How can we meet increasing demand for ports in the Upper North Island?

A report for the Upper North Island Strategic Alliance

November 2012

A technical study of the supply and demand for ports and port-related infrastructure in the Upper North Island

27 November 2012

pwc

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27 November 2012

Upper North Island port and port-related infrastructure supply and demand study

Dear Harvey,

We are pleased to provide our final report on the supply and demand of port and port-related infrastructure in the Upper North Island. Our key findings are detailed in the executive summary of the report.

This report is provided in accordance with the terms of our Contract for Professional Services, reference ACPN_8320, and is subject to the restrictions set out in Appendix D of this report.

Yours sincerely

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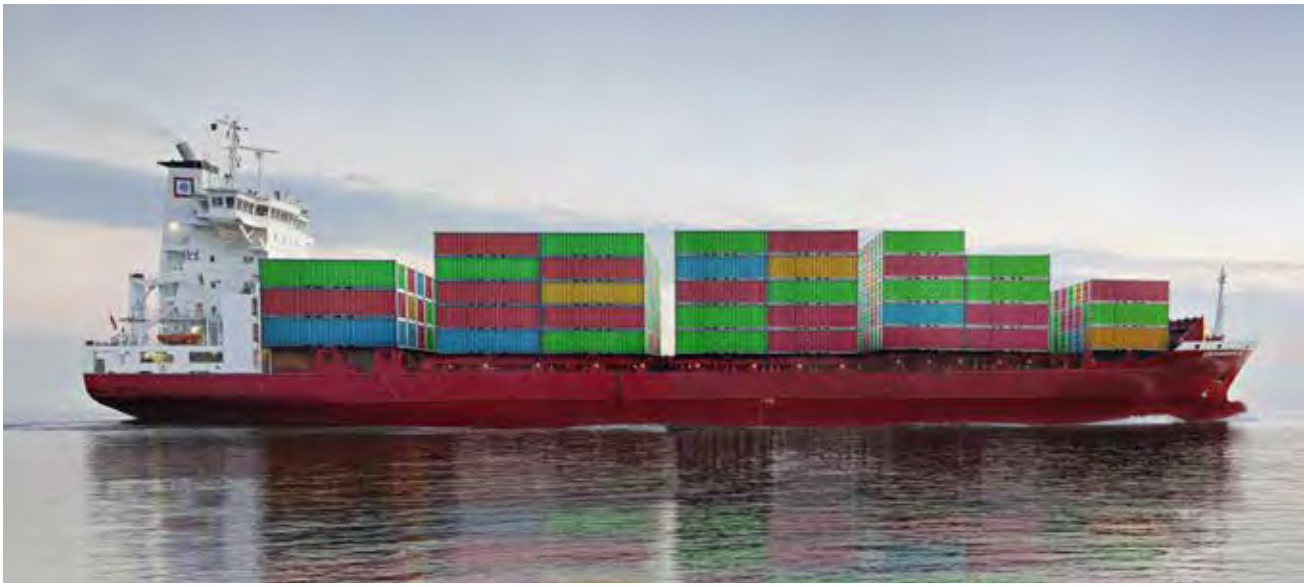
Glossary

Term	Definition
Categories of cargo movement	
Merchandise trade	Trade that moves between regions in physical form, including manufactured goods and products of agricultural and extractive industries.
Throughput	The total amount of cargo that is loaded or discharged at a port. Includes both outside-port cargo and port exchanges.
Outside-port cargo	Cargo moves into the port from sea and out by land, or vice versa. Includes imports, exports, and domestic coastal cargo.
Port exchanges	Cargo that both enters and exits the port by sea. Includes import and export transhipment and international transhipment cargo.
Imports	Cargo that enters a New Zealand port from another country.
Exports	Cargo that leaves a New Zealand port bound for another country.
Domestic coastal	Cargo that leaves a New Zealand port bound for another New Zealand port, or vice versa.
Import transhipment	Cargo that enters a New Zealand port from another country and is loaded on another ship to its final destination in New Zealand without leaving the port gate.
Export transhipment	Cargo that moves from one New Zealand port to another and is loaded on a ship bound for another country without leaving the port gate.
International transhipment	Cargo that enters a New Zealand port from another country and is loaded on another ship bound for a final destination in another country without leaving the port gate. Also called 're-exports'.
Shipping market terms	
Container cargo	Any merchandise that is loaded into and shipped in an intermodal shipping container.
Bulk cargo	Strictly speaking, bulk cargo is cargo that is transported unpackaged in large quantities. It refers to material in either liquid or granular form such as petroleum, grains, or coal typically dropped or poured directly into a bulk ship's hold. Smaller quantities can be boxed (or drummed) and palletised. Bulk cargo is classified as liquid or dry. In this report, we use the term 'bulk cargo' loosely to describe any merchandise that is not moved by container. As we have used it, the term includes a range of cargoes, including bulk liquids (eg crude oil), unprocessed logs, and cars.
Breakbulk cargo	Strictly speaking, breakbulk (or general) cargo covers the variety of goods that must be loaded individually, and not in containers nor in bulk as with oil or grain. In this report, we refer to it as 'Bulk cargo' more generally.
Upper North Island Ports	For the purposes of this study, the UNI ports are defined as: Ports of Auckland (POA), Port of Tauranga (POT), Northport, and the docks near Whangarei at Refining NZ's refinery and Portland cement plant.
Post-Panamax ships	Ships that are too large to navigate the locks in the Panama Canal. Currently, Panamax container ships have a capacity of 5,000 TEU. After an expansion programme is completed in 2014, the Canal will be able to handle 12,000 TEU container ships.

Term	*Definition*
Intermodal container	A standardised shipping container that can be moved between different freight modes (sea freight, road, rail) without having to unload and re-load its contents.
TEU	A standard measure of intermodal container cargo volume that allows for conversion between containers of different sizes. Stands for 'Twenty-foot Equivalent Unit'.
Inland port	A cargo consolidation and distribution facility located inland of a port and generally linked to it via a rail line. Examples in New Zealand include Metroport and Wiri Inland Port in Auckland.

Categories of infrastructure	
Port infrastructure	The capital assets of a port, including the port access channels, berthage, and storage facilities.
Land transport infrastructure	The distribution networks that move cargo between the port and its final origins or destinations inland of the port.
Port access	The depth of a port's channel and berths.
Berthage	The number, length, and configuration of a port's container and bulk berth spaces.
Storage	The container and bulk storage capacity of a port, including the total area of storage yards and the technology used to store and move cargo.
Distribution network	The land transport infrastructure, and associated inland ports and distribution facilities, that service a port. Includes both road and rail networks but not coastal shipping.



Executive summary

Executive summary

Introduction

This report was commissioned by the Upper North Island Strategic Alliance (UNISA) to determine trends in demand for merchandise trade through the Upper North Island (UNI) ports, the capacity of key port and port related infrastructure to manage this demand, and to form a view of potential infrastructure investment requirements.

This report examines future freight demand and infrastructure supply at the Ports of Auckland, Port of Tauranga, and Whangarei seaports[1] over a study period of 30 years. It includes projections of future freight to 2041 based on analysis of trade patterns and port throughput over the last ten years, supplemented by: qualitative information from industry participants; high level forecasts of economic growth in the UNI, New Zealand and amongst key trading partners; expected demographic changes; and physical constraints in respect of agricultural production in New Zealand.

Our primary historical data source is Customs/Statistics New Zealand data on export and import weights and volumes, by product, by port and by origin-destination between 2002 and 2012. We have also relied heavily on data compiled by the ports, particularly with respect to domestic coastal shipping, domestic and international transhipping – none of which are discernible from the Customs/Statistics New Zealand data.

In making our projections we have separately considered two components of total throughput: 'port exchanges' and 'outside-port' volume. Port exchanges include domestic and international transhipping, which involves the unloading and loading of ships at the port, but where products do not leave (or enter from outside) the port gates. Outside-port volume involves inward or outward movement of goods, which leave or arrive from outside of the port gates. Importantly, outside-port volume has an impact on both land transport and port infrastructure, while port exchanges impact port infrastructure only.

Our projections cover the next

30 years

1. The Whangarei ports are: Northport, the New Zealand Refining Company's Marsden Point wharf, and Golden Bay Cement's Portland wharf. Airports have not been included in the study, as they service a low volume of high-value or time-sensitive cargo that would not otherwise move through the ports.

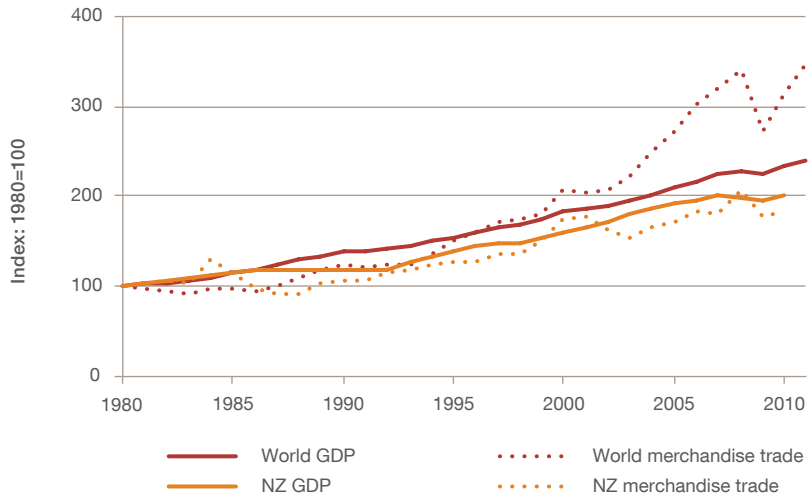
Context

World trade has grown markedly over the last 30 years as the impact of globalisation has re-shaped the way the world has structured itself economically. This is a consequence of a number of underlying drivers including:

- the removal of trade barriers
- relatively stable political environments the mobility of capital
- the emergence of China and other emerging nations as sources of cheap labour (and the subsequent shift of lower skilled manufacturing into these countries
- technological advances in shipping, including containerisation, which have significantly reduced the costs of trade.

Overseas trade plays a critical role in the New Zealand economy. As a small, remote nation with limited domestic markets and significant agricultural capacity, trade underpins our economy. It opens up overseas consumers and supply chains for New Zealand businesses. This enables us to specialise in agricultural products, which serve as the backbone of our exports and provide the income to purchase the manufactured and consumer products we import. It also enables New Zealand businesses to specialise in innovation-intensive market niches in the global economy.

NZ and world growth in GDP, merchandise trade value, 1980-2011



Source: World Bank

In terms of economic growth, exports are fundamental to our future prosperity, and export growth has been identified as a key priority both at a national and local government level (see the UNI local governments' economic development strategies and the government's Business Growth Agenda).

To support these aspirations, ensuring the country has a robust transport and distribution network is key, and the country's port and port related infrastructure represents an important component of this supply chain. The UNI will continue to play an important role in all of these aspects, as it accounts for a large and growing share of New Zealand's overall GDP, population and international merchandise trade.

At the same time, there is a perception of growing pressure on these infrastructure assets, particularly in Auckland, where concerns have been raised in relation to increasing competition with other users on the road and rail networks. In addition, there are growing questions about the appropriateness of having a port in central Auckland, and whether this is the best use of downtown waterfront land given the city's aspiration to be the world's most liveable and the fact that most of Auckland's manufacturing and distribution facilities are in south Auckland.

This report seeks to develop a better understanding of the demand for ports and port related infrastructure in the UNI over the next 30 years. It also investigates the constraints on the ability of this infrastructure to cope with projected demand, and the kind of infrastructure investments likely to be required to meet growth.

Recent trade growth

Over the last decade the UNI has experienced strong growth in both imports and exports, and even faster growth (at least since 2007) in port exchanges.

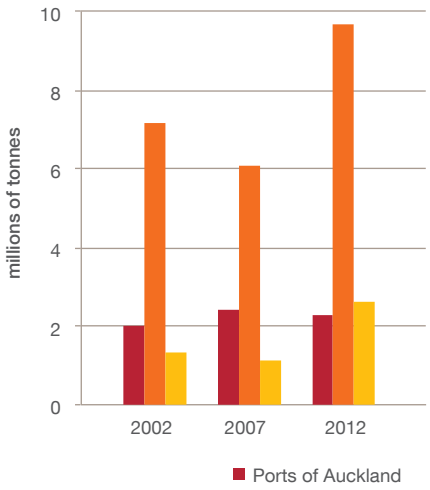
Growth in trade

Over the last decade, the weight of UNI exports grew at an average rate of 3.4% per annum, increasing from 10.5m tonnes to 14.6m tonnes. About half of this growth was in log exports which grew by 2.1m tonnes. Over the same period, UNI imports grew at an average rate of 2.8% per annum, increasing from 10.0m tonnes to 13.2m tonnes. Import growth was dominated by 2.1m tonnes of growth in mineral fuels and 1.0m tonnes of growth in animal feed & pet food (ie palm kernels for cow feed).

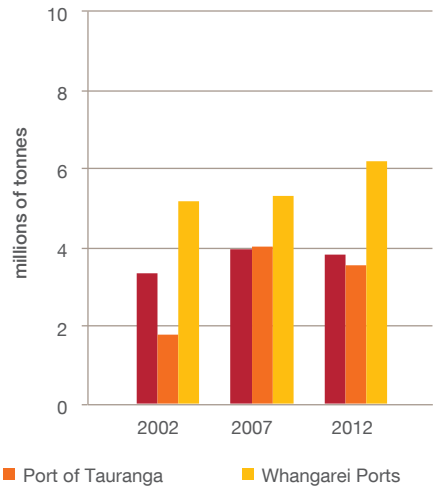
The role of the three ports varies. Ports of Auckland (POA) handles a relatively more diverse range of exports compared with the Port of Tauranga (POT) and Northport, which are more focussed on bulk agricultural products. Dairy products account for the largest portion of exports through Auckland - 21% of total exports, or 473,000 tonnes, in 2012 - followed by wood, iron and steel, and beverages. There are also significant exports of a variety of other commodities.

Exports from Tauranga and Northport are dominated by a few major commodities. Nearly 90% of export weights through Northport (2.26 million tonnes) are of wood products, along with 56% of exports through Tauranga (5.43 million tonnes). Dairy plays a far smaller role in Tauranga, while Northport also exports significant quantities of fuels.

Export weights



Import weights



Ports of Auckland Port of Tauranga Whangarei Ports

Source: Statistics NZ, PwC analysis

Comparing our measures of port task with government and council objectives

Central government and councils have set strategies for driving economic development through export growth (see eg the Government's Business Growth Agenda and the Auckland Plan).

1. our analysis is based on weight not value
2. we exclude all exports through airports, which accounted for 17% of export value in 2012
3. we consider merchandise trade only and exclude service exports, which accounted for 21% of exports in 2011 according to World Bank statistics
4. the relationship between trade weights and trade values may change over time, as trade in high-value/low-weight products grows.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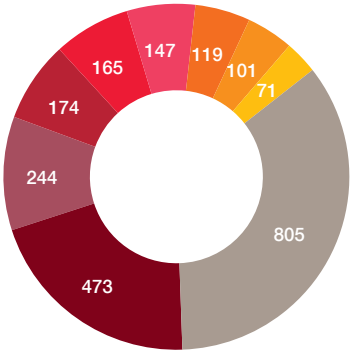
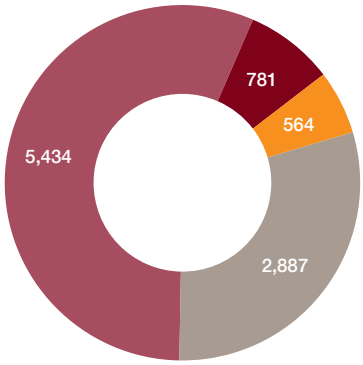
BP-DH-11

The Upper North Island ports have varied export profiles

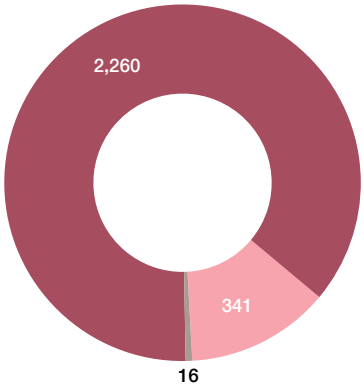
Ports of Auckland Exports, 000 tonnes, (2012)



Port of Tauranga Exports, 000 tonnes, (2012)



Whangarei Ports Exports, 000 tonnes, (2012)



- Other products
- Dairy products
- Wood and articles of wood
- Iron and steel
- Beverages, spirits and vinegar
- Mineral fuels and oils
- Salt, lime, stones, cement
- Meat and edible meat offal
- Pulp of wood
- Fruit and nuts

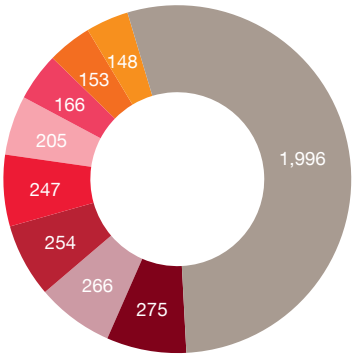
Source: Statistics NZ, PwC analysis

Similarly, POA handles a far wider range of imported products than the other ports. The eight most important import products, in terms of weight, account for just 46% of Auckland's total imports (1.72 million tonnes). In Tauranga, on the other hand, animal feed and pet food alone account for one-quarter of import weights (838,000 tonnes), followed by salt and building materials, fuels, fertilisers, and cereals, collectively weighing 1.55 million tonnes.

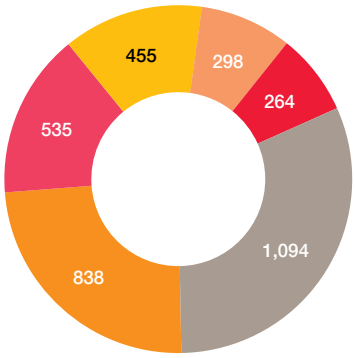
In Whangarei, mineral fuel (crude oil) imports to the Marsden Point refinery account for nearly all imports. Marsden Point, which is distinct from Northport, handles 5.87 million tonnes of fuel imports, which account for 44% of all import weights through the UNI ports. Building materials such as gypsum, which are mostly imported directly to the Golden Bay cement factory at Portland, account for much of the remainder of Whangarei's imports.

Tauranga and Auckland have more varied import profiles

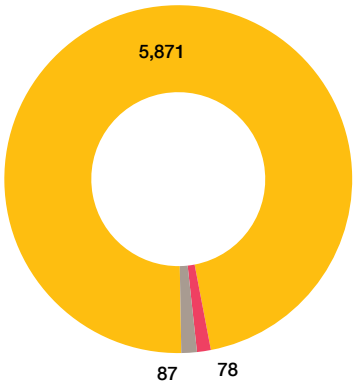
Ports of Auckland Imports, 000 tonnes, (2012)



Port of Tauranga Imports, 000 tonnes, (2012)



Whangarei Ports Imports, 000 tonnes, (2012)



- Other products
- Paper, paper pulp and paperboard
- Sugars and sugar confectionery
- Vehicles (excl railway or tramway)
- Plastics and articles thereof
- Cereals
- Salt, lime, stones, cement
- Iron and steel
- Fertilizers
- Animal feed & pet food
- Mineral fuels and oils

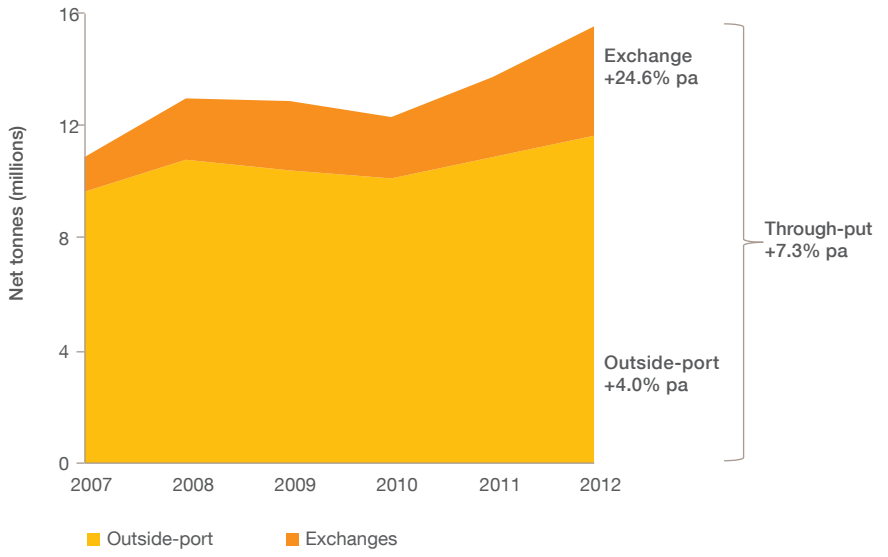
Source: Statistics NZ, PwC analysis

Growth in transhipping

Growth in total throughput at POA and POT has been significantly faster than growth in outside-port volumes, and this has been driven by dramatic increases in port exchange activity (international and domestic transhipping). This probably reflects the growing trend toward port hubbing, and the use of larger ships to extract economies of scale. While New Zealand still has a relatively large number of container ports for its size, regional ports such as Timaru and Wellington are losing traffic to their larger competitors. This trend is evident in both the data on average number of port calls and on import and export transhipment.

While transhipments are still small compared with overall international trade, New Zealand's ports appear to be moving towards a hub and spoke model. If this trend continues as expected, it is likely to reduce the role of regional ports (particularly for container trade) and concentrate overseas trade through a few major ports. The deployment of larger container ships on NZ shipping lines will accelerate this trend as only a few ports will have the trade volumes needed to justify the required investment required to host these ships.

2007-2012 Growth in UNI container volumes



Source: POAL, PoT data

Exogenous influences on infrastructure demand

Aside from growth in trade, demand for infrastructure at ports is being shaped by other influences.

The impact of larger ships

There is an international trend towards larger container ships due to the cost efficiencies they offer. Post-Panamax[2] container ships with a capacity of 8,000 TEUs or more are the fastest-growing category in shipping fleets. By comparison, the largest ships currently serving the New Zealand market can carry 4,100 TEU.

Increases to maximum ship size on major sea routes appear to be having a 'cascade effect' on other routes. Larger ships will be deployed on routes where there is sufficient container demand. However, smaller ships will continue to serve other routes at a higher cost.

There is a clear consensus that New Zealand will need infrastructure capacity to manage up to 6,000 TEU ships in the short to medium term, and perhaps up to 8,000 TEU ships in the medium to longer term. In the process, 3 or 4 hub ports will emerge, with regional ports acting as feeders. However, there is less of a consensus on the timing of these changes, which will be affected by growth in demand for overseas trade, developments in the shipping market, and infrastructure decisions made in New Zealand.

There is also a trend toward larger non-container ships. As with container ships, shipping lines will choose bulk cargo ships that best suit the products and ports that they serve. This trend is less likely to have a material impact on ports than the trend towards larger container ships. Unlike for containerised cargo, larger bulk ships will not lead to an increase in transhipment cargo due to the amount of time needed to load and unload bulk cargoes.

In terms of the UNI container ports, POT is actively preparing to host larger ships. They have recently been granted resource consent for further harbour dredging, which would ultimately provide capacity for ships up to about 8,000 TEU (though they are planning to develop this capacity in two stages).

POA's strategy is to manage larger ships more progressively. They are planning some minor additional dredging, and planning to manage larger ships through tidal windows. POA also note that the draught of ships coming into Auckland tends to be less, due to the lighter imported products they carry.

It is unlikely that this trend will result in a large share of New Zealand's international trade being 'hubbed' through Australian ports. Australian ports also lack the capacity to handle larger ships at present, although Brisbane and Sydney are addressing this shortfall. In addition, container volumes and cargo handling infrastructure at Australian ports are not significantly larger than those in the UNI region. Consequently, UNI trade could not be routed through Australian ports without considerable investment by those ports.

We discuss the impact of larger ships further into this report in the context of the ports' existing and planned infrastructure.

2. Post-Panamax describes the range of ships larger than the capacity of the Panama canal.

Domestic freight costs

Land transport freight costs are a significant component of total freight costs in New Zealand. This has implications for the economics of port configuration options, which rely on considerable land transport legs.

The cost to ship a container to or from Singapore, via Auckland, for various New Zealand cities is estimated below.

For example, a company exporting a container from Napier to Singapore via Auckland would spend:

- $1,520 on shipping line costs
- $407 on fixed costs at POA (including container loading, customs duties, etc)
- $1,529 on road freight from Napier to Auckland, $1,090 on rail freight plus an estimated $210 for container cartage to the rail depot, or $1,054 on coastal freight.[3]

In other words, depending upon the domestic freight mode chosen, between 35% and 44% of the total cost of shipping from Napier would be spent on domestic transport alone. Estimates for other New Zealand cities suggest that domestic freight costs will increase considerably as the distance to the port of export/import grows.

Supply chain analysis - total cost of shipping one TEU on the Singapore-Auckland route

		Importing			Exporting		
International freight costs							
Shipping line costs		$1,373			$1,520		
Port, customs, and biosecurity costs		$456			$407		
Domestic freight costs							
Origin/destination		**Road**	**Rail**	**Coastal**	**Road**	**Rail**	**Coastal**
	Whangarei	$581	$602	NA	$581	$602	NA
	Auckland	$210			$210		
	Hamilton	$463	$400	NA	$463	$400	NA
	Mt Maunganui	$746	$602	$699	$746	$602	$669
	New Plymouth	$1,319	$1,151	$1,376	$1,319	$907	$1,260
	Palmerston North	$1,889	$1,272	NA	$1,889	$1,144	NA
	Napier	$1,529	$1,334	$1,139	$1,529	$1,090	$1,054
	Wellington	$2,363	$1,394	$1,469	$2,363	$1,278	$1,341
	Blenheim	$2,815	$1,413	$1,598	$2,815	$1,685	$1,454
	Christchurch	$3,954	$1,618	$1,703	$3,954	$1,820	$1,515
	Dunedin	$5,252	$1,887	$1,981	$5,252	$2,089	$1,789
Container cartage			**$210**			**$210**	

Source: Productivity Commission, Ministry of Transport, PwC calculations

3. Domestic freight costs are estimates based on data compiled by the Ministry of Transport for road and coastal freight, and KiwiRail's stated prices for 'walk-up' customers. We would expect a shipper with significant volumes or a consolidated customer such as an inland port to be able to negotiate significantly lower costs, especially for rail.

Developing Northport as a container terminal is likely to be uneconomic due to the additional cost of shipping containers from Whangarei to other UNI locations. Auckland and Tauranga are located much closer to main population centres and export-producing regions, meaning that any additional costs for importers-exporters at the port (eg higher charges to compensate for higher land prices) is offset by lower domestic freight costs. Road and rail costs may fall significantly as a result of investment in infrastructure upgrades. However, their magnitude compared with port and sea freight costs means that significant efficiencies and cost reductions would be needed across the board before a container port at Whangarei would make economic sense.

Inland ports

Inland ports are intended to exploit the cost advantages of cargo handling at an inland location. They can potentially serve two purposes. First, they can reduce dwell times at the port by allowing customs clearance (etc) for containers to be completed at an inland location. This can reduce the total cost of port operations if the difference between land prices at the port and inland locations is large enough to offset any double handling.

Second, inland ports can lower costs for importers and exporters by exploiting the cost efficiencies available when moving large volumes of containers by rail. They allow importers and exporters to avoid the costs of road freight (and, in particular, congestion in Auckland's road network) by consolidating freight at a closer location and moving it by rail to a port.

From an infrastructure perspective, the key impact of inland ports is likely to be changes in the distribution pattern of the trade task, in terms of modal shifts (from road to rail) and/or changes to the port of destination or origin. Of these, only changes in the port of destination or origin will have an impact on the projected task for each port. We do not expect inland ports to alter the projected trade task for the UNI as a whole.

Inland ports are likely to reinforce competition between POT and POA. Metroport, an inland port established by POT in Auckland, has enabled POT to actively compete in the Auckland market due to its proximity to manufacturers and distribution centres in south Auckland. We expect that the proposal for an inland port at Ruakura near Hamilton would reinforce this trend.

Inland ports are primarily a commercial proposition and should be evaluated as such. However, they do have some public policy implications for land-use and infrastructure planning. If inland ports provide a commercially viable proposition to shippers – ie if they reduce supply chain costs by consolidating sufficient volumes of freight and moving it to and from a seaport by rail – they may have an impact on land uses in the surrounding area. For example, they may strengthen incentives for production or distribution facilities to locate close to the inland port.

The effects may not necessarily be immediate. The experiences of Metroport and Wiri Inland Port suggest that inland ports will be slow to reach capacity – Metroport reached 55% utilisation in 2011, more than a decade after opening, while Wiri continues to struggle to achieve significant volume. Growth at Wiri has been limited as the convenience, speed and cost of road transport has proven superior to potential cost efficiencies from rail. Consequently, it is likely that their effects on land use and distribution network capacity will occur only in the medium term or beyond. This should be taken into account when assessing future inland port developments.

Key success factors for inland ports

Inland ports succeed or fail as commercial propositions. A 2012 report to the Waikato Regional Council lays out some factors affecting inland ports' effectiveness:

1. size of catchment area
2. location within a freight precinct or industrial centre
3. reliable road and rail access links
4. ability to operate 24/7
5. efficient design to maximise reliability of vehicle and container movements
6. appropriate types of container handling equipment
7. on-site Customs and Biosecurity services
8. storage and repositioning of empty containers

Source: Draft Aurecon report (2012)

Projections of future freight through the Upper North Island ports

We have constructed long-term projections of future freight through the UNI ports. They include high and low scenarios that provide a range of potential outcomes. Our projections to 2041 indicate significant growth in both trade and throughput.

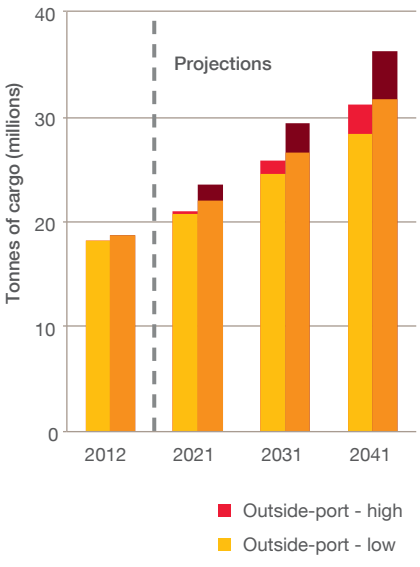
Throughput is expected to grow faster on the back of increased transhipment and domestic coastal freight. Key projections include:

- Throughput growth of 1.7%-2.3% pa, to 22m-32m tonnes, consisting of:
  - Outward growth of 1.8%-2.3%
  - Inward growth of 1.6%-2.3%.
- Outside-port volume growth of 1.4%-1.8% pa, or an additional 17m-22m tonnes, consisting of:
  - Exports of 28m-31m tonnes in 2041, reflecting growth of 1.6%-1.9% per annum
  - Imports of 21m-24m tonnes in 2041, reflecting growth of 1.2%-1.7% per annum.

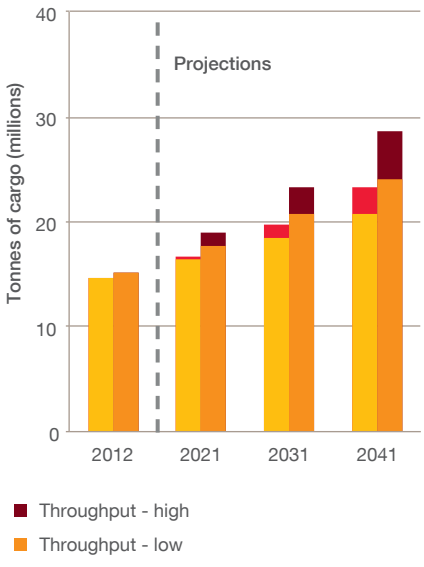
Overseas merchandise trade is the main component of the UNI port task, and hence the most significant driver of change. We expect growth in this area to be driven by, and in some cases constrained by, patterns of production, consumption, and overseas demand.

These include dairy and log production capacity in the UNI, regional population growth and future demand for petroleum products, and rapid growth in emerging Asian economies.

UNI outward cargo movements: outside-port and throughput



UNI inward cargo movements: outside-port and throughput



Source: Statistics NZ, PwC analysis

Overseas merchandise trade is the main component of the UNI port task, and hence the most significant driver of change.

Projections by port, and between container and bulk cargoes

Our main projections of the future port task have been made for the UNI region as a whole. However, we recognise breaking down these projections to individual ports is important in the context of understanding the constraints faced by these ports.

- At POA, container throughput is expected to grow by between 2.3% and 3.2% per annum over the period, while bulk throughput is projected to grow at between 1.9% and 2.2% per annum.
- At POT, container throughput is expected to grow by between 2.5% and 3.1% per annum over the period. Bulk throughput will also grow, but at a slower projected rate of between 1.7% and 2.3%.
- Growth at Northport and Marsden Point is expected to be slow relative to the other UNI ports. This is because the faster growing transhipping element is not expected to be a feature for the Whangarei ports due to the dominance of bulk cargo. Furthermore, growth in Northport's main cargo, unprocessed logs, is expected to be flat after 2020 due to the fact that log availability is projected to level off. Northport may be able to grow more rapidly if it is able to attract other types of cargo.

The table below summarises our projections to 2041, for each port by cargo and throughput type.

2012-2041 growth projections by port and type of cargo

Categories		Northport	Whangarei ports	POA	POT	Total UNI
Outside-port growth:						
Container	Per annum	-	-	2.0% to 2.5%	1.7% to 2.0%	1.8% to 2.2%
	Total	-	-	77% to 105%	62% to 76%	68% to 89%
Bulk	Per annum	1.0% to 1.0%	0.7% to 0.8%	1.7% to 1.9%	1.7% to 2.3%	1.7% to 2.2%
	Total	33% to 33%	22% to 26%	61% to 74%	62% to 91%	62% to 88%
Total	Per annum	1.0% to 1.0%	0.7% to 0.8%	1.9% to 2.4%	1.7% to 2.1%	1.4% to 1.8%
	Total	33% to 33%	22% to 26%	73% to 98%	62% to 84%	50% to 67%
Exchange growth						
Container (2021-2041)	Per annum	-	-	3.3% to 3.3%	5.0% to 5.1%	4.2% to 4.2%
	Total	-	-	90% to 91%	167% to 171%	126% to 128%
Bulk (2021-2041)	Per annum	-	-	6.2%	6.3%	6.3%
	Total	-	-	236%	240%	237%
Total (2021-2041)	Per annum	-	-	3.4% to 3.4%	5.1% to 5.1%	4.2% to 4.3%
	Total	-	-	94% to 95%	168% to 172%	128% to 131%
Total throughput growth						
Container	Per annum	-	-	2.3% to 3.2%	2.5% to 3.1%	2.4% to 3.2%
	Total	-	-	95% to 151%	104% to 146%	100% to 148%
Bulk	Per annum	1.0% to 1.0%	0.7% to 0.8%	1.9% to 2.2%	1.7% to 2.3%	1.7% to 2.3%
	Total	33% to 33%	29% to 33%	71% to 88%	62% to 92%	64% to 92%
Total	Per annum	1.0% to 1.0%	0.7% to 0.8%	2.2% to 3.0%	2.1% to 2.7%	1.7% to 2.3%
	Total	33% to 33%	29% to 33%	90% to 138%	82% to 117%	64% to 91%

Source: PwC analysis

In developing these estimates we have assumed that each port's share of overall UNI growth within each category of cargo movement will be similar to their historical shares, and that the share of cargo weight moving in containers will remain constant at 2012 levels.

With the obvious exception of heavy bulk cargoes such as logs and petroleum products, POA and POT compete for much of the freight task of the Upper North Island. This is especially true for (dry) containerised cargo. Although land transport costs will factor into importers' and exporters' decisions about which port to use, the two container ports are close substitutes for container cargo.

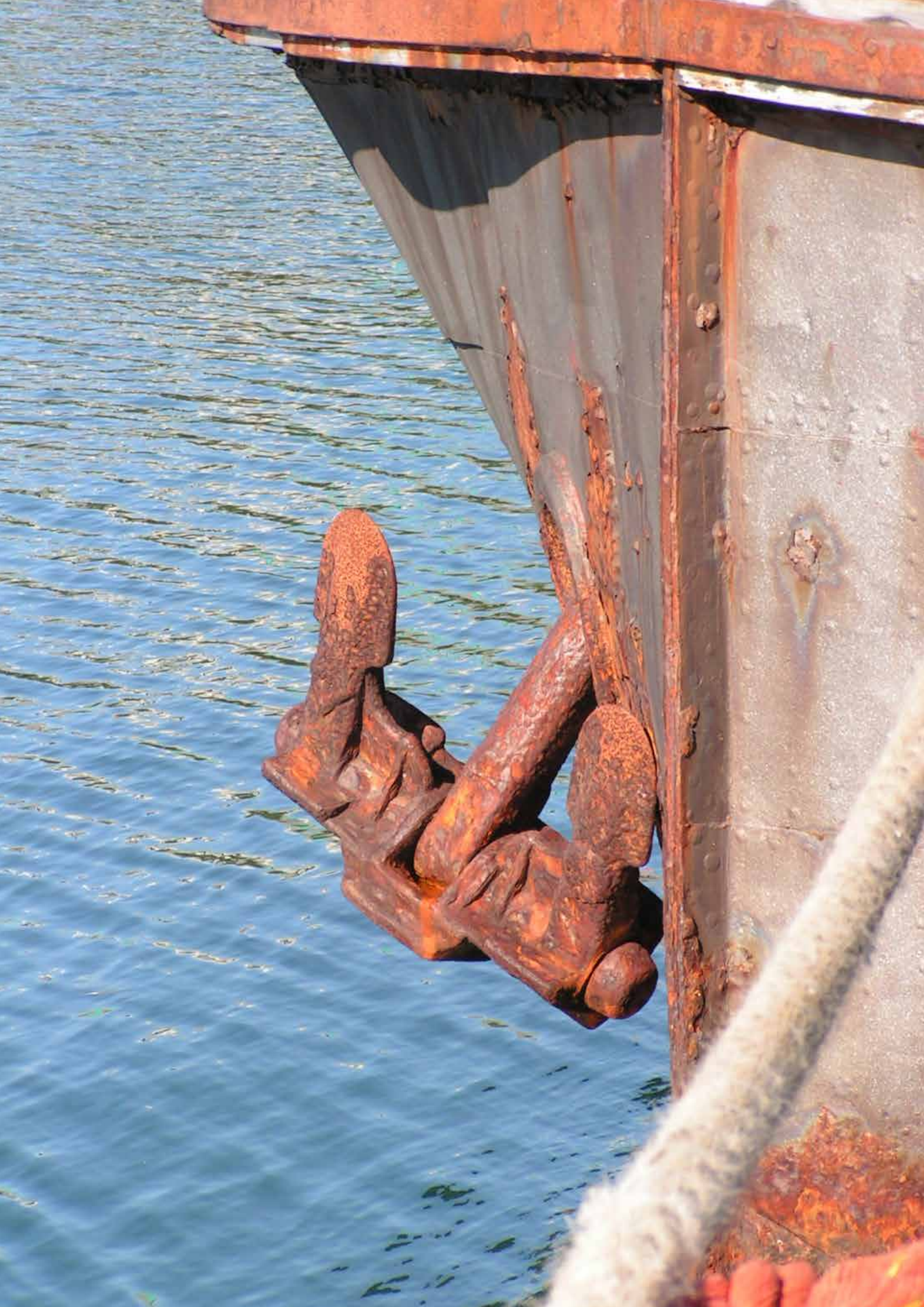
As a consequence, the shares of cargo carried through Auckland and Tauranga are likely to depend upon the ports' capacity to move additional containers, and the marginal cost of doing so. If, for example, POA reaches capacity while POT still has spare capacity, it is likely that POA will have to raise its prices. This will, in turn, encourage some shippers to divert cargo to POT. As long as spare capacity exists within the UNI ports, changing prices will encourage shippers to shift traffic away from congested ports.

Comments on these projections

We understand that these projections may be considered conservative. In particular, both POA and POT have experienced periods of growth in recent years (in container trade especially) that have been considerably higher than our projections. We make the following points in this regard:

- We are forecasting average growth to 2041 – we expect growth to be considerably higher (and lower) in certain years.
- As noted earlier, a considerable portion of recent growth has been driven by growth in port exchanges (over 30% per annum since 2007). While transhipping is expected to continue to grow, it is not realistic for it to grow at these sorts of rates beyond the short term.
- In weight terms, the UNIs key export products are forestry and dairy. While growth is expected to continue in these products, it is ultimately constrained by available forestry stocks, land for dairy farms and limited productivity opportunities.
- UNI population growth is projected to slow to an average of 1.3% per annum over the study period, and we expect imports to slow to reflect this. In addition, our major single import (oil) is expected to grow at an even slower rate as a consequence of supply constraints and more fuel efficient vehicles.

A considerable portion of recent growth has been driven by growth in transhipping.



Existing infrastructure at the Upper North Island ports

In considering existing port and port related infrastructure we have distinguished the following elements:

- ***Port access*** – the depth of each port's channel and berths
- ***Berthage*** – the number, length and configuration of container and bulk berth space at each port
- ***Storage*** – the container and bulk storage capacity of each port
- ***Distribution*** – primarily the land transport infrastructure servicing the port.

Ports also own significant operational infrastructure, such as cranes, straddles (for stacking containers), reefer slots (power points for refrigerated containers), buildings and operational technology. These types of assets are discussed in the context of options for improving port efficiencies.

Port	Access	Berthage	Storage	Distribution
Northport	Channel depth: 14.8m chart datum Berth depth: 2 x 13m, 1 x 14.5m Turning room limits vessels to 275-300m	3 berths totalling 570m	48 hectares reclaimed, 34 hectares of formed storage	Primarily road from the north and west Some domestic coastal shipping
Refining NZ, Marsden Point	Deep water access for both channel and berths, though there is a 14.8m shoal patch on the approach	2 jetties totalling 134m, which can accommodate ships of up to 275m and 200m, respectively	Some bulk liquid storage at refinery	Wiri pipeline to Auckland Coastal shipping Road transport north
POA – container	Channel depth: 12.5m chart datum, 13.9m at high tide Berth depth: 12.5m, 13m and 13.5m	3 berths totalling 870m	46 hectares, with a further 15 hectares at Wiri inland port	Road primarily through Grafton Gully and heading south Rail on North Island Main Trunk (NIMT) south, North Auckland Line (NAL) to Northland
POA – bulk	Range of berth depths	1,637m in total	25.3 hectares	Road, primarily through Grafton Gully to south Rail on NIMT south, NAL to Northland
POT - container	Channel depth: 12.9m chart datum Berth depth: 14.5m	3 container berths totalling 600m, with berthage currently being extended to 770m in total	72 hectares of which 41 is currently used. An additional 3.5 hectares at Metroport.	Road from various locations Rail, on East Coast Main Trunk (ECMT), primarily from/to Metroport in Auckland
POT – bulk	Berth depth: various up to 12.9m	Bulk berths totalling 2,055m plus one cement dolphin berth	112 hectares	Road primarily from the south Rail from central North island forests, and from Auckland
TOTAL UNI - container	-	1,470m or 1,946m including berths being developed at POT and POA	118 hectares, with 18.5 hectares of inland port container storage	-
TOTAL UNI - bulk	-	4,626m	171 hectares	-

The ability of the Upper North Island ports to cater for our projected growth

Overview

The capacity of the infrastructure discussed previous in this report is generally not fixed, and it is therefore difficult to give a strict view on technical limits.

For example, storage requirements depend on many elements including the length of time the containers are stored at the port (the dwell time), the type of straddle technology, the layout of the storage area, the seasonality of the port's activity and the space available. Many of these components depend on different operational parameters.

Similarly, the capacity of berth infrastructure is affected by the length and configuration of the berthage, and by the speed that ships are serviced. This in turn depends on the numbers and quality of cranes servicing vessels, the size of the ships (bigger ships can be serviced relatively faster), the extent of transhipping, and the ability of the port to deploy the appropriate crews to process the ships.

Our approach has been to estimate capacity on the basis of international benchmarks. These give us an indication of the maximum throughput per hectare of storage space or metre of berth space, which the most intensely used ports of similar size to the UNI ports are achieving.

Projected infrastructure limits

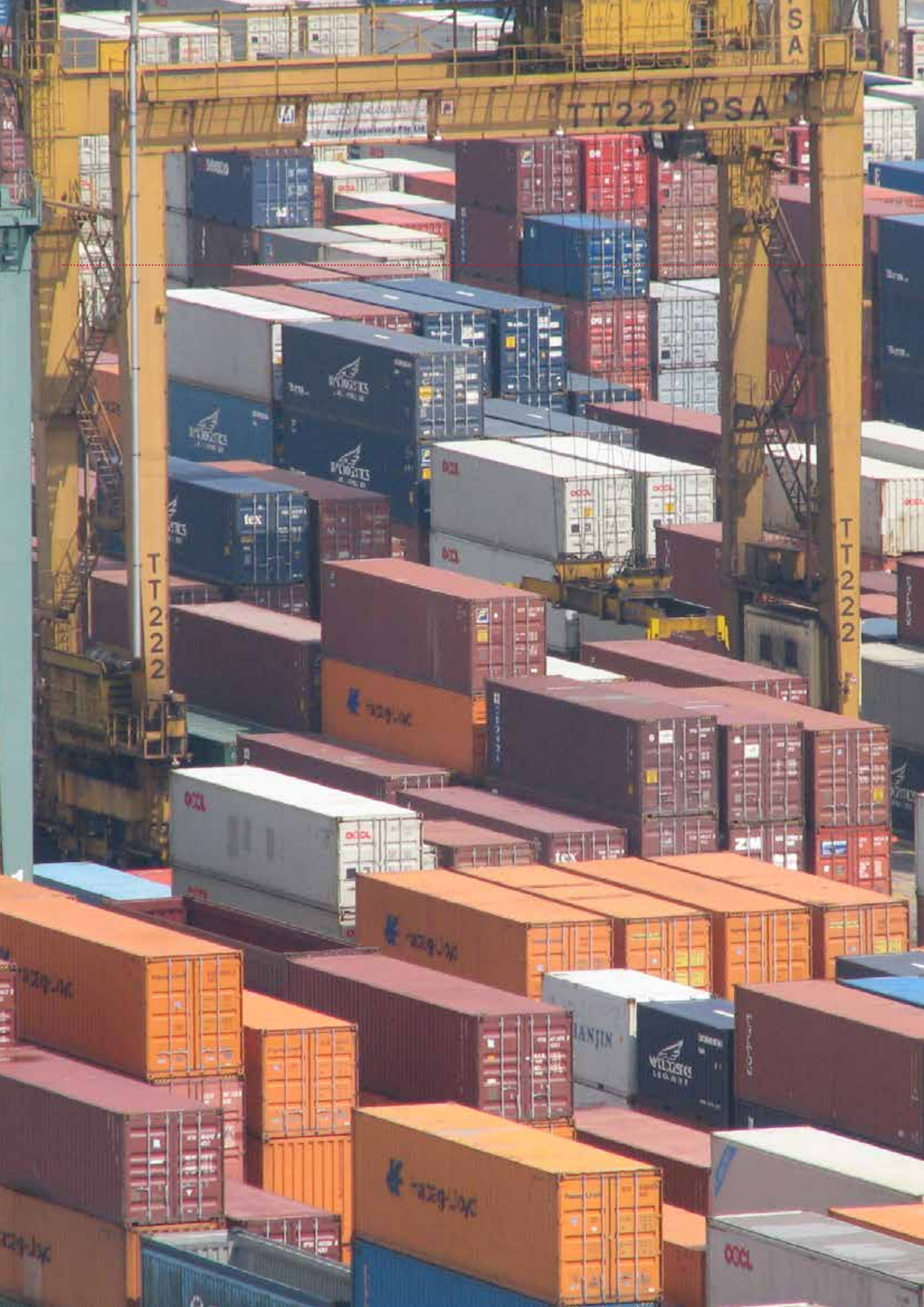
Notwithstanding the comments above, the table opposite outlines the elements of the current port and port-related infrastructure where the current infrastructure appears unlikely to be sufficient to cater to our projected future growth. It also presents options for addressing these limits.

This is an organic or incremental view, in that we are addressing limits and constraints as they are expected to arise, given the current UNI port and distribution system. The next section considers transformational or system changes.

Storage requirements depend on many elements including the length of time the containers are stored at the port (the dwell time), the type of straddle technology, the layout of the storage area, the seasonality of the port's activity and the space available.

Infrastructure issue	Options	Viable?
Berth depth at POA	Increase the depth of the container berths by dredging	Yes, subject to consent and being warranted commercially
	Do nothing, and be unable to cater for ships above a certain size	Yes, though may limit POA's ability to operate as a hub port, and/or increase costs for importers and exporters (compared with the other option)
Berth depth at POT	Increase the depth of the container berths by dredging	Yes, POT has recently received resource consent for channel and berth dredging
	Do nothing, and be unable to cater for ships above a certain size	Yes. As POT has consents, this is likely to be based on commercial decision as to the return on investment in dredging
Container berthage at POA	Develop additional consented container berth. POA have consent to develop a 306m 4th container berth	Yes, but to fully cater for growth further berths or efficiencies will be required
	Develop further additional berthage elsewhere at the port	Probably scope for limited additions, subject to resource consent and potential community sensitivity
	Increase ship handling speeds, through using more or better cranes, increased labour flexibility, handling larger ships, better berthage and storage alignment	Yes, but to reach potential, likely to require some reconfigurations or additional berth length as well
	Re-purpose bulk berthage	Technically viable, but would impact bulk capacity which is also likely to be stretched
Container berthage at POT	Complete full container berth extension	Yes, POT has longer term plans for a 285 metre berth extension. This will likely require an upgrade of air traffic control systems at Tauranga airport, due to flight path conflicts
	Develop further additional berthage elsewhere at the port	Would probably require re-purposing existing bulk berthage, placing pressure on bulk operations. Likely to depend on the relative values to the port of the cargoes
	Increase ship handling speeds	Yes, though POT is already operating at relatively high levels of efficiency
Container storage at POA	Complete the development of the additional 3.6ha of consented reclamation at the north-eastern tip of Fergusson terminal	Yes, being progressively reclaimed currently
	Reclamations	Technical scope, but would require resource consent and this is likely to be affected by community sensitivity
	Improve stacking technology	Yes, POA are currently planning to move from 2+1 to 3+1 stacking technology
	Other efficiencies	Likely to be able to make incremental improvements to dwell times (though imports already have very low dwell times)
	Re-purpose bulk storage	Probably not due to space pressure on bulk cargo

Infrastructure issue	Options	Viable?
Bulk berthage at POA **(particularly if Captain Cook and Marsden wharfs are lost)**	Reconfiguration	Yes, but likely to require some reclamations which are likely to be constrained by community sensitivity There may be a need for additional car storage facilities – eg a low-level car park building
Bulk storage at POA **(particularly if Captain Cook and Marsden wharfs are lost)**	Car stacker Reconfigurations	Yes, based on cost relative to other storage options Yes, but likely to require some reclamations which would need resource consent, which are likely to be affected by community sensitivity
Storage at Northport	Currently unformed land could be developed. Shorter dwell times of bulk cargo Higher stack heights for bulk cargo	Yes. Could undertake further reclamations or use adjacent land owned by Northland Port Corporation. Yes, but likely to be difficult due to the way logs are shipped Yes, but physical constraints mean that benefits are limited
Grafton Gully **Although future congestion likely to be driven by non-port traffic growth, and/or land use pressure that impact existing routes (as opposed to port growth)**	A range of possible corridor improvements, including major work options like grade separation at Grafton Gully Greater use of off-peak times Modal shift to rail	Yes, but investment not likely to be induced by port traffic. General traffic congestion, and land-use changes on Quay street are the primary drivers Yes, though would require changes in the operational hours of receiving distribution centres There is significant technical capacity on rail, but growth likely to be limited due to increasing commuter traffic. Also not cost effective for majority of Auckland based customers
Auckland sections of North Island main trunk	Construct a 3rd line for freight	Construction may be affected by KiwiRail's ability to finance it in their turnaround plan While funding has not been fully agreed, work is currently underway to advance the construction of sections of this line between Southdown and Wiri prior to the introduction of the planned intensive passenger train timetable in 2014 While present-day mode shares would make it difficult to justify, the Auckland Plan includes the construction of a full third track for freight between the port and Papakura between 2021 and 2030. This project may be constrained by community sensitivity
Tauranga rail (including east coast main trunk)	Increasing passing loops, signalling improvements, and ultimately double tracking	Yes, likely to be progressive, based on commercial arrangements between KiwiRail and POT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The role of prices

In conjunction with decisions to invest in infrastructure, relative prices will play a key role in extracting and allocating capacity across the UNI port network, particularly where there are alternatives or substitutes. For example, costs and prices[4] will help determine:

- Whether a port invests in additional physical infrastructure (eg reclamations) or operational efficiencies (eg more cranes, automated stacking technology)
- How freight is distributed (eg by road or rail)
- The types of products that ports cater for – eg if physical space becomes a premium we would expect them to focus on products for which they can charge the most per square metre of storage space. Or put differently, as they start charging more because space is tight, exporters and importers will start considering whether it would be more cost effective for them to use a different port
- Where exporters/importers send or source their products (which is already happening in the container trade competition between POT and POA).

The ability of port customers to choose between ports reinforces the role of price in allocating capacity. While there will continue to be limitations to the extent that ports can be substitutes (especially for bulk products) Metroport has demonstrated that under the right conditions, POT can compete in the Auckland market. We expect that, if successful, the proposed inland port at Ruakura would provide further opportunities to allocate latent capacity, both in the regional rail network and in its ports, though the rate of take-up may be slow given the experience of Metroport and Wiri.

In conjunction with decisions to invest in infrastructure, relative prices will play a key role in extracting and allocating capacity across the UNI port network, particularly where there are alternatives or substitutes.

4. These may be direct costs, or indirect costs such as the costs associated with congestion, or the uncertainty associated with obtaining resource consents.

So what does this all mean?

In summary:

- There is considerable capacity that can be accessed through improved operational efficiencies, most notably for containers and container storage in particular.
- Completion of consented reclamations at Northport and POA and berth developments at all three ports will also provide significant additional capacity.
- Projecting the impact of growth in bulk cargo is much more difficult, due to the lack of uniformity. With a few exceptions (storage for cars and logs) we have conservatively assumed that opportunities for operational efficiencies for these types of cargoes are more limited.
- If each port is to manage their share of trade as projected, we expect each port will need to develop further capacity over the study period (even with assumed operational efficiencies):
  - For Northport this would probably include development of the planned fourth berth and deployment of additional storage area.
  - o For POT this would include the additional 285 metres of container berthage at Sulphur Point. (There is also likely to be some additional bulk infrastructure – but this will likely be managed by reconfigurations rather than substantial development.)
  - For POA, further reclamation and berth developments will probably be necessary, especially if Marsden and Captain Cook wharfs cease to be used. However, with the required operational efficiencies, we expect these requirements to be less substantial than the preferred reclamation options in the 2008 Port Development Plan.
- Relative prices and costs will largely determine which specific options are chosen, including what combination of new infrastructure and efficiencies is utilised.

Potential system changes to manage growth

There has been public commentary on systemic change in the ports systems as an alternative to incrementally adding capacity. We have summarised at a high level the pros, cons and implications of the three potential options. We note that these options would involve a relatively large-scale intervention in the market by government agencies – well over and above their current role.

While these options are not considered in detail in this report, they are provided as a summary to help inform further technical analysis. The options are focused on constraining growth at POA, as this is the port under the most significant pressure in terms of competing land uses, environmental concerns that limit growth capacity, and conflict with other transport uses.

Our options are focused on constraining growth at POA, as this is the port under the most significant pressure.

System change	Impacts/requirements	Comments
Option 1: **Establishing a container terminal at Northport, to incrementally take over POA operations**	Potential to re-purpose elements of Auckland's waterfront Investment at Northport – cranes, berthage, reclamation Rail spur to Northport Investment in Northern rail line Avondale to Southdown line to avoid Newmarket Managing Northland's existing bulk task Additional traffic right through Auckland to the South Auckland distribution network Ongoing increased costs across value chain (land transport costs exceed port costs) Need to re-establish distribution centres	Likely to be very expensive, relative to the incremental approach Likely to have negative economic implications for both Northland and Auckland. The forestry industry would face competition for space, land transport between Auckland and Whangarei would be far more congested. These costs may be partially offset by reduced shipping costs for other Northland importers and exporters. The UNI's trade supply chain would be more expensive, impacting competitiveness for importers and exporters May however provide reserve capacity and network resilience
Option 2: **Manage Auckland's growth elsewhere.** **In effect implying that POT takes container growth and POT and Northport take bulk growth.**	As POA becomes more efficient, potential for footprint to be reduced Increased costs across the value chain for diverted products (and probably a bigger impact for bulk products) Double tracking of Tauranga to Auckland line Increased pressure on freight routes between Auckland and Tauranga and Whangarei Capacity issues may develop in Tauranga, especially in relation to berth length Potential for reverse sensitivity issues in Tauranga, related to increased freight traffic, including trains Northport likely to require 5th berth earlier, and prices for existing bulk trade likely to increase	Given the ability of (container) exporters and importers to choose between the ports it is likely to be more efficient and effective for the market to allocate this growth. If it is relatively cheaper to deploy capacity at POT and Northport, then this should come through in prices The UNI's trade supply chain would be more expensive, impacting competitiveness for importers and exporters
Option 3: **A new UNI port**	Potential to re-purpose elements of Auckland's waterfront Massive infrastructure investment, not only in port infrastructure but also in road and rail links Significant stranded assets Considerable environmental impacts, depending on site selected Transformational change across the supply chain	Given projections, it seems unlikely that this option would make economic sense over the term of this study Benefits of repurposing current POA land seems, alone, insufficient to outweigh large costs for the foreseeable future

Beyond 2041

While our projections provide an indication of the port task and infrastructure requirements out to 2041, there is likely to be further growth thereafter. It may therefore be the case that even if a given amount of infrastructure can cater for the projected trade task in 2041, it may not fully be able to at some point after that.

This suggests a couple of questions:

- ***Is 30 years the right projection period, why not a 50 or 100 year timeframe?***
- ***Surely at some point ports will reach capacity. Shouldn't we be making decisions and plans to provide for this?***

While there are a number of perspectives as to the appropriate period for the planning of long-term infrastructure, we believe a 30-year horizon is a sensible time frame in this context, as:

- It coincides with the longest planning periods used by many public sector entities including NZTA, Auckland Council and Auckland Transport.
- Projections over long time periods become increasingly undermined by transformative changes. If we reflect on changes over the last 30 years for example, we have observed geopolitical changes (the collapse of the Soviet Bloc, the emergence of the Asian economies), massive technological innovation, removal of trade barriers and the globalisation of world trade, and the emergence of environmental concerns into the mainstream. None of these changes would have been easily predicted in 1980, but they have all had significant impacts on international trade.
- As well as transformative change, there is also potential for major system shocks. This could include a major oil shock, natural disaster or some form of conflict that significantly undermines trade.

Given what we currently know or can reasonably assume, if we take our projections out far enough, we will reach serious constraints in our trade supply chain. However, practically reacting or providing for this is probably limited to ensuring planning is flexible, and provides or retains options for future policy makers to react to major changes and constraints as they become more certain.

In this respect, we note that the UNI is actually well served by three ports. This currently provides strong competition to the benefit of exporters and importers, and also operational flexibility and resilience in the UNI's trade and logistics supply chains.

There are benefits in retaining flexibility to adapt to future circumstances, even where there is a financial cost in doing so, and if the option is never exercised. For example, while we do not consider that Northport will be required to manage significant freight from outside of the Northland region, we do believe that retaining capacity for it to take a larger role provides valuable flexibility and resilience across the port network in the UNI.

Conclusions

The UNI ports are projected to experience strong growth over the next 30 years, underpinned by continued growth in the trade of primary products, and the ongoing development of transhipping at POA and POT.

We expect that cargo throughput will grow more rapidly than outside-port cargo, and that containerised cargo will grow more rapidly than bulk cargo – in line with recent trends. As a consequence, more pressure will be placed on port infrastructure, which must handle growing volumes of exchange cargo, than on distribution networks and land transport infrastructure to the port. Likewise, container handling facilities are expected to handle more growth than bulk cargo facilities.

Overall, our projections suggest the UNI port network has capacity to meet the freight task over the next 30 years. But this will require substantial operational efficiencies as well as incremental investment in infrastructure including the uptake of consented berth developments, reclamations, and channel and berth deepening.

If the task is to be managed with broadly the same share and configuration of ports, POA will most likely require further storage and berth capacity. When this is required will depend on the timing of any operating efficiencies, the timing of any release of Captain Cook and Marsden wharfs, and spikes in demand. If POA can make substantial operational efficiencies, we expect these requirements for additional infrastructure to be smaller in scale than the preferred reclamation options in the 2008 Port Development Plan. Whether further reclamation is achievable will depend on the ability to obtain resource consents, which in turn will depend on consideration of the wider costs and benefits (social, economic, environmental and cultural) of the proposals.

If POA is unable to gain approval for an expanded footprint, then some of the projected growth will need to be accommodated at other UNI ports. In our view this is achievable given the capacity across the network. Relative prices will play an important role in reallocating freight - as constraints at one port increase, the cost of handling freight will increase, encouraging importers and exporters to move freight through the alternative port. This however, like any supply side constraint, will have economic consequences in terms of additional supply chain costs for exporters and importers.

The development of inland ports and improvements to transport and distribution networks may partially offset these cost increases, as evidenced by the ability of POT to compete with POA for many types of Auckland cargo, through its presence at Metroport.

We would expect that any transfer of growth to the other ports would occur slowly, but be punctuated by step changes as exporters and importers reconfigure their supply chains.

POT and Northport are also expected to need further infrastructure over the study period. While this would also require resource consent, there are less apparent impediments to these proceeding than at POA.

We do not forecast significant issues for land transport infrastructure to arise as a result of increasing port demand. In Auckland growth is likely to be dominated by non-port demand. Tauranga and Whangarei are generally not under the same land transport congestion pressures. However, improvements to the East Coast Main Trunk line between Auckland and Tauranga will most likely be required, including possible double tracking. We expect these changes to be progressive, based on commercial arrangements between KiwiRail and POT.

In summary, the most efficient and cost effective options are likely to be based around incremental growth at each port, complemented by changes in relative prices that help allocate latent capacity. The public sector will continue to play a key role in:

- balancing the wider costs and benefits of infrastructure investment through decisions around resource consents
- providing additional land transport infrastructure as appropriate
- monitoring the effectiveness of the UNI's logistics supply chain
- retaining flexibility and options across the network, both to provide network resilience and capacity to manage change.

It does not appear, based on current projections, that the benefits of substantial changes to the UNI port system, such as establishing a new container port, currently outweigh the costs involved.

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- Northport
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1

Introduction

Introduction

This report was commissioned by the Upper North Island Strategic Alliance (UNISA) to determine trends in demand for merchandise trade through the Upper North Island (UNI) ports, the capacity of key port and port related infrastructure to manage this demand, and to form a view of potential infrastructure investment requirements. The study period of this report is 30 years.

The report is broken into two main parts. In the first (Sections 2, 3, and 4) we consider trends affecting demand for freight through the UNI ports and make projections of future freight task out to 2041. These projections are based on analysis of trade patterns and port throughput over the last ten years, supplemented by: qualitative information from industry participants; high level forecasts of economic growth in the UNI, New Zealand and amongst key trading partners; expected demographic changes; and physical constraints in respect of agricultural production in New Zealand. In the second part of the report (Sections 5 and 6) we examine the existing infrastructure at the UNI ports, the ability of this infrastructure to cater for projected growth, and options for meeting future demand.

The area of analysis is illustrated in Figure 1. It contains the seven district and regional council areas that comprise UNISA: Northland, Whangarei, Auckland, Waikato, Hamilton, Bay of Plenty, and Tauranga.

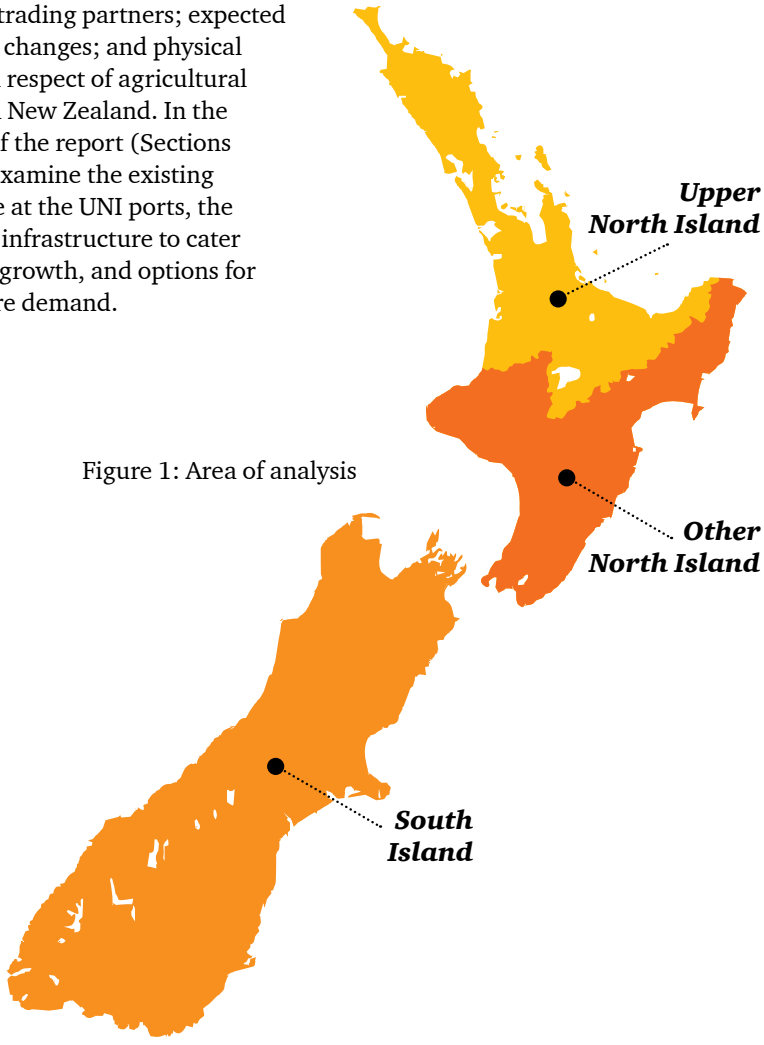


Figure 1: Area of analysis

Figure 2: Ports and railways in the UNI

There are ports in three cities within the UNI – Whangarei, Auckland, and Tauranga – and road and rail networks connecting main freight servicing locations. Figure 2 here shows the locations of the ports, railway lines, and main freight servicing locations in the study area[5]. We discuss the role of these ports, and the linkages between them, in more depth in the following sections.

5. Not all of the rail lines shown in this figure are currently active. For example, branch lines to Rotorua and Taneatua (in the eastern Bay of Plenty) are currently inactive.

2

Context for this study

Context for this study

In this section, we discuss some of the global and macroeconomic trends that shape demand for freight in the UNI region.

First, we consider the significance of ports to regional and national economies in the abstract before discussing the role of trade in the New Zealand economy. Following that, we discuss trends in world trade before a more in-depth discussion of recent trends in economic growth, population, and trade in the UNI region. This information serves as a backdrop to our projections of future port growth and our discussion of the future of freight in the region.

2.1 The role of ports in an economy

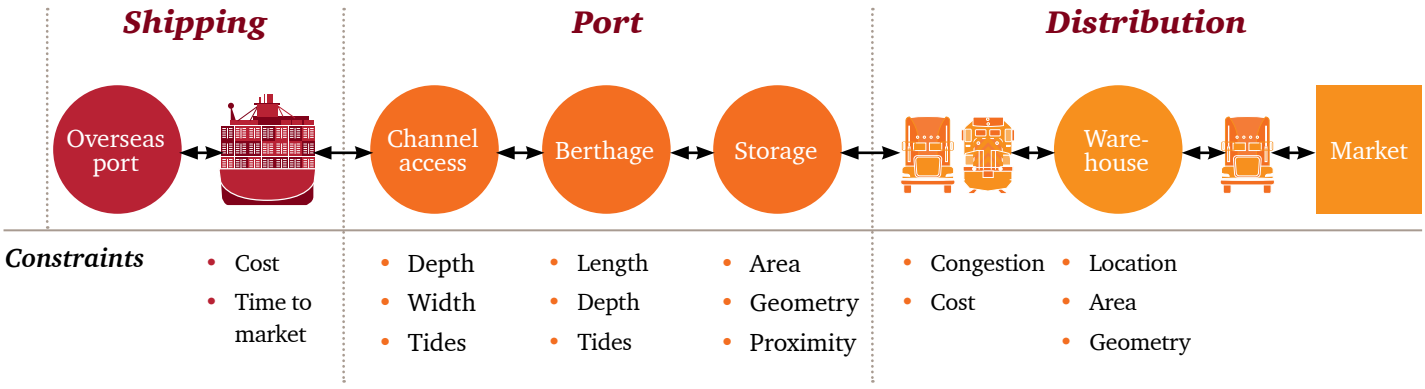
The role of a port is to enable sea trade between different regions and countries. The existence of a facility for moving freight between land transport and oceangoing vessels allows producers of physical goods to reach distant markets at a relatively low cost.

Ports are merely single nodes – albeit important ones – in broader supply chains. Their function is crucial for enabling trade but they cannot exist on their own. Demand for a port is related to underlying economic activity – production and consumption – and in turn can foster increased activity. (This is an important part of the economic literature on gains to trade and specialisation.)

Figure 3 below shows the position of a port vis-à-vis other components of the supply chain. There are a number of activities that occur within a port, including:

- loading and unloading of cargo from ships – ie what we typically think of when we picture a port
- border management functions such as customs and biosecurity clearance
- loading and unloading of cargo from land transport modes such as road and rail.

Figure 3: The role of a port in an international supply chain



Ports often serve as significant pieces of economic infrastructure for cities, regions, and nations. First and foremost, ports allow local producers to reach larger markets overseas, and local consumers to access goods produced elsewhere. The presence or absence of a port in a region can therefore have a significant effect on the cost of doing business and the cost of living within a region.

Second, ports may make a significant economic contribution to a region in their own right[6]. They are important employers and, in the case of most New Zealand ports, sources of revenue for councils, and, under the right circumstances, can anchor or attract additional economic activity. For example, Singapore's economic development over the past 50 years has been deeply linked to its role as a major hub port for the Asia-Pacific region. It was able to benefit twice – first, from revenues earned from trade passing through the city, and second, from additional manufacturing and warehousing activity that sprung up as a result of its relatively low transport costs.

6. See eg Market Economics (2011), Economic Impacts of the Ports of Auckland Limited: 2010, 2021 and 2031.

2.2 The role of trade in the New Zealand economy

Overseas trade plays a critical role in the New Zealand economy. As a small, remote nation with limited domestic markets and significant agricultural capacity, trade underpins our economy. It opens up overseas consumers and supply chains for New Zealand businesses. This enables us to specialise in agricultural products, which serve as the backbone of our exports and provide the income to purchase the manufactured and consumer products we import. It also enables New Zealand businesses to specialise in innovation-intensive market niches in the global economy.

In terms of economic growth, exports are fundamental to our future prosperity, and export growth has been identified as a key priority both at a national and local government level (see the UNI local governments' economic development strategies and the government's Business Growth Agenda). The UNI region plays, and will continue to play, an important role in New Zealand's prosperity due to its a large and growing share of New Zealand's overall GDP, population and international merchandise trade.

To support these aspirations, ensuring the country has a robust transport and distribution network is key, and the country's port and port related infrastructure represents an important component of this supply chain.

At the same time, there is a perception of growing pressure on these infrastructure assets, particularly in Auckland, where concerns have been raised in relation to increasing competition with other users on the road and rail networks. In addition, there are growing questions about the appropriateness of having a port in central Auckland, and whether this is the best use of downtown waterfront land given the city's aspiration to be the world's most liveable and the fact that most of Auckland's manufacturing and distribution facilities are in south Auckland.

As a small, remote nation with limited domestic markets and significant agricultural capacity, trade underpins our economy.

2.3 Growth in world trade

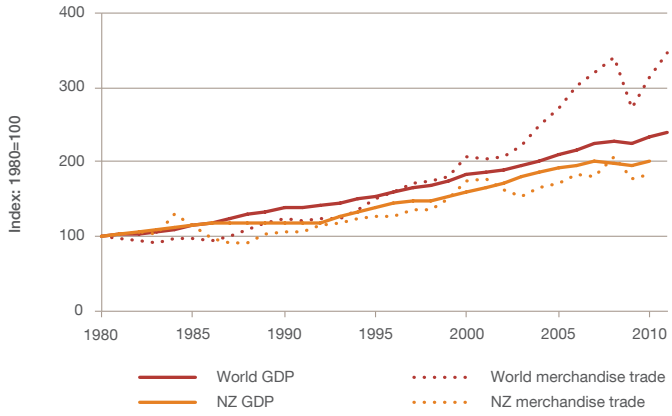
World trade has grown markedly over the last 30 years as the impact of globalisation has re-shaped the way the world has structured itself economically. Figure 4 compares GDP and merchandise trade value growth over the past three decades. Global trade growth has outpaced global economic growth significantly over the past decade. Merchandise trade growth in New Zealand has been less dramatic, however – it has generally kept pace with overall economic growth in recent decades[7].

Growth in trade over the last three decades, and in particular over the last decade, is a consequence of a number of underlying drivers including:

- the removal of trade barriers
- relatively stable political environments
- the mobility of capital
- the emergence of China and other emerging nations as sources of cheap labour (and the subsequent shift of lower skilled manufacturing into these countries)
- technological advances in shipping, including containerisation, which have significantly reduced the costs of trade.

Figure 4: Growth in GDP and merchandise trade value, NZ and world

NZ and world growth in GDP, merchandise trade value, 1980-2011



Source: World Bank

7. Note, however, that these figures do not account for trade in services, which has risen more rapidly than merchandise trade, albeit from a lower base.

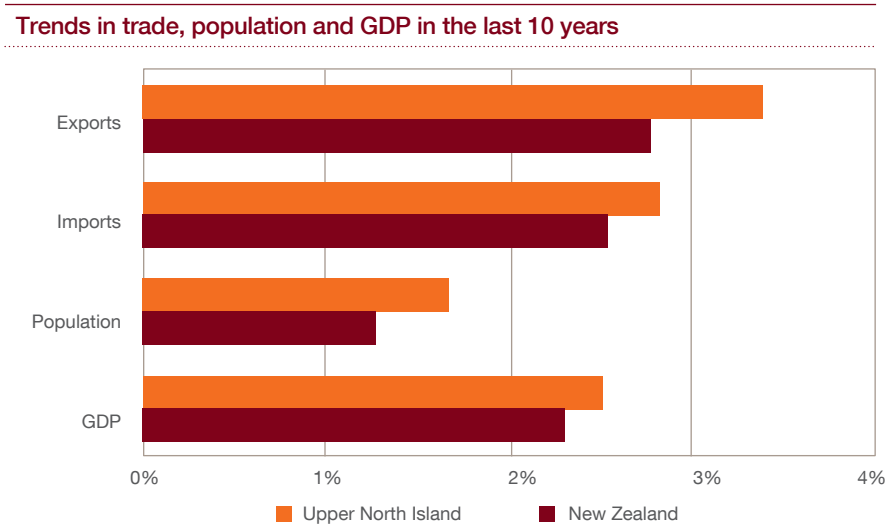
2.4 Recent economic and population trends in the UNI

The UNI accounts for a large and growing share of New Zealand's overall GDP, population and international merchandise trade. As shown in Figure 5, the UNI's growth exceeded that of New Zealand as a whole from 2002 to 2012. This is expected to continue in the medium to long-term.

GDP, population and merchandise trade have grown faster in the Upper North Island:

- Both import and export weights have grown faster than GDP
- Exports have grown at double the population growth rate
- Imports have grown at 1.7 times the population growth rate

Figure 5: Recent trends in trends, population and GDP



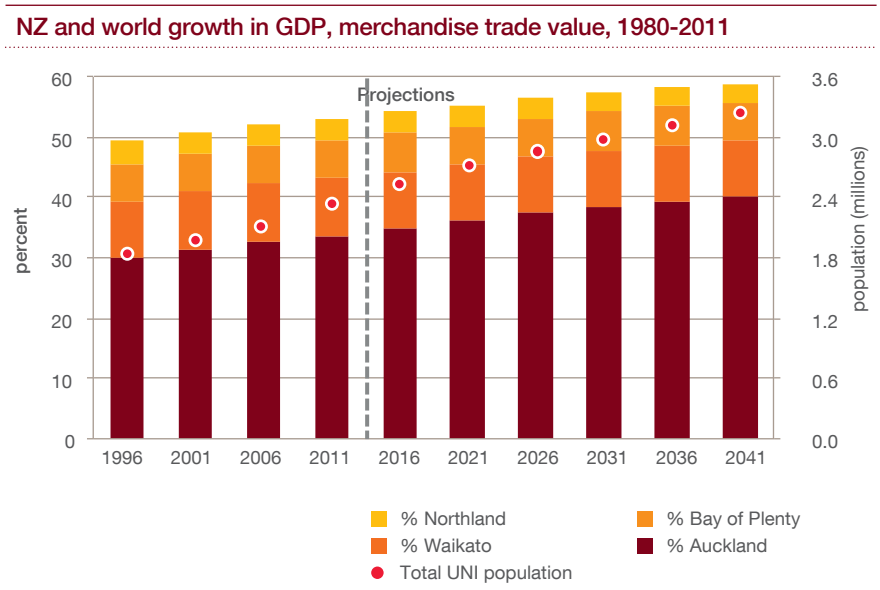
Source: Statistics NZ, PwC analysis

Current and future UNI Population

The UNI accounted for 53% of New Zealand residents in 2011. Its share of national population will increase in the future, as a majority of future NZ population growth is expected to occur in the region. Figure 6 presents historical and projected population growth of the UNI from 1996 to 2041. The growth projections are based on Statistics New Zealand projections of growth at a national level to 2061, and at a regional level to 2031.

The total population of the UNI is expected to grow from around 2.3m in 2011, to 3.3m in 2041. Auckland will dominate population growth in New Zealand, and is expected to account for around 40% of the country's population by 2041. In total, the UNI is expected to represent 59% of the New Zealand population by 2041, up from 53% today.

Figure 6: The Upper North Island will drive New Zealand population growth



Source: Statistics NZ, PwC analysis

The Upper North Island economy

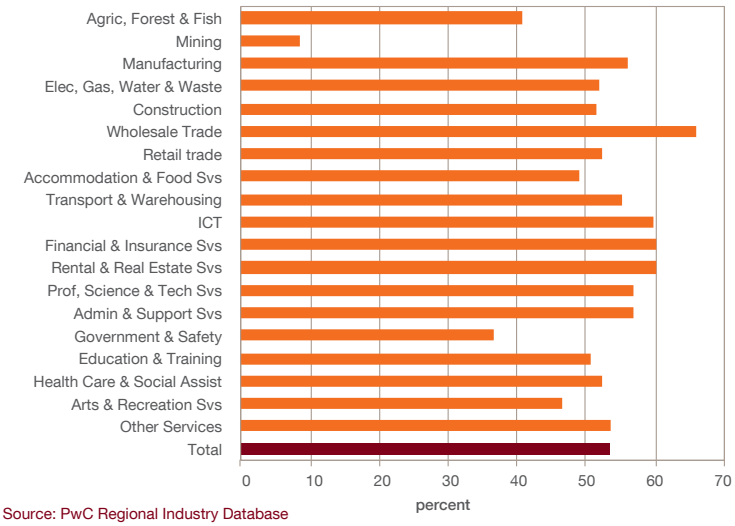
The UNI generated an estimated 53% of New Zealand GDP in the year to March 2011. In some industries, such as the wholesale trade sector, the UNI is even more important, with as much as 66% of GDP. These proportions emphasise the crucial role of the UNI in the New Zealand economy, and highlight the fact that throughput in the UNI ports is likely to continue to account for a larger than proportionate share (based on population) of New Zealand's total exports and imports.

Figure 7 shows the UNI share of national activity within 19 major industries, in terms of GDP, and displays average annual industry growth rates over the 2001-2011 period. We expect the UNI to continue to make up a large share of national GDP in most industries.

Over the last ten years, the fastest growing sectors in the UNI have been Information and Communications Technology (ICT), where GDP has increased 7.2% a year, doubling the sector's contribution since 2001. At the other end of the spectrum, primary production and manufacturing have not seen strong GDP growth despite strong growth in export weights. These facts probably hide a story of strong dairy farming and dairy manufacturing growth at the expense of sheep and beef; a wood sector that battled for several years and is only now recovering; and a long-term trend of manufacturing moving to countries with lower labour costs that has been exacerbated in recent years by a high exchange rate and global downturn.

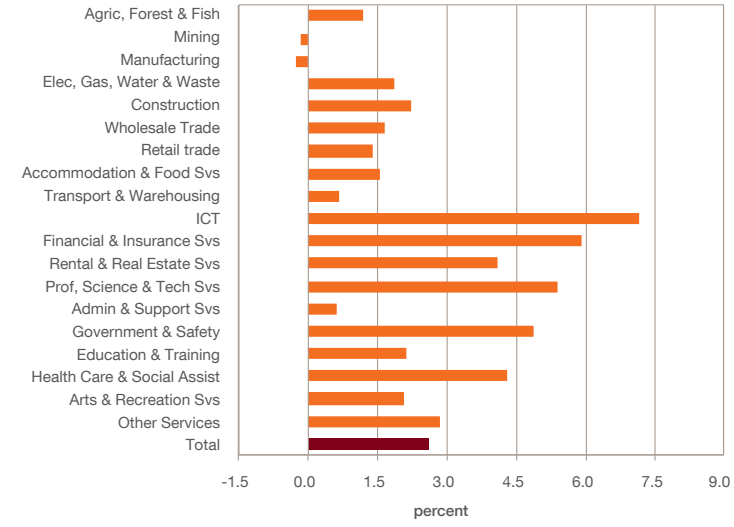
Figure 7: The upper North Island dominates New Zealand GDP, and has grown strongly since 2001

Upper North Island share of New Zealand GDP by industry



Source: PwC Regional Industry Database

Upper North Island GDP growth by industry (2001 to 2011)



Source: PwC Regional Industry Database

Major Upper North Island industries

Another factor that will affect demand for trade through the UNI ports is the composition of the local economy, which requires imports to produce some of its products for domestic consumption, and which exports large weights of mostly primary products and processed primary products.

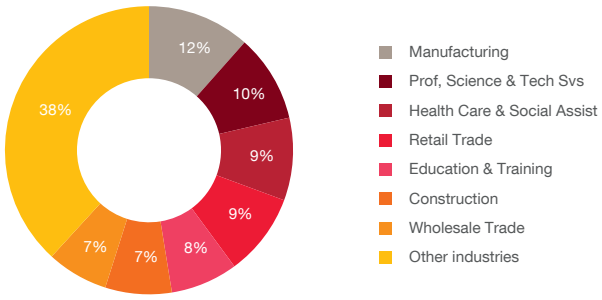
Given the dominant role Auckland plays in the UNI and the New Zealand economy, it is unsurprising that primary industries (such as forestry) do not appear among the largest eight industries. However, manufacturing (which includes manufacturing of dairy, beverage, timber and pulp products) is the most important single sector, with 12% of employment.

Other industries typically associated with urban centres, such as professional, scientific and technical services; health care and social assistance; retail trade; education and training; and wholesale trade dominate the employment picture. Some of these industries account for significant import demand. In particular, the retail and wholesale trade sectors are major importers of a variety of products that rely on the UNI ports.

As discussed in more depth in Section 4, a large share of international trade in the UNI is accounted for by three industries: wood, dairy, and petroleum refining. Wood and dairy also account for a significant proportion of freight within the region.

Figure 8: The Upper North Island has a wide mix of major industries

Upper North Island major industries (FTEs)



Source: PwC Regional Industry Database

Manufacturing is the most important single sector, with 12% of employment.

3

Background to projections

Background to projections

This section provides an in-depth background to our projections of future demand for the UNI ports.

3.1 Definitions

To measure current port task and make projections for future port task growth, it was necessary to choose appropriate and relevant measures and definitions of the port task. Here, we describe our key measures:

- We measure cargo in terms of weight rather than value, as weight of cargo is a better indicator of the size and number of vessels, trucks, trains, wharfs, cranes, and other infrastructure required
- We define three categories of cargo passing through UNI ports: outside-port cargo, which leaves the port gate to the surrounding region (or vice versa), exchanges, which transit through the port without leaving it, and throughput, which includes both outside-port and exchange cargo.

Weight versus value

Freight is commonly measured in one of three ways:

- According to the dollar value of the cargo. This is a commonly-reported measure as it enables comparisons to be made between the size of a nation's economy and its overseas trade (eg export-to-GDP ratios). However, it does not provide an accurate picture of the port task due to the fact that two commodities of an equal weight may have very different values.
- According to the weight (in tonnes) of the cargo. For many classes of cargo (eg bulk and breakbulk commodities that can easily be measured by weight), ports charge according to the weight of the cargo. We have used this measure in our calculations as it enables us to compare quantities across different types of commodities and cargoes. Statistics New Zealand publishes data on import and export cargo weights, based on Customs lodgement forms.
- According to the volume of the cargo. Ports charge according to volume for many classes of cargo, and trade data is occasionally published in terms of volumes. For example, containerised cargo is usually reported in terms of twenty-foot equivalent unit (TEU) containers, and log exports are usually reported in cubic metres. Volume data is less comparable between different cargoes.

Comparing our measures of port task with government and council objectives

Central government and councils have set strategies for driving economic development through export growth (see eg the Government's Business Growth Agenda and the Auckland Plan). The analysis in this report does not reflect upon these policy objectives for three reasons:

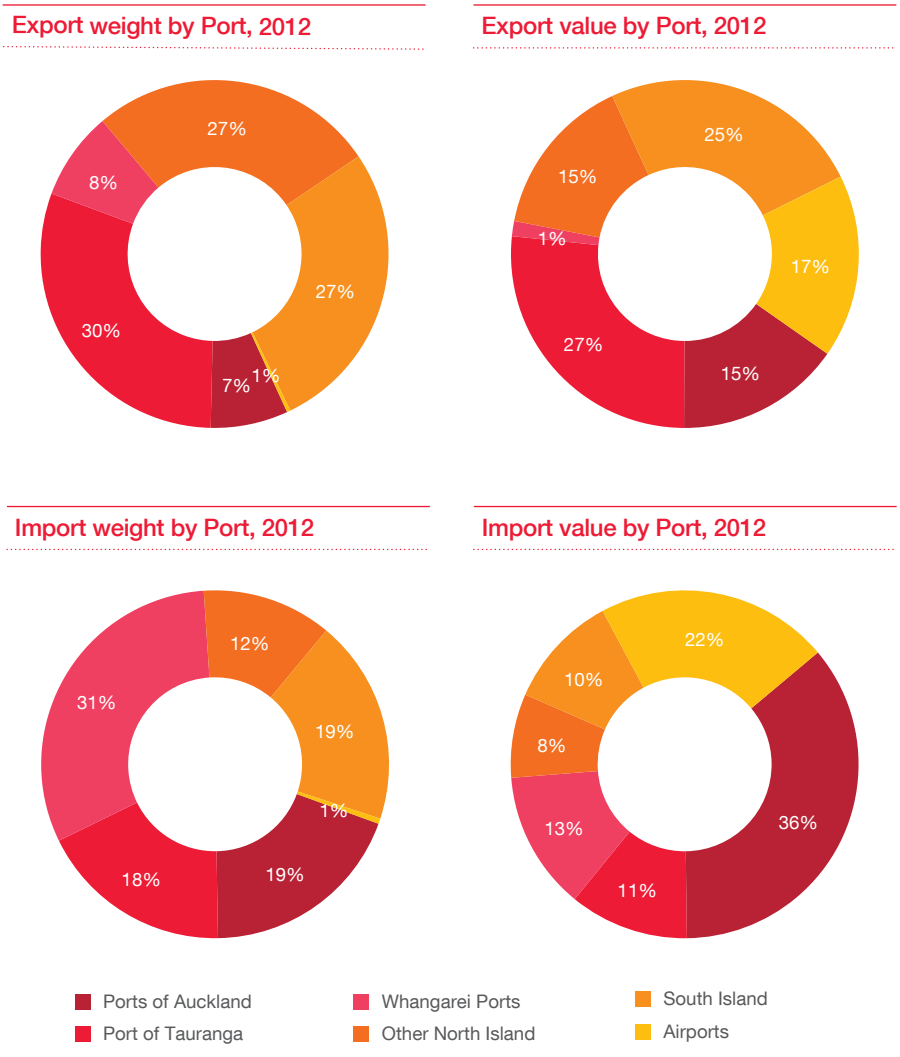
1. our analysis is based on weight not value
2. we exclude all exports through airports, which accounted for 17% of export value in 2012
3. we consider merchandise trade only and exclude service exports, which accounted for 21% of exports in 2011 according to World Bank statistics
4. we expect the relationship between trade weights and trade values to change over time, as trade in high-value/low-weight products is likely to grow.

Our projections of future port demand are based on freight weight due to the fact that it is a comparable measure that captures the total quantity of goods that must be moved through ports. While we expect the relationship between trade weight and value may change over time if and as New Zealand exports more higher value products, we do not believe this has a readily predictable impact on the weight-based freight task.

Comparing weight and value measures

Because different commodities differ in value, trade weight and trade value are not always correlated. For example, the following charts show that New Zealand's airports account for a significant share of the total value of exports and imports in spite of the fact that they account for less than one percent of the weight of imports and exports. Conversely, the ports at Whangarei account for a larger share of New Zealand's total trade weight than trade value due to the fact that they specialise in relatively heavy, low-value commodities.

Figure 9: Trade weights and values by port, 2012



Source: Statistics NZ, PwC analysis

While UNI ports still account for a large share of export and import trade weights, the role of airports in particular in facilitating trade in high value items means the share of trade accounted for by the UNI ports in value terms is lower. The three ports account for 43% of export values and 60% of import values, compared with 45% of export weights and 68% of import weights. The role of Northport in particular is far lower for trade values than for weights, given the lower dollar per tonne value of wood and oil products.

Furthermore, the average value of a kilogram of overseas cargo varies considerably between ports. Figure 10 shows the average value per tonne of product imported or exported through the UNI ports, the lower North Island and the South Island. Auckland has the highest value per kilogram for both exported and imported commodities, at nearly $3.40 a kilogram and $4.30 a kilogram respectively. Exports through Whangarei, which are predominantly wood products, average around $0.30 a kilogram, while imports (mainly of fuel products) average around $1.00[8]. The other ports fall somewhere in the middle.

Goods transported by air tend to be far more valuable per kilogram. The average value of air freight exports is around $84 a kilogram, and $101 for imports. Air freight offers faster service at a higher cost and as a result tends to get used for more expensive, time-sensitive goods.

Outside-port cargo, exchanges, and throughput

The function of a port is to load and discharge cargo from oceangoing ships. Depending upon the origin and destination of the cargo, there are several ways in which cargo can move through a port. We define three broad categories of cargo movements:

- ***Outside-port cargo*** moves into the port from sea and out by land, or vice versa. It is the weight of goods that have final origins or destinations inland of the port.

  Outside-port volume is the best measure of infrastructure requirements inland of the port, such as the rail and road capacity required to move cargo to and from its final destination.

- ***Cargo exchanges*** enter and exit the port by sea. They transit through the port without leaving the port gate.

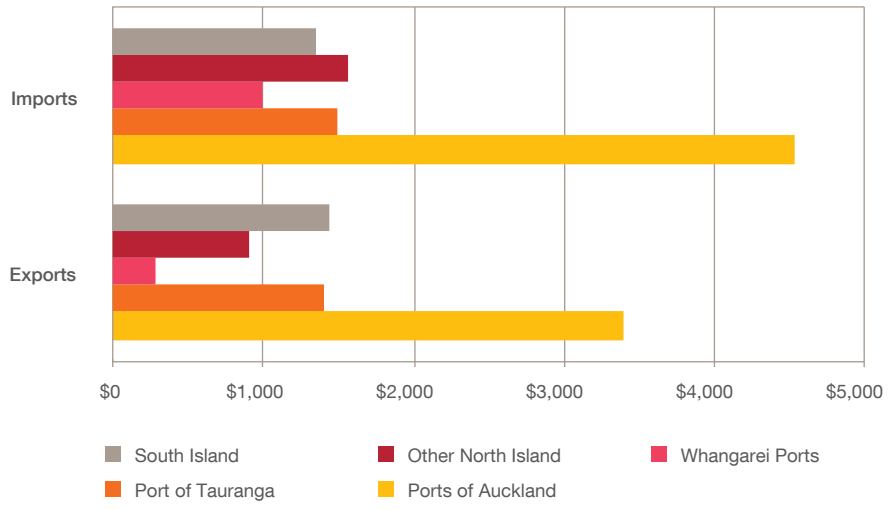
  Exchanges have an impact on port infrastructure requirements but have no effect on land transport infrastructure.

- ***Throughput*** includes both outside-port cargo and exchanges. It measures the total amount of cargo that is loaded or discharged at a port.

  Throughput is the best measure of infrastructure requirements at the port itself, including the number of cranes required to move containers on and off ships, the amount of port land required to store cargo, etc.

Figure 10: Average value per tonne is highest through POA

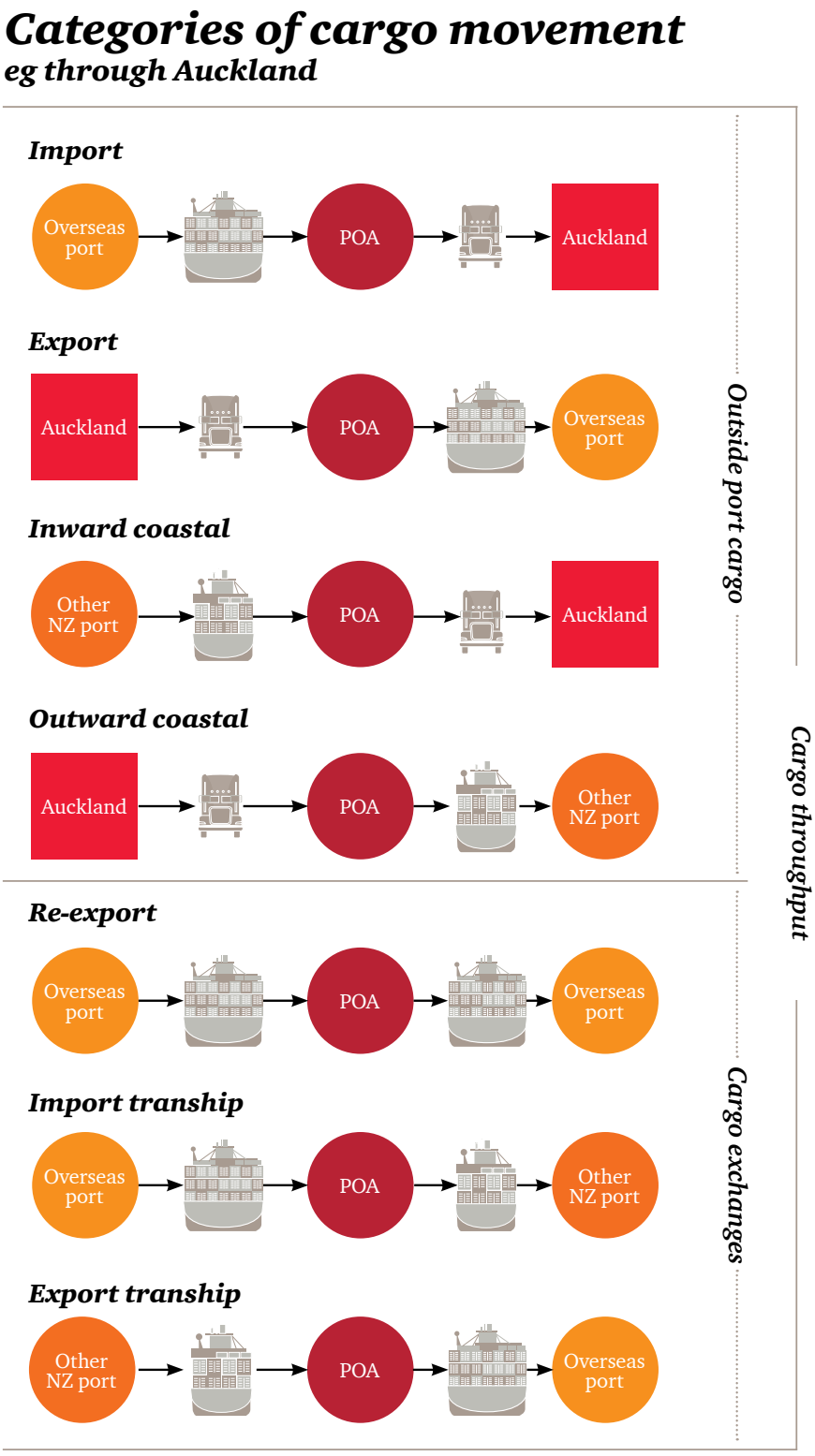
Value per tonne (NZ$), imports and exports



Source: Statistics NZ, PwC analysis

8. This value is almost identical to the 2012 price of crude oil.

Figure 11: Categories of cargo movement



Not all of these cargo movements will have the same impact on port and port-related infrastructure. For example, re-exports require no infrastructure outside of the port gate, as they are moved off one international cargo ship and transferred to another without leaving the port. On the other hand, imports will have an impact on land transport infrastructure, as they pass through the port to the local market.

The impacts of various types of cargo movement on port and land transport infrastructure are summarised in Table 1 overleaf. Only two categories – international trade (imports and exports) and domestic coastal movements (inward and outward) – require both port and inland infrastructure within the region of the port. The other categories of movement take place entirely within the port.

Table 1: Infrastructure requirements of different cargo movements

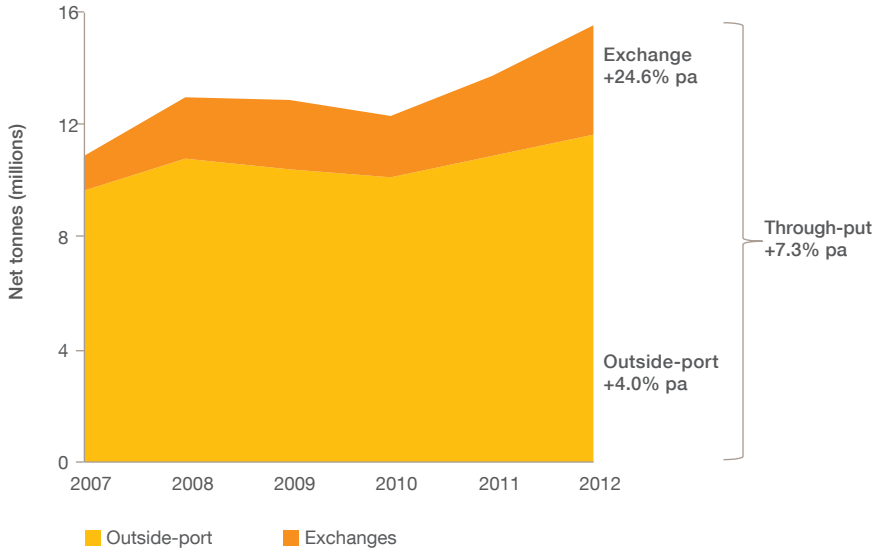
Inward	Outward	Infrastructure
Imports	Exports	Port and land transport
Domestic coastal inward	Domestic coastal outward	Port and land transport
Import transhipments	Export transhipments	Port only
Domestic leg of export transhipments	Domestic leg of import transhipments	Port only
International transhipments	International transhipments	Port only

Recent growth in outside-port container cargo and container throughput

In recent years, cargo exchanges appear to have grown considerably more rapidly than outside-port cargo. Based on data on container volumes from POA and POT, outside-port container cargo grew at a rate of 4.0% per annum from 2007 to 2012. However, container exchanges grew at a rate of 24.6% per annum over this period. As a consequence, container throughput grew at an average rate of 7.3% per annum – considerably more rapidly than outside-port volumes.

Figure 12: Growth in container volumes at POA and POT, 2007-2012

2007-2012 Growth in UNI container volumes



Source: POA, POT

3.2 Current trends in UNI international trade

Figure 13 summarises recent growth in export and import weights through New Zealand ports, including the UNI ports. National and UNI export weights have fluctuated over the last decade, falling between 2002 and 2007 before growing significantly in the five years to 2012. During this time, the UNI ports' share of national exports ranged from 42% to 46%. Import weights, on the other hand, have grown more steadily, in part because they are linked to population growth. The UNI ports have dominated national import weights – their share ranged from 67% to 71% of the total.

In 2002, New Zealand ports exported just under 25 million tonnes. Of this, around 43% passed through the UNI ports. Export weights declined over the five years to 2007, led by declines in the UNI, which saw the area's share of exports fall to a little under 42%. By 2012, export trade had rebounded on the back of improved wood and dairy exports, reaching nearly 32m tonnes, of which nearly 46% was through the UNI ports.

National import weights have grown from just over 15m tonnes in 2002 to over 19m tonnes in 2012. UNI import weights have grown in line with this overall trend. However, the UNI's share of total import weights has fluctuated from year to year. In 2002, the UNI ports accounted for two-thirds of import weights. This share rose to 71% in 2007, before declining slightly to 68%.

Over the last decade, UNI exports weights have grown from 10.5m tonnes to 14.6m tonnes. This represents growth of 3.4% per annum. Half of the total growth – 2.1m tonnes – was accounted for by increased log exports. UNI imports grew less rapidly over this period, from 10.0m tonnes to 13.2m tonnes. This represents growth of 2.8% per annum. The majority of this growth was accounted for by imported mineral fuels (an additional 1.2 million tonnes) and animal feed & pet food (an additional 1.0m tonnes).

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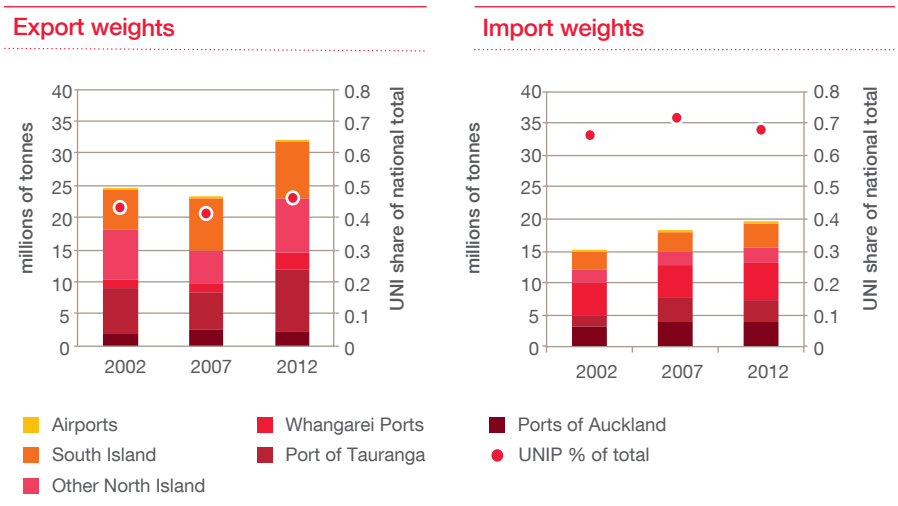
Figure 13: Recent growth in UNI export and import weights



Source: Statistics NZ, PwC analysis

3.2.1 The role of the UNI ports

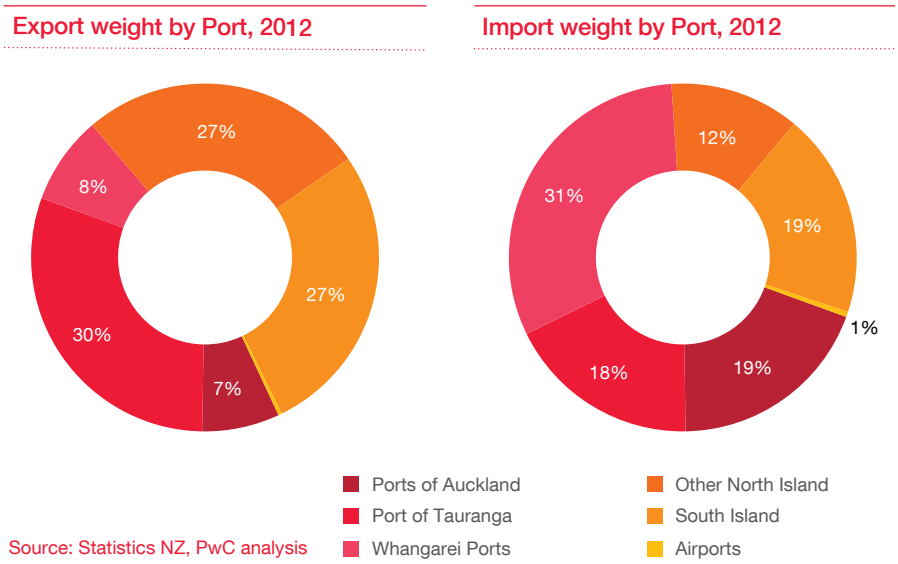
Share of freight exports and imports

Figure 14 shows the distribution of export and import weights across the UNI ports, the Lower North Island and the South Island.

The three UNI ports accounted for 45% of New Zealand's total freight export weights in 2012. 30% of national export weights were shipped through POT alone. The three UNI ports are even more important to national imports, with 68% of total weights in 2012. The Whangarei ports, which include the Marsden Point refinery's oil terminal, accounted for 31% of import weights on their own. This reflects Whangarei's national role in oil refining and distribution.

Only 1% of export and import weights are transported by air. The majority of the country's air freight moves through Auckland International Airport.

Figure 14: Upper North Island ports dominate import weights



Source: Statistics NZ, PwC analysis