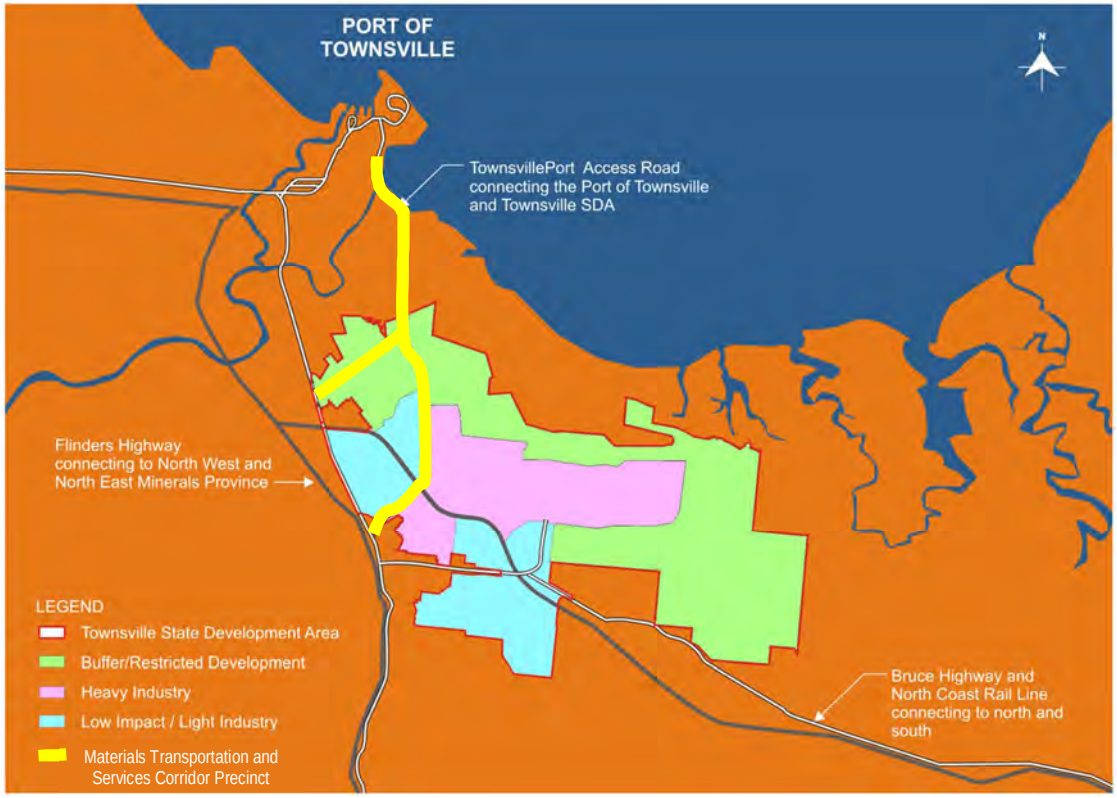
Improving access to the Port of Townsville has been a State Government priority for many years. Balancing the needs of residents living close to the Port, as well as users, is seen as a key challenge for the existing rail line. In 1996, the State Government reviewed the likely growth of road and rail access requirements for the Port of Townsville to the year 2025. This work centred on identifying a solution that would improve safety and amenity, and provide secure and cost efficient freight transport access. Two broad options were suggested by the study:

- An upgrade of the existing road and rail corridors; and
- Development of a new eastern corridor through the Stuart industrial area.

In late October 2003, following extensive public consultation, the State Government declared the Townsville State Development Area (TSDA). The TSDA covers about 4,900 hectares and includes the Stuart Industrial Area and proposed Townsville Eastern Port Access Road and Rail Corridor. As required by the State Development and Public Works Organisation Act 1971, a Development Scheme for the TSDA has been prepared for the area shown in Figure S6.

[3] It is likely that at volumes much less than 25mtpa but materially higher than current volumes (for example, 15mtpa or more) that there will be community amenity issues.

Figure S 6: Townsville State Development Area



Source: DLGP

The road and rail route within the TSDA was approved by the State Government on 19 November 2001, based on a recommendation by Queensland Transport. The State Government also agreed to secure this route for future use for transport infrastructure and to acquire associated industrial land. The land within the TSDA required for the Townsville Eastern Port Access Road and Rail Corridor has been acquired by the Coordinator-General in response to an election commitment.

The Townsville Eastern Access Road and Rail Corridor has been included in the Materials Transportation and Services Corridor Precinct under the Development Scheme and provides for dedicated port access to benefit existing and future industries including access for existing and future heavy vehicles from the Flinders and Bruce highways.

The purpose of the Materials Transportation and Services Corridor Precinct under the Development Scheme is to:

- Provide a dedicated route for the Townsville Port Eastern Access (Road and Rail) Corridor as approved by the Government in November 2001;
- Provide an efficient and effective route for materials transportation infrastructure and utility services between industrial developments established in the Townsville State Development Area and the Port of Townsville. Materials transportation infrastructure is likely to include, but not be limited to, road, rail, conveyors and pipelines. Utility services are likely to include water, gas, electricity, sewerage and telecommunications;
- Plan and develop the corridor in a manner which ensures the efficient use of available land; and

- Protect existing infrastructure located in the corridor and have regard to existing user requirements when considering the appropriateness of future infrastructure proposals.

The location of the Materials Transportation and Services Corridor Precinct is based on preliminary investigations carried out by the Department of Main Roads and Queensland Rail.

The TSDA is recognised by key regional stakeholders as vital to the future economic development and growth of Townsville. Due to the TSDA's close proximity to the port of Townsville and freight routes, transport and logistics and distribution type land uses have been identified as the highest and best use of the land adjacent to the Townsville Port Access Road, currently under construction and which will run through the TSDA.

The Department of Transport and Main Roads is planning for future Port access through the Townsville Port Access Road (TPAR) project. The Townsville Port Access Road (TPAR) will directly link the Flinders and Bruce Highways to the Port of Townsville. The 10 km project consists of two stages:

- Stage one: Stuart Bypass (2.5 km – complete 2010); and
- Stage two: Eastern Access Corridor (EAC) (7.5 km).

Stage one begins at the Flinders Highway at Stuart and finishes on the Bruce Highway 600m south of the Visitor Information Centre. Section two begins at the Bruce Highway 600m south of the Visitor Information Centre and continues generally northward to the Port of Townsville. Construction of the Stuart Bypass began in August 2008 and was opened to traffic in January 2010.

The EAC will be a new two lane 7.5 km road extending from the Bruce Highway 600m south of the Visitor Information Centre and running generally northward to the Port of Townsville. Six new bridges will be built, including one across the Ross River near the corner of Boundary Street and Benwell Road, South Townsville. Initially, a two-lane road will be built. The road corridor will include provision for another two lanes in the future, as well as rail and other services such as telecommunications, power and a conveyor. The construction of the EAC began in May 2009 and is expected to finish in 2012.

2. Project Options and Costs

2.1 Base Case

In order to assess the economic merits of the Project Case (i.e. "with" the project situation), it was necessary to clearly articulate the Base Case (i.e. the "without" the project situation) for it is against (or incremental to) the Base Case that the Project Case is measured in economic evaluation. The Base Case rarely constitutes a "Do Nothing" situation but usually undertaking planned investments and those necessary to maintain safe and reasonable operations. The Base Case constitutes a realistic scenario whereby 1000m trains will operate as standard if TEARC does not proceed. The Base Case includes the continued operation of rail freight and bulk haulage into the Port of Townsville along the existing rail corridor via the Jetty Angle. The Base Case also includes some level of investment to increase the capacity of both the Mount Isa System and the Jetty Angle. Therefore, the Base Case requires the following works:

- Staged upgrades to the Mount Isa System to effectively accommodate 1000m train operations;
- Track upgrades from the Jetty Angle into the Port to remove existing single-line constraints;
- Construction of a new balloon loop on the reclaimed area as part of Berth 12 works; and
- Extraction of maximum value by increasing capacity through operational efficiency enhancements.

2.2 Project Case

The Project Case is defined as the capital investments required between Mount Isa and the Port of Townsville to enable 1400m train operations. The Project Case therefore requires the construction of TEARC to facilitate 1400m train operations and upgrades to the Mount Isa System. The Project Case requires the following works:

- TEARC will be a new 8 kilometre rail link from the North Coast Line near Cluden, through the State Development Area, and to the Port of Townsville. TEARC will be a double track configuration and will require a fixed bridge over the Ross River;
- Staged upgrades to the Mount Isa System and yards to accommodate 1400m trains; and
- Grade separation works at Abbott Street (two road-over-rail bridges).

It is also assumed that the Project Case will involve retention of the existing North Coast Line from Stuart to the Jetty Angle (during consultations with stakeholders there was suggestion that this section be made redundant). This corridor will still be required for passenger train services and other freight services that will continue to travel along the North Coast Line unless a viable technical solution and business case support the deviation of passenger train services and other freight services via TEARC connecting through the city to the North Coast Line that does not constrain the operational efficiency of TEARC.

The capital investments for the Base Case and Project Case are set out in Table S4.

Table S 4: Capital investment costs ($million in 2011 dollars)

	Base Case	Project Case	Incremental Capex
Port Infrastructure			
Berth 12	$120	$120	-
Channel dredging stage 1	$40	$40	-
Stacker/reclaimer & conveyors / shiploader	$180	$180	-
TOTAL	**$340**	**$340**	**$0**
Port Rail Infrastructure			
Balloon loop and rail receival	$50	$50	-
Port bottleneck / terminal / interface upgrades	$40	$40	-
Rail realignment to terminals	$4	$4	-
Remove single track constraints	$16	-	-$16
TOTAL	**$110**	**$94**	**-$16**
TEARC			
Connection to North Coast Line	-	$47	$47
Alignment through TSDA	-	$64	$64
Connection to Port of Townsville	-	$33	$33
Bridge over Ross River	-	$62	$62
Land reclamation along Benwell Rd	-	$15	$15
TOTAL	**$0**	**$221**	**$221**
Consequential Works			
Mt Isa Line extend existing loops for 1400m trains	-	$101	$101
Abbott Street Grade Separation (road-over-rail)	-	$59	$59
Avoided costs for Abbott Street Deviation	$140	$100	-$40
TOTAL	**$140**	**$260**	**$120**
TOTAL	**$590**	**$915**	**$325**

NOTES:

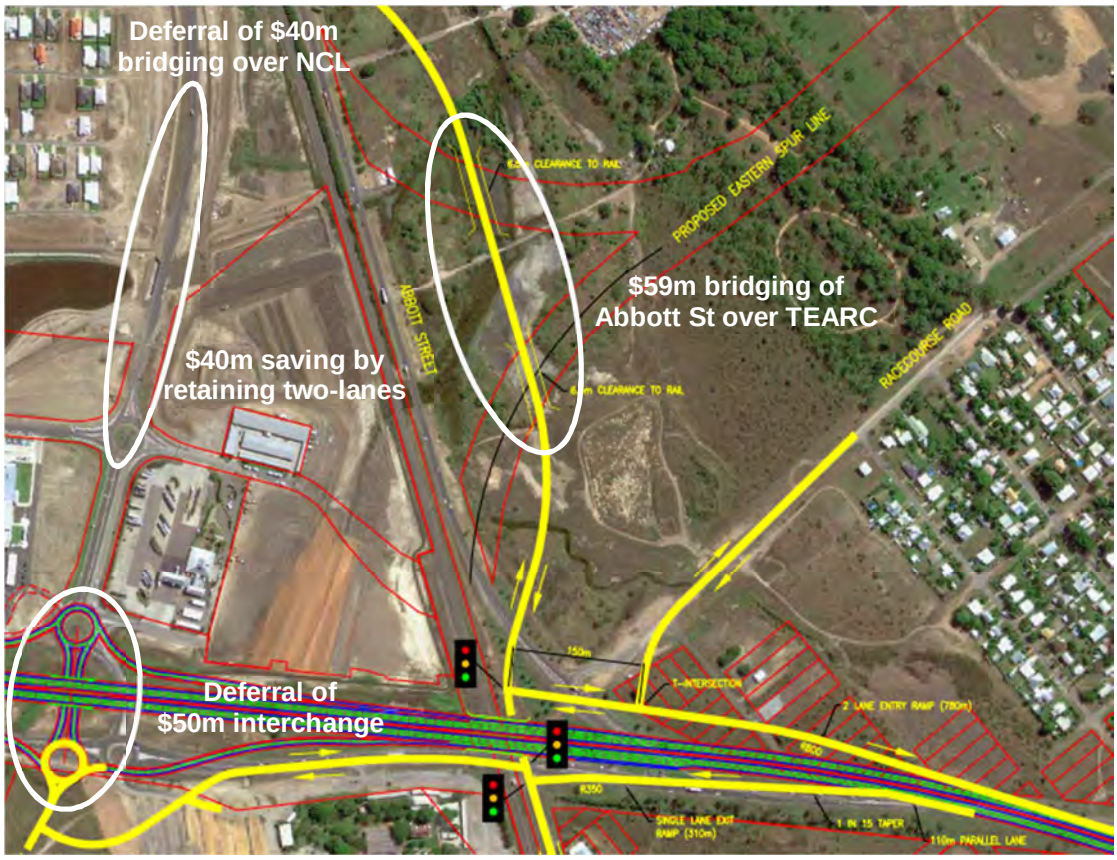
- *$879m resleepering in Rail Infrastructure Master Plan applies to Base Case and Project Case*
- *Private investment costs for new port terminals are captured in access charges*
- *Analysis assumes ten year deferral of $40m for ASD and $50m for Bruce Highway interchange*
- *Drainage costs are included as part of "Land reclamation along Benwell Rd"*
- *Analysis assumes $121m for Berth 14 for coal sensitivity testing*
- *Does not show avoided costs of 23 passing loops for 1000m trains in high scenario (see Table 14)*
- *Does not apply for overland conveyor alternatives*
- *All costs provided by TMR, POTL or QR and vary in terms of levels of confidence and degrees of uncertainty due to varying positions in the planning life-cycle*
- *The level of confidence in the AECOM order-of-magnitude cost estimate is -50% and +75%*

2.3 Key Costs Avoided

As noted in Table S4, avoided road infrastructure is a significant benefit associated with TEARC. The Department of Transport and Main Roads (TMR) estimates the Abbott Street Deviation (ASD) project will cost $140 million which includes the four-lane upgrading of Lakeside Drive, bridging over the North Coast Line and bridging over Ross River. The alternative arrangement with TEARC is to bridge Abbott Street over TEARC at a cost of $59 million as illustrated in Figure S7.

TMR advises that this alternative arrangement will result in a reduced scope for ASD saving $40 million immediately (by retaining two-lanes on Lakeside Drive) and deferral of $40 million (by deferring bridging over the North Coast Line). This would also result in deferral of the $50 million Bruce Hwy / Lakeside Drive interchange. For the Preliminary Evaluation a 10 year deferral period to 2024 has been assumed.

Figure S 7: Abbott Street Deviation and alternative bridges over TEARC



Source: TMR

3. Tonnage Demand and Projections

3.1 Approach

The key driver for investment in additional rail and / or port capacity is the need to accommodate traffic growth. This growth is expected from two main sources:

i. Expansion of existing production capacity / mine output; and

ii. Establishment of new mines (for either currently handled commodities or new commodities not previously exploited in the region) contiguous to the railway or near to Townsville.

Other factors influencing future traffic volumes include production and mining input supply activities and changes in mineral processing activities in the Mt Isa – Townsville corridor.

Tonnage projections were estimated using a first principles approach by examining individual mines contiguous to the Mount Isa-Townsville rail system. In summary, mines were categorised using the Joint Ore Reserves Committee (JORC) Code:

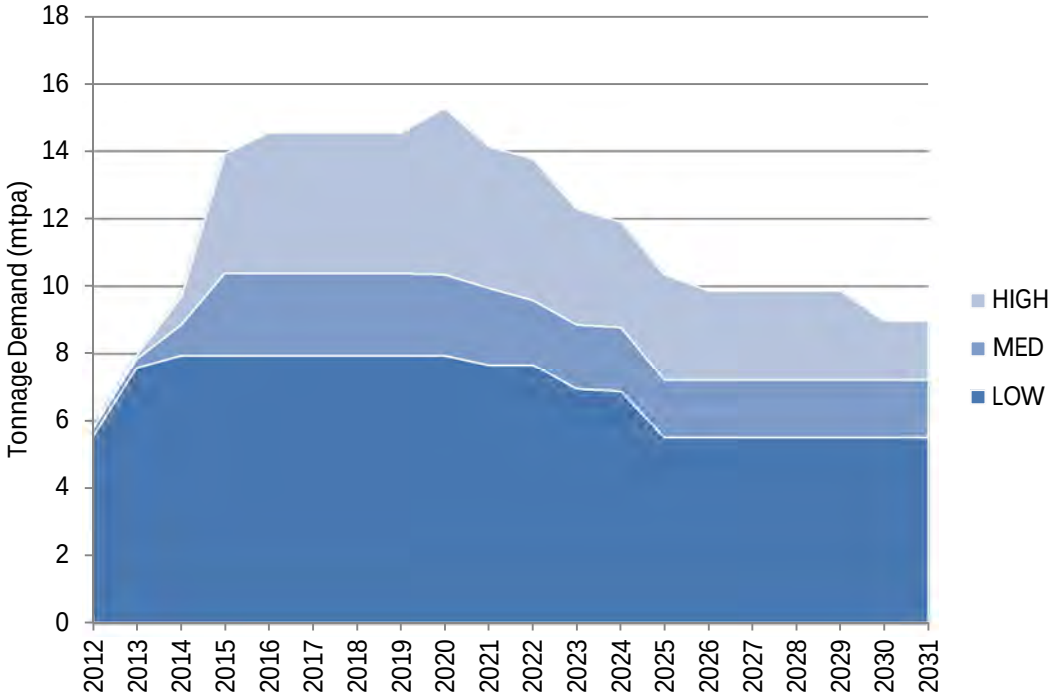
- **Indicated Resources:** applied to high scenario;
- **Measured Resources/Probable Reserves:** applied to high and medium scenarios;
- **Proved Reserves/Operating Mines:** applied to high, medium and low scenarios; and
- **Inferred Resources:** not included because, at this stage, these mines have a very low level of confidence with high uncertainty around tonnages. Instead, a sensitivity test of the economic analysis was undertaken around coal export tonnages, for example.

It is recognised that demand for the rail line and port will need to be reviewed regularly as the situation can change within a short period of time (e.g. year on year) due to the vagaries of global commodity prices, exchange rates and other factors such as the level of investment in exploration.

3.2 Rail Traffic Forecasts

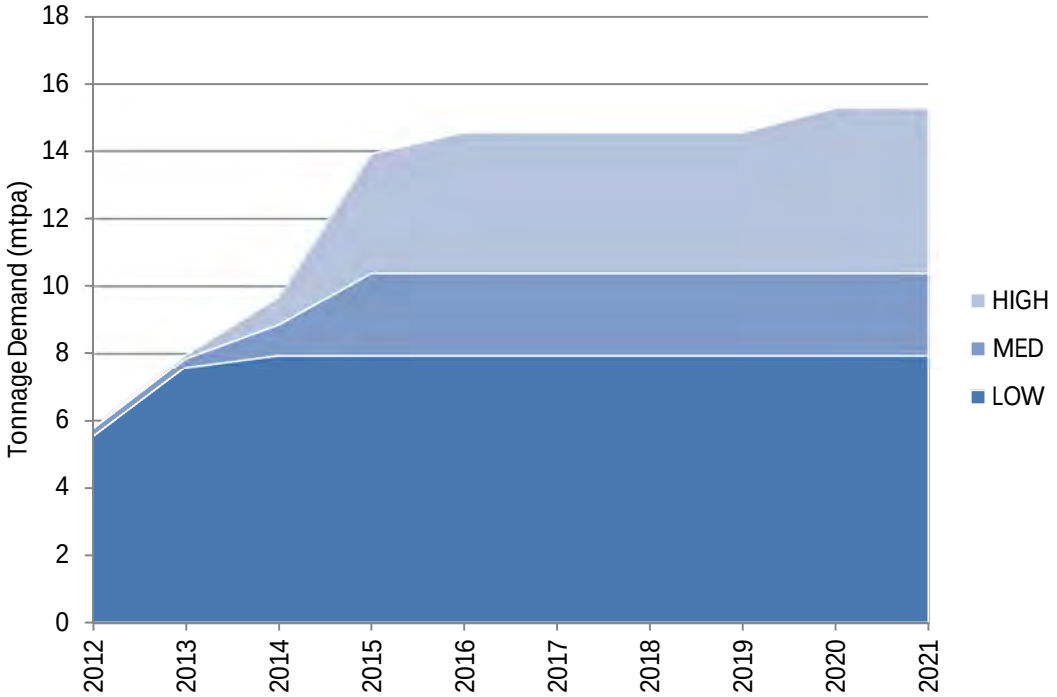
The traffic volumes for three different growth scenarios expected on the Mt Isa Line are presented in Figures S8 and S9. The expectation is for total rail volumes to rise rapidly from c. 6mpta now to between c. 8 (Low scenario) mtpa and c. 14 mtpa (High scenario) by 2014 to 2015. These estimates are exclusive of any export coal traffic on the railway. Export coal traffic has been treated as a sensitivity analysis given the stage the commodity is in the corridor in terms of the mine(s) life cycle. In a commodity-based market situation providing a service that is a derived demand as faced by the Mt Isa Line and the port of Townsville, trade growth (and decline) can be significant and rapid due to 'shocks' e.g. new mines coming on stream, mines closing etc. Much of the traffic is not typically "GDP-related", i.e. closely aligned to the underlying rate of aggregate economic activity in the economy as is the case for a capital city container terminal, for example. With this in mind, it would be prudent to monitor development activity, particularly in the extractive industries sector, along the Mt Isa – Townsville and nearby, and consider the impacts on future haulage and export tasks on a regular basis.

Figure S 8: Mount Isa-Townsville Line - 20 year demand profile by scenario (excl. coal exports)



Source: GHD analysis

Figure S 9: Mount Isa-Townsville 10 year demand profile by scenario (excl. coal exports)



Source: GHD analysis

4. Preliminary Economic Analysis

4.1 Introduction

The Preliminary Economic Analysis is based on adoption of a rapid Benefit Cost Analysis (BCA) framework as detailed in the Australian Transport Council guidelines[4]. The analysis involves two train configurations – 1000m trains (Base Case) and 1400m trains (Project Case).

The economic evaluation was undertaken over a 30 year evaluation timeframe with a real discount rate of 7% applied to future cost and benefit streams. The first year of TEARC as an operational part of the Mt Isa Line is 2015.

4.2 Project Benefits

A range of benefits were investigated and estimated / quantified, namely:

- "Above rail" train operating costs;
- "Below rail" maintenance costs;
- Vehicle delays at level railway crossings; and
- Externalities (predominantly cost of carbon and noise).

For each demand scenario, incremental benefits were estimated for the project; as shown in Table S5.

Table S 5: Present Value Benefits – Project Case v Base Case – All Demand Scenarios

Benefits ($m)	Low Demand	Medium Demand	High Demand
Above Rail Opex	$146.8	$202.9	$260.4
Below Rail Opex	$11.3	$15.7	$23.4
Vehicle Delays	$10.3	$13.3	$19.1
Externalities	$1.8	$2.5	$3.7
TOTAL	**$170.3**	**$234.4**	**$306.6**

Source: GHD analysis

[4] *National Guidelines for Transport System Management in Australia*, ATC, Canberra, 2006.

(In February 2011, the Council of Australian Governments (COAG) agreed to a new Council System consisting of Standing Councils, Select Councils, and Legislative and Governance. On 17 September 2011, COAG withdrew the remit of the Australian Transport Council and replaced it with the Standing Council on Transport and Infrastructure. The inaugural meeting of the Standing Council was held on Friday, 4 November 2011.)

4.3 Project Costs

A range of costs were also investigated and estimated / quantified, namely:

- Number of new passing loops based on section run time constraints;
- Number of passing loops needing lengthening (Project Case only);
- Capital investment and residual values (Project Case only);
- Rolling-stock requirements based on train movements; and
- Grade-separation costs for arterial roads (Project Case only).

For each demand scenario, incremental costs associated with the project were estimated; as shown in Table S6.

Table S 6: Present Value Costs – Project Case v Base Case – All Demand Scenarios

Costs ($m)	Low Demand	Medium Demand	High Demand
Savings in Loops	$0.0	$0.0	-$89.7
TEARC & Bridge	$159.6	$159.6	$159.6
Extend Existing Loops	$60.3	$60.3	$60.3
Savings in Rolling-stock	-$16.5	-$14.4	-$37.7
Abbott Street Deviation	-$26.6	-$26.6	-$26.6
TOTAL	**$176.8**	**$178.9**	**$65.9**

Source: GHD analysis

4.4 Economic Worth and Other Analyses

In order to determine the net economic worth (i.e. merit or economic justification) of the project, it was necessary to calculate a number of decision criteria (results shown in Table S7), namely:

- Net Present Value, Benefit Cost Ratio and Internal Rate of Return.

Furthermore, even though only at Preliminary Evaluation stage, it was deemed beneficial to undertake a couple of key supplementary analyses, “over and above” sensitivity testing at differing discount rates and variation in the year the project would open, namely:

- Sensitivity testing of, export coal volumes;
- Examination of the contestability of Townsville versus Abbot Point for coal exports; and
- An initial financial analysis to gauge commercial viability.

Table S 7: **Decision Criteria – All Demand Scenarios**

Decision Criteria	Low Demand	Medium Demand	High Demand
Net Present Value ($m)	**-$6.5**	**$55.5**	**$240.7**
Benefit Cost Ratio	**0.96**	**1.31**	**4.65**
Internal Rate of Return	**7.1%**	**9.7%**	**33.3%**

Source: GHD analysis

The decision criteria show that TEARC is economically justifiable under medium and high demand scenarios with significant benefits over costs and solid benefit cost ratios. The project is marginal (i.e. on or near to economic break-even) under low demand scenarios.

Historically, there has been very little exploration for coal deposits along the Mount Isa Line. However, there has been increasing speculation and exploration in the northern portion of the Galilee Basin over the past 12 months. As of 5 December 2011 the following projects have made ASX announcements:

- Guildford Coal: Hughenden Project with inferred resource of 1.036 billion tonnes (ASX 15 November);
- Baru Resources: West Galilee Project 16km west of Richmond (ASX 15 November); and
- Blackwood Corporation: South Pentland and North Hughenden (ASX 22 November).

Clearly, in future deliberations of TEARC the progress of the above (and other) developments in terms of export coal need to be investigated as the implications for future traffic and needed supply chain capacity could be significant and a 'step change' for the corridor in terms of scale.

For the Stuart-Hughenden section of the railway, which is the section where coal exports would most likely be loaded on to trains, the theoretical capacity limit is 19.7mtpa using 1000m trains and Direct Train Control (DTC). As coal tonnages are added to this section beyond this theoretical limit, infrastructure investment and maintenance costs increase dramatically. For the high scenario (which is c. 15mtpa of non-coal freight) an additional 10mtpa of coal results in a lower NPV because of the step change in infrastructure costs (for both rail and port capacity) and new rolling stock requirements.

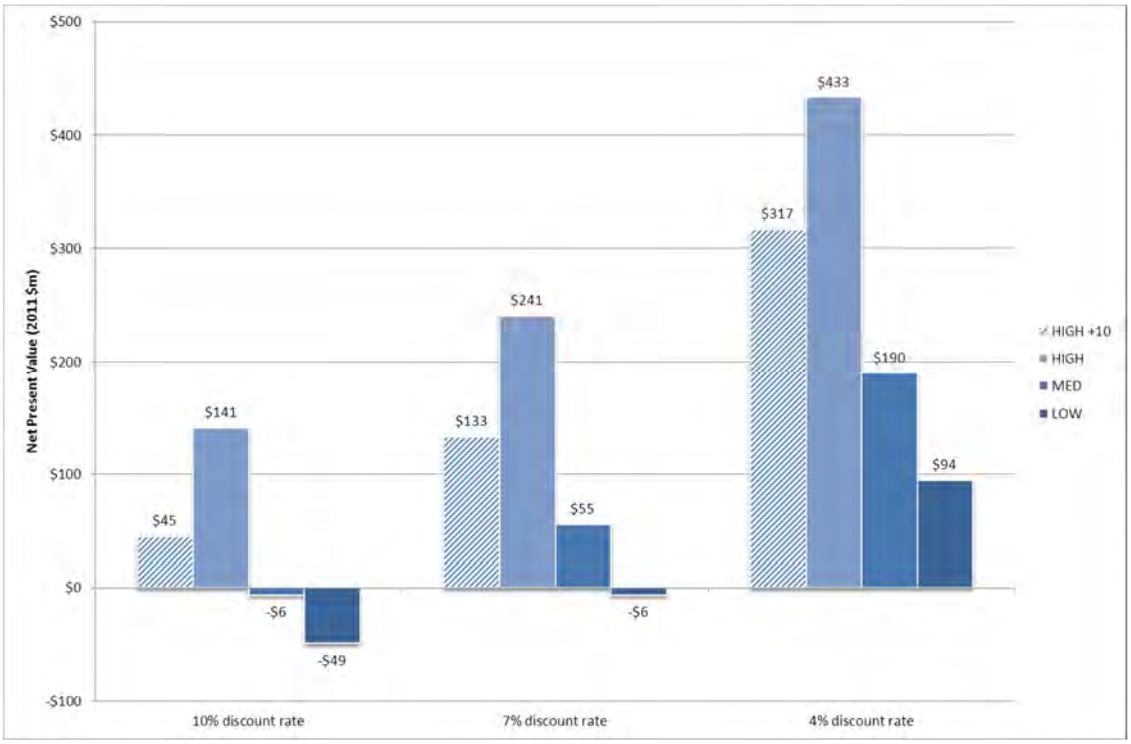
The Port of Townsville estimates that an additional berth (Berth 14 at $121 million) will be required to achieve a "nameplate capacity" of 35mtpa as follows:

- 15 mtpa over existing berths comprising c.11mpta of current trade volumes plus 4mtpa growth on the North Coast Line;
- 10mtpa over Berth 12 for high growth tonnage projections on the Mount Isa Line[5]; plus
- 10mtpa over Berth 14 for dry bulk exports (Berth 12 and 14 are interchangeable).

The results of various sensitivity tests undertaken are presented in Figure S10, including an addition of 10 mtpa of export coal on the railway line under the High demand scenario.

[5] Nominal capacity of a berth will be impacted by the nature of the cargo / trade at the berth. Capacity, *cet par*, will be maximised where there is a dedicated single trade as opposed to a mix of cargoes and / or shippers. The further one moves from a single dedicated trade the lower nominal capacity will typically become. For 10mtpa over berth 12 it will be necessary to complete Stage 1 dredging.

Figure S 10: Sensitivity Testing for Net Present Values (2015 opening)



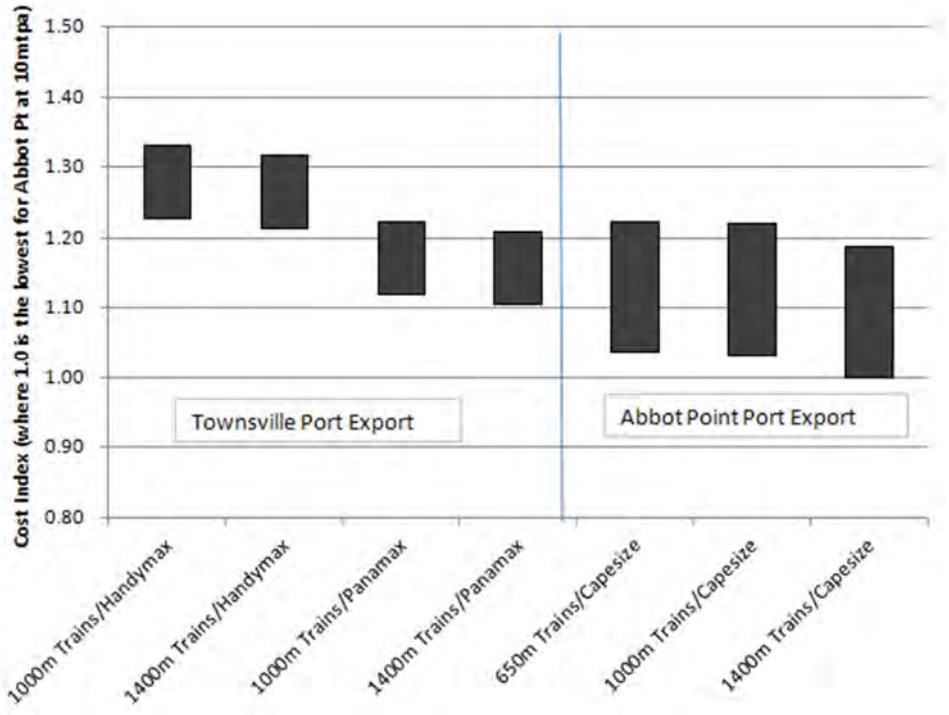
Source: GHD analysis

Whilst sensitivity testing has been used to indicate the impact that adding coal export tonnage has on economic decision criteria, it is also prudent to examine the contestability of Townsville and Abbott Point for coal exports. Results of the contestability analysis (shown in Figure S11) indicate that:

- Longer trains generate the greatest benefit at lower coal volumes through Townsville. Benefits from longer trains for Abbot Point are not fully realised until train length reaches 1400m. This is due to the longer haul distance and larger fleet size required for the freight task.
- A significant reduction in total costs is achieved through the use of Panamax class vessels at Townsville. This is due to the larger payload per vessel relative to the cost of charter; the higher load rates achieved by a larger class of vessel; and the port related costs that are charged per visit.
- The economies of scale generated through the use of Panamax vessels in Townsville (in combination with a shorter rail distance) offset the benefits of larger ships, lower terminal charges, and lower port charges at Abbot Point when 'below rail' access charges are at the upper limits.[6]
- Abbot Point provides a contestable export gateway to the Port of Townsville but this is heavily influenced by the rail access charge.

[6] It could be anticipated that the actual terminal and port charges levied will vary from those currently published as changes in scale associated with developments will dedicate establishment of specific new tariffs. This may have an impact on this type of contestability analysis.

Figure S 11: Contestability of 10mtpa coal exports based on transport costs



Source: GHD Analysis

4.5 Initial Financial Analysis

In order to undertake an initial financial analysis to gauge the likely commercial viability of the project, it has been necessary to derive estimates of likely "revenue" associated with the project. These are developed by deriving an estimate of access charges; access charges being the most likely source of revenue to the track owner. Table S8 shows two access charge rates for TEARC at different levels of coal tonnages ("over and above" the high tonnage projection of 15.3mtpa for non-coal traffic). The first access charge is based on Earnings Before Interest and Taxation (EBIT) which assumes $265 million government grant funding. The second access charge is based on Earnings Before Taxation (EBT) which assumes $265 million government loan funding and takes into account interest charges and loan repayments.

The assumed access charge for the Mount Isa Line is between 1.5c/ net tonne kilometre and 3.3c/ net tonne kilometre (ntk). In comparison, the preliminary financial analysis suggests TEARC would require relatively high access charges for tonnages below 25mtpa (coal and non-coal) assuming government grant funding and full cost recovery (i.e. NPV=0). For government loan funding, the preliminary financial analysis suggests TEARC will need to be considered as part of a broader project incorporating port infrastructure and the Mount Isa Line. Future analysis will need to also consider the nature of access charges where more certainty of investment (scale and timing) and trade is involved.

Table S 8: TEARC Access Charge Breakeven Analysis

Coal (mtpa) Non-coal (mtpa)	0 15.3	2.5 15.3	10 15.3	20 15.3	30 15.3	40 15.3
EBIT charge ($/net tonne)	$0.39	$0.34	$0.26	$0.20	$0.17	$0.15
EBIT charge (c/ntk)	4.9c	4.3c	3.3c	2.5c	2.1c	1.9c
EBT charge ($/net tonne)	$2.71	$2.32	$1.63	$1.17	$0.92	$0.77
EBT charge (c/ntk)	33.9c	29.0c	20.4c	14.6c	11.5c	9.6c

Source: GHD analysis

5. Other Analysis

5.1 Preliminary Market Sounding

Possibilities were explored for private sector delivery, operation and ownership of TEARC. These were explored through two exercises: a 'project delivery options / value for money' workshop and an informal market sounding exercise. The workshop explored the views of key government stakeholders in terms of the ability of private sector involvement in TEARC to deliver value for government spending.

The market sounding exercise sought to understand the level of interest and appetite for investment in TEARC with actual and potential market participants, and any limitations and risks of the project from a financial perspective. The main findings of the workshop and market sounding exercise are that:

- There was a sufficient case to warrant further consideration of PPP delivery;
- PPP delivery was more likely to be viable under a consortium arrangement or third party investor model, due to an unwillingness for a single party to take on demand risk; and
- Investor interest is limited by the small scope and scale of the project – interest would be significantly greater if the scope were expanded to cover the entire Mt Isa to Townsville line, and even extending to upgrades at the Port of Townsville itself.

5.2 Preliminary Risk Analysis

A risk analysis of TEARC was performed to identify risks to the project budget, timeline and social acceptability. From an engineering standpoint, construction cost escalation and flooding during operation were recognised as high risk areas.

From an environmental perspective, there are numerous further investigations that were identified as being required under existing Queensland and Commonwealth legislation to ensure regulatory approval which will impact on planning and Business Case timing.

Community impacts will also need to be explored and carefully managed in the implementation and operation of TEARC should the project proceed to Business Case stage.

The greatest risks to economic viability are long-term tonnage demand, construction cost escalation and uncertainties around actual rail and train operational capacities along the Mt Isa System and Port of Townsville (which will require detailed simulation and engineering to accurately confirm).

Table S9 provides a summary of the results of the qualitative risk assessment for the TEARC project, highlighting the areas where perceived risks are highest.

Table S 9: Risk Assessment Summary for the TEARC project

Risk	Likelihood	Consequence	Perceived Risk
Site and Approval Risks			
Wetlands & Mangroves	Almost Certain	Minor	Medium
Land/Carbon Offsets	Likely	Moderate	Medium
Land Acquisitions	Likely	Moderate	Low
Design Risks			
Detailed Design	Likely	Moderate	Medium
Acid sulphate soils	Likely	Minor	Medium
Pre-loading/Ground Surface Treatment	Likely	Moderate	Medium
Batter Protection	Likely	Minor	Medium
Drainage Structures	Likely	Moderate	Medium
Existing Connections	Likely	Moderate	Medium
Ross River Bridge	Likely	Moderate	Medium
Construction Risks			
Construction cost escalation	Likely	Major	High
Traffickability	Moderate	Moderate	Medium
Embankment Material Sourcing	Likely	Moderate	Medium
Operating Risks			
Ground Settlement	Likely	Moderate	Medium
Flooding	Likely	Major	High
Noise	Likely	Minor	Medium
Other Risks			
Legislative requirements	Moderate	Moderate	Medium
Environmental	Moderate	Moderate	Medium
Political / Social	Moderate	Minor	Low

5.3 Business Case Steps

Should it be deemed appropriate to take the TEARC project to a full Business Case preparation phase, the level of information and analysis must be sufficient to enable the Cabinet Budget Review Committee and Cabinet to:

- Determine the preferred project delivery option; and,
- Make commitments regarding funding of the potential project.

The scope of work of the Preliminary Evaluation focused on tonnage demand projections, economic analysis and market sounding with a desktop risk analysis using existing order-of-magnitude cost estimates and a dated Impact Assessment Study. As a result, the Business Case stage will require more detailed development and options analysis than what might be typically expected. It is also assumed that the TEARC Business Case will consider the whole supply chain from Mount Isa to the Port of Townsville (rather than considering TEARC in isolation). The estimated TEARC Business Case costs are shown below excluding government project management costs, legal fees, contingencies and taxes. The detailed tasks for this level of PPP Business Case would take approximately nine months to complete.

Table S 10: Business Case - Tasks and Initial Indicative Budget Estimates

Task	Description	Estimate ($m)
Rail, structural and civil engineering design	• Options analysis (incl. North Coast Line & Port) • Reference design & output spec (incl. Mt Isa Line) • Rail, bridging, hydrology, utilities and civil works	$4.50
Site inspections and field investigations	• Topographical and asset condition surveys • Geotechnical and environmental testing	$1.00
Cost & quantity estimates and risk analysis	• P90 capital cost /operational cost risk adjusted estimates • Risk quantification, allocation and mitigation	$0.45
Dynamic train operations modelling and simulations	• Evaluate supply chain using existing RailSys model • Train operations, rolling stock, track alignment, load points	$0.30
Detailed tonnage demand forecasts	• Analysis of mine production cost curves and markets • Probability of inferred resources / induced demand	$0.20
Detailed economic impact analysis	• Detailed benefit cost analysis using induced demand • Development of Public Sector Comparator	$0.20
Detailed commercial and financial analysis	• Financial model of procurement and technical options • Affordability analysis and value uplift opportunities	$0.30
Market sounding and procurement strategies	• Formal market sounding consultations / workshops • Value for money based on whole-of-life risk profile	$0.35
Legislative and environmental approvals	• Environmental impact statement • Cultural heritage, native title, land use planning	$1.00
Whole-of-government regulatory and policy issues	• Port and rail access charges and contestability • CGE modelling of economic impact and employment	$0.15
Public interest assessment	• Comprehensive stakeholder engagement • Public displays and project website information	$0.25
TOTAL		**$8.70**

Source: GHD analysis

6. Conclusions

The proposed Townsville Eastern Access Corridor Project (TEARC) is an 8 kilometre rail line from Cluden (near Stuart) through the Townsville State Development Area to the Port of Townsville. TEARC, as part of the Mount Isa to Townsville Rail Corridor Upgrade, is recognised by Infrastructure Australia as being nationally significant. Following a review of previous studies and meetings with stakeholders, the service requirements for TEARC are defined as follows:

- Meet growing tonnage demand on the Mount Isa Rail System;
- Facilitate the use of 1400m long trains;
- Reduce bottlenecks in the Port of Townsville; and
- Improve urban amenity including increasing safety and reducing traffic delays by diverting bulk rail haulage away from suburban areas of Townsville.

6.1 Demand Projections

The 20 year raw tonnage projections (excluding coal exports) clearly indicate a peak in 2020. The low scenario peaks at 8.0mtpa, the medium scenario peaks at 10.4mtpa and the high scenario peaks at 15.3mtpa. The 10 year demand profile by commodity shows that the majority of growth in the high scenario is from minerals exports, and to a lesser degree from fertiliser exports and acid imports.

The tonnage demand profile for 2021 is carried forward; this may be considered conservative given that for many bulk mineral exports there are forecasts of strong long term growth of 'inferred resources'. In addition to mine growth in the Mount Isa region there is potential for substantial coal exports from the Galilee Basin and potential growth of traffic on the North Coast Line to the Port of Townsville.

6.2 Preliminary Economic Analysis

The decision criteria for the central case (2015 opening @ 7% discount rate) show that TEARC is economically viable under high demand and medium demand scenarios. TEARC is marginal under low demand scenarios. The main benefit of TEARC is enabling 1400m trains providing substantial savings in train operating costs and passing loops (relative to 1000m train operations which requires more passing loops to handle more frequent, shorter trains for the same freight task). Contestability of Townsville Port versus Abbot Point is a factor of rail haul distance, train lengths and shipping size. The haul distance is 180 kilometres further to Abbot Point. Train lengths are currently constrained to 1000m for the Mount Isa System and 650m for the North Coast Line. Port of Townsville is constrained to fully laden Handymax and Panamax ships[7] whereas Abbot Point, with its deep harbour, can handle significantly larger Capesize ships. The economies of scale gained by using 1400m trains for TEARC and Panamax ships from deepening the Port of Townsville is competitive with Abbot Point.

[7] Without dredging fully laden Panamax vessels can not currently be accommodated at the port of Townsville.

6.3 Preliminary Market Sounding

The main findings of the market sounding analysis are that:

- There was a sufficient case to warrant further consideration of PPP delivery;
- PPP delivery was more likely to be viable under a consortium arrangement or third party investor model, due to an unwillingness for a single party to take on demand risk; and
- Investor interest is limited by the small scope and scale of the project – interest would be significantly greater if the scope were expanded to cover the entire Mt Isa to Townsville line, and even extending to upgrades at the Port of Townsville itself.

6.4 Preliminary Risk Analysis

A risk analysis of TEARC was performed to identify risks to the project budget, timeline and social acceptability. From an engineering standpoint, construction cost escalation and flooding during operation were recognised as high risk areas.

From an environmental perspective, there are numerous further investigations that were identified as being required under existing Queensland and Commonwealth legislation to ensure regulatory approval which will impact on planning and Business Case timing.

Community impacts will also need to be explored and carefully managed in the implementation and operation of TEARC should the project proceed to Business Case stage.

The greatest risks to economic viability are long-term tonnage demand, construction cost escalation and uncertainties around actual rail and train operational capacities along the Mt Isa System and Port of Townsville (which will require detailed simulation and engineering to accurately confirm).

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