

3

Supply chain and logistics

Key Messages

Existing infrastructure between Mount Isa and Townsville is not operating at capacity and can currently manage forecasted volumes of known resources.

An increase in economic activity may exceed the capacity of the road network. This may provide an impetus to make the existing supply chain operate more efficiently as multi-mode hubs. Road traffic could take freight to Mount Isa, and from here it could be railed to Townsville. Similarly, road traffic to Tennant Creek would be railed to Darwin.

A case for construction of the MITCR could exist if

- Discovery of new resources occurs
- Economic activities develop between Mount Isa and Tennant Creek that exceed a reasonable road capacity (3 to 5 mtpa)
- Economic activity in the Darwin to Townsville corridor is great enough to warrant supply chain redundancy.

Should one or a combination of the above triggers prompt further progression of the MITCR, the unknown additional economic activity induced by connecting the broken link in Australia's rail network must also be taken into consideration.

The Darwin to Townsville economic corridor is a supply chain gateway to the north east of Australia. Most of north-eastern Australia is within a 250 kilometre distance of this corridor. The Darwin to Townsville economic corridor is 500 kilometres wide and:

- Covers approximately one tenth of Australia's area, approximately 700,000 square kilometres, and is more than twice the size of Victoria
- Is home to approximately 350,000 Australians
- Includes Australia's key multipurpose regional ports of Darwin and Townsville
- Contains the world's leading lead-zinc-silver district (Commonwealth of Australia 2015a)
- Average production per worker is almost double the Australian average (Commonwealth of Australia 2015a, p.56)
- Contains Australia's two largest military bases in Darwin and Townsville.

#	Geographic location	Population
1	Darwin	142,300
2	Tennant Creek	3,185
3	Mount Isa	21,821
4	Cloncurry	2796
5	Richmond	522
6	Hughenden	1,154
7	Townsville	180,333

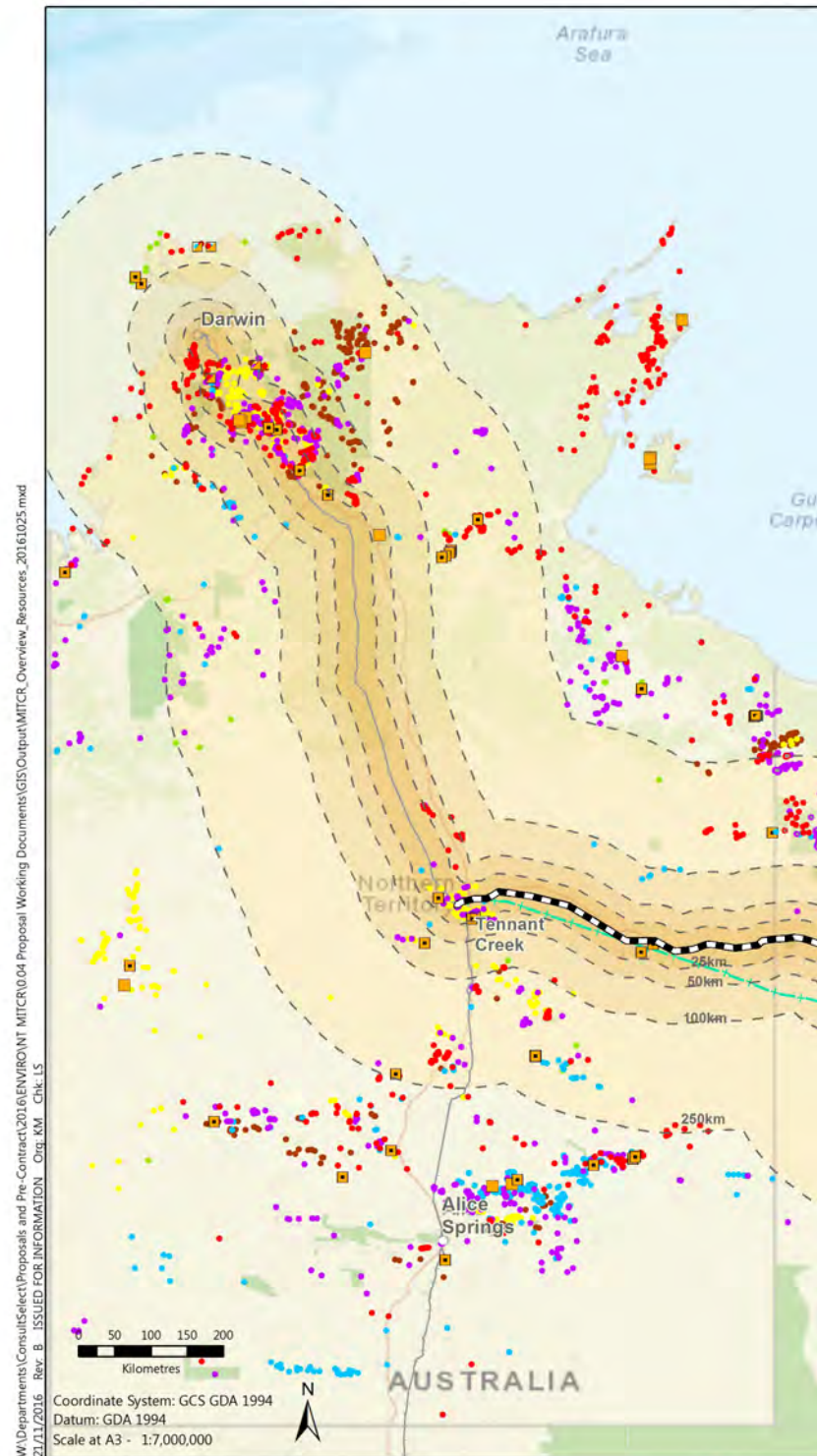
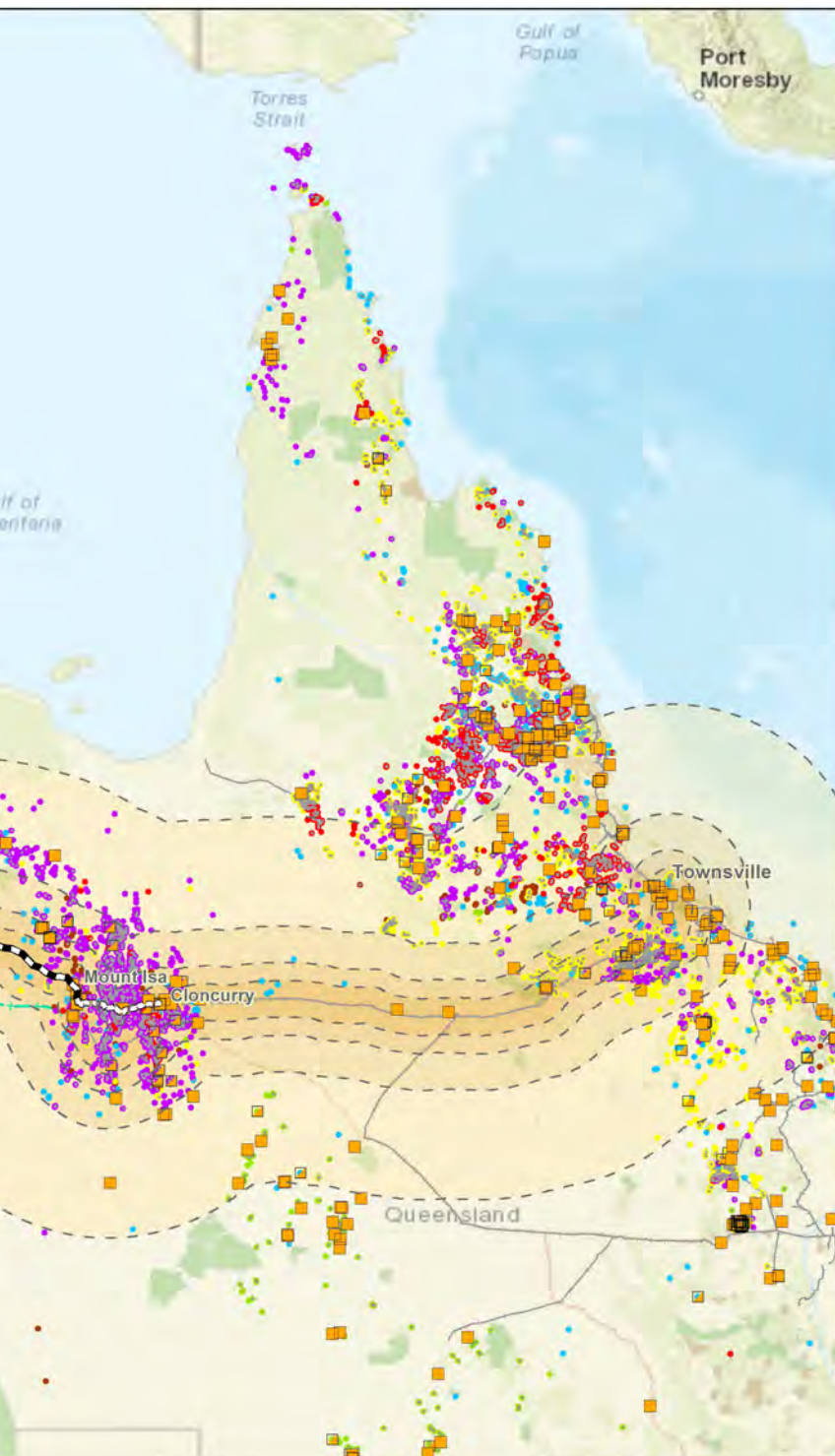


Figure 3.1: The north east Australia showing the MITCR and clusters of mineral resources



Mount Isa to Tennant Creek Rail Link

Resources location along the Darwin to Townsville Rail Transport Corridor

- | | |
|--|---|
| <p>Mount Isa to Tennant Creek Rail Alignment (potential)</p> <p>Mount Isa To Cloncurry direct (potential)</p> <p>Existing railway network</p> <p>Proposed gas pipeline</p> <p>Distance from potential Darwin to Townsville Rail Route</p> <ul style="list-style-type: none"> 0 - 25 km 25 - 50 km 50 - 100 km 100 - 250 km 250 - 500 km | <p>Mines</p> <ul style="list-style-type: none"> Abandoned Care and maintenance Feasibility Operating <p>Mineral Occurrence</p> <ul style="list-style-type: none"> Alloying metals Base metals Gems Industrial minerals Precious metals Radioactive minerals |
|--|---|

Source Information:

Mines and Mineral Occurrences

- Northern Territory Government - Department of Mines and Energy, Department of Land Planning and the Environment and the Department of Land Resource Management (downloaded 24/10/2016)
- Queensland Department of Natural Resources and Mines

Existing Rail Network

- 250K Topo series, Geoscience Australia

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For further information contact:

Luke Stalley
m: 0418 625 406
luke.stalley@advisian.com



Advisian

WorleyParsons Group

3.1 Current supply chain infrastructure

3.1.1 Overview

The key supply chain elements for the Darwin to Townsville corridor are:

- Darwin Port
- Tennant Creek – Darwin Rail
- Tennant Creek Terminal
- Barkley and Flinders Highways
- Townsville Mount Isa Line (Great Northern Railway)
- Multimode terminals in Townsville
- Port of Townsville



Figure 3.2: Darwin to Townsville corridor supply chain (kilometres noted follow the railway alignment)

The existing Barkly Highway connection is the main freight route between the Northern Territory and Queensland. There is currently limited knowledge of the nature of freight travelling across the Barkly Highway. QGlobe (2015) data from the Department of Transport and Main Roads indicates that Average Annual Daily Traffic (AADT) counts of heavy vehicles is 85 (both directions) and the AADT count for road trains is 31 (both directions).

East of Mount Isa freight is transported either by road on the Flinders and Landsborough Highways or via rail on the Great Northern Railway. QGlobe (2015) data from Department of Transport and Main Roads indicates that Flinders Highway Average Annual Daily Traffic (AADT) counts of heavy vehicles is 141 (both directions) and 64 for road trains (both directions).

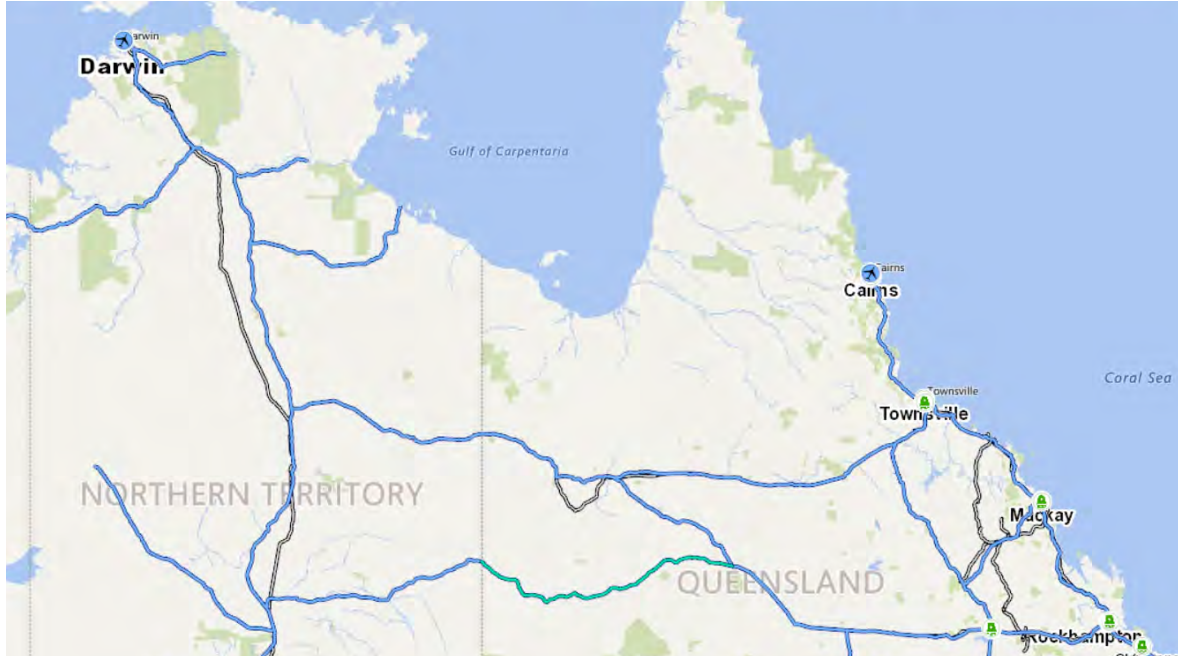


Figure 3.3: Australia's key road and rail freight paths (Commonwealth of Australia Department of Infrastructure and Regional Development 2017)

3.1.2 Darwin Port

Darwin Port is the only deep water port between Fremantle and Townsville that has the added strategic advantage of being in close proximity to key Asian markets. Following the release of the Commonwealth Government's White Paper on Developing Northern Australia, the Darwin Port will take a leading role in supporting a wide range of key projects, initiatives and capital work, to facilitate new mineral resource, agricultural, aquaculture and horticultural opportunities across the north. Darwin Port has an established role as a strategic Defence port and a service and supply hub for the region's oil and gas industry.



Figure 3.4: Aerial image Darwin Port, East Arm Wharf (source: www.darwinport.com)

Trade analysis

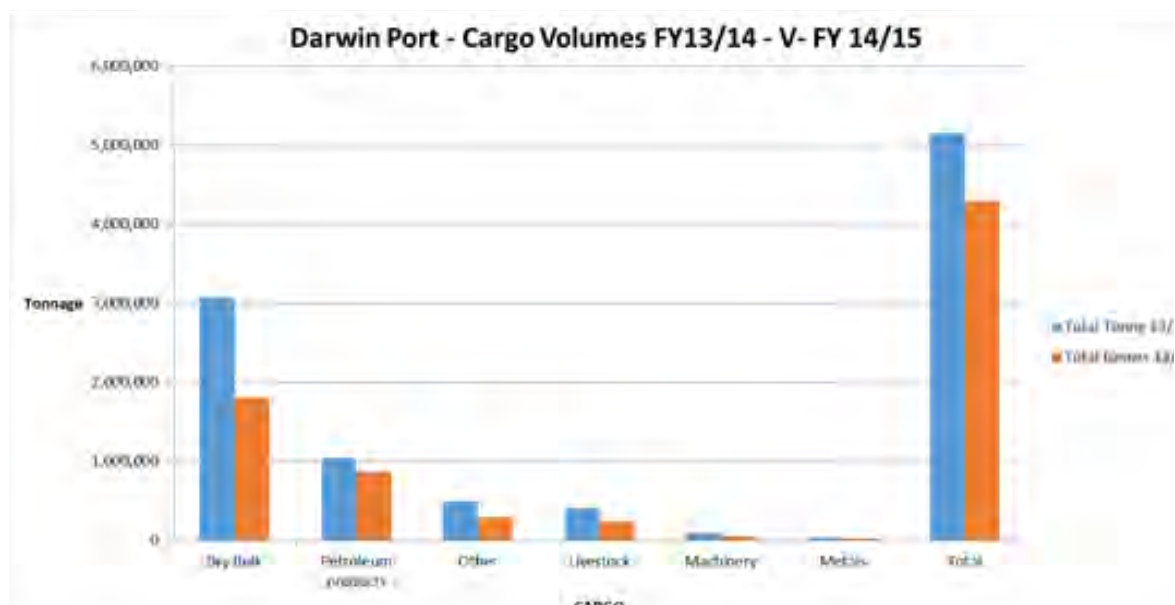


Figure 3.5: Darwin Port – Cargo volumes FY13/14 vs FY14/15 (Darwin Port Corporation 2015a, p.2)

Figure 3.5 shows an analysis of the cargo trade for FY13/14 and FY14/15 out of Darwin Port, the total volume of cargo dropped by 853,138 tonnes, or 17 percent. The main contributing factor was a decrease in the throughput of dry bulk minerals (namely iron ore and manganese). Total dry bulk exports decreased by 40 percent (1,262,764 tonnes) as a result of the downturn in iron ore exports which decreased by 61 percent (1,114,260 tonnes). Export quantities of manganese also decreased from 924,946 tonnes to 791,970 tonnes in the same time period.

Forty-eight percent of total cargo was traded with China due mainly to bulk mineral exports. The next highest trading partner was Singapore with 28 percent, reflecting petroleum and general cargo imports (Darwin Port Corporation 2015a). Darwin Port is major entry and exit port for Defence logistics, freight and equipment. A full table of commodities can be found in Appendix D (Darwin Port trade statistics).

Port expansion

The East Arm Wharf Facilities Master Plan 2030 (Darwin Port Corporation 2011) was developed to accommodate the projected trade growth and vessel demands in order to enhance local and regional economic development. The objectives of the masterplan include:

- Provide a staged development of the reclaimed land for dry bulk stockpiles
- Provide a rail balloon loop and additional rail dump station to manage multiple train loads simultaneously within the port area
- Spate the liquid and dry bulk berths away from the general cargo area



Figure 3.6: East Arm Wharf, access road; Mobile container crane; Overhead gantry for conveyor and bulk dry good ship loader; Live cattle export vessel at East Arm berth

Darwin Port has a Port Development Strategy (2014-2018) to expand based upon its current relative underutilisation, available space for expansion and its strategic location in good proximity to the Asia market for Australian major exports, namely agriculture and resources. Any new or proposed mine or resource developments in the Northern Territory in the vicinity of the project corridor are likely to export through Darwin Port.

3.1.3 Alice Springs to Darwin Railway

The Alice Springs to Darwin Railway is 1,420 kilometres long. It is a 23 tonne axle load (tal) standard gauge track. There is clearance to operate double stacked containers. It is a single lane track with passing loops with a maximum speed of 115 kilometres per hour.

The track project was managed by the AustralAsia Railway Corporation, a combined Northern Territory/South Australia organisation. The project was structured to have a high level of local involvement with plant, materials, labour and subcontractors sourced from the Northern Territory and South Australia. The track includes the 'last mile' to Darwin Port which means produce can rail direct to ships.

The project cost \$1.2 billion (or \$846,000 per kilometre). This was sourced from:

- Commonwealth Government – \$191.4 million (16 percent)
- South Australia Government – \$367.8 million (31 percent)
- Private sector – \$640.8 million (53 percent).

The line carries containerised traffic consist of two locomotives, an in-line fuelling wagon, crew van, and wagons as required. The maximum train length is 1,800m and the transit time is 52 hours.

Railway system	Alice Springs to Darwin (standard gauge 1,435mm)
Distance	1,420km
Rail (kg/m)	50kg/m
Axel load (tonne)	23tal
Speed (max.)	115kph
Train length (max.)	1,800m
Annual tonnage	3.3 mtpa (2011)

Table 3.1: Alice Spring to Darwin line details

The decision to proceed with the Alice Springs to Darwin Railway project was subject to criticism at the time from, among others, the Institute of Public Affairs and the economics editor of The Australian newspaper (Gearin 2000):

“Let’s say they do pull in a few containers from Gippsland that would otherwise go to the Melbourne port. I might add, Melbourne and Sydney’s ports have improved in productivity and their efficiency immensely. They’re highly competitive now, now at world’s best practices. But let’s say the rail system up in Darwin attracts those. What are the benefits to farmers? Shrugs. Maybe a few cents per container? Bigger all. Are we spending \$480m to get a marginal benefit in terms of shipping a container? No, that’s not good return on government money.”

- Mike Nehan, Executive Director of the Institute of Public Affairs

Genesee & Wyoming Australia Pty Ltd operates the 2,200 kilometre Tarcoola to Darwin rail line (incorporating the Alice Springs to Darwin section) and the intermodal terminal in Darwin. Train control operates 24/7 from Dry Creek, Adelaide.

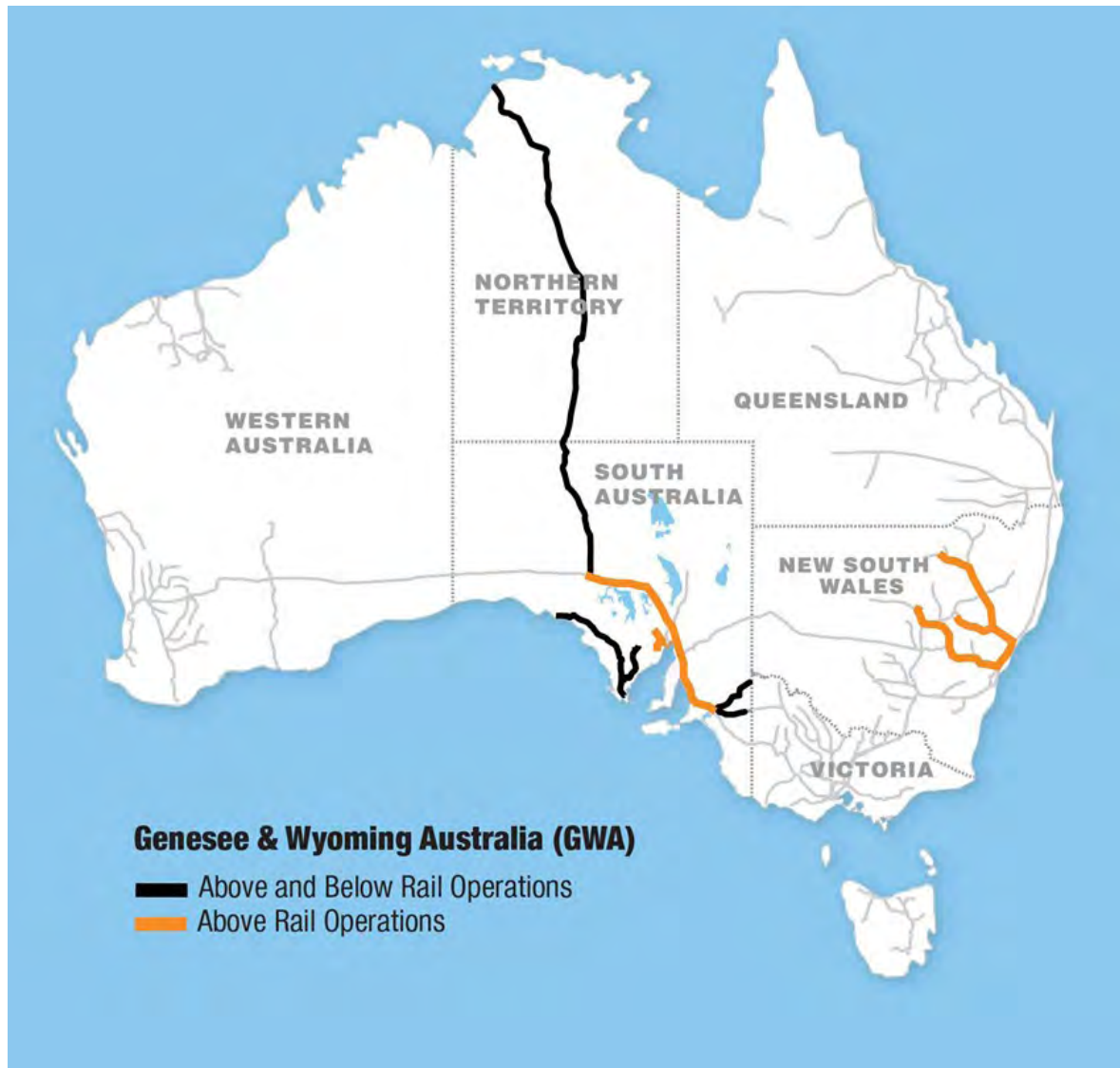


Figure 3.7: Genesee & Wyoming Australia, Tarcoola to Darwin rail line (Genesee & Wyoming Australia n.d.)

The rail freight is all transported in intermodal containers, which are transferred from the train to truck for distribution in the Darwin area. There no box cars, no flat cars, and no bulk (sands or grain). The containers are transferred from the train to waiting truck by mobile top and bottom lift restacking machines. Figure 3.8 to Figure 3.12 illustrate some of the container handling equipment and operations at the Darwin intermodal facility. Refrigerated units traveling south carry fresh produce (e.g. mangoes) and refrigerated units travelling north carry groceries (Coles and Woolworths). The rail line has an advantage over road for large volumes, safety over long distance and achieves a 95 percent reliability for on time pick-up at Darwin. The rail line carries a wide variety of freight including Australia Post, cement for underground mines near Alice Springs, steel for construction, and domestic/industrial construction materials. Freight transportation companies that utilise the rail line include: Toll, Linfox, Northline, shores, Gilbert and TNT.



Figure 3.8: Container loading onto a well wagon



Figure 3.9: Mobile container stacker, top and bottom lift



Figure 3.10: Half-height containers



Figure 3.11: Bottom dumping bulk mineral wagons



Figure 3.12: Genesee & Wyoming locomotive, Darwin to Adelaide line

3.1.4 AustralAsia Railway Corporation

The AustralAsia Railway Corporation is a statutory body set up to represent the interests of the South Australia and Northern Territory Governments during the construction and operations of the AustralAsia Railway.

The rail operator, Genesee & Wyoming, and AustralAsia Railway Corporation are parties to a Concession Deed covering rights and obligations, including project risks. The AustralAsia Railway Corporation focuses on ensuring delivery of obligations of the parties to the Concession Deed throughout the concession period.

An important responsibility of the AustralAsia Railway Corporation is to ensure the rail infrastructure is properly maintained. This includes annual inspections and regular reviews of maintenance to ensure compliance with concession obligations. The AustralAsia Railway Corporation also provides advice to the Northern Territory and South Australia Governments on matters impacting the railway.

3.1.5 Darwin intermodal and bulk materials terminal

The intermodal facility in Darwin operated by Genesee & Wyoming has three parallel standard gauge rows for train loading and unloading on a flood light hardstand that is approximately 2,000 metres long. There is a gatehouse facility to manage truck's arrival for container collection and deliveries. The terminal has a small maintenance facility for rollingstock, running repairs, wagon servicing and wheel changes.

The rail terminal has a 1,500 tonne-per-hour rail dump facility installed for transferring rail-transported ore (iron ore, manganese and copper concentrates, and phosphate rock) from bottom dumping rail wagons to a conveyor system. The conveyor transports this dry bulk material to existing ore-specific stockpiles, located on Darwin Port land to the south east of the rail line. The unloading infrastructure has the capacity to handle 25 ore trains per week. However no bulk mineral materials are being exported currently.

3.1.6 Barkly, Flinders and Landsborough Highways

The Flinders Highway between Townsville and Cloncurry is part of the National Highway, an approved route for the largest type of road train, type 4A heavy goods vehicle. The Barkly Highway with total length of 755 kilometres from Cloncurry to Tennant Creek is the main transport route between Queensland and the Northern Territory. East of Mount Isa, the Landsborough Highway deviates southward away from the Mount Isa-Townsville corridor towards Winton. The freight capacity of these highways is 3 to 5 mtpa¹. Relevant National Highway information is outlined in Table 3.2.

National Highway section	Length	Pavement/speed limit	Road trains
Landsborough Highway Winton to Cloncurry	Approx. 1,049km	Sealed / 110km/h	53.5m maximum length, PBS 4A (Type 1 & 2 Road Trains, 23 & 25 metre B doubles)
Flinders Highway Townsville to Cloncurry	Approx. 754km	Sealed / 100km/h	53.5m maximum length PBS 4A (Type 1 & 2 Road Trains, 23 & 25 metre B doubles)
Barkly Highway (Qld) Cloncurry to Border	Approx. 198km	Sealed / 100km/h	53.5m maximum length, PBS 4A (Type 1 & 2 Road Trains, 23 & 25 metre B doubles)
Barkly Highway (NT) Border to Tennant Creek	Approx. 557km	Sealed / 130km/h	NT Road train route

Table 3.2: Highway freight capacities

Road transit time

Truck transit time between Mount Isa to Townsville is around 12 hours (907 kilometres). Travel time for two drivers sharing the heavy vehicle freight journey between Mount Isa and Darwin is approximately 21 hours (1,667 kilometres).

¹This calculation assumes a weight of 30 to 50 tonnes per B-double vehicle with one passing every 5 minutes, 24 hours per day, 365 days a week

Average Annual Daily Traffic (AADT)

Traffic counts conducted by the Northern Territory Department of Transport for 2015 (Northern Territory Government 2016c) provide the number and type of vehicles on the Barkly Highway and Stuart Highway along the road route alternative to the proposed rail link between Mount Isa and Tennant Creek. This traffic data is expressed as Average Annual Daily Traffic (AADT) and summarised in Table 3.3 below.

Location	Travel direction	Cars per day	Heavy Vehicles (HVs) per day	Road Trains (included in HVs)
Barkly Highway, (100km east of Threeways)	Eastbound	68	43	16
	Westbound	65	42	15
Stuart Highway (100km north of Threeways)	Northbound	133	72	33
	Southbound	114	62	23

Table 3.3: Northern Territory, Barkly Highway and Stuart Highway traffic count AADT summary data

Source: Northern Territory Government Department of Transport 2015

Traffic counts conducted by the Queensland Department of Transport and Main Roads (TMR) 2015 provide number and type of vehicle on the Flinders, Barkly and Landsborough Highways east and west of Mount Isa expressed as AADT. Traffic data is summarised in Table 3.4.

Location	Travel direction	Cars per day	Heavy Vehicles (HVs) per day	Road Trains (included in HVs)
Barkly Highway (6km west of Camooweal)	Eastbound	96	55	27
	Westbound	99	46	26
Flinders Highway (2km east of Landsborough Highway)	Eastbound	105	73	31
	Westbound	108	68	33
Landsborough Highway (133km south of Landsborough-Flinders Highway junction)	Northbound	152	91	52
	Southbound	168	62	32

Table 3.4: Queensland, Barkly Highway, Flinders Highway and Landsborough Highway traffic count, AADT summary data

Source: Department of Transport and Main Roads 2015: AADT Segment Reports, road sections 13H, 14E & 15C

TMR is currently collecting freight and volume data transported across the Barkly and Flinders Highways. Capturing this freight information for heavy vehicles is the subject of an upcoming TMR project. Similarly, the Northern Territory Department of Transport does not have data on the type and volume of heavy vehicle freight transported by road.

Figure 3.13 shows AADT along the Barkly and Flinders Highways between Townsville and Cloncurry. .

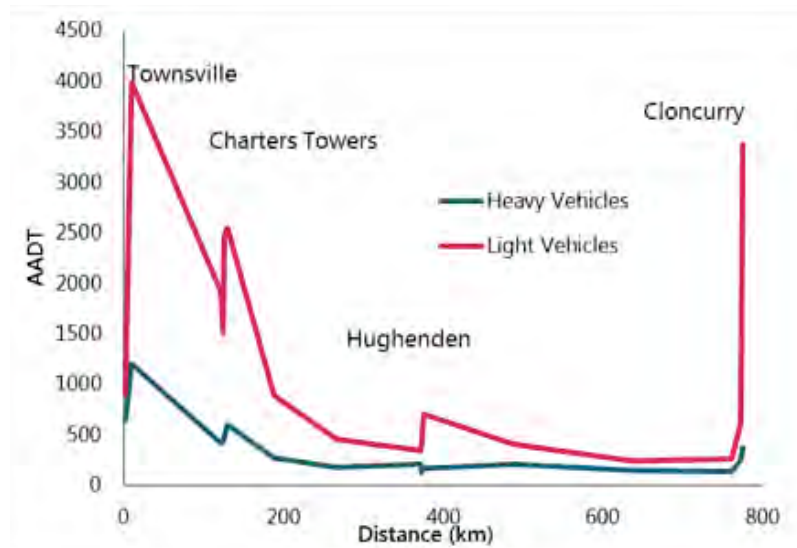


Figure 3.13: AADT for vehicles travelling Townsville to Cloncurry

This equates to approximately 180 heavy vehicles per day, after Charters Towers most of this heavy vehicle traffic travels the full distance to Cloncurry.

Road trains

The Flinders and Barkly Highways are approved PBS (Performance Based Standards) Level 4A heavy vehicle routes. The National Heavy Vehicle Regulator (NHVR) has been responsible for the administration of the PBS scheme for heavy vehicle classification since January 2013. Vehicles with performance Level 4A are the largest and heaviest heavy freight vehicles permitted in Queensland with a maximum vehicle length 53.5 metres road train (Type 2), refer Figure 3.14.

These PBS Level 4A road train vehicles have a nett freight capacity of up to approximately 75 tonnes of product or the equivalent of three fully loaded 40 foot shipping containers.

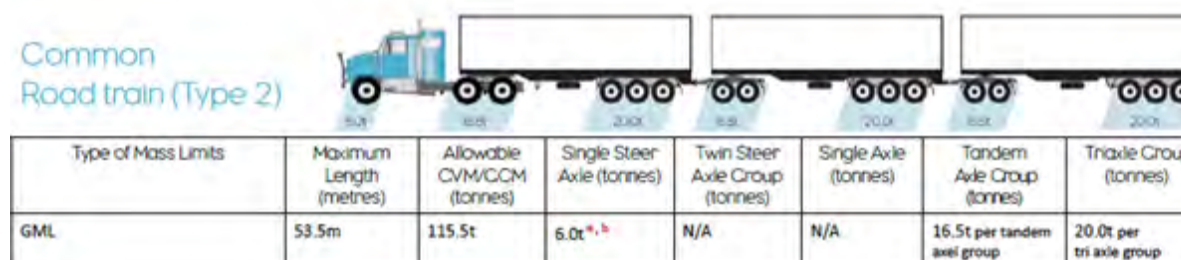


Figure 3.14: Gross Mass Limit (GML) and dimensions for common road train – type 2 (National Heavy Vehicle regulator 2016)

3.1.7 The Townsville Mount Isa Rail Line, *Great Northern Railway*

The Great Northern Railway (GNR) is approximately 1032 kilometres long with some parts of the track requiring trains to slow to a speed of 40 kilometres per hour. It is maintained 'fit for purpose' (personal communication with Queensland Rail). The system is a 20 tal system. Rail is a combination of sizes up to 60kg/m with older, smaller rail being replaced as it wears out. Sleepers are mainly concrete with a re-sleepering program in progress to finalise replacement of remaining steel sleepers in the system.

The GNR extends from Stuart (approximately 10 kilometres south of Townsville) to Mount Isa and includes the Phosphate Hill branch. The 1,032 kilometres of track is a critical link for the North West Minerals Province to the Port of Townsville where the majority of bulk products are exported (Queensland Rail 2016a). GNR key details are shown in Table 3.5.

The GNR is a single line, narrow gauge system with 46 passing loops and incorporates the balloon loops at Yurbi, Phosphate Hill and Mount Isa (minimum loop length 1,009 metres). The line has steel and concrete sleepers, over 200 bridges, and 198 level crossings. Communications on the Mount Isa System between driver and controller (Townsville) are via a UHF radio (operated by Direct Traffic Control system).

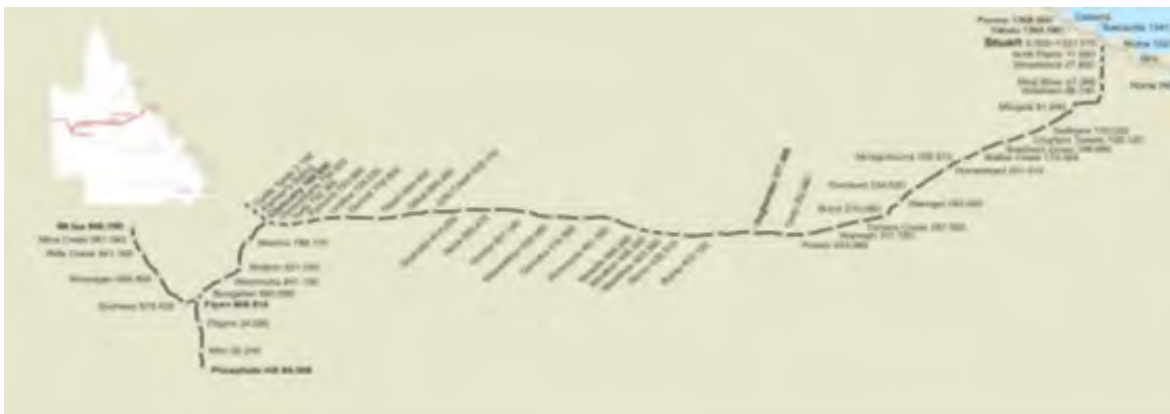


Figure 3.15: Mount Isa Rail Line (Queensland Rail 2016a, p.5)

Railway system	Mount Isa Rail Line (narrow gauge 1,067mm)
Distance	1,032km
Rail (kg/m)	41, 47, 50, 53 and 60kg/m
Axel load (tonne)	20tal
Speed (max.)	80km/h STU-HGD 60km/h HGD-ISA 80km/h PH
Train length (max.)	1,009m
Annual tonnage	5.8 mt (2012)
Owner Operator	Queensland Rail
Rollingstock	Aurizon Pacific National

Table 3.5: Mount Isa rail line details

A rail traffic flow summary is provided in Table 3.6. Intermodal traffic includes: general bulk freight, general freight, containerised coal, fuel, cement, sulphur, lead bullion, copper anode.

Product	Origin	Destination
Sulphuric Acid	Sun Metals (Townsville)	Phosphate Hill
Sulphuric Acid	Mount Isa	Phosphate Hill
Fertiliser	Phosphate Hill	Port of Townsville
Lead/Zinc Concentrate	Cloncurry	Port of Townsville
Lead/Zinc Concentrate	Mount Isa	Port of Townsville
Zinc Concentrates	Mount Isa	Sun Metals (Townsville)
Intermodal traffic	Port of Townsville	Cloncurry/Mount Isa
Intermodal Traffic	Mount Isa/Cloncurry	Port of Townsville
Livestock	Cloncurry/Julia Creek	Stuart

Table 3.6: Mount Isa Line Rail Traffic Flow by product

The major commodity freight items are dangerous goods in the form of sulphuric acid and fertiliser to and from Phosphate Hill. The next most common freight types are empty containers, loaded containers and cement. Noticeable omissions in the freight carried are any type of base metal mineral product, or ore, and petroleum which are moved by truck.

Train capacity and transit times

At present 88 trains per week is the current maximum number of train paths on the Mount Isa Line. Currently 68 trains operate contracted services per week on the line. The maximum number of paths cannot increase until the completion of the long-term concrete re-sleeping program which involves an extended period of nine hour daily closures. Once the re-sleeping program is complete, the capacity could increase to operational capacity of 120 trains per week, subject to demand.

A fully loaded bulk mineral train is the largest and longest regular train consisting of around 90 wagons (approximately 1,000 metres long) and carries 5,500 net tonnes of freight products. 'The Inlander' passenger train between Townsville and Mount Isa travels each direction two times per week with a transit time of between 19 and 20 hours. The transit time from Mount Isa to Townsville for some mineral trains can be up to 36 hours due to operational requirements, e.g. multiple loading/unloading location, crew changing, dwell time in Cloncurry etc. However the quickest freight train completes the journey in approximately 23 hours, utilising a crew van to allow efficient crew changes.

Revenue and maintenance

In 2015/16, 5.7 billion gross tonne kilometres of mineral concentrate, intermodal and general freight, sulphuric acid, fertiliser and cattle generated \$91.06 million in access revenue. Annual maintenance costs for the line is in the order of \$50 million to ensure ongoing safety and reliability.

Operational constraints

Operation of the GNR is complex due to the range of train types and wide variety of freight products transported, refer above. There are several competing train operators plus numerous mines with fluctuating freight requirements which varies demand. Compounding this complexity are the operating restrictions associated with extreme heat and track maintenance plus interface constraints with accessing the main north coast line on approach to Port of Townsville.

Notwithstanding these operational constraints, at present, sufficient capacity exists for the current projected tonnages on the GNR. For the foreseeable future additional capacity will not likely be required without an increase of economic activity along the Darwin to Townsville corridor. The system operates at a 'fit for purpose' standard to meet contracted tonnages. Capacity enhancements are able to be delivered for future projects provided that contracted tonnages are sufficient to justify the necessary capital investment (Queensland Rail 2016b).

Temperature

The temperatures on the GNR vary throughout the year. Summer temperatures can reach above 45°C whilst minimum temperatures during winter can fall below 3°C. At times during periods of extreme heat it may be an operational requirement to impose temporary speed restrictions – heat restrictions (reducing the train operating speed) over various sections of the track to minimise the risk of incident. These hot weather protocols are aimed at reducing the risk of an incident from track instability.

When the air temperature reaches 35°C, a hot weather patrol will be undertaken by Queensland Rail personnel to observe and determine the condition of the track structure. On the basis of this inspection, a blanket speed restriction may be imposed if signs of track instability have been observed.

Temporary speed restrictions may also be put in place during and after the completion of maintenance activities. The extent of the restriction will depend upon the type of maintenance activity and the risk of track misalignments.

Rainfall

Rainfall on the GNR is mostly confined to the summer months where in excess of 90 percent of the annual total is recorded between November and April. This rain is mostly associated with monsoonal troughs. Tropical lows, which develop from November to April, occasionally deepen to cause tropical cyclones. Tropical cyclones frequently foster high winds, heavy flood-producing rainfall. The high wind risk does not usually extend further inland than 50 kilometres, however the rainfall associated with tropical cyclones have been known to impact the GNR.

Black soil

The GNR is constructed on ‘black soil’ plains between Hughenden and Cloncurry. ‘Black soil’ is a type of Gilgal clay prone to shrinkage and swelling in dry and wet conditions, respectively. This movement of the underlying soil material can affect the stability of the railway formation and cause the track to become misaligned. Queensland Rail operates an Automated Geometry Measuring System (AGMS) which is an unmanned track recording machine which completes a weekly assessment of the Mount Isa track. The AGMS measures track geometry, the profile of the rail and captures video which is sent by mobile network for analysis and provides automatic alerts for high priority defects to field staff for urgent attention.

Maximum train length

The maximum train length permitted on the GNR is 1,009 metres. This length only applies west of Stuart, though limitations/restrictions apply between Stuart and Townsville Jetty and reduced lengths apply on other lines such as the North Coast line. Other factors that the maximum length of trains is determined by include:

- Restrictions for crossing/passing other trains
- Requirements for braking performance of the train
- Capacity of the route
- Drawgear capacity
- Train handling
- Requirements for road/pedestrian access across the track
- Loading/Unloading facility restrictions.

Variations of train length for a particular train configuration are possible; however these need to be agreed as part of access agreement negotiations.

Trackside detection equipment

Queensland Rail has invested in derailment prevention technologies along the GNR. These systems provide a simultaneous alarm to the train driver and Townsville Network Control Centre that detects problems outside normal operating parameters. Trackside detection systems include:

- Dragging Equipment Detectors (23 locations) detect anything that may be dragging underneath a train which may indicate that a wheel or wagon is derailed
- Hot Box Detectors/Hot Wheel Detectors (three locations) detect faulty bearings on rollingstock that are projecting heat and noise signatures outside the normal operating parameters
- Overload and Imbalanced Load Detectors (two locations) detect overloaded or unevenly loaded freight wagons which can cause excessive train and track forces that can lead to a derailment
- Wheel Impact Load Detectors (one location) identifies flat wheels on rollingstock which can cause severe damage to the network resulting in the closure of the track.

Future infrastructure improvements

Queensland Rail has developed a program of works to upgrade the infrastructure of the network to increase the long term stability of the line which includes:

- Replacing steel sleepers with concrete sleepers
- Replacing light rail with heavy 60kg/m rail.

A \$25 million program of work commenced in May 2016 to replace 41 kilometres of sleepers in areas between Richmond and Julia Creek to deliver a more stable and reliable track structure by replacing steel sleepers with concrete. Other work in 2015/16 included upgrade of the Acid Junction to Mount Isa section with new rail, ballast and concrete sleepers, plus full track relays of the Cape River Bridge and a one kilometre section between Cloncurry and Marimo.

Queensland Rail aims to continue the re-sleeping and re-railing to complete the transformation of the entire system. The current timing of the program is dependent on sufficient growth occurring on the line to provide the additional funding for these works. Should additional tonnes be contracted on the network, the works program will need to be accelerated to coincide with the increased traffic.

3.1.8 Port of Townsville

The Port of Townsville is one of 11 commercial trading ports operating within the Great Barrier Reef World Heritage Area (GBRWHA) along Queensland's eastern coast line. The port primarily services the export demands of the Queensland agricultural and mineral provinces as well as supporting general cargo imports and exports for a range of domestic and industrial commodities (such as fuels, food, vehicles, commercial machinery and manufactured items). The port is managed and operated by a government-owned corporation, the Port of Townsville Limited (POTL), and currently operates 11 berths (refer Figure 3.16).

The Port of Townsville is the northern-most of four priority ports identified under the Queensland *Sustainable Ports Development Act 2015* (Ports Act), which was enacted in November 2015. Amongst other things, the Ports Act:

- Restricts new port development in and adjoining the GBRWHA to within current port limits and outside Commonwealth and State marine parks
- Prohibits major capital dredging for the development of new or expansion of existing port facilities in the GBRWHA outside the priority ports of Gladstone, Abbot Point, Townsville and Hay Point/Mackay
- Prohibits the sea-based disposal of port-related capital dredge material within the GBRWHA (Queensland Government Department of State Development, 2016a).

Through the Ports Act, the Queensland Government seeks to strike a balance between environmental considerations and the protection of the State's priority ports which are critical elements of the economic infrastructure of Queensland. To achieve this, the Ports Act introduces a strategic planning process. The master planning process considers aspects beyond the priority port boundary and assists with the optimisation of infrastructure and addresses operational, environmental, social, and economic relationships. Key considerations beyond the port boundary include supply chains and surrounding land uses. The Priority Port of Townsville Master Plan Evidence Based Report has been prepared including the proposed boundaries of the Master Planned Area and precinct within that area (Advisian 2016).



Figure 3.16: Aerial image of the Port of Townsville

Trade analysis

As a multi-commodity port, it now handles about 14 percent of the total international export trade by earned value, yet only 4 to 5 percent of the total tonnage emanating from Queensland sea ports. An expansion of sea-borne trade is expected in north Queensland in the next few decades as a result of Free Trade Agreements and emerging Asian markets.

In the FY 2016, the port's throughput decreased overall from approximately 10.5 million tonnes to approximately 9.2 million tonnes. This was primarily driven by a decrease in bulk nickel through Berth 2 and decommissioning of Berth 7. The decrease was partially offset by increased throughput of bulk material (Berth 8) and liquids (Berth 1). Low commodity prices and the closure of Queensland Nickel in Yabulu are the contributing factors to the reduction of commodity throughput volumes. Vessel calls decreased accordingly.

The current operational conditions of the various berths within the port are provided in Table 3.7.

Berth	Existing product/berth infrastructure capability	2015/2016 Utilisation (%)	2015/2016 Throughput (t)
1	Bulk liquids	28%	1,120,038
2	Bulk nickel	33%	1,638,690
3	Multi-purpose (incl. containers)	80%	1,702,694
4	Multi-purpose. Currently being upgraded with heavy crane beams	44%	645,898
7	Decommissioned dry bulk	0.00%	0
8	Bulk material/multi-purpose	44%	1,884,841
9	Sugar, molasses, motor vehicles, bulk, general cargo	30%	1,545,664
10	Navy/cruise/multi-purpose (incl. cattle)	44%	288,718
11	Bulk mineral export	17%	403,025

Table 3.7 Existing berth use

Source: Port of Townsville Ltd

At present, the Port of Townsville caters for an extensive range of import and exports with a focus on the following five trade sectors (Port of Townsville 2016a).

Mining and resource hub

The Port of Townsville is linked by road and rail to one of the world's largest base metals provinces. The North West and North East Minerals Provinces surrounding the Mount Isa and Cloncurry regions are rich in commodities such as copper, silver, lead, zinc, gold, phosphate, magnetite and thermal coal.

Agriculture hub

The Port of Townsville is the largest sugar export facility in Australia and one of the most efficient exporters of live cattle. Demand for agricultural products such as sugar, molasses, biofuels, beef, fertilisers, rice, chickpea, mung bean and grain sourced from northern Australia is expected to increase as Asia continues to grow and experiences difficulty in meeting demand with local resources. In FY 2016, around 261,000 head of cattle were exported through the Port of Townsville, with Indonesia accounting for 60 percent of the destination market and the remainder to Vietnam.

Fuel import hub

The demand for fuel imports through Townsville is directly linked to new mining projects in the northern Australia region, as well as population growth. The Port of Townsville has recently invested in the fuel pipeline infrastructure on Berths 9 and 10.

General cargo hub

The Northern Queensland region is projected to grow over the life of the master plan, which will drive growth in containerised cargo imports. Increased agricultural exports driven by the Asian demand for grain and beef, will provide further growth opportunities for POT in the containerised cargo sector. Container import and export numbers totalled 58,711 Twenty Foot Equivalent Units (TEU) containers for FY 2016.

General cargo is the predominant component of container imports while refined metals make up the major proportion of exports. There is an increasing trend to containerise refined metals due to the proliferation of Asian container ports which facilitate logistical efficiencies and therefore cost savings for customers. The potential to develop coal resources in the Galilee Basin may provide additional growth opportunities in project cargo imports due to new mining projects and the construction of infrastructure associated with newly developed resource regions. These opportunities are dependent on market conditions and commodity prices strengthening. The completion of a \$40.7 million upgrade and refurbishment of Berth 4 due for completion at the end of 2017 will improve Port of Townsville's ability to increase container trade.

Figures 3.17 and 3.18 illustrate the tonnages of imports and exports for 2014-15. It is clear that nickel ore and mineral concentrate component of the port's traffic was significant in FY 2016. The loss of this component has led to Port of Townsville reinventing itself.

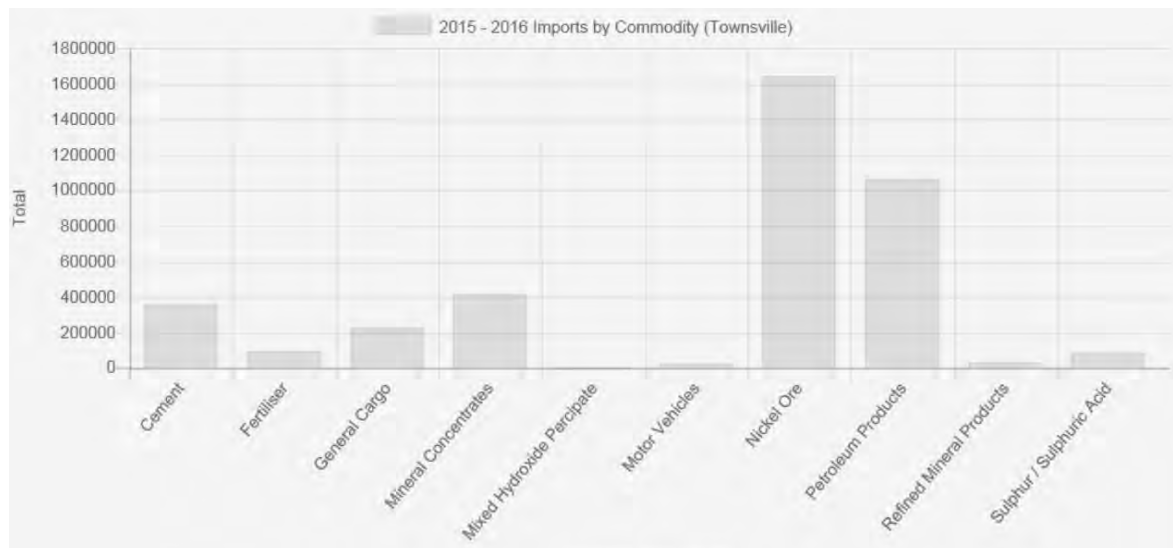


Figure 3.17: FY 2016 imports by commodity via the Port of Townsville (Port of Townsville 2016b)

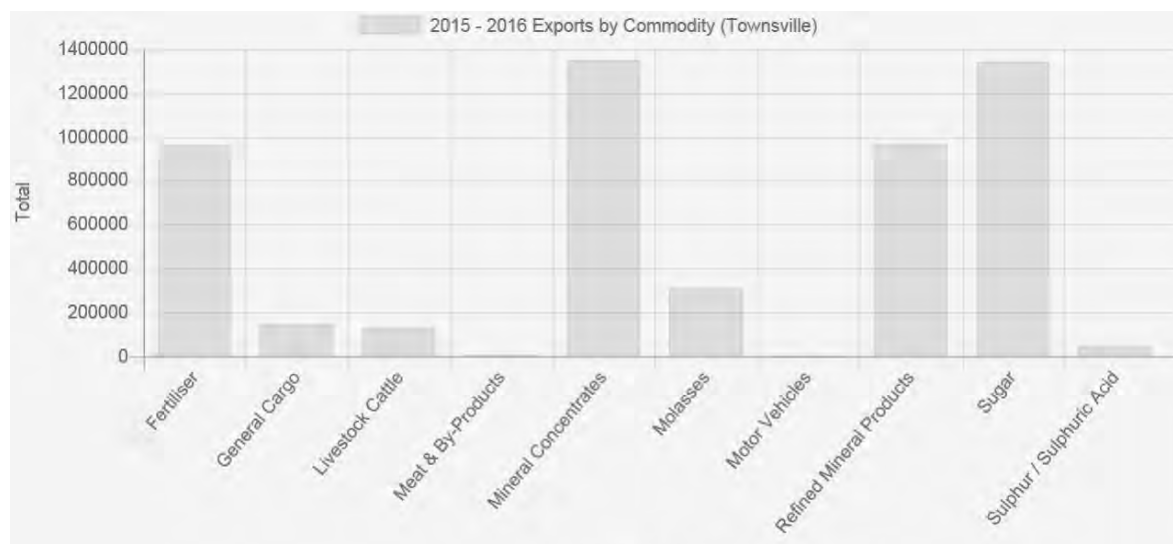


Figure 3.18: FY 2016 exports by commodity via the Port of Townsville (Port of Townsville 2016b)

This reinvention has mainly been in the form of increasing container and general freight traffic. The growth in container traffic is shown in Figure 3.19.

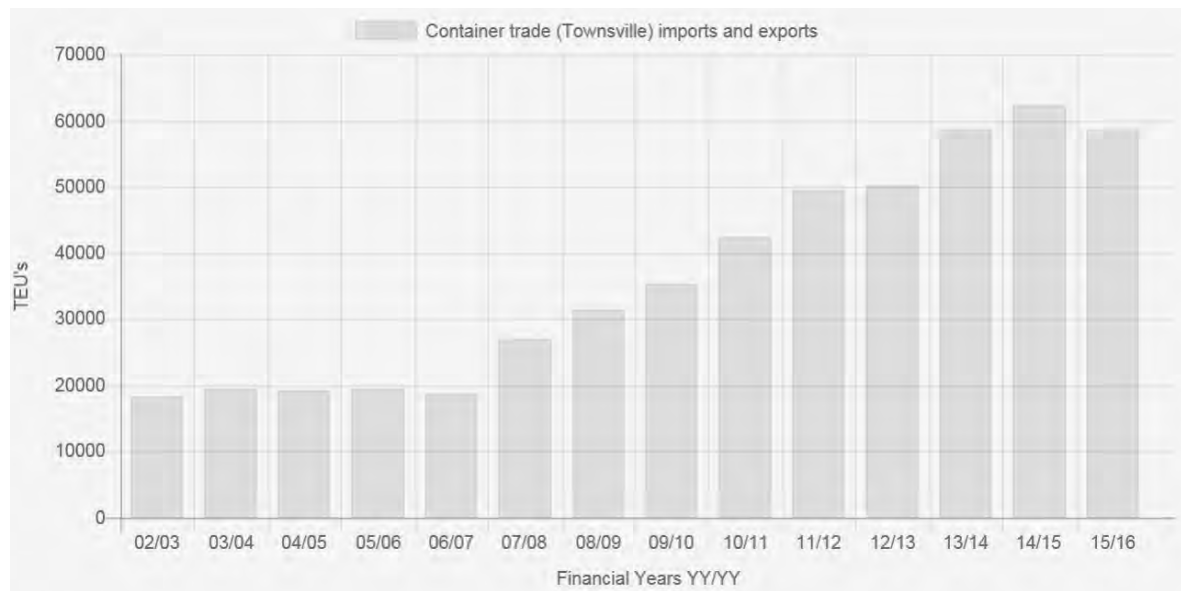


Figure 3.19: Growth in container traffic at the Port of Townsville (Port of Townsville 2016b)

3.2 Working towards a streamlined national freight network

Australia has a number of major challenges in developing a national freight strategy to create an environment of competitive transport costs. These challenges include:

- Legacy issues of rail infrastructure from a strong State-based heritage
- Long distances
- Sparse population.

Of these three, the one that is mostly within the government's control is the first; addressing the legacy of strong State-based rail systems. The impact of the State-based legacy issues can be seen most clearly in the different gauges between States but is also apparent in other ways such as regulation, standards and even investigating new signalling technology.

The Australasian Railway Association (ARA), Australian Logistic Council (ALC), National Transport Commission (NTC), the Office of the National Rail Safety Regulator (ONSR) and the Rail Infrastructure Standards and Safety Bureau (RISSB) are all initiatives to drive a more uniform approach to rail across the States.

More recently, on behalf of the Commonwealth Government, Minister Darren Chester announced the preparation of a new infrastructure plan targeting effective freight networks:

“An overhaul of the nation's road, rail and port systems to cope with burgeoning freight demands will be a central part of a new 15-year national infrastructure plan to be launched on Thursday by the Turnbull government.

The plan, which aims to freshen the government's policy agenda for next year, will adopt 69 of the 78 recommendations made by Infrastructure Australia in a report to government in February.

That comprehensive document included a wide range of recommended policy changes and funding reforms such as a public inquiry into road funding to identify a new model to replace existing road taxes and charges with a more equitable approach that charges users, not taxpayers.

It recommended a heavy vehicle road charging structure within five years, to shift more freight to rail, followed by the extension of road charging across all vehicle types within 10 years.”

- Coorey 2016

In addition to the MITCR, a number of projects are underway that are part of the drive to create an effective interconnected freight network. Projects of particular relevance to MITCR development are:

- Melbourne to Brisbane Inland Rail (Inland Rail or MBIR)
- Townsville Easter Access Rail Corridor (TEARC)
- Port of Townsville Port Expansion Plan (PEP)
- Mount Isa City Council and Mount Isa to Townsville Economic Zone (MITEZ) feasibility study into a multi-mode terminal at Mount Isa.

The current Australian rail network is shown in Figure 3.20.

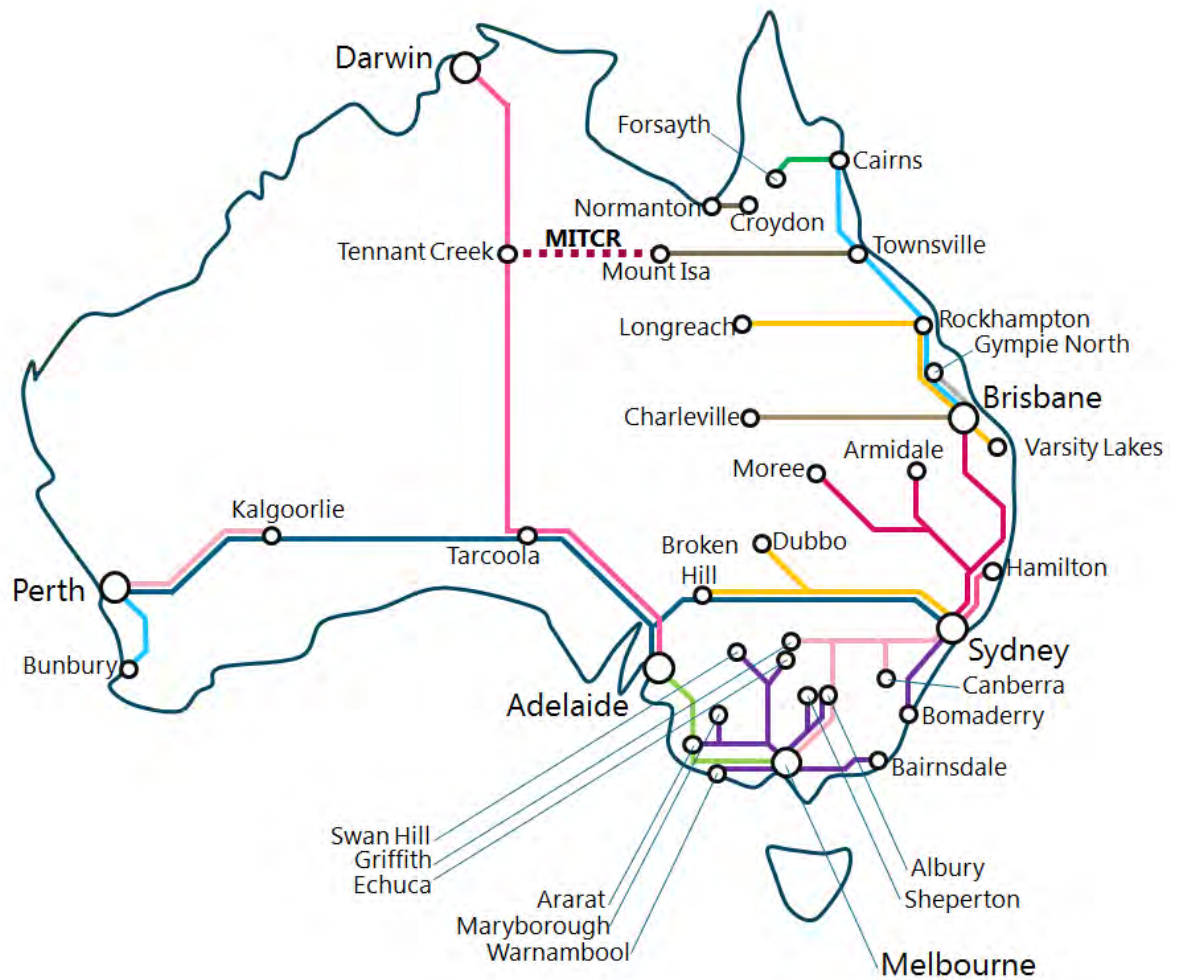


Figure 3.20: Australian rail network map illustrating location of MITCR link

3.2.1 Melbourne to Brisbane Inland Rail

Inland Rail is the largest of the five rail projects with a P90 estimate of \$10.7 billion and the construction of approximately 600 kilometres of new track and an additional 400 kilometres of track upgrade. The 1,730-kilometre Melbourne to Brisbane route obtained \$8.4 billion of equity funding in the 2017 budget. It is primarily driven by the need to accommodate future freight traffic demands due to increasing populations along the eastern seaboard. The value of agriculture and other goods currently travelling along the corridor is approximately \$34 billion per annum (Commonwealth of Australia 2015a, p.14). The key outcomes for Inland Rail are decreased user costs, increased competition between road and rail, reduced congestion in urban areas and increased flexibility of freight movement along the eastern coast.

Financial analyses show that Inland Rail will be cash flow positive once operational, however it will not generate enough revenue to provide a return on its full construction cost.

Inland Rail undertook a consultative approach that involved user input to aid development of the project.

Market Testing was carried out in two stages. In September 2016, the Commonwealth Government sought views of a broad range of market testing participants on the design, construction, delivery and financing of the Inland Rail project as part of Stage One Market Testing. Stage Two Market Testing sought market participants' views on the preferred delivery model, risks associated with delivery, capacity to enhance the performance and value of Inland Rail and potential project level procurement models for the design and construction of Inland Rail.

Following the Market Testing, the Commonwealth Government announced funding in the 2017 Budget. ARTC will deliver the project and will enter into a Public Private Partnership (PPP) to fund and construct the Toowoomba to Kagaru (Brisbane) section. The Government's view is that this will enable it to manage risk, drive value and leverage private sector expertise in the design, finance, build and maintenance of the most technically complex section, that is Toowoomba to Kagaru (Brisbane).

A market sounding, or testing, process has merit and can be enhanced to identify greater private sector involvement for future projects at early stages. The commercial competitive drive of the private sector for innovation and efficiency should be harnessed.

Case studies in this Paper illustrate other international examples of how different approaches have allowed the private sector to become involved earlier in the process, take on more risk and propose creative arrangements that would not otherwise come from a conventional approach. By undertaking confidential engagements with potential private sector railway owners prior to the establishment of frameworks within which the project must progress, opportunities and strengths of each interested party can be exploited. Once each party's preferred frameworks are understood, they can be effectively developed so as to incorporate key aspects highlighted by the market sounding activity. Below are some framework aspects that may come into consideration:

- Bundling of development rights along the corridor
- Reverse auction prospects (i.e. the party with the shortest concession period request is successful)
- Segmentation of corridor into smaller parcels, allowing smaller firms to bid on construction of a small length of railway
- with rights to certain developments
- Painshare/Gainshare type mechanisms for initial predetermined period of operation.

By obtaining private sector input into the development of the project frameworks, the process becomes more competitive in nature and allows the project to benefit from private sector knowledge and market insights. A market sounding could be undertaken early in the conceptual stage of the project after development of sufficient economic activity. Depending on the circumstances and interest in the project, potential private sector owners may want to take charge of the project at a very early stage (i.e. from approval process through to land acquisition, design and commissioning). This process allows governments to shift risk to the private sector.

3.2.2 Townsville Eastern Access Rail Corridor (TEARC)

The Townsville Eastern Access Rail Corridor (TEARC) is a proposed rail line east of the Townsville CBD. The proposed corridor travels from the current North Coast Line (NCL) at Cluden through the Townsville State Development Area (TSDA) to the Port of Townsville. TEARC is expected to provide a direct and uninterrupted corridor to the Port of Townsville (Refer Figure 3.21).

The construction of the TEARC will improve vehicular traffic flow and safety by redirecting freight travelling by rail to the Port of Townsville away from multiple at grade road crossings through the CBD (Port of Townsville 2016a).

The potential benefits of the project include:

- Improved access for bulk freight traffic to the Port of Townsville allowing 1,400 m long trains. Currently train lengths are limited to 1,000 m on the Mt Isa line and 650 m on the North Coast line.
- Additional capacity for the growing tonnage demand on the Mount Isa rail system, a critical link between the mines in North West Minerals Province and the Port of Townsville.
- Improved traffic flow on the Townsville road network by reducing the number of freight trains that use the current North Coast line between the Bruce Highway and Boundary Street.
- Improved urban amenity within the City of Townsville.
- Improved road safety.

The existing railway would potentially be retained (as it still forms part of the NCL), however train volumes along this section of track would be reduced. Road crossings along the proposed corridor will be grade separated to reduce impacts on the road network.

The TEARC feasibility study was completed in 2012. Since then the Queensland and Commonwealth governments have commissioned a business case for the TEARC project and committed \$147 million.



Figure 3.21: Proposed TEARC corridor alignment, final design pending (GHD 2012, p.3)

3.2.3 Port of Townsville Port Expansion Plan (PEP)

POT currently proposes an expansion of the Port of Townsville to accommodate future trade growth over the planning horizon to 2040. To be able to accommodate future trade growth and to remain a competitive global port, the Port of Townsville proposes to widen the channel entrance to the harbour to accommodate larger vessels and build new berths in the outer harbour.

The port expansion is proposed to be developed progressively to match the demand for additional port facilities. The three primary stages of development are as follows:

- Stage 1: Initial outer harbour reclamation, channel widening and development of Berth 12
- Stage 2: Ultimate outer harbour reclamation and development of Berths 14, 15 and 16
- Stage 3: Channel deepening, and development of Berths 17 and 18.

Engagement with Townsville City Council and the Port of Townsville indicate they would be supportive of the MITCR provided it does not undermine the freight volumes passing through Townsville.

3.2.4 Feasibility study of Mount Isa intermodal terminal

Mount Isa to Townsville Economic Zone (MITEZ) and Mount Isa City Council have intentions of undertaking a feasibility study for an intermodal terminal in Mount Isa. Mount Isa is a likely 'swap over' location between existing Mount Isa to Townsville narrow gauge rail for rail freight travelling east and a potential new standard gauge rail line for freight travelling west to Tennant Creek or onto Darwin. The intermodal terminal will also operate as a multimodal terminal to allow rail freight to be moved onto road transport and vice versa.

An intermodal terminal at Mount Isa could serve as a sorting hub for the container trains. Westbound containers traveling towards Mount Isa on narrow gauge trains could be unloaded without regard to destination. As the containers are transferred from the narrow gauge trains to the standard gauge trains or trucks, the containers would be grouped according to destination along the route, minimising train delay and container dwell times at the destination terminals. The reverse operation would also occur.

The change of gauge at Mount Isa should not be viewed as a barrier to efficient container transport. In the United States, the CSX railroad has developed such a hub terminal in northern Ohio which has proven quite successful at supporting new intermodal markets that were previously not competitive with truck transport.

There are a range of roles that enable delivery of terminals with relevant risks and returns. Further consideration is required to determine who best fulfills the roles including:

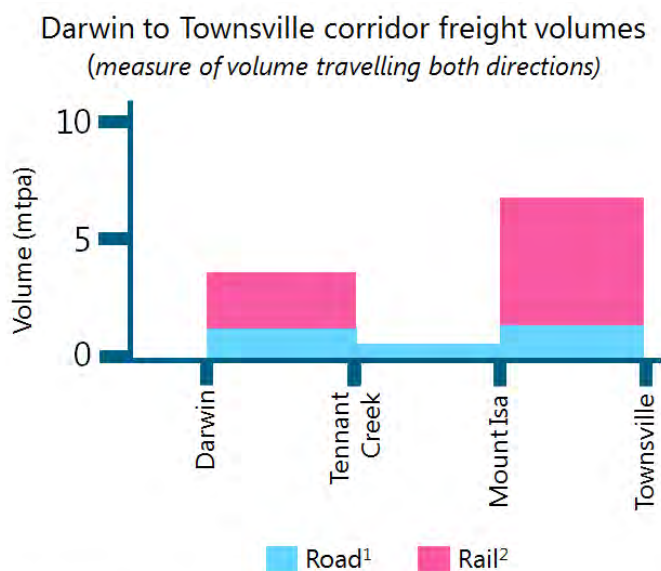
- Network connector
- Terminal sponsor
- Terminal owner
- Terminal developer
- Terminal operator.

3.3 Development of the supply chain between Darwin and Townsville

Existing supply chain infrastructure along the Darwin to Townsville corridor (road and rail modes) currently traffics approximately:

- 4.3 mtpa between Darwin and Tennant Creek;
- 0.5 mtpa between Tennant Creek and Mount Isa;
- and 7.0 mtpa between Mount Isa and Townsville.

Current hauled tonnages across the corridor are illustrated in Figure 3.22 (measure is of tonnages travelling in both directions).



¹ Information obtained from QGlobe (2015 data)

² Approximate volumes obtained from Queensland Rail and Genesee & Wyoming, personal communication 2016

Note: volumes between Darwin and Tennant Creek include volumes travelling from Darwin to Adelaide

Figure 3.22: Road and rail haulage along the Darwin to Townsville corridor (mtpa)

Engagements with stakeholders indicate the nature of the current supply chain does not operate in a hub-and-spoke fashion. Rather, in most instances between Mount Isa and Townsville, heavy vehicles and trains transport freight directly from origin to destination with no change of vehicle or mode of transport occurring. Intermodal freight (containers) on the GNR account for less than 20 percent of total tonnages transported. An example of an origin to destination agreement is the 5-year contract between mining company CuDeco Townsville Bulk Storage and Handling, signed in late 2015 (ASX Market Release 2015).

Volumes of intermodal freight transfers at Tennant Creek are unknown. It is presumed there is minimal freight being transferred from rail to road (and vice-versa) at Tennant Creek.

Major roads along the Darwin to Townsville corridor would have a maximum haulage capacity of approximately 3 to 5 mtpa. This is based on one 50-tonne B-double truck passing every 5 minutes 24 hours a day, 365 days per year. With the current approximate volumes as illustrated in Figure 3.22, it is clear there is unutilised capacity on road and rail along the Darwin to Townsville corridor. Current operation of the Darwin to Townsville supply chain is illustrated in Figure 3.23.



Figure 3.23: The current operation of the Darwin to Townsville supply chain, transporting between 3 to 5 mtpa between Darwin and Mount Isa, and approximately 7 mtpa between Mount Isa and Townsville

As economic activity develops along the Darwin to Townsville corridor, the supply chain will have to operate more effectively. This will require efficient operation of intermodal change points between road and rail at Mount Isa and Tennant Creek. This would then be operating as a hub-and-spoke freight network and is illustrated in Figure 3.24.



Figure 3.24: The Darwin to Townsville supply corridor operating as a hub-and-spoke freight network

There may be two possible triggers that would warrant construction of the MITCR from a logistical perspective. These are:

- If freight traffic between Mount Isa and Tennant Creek exceeds road capacity, or;
- If there are sufficient freight volumes travelling along the Darwin to Townsville corridor to warrant redundancy in the supply chain.

This supply chain arrangement is illustrated in Figure 3.25.

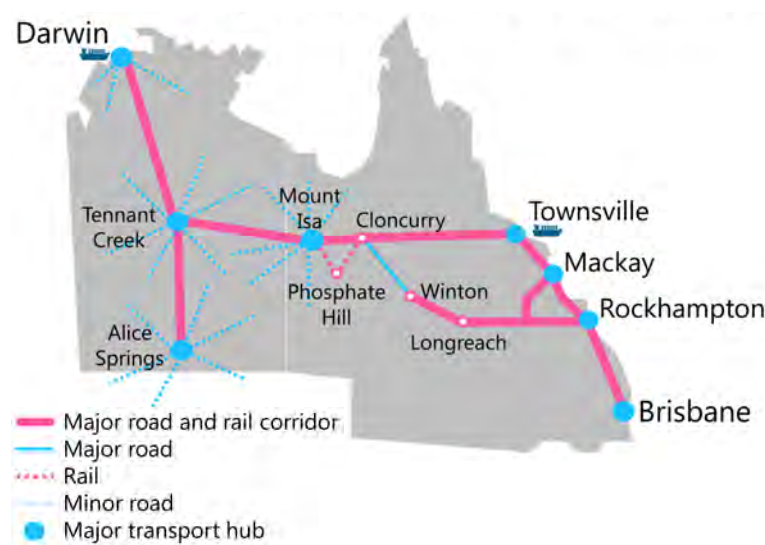


Figure 3.25: The Darwin to Townsville supply chain with construction of MITCR

“The Regional Development Australia Fitzroy and Central West Committee are excited by the economic capacity of the Mount Isa to Tennant Creek rail project to create a fully connected Northern Australia. The potential it holds to achieve is significant - by exporting and shipping goods between Darwin, Mount Isa and Townsville and in the future connecting to the Central Queensland lines via Winton. This would enable access for commodities to be imported and exported via six ports and three internationally capable airports across approximately 25% of Australia. With the success of this project the future for business owners and investors across the region is bright with the opportunity to diversify supply chain and freight options and match competitors in southern states who have access to road, rail and intermodal options as a matter of course.”

- Kalair Macarthur, Chief Executive Officer, Regional Development Australia Fitzroy and Central West

3.4 Modal shift

The recent release of Infrastructure Australia’s 15-year national infrastructure plan emphasises modal shift from road to rail as one of the important changes that needs to take place to enable Australia to manage its demand which is “expected to grow by 50 per cent by 2030” (Coorey 2016, p.7). The plan recommends that within five years the heavy vehicle charging structure be changed so as to move more freight from road onto rail. This reinforces the need for a national rail network that brings rail access closer regional economic activity to enable the development of an effective hub-and-spoke network. Rural Queensland may potentially suffer more from the prospective heavy vehicle charging regime changes than other states. This is due to the fact that access to the rail network in rural Queensland is limited when compared to Victoria and New South Wales.

“...there is a strong dependence on road transport for the freight task across Queensland, so movement of freight from road to rail in response to any increases in road use pricing relative to rail is often not possible. The results of the Inquiry could therefore have adverse impacts on many rural and remote communities as a result of increases in freight costs.” Local Government Association of Queensland n.d., p.2

Queensland's largest port, Port of Brisbane, acknowledges the importance of rail and costal shipping in the context of developing competitive supply chains. In a presentation the following was noted:

“Why are we focused on rail and costal shipping:

- *Provide long term competitive market access for users*
- *Plan and deliver alternative as road reliance unsustainable in long term.”*

– Keyte n.d., p.4

In Australia there are cases of modal shift occurring along routes such as the Perth to Adelaide and Adelaide to Darwin rail lines. Engagement with the private sector indicated that since completion of the Adelaide to Darwin railway line, road traffic has reduced to approximately 20 percent with the other 80 percent being transported via rail. South Australia's rail freight task is noted to have increased by 106 percent, higher than the 36 percent national average (South Australian Government n.d., p.61).

Engagements with freight operators indicate that under the existing heavy vehicle charging regime, freight distances less than 1,000 kilometres are more efficiently transported via road (excluding some inter-capital corridors such as Sydney to Melbourne).

International statistics – particularly in the United States – show that rail is the dominant mode for freight distribution. Figure 3.26 illustrates the percentage of freight transported via road (trailers) and rail (containers) in the United States.

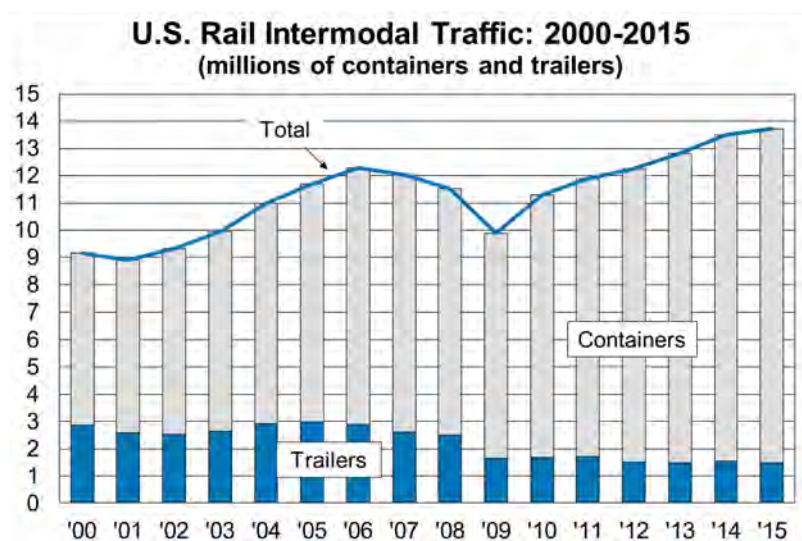


Figure 3.26: Rail intermodal traffic in the United States (Association of American Railroads 2016, p.1)

The main reasons and motives for which rail is the mode of choice for freight are:

- Relieve congested roads
- Reduce environmental impact and carbon emissions
- Increased productivity
- Ability to double stack containers (height clearance requirements)
- Truck driver shortages.

Enabling rail to play a more significant role in Australia's hub-and-spoke logistics network would allow Australia to realise and address some of the above-mentioned benefits and issues. Figure 3.27 by the U.S. Department of Transportation shows that rail starts to become the preferred mode of freight transport for distances greater than 500 miles (805 kilometres).

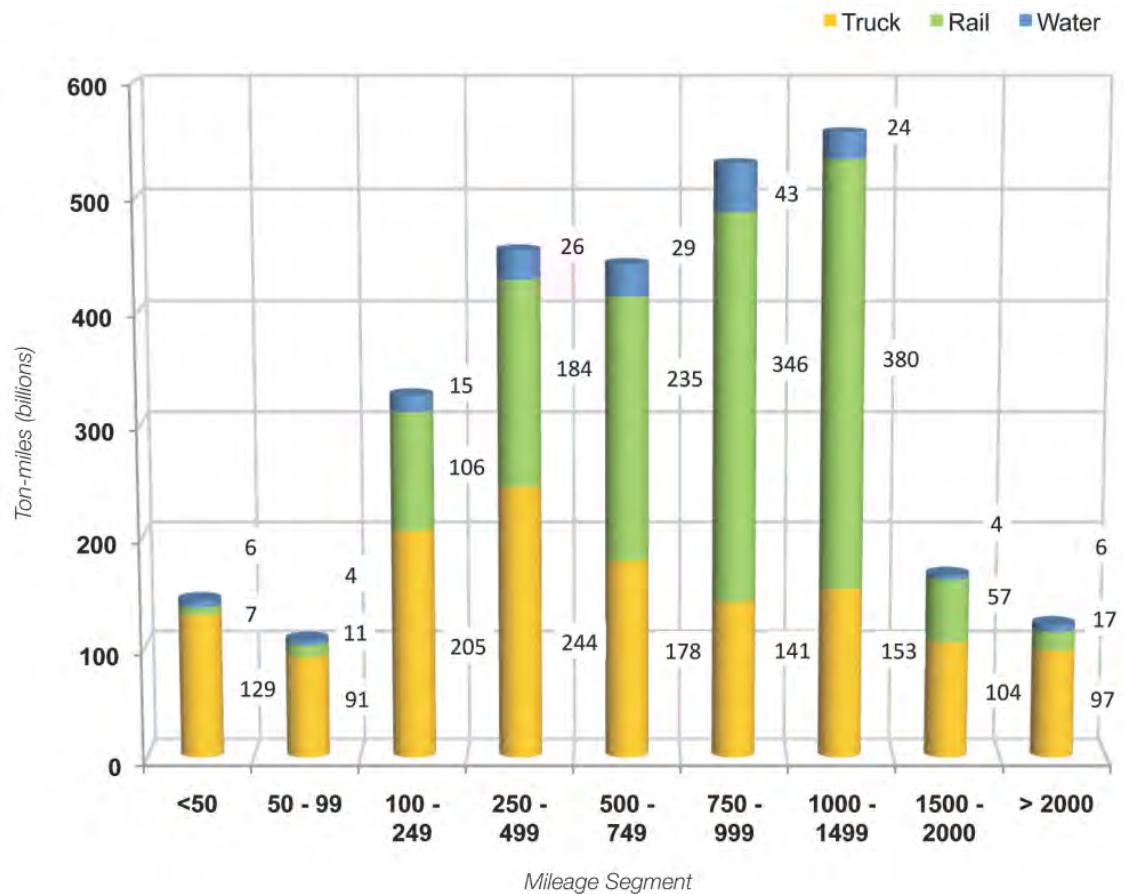


Figure 3.27: U.S. freight transportation mode share by distance (U.S. Department of Transportation 2010, p.16)

Australia has different infrastructure, logistical and demographic characteristics to the United States, meaning that its mode share between road and rail will undoubtedly be different.

In 2015, Australia's population density was three people per square kilometre whilst the United States was 35 (World Bank 2016). The ability to realise major road and rail infrastructure projects is very dependent on a country's population and capacity to consume (excluding instances requiring transportation of high volumes along specific corridors – i.e. resources). It must also be noted that the general geographical locations of the United States and Australia in relation to other population centres of the world are different. Australia will never be able to export goods from its northern seaboard to international markets south of its confines. Geographically, Australia is at the end of the line. Conversely, the United States has population centres north, east, south and west of its borders, allowing it to benefit from higher freight volumes of both international and domestic trade flows in multiple directions across its territory.

Notwithstanding these differences, the United States and other developing nations are aware of the benefits associated with establishing effective hub-and-spoke networks for their specific circumstances. Australia must consider how its freight network would best serve its needs and strike the right balance between flexibility and efficiency.

When considering the management of the Australian freight task it is important to take into account the externalities associated with these modes. A 2012 study commissioned by the International Union of Railways indicates that in Europe the external costs associated with road are over six times those of rail excluding congestion costs. Figure 3.28 below illustrates the attributed costs of externalities of road and rail modes.

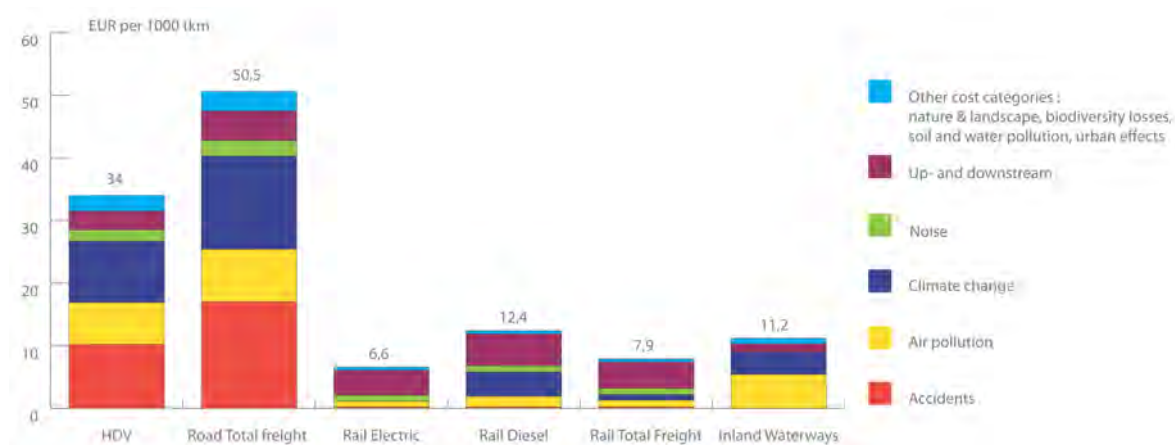


Figure 3.28: Cost of externalities by mode of transport in Europe (International Union of Railways 2012)

A report commissioned by the Commonwealth Government by Access Economics notes that as a basic principal of economic theory, the cost of externalities must be accounted for when assessing competitive neutrality between road and rail modes of transport.

“If users do not bear the costs of negative externalities (or do not accrue the benefits of positive externalities) then they will consume too much (or too little) of the service.” – Access Economics 2007, p.2

In many instances road and rail modes are complimentary to each other given their different characteristics. Road is generally the preferred mode of transport within a 1,000-kilometre radius of Australian ports, as the addition of modal transfers adds cost and time to any supply chain operation – often offsetting any gains made by utilising rail. However, it must be acknowledged that to enable the efficient allocation of resources, the most effective method of allowing a like-with-like comparison to occur must be employed. This includes:

- Ensuring that the differential in cost between externalities is taken into account
- Ensuring that there is competitive neutrality between the two modes. This may involve assessing the attributed maintenance costs against the capacity to transport bulk or freight cargo along a comparable road route.

4

Infrastructure options



Key Messages

A number of infrastructure options exist for linking Mount Isa to Tennant Creek. The preferred option is a standard gauge railway between Tennant Creek and Mount Isa, an intermodal facility at Mount Isa and a dual gauge link between Mount Isa and Cloncurry. This was assessed to be the most appropriate balance between achieving policy objectives, cost and increasing transport competition.

4.1 Bridging across narrow and standard rail gauges

A fundamental decision prior to investigation of options is the choice of railway gauge (width between rails) for the proposed MITCR line. The proposed link will join the existing Alice Springs to Darwin standard gauge (1,435mm) railway at Tennant Creek and the existing narrow gauge (1,067mm) Mount Isa Rail Line at Mount Isa. The Queensland rail network is narrow gauge and differs from the standard gauge national freight and all other interstate rail systems.

Narrow gauge is less expensive than standard gauge as it requires less earthworks (cut and fill) and less imported material for the formation and ballast. It must be noted that earthworks should not be considered a significant factor in decision making for the MITCR due to the flat topography of the area. A disadvantage of narrow gauge is the higher cost of rollingstock since there are more standard gauge locomotives and wagons manufactured worldwide and operators of narrow gauge can pay up to a 30 percent premium for rollingstock.

Standard gauge offers the following benefits over narrow gauge:

- Capacity to cater for higher tonne axle loads (tal), resulting in lower rail lifecycle maintenance costs
- Standard gauge wagons have approximately 20 percent greater volume of product capacity than equivalent narrow gauge wagons
- Standard gauge can cater for double stacked containers, achieving 30 percent cost reduction for freight transportation
- Construction of standard gauge railway requires approximately 10 to 15 percent additional CAPEX expenditure with respect to narrow gauge.

Standard gauge is consistent with other interstate railway gauges and would be congruent with any long-term strategy to create a nation-wide same-gauge rail network. Given the extensive Australia Rail Track Corporation network has already-established standards stipulating acceptable train speeds for different tonne axle loads, a common-sense approach is to follow these standards. Refer to Australian Rail Track Corporation's Route Access Standard General Information document (Australian Rail Track Corporation 2016) for specifications.

This Paper does not take into further consideration the option of narrow gauge use in any eventual MITCR development.

4.2 Route alignment

The proposed rail alignment between Tennant Creek and Mount Isa examined in this study is the alternate design alignment noted in Ranbury's 2015 Preliminary Corridor Technical Feasibility Review. This alignment has the following characteristics:

- Remains close to the Barkly Highway over its full length, facilitating construction access, and maintenance and operational access (with expected lower capital and maintenance costs)
- Does not cross the Barkly Highway, hence no need for grade separation
- Sufficient separation distance to minimise upstream flooding impacts on the Barkly Highway
- Acceptable location and alignment across drainage channel and flood plain
- Very similar to the original concept alignment (ATEC) where it crosses the Stuart Highway and at its junction with the Alice Springs to Darwin rail line.

For an alignment map, refer to Appendix E. This alignment is a proposed alternative in response to a 2004 ATEC report. Refer to Appendix E for the alignments proposed by ATEC in 2004.

4.3 Identification of railway system options

The purpose of this section of the Paper is to identify and examine potential options to provide a rail link between Tennant Creek and Mount Isa. A comparative evaluation of the potential options has been undertaken by considering each option's performance utilising a common performance criteria framework.

Potential options have been developed and considered in relation to their individual ability to enable the following key outcomes:

- Creating a transport corridor and an accompanying development zone that serve as a catalyst for economic development and increased growth potential in northern Australia
- Creating economic activity and jobs in Northern Territory and Queensland associated with railway construction and ongoing operations
- Lowering barriers to entry for new and smaller mine operators
- Providing increased certainty for private investment
- Providing increased certainty for indigenous landholders
- Creating greater competition for cost effective mineral, agriculture and general freight transport
- Generating greater royalties and revenue returns to the Queensland, Northern Territory and Commonwealth governments
- Improving liveability for regional communities.

Implications associated with maintaining the status quo also need to be considered as this is the default option.

The options are in-part based on previous studies and also take into consideration potential demand, economic growth, infrastructure requirements, financing and stakeholder input.

Option	Description	Demand	Projected freight
1A	Status Quo – Do not construct combined with targeted policy reforms	LOW	<5 mtpa
1B	Tennant Creek to Wonarah (standard gauge)	LOW	<5 mtpa
2A	Tennant Creek to Mount Isa (standard gauge)	MODERATE	>5 mtpa and <15 mtpa
2B	Tennant Creek to Mount Isa to Cloncurry (dual gauge Mount Isa to Cloncurry)	MODERATE	>5 mtpa and <15 mtpa
2C	Tennant Creek to Mount Isa to Cloncurry (dual gauge Mount Isa to Cloncurry) with Spur line to Lawn Hill	MODERATE	>5 mtpa and <15 mtpa
3A	Tennant Creek to Mount Isa to Townsville (dual gauge Mount Isa to Townsville)	HIGH	>15 mtpa
3B	Tennant Creek to Mount Isa to Townsville (standard gauge Mount Isa to Townsville)	HIGH	>15 mtpa

Table 4.1: Rail infrastructure options for MITCR link – refer to Appendix F for detailed review of infrastructure options

The rationale behind the different options is to examine project alternatives with different costs and outcomes for the Darwin to Townsville supply chain corridor. The optimum solution needs to target an appropriate balance between the following broad criteria:

- Responding to existing freight demand
- Enabling economic benefits resulting from the MITCR line
- Cost of railway construction and operation.

4.4 Option cost estimates

Capital cost estimates were done for all seven of the considered options. These cost estimates are based on conceptual information so as to enable high-level comparisons to be made between various options. Cost elements considered are illustrated in Figure 4.1.

A summary of the cost estimates is presented in Table 4.2. Cost estimates are based on conceptual design data in the 2015 Ranbury study – *Mount Isa-Tennant Creek Rail Link, Preliminary Corridor Technical Feasibility Review*.



Figure 4.1: Elements of CAPEX estimates

Capital Cost Estimate of Options

Option No.	Description	Length km	Additional Items	Estimate	Total Estimate
1A	Status Quo – Do Nothing	-	-	-	-
1B	Tennant Creek to Wonarah (standard gauge)	280	Mine loop	\$20,000,000	\$1.20B
2A	Tennant Creek to Mount Isa (standard gauge)	639	Capital cost estimate for 646km (Ranbury 2015)	-	\$2.70B
2B	Tennant Creek to Mount Isa to Cloncurry (dual gauge Mount Isa to Cloncurry)	765	new dual gauge 126.4 km additional rail costs add 10% additional earthworks Selwyn Range assume 16,000m ³ /km cut or fill @\$40/m ³ Cloncurry intermodal and loading facility	\$53,433,537 \$80,896,000 \$25,000,000	\$3.39B
2C	Tennant Creek to Mount Isa to Cloncurry (dual gauge Mount Isa to Cloncurry) with Spur line to Lawn Hill	1052	as per Option 2B plus additional 287.3km standard gauge spur to Lawn Hill	\$1,214,513,856	\$4.61B
3A	Tennant Creek to Mount Isa to Townsville (dual gauge Mount Isa to Townsville)	1549	as per Option 2B plus upgrade narrow to standard at 85% cost of new build plus new dual gauge 783.7km with additional rail costs add 10%	\$3,147,315,641	\$6.54B
3B	Tennant Creek to Mount Isa to Townsville (standard gauge)	1549	new standard gauge	\$6,547,299,202	\$6.55B

Notes:

- 1 New standard gauge rail estimate based upon \$4,227,337/km
- 2 Capital Cost Estimate based upon 'Mt Isa - Tennant Creek Rail Link Preliminary Corridor Technical Feasibility Review', Ranbury 2015
- 3 Estimate in 2015 dollars

Table 4.2: Capital cost estimates of each option

4.5 Stakeholder implications

Table 4.3 illustrates how each option is likely to impact on various stakeholders.

	Option 1A	Option 1B	Option 2A	Option 2B	Option 2C	Option 3A	Option 3B
✓ - affirms statement							
X - negates statement							
Increased local employment during construction	X	✓	✓	✓	✓	✓	✓
Increased long-term economic development	X	X	✓	✓	✓	✓	✓
Increased rail access for smaller miners	X	X	✓	✓	✓	✓	✓
Short-term negative impact on Townsville throughput	X	X	?	?	?	?	?
Port of Townsville long-term benefit from increased throughput	X	X	✓	✓	✓	✓	✓
Darwin Port benefits from increased throughput	X	✓	✓	✓	✓	✓	✓
Established rail operators subject to competition	X	X	✓	✓	✓	✓	✓
Impact on Queensland Rail infrastructure operations	X	X	?	?	?	?	?
Local trucking companies positively impacted	✓	✓	X	X	X	X	X
Mount Isa benefits from intermodal facility	X	X	✓	✓	✓	✓	✓
Cloncurry benefits from intermodal and loading facility	X	X	X	✓	✓	✓	✓
Landowners receive compensation or increased land value	X	✓	✓	✓	✓	✓	✓

Table 4.3: Stakeholder matrix against various infrastructure options – refer to Appendix G for full details of stakeholder engagements

4.6 Options analysis methodology

The analysis of each option utilises a framework approach to support assessment consistency and enable effective comparison. The options have differences such as physical length and capacity to cater for demand which influence an option's evaluation against common performance criteria. The location and extent of each rail line option offers a range of supply chain opportunities and benefits contrasted against disadvantages (e.g. scale of potential economic development against total capital expenditure). The analysis framework applied to each option includes:

1. Options Assessment
2. Performance Evaluation
3. Comparative Analysis.

4.6.1 Performance evaluation key

To facilitate presentation of the qualitative comparison of the options, a performance evaluation key has been developed and is illustrated in Table 4.4. The performance of individual options was given a High, Moderate or Low rating against each of the criteria.

The performance criteria in Table 4.4 were utilised to develop a performance summary for each option in this Paper.

Performance criteria	High performance	Moderate performance	Low performance
Opportunity	Enables large regional development opportunities directly relevant to government policy with regional and local benefits including long term job creation	Enables some regional development opportunities in accordance with government policy with potential and regional local benefits including job creation	Enables limited regional development opportunity, partially relevant to government policy with limited regional or local benefits
Functionality	Services high volume freight demand with freight efficiency gains for existing and emerging freight tasks, providing a supply chain with high resilience and high reliability	Services moderate volume freight demand with freight efficiency gains for a regional freight supply chain with good reliability	Services a low volume freight demand and provides a part supply chain solution for the region
Cost	Economic benefit for the capital investment achieves a higher level return	Economic benefit for the capital investment achieves a neutral or mid-level return	Economic benefit for the capital investment achieves a negative return
Compatibility	Provides seamless supply chain connection between Darwin Port and Port of Townsville with connection to the national rail freight network and promotes complementary supply chain investment	Provides a supply chain connection between Darwin Port and Port of Townsville (gauge change) with connections to the national rail freight network	Provides a local supply chain solution with limited connection for regional or national rail freight networks
Constructability	Construction is straightforward with relatively flat terrain and few structures. Recent similar rail projects in Australia	Construction is similar to the majority of freight rail projects in Australia	Construction risk is greater due to the nature and scale of the new work, plus inclusion of upgrade and renewal of existing track.

Financial Analysis	Financial appraisal of project revenue versus project total cost gains a higher level of support from private sector	Financial appraisal of project revenue versus total project cost provides a neutral mid-range level of support from the private sector	Financial appraisal of project revenue versus total project cost provides a low level of support from the private sector
Environmental Implications	Net benefit opportunities exist for positive environmental outcomes, with manageable nuisance of harm issues	Environmental nuisance or harm issues identified, but for the most part are considered manageable	Environmental nuisance or harm issues unlikely to be easily managed
Social Implications	Positive social opportunities exist for the region, local communities and other key stakeholder groups	Some limited positive social opportunities exist for the region and for individual local communities	Negative social impacts exist and are unlikely to be easily managed
Economic Implications	Positive economic opportunities exist, enhancing community economic development and provide a catalyst for growth	Limited economic opportunities exist for enhancing economic growth	Lost or negative economic opportunities to enhance community economic growth
Approvals and Permits	Recognised approvals pathway with land tenure resolved and few management issues identified	Recognised approvals pathway, with land tenure and management issues identified	Not supported by current legislation / policy, or would require complex land tenure negotiations and high level environmental offset considerations
Constraints	There are few constraints which are for the most part considered manageable	Constraints are identified and there is a degree of uncertainty in the ability to overcome or manage them	Multiple constraints are present that would limit realistic implementation
Knowledge Gaps	There are few knowledge gaps in resources deposit and mine development planning and less than one year of further research work would be required to progress	There are multiple resource deposit and mine development planning knowledge gaps and 1-3 years of further research work would be required to progress	There are multiple and/or complex knowledge gaps in mineral deposit and mine planning and greater than 3 years of further research work would be required to progress
Future Considerations	The rail development option provides a flexible long term supply chain solution enabling capacity to be upgraded to meet future high demand	The rail development option would cater for immediate needs and has some scope to be upgraded to meet medium capacity demand	The rail development option has only a single application and limited capacity to be upgraded to meet potential future increased capacity demand.

Table 4.4: Performance criteria evaluation key

4.6.2 Performance evaluation results

The results for the evaluation of each option are summarised in Table 4.5 below.

Performance Criteria	High Performance	Moderate Performance
Opportunity	Enables large regional development opportunities directly relevant to Government policy with significant regional and local benefits including long term job creation	Enables some regional development opportunities in accordance with Government policy with potential and regional local benefits including job creation.
Functionality	Services high volume freight demand with significant freight efficiency gains for existing and emerging freight tasks, providing a supply chain with high resilience and high reliability	Services moderate volume freight demand with freight efficiency gains for a regional freight supply chain with good reliability
Cost	Economic benefit for the capital investment achieves a higher level return	Economic benefit for the capital investment achieves a neutral or mid level return
Compatibility	Provides seamless supply chain connection between Darwin and Townsville Ports with connection to the National rail freight network and promotes complementary supply chain investment	Provides a supply chain connection between Darwin and Townsville ports (gauge change) with connections to the national rail freight network
Constructability	Complexity of construction is straightforward with relatively flat terrain and few structures. Similar to recent rail projects in Australia.	Complexity of construction is similar to the majority of freight rail projects in Australia
Financial Analysis	Financial appraisal of project revenue versus project total cost gains a relatively higher level of support from private sector	Financial appraisal of project revenue versus total project cost provides a neutral mid range level of support from the private sector
Environmental Implications	Net benefit opportunities exist for positive environmental outcomes, with manageable nuisance of harm issues	Environmental nuisance or harm issues identified, but for the most part are considered manageable
Social Implications	Positive social opportunities exist for the region, local communities and other key stakeholder groups	Some limited positive social opportunities exist the region and for individual local communities
Economic Implications	Positive economic opportunities exist enhancing community economic development and provide a catalyst for growth	Limited economic opportunities exist for enhancing economic growth
Approvals and Permits	Recognised approvals pathway with land tenure resolved and few management issues identified	Recognised approvals pathway, with significant land tenure and management issues identified
Knowledge Gaps	There are few knowledge gaps in resources deposit and mine development planning and less than 1 year of further research work would be required to progress	There are multiple resource deposit and mine development planning knowledge gaps and 1-3 years of further research work would be required to progress
Future Considerations	The rail development option provides a flexible long term supply chain solution enabling capacity to be upgraded to meet future high demand	The rail development option would cater for immediate needs and has some scope to be upgraded to meet medium capacity demand

	1A. Status Quo	1B. TC to Wonorah (standard)	2A. TC to MI (standard)	2B. TC to MI to Cloncurry (dual gauge MI to Cloncurry)	2C. TC to MI to Cloncurry (dual gauge MI to Cloncurry) with MI NW Mineral spur	3A. TC to MI to TVL (dual gauge MI to TVL)	3B. TC to MI to TVL (standard gauge MI to TVL)
Low Performance							
Enables limited regional development opportunity, partially relevant to Government policy with limited regional or local benefits.	Low	Low	Mod.	High	High	High	High
Services a low volume freight demand and provides a part supply chain solution for the region	Low	Low	Mod.	High	Mod.	High	High
Economic benefit for the capital investment achieves a negative return	N/A	Mod.	High	High	Mod.	Low	Low
Provides a local supply chain solution with limited connection regional or National rail freight network	Low	Low	Mod.	Mod.	Mod.	High	High
Complexity of construction is greater due to the nature and scale of the new work, plus inclusion of significant upgrade and renewal of existing	N/A	High	High	Mod.	Mod.	Low	Low
Financial appraisal of project revenue versus total project cost provides a relatively low level of support from the private sector	N/A	Mod.	Low	High	High	Mod.	Mod.
Environmental nuisance or harm issues unlikely to be easily managed	Mod.	Mod.	Mod.	Mod.	Mod.	Low	Low
Negative social impacts are unlikely to be easily managed	Low	Mod.	High	High	High	High	High
Lost or negative economic opportunities to enhance community economic growth	Low	Mod.	High	High	High	High	High
Not supported by current legislation / policy, or would require complex land tenure negotiations and high level environmental offset considerations	Mod.	Mod.	Mod.	Mod.	Low	Low	Low
There are multiple and/or complex knowledge gaps in mineral deposit and mine planning and greater than 3 years of further research work would be required to progress	N/A	Mod.	Mod.	Mod.	Low	Low	Low
The rail development option has only a single application and limited capacity to be upgraded to meet potential future increased capacity demand.	Low	Low	Mod.	Mod.	Mod.	Mod.	Low

4.6.3 Comparative analysis

To enable a comparative analysis, the performance of options against each criteria have been arranged into a bar graph format and arranged by order of score under different weighted score scenarios (i.e. a sensitivity analysis).

Base Case weighting

The Base Case results are illustrated in Figure 4.2 and have the weighting criteria as shown in Table 4.6.

Criteria	Weight	Total weight
Opportunity / Economic / Social / Financial / Cost	15% each	75%
All other criteria (7)	3.5% each	25%

Table 4.6: Weighting of criteria for Base Case

The Base Case weighted criteria are applied to rating calculations to reflect the importance of these key criteria. Its intent is to highlight options that rate highly in these key areas in the overall ranking of options.

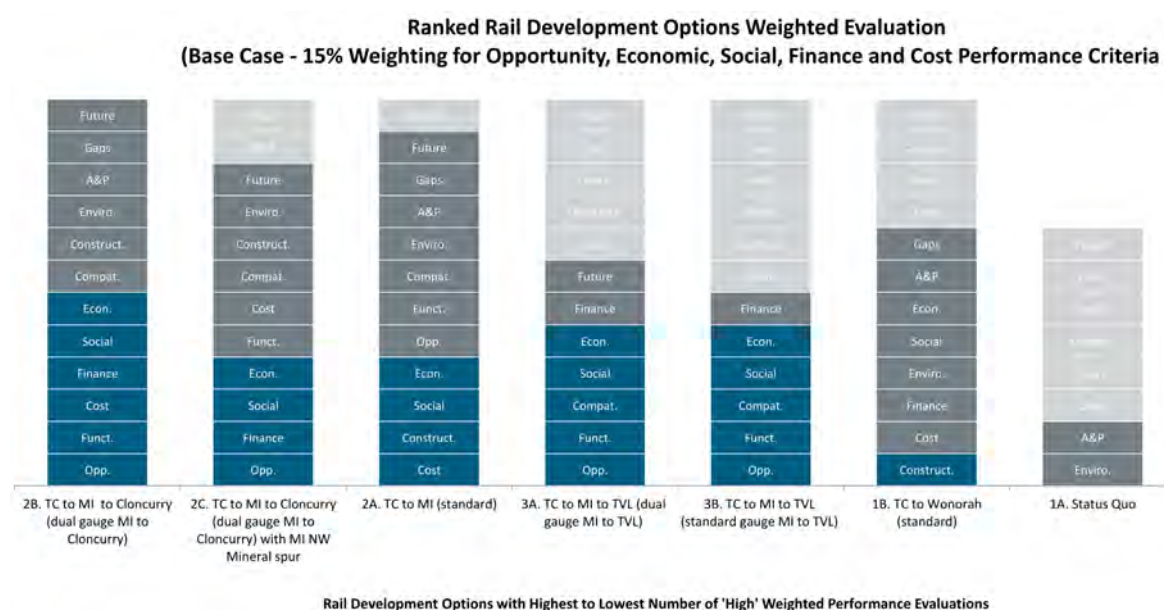


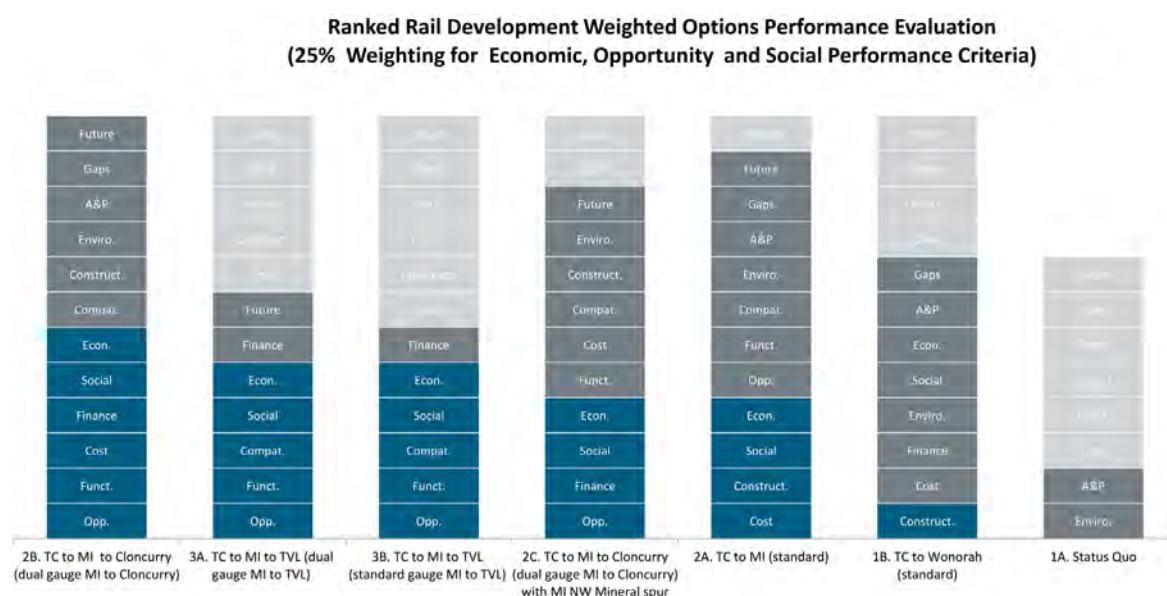
Figure 4.2: Base Case ranking of options

Opportunity / Economic / Social Case

The first sensitivity analysis to be applied to the comparative analysis has a 25 percent weighting for each of Opportunity, Economic, and Social Performance criteria. The remaining 25 percent is distributed across the other nine criteria. Table 4.7 shows the weighting allocation against each criteria and Figure 4.3 illustrates the ranking of each option under the Opportunity / Economic / Social Case.

Criteria	Weight	Total weight
Opportunity / Economic / Social	25% each	75%
All other criteria (9)	2.7% each	25%

Table 4.7: Weighting of Opportunity / Economic / Social Case



Rail Development Options with Highest to Lowest Number of 'High' Weighted Performance Evaluations

Figure 4.3: Opportunity / Economic / Social Case ranking of options

Cost Case

The Cost Case places greater importance on the cost criteria, 50 percent. Table 4.8 shows the weighting allocation against each criteria and Figure 4.4 illustrates the ranking of each option under the Cost Case.

Criteria	Weight	Total weight
Cost	50%	50%
All other criteria (11)	4.5% each	50%

Table 4.8: Weighting of Cost Case



Figure 4.4: Cost Case ranking of options

4.7 Preferred infrastructure options

Option 2B is the highest ranked option under all weighted scenarios. This option provides the majority of benefits as well as a value-for-money proposition with regards to capital expenditure and delivery on policies. Option 2B will be included in a short list of options recommended for further assessment.

As **Option 2A** – Tennant Creek to Mount Isa (standard gauge) also completes the proposed rail link and ranks highly in the various analyses, it too will be included in the short listed of recommended options.

Option 1A – Status quo (do not construct combined with targeted policy reforms) is also included in the short list as it is the most similar to a ‘do nothing’ option (default position). This option provides little economic advantage other than meeting small incremental growth needs. Additional transportation requirements are limited by the capacity of the Barkly and Flinders Highways, around 3 to 5 mtpa.

Although the three preferred options identified above have merit, Options 2B and 2A are not commercially viable under current economic conditions. For either of these two options to proceed, a significant government subsidy would be required.

5

Potential financing of MITCR



Key Messages

Under the current risk conditions and estimated capital investment, the MITCR is not commercially viable. Actions that may enable future financing of the MITCR are:

- Increasing private sector confidence by undertaking economic-enabling activities
- Form a corridor master plan that identifies and confirms economic precincts and provides a framework to encourage private sector innovation and investment
- Undertake a confidential market sounding with private sector operators
- Potential leverage of low-interest financing options such as NAIF
- Explore innovative funding models to determine the best way to engage the private sector
- Identify suitable regulatory regimes that maximise competition
- Assess potential governance vehicles for the project.

5.1 Introduction

The Centre for International Economics (2017a) identifies six possible uses for the MITCR:

- Import of consumption goods into the MITCR region
- Import of consumption goods into Queensland via the Northern Territory
- Import of consumption goods into the Northern Territory from Queensland
- Export of resources from the MITCR region
- Export of resources extracted east of Mount Isa via the MITCR to Darwin Port
- Export of resources from the Northern Territory to Townsville (or elsewhere in Queensland).

The MITCR project could be realised through funding, financing or a combination of the two.

In the financing scenario, capital is provided under a contractual requirement to pay back the capital plus interest. This financed capital can be provided by the governments or the private sector.

It is likely that, given the current risk profile, the MITCR will require a combination of funding and financing. The extent to which the risk profile can be reduced will increase the willingness of private investors to finance the project and decrease the capital that governments may have to commit to close the gap.

Project delivery alternatives exist on a spectrum from full government service delivery through to full private service delivery. This spectrum is shown in Figure 5.1 below.

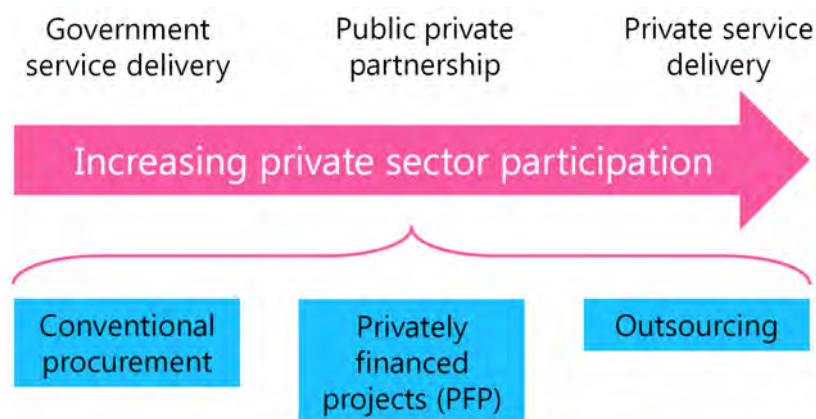


Figure 5.1: Relationship between PFPs and PPPs

The commercial attractiveness of a project in terms of likely return on investment will influence the level of interest from the private sector. At the right end of the spectrum, there is a high likelihood of a healthy return and, consequently, the project has strong interest and little difficulty raising financing.

However, projects exist that have merit in terms of public benefit but little chance of a strong return. Consequently, financing is difficult to achieve. These projects sit to the left and require government support or funding. A range of Public Private Partnerships (PPPs) of various forms completes the gap in between.

There are opportunities for innovation in both funding and financing.

5.2 Financing alternatives

The MITCR project has three financing options:

1. Commercial operators
2. Institutional investors
3. NAIF or other low-interest financing.

The ideal scenario is that the MITCR could be financed entirely by the private sector with minimal or no requirement for gap funding from sources such as NAIF or State and Commonwealth governments.

As we have seen in this Paper, under the current risk conditions and estimated capital investment required for the MITCR, this is not likely. One or a number of governments will have to fund the gap between the capital cost for the project and the capital value that revenue from the MITCR would support. The nature of funding this gap could be flexible.

5.2.1 Commercial operators

The MITCR project will form a critical part of the northern Australia logistics supply chain. The larger operators in this space could be multimode operators with the goal to optimise the total cost of a supply chain. Alternatively, they could be miners seeking to have greater control of their resource supply chain.

Companies that fit within the commercial operator's space and have the potential to be sources of finance are:

- Adani
- Agility Logistics
- Aurizon Operations
- Australian Track and Energy Corridor (ATEC) Limited
- BHP
- CUBE Logistics
- FMG
- Genesse & Wyoming Australia
- Landbridge
- Linfox
- Pacific National
- Toll Holdings
- Others (non-exhaustive list).

These firms generally prefer as much vertical integration of a supply chain as possible. Vertical integration refers to the level of ownership for different elements of the supply chain. Two extremes of this are the Central Queensland Coal Network (CQCN), which is not vertically integrated and the proposed Adani Carmichael project, where the mine, below rail, rollingstock, port and destination power stations are all controlled by Adani.

Vertical and horizontal integration have advantages and disadvantages. There are two ways of leveraging the strength of vertical or horizontal integration:

- Vertical integration
 - Combine ownership (or lease agreements) of rail line(s) with either Darwin Port (Landbridge) or Port of Townsville
 - Combine ownership of rail line with ore body rights (e.g. Glencore)
- Horizontal integration by engaging other rail asset owners such as Queensland Rail, Genesee & Wyoming Australia, Aurizon, Brookfield Rail or ARTC.

Horizontal integration would be beneficial in creating competition as the MITCR would serve multiple customers and freight types.

Applying these two options to the MITCR, it can be expected that the firms with the most interest in MITCR would be those with existing vertical or horizontal links. Advisian's stakeholder engagement experience supports this, with those organisations already connected expressing generally positive perspectives.

The fundamental question to address is: are these commercial operator investors interested in MITCR?

Advisian has conducted extensive testing of industry groups and key industry operators on their perspectives on the MITCR. Commercial operators are very interested in the opportunities provided by the MITCR but they have three general perspectives that have merit considering:

- They are generally multimodal in approach
- They consider that there are risks to MITCR that are better addressed by governments
- They also consider that they can add value to project feasibility by way of early engagement with the lead government agency.

Some of these potential investors are aware of the need to achieve a modal shift from road to rail. This is due to the drive to reduce total supply chain cost but also the possibility of a shortage of long haul truck drivers in the next ten years².

On the other hand, the potential investors acknowledge that, in some circumstances, rail is not suitable and, to force a rail solution, would not work. The general perspective is that rail becomes more cost effective than road transport on routes greater than 700 to 1,000 kilometres, with few stops and when tonnages are higher than approximately 2 mtpa.

² Long haul truck drivers have the oldest average age of any industry group, in excess of 47 years' old (Carey 2016)

The second point, that there are risks that are better managed by government, is important. The general principle of risk is that the party that has best control of the risk should be accountable for that risk and allow for it. Transferring a risk to a party that has no scope to control the risk leaves that party with little alternative other than to price a risk premium into their scope.

In the case of MITCR, the following risks were perceived to be more effectively addressed by governments:

- Corridor access and land tenure
- Demand risk
- Regulatory or governance structure
- Some technical aspects of construction.

These commercial operators are looking to have the project de-risked to an extent where they have the best opportunity to make it a successful operation. Once the risks outside the operators control are understood then, if the prospect looks possible, they will back their team and the ability to innovate to create a successful operation. These commercial operators are accustomed to competitive environments.

Currently, the understanding of some of the risks for MITCR is perceived to be too low for these investors to be at the stage where they are willing to risk capital. To attract serious investors, some de-risking and engagement of this group needs to occur.

5.2.2 Institutional investors

The institutional investors have a different approach and a different risk profile. These investors are banks, infrastructure fund managers, insurance companies, wealth managers or pension funds. The Centre for International Economics (2017b) lists the top infrastructure fund managers and asset managers.

These investors are interested in asset classes only in as much as the particular asset class provides a rate of return acceptable for their risk profile. Generally, they are looking for a reasonable return with a low risk profile.

The following extract from the Centre for International Economics (2017b) illustrates the range of investments made by this group between 2013 and 2015 by value.

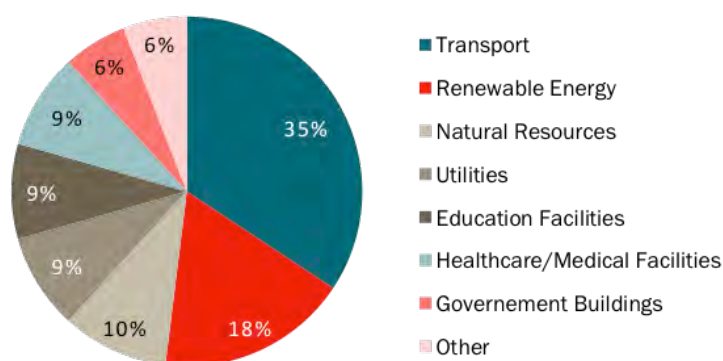


Figure 5.2: Range of investments made by institutional investors (Source: Pegin Infrastructure)

The Centre for International Economics (2017b) breaks the 35 percent of infrastructure investment down further into:

- Railroads - 11 percent
- Seaports - 17 percent
- Airports - 20 percent
- Roads - 53 percent

Unfortunately, this indicates that rail has the lowest level of interest from these investors in the infrastructure asset class. The Centre for International Economics (2017b) further goes on to look at interest by this class of investor by project stage:

- Greenfield - 23 percent
- Brownfield - 7 percent
- Operating - 70 percent

Now, returning to the fundamental question to address: are these institutional investors interested in MITCR?

The stakeholder engagement has gauged that institutional investors would require an almost guaranteed return and low risk. It is unlikely that this group of investors would invest directly in MITCR with no evidence of revenue and outstanding risk. They may be willing to invest either through a commercial operator or government agency. However, this investment would generally be accompanied by some indemnity to guarantee a return on the funds.

5.2.3 Northern Australia Infrastructure Facility (NAIF)

The NAIF was established by Parliament in 2016 as part of an initiative arising from the White Paper on Developing Northern Australia. The NAIF offers concessional finance to private sector investors that meet the criteria mandated. This is to promote and attract private sector investment in infrastructure that helps develop northern Australia.

To be eligible for funding from the NAIF, the proposed project must meet seven mandatory criteria. The mandatory criteria are that the proposed project must:

1. Involve the construction or enhancement of economic infrastructure
2. Be of public benefit
3. Be unlikely to proceed, or will only proceed at a much later date, or with a limited scope, without financial assistance
4. Be located in, or will have a significant benefit for, northern Australia
5. Not have the NAIF loan monies constitute the majority source of debt funding
6. Be able to repay or refinance the loan
7. Provide a strategy for indigenous engagement.

Two non-mandatory criteria are also provided by the NAIF. Proposed projects that meet these additional criteria will be granted preference to receive the funding. The non-mandatory criteria are that the proposed project may:

1. Seek financing from the NAIF for an amount of \$50 million or more
2. Demonstrate an identified need for the project.

Option 1A, the status quo option combined with targeted policy reforms, does not involve a proposed project. Therefore, it does not meet the mandatory criteria for NAIF financing.

Option 2A, to construct the MITCR project as a standard gauge rail line from Tennant Creek to Mount Isa, and Option 2B, to construct the MITCR project as a standard gauge rail line from Tennant Creek to Mount Isa as well as a dual gauge link between Mount Isa and Cloncurry, both meet the mandatory criteria. Therefore, both projects are potential candidates to receive NAIF financing.

5.2.4 Global investment

In the last 10 to 20 years, the world as a global economy has accelerated. Australia is now home to:

- Projects that are being constructed by international companies
- Assets that are being operated by international companies
- Assets that are owned by international companies.

This globalisation is a double-edged sword.

Australia now has access to international parties in terms of operators or investors and can, to an extent, take advantage of cyclic downturns in other regions. An example of this is the construction of the Legacy Way Tunnel by the Transcity Joint Venture.

The other side of the sword is that Australia now has to compete in attractiveness as a destination for either commercial operator or institutional investment. Here Australia has one large advantage – Australia is seen as having very low sovereign risk.

The Legacy Way Project

Situation The Legacy Way project was a government-funded, tolled, twin road tunnel in Brisbane, Australia. It was the third in a series of tunnels in Brisbane, and provides an alternative route between the Western Freeway and the Inner City Bypass.

The initial procurement of this project was a PPP contract with two major contractors as the likely candidates to construct it. However, one of these contractors dropped out due to financing and the remaining contractor's price was considered unreasonably high.

Approach Instead of awarding the project to the remaining contractor, the government went on an international trade mission. This had the aim of leveraging off the slow European construction market to attract international contractors interested in expanding into the Australian market.

The government also changed the contract to be a design, construct, operate and maintain contract, whereby the government took back patronage risk and provided funding.

Result The Legacy Way project was awarded as a design, construct, operate and maintain contract to the Transcity Joint Venture in 2010. This consortium comprised of BMD Constructions (an Australian company providing local knowledge and civil works experience), Ghella (an Italian tunnel construction company looking to expand into Australian) and Acciona (a Spanish construction company looking to add depth to their Australian portfolio).

Relevance This particular project changed the infrastructure construction landscape in Australia. It took advantage of slow European construction markets to obtain the best possible price to construct the Legacy Way Tunnel. Now Indian, Korean and Chinese companies, among others, have established or are actively establishing a presence in Australia. Further, they are acting very competitively to achieve this presence.

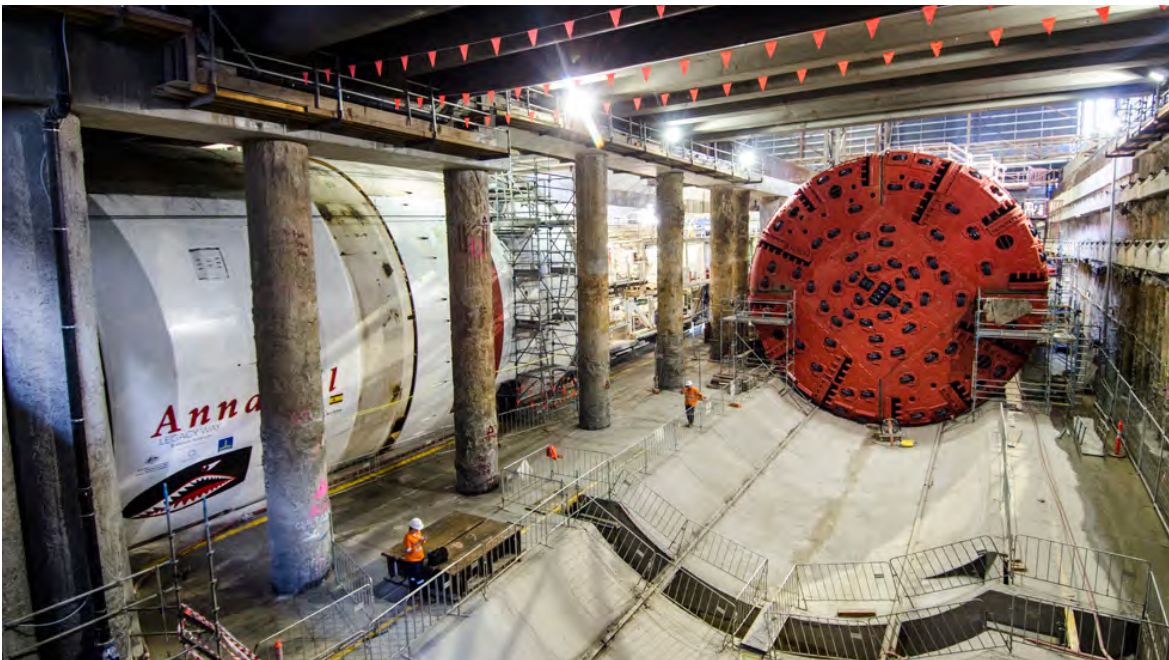


Figure 5.3: The assembly of the tunnel boring machines on Legacy Way

5.2.5 Financing summary

In order to realise the MITCR project from a finance perspective, a combination of the following will be required:

- Financing by a commercial operator
- Gap funding from one or more governments or low-interest public financing options such as NAIF.

The option of financing through an institutional investor is not realistic until the MITCR is operating with proven revenue.

The challenge then is to identify a delivery option that can maximise the opportunity to access these financing sources and minimise the gap that would have to be funded by one or more governments providing capital, or subsidy, in some form.

The keys to financing the MITCR are:

- Focus on commercial operators
- Governments de-risk the project to the extent within their control
- Potential leverage of low-interest financing options such as NAIF
- Maximise the advantages of international interest by leveraging off Australia's low sovereign risk.

5.3 Delivery options

It is worth returning to the delivery options described earlier.

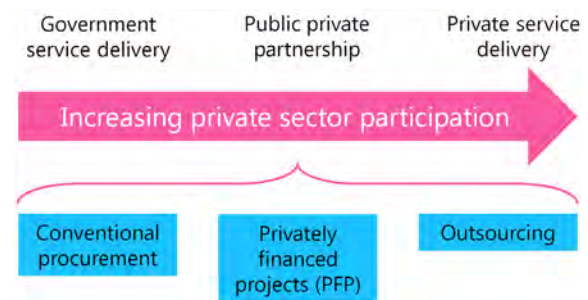


Figure 5.4: Relationship between PFPs and PPPs

Figure 5.4 shows that the project could be delivered as a:

- Government service
- Private service delivery
- PPP.

The Centre for International Economic (2017b) notes that the delivery structure may change through the life of the project and identifies three points at which decisions could be made in regard to structure:

- Construction
- Initial operations
- Ongoing operations.

The decision could relate to an option to sell or lease the asset, or reduce revenue supports.

5.3.1 Government service

The first delivery option is an avenue open to government. However, it would require a large investment in capital and a possible loss making operation. Options to government are:

- Government department
- Queensland Government Owned Corporation
- Controlled entity or Special Purpose Vehicle (SPV).

The Centre for International Economics (2017b) describes these:

Government department

This can offer the public the most direct line of sight between taxpayers and their representative (the relevant Minister) as it provides the highest level of scrutiny. This structure is most likely suitable in instances where there is a single government source of funding and strong desire for public scrutiny. This, therefore, may not be suitable for the MITCR if it requires multiple sources of government funding and is located across multiple jurisdictions.

Commonwealth company / Queensland GOC / Northern Territory Public non-financial corporation

These options share an over-arching similarity of structure, whereby a separate entity owned by government is established to operate the underlying business. Unlike commercial operations however, these businesses report to the government department rather than private sector shareholders. As such, these entities are usually run to fulfil the mandate given to them rather than to maximise returns.

With an infrastructure asset such as the MITCR an appropriate mandate could be to operate at a level required to recover operating and maintenance costs and / or to maximise rail usage.

Care may be needed using this structure given the MITCR will potentially be funded from multiple government sources and located across multiple jurisdictions.

A controlled entity or Special Purpose Vehicle

This option appears to be the most flexible in design as it allows for a wide range of underlying investment structures (such as a unit trust, company shares or a joint venture) and could conceivably involve shareholdings and governance arrangements (i.e. board seats) from governments across multiple jurisdictions. The purpose for which it is run can be determined by the underlying corporate arrangements (e.g. company constitution or trust deed). With appropriate care, this structure could be suitable for the MITCR as it allows for multiple jurisdictions.

A controlled entity or SPV could be financed from the private sector and become a PPP.

5.3.2 Private service delivery

The next delivery option, private service delivery, can be discounted. If this was a realistic option, the MITCR would already have been constructed and would be operating. The message in this is that the MITCR, as it stands, is not assessed by the private sector to be commercially viable.

5.3.3 Public Private Partnerships

A PPP arrangement is a mutually beneficial relationship between one or more public and private sector parties. Infrastructure Australia (Infrastructure Australia n.d.) considers PPPs to be:

“...vital to the development of infrastructure in Australia as they allow governments and the private sector to work together and share resources on key projects.” – Infrastructure Australia n.d.

World Bank Group (2016) notes that governments can assist worthy projects in other ways by:

- Direct funding
- Waiving fees, costs and other payments
- Financing
- Shadow tariffs
- Guarantees
- Indemnities
- Contingent debt
- Hedging of project risk
- Acting as a financial intermediary.

Part 8 of The Centre for International Economics (2017b) identifies four PPP delivery options that may be applicable to the MITCR. Each of these options contains advantages and disadvantages.

These PPP delivery options are:

- Private sector construction and operation with revenue support
- Public sector construction and private sector operation
- Public sector construction and then a lease to the private sector
- Tripartite entity build and operate (i.e. the JTWG).

Table 5.1 below, adapted from the The Centre for International Economics (2017b), shows a summary of the advantages and disadvantages of each PPP delivery option. Further detail on these options can be found in Appendix C of

The Centre for International Economics (2017b). These options apply equally to the infrastructure Option 2A and 2B.

	Advantages	Disadvantages
Private sector construction and operation with revenue support	<ul style="list-style-type: none"> • Access to NAIF financing • Limited public funds commitment for construction • Revenue support flexibility and review and update process • Incentives to increase demand by both public and private sectors 	<ul style="list-style-type: none"> • Level of revenue support required could be substantial and required indefinitely • Private sector likely to require premium to expected build cost • No guarantee private sector completes build • Private operator behaviour may not be compatible with public interests • Requires mechanism to incentivise private sector operator to increase patronage • Potentially limited market for buyers • Coordination with existing above and below rail operators
Public construction and private sector operation	<ul style="list-style-type: none"> • Potential to establish above and below rail regulated price caps • Limited ongoing revenue support • Creates competitive tensions 	<ul style="list-style-type: none"> • Negotiating sale price before line is operational would reduce value • Potentially limited market for buyers
Public construction & lease (either MITCR or to Townsville)	<ul style="list-style-type: none"> • Potential access to NAIF financing • Private sector risk levels can be matched to demand levels • Linking with existing Townsville line spreads risk demand 	<ul style="list-style-type: none"> • Public funds required to construct • Competitive tensions may remain unchanged • Potentially limited market for buyers
Tripartite entity build & operate with private sector consortia	<ul style="list-style-type: none"> • Access to NAIF financing • Commercially focused infrastructure without privatisation • Potential to combine with Tennant Creek to Darwin railway line in 37 years (2054) 	<ul style="list-style-type: none"> • Supply of capital may be limited

Table 5.1: Summary of PPP delivery options

The final PPP delivery option, a tripartite entity that could be the JTWG, warrants further consideration. A few things to note about this potential structure for the tripartite entity:

- The tripartite entity would be a government agency
- The project would be delivered by a private sector consortium, possibly under a BOOT structure
- The transaction process would be structured to maximise the contribution of the private sector consortium to the capital cost of the project
- The private sector consortium would potentially have access to NAIF financing
- The private sector consortium may also request in its proposal some form of mitigation against patronage risk.

It is highly unlikely that enough capital could be sourced under a commercially financed arrangement to cover the capital cost of the project; even while factoring in the reduced cost of financing from the NAIF. Governments will have to address any funding gap through some means. These means may include:

- Direct capital contribution
- Government takes the risk for traffic
- Contribution of an asset towards supply chain, such as the Mount Isa to Townsville railway
- Value creation and capture mechanism.

Direct capital

One way the government can contribute to bridging the gap between private investor financing and the capital cost of the MITCR project is to provide the difference as a direct capital injection. This can be achieved through the provision of direct capital grants or via the payout of part of the project debt after a future milestone, such as project completion.

Government takes the risk for traffic

Another way the government can contribute to bridging the gap is by assuming any risk for the rail traffic. This would require the government to implement a Take or Pay contract with the below rail operator to the estimated traffic requirement for the asset to be commercially viable. Any shortfall in traffic below this amount would be paid to the operator by the government. This option has a major disadvantage as it is a disincentive for the operator to encourage increased traffic.

Asset contribution

The government could also contribute to the financing gap by providing assets that may support the overall supply chain interests of the investor. This could be by a transfer, sale, or lease of an asset.

Value creation and capture

Infrastructure projects, in particular road and rail, often carry an inherent value that is realised after the project's construction costs are incurred and often only by a select group of people within a certain geographical proximity to the asset. Although there is no standardised method of capturing post-project value-add aspects, conceptual models have been developed.

There are two main approaches to value capture (Commonwealth Government Department of Infrastructure and Regional Development 2016, p.5). These are:

1. Passive value capture: Value that is captured by default and does not require any targeted mechanisms to be employed. Examples of this are increased taxes and royalties due to additional economic activity enabled by infrastructure
2. Active value capture: Value that is captured via targeted mechanisms that enable a portion of the project's capital costs to be:
 - Recovered after project completion. An example of this may be increased infrastructure usage fees for a period of time pre-arranged with users before the project's commencement
 - Incorporated into the bundling of a project. An example of this may be the retention of additional income associated with developments alongside the road or rail corridor by the project's proponent (either a private or public entity).

In urban settings, additional value derived from major infrastructure projects may be easily recognisable in the short term or immediately after public announcements are made as knowledge of property markets and economic activities are well-mapped. In the case of the MITCR, additional value that may be attributed to the rail link is less visible. In-depth engagement with private sector will provide additional insights, however the full extent of additional economic activity cannot be known until after the realisation of such a project. The reason is that the private sector itself is not aware of potential gains may be made as a result of the MITCR.

In the case of the MITCR, both the passive and active value capture mechanisms could occur. Passive in that the governments will recover costs over the years to come from increased taxes and royalties that result as projects become viable.

Active value capture may also be possible. To determine this, engagement with the private sector would provide inputs regarding frameworks and bundling combinations that would appeal to the private sector.

Case study: The Saudi Landbridge – Integrated Infrastructure project

Situation The aim of the Saudi Landbridge project was to construct “a modern and commercially viable railway with the financial backing to renew itself on an ongoing basis” and to “respond to changes in the global and regional market place”. It comprises a 950 kilometre rail line connecting the west coast port of Jeddah to the existing railroad at Riyadh.

The project is expected to improve logistics by providing an efficient supply chain that maximises the transport potential of Saudi Arabia.

Approach The project was first tendered as a design, construct, operate and maintain contract in 2007. An unusual financing structure was recognised during these tender conditions. It included:

- No traffic guarantees provided by the government, such as guaranteed passenger subsidies, minimum freight volume guarantees, minimum price per tonne guarantees or any limitations on the number of trucks allowed into the Kingdom
- A lump sum subsidy payment provided to the developer at a point in the future
- Providing non-financial benefits to the developer, in particular the development rights for a particular corridor width either side of the railroad’s centreline.

Result Ultimately, a winning consortium was appointed, though the project did not proceed. However, it is now being developed by the government of the Kingdom of Saudi Arabia as a design and construct project.

Relevance The government was able to provide ways to attract investors without providing guarantees about traffic volumes or upfront financial outlay. The future lump sum subsidy represents a value capture mechanism whereby the developers were encouraged to provide the lowest bid in order to win.

By providing the non-financial benefit of the development rights to either side of the railroad, the developers were able to offset the capital outlay required for the construction of the rail line through the potential income, influence and prestige of developing the area with high rise buildings, shopping malls and industrial parks.

5.3.4 Delivery summary

A form of PPP is the delivery option which appears to have the most opportunity to tap into the strengths of government and the private sector.

Private and government risk profiles are shown in Table 5.2 below.

	Design risk	Construction risk	Land tenure	Revenue/ Patronage risk	Operations and Maintenance cost	Interest rate risk
Private sector construction and operation with revenue support	Private	Private	Government	Government	Private	Shared
Public construction and private sector operation	Government (possible to pass to Private)	Government (possible to pass to Private)	Government	Private	Private	Shared
Public construction and lease (either the MITCR or to Townsville)	Government (possible to pass to Private)	Government (possible to pass to Private)	Government	Private	Private	Shared
SPV builds and operates	Government (possible to pass to Private)	Government (possible to pass to Private)	Government	Government	Government (possible to pass to Private)	Shared

Table 5.2: Risk profile for each PPP delivery option

5.4 Innovation in procurement

Some of the innovative ways of funding infrastructure projects include:

- Double Early Contractor Involvement (dECI)
- Reverse auctions, where the private sector bids on the government subsidy required, with the lowest bid successful
- Flexible charging regimes where early users obtain a discount under a Take or Pay regime for 'Foundation' customers
- Variable term concession PPPs
- Accelerated procurement that fast tracks the EIS and design stage.

5.4.1 Double Early Contractor Involvement (dECI)

The dECI procurement process is an extension of the ECI process and is where two consortia develop a concept design and tender proposal in parallel. This is done as an interactive process between the client and tenderer. One consortium is then selected to design and construct the project, though both consortiums are at least partially reimbursed for tender costs incurred.

The greatest impact on the capital cost of a project is made during the pre-feasibility stage, and the interactive nature of the dECI process enables this due to the following benefits:

- Developing early trust and cooperation between the client and contractor, which means a more suitable design is developed and agreed upon earlier, more accurate pricing and better risk consideration
- Additional engineering value gained through the competitive environment
- Improved construction planning, since communication lines are established early between the client, contractor, community and stakeholders.

As the interactive tendering process becomes more established, the alignment of understanding risk becomes evident. This can be seen in Figure 5.5, which shows that the dECI process is evolving and is ultimately resulting in less risk retained by the client.

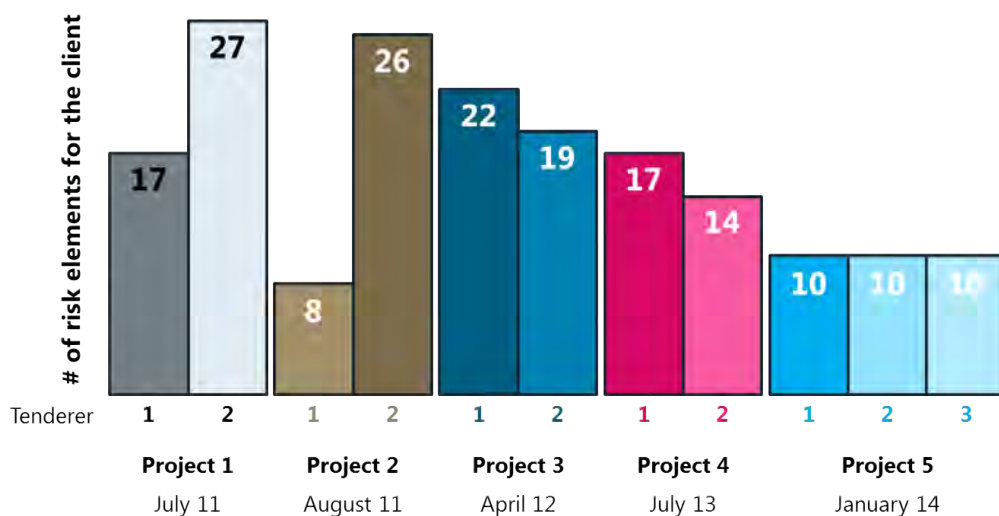


Figure 5.5: Impact of interactive tendering – shared understand of project intent and risk profile

Although there is an additional upfront cost for the client associated with the dECI process, the intellectual property developed during this time is ultimately owned by the client. This is important, as the competitive nature of this procurement process means that great innovation occurs. Over the number of projects this process has been applied to, there is clear evidence of innovation in engineering, design, urban design, delivery method and time saving. This is illustrated by the Northern Link project mentioned in the case study below.

Case study: TMR and BCC – dECI contracts

Situation TMR and Brisbane City Council (BCC) use the dECI (or a similar process) extensively to deliver large capital infrastructure projects within Queensland. A non-exhaustive list of projects delivered using this process includes:

- Mains Road and Kessells Road Intersection Upgrade
- Moreton Bay Rail Link
- Kingsford Smith Drive upgrade
- Cairns Bruce Highway upgrade
- Port of Brisbane Motorway
- Smith Street interchange
- Northern Link Road Tunnel
- Sunshine Coast Motorway.

Approach The objective of the dECI process is to optimise innovation through a parallel design and tender process with a number of consortia.

An important aspect of this process is that the consortia involved are reimbursed an agreed amount after a certain milestone in the process. Although this leads to additional cost for the client at this stage, it means the intellectual property and innovation is maintained by the client for both designs.

Result An example of the benefit to owning the intellectual property for all consortia's concept design can be seen during the Northern Link tunnel project. On this project, the winning consortium considered a design for an overland conveyor that connected the tunnel portal to the neighbouring quarry where spoil disposal was to occur. However, the unsuccessful consortium proposed a different design whereby the conveyor ran through a secondary tunnel that connected the main tunnels' portal and the quarry. This design reduced the environmental and community impact. Since the government owned the intellectual property for both designs, it was able to work with the successful consortia to utilise this alternate design.

Relevance The dECI process is a procurement process that is showing significant benefits to the client, and should be considered for the procurement of the MITCR project. Although the client is required to provide an initial capital outlay to the tenderers, innovations in design and project delivery (outcomes from the competitive tender process) remain the intellectual property of the client.

5.4.2 Reverse auctions

A reverse auction is where the roles of the buyer and the seller in an auction are swapped. In this situation, the tenderers for an infrastructure project compete to win the tender by requesting the least amount of financial subsidy from the government.

As seen in the Saudi Landbridge case study, the Saudi Government held a reverse auction. In addition to the concession to operate the line, the winner of the contract would also attain the right to develop property along the corridor.

5.4.3 Accelerated procurement

In 2015, Advisian prepared a document titled 'Accelerated Procurement of Major Road Infrastructure'. This document shows that, traditionally, the procurement process for major infrastructure projects in Australia requires a long lead time.

It details that the typical approach to procurement follows these seven steps:

1. Pre-feasibility Study
2. Business Case
3. Decision to proceed
4. Reference design
5. EIS
6. Lodge planning application
7. Commence procurement process while awaiting planning approval.

In this approach, the steps predominantly occur sequentially with minimal overlap of activities, which makes the transfer of ownership of risk clear.

The Advisian document considers a new accelerated procurement approach currently being seen in the industry, which results in the delivery of infrastructure projects faster than the standard procurement approach. This acceleration occurs by omitting the reference design activity and by conducting the detailed design and the EIS approval simultaneously. When applied to WestConnex, this approach led to a saving of 12 months in an approximately three year project initiation cycle. This accelerated process is shown in Figure 5.6.

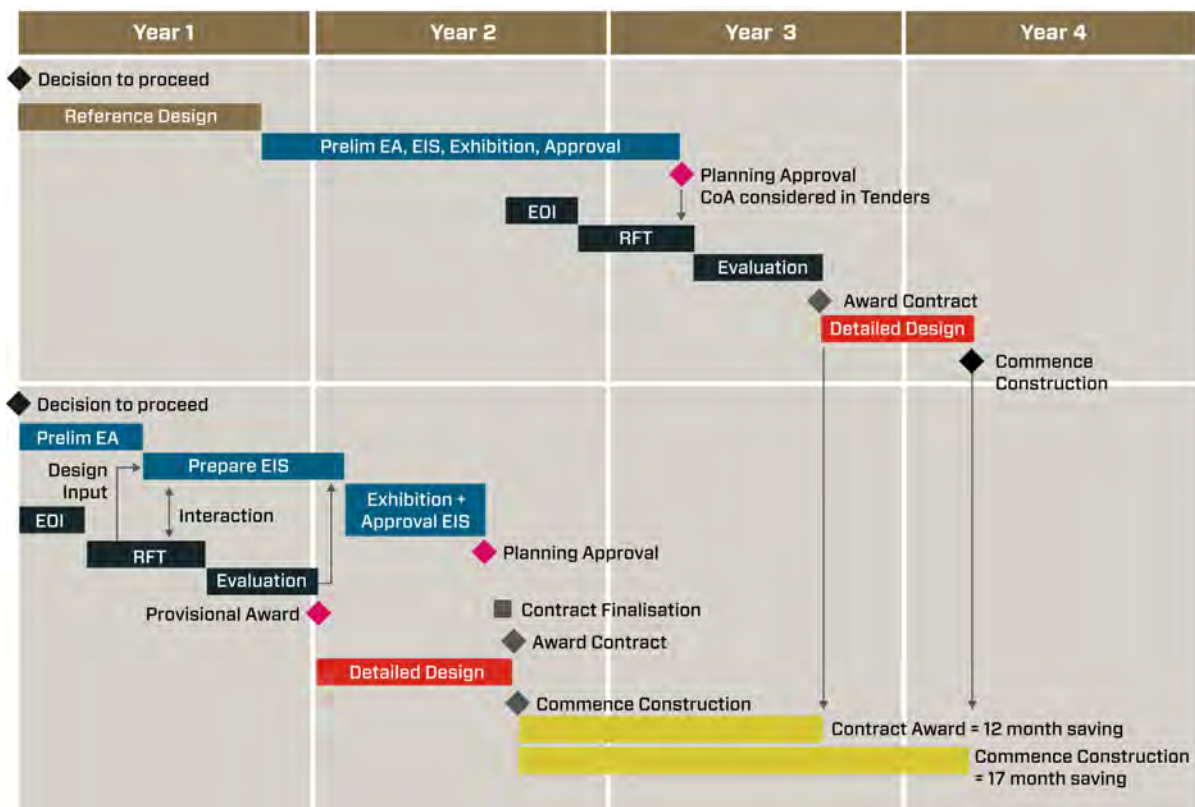


Figure 5.6: Comparative procurement approach timeline for WestConnex (Advisian 2015b, p.6)

The advantages of the accelerated procurement process are:

- The interactive process ensures tenderers stay on the right track and the ultimate proposals meet expectations and are not a surprise to the client
- Financial savings for both the client and the proponents
- More innovation from the proponents as they have not been dictated a specific design to comply with, allowing them the freedom to meet the functional requirements of the project using their own ideas, experience and network base
- Time savings, as construction can start earlier and therefore be delivered earlier
- Project can potentially be achieved within a single electoral cycle.

The disadvantages associated with the accelerated procurement process are:

- A risk due to proceeding to tender without a full reference design. This is mitigated by the interactive tender process
- Insufficient design available to provide an accurate capital cost estimate. This risk is mitigated by the appropriate risk allowance and publication of capex budget for market sounding
- Risk is transferred from the client to the contractor regarding the EIS process. The EIS at the preferred tenderer stage should be accepted for the final contract to mitigate this risk
- A risk raised regarding the achievement of planning approvals, which can be mitigated by the EIS development team being aware of competing technical proposals prior to the EIS exhibition
- Community consultation timeframe is decreased and so it is important to have an effective community engagement strategy based on prefeasibility design.

5.5 Conclusion

The key funding and financing points for the MITCR project are:

1. Institutional investors are unlikely to be interested in directly investing in this project at this stage
2. Commercial operators are interested in the concept of the project. Currently, some risks are discouraging these commercial operators. Some of these risks are within the governments' control and can be mitigated
3. NAIF financing or other sources of low-interest financing are likely to be a critical part of realising this project
4. The MITCR should maximise the advantages of international interest by leveraging off Australia's low sovereign risk
5. There is likely to be a gap between the funding sourced under a commercial finance arrangement and the capital cost of the project. The government will have to address this through some means. The size of this funding gap will be determined by the success of the de-risking exercise and the market sounding of the public sector
6. An SPV could be established once a Business Case describes an acceptable outcome, balancing economic benefits of the project with financing and gap funding options.
7. A BOOT contract could be one mechanism that a potential SPV could use to deliver the project. This would harness the complementary strengths of the private and public sectors
8. The competitive ECI (or dECI) process is widely used by Queensland's TMR for the delivery of capital infrastructure projects. This would be an acceptable procurement methodology for the MITCR project, and would be an effective way to drive private sector innovation and minimise costs whilst achieving the required operational result
9. Further innovative procurement process initiatives could include applying a reverse auction approach, whereby the successful proponent is the one requiring the lowest capital subsidy
10. The application of an accelerated procurement process would fast track the realisation of the project. However, this may compromise some of the environmental or other project approval processes, and may not be suitable.





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The background of the page is a photograph of a large bridge and industrial structures, possibly a port or refinery, silhouetted against a sunset sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. The bridge has multiple spans supported by tall, dark piers. To the left, there are complex industrial structures, including what looks like a crane or a large storage tank. The water in the foreground is dark and reflects the light from the sky. The overall mood is industrial and serene.

Legislation

Aboriginal Cultural Heritage Act 2003 (Qld)
Aboriginal Land Rights Act 1976 (NT)
Atomic Energy Act 1953 (Cwlth)
AustralAsia Railway (Third Party Access) Act 1999 (SA)
Coastal Protection and Management Act 1995 (Qld)
Dangerous Goods Act 2012 (NT)
Dangerous Goods Regulations 2015 (NT)
Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)
Environmental Protection Act 1994 (Qld)
Fisheries Act 1994 (Qld)
Great Barrier Reef Marine Park Act 1975 (Qld)
Heavy Vehicle (General) National Regulation 2016 (Cwlth)
Heavy Vehicle (Mass, Dimension and Loading) National Regulation 2016 (Qld)
Heavy Vehicle (Vehicle Standards) National Regulation 2016 (Qld)
Land Act 1994 (Qld)
Mineral Titles Act 2010 (NT)
Native Title Act 1993 (Cwlth)
Northern Australia Infrastructure Facility Act 2016 (Cwlth)
Northern Australia Infrastructure Facility Investment Mandate Direction 2016 (Cwlth)
Northern Territory Aboriginal Sacred Sites Act 1978 (NT)
Queensland Heritage Act 1992 (Qld)
Radioactive Ores and Concentrates (Packaging and Transport) Act 1980 (NT)
State Development and Public Works Organisation Act 1971 (Qld)
Sustainable Planning Act 2009 (Qld)
Sustainable Ports Development Act 2015 (Qld)
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010 (NT)
Wild Rivers Act 2005 (Qld)



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