PORT OF NEWCASTLE

CONTAINER TRANSPORT ECONOMICS STUDY UPDATE

6134-REP-001

August 2018

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1.0 EXECUTIVE SUMMARY

The viability of a container terminal at the Port of Newcastle is dependent on the efficient, reliable, socially acceptable and most importantly cost-effective transport of goods to and from regional areas of NSW.

Port of Newcastle Investments (PON) commissioned Lycopodium Infrastructure (Lycopodium) in August 2016 to undertake an investigation into the differential costs associated with container transport from various regions within NSW to existing East Coast Ports compared to a theoretical container capacity at Newcastle. The study team consisted of Ian Travis from Inteplan and Stuart Sutherland and Dale Smith from Lycopodium. The original report has been updated to August 2018 at the request of PON.

Given the available information on containerised movements, the export streams can be tracked from regional centres whereas imports are generally moved to a distribution centre within the Sydney Metropolitan area and often re-aggregated before moving to the final consumption location.

A key focus of the study was an assessment of the cost of container transport from origins within the North West and West of NSW, which were considered to be within the contestable catchment of the Newcastle Port. The catchment for the purposes of the study was defined as the areas within the West and North West NSW including the major regional centres of Moree, Narrabri, Tamworth and Dubbo. Parkes was also included as a key source of export containers and is contestable given the ability of Newcastle Port to develop to handle longer trains than currently envisaged for Botany.

During the assessment the study team developed bottom up cost models for transport of containers by rail from the major centres within the catchment using modelled costs for operations and maintenance which incorporate labour and fuel costs. The cost models incorporated capital amortised costs for the various modes as well as below rail access charges. Freight rates for road transport were calculated based on rates provided from industry sources and accounted for operations, maintenance, licensing and registration costs. This report utilises a mixture of price inputs however primarily relies on bottom up engineered estimates for rail and industry sourced rates for road transportation.

The rail freight rates calculated have been discussed with rail freight operators and it has been confirmed that they are reasonable. Importantly by using the same baseline build-up of costs the relativity of the calculations between the ports is maintained.

As a further check, we have seen some rates generated by the TraNSIT model developed by the CSIRO for grains transported from Moree and Narrabri to Newcastle. While these are for bulk commodities the freight cost structure is consistent as are the rates calculated by each of the models.

Road rates have been tested using both reference to a reputable operator and calculated using the Fixing Country Roads model from TfNSW. The rates generated from the FCR model were generally 20% lower for Botany and 35% lower for Newcastle using semis and average 15% higher for B-Doubles into both ports. The differential between the ports in favour of Newcastle would therefore be higher using the FCR model rather than the Lycopodium model.

The cost of container transport from the identified catchment to Newcastle Port has been assessed as well below the cost of transport to either Port Botany or Port Kembla. However, container terminal development would not be sustainable without consistent freight volumes. Therefore, the study team assessed the potential volume of freight within the catchment that could be immediately attracted to Newcastle Port based on an assessment of the existing freight generated from within the catchment that currently transits through Port Botany.

Future additional freight volumes over and above what has been assessed as immediately contestable would be driven through a combination of:

- Incremental growth in the overall freight task;
- Competitive pricing from Parkes and Central West of NSW; and
- Modal shift from road to rail that could be generated through a significant reduction in transport cost by rail to the Port of Newcastle.

Whilst immediate contestable volumes have been assessed, future potential volumes would need to be determined through a comprehensive demand study.

Findings of this Report

The cost of transport by rail from the Catchment nodes is more cost effective to Port of Newcastle for the vast majority of road and rail consists investigated. Transport costs to the Port of Newcastle from all regional nodes within the Catchment assessed are less than transport costs to Port Botany, Port Kembla and/or Brisbane, however the cost of transport from areas such as Parkes were not as competitive compared to transport costs to Botany when using similar sized trains. These costs are purely for the transport and incorporate all applicable costs including the requirement for different locomotive numbers for the consists due to ruling grades and have included times for the necessary shunting to break and remake trains to fit existing track infrastructure. Terminal handling costs are not included in the analysis.

The study found that:

- Cycle time is a key factor in the calculation of freight costs, particularly for rail transport;
- Delays in cycle time through congested Ports and staging terminals such as Enfield Yard and Cooks River in Sydney add significantly to the cost of transport;
- The modelled transport costs indicate the additional travel time and dwell time for freight transported through the Sydney Metropolitan rail network to Port Botany from the North West and Western regions leads to an increase in costs in excess of the cost of transport direct to the Port of Newcastle;
- The additional cost of transporting containers to Port Botany compared to the cost of direct transport to the Port of Newcastle is calculated to be as much as 30% higher depending on the type of rail consist modelled and the origin – destination route assessed;

- Furthermore, the greatest efficiencies are delivered by long trains, equal to or greater than 900m.

Whilst various train consist utilisations were studied in sensitivity assessments and compared to known direct freight rates, the report findings and base freight rates are based on a loaded in-bound and empty return scenario for both road and rail (i.e. – no back-haul assumed). This 50% utilisation scenario most closely reflected market freight rates and so was used in calibration of the cost model.

The following summarises the base freight rates approximated through the study which have been checked and validated by comparing outputs from the TfNSW Fixing Country Road model and the CSIRO TraNSIT model.

		Calculated Cost					
		Rail				Road	
		640m trains	900m trains	1200m trains	1,500m trains	19m semi	25m B-Double
Origin	Destination	$ / TEU	$ / TEU	$ / TEU	$ / TEU	$ / TEU	$ / TEU
Tamworth	Botany	$1,085	$888	$812		$1,129	$753
	Newcastle	$572	$454	$413	$360	$958	$639
Narrabri	Botany	$1,363	$1,123	$1,028		$1,272	$848
	Newcastle	$855	$686	$625	$549	$1,107	$738
Moree	Botany	$1,468	$1,220	$1,121		$1,399	$933
	Brisbane					$1,240	$827
	Newcastle	$1,037	$841	$761	$681	$1,231	$821
Dubbo	Botany	$1,105	$913	$833		$1,115	$743
	Port Kembla	$1,137				$1,171	$781
	Newcastle	$970	$784	$709	$632	$1,078	$719
Parkes	Botany	$1,012	$812	$734		$1,030	$687
	Port Kembla	$1,043				$1,091	$728
	Newcastle	$1,254	$1,023	$929	$834	$1,367	$911
Newcastle Port	Enfield	$454	$352	$316		$556	$371
Botany	Enfield	$242				$78	$52
Newcastle Port	Western Sydney	$538	$423	$379		$600	$400
Botany	Western Sydney	$241				$222	$148
Newcastle Port	Central Coast	$263	$198	$175	$148	$232	$155
Botany	Central Coast	$396				$382	$255

Botany is limited to 640m shuttles. Larger trains are split or assembled at Enfield.
1200m assumed to be maximum
Port Kembla limited to 640m trains through Moss Vale- Unanderra line
No rail line connection - gauge changes between NSW and Qld

Table 1.1 Summary Table of Base Freight Rates

Based on the cost of freight to the Port of Newcastle being far cheaper than through Port Botany, we believe that the approximately 100,000 TEU which is currently transported by rail and at least 12,000 TEU currently transported by road from the catchment and exported annually through Port Botany could be attracted to a developed container terminal at Newcastle Port immediately upon commencement of the facility. The possible savings are highlighted by the tables below.

	$ Savings per TEU	Total $ Savings per annum
Possible Regional Exports		
Moree Region 5,000 TEU	431	2,155,000
Narrabri Region 25,000 TEU	507	12,675,000
Tamworth Region 5,000 TEU	513	2,565,000
Dubbo Region 35,000 TEU	135	4,725,000
Newcastle Region 30,000 TEU	464	13,920,000
Road from Northern 12,000 TEU	111	1,332,000
Possible Imports	Sub-total	37,372,000
Road to Northern Region 12,000 TEU	111	1,332,000
Central Coast 30,000 TEU	133	3,990,000
Enfield 40,000 TEU	-212	-8,480,000
Western Sydney IMT 30,000 TEU	-297	-8,910,000
	Sub-total	-12,068,000
Based on equivalent train sizes (640m) and B-Double trucks to both ports	TOTAL	25,304,000

Figure 1-1 Possible Throughputs and Savings vs Botany (same train size)

	$ Savings per TEU	Total $ Savings per annum
Possible Regional Exports		
Moree Region 5,000 TEU	787	3,935,000
Narrabri Region 25,000 TEU	813	20,325,000
Tamworth Region 5,000 TEU	724	3,620,000
Dubbo Region 35,000 TEU	473	16,555,000
Newcastle Region 30,000 TEU	464	13,920,000
Road from Northern 12,000 TEU	111	1,332,000
Possible Imports	Sub-total	59,687,000
Road to Northern Region 12,000 TEU	111	1,332,000
Central Coast 30,000 TEU	248	7,440,000
Enfield 40,000 TEU	-74	-2,960,000
Western Sydney IMT 30,000 TEU	-138	-4,140,000
	Sub-total	1,672,000
Based on large trains to Newcastle and B-Double trucks to both ports	TOTAL	61,359,000

Figure 1-2 Possible Throughputs and Savings vs Botany (large trains to Newcastle)

Additional volumes above those currently railed to Port Botany from the catchment would depend on the modal switch from road to rail that could be generated through significant reductions in freight

cost as well as the predicted increases in the total freight task, which is driven by continued growth in import/export demand. Studies such as the NSW Freight and Port Strategy provide estimates of the predicted increase in the total freight task across NSW over coming decades and such studies are a reasonable predictor of the incremental increase in freight volumes through the Port of Newcastle at approximately 3-7% annual compound growth.

The volume of freight that could be attracted by rail to the Port of Newcastle through the establishment of a container terminal cannot reliably be estimated through a desk top assessment of transport cost. This potential demand would need to be assessed based on a more comprehensive demand assessment which would involve consultation with regional export/import businesses and freight forwarders. We recommend that PON or terminal developer proponent consider undertaking such a study as a follow on from this initial assessment.

Whilst rail transport to the Port of Newcastle is considered the most economical mode of transport from the North West and Western areas of the State to any of the eastern export Ports, the configuration of a container facility should support efficient rail operations into and out of the terminal. The Study team recommend the terminal configuration at the Port of Newcastle be designed to allow for efficient turnaround of long trains (1,200m – 1,500m) in order to achieve the maximum benefit from the efficiencies that Newcastle Port naturally offers due to its geography and lack of rail network constraints compared to Port Botany, Port Kembla and Brisbane.

PON also needs to encourage shipping lines to establish regular efficient services from Newcastle in order to maximise the value of the land transport efficiencies.

The relief on the Port Botany Rail line created through the development of a container terminal at Port of Newcastle is likely to improve reliability and journey time for short distance shuttle services into Port Botany from various current and planned intermodal terminals in Sydney. These benefits extend also to services from the South, which terminate at Port Botany. This release of capacity directly attributable to a Newcastle Port container terminal could reduce the extent of costly upgrades required particularly on road networks through to Port Botany.

The intermodal terminal developments in Sydney are primarily to service shuttle services from Port Botany and to link with interstate services. Moorebank, for example, will also transfer containers from rail to road for import and road to rail for export and trains will shuttle to Botany on the Southern Sydney Freight Line.

The Inland Rail will not materially change the connections by rail to either Botany or Newcastle although the Parkes to Narromine section which has just been approved for construction could favourably alter the economics of container movements to Newcastle from Parkes and southern regions.

The supply chain through to the Port of Newcastle has already undergone significant upgrade resulting in excess capacity. Of the four East Coast ports considered in this report, the supply chain leading to the Port of Newcastle is least likely to see material increases in the cost of access due to infrastructure upgrades over time.

Recommendations

The recommendations arising from this report are as follows:

- Development of a concept design for the container terminal at the Newcastle Port which accommodates long trains of 1,200m to 1,500m;

- Undertake initial designs for a terminal to handle 224,000 TEU on the clearly contestable freight from the North and Hunter regions, and up to 350,000 TEU based on the central West via Parkes being contestable;

- Negotiate with Shippers/Potential Terminal Operators on possible services to be scheduled through the Port of Newcastle;

- Negotiate with Transport for NSW and relevant Government departments to lift restrictions on the container terminal volumes through the Port of Newcastle based on the benefit that such operation would deliver for producers in the North West and Western areas of NSW;

- Undertake a comprehensive demand study to determine potential additional freight volumes that could be generated from the identified catchment resulting from the modal switch resulting from a significant reduction in the cost of transport by rail to the Port of Newcastle. This study would involve direct consultation with regional export/import businesses and freight forwarders in the identified catchment to approximate volumes which may switch to rail subject to improved efficiency. This demand study should also address the balancing of trade flows (import and export), the seasonality of rural exports and how the rail and logistics network can assist in managing the flow of imports into Sydney or the Central Coast via Newcastle Port.

2.0 PROJECT BACKGROUND AND CONTEXT

This report is an update of the previous report from 2016 using more recently published volumes of cargo and reassessing the calculated freight rates, particularly testing against other sources. The intent of the study is to assist PON to understand the feasibility of a container facility (e.g. project cargo, container capability) in the Mayfield precinct.

The PON conceptually would like to develop the following infrastructure:

- Appropriate hardstand to support Rail/Road interface behind berth operation on the available 80 hectares;
- Rail and Road connectivity;
- Supporting quay line and berth interface infrastructure.

A key factor in the feasibility of such a Multi Modal facility is the cost of freight transport to the facility compared to the costs of transport to competing facilities. The differential transport costs to various Ports in NSW including the Port of Newcastle are thus the main focus of the transport study.

3.0 SCOPE OF WORKS

This study aims to determine where competitive advantage can be obtained for the Port of Newcastle to support the development of a container terminal. The primary focus is on the landside logistics tasks from the key export industries which fall within the natural catchment for Newcastle.

By review of available public information and development of cost scenarios:

- Identify the regional sources of potential containerised cargo;
- Determine whether sufficient scale of throughput could be attracted to Newcastle;
- Identify cost benefits in transporting to/from Newcastle compared to Port Botany, Brisbane and Port Kembla;
- Review factors affecting the cost and highlight the necessary actions to sustain ongoing growth of a container business in the Port of Newcastle; and
- Review current infrastructure projects and assess any likely impact on Newcastle.

4.0 APPROACH

This study has been undertaken confidentially and has relied on available public information and information held by the study participants. Lycopodium has used the available information and internally developed processes to assess possible opportunities and provide comparative landside logistics cost benefits for these opportunities.

Comparative calculations have been made for the landside logistics cost for both rail and road movements to each of the following ports:

- Newcastle;
- Brisbane;
- Botany; and
- Port Kembla.

The approximation of landside logistics costs has focussed on containerised exports from those regional areas where there is a tangible benefit:

- Moree;
- Narrabri;
- Tamworth;
- Dubbo; and
- Parkes,

5.0 POTENTIAL TRANSPORT MODES

Transport and Logistics associated with potential container movements are complex with mode, transport route, political and social issues to consider in addition to the financial considerations. Only road and rail modes are considered in this report. However, lowest cost is critical as it drives profitability for the export cargo owner and increases Australian competitiveness and resilience in international markets. On the import side the lowest cost reduces the cost of inputs to production and construction as well as retail and consumable goods.

The cost of transport to East Coast Ports depends on a number of factors including the following:

- Efficiency of the existing road and rail networks to support high axle load, high speeds with minimum dwell times;
- Distance of haul. Generally, the longer the distance the greater advantage from rail transport as the inefficiencies of handling are outweighed by the greater efficiencies gained through long distance transport and reduced fuel per tonne;
- Fuel efficiency of the motive equipment including fuel saving systems;
- Cost of fuel;
- Cost of access, tariffs and fees, maintenance and capital cost of infrastructure supporting the freight transport;
- Social and political considerations (not dealt with in this report); and
- The capacity/underutilisation of the adjacent systems to support efficient freight connections (Ports and other freight terminals).

As a general rule, road transport suits short haul, time dependent and high value freight compared to rail which is more suited to long distance and less time dependent freight.

6.0 EXISTING TRANSPORT ROUTES

The key transport corridors, through to the Port of Newcastle, Port Botany, Brisbane Port and Port Kembla, which were assessed during the Study are illustrated in the figure below.

Figure 6-1 Key Transport Corridors

7.0 CATCHMENT

Freight origins within the North West and West of NSW were considered to be within the contestable catchment of the Port of Newcastle. The catchment for the purposes of the study has been defined as the areas within the West and North West NSW including the major regional centres of Moree, Narrabri, Tamworth and Dubbo. These locations are regional centres and aggregation hubs for general freight and agri-products and obvious key nodes.

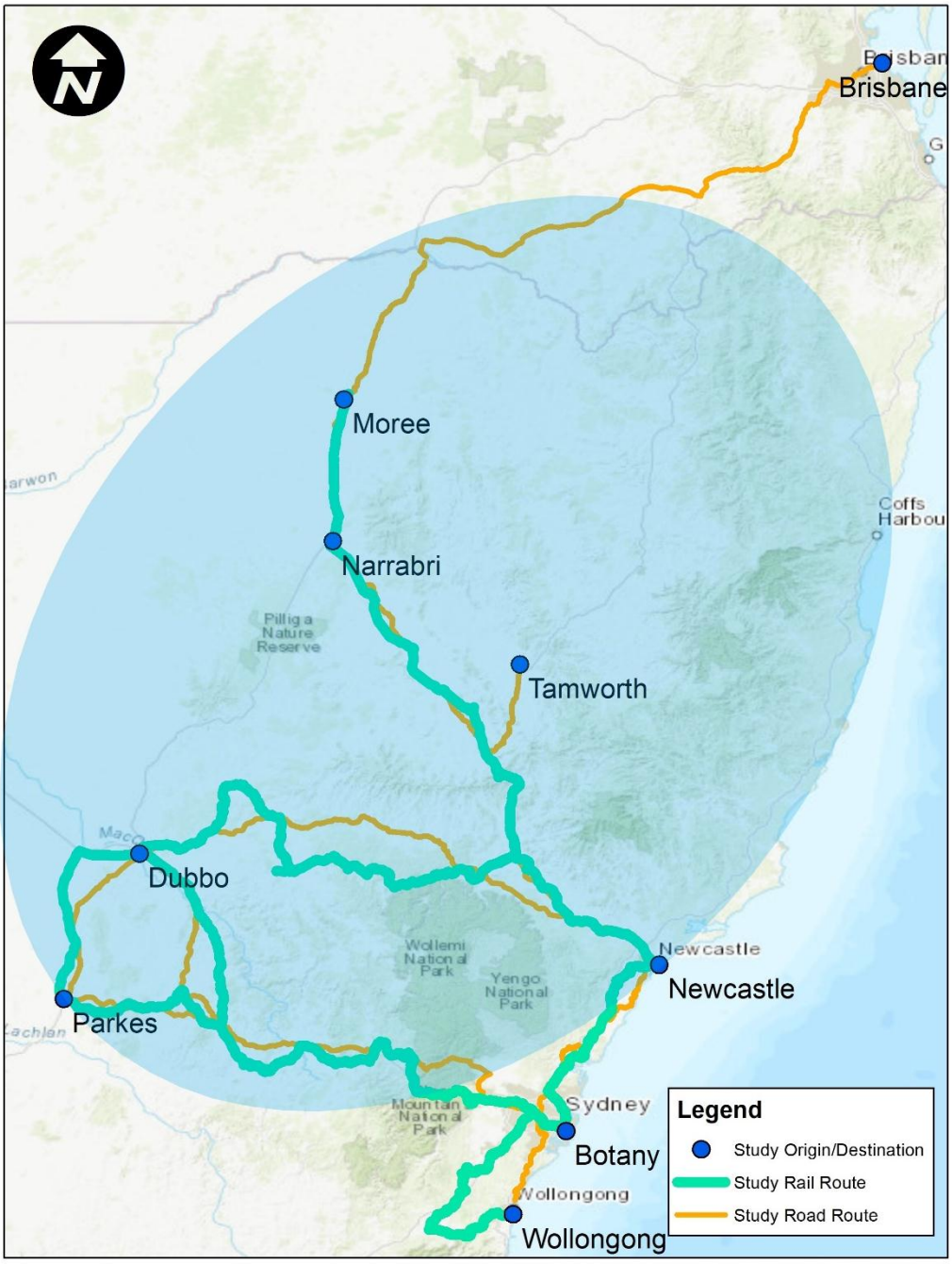

Figure 7-1 Potential Catchment for container transport to the Port of Newcastle

8.0 TRANSPORT COST MODELS

So as to consider holistically the cost of transport route options, each option has been assessed based on current information and a cost per tonne presented. The costs have been estimated and developed to a +/- 15% confidence level. The cost of new infrastructure and cost of upgrades to existing infrastructure have not however been included on a cost per tonne basis, it is only the operational cost factoring in the cost of operations and maintenance as well as the capital amortisation of capital that has been considered. The cost of terminal handling is not included in the estimates.

9.0 TRANSPORT COST ANALYSIS

The following section summarises the findings of the study for each of the key origin-destination combinations analysed, provides charts depicting the calculated freight rates and summarises the comparative advantages of transporting containers to Newcastle Port.

9.1 Tamworth

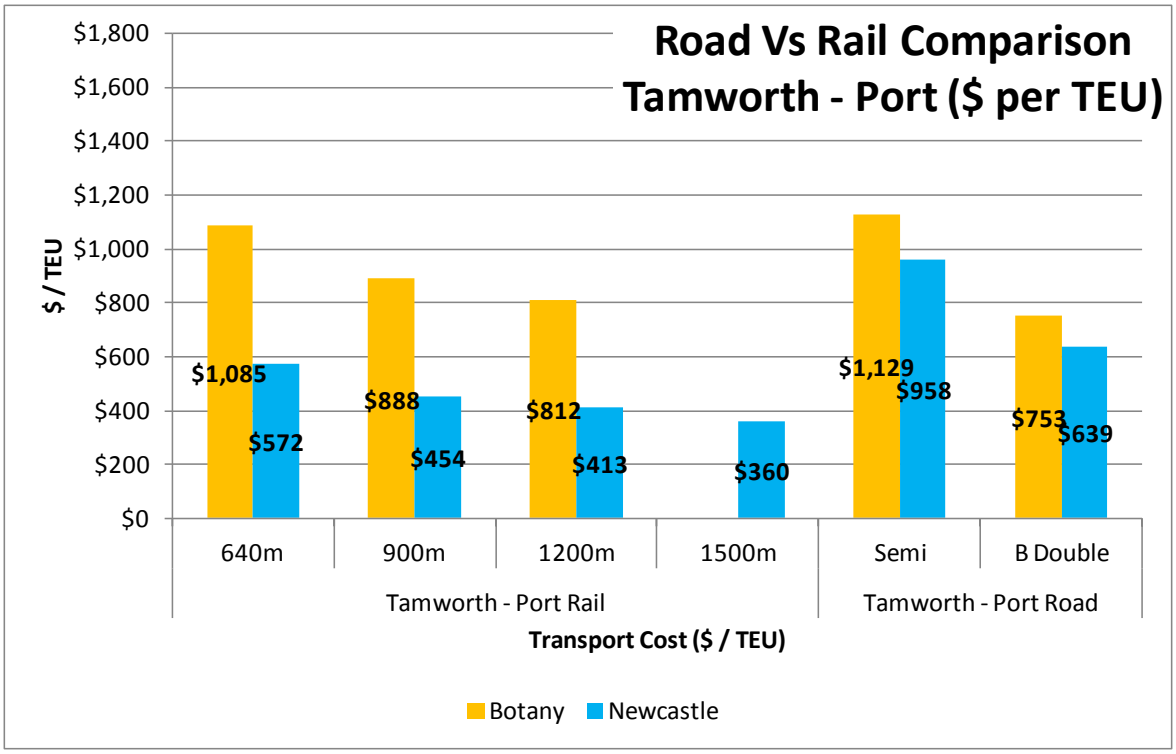

Figure 9-1 Summary of Freight Rates for Road and Rail from Tamworth (per TEU)

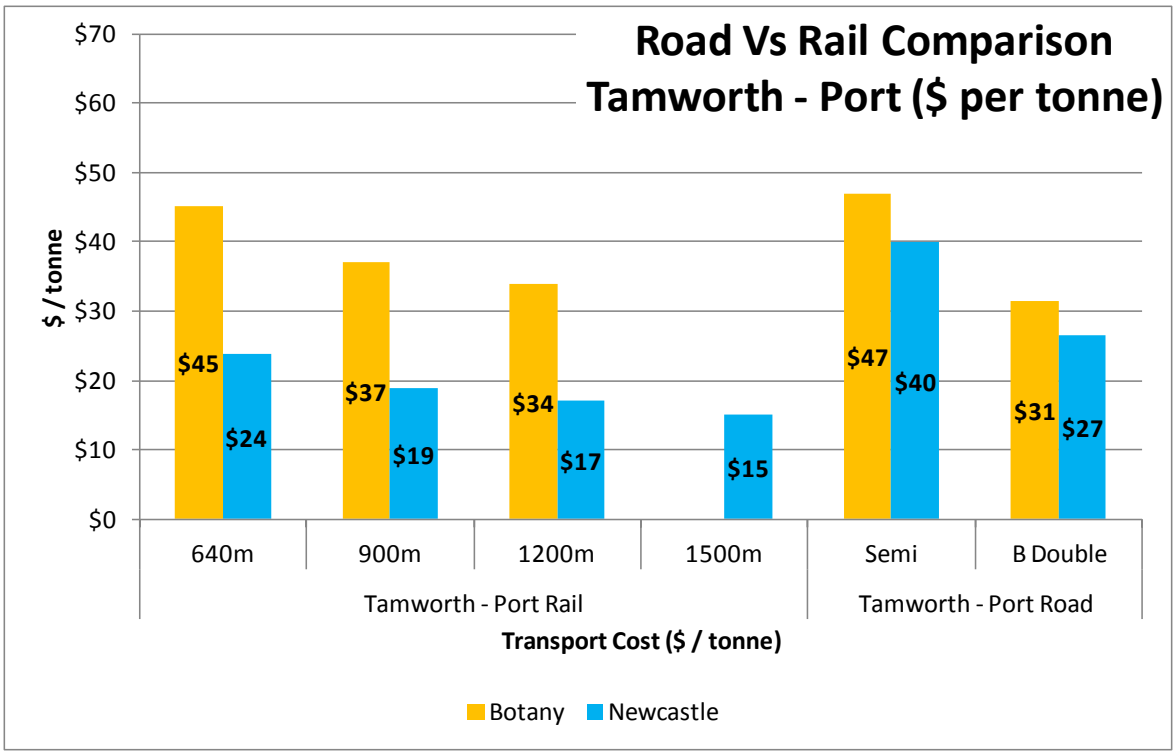

Figure 9-2 Summary of Freight Rates for Road and Rail from Tamworth (per tonne)

Advantages of Rail Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by rail from Tamworth and return are considered to include:

- Transport direct to the Port of Newcastle from Tamworth and return creates capacity through the Northern rail corridor and Port Botany rail line in Sydney, allowing State and Federal governments to redirect infrastructure spending on higher priorities rather than further planned upgrades on freight rail networks in Sydney including the Port Botany line and future intermodal terminals;

- Lower comparative below rail access charges for transport by rail through the ARTC Hunter Valley Network (by net tonne km) as opposed to transport to Port Botany. Although Sydney Trains access charges are not publicly available, we understand these charges are significantly higher and would apply on the portion of the journey from Broadmeadow to Port Botany;

- Reduced cycle times as trains from Tamworth can be accepted at the Port of Newcastle without the need to arrive at an intermediate terminal, which would only add further cost associated with additional dwell time. Transport to Port Botany requires trains to arrive at intermodal staging terminals prior to shuttle to Port Botany (actual train running data has been used to approximate cycle times for all Port services);

- Reduced terminal handling charges as trains travel direct to the Port of Newcastle through the highly efficient ARTC Hunter Valley rail network. Additional handling costs are levied on

container movements through the intermodal terminals in Sydney such as Enfield and Cooks River;

Advantages of Road Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by road from Tamworth and return are considered to include:

- Direct access to the Port of Newcastle for higher productivity vehicles such as B Doubles;
- Significantly shorter transit to and from Newcastle Port and thus reduced cost;
- Reduced terminal handling charges as trucks often arrive at an intermodal terminal within Sydney for container consolidation rather than transiting direct to Port Botany. This double movement of containers adds cost.

9.2 Narrabri

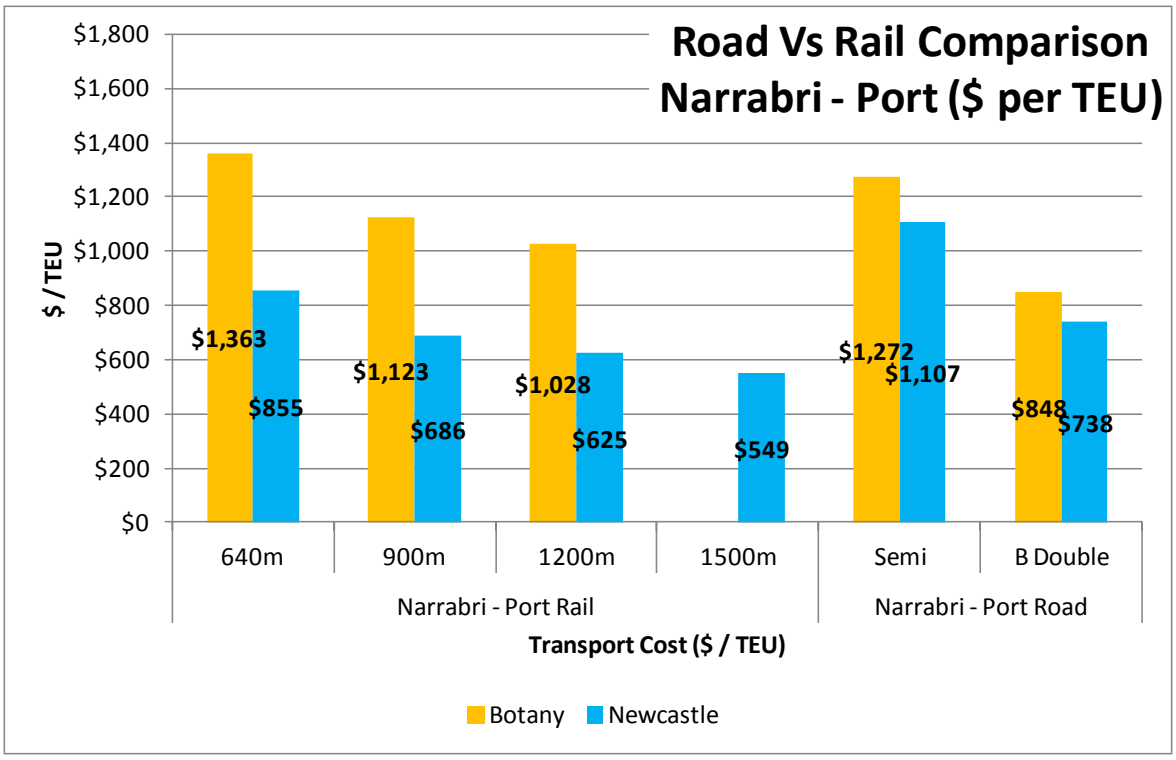

Figure 9-3 **Summary of Freight Rates for Road and Rail from Narrabri (per TEU)**

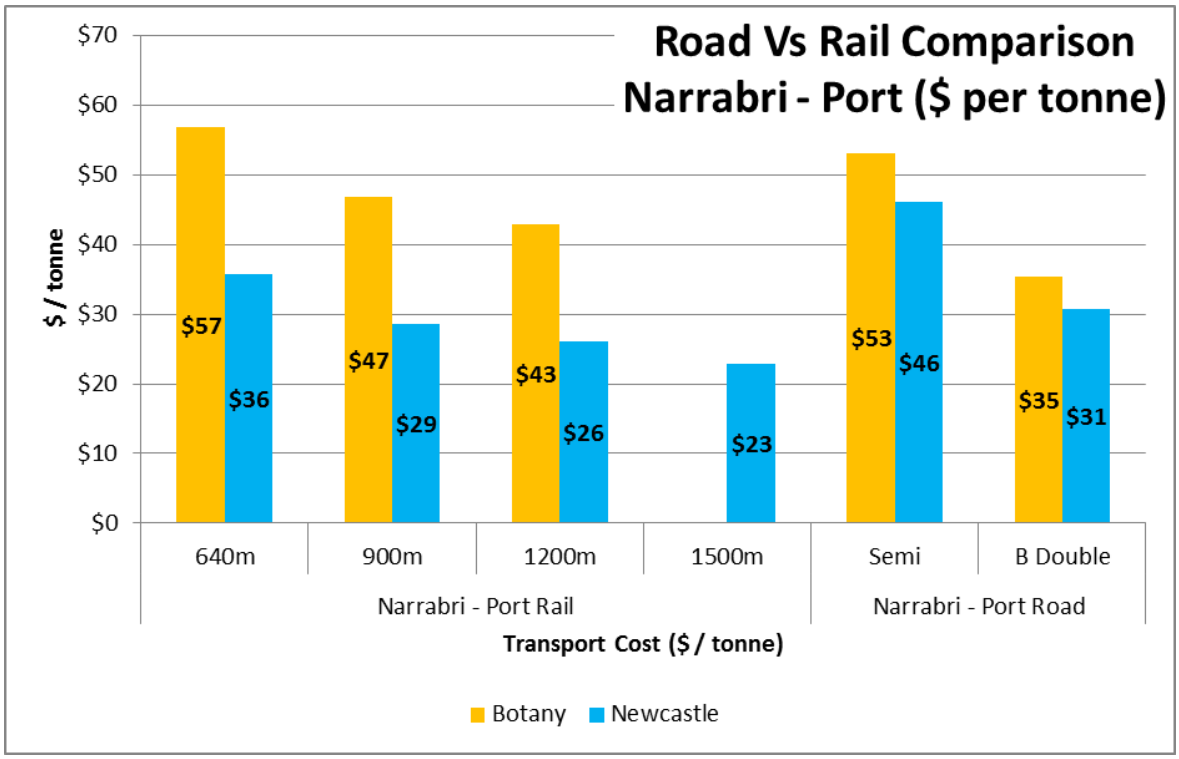

Figure 9-4 **Summary of Freight Rates for Road and Rail from Narrabri (per tonne)**

Advantages of Rail Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by rail from Narrabri and return are considered to include:

- Transport direct to the Port of Newcastle from Narrabri and return creates capacity through the Northern rail corridor and Port Botany rail line in Sydney, allowing a redirection in State and Federal government infrastructure spending;

- Lower comparative below rail access charges for transport by rail through the ARTC Hunter Valley Network (by net tonne km) as opposed to transport to Port Botany;

- Reduced cycle times as trains from Narrabri can be accepted at the Port of Newcastle without the need to arrive at an intermediate terminal, which would only add further cost associated with additional dwell time;

- Newcastle Port would have the ability to accept long trains of approximate length 1500m compared to Port Botany which is limited to accepting 600m trains (1200m trains can be accepted to Sydney intermodal terminals for consolidation to Port Botany);

- Reduced terminal handling charges as trains travel direct to the Port of Newcastle through the highly efficient ARTC Hunter Valley rail network.

Advantages of Road Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by road from Tamworth and return are considered to include:

- Direct access to the Port of Newcastle for higher productivity vehicles such as B Doubles;

- Significantly shorter transit to and from Newcastle Port and thus reduced cost;

- Reduced terminal handling charges as trucks often arrive at an intermodal terminal within Sydney for container consolidation rather than transiting direct to Port Botany.

9.3 Dubbo

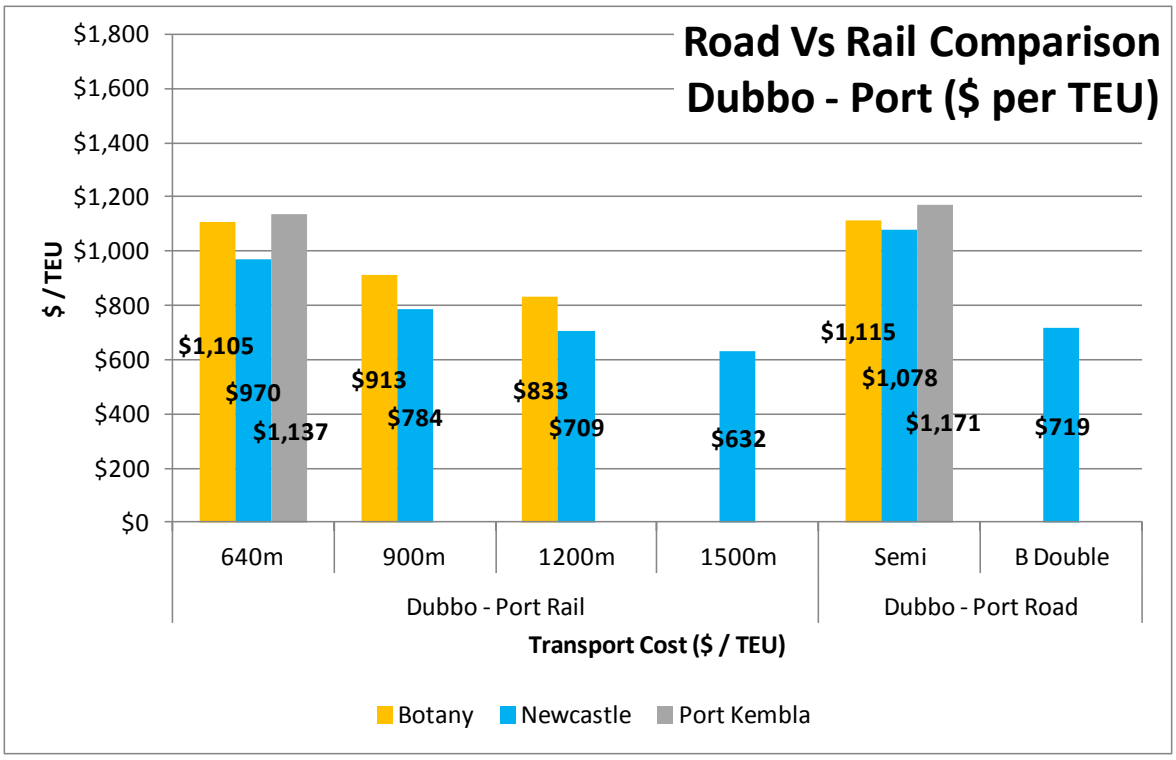

Figure 9-5 **Summary of Freight Rates for Road and Rail from Dubbo (per TEU)**

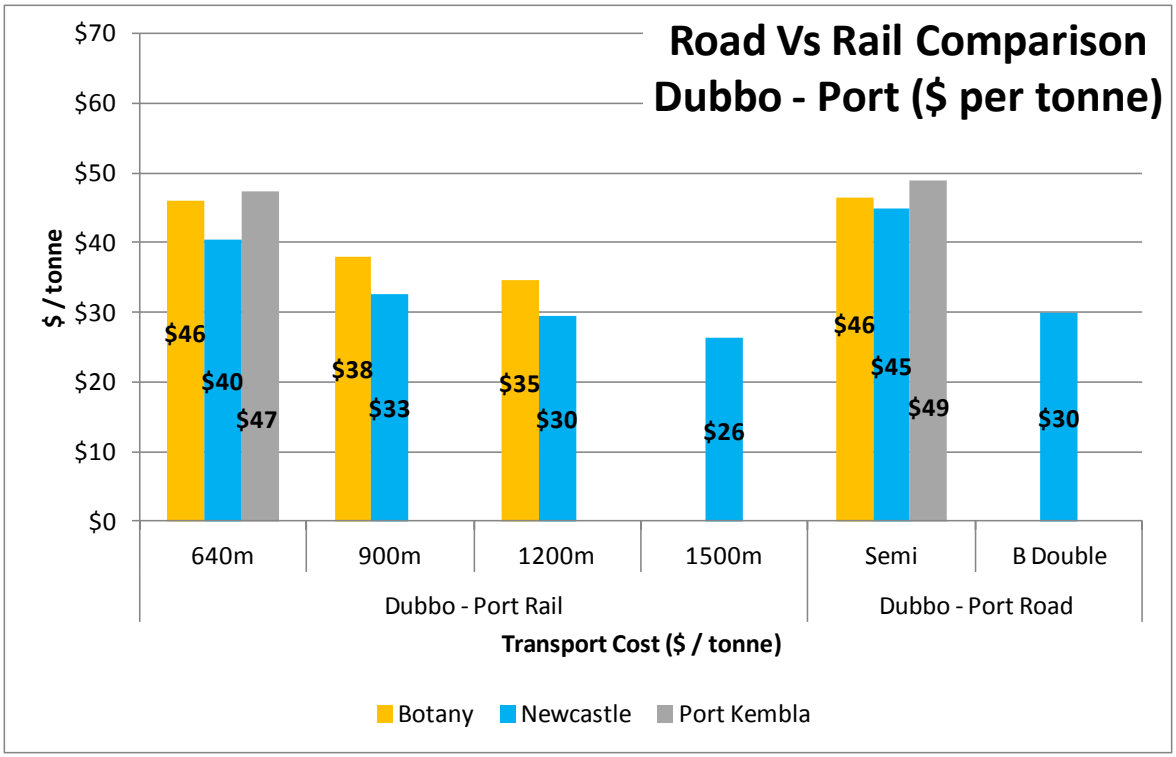

Figure 9-6 **Summary of Freight Rates for Road and Rail from Dubbo (per tonne)**

Advantages of Rail Transport to and from Newcastle Port

The analysis indicates that the cost of rail transport using short trains to the Port of Newcastle is similar to road transport through to the Port of Botany. However as with other modes assessed the cost of rail transport from regional nodes to the Port of Newcastle has been calculated to be the least cost alternative;

The comparative benefits of transporting containers to Newcastle Port by rail from Dubbo and return are considered to include:

- Transport direct to the Port of Newcastle from Dubbo and return creates capacity through the Western rail corridor including the Blue Mountains network and Port Botany rail line in Sydney, allowing a redirection in State and Federal government infrastructure spending. Relieving capacity particularly through the Blue Mountains shared Sydney Trains corridor would allow for additional express passenger services from the Lithgow and Bathurst areas, which aligns with State Infrastructure planning;

- Lower comparative below rail access charges for transport by rail through the ARTC Hunter Valley Network (by net tonne km) as opposed to transport to Port Botany. Higher charges are imposed on transit through the Sydney Trains network from Lithgow to Port Botany as opposed to the route from Dubbo to the Port of Newcastle which would be entirely on the ARTC network at lower charges per net tonne km;

- Reduced cycle times as trains from Dubbo can be accepted at the Port of Newcastle without the need to arrive at an intermediate terminal, which would only add further cost associated with additional dwell time;

- Newcastle Port would have the ability to accept long trains of approximate length 1500m from Dubbo compared to Port Botany which is limited to accepting 600m trains. While 1200m trains can be accepted to Sydney intermodal terminals for consolidation to Port Botany eg Fletcher's regularly operate a 1200m train from Dubbo to Port Botany, the need to break and reconsolidate the train adds further time and cost;

- Reduced terminal handling charges as trains travel direct to the Port of Newcastle through the highly efficient ARTC Hunter Valley rail network;

- For Dubbo routes Port Kembla has also been assessed as a viable option, however train length and maximum payload size for trains travelling to Port Kembla is restricted. General rail freight originating from the Central West of NSW travelling to Port Kembla generally transits via the Moss Vale to Unanderra rail line. This line (maintained and operated by ARTC) is restricted to a maximum train length of 680m due to conflicting services and the limited passing loops and a maximum trailing payload of 3,600 tonnes (not including coal services). It is relevant to note that these load restrictions prevent greater train efficiency to Port Kembla, without significant investment either in the Moss Vale line or the completion of the Maldon – Dombarton railway.

Advantages of Road Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by road from Dubbo and return are considered to include:

- Direct access to the Port of Newcastle for higher productivity vehicles such as B Doubles (approx. 26m). There is a restriction on high productivity vehicles over the Blue Mountains. A road limit is currently in place restricting the maximum size of road vehicles transiting from the Central West to the Sydney basin to 19m. Significant investment is required to enable this restriction to be lifted (ie – The Bells Line of Road Expressway);

- Reduced terminal handling charges as trucks often arrive at an intermodal terminal within Sydney for container consolidation rather than transiting direct to Port Botany.

9.4 Moree

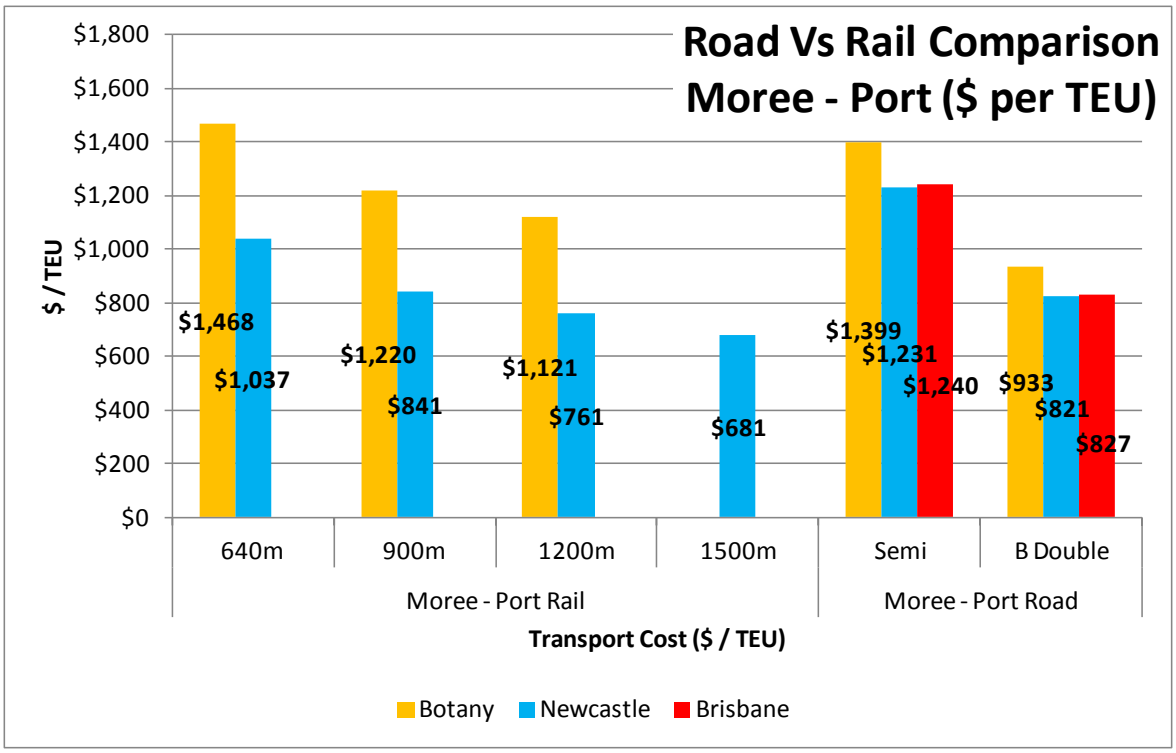

Figure 9-7 **Summary of Freight Rates for Road and Rail from Moree (per TEU)**

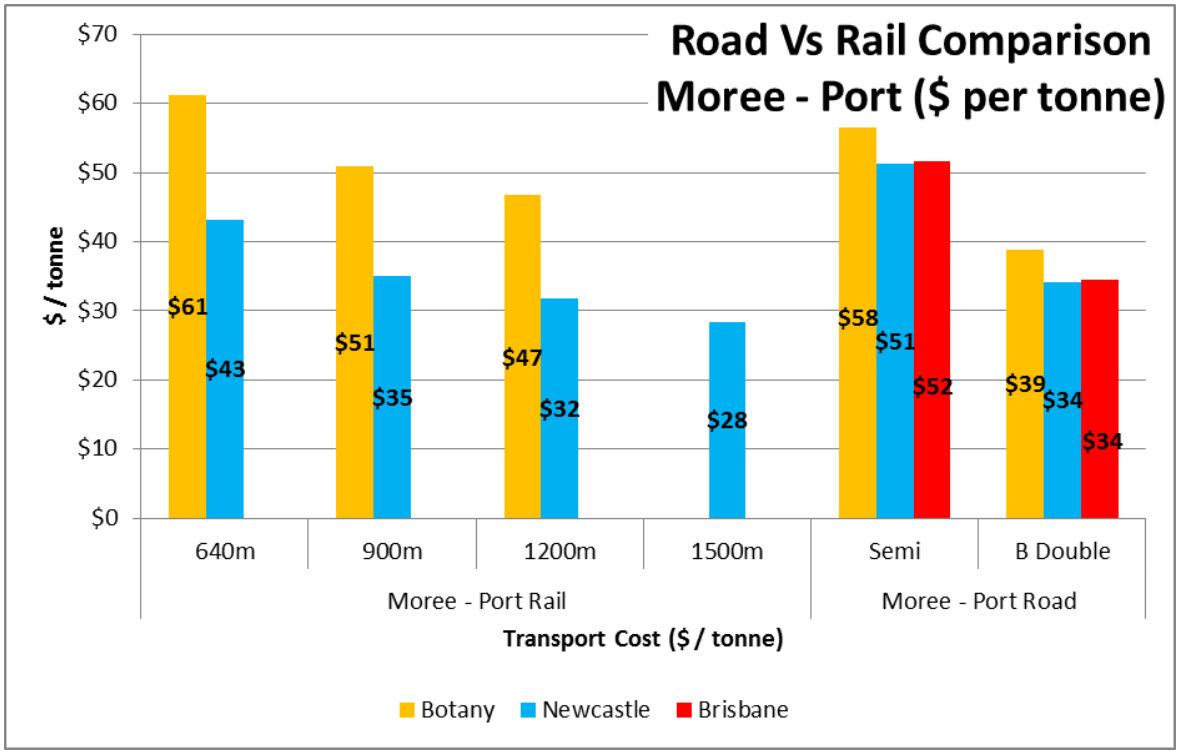

Figure 9-8 **Summary of Freight Rates for Road and Rail from Moree (per tonne)**

Advantages of Rail Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port (as opposed to Port Botany) by rail from Moree and return are considered to include:

- Transport direct to the Port of Newcastle from Moree and return creates capacity through the Northern rail corridor and Port Botany rail line in Sydney, allowing a redirection in State and Federal government infrastructure spending;

- Lower comparative below rail access charges for transport by rail through the ARTC Hunter Valley Network (by net tonne km) as opposed to transport to Port Botany;

- Reduced cycle times as trains from Moree can be accepted at the Port of Newcastle without the need to arrive at an intermediate terminal, which would only add further cost associated with additional dwell time;

- Newcastle Port would have the ability to accept long trains of approximate length 1500m compared to Port Botany which is limited to accepting 600m trains (1200m trains can be accepted to Sydney intermodal terminals for consolidation to Port Botany);

- Reduced terminal handling charges as trains travel direct to the Port of Newcastle through the highly efficient ARTC Hunter Valley rail network;

- The change of gauge and the limitations of the rail line over the mountain range restrict rail access to the Port of Brisbane and truck access is the only option.

Advantages of Road Transport to and from Newcastle Port

The comparative benefits of transporting containers to Newcastle Port by road from Moree and return are considered to include:

- Direct access to the Port of Newcastle for higher productivity vehicles such as B Doubles yields similar rates for road to Brisbane and Newcastle but rail to Newcastle is cheaper and more easily managed;

- Significantly shorter transit to and from Newcastle Port and thus reduced cost compared to Port Botany;

- Reduced terminal handling charges as trucks often arrive at an intermodal terminal within Sydney for container consolidation rather than transiting direct to Port Botany.

9.5 Parkes

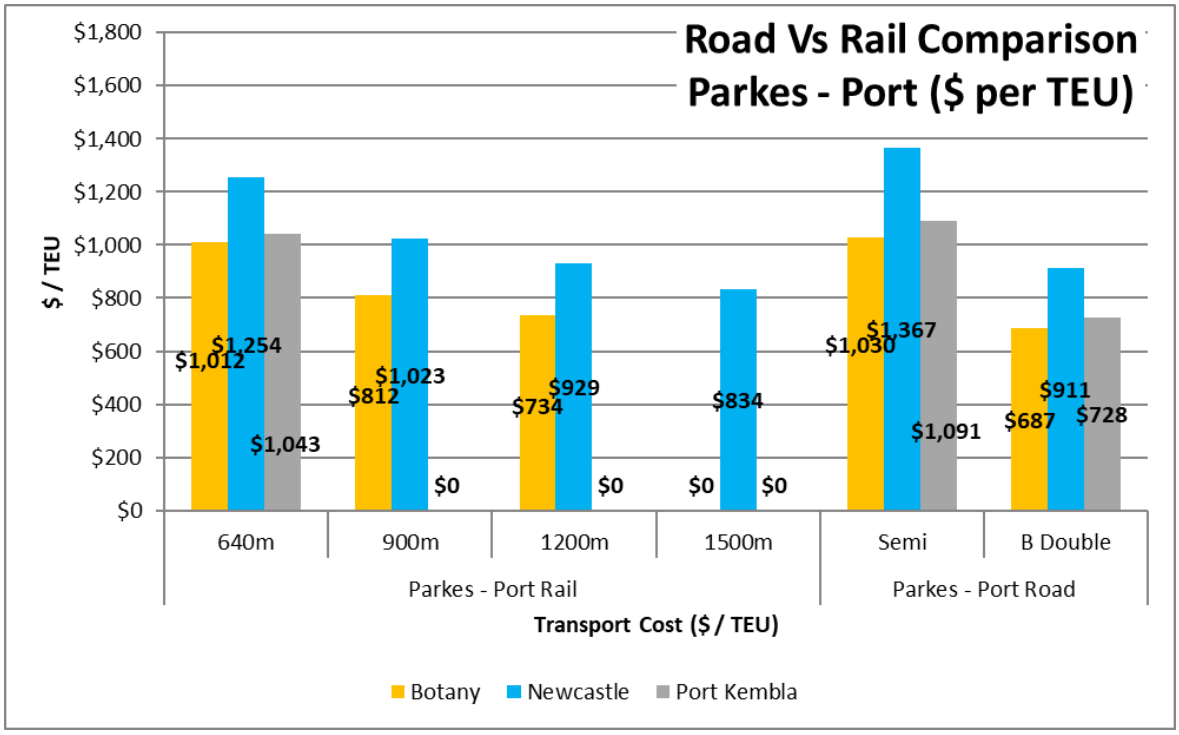

Figure 9-9 **Summary of Freight Rates for Rail and Road from Parkes (per TEU)**

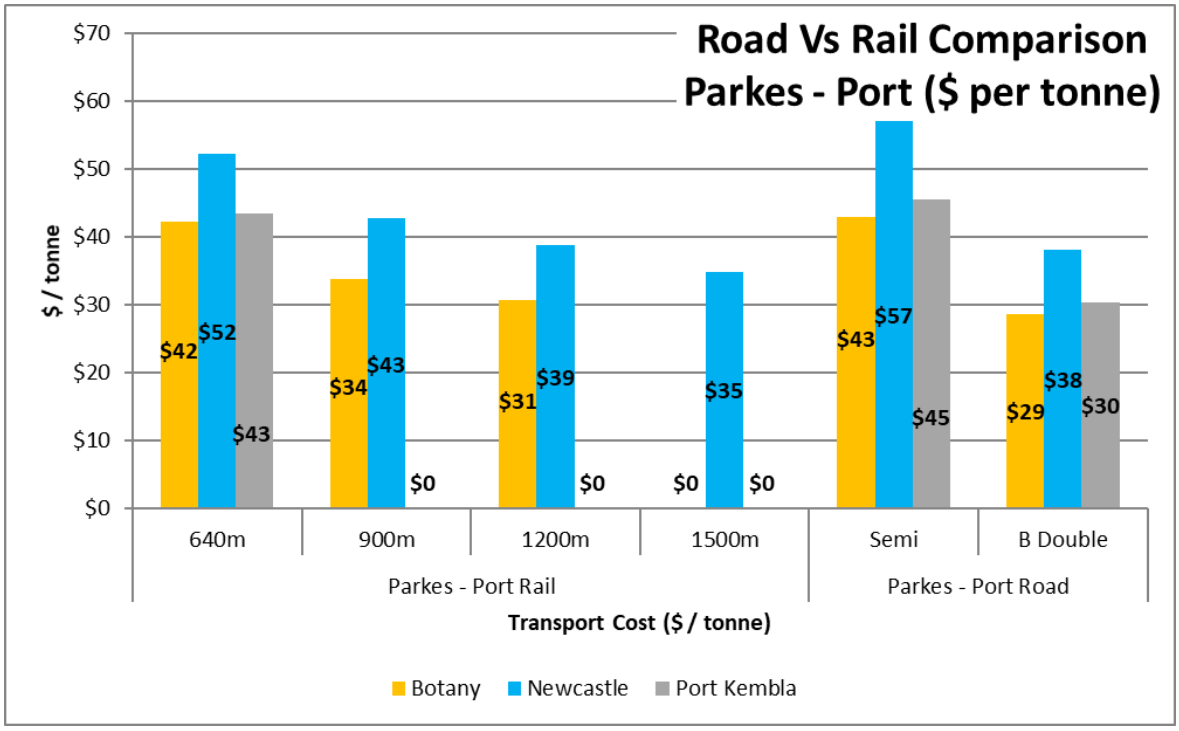

Figure 9-10 **Summary of Freight Rates for Rail and Road from Parkes (per tonne)**

Advantages of Rail Transport to and from Newcastle Port

The analysis indicates that the Botany or Port Kembla can compete if Newcastle is limited to similar small train sizes. The possible use of 1500m trains into Newcastle enables a competitive freight rate against Botany even if 900m trains can be handled at Botany and is more favourable against the smaller 640m trains.

The comparative benefits of transporting containers to Newcastle Port by rail from Parkes and return are considered to include:

- Transport direct to the Port of Newcastle from Parkes and return creates capacity through the Western rail corridor including the Blue Mountains network and Port Botany rail line in Sydney, allowing a redirection in State and Federal government infrastructure spending. Relieving capacity particularly through the Blue Mountains shared Sydney Trains corridor would allow for additional express passenger services from the Lithgow and Bathurst areas, which aligns with State Infrastructure planning;

- Lower comparative below rail access charges for transport by rail through the ARTC Hunter Valley Network (by net tonne km) as opposed to transport to Port Botany. Higher charges are imposed on transit through the Sydney Trains network from Lithgow to Port Botany as opposed to the route from Parkes to the Port of Newcastle which would be entirely on the ARTC network at lower charges per net tonne km;

- Reduced cycle times as trains from Parkes can be accepted at the Port of Newcastle without the need to arrive at an intermediate terminal, which would only add further cost associated with additional dwell time;

- Newcastle Port would have the ability to accept long trains of approximate length 1500m from Parkes compared to Port Botany which is limited to accepting 640m trains. While 1200m trains can be accepted to Sydney intermodal terminals for consolidation to Port Botany eg Fletcher's regularly operate a 1200m train from Dubbo to Port Botany, the need to break and reconsolidate the train adds further time and cost;

- Reduced terminal handling charges as trains travel direct to the Port of Newcastle through the highly efficient ARTC Hunter Valley rail network;

- For Parkes routes Port Kembla has also been assessed as a viable option, however train length and maximum payload size for trains travelling to Port Kembla is restricted. General rail freight originating from the Central West of NSW travelling to Port Kembla generally transits via the Moss Vale to Unanderra rail line. This line (maintained and operated by ARTC) is restricted to a maximum train length of 680m due to conflicting services and the limited passing loops and a maximum trailing payload of 3,600 tonnes (not including coal services). It is relevant to note that these load restrictions prevent greater train efficiency to Port Kembla, without significant investment either in the Moss Vale line or the completion of the Maldon – Dombarton railway.

Advantages of Road Transport to and from Newcastle Port

The road freight rates favour using Botany or Port Kembla with the same truck sizes. Given the current restrictions on B Doubles into the Sydney Basin, Newcastle can compete given the access to the port. The comparative benefits of transporting containers to Newcastle Port by road from Parkes and return are considered to include:

- Direct access to the Port of Newcastle for higher productivity vehicles such as B Doubles (approx. 26m). There is a restriction on high productivity vehicles over the Blue Mountains. A road limit is currently in place restricting the maximum size of road vehicles transiting from the Central West to the Sydney basin to 19m. Significant investment is required to enable this restriction to be lifted (ie – The Bells Line of Road Expressway);

- Reduced terminal handling charges as trucks often arrive at an intermodal terminal within Sydney for container consolidation rather than transiting direct to Port Botany.

9.6 Utilisation

Separate cost models were developed to assess the sensitivity of train loading against the base freight rates. The 50% utilisation scenarios, which model a fully loaded in-bound consist with no backhaul, were considered to most accurately reflect market freight rates and thus the 50% utilisation scenarios were used as the basis for the report findings. Freight cost models were developed for the 75% and 100% utilisation scenarios, and whilst not used in the main report findings illustrate that a highly regular and balanced inbound and outbound freight service allows significant savings in transport cost over and above the base freight rates presented in this report. The following chart illustrates the cost variances for the 900m train cost models for the various utilisations scenarios studied.

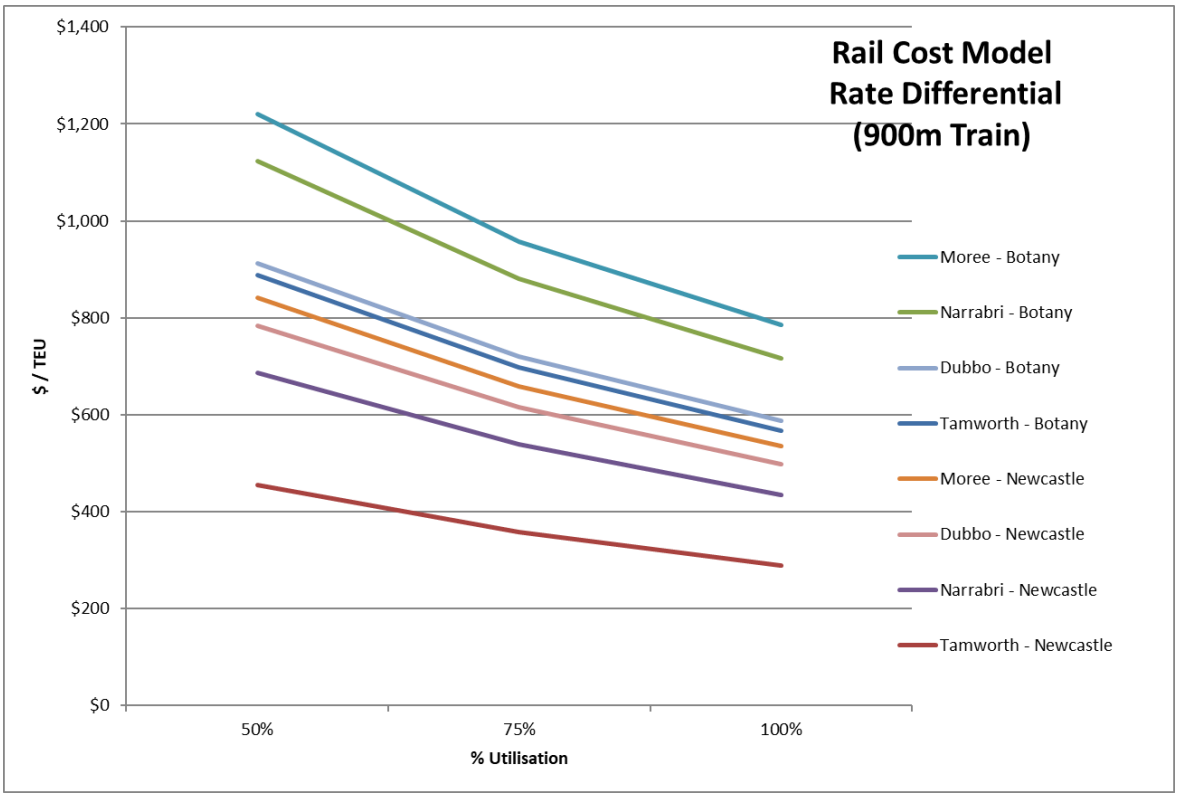

Figure 9-1 Illustration of Transport Cost Savings for Various Utilisation Scenarios based on the example of a 900m train

The higher than 50% utilisations can be achieved when export trains can be used to transport either full import or empty containers back to the regional source or to a facility that is located on the same network leg. The latter triangulation service is a key planning tool to increase efficiency and lower cost and is considered to be highly possible from Newcastle given the imports required in the region such as fertiliser, cement, grinding media, and steel.

The Hunter Valley rail network is a world leader in developing and implementing efficient scheduling algorithms and procedures and it could be reasonably expected that these capabilities of the coal chain can be brought to bear on the container transport industry as well. This competitive advantage of a Newcastle Port container operation could, in a short time frame, enable utilisation levels approaching 90%.

9.7 Freight Rate Calculation and Validation

The freight rates have been calculated by developing a build-up of all costs associated with the particular movement and applying appropriate margins. The rates calculated are summarised below.

		Calculated Cost					
		Rail				Road	
		640m trains	900m trains	1200m trains	1,500m trains	19m semi	25m B-Double
Origin	Destination	$ / TEU	$ / TEU	$ / TEU	$ / TEU	$ / TEU	$ / TEU
Tamworth	Botany	$1,085	$888	$812		$1,129	$753
	Newcastle	$572	$454	$413	$360	$958	$639
Narrabri	Botany	$1,363	$1,123	$1,028		$1,272	$848
	Newcastle	$855	$686	$625	$549	$1,107	$738
Moree	Botany	$1,468	$1,220	$1,121		$1,399	$933
	Brisbane					$1,240	$827
	Newcastle	$1,037	$841	$761	$681	$1,231	$821
Dubbo	Botany	$1,105	$913	$833		$1,115	$743
	Port Kembla	$1,137				$1,171	$781
	Newcastle	$970	$784	$709	$632	$1,078	$719
Parkes	Botany	$1,012	$812	$734		$1,030	$687
	Port Kembla	$1,043				$1,091	$728
	Newcastle	$1,254	$1,023	$929	$834	$1,367	$911
Newcastle Port	Enfield	$454	$352	$316		$556	$371
Botany	Enfield	$242				$78	$52
Newcastle Port	Western Sydney	$538	$423	$379		$600	$400
Botany	Western Sydney	$241				$222	$148
Newcastle Port	Central Coast	$263	$198	$175	$148	$232	$155
Botany	Central Coast	$396				$382	$255

Botany is limited to 640m shuttles. Larger trains are split or assembled at Enfield.
1200m assumed to be maximum
Port Kembla limited to 640m trains through Moss Vale- Unanderra line
No rail line connection - gauge changes between NSW and Qld

Figure 9-18 Summary of Calculated Freight Rates using Lycopodium Model

The rail freight rates calculated have been discussed with rail freight operators and it has been confirmed that they are reasonable. Importantly by using the same baseline build-up of costs the relativity of the calculations between the ports is maintained.

As a further check, we have seen some rates generated by the TraNSIT model developed by the CSIRO for grains transported from Moree and Narrabri to Newcastle. While these are for bulk commodities the freight cost structure is consistent as are the rates calculated by each of the models.

Road rates have been tested using both reference to a reputable operator and calculated using the Fixing Country Roads model from TfNSW. The rates generated from the FCR model were generally 20% lower for Botany and 35% lower for Newcastle using semis and average 15% higher for B-

Doubles into both ports. The differential between the ports would therefore be higher using the FCR model rather than the Lycopodium model.

10.0 CURRENT VOLUMES

The original report used the Waterline 57 report prepared by BITRE in Dec 2015. This report updates the figures by utilising the Waterline 61 report published by BITRE in Dec 2017.

10.1 Current Rail Volumes

Table 1.2 Container terminal throughput: Sydney

	2015						2016						2017		
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
WHARFSIDE															
UCC ships handled, as reported by stevedores	272	281	553	286	281	567	268	260	528	278	279	557	275	293	568
Total containers handled *('000)*	354.9	367.0	721.8	389.4	399.3	788.7	366.2	364.9	731.2	395.5	413.1	808.6	375.1	396.8	771.9
Total TEUs handled *('000)*	547.7	563.5	1 111.3	599.8	618.4	1 218.3	564.2	559.8	1 123.9	611.6	638.7	1 250.3	580.8	614.3	1 195.1
40-foot containers as per cent of all containers handled *(%)*	54.4	53.6	54.0	54.0	54.9	54.5	54.0	53.4	53.7	54.6	54.6	54.6	54.8	54.8	54.8
LANDSIDE															
Number of trucks used in VBS/TAS operations *('000)*	139.9	153.8	293.7	158.3	158.4	316.7	148.3	156.7	305.0	164.5	171.8	336.3	163.2	167.9	331.0
Total containers transported by VBS/TAS trucks and rail *('000)*	244.7	267.2	511.9	275.3	287.1	562.3	261.4	273.5	535.0	297.2	313.5	610.7	297.0	305.9	602.9
Containers by VBS/TAS trucks *('000)*	189.0	214.7	403.7	225.0	225.7	450.7	209.5	221.5	431.0	234.5	244.2	478.6	230.7	238.5	469.2
Containers by rail *('000)*	55.7	52.5	108.2	50.3	61.4	111.6	52.0	52.0	104.0	62.7	69.4	132.0	66.3	67.3	133.6
Balance of containers handled landside *('000)*	110.2	99.8	210.0	114.1	112.2	226.3	104.8	91.4	196.2	98.4	99.5	197.9	78.1	90.9	169.1
Total TEUs transported by VBS/TAS trucks and rail *('000)*	369.2	391.8	760.9	398.4	411.4	809.7	377.3	394.9	772.2	429.7	445.2	874.9	419.1	440.8	859.9
TEUs by VBS/TAS trucks *('000)*	288.8	315.5	604.3	323.8	322.3	646.1	302.8	318.3	621.1	335.8	343.6	679.4	325.0	340.8	665.8
TEUs by rail *('000)*	80.3	76.3	156.6	74.6	89.0	163.7	74.5	76.6	151.1	93.9	101.7	195.5	94.2	99.9	194.1
Balance of TEUs handled landside *('000)*	178.6	171.8	350.4	201.4	207.1	408.5	186.8	164.9	351.7	181.9	193.5	375.4	161.7	173.6	335.2
WHOLE OF CONTAINER TERMINAL															
Total number of container ship visits	260	267	527	277	271	548	258	255	513	274	271	545	269	281	550
Total containers (lifts) exchanged ('000)	350.1	362.7	712.7	385.3	392.3	777.6	363.5	363.8	727.2	388.5	409.5	798.0	375.6	388.0	763.6
WHOLE OF PORT															
Total cargo throughput *(million tonnes)*	4.4	5.8	10.3	5.7	6.4	12.1	5.9	6.1	12.0	6.5	6.9	13.4	6.6	7.0	13.6
Non-containerised general cargo throughput *(million tonnes)*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total TEUs exchanged *('000)*	542.4	561.3	1 103.7	592.1	614.2	1 206.3	559.1	558.3	1 117.5	609.2	635.4	1 244.6	575.7	610.8	1 186.5
Full import *('000)*	265.3	282.0	547.4	299.2	307.5	606.7	275.6	280.2	555.8	312.3	315.9	628.2	283.9	305.4	589.3
Empty import *('000)*	3.1	2.3	5.5	2.1	3.9	6.0	1.7	2.7	4.4	2.3	3.6	5.8	3.3	4.1	7.4
Full export *('000)*	112.1	122.8	234.9	112.3	121.2	233.6	110.8	115.4	226.2	127.4	125.9	253.2	122.6	131.4	254.0
Empty export *('000)*	161.8	154.2	316.0	178.4	181.5	359.9	171.1	160.0	331.1	167.3	190.0	357.3	165.8	169.9	335.7

Note: Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.
Cells with an entry of "0.0" mean that data were reported but rounded to zero.
Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2017), Hutchison Ports Australia (2017), Patrick (2017) and NSW Ports (2017).

Figure 10-1 Waterline 61 Report, BITRE Extract presenting current rail volumes through Port Botany

The Port Botany rail and total throughput reported by BITRE has been for the calendar years:

Calendar	Rail TEUS	Total TEUS	Percentage
2013	272,000	2,152,000	12.6
2014	211,000	2,247,000	9.3
2015	320,000	2,310,000	13.8
2016	346,000	2,362,000	14.6
2017 (6 months to June)	194,000	1,186,000	16.4

Despite the increasing port throughput since 2000 there has been little growth in the rail performance. In 2002/3 rail throughput was 255,000 TEU when the total port throughput was 1.16M TEU (22%). Essentially the rail throughput has been based around the long-haul transport from the areas which would be key catchment regions for the Port of Newcastle.

The source of rail containers to Port Botany has been extracted from the BITRE Research Report 139, Feb 2016. The report indicates that approximately 32 services per week arrive at Port Botany from the regions nominated as potential catchments for the Port of Newcastle.

Assuming that train sizes are reasonably similar at an average 60 TEU per train, these services would result in approximately 100,000 TEU per annum, which is considered to be the immediately contestable volume that could be attracted to the Port of Newcastle. Note this does not include any

import handling but it is reasonably anticipated that the empties provided to the regions for export stuffing would also be handled by rail. The total available volume for rail services to and from Newcastle Port would be approximately 200,000 TEU per annum. There has been some growth over the last couple of years of the rail component of the Botany throughput but there is little available information to determine the source of the increase. The dominant commodities include logs, cotton, refrigerated meat, agricultural products, processed grain and mixed exports including wool. It is unlikely, at least until such time as the Inland Rail becomes operational, that containers originating south of Sydney could be economically moved to Newcastle.

Including Parkes as a possible source of export containers increases the volume but available data is unclear and inconsistent. The relative costing for Parkes to the ports shows an advantage for Botany for similar sized trains. The potential for larger trains to be used into Newcastle eliminates the advantage and 1500m trains into Newcastle provide similar costs to 900m trains into Botany. From the Price Waterhouse reports on containerised cargo demand for the Northern and Central West regions, the estimated rail export is 62,000 TEU (Figure 10-4).

10.2 Current Road Volumes

Without further breakdown of the data (which is not available) the volume of export and import freight moved by road between the potential Newcastle Port catchment and Port Botany is difficult to approximate.

From the Waterline reports, however, for the calendar years:

'000 TEU	2013	2014	2015	2016
Total full export	436	443	468	479
Total full import	1077	1122	1154	1184
Total empty export	630	671	675	688
Total empty import	11	12	11	10
Total by VBA/BAS trucks	1150	1226	1250	1300
Balance handled landside	728	798	759	727
Rail	272	211	320	346
Total	2152	2247	2310	2362

Figure 10-3 BITRE Waterline data of Botany throughput

It is clear that some of the full export boxes would emanate from the Port of Newcastle catchment. Referring to the Price Waterhouse reports on containerised cargo demand for the Northern and Central West regions the table below has been extracted and provides some insight.

Region	Mode	Direction	2015	
			Total	**Export**
			TEU	TEU
Northern	Rail	Inbound		
		Outbound	20753	20770
	Road	Inbound	29477	
		Outbound	31584	11878
Central West	Rail	Inbound	1070	
		Outbound	62130	61483
	Road	Inbound	67582	
		Outbound	43175	0

Figure 10-4 Data from PWC Reports – Containerised Cargo Demand Assessment 2015

The rail export figure for the Northern region equates reasonably closely to the 9 services per week (23,000 TEU) estimated in the previous section. The road export figure from the Northern region could therefore be assumed to be approximately 12,000 TEU. Some, if not all, of this may be possible to convert to rail if the efficiency and availability of rail services to Newcastle are high.

10.3 Potential Volumes

Without a rigorous market study, the potential volume for a Newcastle terminal cannot be properly assessed. It is clear from the above analysis of current export activity that the immediate landside logistics savings would justify the transfer of approximately 112,000 TEU per annum ***export*** (100,000

by rail and 12,000 by road). Additionally, containers sourced from Parkes and further west could possibly also be transferred, with a potential ***export*** in excess of 60,000 TEU.

Additional export containers might be economically transferable from Botany to Newcastle but may depend on industry and/or aggregation facilities relocating from the western suburbs of Sydney where the bulk of containers make their primary move.

Further growth in exports is possible with transfer from road to rail, for example, Moree to Brisbane. The road cost to Brisbane is $827 per TEU compared to the rail to Newcastle costs of $761 per TEU for 1200m trains and $681 per TEU for 1500m trains.

There is also a trend for some bulk exports to be containerised and competitive container freight and handling costs will support this trend.

For shipping services to make a call at Newcastle there would be a need to have reasonably balanced exchange volumes. With balanced exchange the shipping line may be able to include Newcastle into the East Coast schedule and possibly avoid Botany.

There is a relatively large proportion of the total imported goods estimated to end up in the Newcastle catchment area but, as noted in the Deloitte report on NSW Container and Port Policy March 2018, containers are generally transported to broader Western Sydney areas such as Eastern Creek, Hoxton Park, Erskine Park, Wetherill Park and Blacktown, which are supported by significant warehousing facilities.

Deloitte also note that 27% of imported containerised goods are estimated to end up in the Newcastle catchment area which would amount to over 300,000 TEU. Without the distribution and warehouse facilities in the Newcastle region it is most likely that these containers would move to the existing Sydney distribution centres.

Some import containers do make their primary move from the port to the Newcastle catchment region and the best estimate is from the New South Wales Import Export Container Mapping Study Report prepared for Sea Freight Council of NSW by Jays Corporate Services February 2004. This report tracked full import containers into the Newcastle catchment and estimated that it was 2% of total full import containers. Consequently, we have used the 2% figure as a conservative and justifiable estimate of full import container movements at the present time (this would equate to approximately 24,000 TEU per annum (2% of 1.2 MTEU).

The import of containers and containerised goods will require appropriate facilities in the Hunter or local environs to unpack and distribute the contents. Some of this will inevitably develop but there will be a need to initially move containers into the Central Coast and potentially Sydney in the early years of operation. Consequently, costing of the movement of containers to the Central Coast and to the Enfield/Chullora areas have been undertaken to assess the impact of moving containers to Sydney.

Considering the above, the potential initial volume with balanced ship exchange would be **224,000 TEU per annum**, and up to **350,00 TEU per annum** if the Central West via Parkes volumes can be attracted to Newcastle.

10.3.1 Modelled Freight Costs (Import through Newcastle)

Newcastle to Future Central Coast Distribution Facility

A distribution terminal on the Central Coast shows a positive advantage for Newcastle with both rail and road rates being $133 and $150 per TEU lower for the same configuration. Larger trains from Newcastle show an even greater advantage.

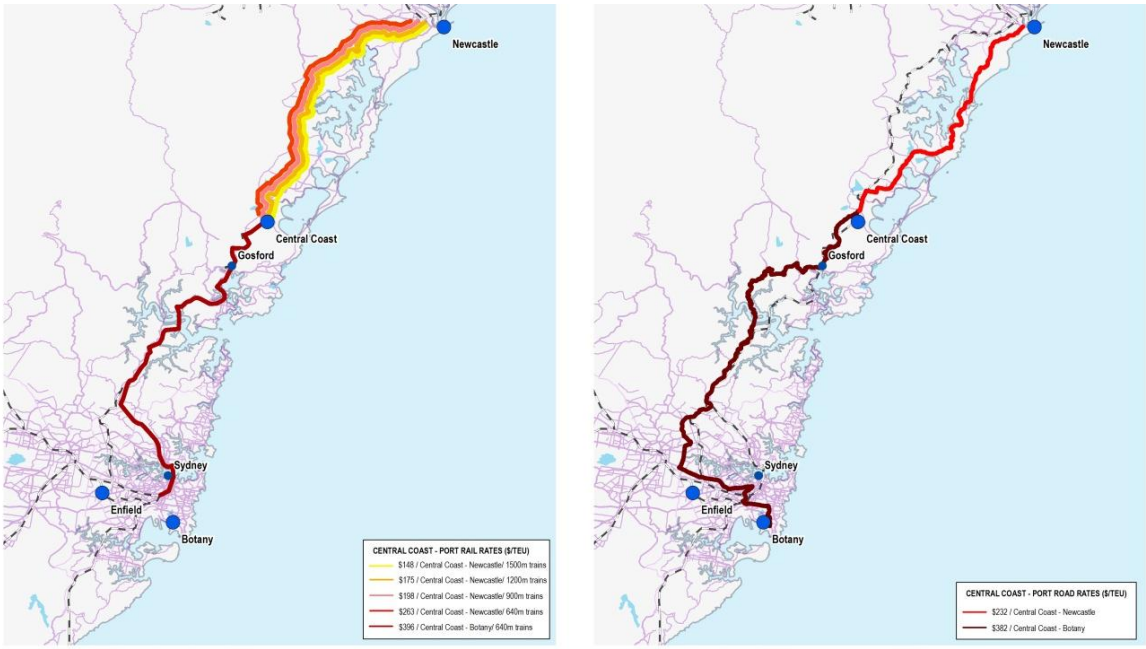

Figure 10-5 Illustration of Freight Rates for Rail from Newcastle Port to a Future Central Coast Distribution Facility

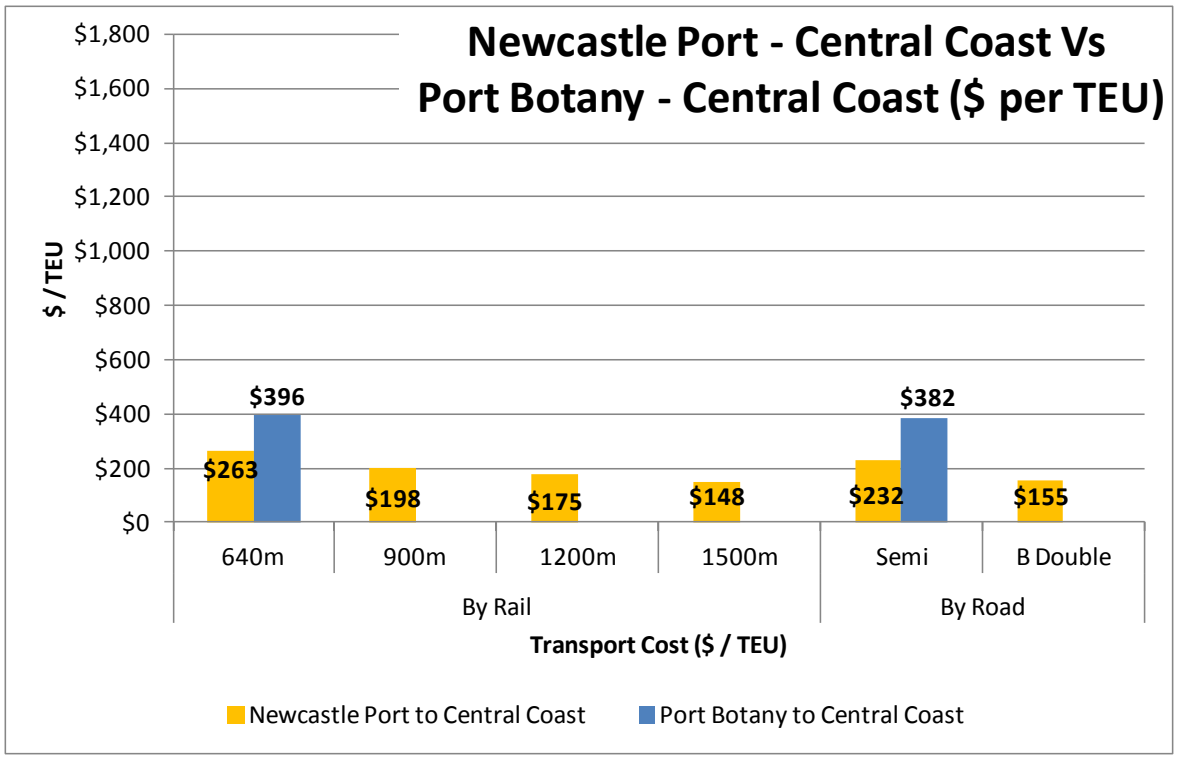

Figure 10-6 **Summary of Freight Rates for Rail from Newcastle Port to a Future Central Coast Distribution Facility (Per TEU)**

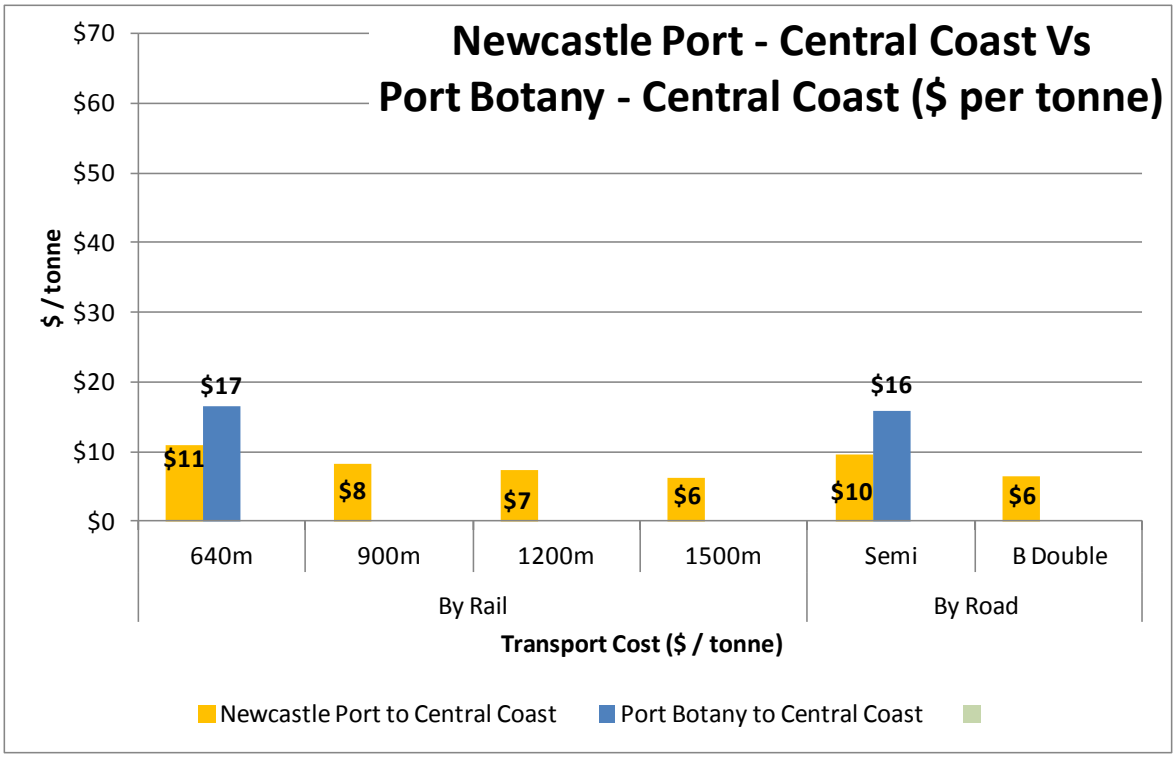

Figure 10-7 **Summary of Freight Rates for Rail from Newcastle Port to a Future Central Coast Distribution Facility (Per tonne)**

Newcastle to Enfield and/or Western Sydney Vs Port Botany to Enfield and/or Western Sydney

Moving containers into the Enfield area shows an advantage for Port Botany, particularly for road freight, however, the use of road freight from Port Botany is contrary to the needs of the supply chain to increase rail movements.

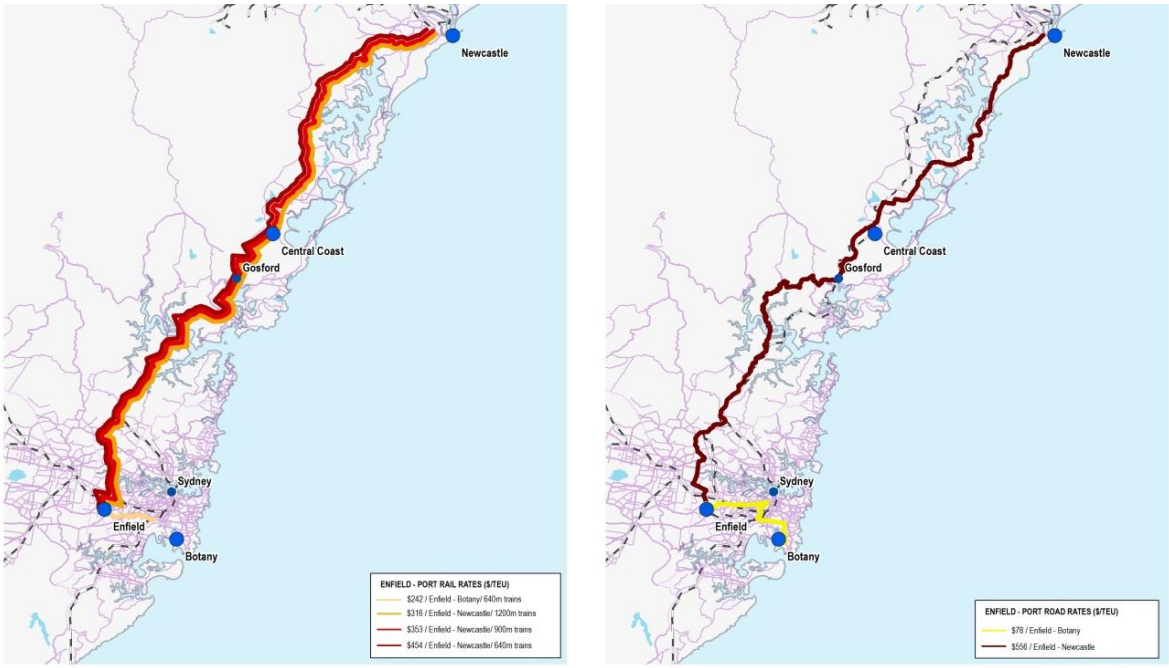

Figure 10-8 Illustration of Freight Rates for Rail from Newcastle Port and Port Botany to Enfield

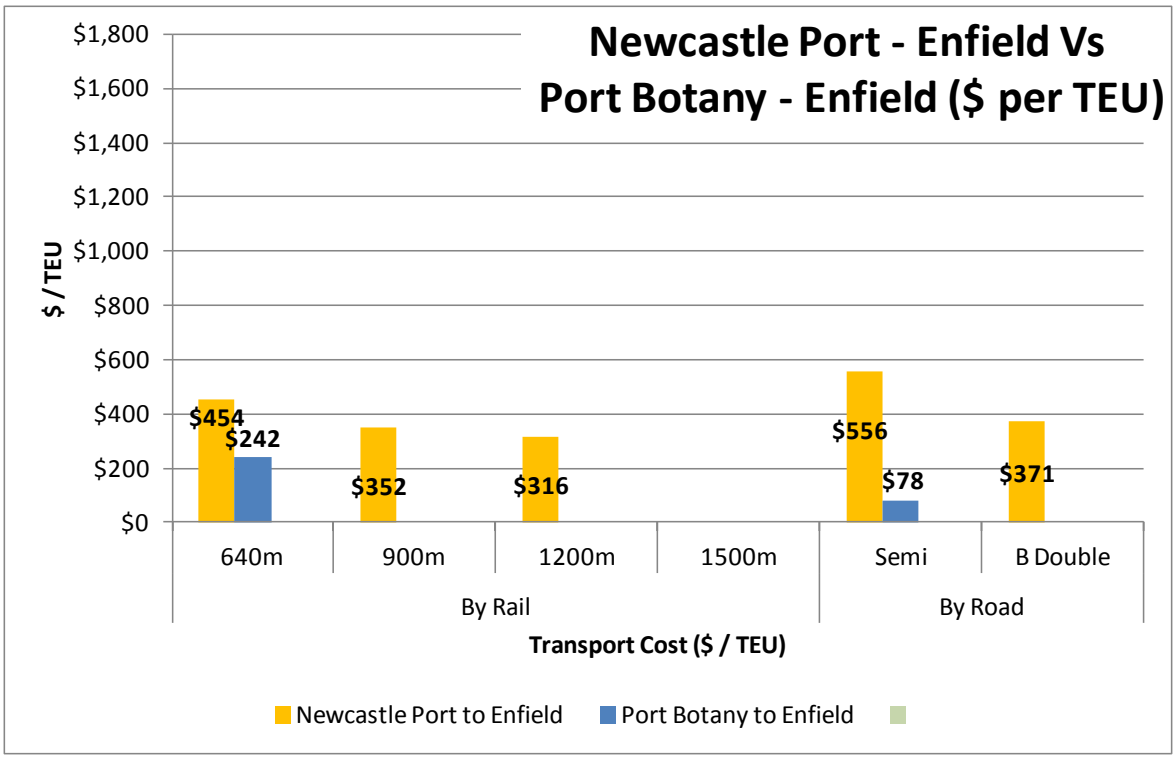

Figure 10-9 **Summary of Freight Rates for Rail from Newcastle Port and Port Botany to Enfield (per TEU)**

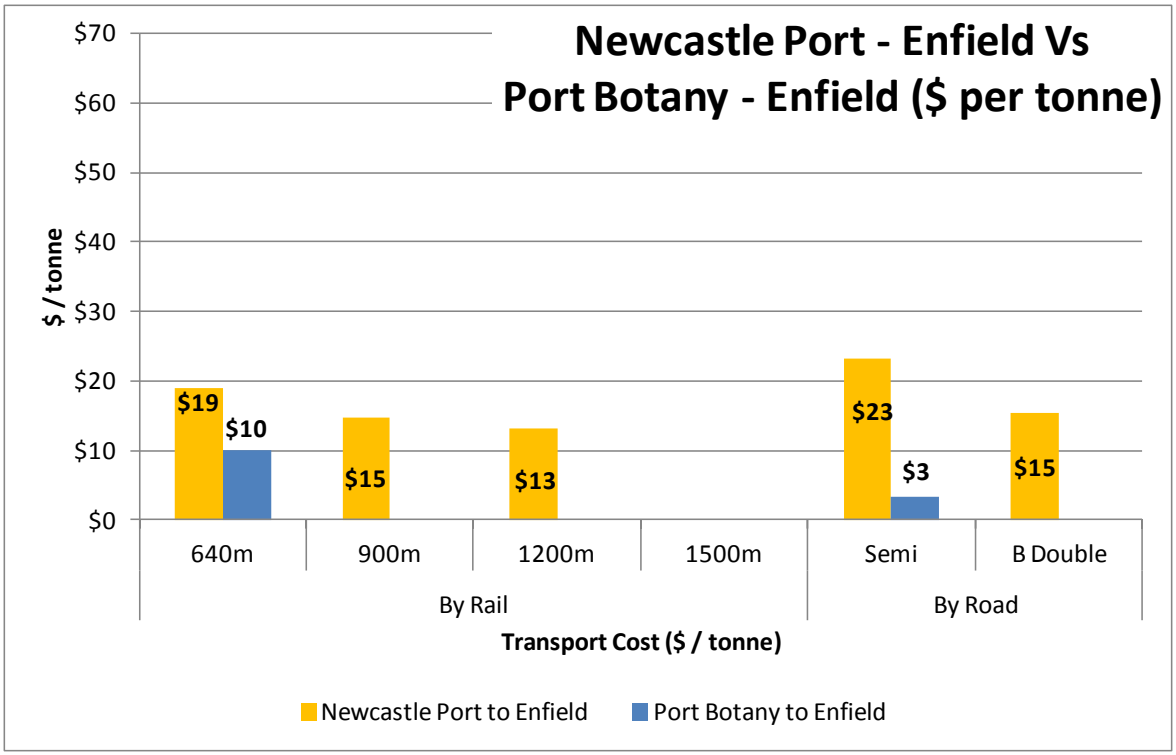

Figure 10-10 **Summary of Freight Rates for Rail from Newcastle Port and Port Botany to Enfield (per tonne)**

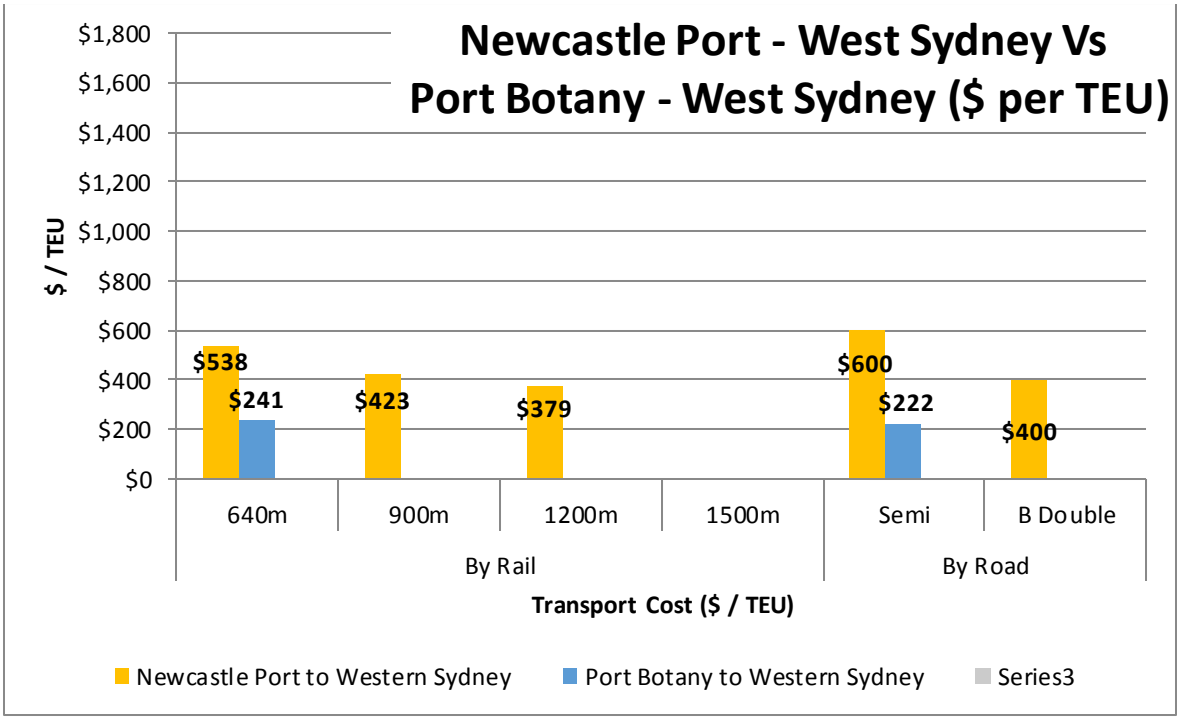

Figure 10-11 **Summary of Freight Rates for Rail from Newcastle and Port Botany to Western Sydney (per TEU)**

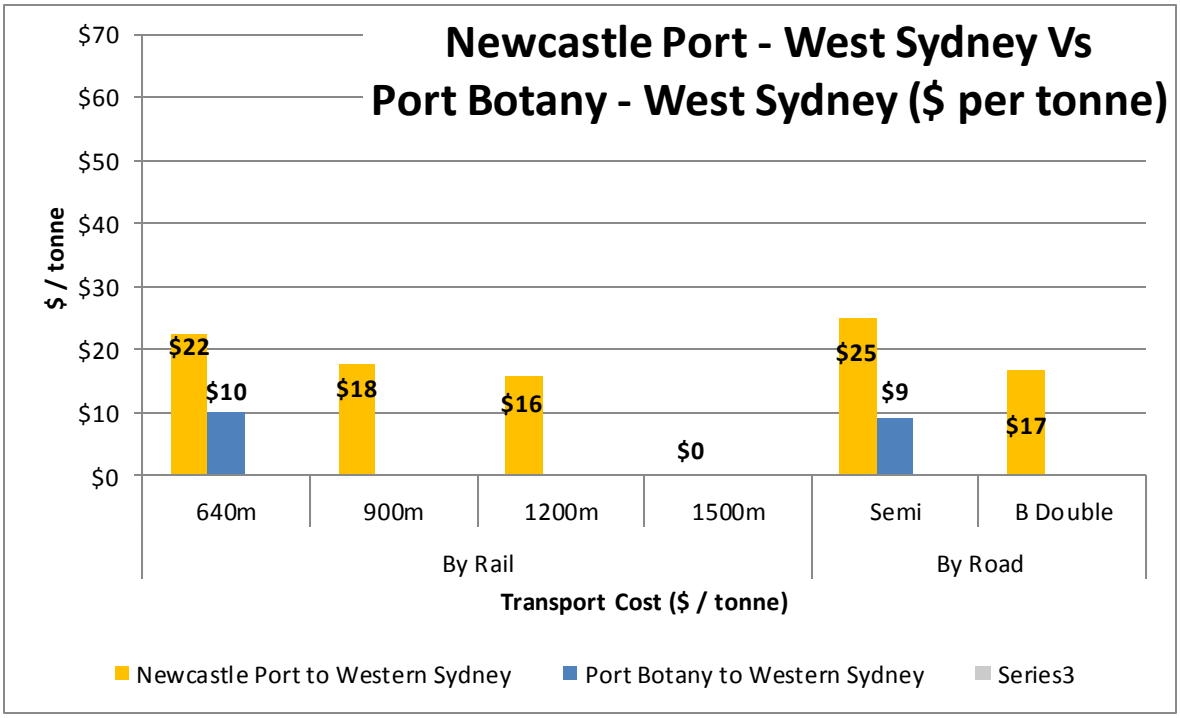

Figure 10-12 **Summary of Freight Rates for Rail from Newcastle and Port Botany to Western Sydney (per tonne)**

Thus, the question of whether imports of 112,000 TEU can be economically managed through Newcastle revolves around the net difference between export savings and import costs

The following tables demonstrate the potential freight savings for the possible 224,000 TEU available to be immediately transferred from Botany to Newcastle. These two cases are based on the estimated export volumes currently and using the Central Coast to receive 30,000 TEU per annum.

The mechanism for capturing and allocating the savings will need to be developed.

Possible Regional Exports	$ Savings per TEU	Total $ Savings per annum
Moree Region 5,000 TEU	431	2,155,000
Narrabri Region 25,000 TEU	507	12,675,000
Tamworth Region 5,000 TEU	513	2,565,000
Dubbo Region 35,000 TEU	135	4,725,000
Newcastle Region 30,000 TEU	464	13,920,000
Road from Northern 12,000 TEU	111	1,332,000
Possible Imports	Sub-total	37,372,000
Road to Northern Region 12,000 TEU	111	1,332,000
Central Coast 30,000 TEU	133	3,990,000
Enfield 40,000 TEU	-212	-8,480,000
Western Sydney IMT 30,000 TEU	-297	-8,910,000
	Sub-total	-12,068,000
Based on equivalent train sizes (640m) and B-Double trucks to both ports	TOTAL	25,304,000

Figure 10-13 Potential Newcastle throughput and savings vs Botany (same size trains)

Possible Regional Exports	$ Savings per TEU	Total $ Savings per annum
Moree Region 5,000 TEU	787	3,935,000
Narrabri Region 25,000 TEU	813	20,325,000
Tamworth Region 5,000 TEU	724	3,620,000
Dubbo Region 35,000 TEU	473	16,555,000
Newcastle Region 30,000 TEU	464	13,920,000
Road from Northern 12,000 TEU	111	1,332,000
Possible Imports	Sub-total	59,687,000
Road to Northern Region 12,000 TEU	111	1,332,000
Central Coast 30,000 TEU	248	7,440,000
Enfield 40,000 TEU	-74	-2,960,000
Western Sydney IMT 30,000 TEU	-138	-4,140,000
	Sub-total	1,672,000
Based on large trains to Newcastle and B-Double trucks to both ports	TOTAL	61,359,000

Figure 10-14 Potential Newcastle throughput and savings vs Botany (large trains to Newcastle)

11.0 INFRASTRUCTURE DEVELOPMENTS

Significant developments have been recently completed in Botany and the Greater Sydney region including the third container terminal and Enfield Logistics Centre. Additionally, Moorebank Intermodal Terminal is likely to commence major construction within 2018.

The benefits and broad costs of certain infrastructure developments which relate to the transport of freight to the East Coast Ports are discussed below. It is important to note that apart from the proposed container port development, transport to the Port of Newcastle from the identified catchment does not require additional investment. The rail and road networks to the Port of Newcastle have been significantly upgraded over many years, particularly the Hunter Valley rail network.

Whilst future infrastructure developments, private or public, have not been factored into the freight cost estimates presented in this report, infrastructure upgrades within existing supply chains are expected to lead to future cost increases within the respective supply chain as the cost of upgrade is likely to be recovered through access pricing. This would appear to be an additional unnecessary cost burden to the transport logistics task.

From a landside transport logistics cost basis, there is a compelling argument to consider container capacity at the Port of Newcastle as it offers a lower cost solution for the export industries it will be able to service.

11.1 Summary of Major Proposed Infrastructure Developments

The map below highlights some of the future planned infrastructure projects across NSW, which are targeted primarily at addressing supply chain bottle necks and improving freight efficiency through to the existing East Coast export/import Ports. It is relevant to note that these projects would come at a significant cost to the State and Federal governments or private operators and further support what are considered to be inefficient supply chains. This report has presented a case for transport to and from Newcastle Port based on the reduced freight transport costs and so questions the economics of continuing to invest in inefficient and capacity constrained supply chains.

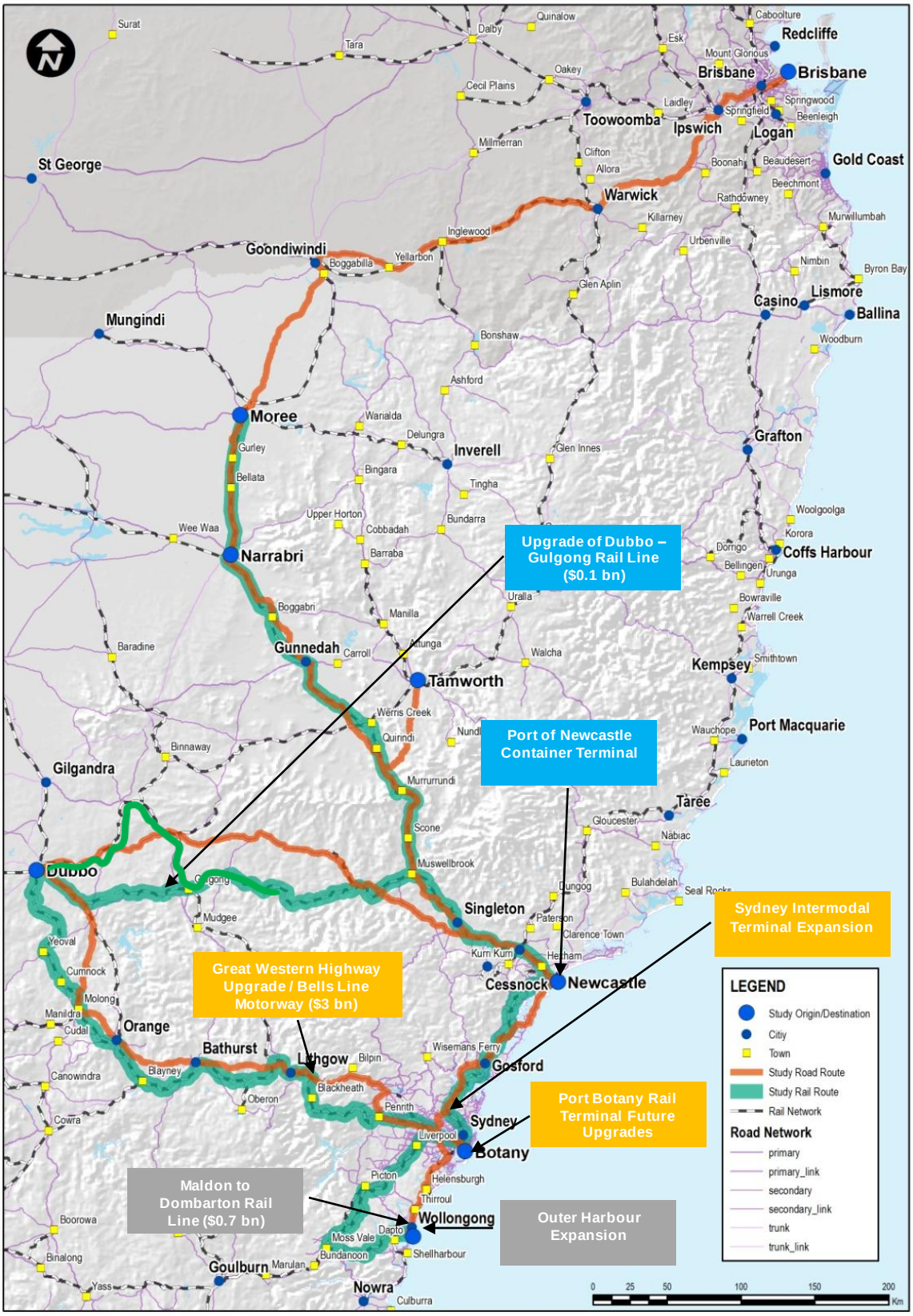

Figure 11-1 **Proposed infrastructure projects relating to East Coast Port supply chains**

11.2 Inland Rail

The Inland Rail Project is a major initiative to connect the Eastern States more effectively by rail.

It will complete the 'spine' of the national freight network between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland. It's the largest freight rail infrastructure project in Australia, with early works to start in 2018 and is expected to be operational in 2024-2025.

The early stages such as Parkes to Narromine are most likely to support increased rail traffic to Newcastle.

Figure 11-2 Inland Rail NSW (TfNSW)

11.3 Infrastructure Supporting Port of Newcastle Container Terminal

11.3.1 Rail Capacity Improvements

Hunter Valley Network

Under the direct management of the ARTC and guidance of the Hunter Valley Coal Chain Coordinator (HVCCC) significant investments have been made across the Hunter Valley rail network over the last decade. The capacity upgrades which include rail track and signalling expansion and renewal projects have been matched with load point and bulk terminal capacity upgrades. In the order of $4 billion has been invested in the supply chain capacity expansion over the last decade in the Hunter Valley, which has resulted in reduced cycle times, improved reliability and increased train path and throughput capacity.

Significant capacity exists in the network and the recent expansion now presents the opportunity for low cost general freight transport to the Port of Newcastle.

Dubbo to Werris Creek

The line from Dubbo to Werris Creek is managed by ARTC and currently allows general freight trains of 21 tonne axle load to traverse the section of track which is a mix of timber and steel sleepered track. A waiver is in place for 23 tonne axle load operation. Whist the line allows adequate tonnages for general container freight, a capacity upgrade of the line including the replacement of timber bridges and the construction of a triangle at Merrygoen would significantly improve cycle times to Newcastle Port.

No figures are publicly available however it is considered the upgrade would be in the order of $100 million.

11.4 Infrastructure Supporting Port Botany Container Terminal

11.4.1 Road Capacity Improvements

Bells Line of Road Expressway

The majority of freight moved in and out of the Sydney basin from Western NSW traverses the Blue Mountains Great Western Highway or Bells Line of Road. Major upgrade to either Great Western Highway or the Bells Line is required to lift the current heavy vehicle restriction across the Blue Mountains. Currently there is a restriction on the length and mass of heavy vehicles operating from the Central West to Sydney through the Blue Mountains. Whilst upgrades of the Great Western highway are progressing, the restriction on high productivity vehicles will remain.

The construction of a Bells Line of Road Expressway could logically provide a path for high production vehicles to operate into and out of the Sydney region. This project aligns with Task 1D-2 of the NSW Freight and Port Strategy ‘Provide necessary infrastructure to support High Productivity Vehicle access’ and well as Task 1A-5 ‘Promote efficient movement of general road freight’. However, the guide cost for the project is $3 Billion, which puts into question the advantages of improved efficiency for high productivity vehicles transporting to and from Port Botany compared to

investment into the Newcastle Port supply chain at a fraction of the cost. The potential for this project to increase road volumes is in contrast to the ability to move more product by rail into Newcastle at cheaper freight rates.

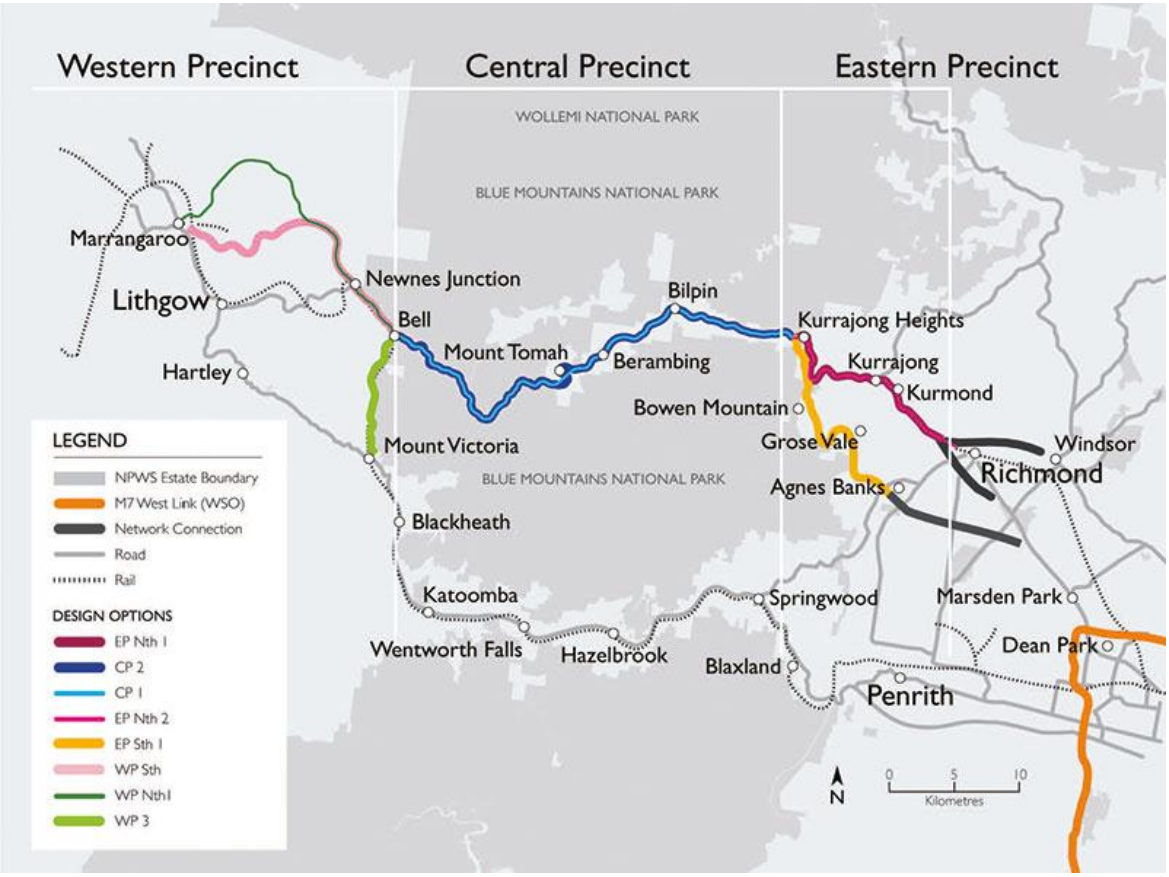

Figure 11-3 Bells Line of Road Expressway Alignment

11.4.2 Rail Capacity Improvements

Port Botany Rail Line Upgrade

Stage 3 of the Port Botany Rail Line capacity upgrade is underway at a cost of $75 million. Stage 3 follows the previously completed Stages 1 and 2. Current works up to Stage 3 are targeted to upgrade the track to ARTC mainline standard allowing faster and heavier trains (up to 25 tonne axle load) to transit the corridor. The line is currently single track with passing loops. Plans have now been approved and the federal government has pledged $400million over ten years for the duplication of rail track and bridges across the 2.9-kilometre freight line between Mascot and Botany along with construction of a passing loop between Cabramatta and Warwick Farm.

11.5 Botany Port Terminal Capacity Upgrades

The current layout at Port Botany terminal is shown below.

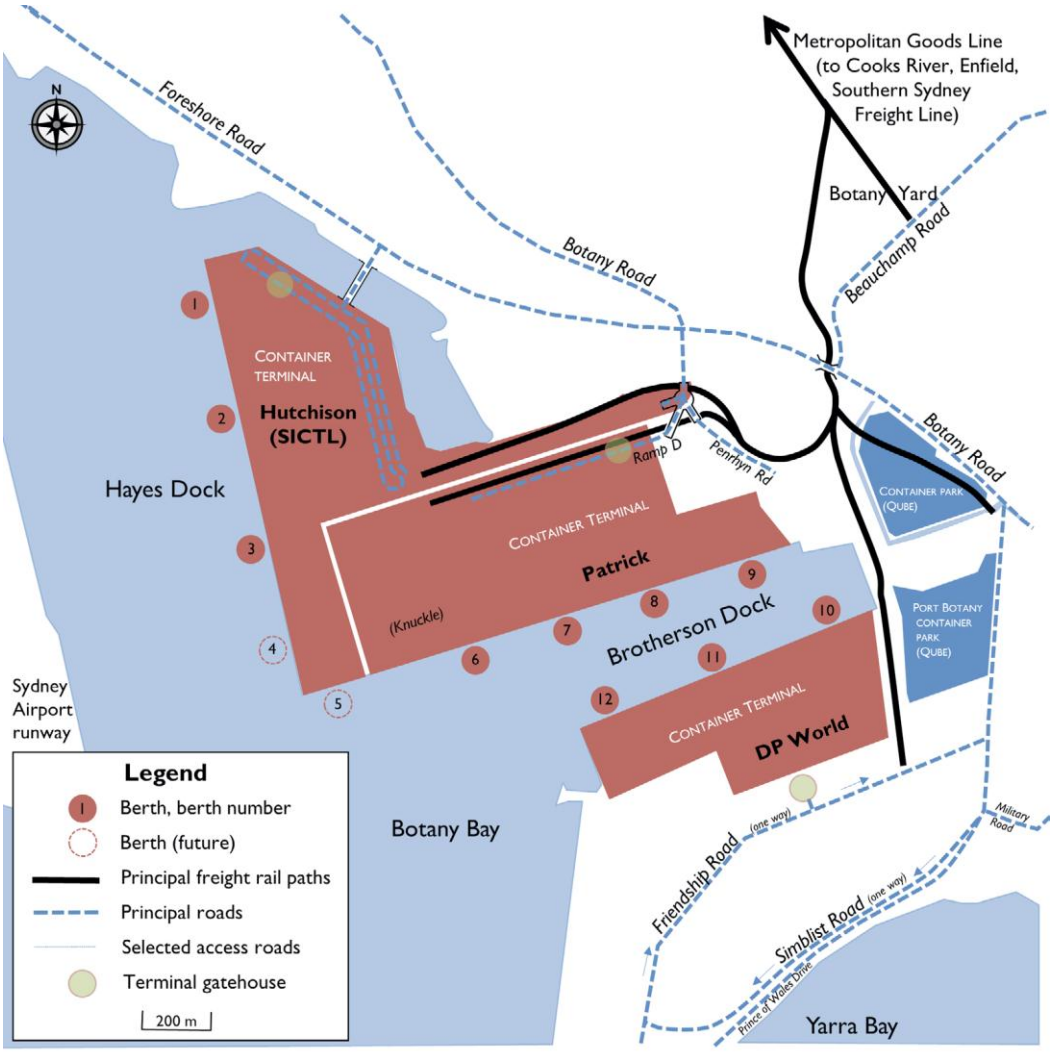

Figure 11-4 Port Botany Terminal Layout (Waterline 57 Report)

11.5.2 Facilities.

Each stevedore has rail facilities near to, but not on, its berths. DP World has 3 sidings of 340 metre length.

Patrick has 2 sidings of 650 metre length.

Hutchison's terminal has 2 rail sidings of 680 metres; these are parallel to the Patrick sidings.

11.5.3 Services.

Scheduled rail container services between Botany and the hinterland include:

- Short-haul:
    - Yennora, Cooks River and Minto.

- Long-haul:
    - logs and grain from Kelso (Southern Shorthaul Railroad; Pacific National);
    - Reefer containers carrying processed meat, and grain in standard containers from Dubbo (Fletcher Export International/Southern Shorthaul Railroad; Qube);
    - Specialised grain transport from Coonamble (Qube);
    - Cotton and agricultural produce from Nevertire, Warren, Warren South, Trangie, Narrabri, Wee Waa, Narromine and Forbes (Qube; Genesee & Wyoming; Sydney Rail Services);
    - Paper products and grain from Harefield (Qube);
    - Scrap metal from Canberra (Espee Railroad Services);
    - Aluminium, logs and agricultural produce from Walsh Point, Carrington and Sandgate [Newcastle] (Qube and Crawfords Freightlines/Sydney Rail Services).

Increases in capacity or efficiency at Port Botany are problematic given substantial previous development and limited land for development.

11.6 Sydney Intermodal terminals

The currently operational and proposed intermodal facilities within the Sydney basin are shown below. These terminals offer regional train operators the ability to consolidate freight ahead of shuttling trains to and from the Port.

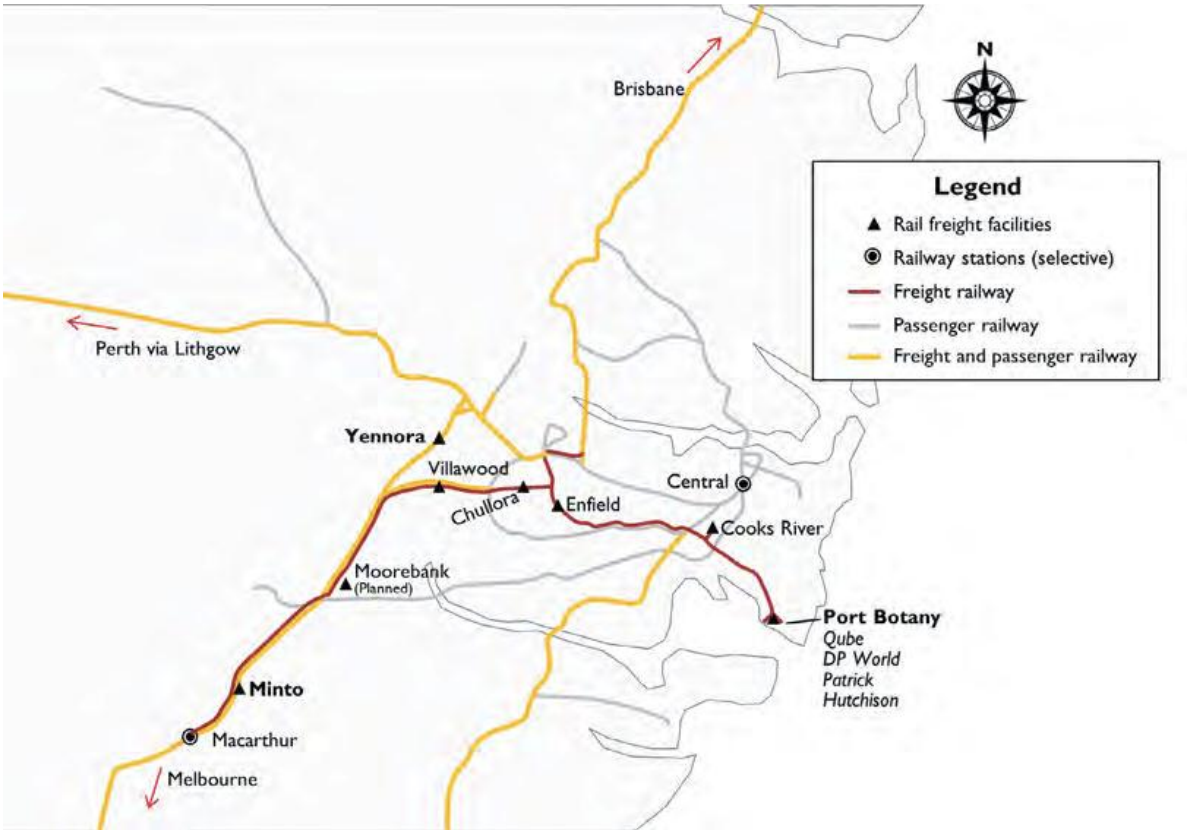

Figure 11-5 Intermodal Terminal Locations, Sydney basin (Waterline 57 Report, Page 59)

It is clear that the need to increase rail traffic into Port Botany requires the reallocation of containers from road to rail and the intermodal terminals are the major initiative being progressed to facilitate that move. However, the inevitable offset will be increases in access costs. The long-haul advantages for rail are highlighted by BITRE but the issues in Botany handling large trains are also noted.

There are numerous impediments to commercial operation of short-haul urban and regional rail at Port Botany. The port/rail interface, shared passenger and freight tracks and extra maritime terminal handling detract from rail's competitiveness. These factors have been extensively considered in earlier public inquiries.

Despite these impediments and detractions, but consistent with railway economics, the regional, containerised rail movements are sustained. These boxed exports are sustained by longer distances from the port (reducing truck utilisation), from low drayage issues and from regular high-volume flows of regional exports.

Source: BITRE Report 139 Feb 2016

The logic in developing intermodal terminals is also highlighted, noting the necessity to supplement road capacity into the Botany precinct despite the poor economics.

The short-haul urban services are notable, however, operating in spite of the maritime rail terminal impediments and detractions and in spite of the apparently-poor railway economics over very short distances.

Qube's Minto port shuttle is an instructive case-study when considering factors that contribute to competitive short-haul rail. Rail becomes more competitive because of poor road freight productivity; access between the Port and south west Sydney is heavily congested. However, the rail service is not simply a default option due to poor road reliability. The Minto terminal operates as an inland port because it is readily accessible to customers—drayage distances are low. The terminal is in an industrial area with easy access for trucks. Furthermore, the transport facilities are co-located with numerous ancillary services and with major shippers—a malt processing plant, a paper manufacturer—both of whom export large volumes of containers— and a customer with an import distribution centre. Demand for transport, therefore, has been sufficient at Minto for a regular rail service to be viable.

Source: BITRE Report 139 Feb 2016

Infrastructure Australia also highlights the need from a capacity and congestion viewpoint rather than an economic/efficiency position.

The problems that have led to the development of the Moorebank Intermodal Terminal option are:

- high growth rates for import and export of containers through Port Botany. Freight volumes through Port Botany have increased by 7% per year for the past five years and are anticipated to increase by 3 to 4% per year for the next 25 years. These growth rates lead to the problems as discussed below;
- insufficient intermodal capacity (both IMEX and interstate) within Sydney – the existing terminals are generally small and poorly located, with limited or no ability to expand;
- general road congestion in and around Port Botany and Sydney Airport and the attendant reduction in road freight productivity. Speeds on these roads in peak times are one fifth to one third of the speed limit in some parts, and congestion and its economic impacts are amongst the worst in Australia. Congestion is a problem throughout the day, rather than just at peak times, with the major road links congested for over half the day. There is also congestion on associated arterial and minor roads.
- road freight congestion impacts in and around Port Botany. For example, the M5 East carries more than 8000 trucks per day, and truck traffic at Port Botany is estimated to increase by 400% by 2029/30 if the current rail mode share is not increased. The major road system around Port Botany is under heavy strain, although only a part of this reflects road freight. Heavy vehicle traffic can have significant congestion impacts on minor roads and also an over-proportionate impact on major roads because of heavy vehicle acceleration limitations
- a declining share of freight volumes transported via rail from Port Botany – which is exacerbating the above problems,
- an increasing share of Sydney's industrial activity occurring in west and south-west Sydney, which is outside the areas best served by the existing smaller intermodal freight terminals.

Source: Infrastructure Australia 2014-2015 Assessment

The need to manage a transfer of container movements to and from the port from road to rail is clearly evident and yet the performance over the past 10-15 years has not increased the rail volumes at all and the rail share has been diminishing despite considerable enquiries, reviews and planning.

This study highlights the commercial competitiveness and ability of an alternative supply chain servicing container capacity at the Port of Newcastle.

11.7 Infrastructure Supporting Port Kembla Container Terminal

11.7.1 Rail Capacity Expansion Projects

Maldon to Dombarton Rail Line

Currently freight paths for rail bound for Port Kembla and on to export markets via the Illawarra line is restricted and reserved for coal trains. General freight paths are available via the Main South and the Moss Vale to Unanderra Line however this route is longer, slower and load restricted.

The connection between Maldon and Dombarton would provide a quicker and higher capacity link for train services from the Central West to Port Kembla. Services would still be required to transit through the Sydney Metropolitan Network, however, the increased path availability, increased capacity (train length and training tonnes), and reduced journey time would result in a reduced freight cost for commodities bound for export from the Central West, but at increased capital cost and therefore access charges.

Source: Roads and Maritime Services

Figure 11-6 Maldon to Dombarton Rail Alignment

The proposed Maldon to Dombarton Railway is a 35-kilometre single track dedicated rail freight line between the Main South Line at Maldon (in the Southern Highlands) and Dombarton (near Port Kembla). Construction on the line started in 1983 but was halted due to an economic downturn. If completed, the Maldon to Dombarton Railway could provide additional rail freight capacity in and out of Port Kembla and the Illawarra, helping cater for the growth forecast in the NSW freight task over the next 20 years. The 2013 NSW Freight and Ports Strategy estimated the cost to complete the line at $667 million.

11.8 Newcastle Competitive Advantage

The reallocation of any of the long-haul rail from Botany to Newcastle will remove that part of the rail transport which provides a significant proportion of rail throughput in Botany and which is clearly more competitive than the alternative road transport.

The NSW Freight and Ports Strategy reinforces the competitive advantage of rail in the movement of containers from regional areas.

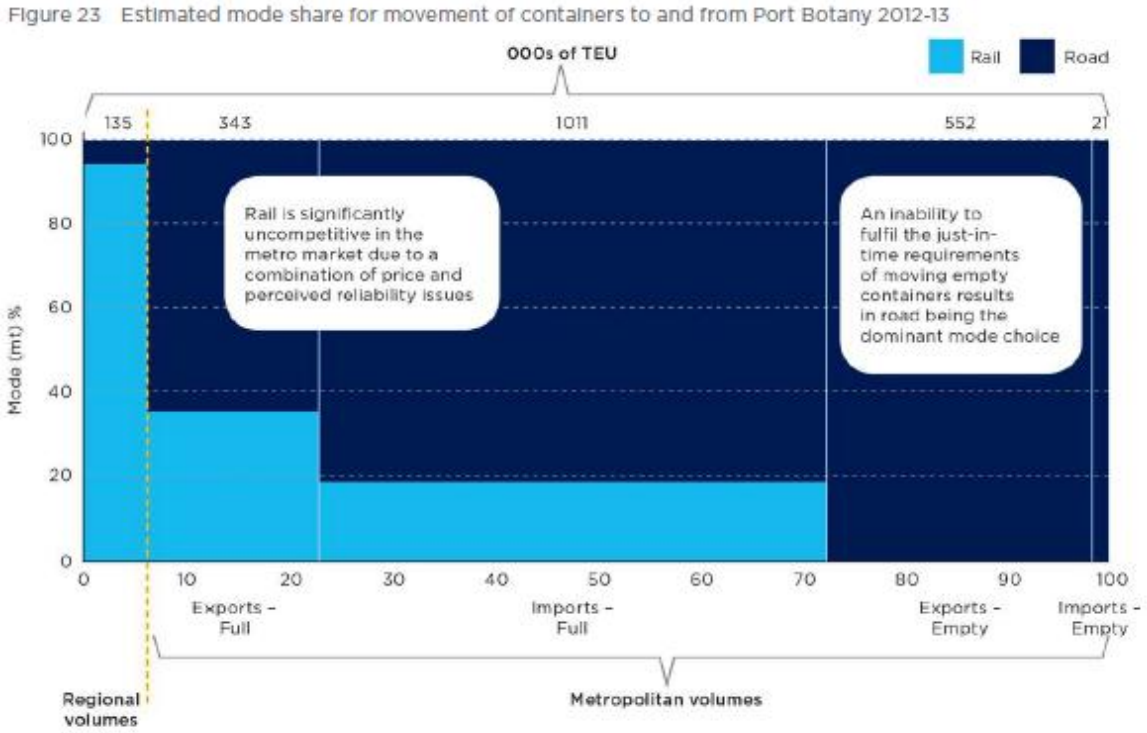

Figure 11-7 Mode Share Issues – NSW Freight and Ports Strategy

Plans to provide additional intermodal facilities in the Sydney basin will support additional short haul rail activities but there appear to be no plans to enhance the port area rail activity other than the duplication of the line from Botany to Enfield. The provision of this duplication will, in our opinion, do little to improve rail performance as there are adequate rail paths to service the throughput and the major issue is the limited rail nesting area and shunting capability at Botany. The duplication will enable some limited mainline queuing and possible resequencing if bidirectional signalling and operations are included.

The Hunter Valley rail network has the paths available and the management regime to satisfactorily service rail hauled containers into the port environs. The design of the terminal will need to incorporate adequate train handling capabilities but given the 80ha land available with rail availability there are no major impediments to this occurring. The infrastructure requirements to handle volumes in excess of 100,000 TEU are therefore limited to the port terminal and its immediate environs and will involve cost significantly less than the Botany line duplication.

It is also noted that the Main North Line is operating close to capacity and will require investment to support the growth into Port Botany for exports from the regional areas. Conversely, if these exports are railed to Newcastle, the demand for export train services on the Short North will be removed.

Figure 10 Key rail freight corridors showing estimated annual volume and capacity for container movement to and from Port Botany

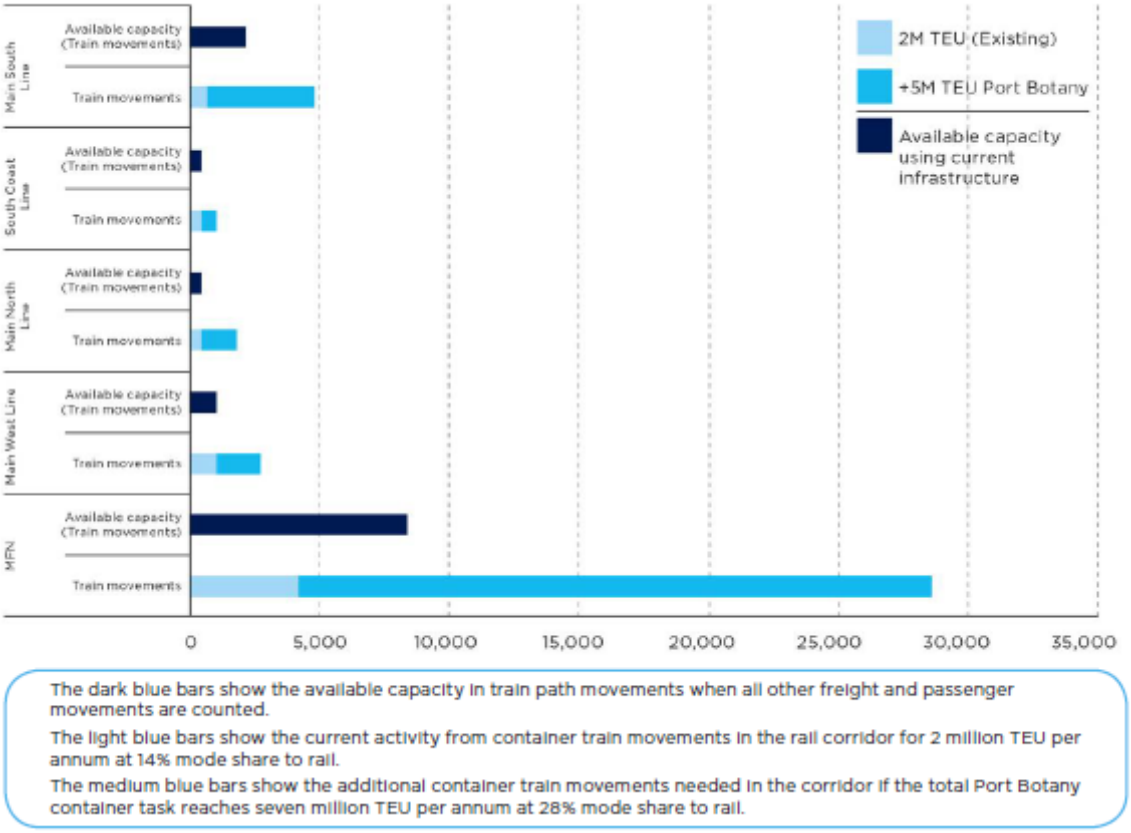

Figure 11-8 Estimated Volume and Capacity – NSW Freight and Ports Strategy

11.9 Strategic Alignment

The proposed Container Terminal at the Port of Newcastle aligns with a number of Transport for NSW (TfNSW) Strategic Action Programs as outlined in the NSW Freight and Ports Strategy and which are discussed in more detail below:

TfNSW Strategic Actions	Demonstration of Benefit
Strategic Action Program 1: Network Efficiency **ACTION 1B:** Shift more freight movements to off-peak periods	Intermodal train services could operate into the Port of Newcastle during out of Peak Periods relieving congestion within Metropolitan Sydney and taking truck movements off roads in Peak times.
ACTION 1D: Improve productivity of the road freight network	Higher productivity road vehicles (25mB Doubles) could operate from regional areas into the Port of Newcastle container terminal via Industrial Drive and RMS road network. This again relieves congestion on the Sydney Metropolitan Network for freight that would otherwise be transported to Port Botany.
ACTION 1E: Improve productivity of the rail freight network	More efficient use of rail network (Main lines) to Mayfield Terminal taking trucks off road and onto rail.
ACTION 1H: Improve efficiency of landside cargo transport in regional and urban areas	Port of Newcastle container terminal allows the opportunity to develop an efficient landside multi modal hub in an appropriate location.
Strategic Action Program 2: Network Capacity **ACTION 2D:** Develop effective port growth plans to meet freight volume growth (Develop a Port of Newcastle growth plan) **ACTION 2E:** Foster intermodal terminal network development (Support the operation of regional intermodal terminals)	Developing a growth plan for the Port of Newcastle is a specific task in the TfNSW Strategy. A container facility would align with a longer-term growth plan for the Port of Newcastle to manage increased container movements. Port of Newcastle container facility meets Actions 2D and 2E
Strategic Action Program 3 – Network Sustainability **ACTION 3B:** Manage congestion, noise and emission impacts of freight transport Recognise costs of congestion Mitigate noise from freight operations Mitigate emissions from freight operations **ACTION 3C:** Prioritise safety of freight transport	The Port of Newcastle container facility would address all 3 of the sub objectives under 3B by providing an efficient terminal in an existing industrial precinct, screened from built up inner city areas. The facility would reduce train movement through metropolitan Sydney for freight originating in the west and north west of the State. This reduction would in turn partially alleviate issues associated with congestion in inner city areas such as noise and emissions.

Table 11-1 Strategic Alignment to NSW Freight and Ports Strategy