# Analysis of Port Capacities and Infrastructure Requirements

## Upper North Island Supply Chain Strategy Project

**Prepared for Sapere Research Group Ltd.**

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Advisian
Worley Group

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Disclaimer- This report was prepared for Sapere Research Group, to inform their work on the Upper North Island Supply Chain Strategy. It does not represent the views of the Ministry of Transport.

**Disclaimer**



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**PROJECT 311015-00060 – MA-REP-0003-1: Analysis of Port Capacities and Infrastructure Requirements - Upper North Island Supply Chain Strategy Project**

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# Executive summary

Advisian was commissioned by Sapere Research Group to undertake analysis of port capacities to inform the Upper North Island Supply Chain Strategy. The study considered the capacity and ability for growth of Ports of Auckland (POAL), Port of Tauranga (POT), and Northport (NP) over the next 60 years. This report concluded that in order to accommodate POAL's current and future forecast freight growth to the year 2077/78, both NP and POT will need to be fully utilised within existing port precincts and adjacent industrial areas.

This report considered port infrastructure requirements, such as number of berths and terminal areas, to accommodate forecast freight growth. This report did not consider the broader supply chain requirements beyond the port precinct.

Freight growth forecasts adopted in the report were provided by Sapere [1].

Additional port infrastructure requirements within existing port precincts, or adjacent industrial areas, to accommodate trade growth forecasts were based on existing port development plans provided by POAL, POT and NP, together with other potential port development options identified by Advisian. The estimated year at which port capacity is reached and port infrastructure costs associated with the port development is provided in this report.

Where ports have insufficient capacity to cater for the 60 year freight growth forecast, potential future port expansion areas were identified by Advisian. Only high level consideration of social and environmental impacts and associated risks with such development were made. This report therefore provides an assessment of the ability of ports to accommodate the 60 year trade growth forecast taking into account both ports' development plans and the potential areas for future expansion identified in this report.

The future capacity of port infrastructure has been determined by adopting port capacity metrics from the existing port development plans. Advisian applied a capacity reduction factor to the peak capacity metrics to reflect inefficiencies that occur in port operations when operating near capacity. Advisian determined that the container terminal throughput capacity metrics provided by POAL and POT were higher than global average metrics but are considered appropriate with capacity reduction factors applied. Port capacity metrics adopted in this report are similar to the capacity metrics adopted in previous upper North Island supply chain studies [2] and [3].

Both POT and NP are estuary ports with natural navigation channels subject to strong currents. Such conditions make vessel navigation and turning difficult and can impact port capacity due to limitations on vessel sailing times. Based on experience with other ports, Advisian believes that the risk of port capacity limitations due to navigation issues can be reduced through the use of larger tugs and possible channel modifications (subject to navigation and coastal process studies).

High level cost estimates of required port infrastructure were developed from Advisian's database of port infrastructure construction projects recently estimated or executed within Australia and New Zealand. Cost estimates have been developed for comparison of various port development options presented herein.

Port development scenarios analysed in this report are shown in Table 0-1. The estimated year at which port capacity is reached and port infrastructure costs associated with the port development is also provided. This date is based on the capacity of the provided masterplans and future expansion areas within the existing port precincts. The Base Case assumes all three ports continue to develop; Scenarios B and C assume the majority of POAL freight is relocated to either POT or NP; and Scenario D assumes that the freight from POAL is split between POT and NP.

*Table 0-1: Analysed scenarios and the port capacity and associated capital cost*

| Scenario | | Port Capacity Exceeded | Cost |
|---|---|---|---|
| A | Base Case/No change for the three ports | POAL – 2053<br>POT – not within study period | POAL - $500 Million<br>POT - $1.6 Billion |
| B | POAL freight to POT | 2056 | $1.6 Billion |
| C | POAL freight to NP | 2058 | $1.7 Billion |
| D | Split of POAL freight to POT and NP | Not within study period | POT - $2.1 Billion<br>NP - $1.8 Billion |

## Scenario A – Base Case

The Port of Auckland would need to develop within the existing port precinct in accordance with POAL development plans to accommodate the adopted forecast freight growth. The estimated cost to develop port infrastructure within this footprint to accommodate growth to 2053 is $500 Million. Under the forecast freight growth assumptions at 2053 the capacity of the current POAL precinct will be reached and it will no longer be able to accommodate further growth without precinct expansion.

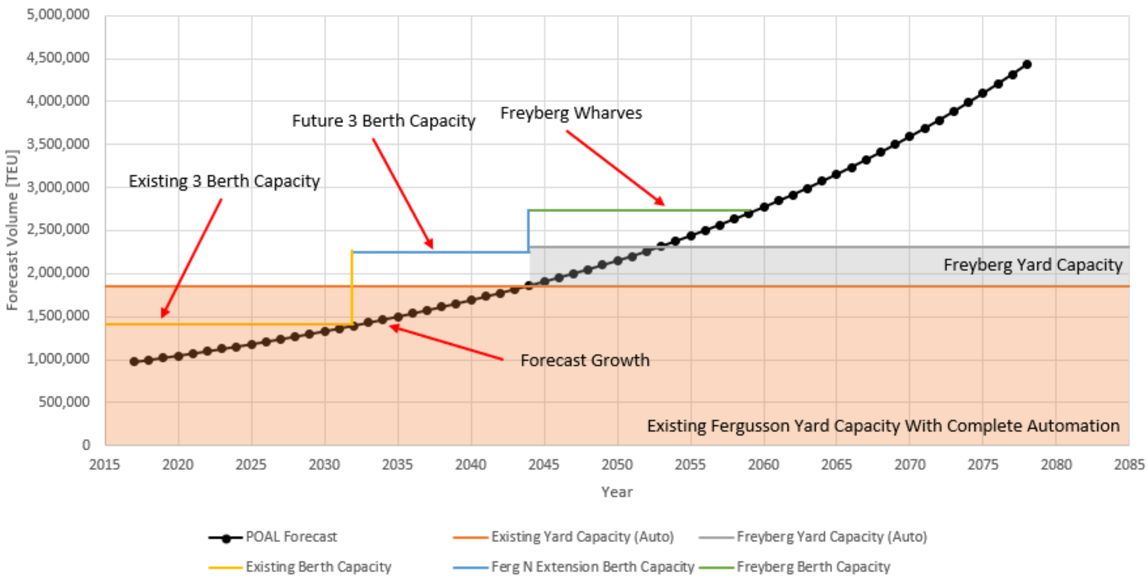



*Figure 0-1: Scenario A POAL – container capacity plot*

The Port of Tauranga would need to develop within the existing port precinct and adjacent industrial areas to accommodate the adopted forecast freight growth. The estimated cost to develop port infrastructure within this footprint to accommodate growth to 2078 is $1.6 Billion.

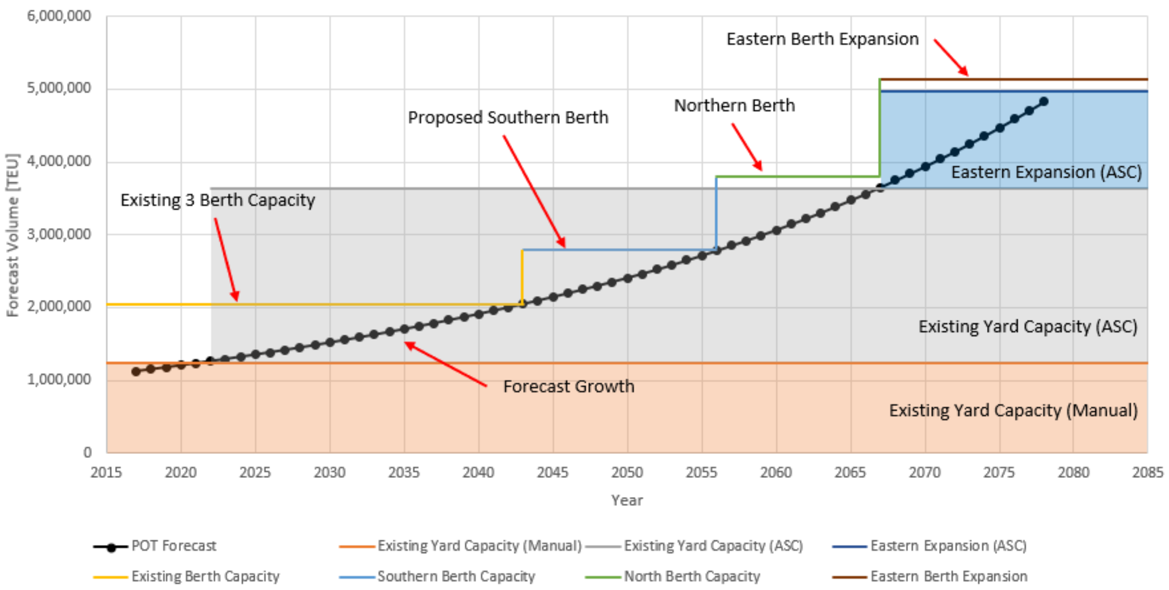



*Figure 0-2: Scenario A POT – container capacity plot*

As the main commodities through NP are currently logs and breakbulk, the Port will be able meet forecast demand under the current three-port assumption with minimal capital expenditure.

## Scenario B – POAL Freight to POT

To accommodate all of the Port of Auckland's current and forecast freight growth, POT port would need to develop within the existing port precinct and adjacent industrial areas to accommodate the adopted forecast freight growth. The estimated cost to develop port infrastructure within this footprint to accommodate growth to 2056 is $1.6 Billion. The hypothetical freight forecast curve in Figure 0-3 starts in the year 2030 as it is assumed that freight has relocated by this year from POAL to POT.

Beyond this, the Port has no further expansion plans and further works would be required for the port to accommodate further growth which is assumed to the south of the existing port precinct. This port expansion would require relocation of other significant infrastructure including the highway, marina and airport. The estimated cost to develop port infrastructure to accommodate all growth to 2077/78 is $3.3 Billion. This cost does not include costs related to relocation of other infrastructure such as the highway, marina, and airport.

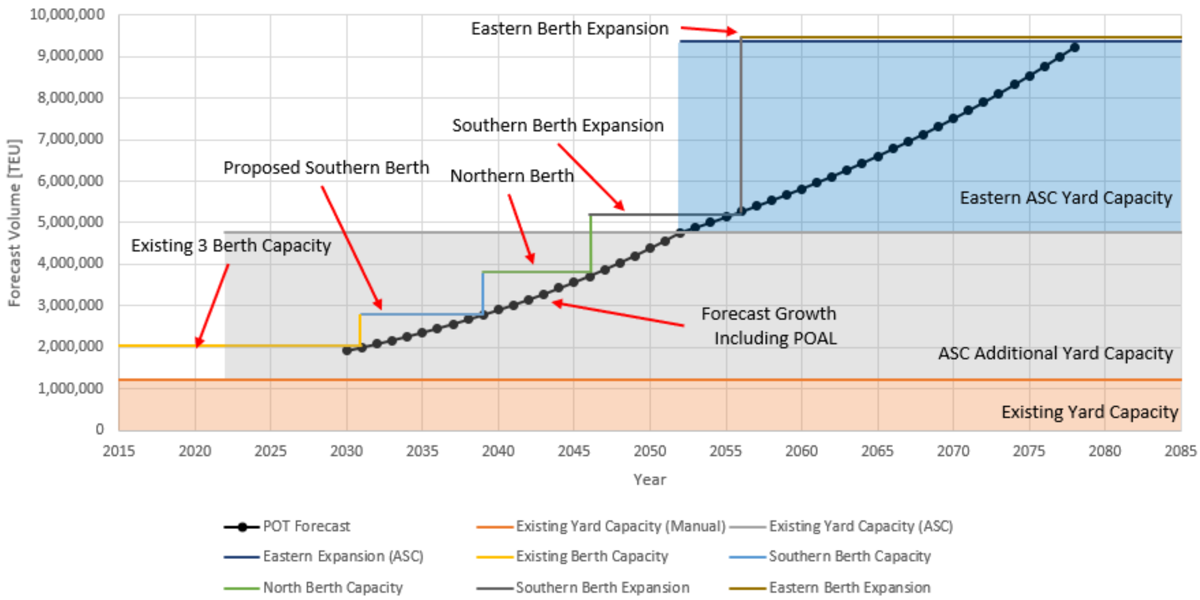



*Figure 0-3: Scenario B POT – container capacity plot showing a hypothetical growth curve of the combined POAL and POT growth starting from 2030*

## Scenario C – POAL Freight to NP

Should NP also accommodate all of the Ports of Auckland's current and forecast trade growth, the port would need to develop within the existing port precinct and adjacent industrial areas to accommodate the adopted forecast freight growth. The estimated cost to develop port infrastructure within this footprint to accommodate growth to 2058 is $1.7 Billion. The hypothetical freight forecast curve in Figure 0-4 starts in the year 2030 as it is assumed that freight has relocated by this year from POAL to NP.

Beyond this, the Port has the ability to expand into port owned land to the south. Additional berth length is feasible, although challenged by limitations imposed by existing housing development, natural estuary channel geometry and coastal processes at Marsden Point. If sufficient berth length is provided to accommodate all growth to 2077/78, the estimated cost to develop the required port infrastructure is $2.5 Billion.

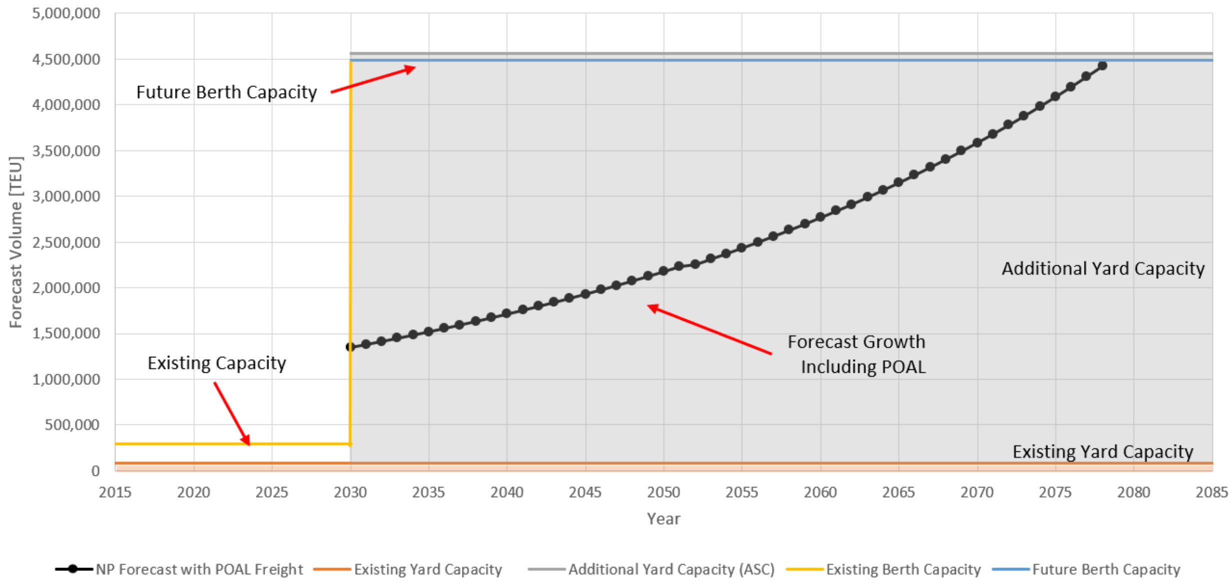



*Figure 0-4: Scenario C NP – container capacity plot showing a hypothetical growth curve of the combined POAL and NP growth starting from 2030*

## Scenario D – POAL Freight to Both POT and NP

Should the POAL current and forecast trade growth be relocated to both POT and NP, the combined port capacity will not be exceeded within the study period to 2077/78. This capacity is based on both ports developing within their existing port precincts and adjacent industrial areas. The estimated cost to provide port infrastructure to accommodate the 2077/78 growth is $2.1 Billion at POT and $1.8 Billion at NP. This cost does not include costs related to relocation of other infrastructure such as the highway at Tauranga. There is also the potential for the container terminal to interfere with the Tauranga airport maximum air draught restrictions, and will require further studies and consultation to assess the impact. The hypothetical freight forecast curve in Figure 0-5 and Figure 0-6 starts in the year 2030 as it is assumed that freight has relocated by this year.

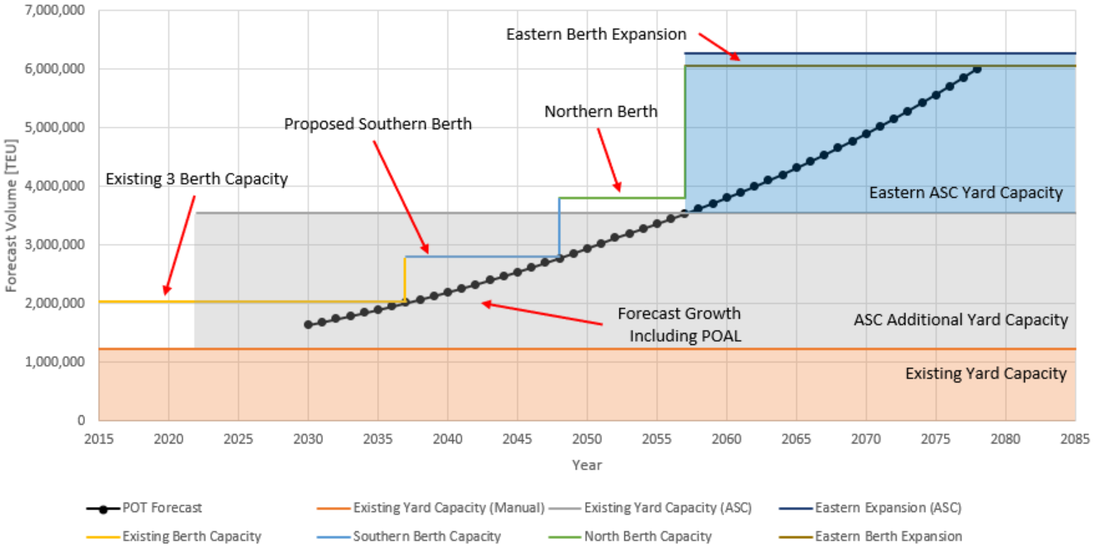



*Figure 0-5: Scenario D POT – container capacity plot showing a hypothetical growth curve of the combined POAL and POT growth starting from 2030*

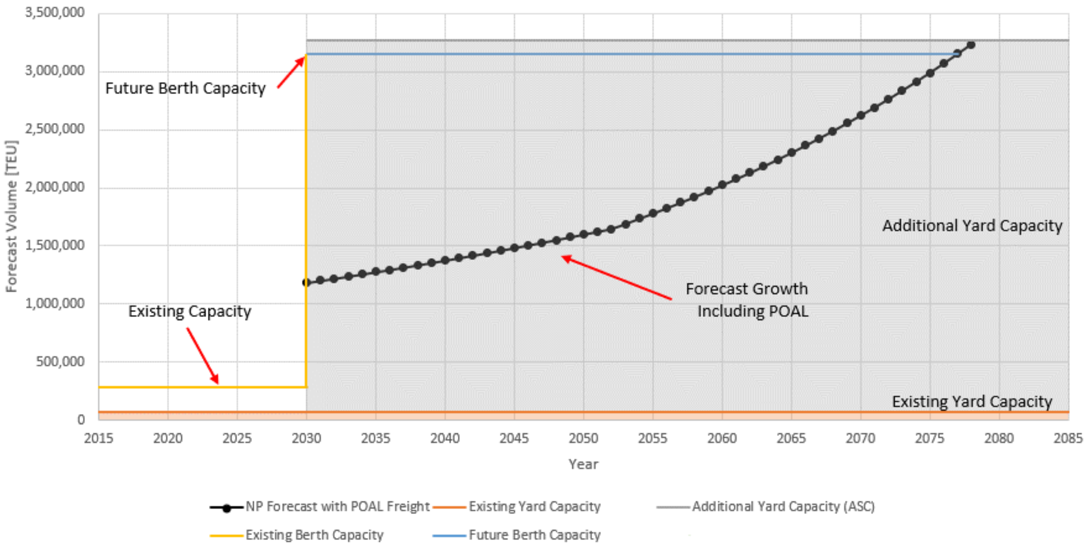



*Figure 0-6: Scenario D NP – container capacity plot showing a hypothetical growth curve of the combined POAL and NP growth starting from 2030*

# Acronyms and abbreviations

| Acronym/abbreviation | Definition |
|---|---|
| ARMG | Automated Rail Mounted Gantry Crane |
| ASC | Automated Stacking Crane |
| EY | Ernst & Young |
| JAS | Japanese Agricultural Standard |
| MOT | Ministry of Transport |
| NP | Northport |
| NZTA | New Zealand Transport Agency |
| POAL | Ports of Auckland Limited |
| POT | Port of Tauranga |
| QC | Quay Crane |
| RoRo | Roll-On Roll-Off Vessel |
| SC | Straddle Carrier |
| TEU | Twenty-Foot Equivalent Unit |
| UNISCS | Upper North Island Supply Chain Strategy |
| WG | Working Group |

# 1 Purpose

Advisian was commissioned by Sapere Research Group to contribute analysis to a programme of work to inform future decisions on the Upper North Island Supply Chain Strategy, including port relocation and timeframes for doing so. The scope of the study was to consider the capacity and ability for growth of Ports of Auckland (POAL), Port of Tauranga (POT), and Northport (NP) for the next 60 years, and included the following:

- review Advisian's previous port analysis, prepared for the Upper North Island Supply Chain Strategy Working Group in 2019 [3];
- undertake in-person engagement with three ports – POAL, POT and NP;
- prepare updated assumptions and layouts for scenarios in which each of the three ports, named above, handle the freight operations of POAL, or, in which those freight operations are handled by a combination of the POT and NP;
- prepare a high-level schedule of necessary capital works and associated costings to support each of the above scenarios;
- liaise with other port consultants to ensure consistent assumptions, where appropriate;
- prepare a formal summary of this work in the form of a detailed spreadsheet of costings, a statement of the key findings with conclusions and supporting graphics, and a technical paper that lays out the approach, assumptions and comments on uncertainty.

This report and analysis were conducted from an engineering viewpoint on the port infrastructure and did not account for the broader supply chain of the Upper North Island or shipping routes. The analysis was conducted at a high level with minimal engineering design work conducted.

For the purpose of this study, it has been assumed that the proposed Drydock facility for Northport will not be built at the port.

# 2 Assumptions

## 2.1 Common for Three Ports

The following assumptions have been made which are common between the three ports assessed:

- The forecast data received has been assumed to accurate and no further analysis was conducted on these values. Assumptions and methodology can be found in [1].
- The capacity plots used to assess the additional infrastructure required to accommodate POAL's current and forecast freight start at 2030 as it is assumed that freight has relocated from POAL by this year
- This report and analysis were conducted from an engineering viewpoint on the port infrastructure and does not account for the broader supply chain of the Upper North Island or shipping routes.
- The analysis was conducted at a high level with minimal engineering design work which was based off available masterplans for the ports, with future expansion areas independently conceptualised
- Only "On-Port" areas were analysed in this study, therefore "Off-Port" storage and intermodal facilities are not included in available land/capacity
- All three ports (POAL, POT, and NP) will be able to handle the future growth of bulk commodities, as imports are offloaded to off port storage areas
- Metrics for berth and yard capacities are existing figures and do not consider potential future productivity and efficiency improvements
- Metrics were derived from existing and assumed future capacities provided by the ports, which are a maximum capacity. Where no metrics were provided, assumptions based of benchmarking and reference documents were made.
- A yard capacity reduction factor applied of 12% to estimate the operational capacity based off operational ports in Australia and the Middle East
- The cost estimates have been developed without conducting engineering analysis and preparation of material quantities and are therefore deemed to be high level, budgetary estimates. These budgetary estimates shall be used for comparative budget estimate orders of magnitude with an order of accuracy of no less than ±50%.
- The budgetary estimates are for capital investment only and does not allow for contingencies. The assumed cost metrics are as of 2020 and do not account for changes in costs in the future
- Cost structures between location of reference projects used to develop the budget estimates and the location of projects presented herein are assumed to be comparable

## 2.2 Ports of Auckland

The following assumptions have been made for POAL:

- The rail siding will be automated in the future to improve throughput via rail
- Cruise vessels will remain in POAL
- The automated one over three Straddle Carriers (SC) will be fully deployed in the future with no manual SC operating in the yard

- Figure 2-1 shows a standard One over Two SC which can stack containers three high, but only lift one container over a two high stack. POAL have invested in One over Three SC which can stack four high therefore increasing the yard capacity.


*Figure 2-1: One over Two Straddle Carrier which can stack containers three high*

### 2.2.1 Areas Examined in this Study

The area circled in Figure 2-2 has been the assumed area of expansion to accommodate future growth in containers if the port was to remain in place in the long term. This would involve substantial reclamation in the harbour but not necessarily extending beyond the current north face of the Fergusson wharf. Reclamation is a controversial topic; however it is not accounted for the purpose of this engineering-focused analysis. It does however pose a significant risk which will need to be quantified and analysed in future studies.

Expansion eastward will have coastal impacts on the sediment flow through the harbour potentially causing siltation around Mechanics Bay and Judges Bay. This would require further study to assess the impact.

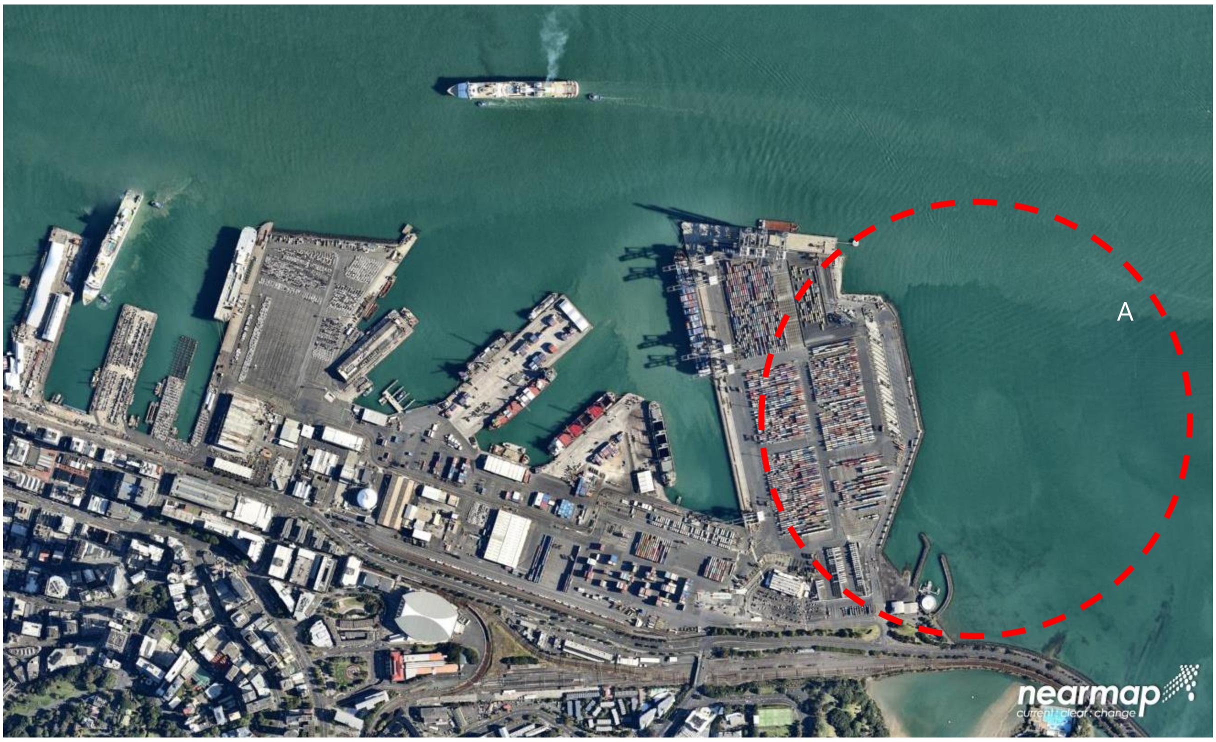



*Figure 2-2: POAL areas of potential expansion*

Listed below are the planned projects for POAL and their current consent status as per their 30 year masterplan [4]:

- Extend Fergusson North wharf – consent required
- Complete Fergusson reclamation – already consented
- Construct North Berth at Bledisloe – consent required
- Construct roof top park – low level consent required
- Demolish Shed 51 and part B1 wharf – permitted activity
- Replace wharf structure on south end of Bledisloe west – low level consent required
- Construct new seawall south of Marsden Wharf – low level consent required
- Remove Marsden Wharf and dredge basin – consent required
- Deepen channel – have applied for consent
- Engineering workshop – low level consent required
- Rail grid automation – permitted activity

## 2.3 Port of Tauranga

The following assumptions have been made for POT:

- The container terminal will be converted to automated rail mounted gantry cranes (ARMG), also known as Automated Stacking Cranes (ASC), as yard capacity is required
- Northern breakwater wharf operational inefficiencies are not accounted for in the metrics

### 2.3.1 Areas Examined in this Study

There are three highlighted areas in Figure 2-3 where potential port expansion could occur.

Area A is to the south of the existing berths at Sulphur Point and Mount Maunganui and enables expansion of the bulk and container terminals within existing port precincts and adjacent industrial areas. It will involve dredging the channel and berth pockets and relocating the marina. However, this expansion will not be possible until the airport either changes current flight operations, adjusts the location of the runway, or is relocated to outside of the city; this is due to the air-draught restrictions surrounding the approach flight path.

Area B is located to the west of the existing Sulphur Point container terminal which will involve constructing a new quay line where the boat ramp and marina are currently located. This will allow for connectivity to the existing container terminal. Significant dredging would be required to widen the creek to allow for a berth pocket sufficient for container vessels. It has been assumed that current flow through the creek would not be strong enough to flush sediment from the berths and therefore maintenance dredging would also be required. It is believed that there would not be significant impacts on existing coastal processes. The land is not owned by the port, and the expansion would involve the relocation of the marina and public boat ramp. For these reasons, this Area B is less desirable than Area A.

Area C involves reclamation to the north of the Sulphur Point to create additional hardstand and enable a continuous quay line. However, there is a channel that runs adjacent to the northern breakwater where strong currents from tidal flows are common. Expansion northward into the tidal channel would change tidal flow paths both to the northeast onto the Mount Maunganui foreshore and to the west into the estuary. Locally it would impact the entrance to the adjacent marina, possibly causing siltation and presenting a navigation hazard to recreational boating. This would require detailed investigation including modelling, although, even with detailed modelling, there would still be a significant risk to existing coastal processes. Therefore, no reclamation north of Sulphur Point has been considered.

Area D involves expanding the Mount Maunganui wharves north up to Pilot Bay. However, this is a popular tourist beach, which is quite shallow and with residential areas adjacent, thus requiring significant dreading and reclamation. Compared to Area A, Area C is less desirable due to the proximity of residential areas leading to significant consenting issues.


Figure 2-3: POT areas of potential expansion

## 2.4 Northport

The following assumptions have been made for NP:

- Land behind the port can be developed as required
- The potential drydock facility is not built on the western expansion of the port
- Container terminal will be developed with ASC initially and expanded as required

### 2.4.1 Areas Examined in this Study

There are two highlighted areas of expansion identified for Northport as shown in Figure 2-4.

Area A is to the east of the existing wharves towards the Refining NZ berths. Northport currently has consent to extend the wharf by 270 m and associated reclamation. Reclamation to the east could extend out to approximately the yellow circle without significant impacts to the existing coastal processes as this follows the natural curvature of the coastline. Further expansion would have a significant impact on coastal processes, particularly along the beach to the southeast leading up to Marsden Point. Such works would interrupt the sand supply to the estuary and result in the accumulation of sand to the east of the tank farm. Such a major perturbation to the coastal processes would require detailed investigation. Expansion to the east will require the demolition and relocation of the existing bulk liquid berths.

Area B is to the west of the existing terminal, which is where there are potential plans to locate a drydock facility. This area includes a culturally and environmentally significant wetland to the south which will have to be considered. Increased sedimentation within this estuary would be expected and would require further studies to establish the required planning and management of the area due to changes to the coastal processes. Development to the west will also impact on views of residents at Marsden Cove. NP has plans for a 300 m expansion with reclamation to the west, however further expansion further westward has also been considered in this Study.

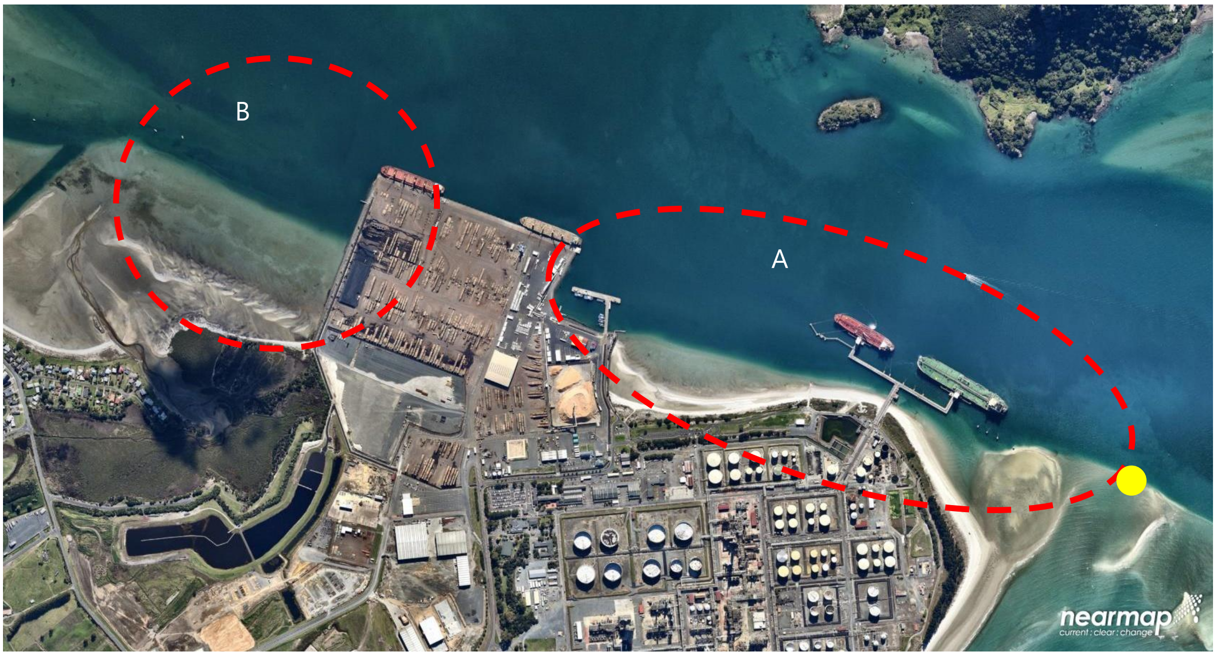



*Figure 2-4: NP areas of potential expansion where the limit of expansion is shown in yellow*

# 3 Input Data and Metrics

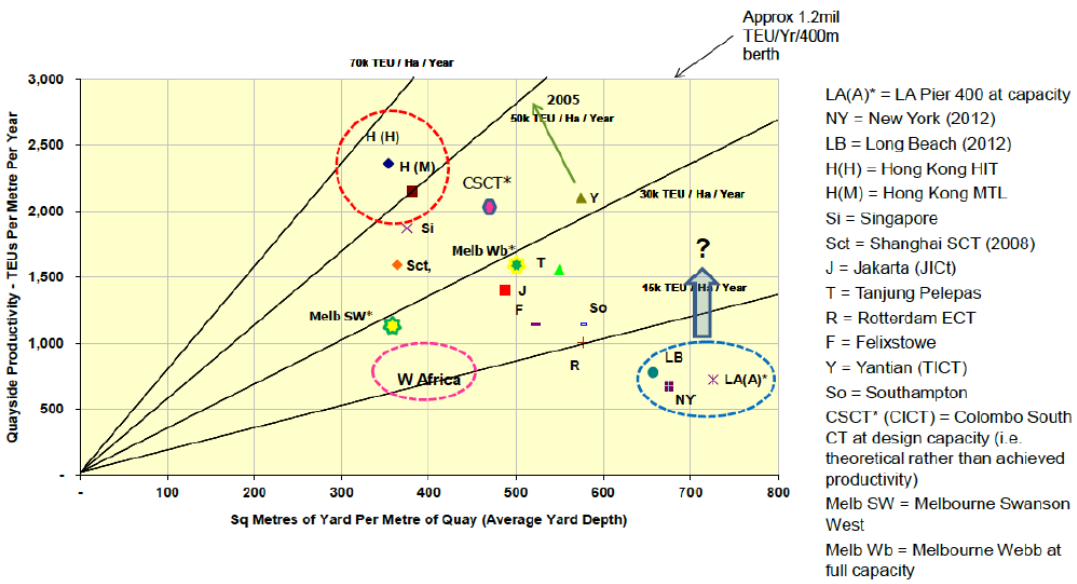
## 3.1 Common for Three Ports

The below metrics were developed from benchmarking throughput of different commodities against other ports both domestically and internationally, reference documents ( [5], [6], and [7]), and through consultation with the ports as listed in Appendix A, [8], [9], and [10]. Different metrics were used for each port as their operational procedures are not consistent.

The provided metrics were derived through work conducted for the ports by external consultants and have been assumed to be maximum capacities of the terminal. Although the provided metrics are higher than the global averages for container terminals, the productivity rates in New Zealand are quite high due to high labour productivity in the ports.

Although, it is not practical to operate a container terminal at maximum capacity for extended periods as the terminal becomes congested thus effecting productivity. As no modelling reports were provided, it is assumed that the metrics provided by the port are at maximum capacity throughput, which is higher than an operational capacity. Therefore, a reduction capacity of 12% was applied to the yard capacity, which was benchmarked from operational ports in Australia and the Middle East. An additional capacity reduction factor of 35% was applied to the planned Freyberg Wharf Terminal area in POAL due to the inefficient layout which will not yield the same performance as the main Fergusson Terminal. This lower capacity has been adopted as prudent planning would suggest not to use best case maximum capacities for future planning purposes.

It is noted however, that benchmarking container terminal metrics from other ports can introduce inconsistencies, as each ports' mode of operation, productivity, and external factors are different. This can be observed in Figure 3-1, taken from [2], where there is a wide range of berth and yard metrics for operating container terminals worldwide. It is for this reason the metrics provided by the ports were utilised where possible as modelling had been conducted by external consultants.




Source: ICF GHK; data are for 2011 throughput unless otherwise stated

*Figure 3-1: International comparison of terminal productivity from 2011 [2]*

## 3.2 Ports of Auckland

Tabulated below are the existing land and berth areas (Table 3-1), and derived metrics for land capacities (Table 3-2) and berth throughputs (Table 3-3).

*Table 3-1: Existing yard and berth for POAL*

| Product | Land Area [Ha] | Berth Length [m] |
|---|---|---|
| **Containers** | 19.9 | 960 |
| **Vehicles** | 10.1 | 495 |
| **Other Bulk** | 3.4 | 1,444 |

*Table 3-2: Existing yard capacity metrics for POAL*

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Containers Manual** | 45,000 | TEU/Ha/Yr | Existing capacity and area provided by POAL |
| **Containers Automated** | 100,000 | TEU/Ha/Yr | Future capacity and area provided by POAL |
| **Vehicles** | 65,000 | No./Ha/Yr | Based off Port Kembla 5.7M tonne of vehicle imports, assumed 2 t/car, and 44 Ha on berth area |
| **Other Bulk** | 553,687 | MT/Ha/Yr | Existing capacity of POAL |

*Table 3-3: Existing berth capacity metrics for POAL*

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Containers** | 1,448<br>2,300 | TEU/m/Yr<br>TEU/m/Yr | Figure provided by POAL<br>Assumed future throughput as provided by POAL |
| **Vehicles** | 3,650 | No./m/Yr | Port Kembla 5.7M tonne cars at 3 berths assumed, assumed 2 t/car |
| **Bulk** | 18,250 | MT/m/Yr | Assuming 150kT bulk carrier every 10 days |

## 3.3 Port of Tauranga

Tabulated below are the existing land and berth areas (Table 3-4), and derived metrics for land capacities (Table 3-5) and berth throughputs (Table 3-6).

*Table 3-4: Existing yard and berth for POT*

| Product | Land Area [Ha] | Berth Length [m] |
|---|---|---|
| **Logs** | 26.0 | 1,060 |
| **Containers** | 30.8 | 770 |
| **Vehicles** | - | - |
| **Bulk** | 9.3 | 900 |

*Table 3-5: Existing yard capacity metrics for POT*

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Logs** | 468,750 | JAS/Ha/Yr | Benchmarked from other NZ ports |
| **Containers Manual** | 45,000 | TEU/Ha/Yr | Benchmarked off existing capacity and area |
| **Containers Automated** | 134,000 | TEU/Ha/Yr | Benchmarked off DPWA BNE Capacity for ASC [11] |
| **Vehicles** | 65,000 | No./Ha/Yr | Based off Port Kembla 5.7M tonne of vehicle imports, assumed 2 t/car, and 44 Ha on berth area |
| **Other Bulk** | 629,000 | MT/Ha/Yr | Existing capacity of POT |

*Table 3-6: Existing berth capacity metrics for POT*

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Logs** | 13,600 | JAS/m/Yr | Benchmarked from other NZ ports |
| **Containers** | 2,650 | TEU/m/Yr | Figure provided by POAL |
| **Vehicles** | 13,600 | No./m/Yr | Port Kembla 5.7M tonne cars at 3 berths assumed, assumed 2 t/car |
| **Bulk** | 26,000 | MT/m/Yr | Assuming 150kT bulk carrier every 7 days |

## 3.4 Northport

Tabulated below are the existing land and berth areas (Table 3-7), and derived metrics for land capacities (Table 3-8) and berth throughputs (Table 3-9).

*Table 3-7: Existing yard and berth for NP*

| Product | Land Area [Ha] | Berth Length [m] |
|---|---|---|
| **Logs** | 20.0 | 370 |
| **Containers** | 2.6 | - |
| **Vehicles** | - | - |
| **Other Bulk** | 7.1 | 200 |

*Table 3-8: Existing yard capacity metrics for NP*

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Logs** | 468,750 | JAS/Ha/Yr | Benchmarked from other NZ ports |
| **Containers Manual** | 30,000 | TEU/Ha/Yr | Metric from [5] |
| **Containers Automated** | 134,000 | TEU/Ha/Yr | Benchmarked off DPWA BNE Capacity for ASC [11] |
| **Vehicles** | 65,000 | No./Ha/Yr | Based off Port Kembla 5.7M tonne of vehicle imports, assumed 2 t/car, and 44 Ha on berth area |
| **Other Bulk** | 629,000 | MT/Ha/Yr | Existing capacity of POT |

Table 3-9: Existing berth capacity metrics for NP

| Product | Rate | Units | Reference |
|---|---|---|---|
| **Logs** | 13,600 | JAS/m/Yr | Benchmarked from other NZ ports |
| **Containers** | 2,300 | TEU/m/Yr | Future throughput assumed the same as POAL |
| **Vehicles** | 13,600 | No./m/Yr | Port Kembla 5.7M tonne cars at 3 berths assumed, assumed 2 t/car |
| **Bulk** | 18,250 | MT/m/Yr | Assuming 150kT bulk carrier every 10 days |

# 4 Analysis

## 4.1 Methodology

The analysis was conducted by deriving metrics for yard and berth capacities from benchmarking against other ports and standard metrics as outlined in Section 3. This enabled reverse engineering to determine the required yard and berth to handle the forecast throughput.

The high-level budget estimates have been developed from Advisian's database of marine works construction projects recently estimated or executed within Australia or New Zealand. These costs have then been converted into a cost metric so that they may be applied to the different infrastructure requirements identified within this report to allow for a comparative assessment between the different ports and options presented herein.

Four different Scenarios were analysed which are listed in Table 4-1. The Base Case assumes no change in current supply chain and the port expansion is unconstrained; Scenario B and C assume the majority of POAL freight is relocated to either POT or NP; and Scenario D assumes that the freight form POAL is split between POT and NP. The relocated freight from POAL does not include the following for Scenarios B, C and D as advised in [1]:

- Aggregate, Sand and Cement products
- Iron and Steel scraps
- Wood products
- Cruise vessels

These commodities are not being relocated for the following reasons:

- Cement products are typically needed in the city for construction purposes and if they are relocated outside of the city, they will still need to be transported from the import port to the construction site. This is similar to what currently occurs in Sydney, where cement is still imported to Glebe Island, in the city, as majority of the cement requirements are in the city.
- Iron and steel scraps and wood products are relatively low value commodities and relocating them outside the city port would greatly devalue the product
- The cruise industry is a significant tourism income for the city and should remain as has been done in many major port cities around the world, such as Sydney

*Table 4-1: Analysed scenarios*

| Scenario | |
|---|---|
| A | Base Case/No change for the three ports |
| B | POAL freight to POT |
| C | POAL freight to NP |
| D | Split of POAL freight to POT and NP |

## 4.2 Scenario A – Base Case

The base case assumes that each port handles their own growth with no new commodities introduced at any of the three ports.

### 4.2.1 Ports of Auckland

Auckland Port has been separated into three areas according to dominant commodity type: containers, bulk, and cars.

It has been assumed that Auckland's capacity to handle bulk commodities will remain sufficient throughout the forecast period. This is because the majority of the bulk imported goods are not stockpiled on the wharf but are transported directly to an offsite depot via road and rail. However, cement imports are stockpiled within the Port and have just been upgraded to increase capacity. Although if additional on port storage is required, the areas surrounding the Holcim Cement Dome could be converted into silos.

Similarly for vehicles, it has been assumed that the hardstand adjacent to the wharf and multistorey carpark will be sufficient to service the future demands. This assumption is based on the ability to stockpile vehicles off port which further reduces the dwell time thus increasing throughput. This is a similar methodology to what was utilised at Glebe Island Car Terminal, in Sydney, prior to the vehicle trade relocation to Port Kembla.

#### *4.2.1.1 Capacity Plot*

Figure 4-1 shows the capacity of the existing Fergusson Container Terminal, with complete automation, with the forecast growth shown in black. It can be seen that the existing Fergusson Container Terminal will reach operational capacity in approximately 2044, and thereafter, expansion into Freyberg wharf will be required.

However, due to the geometry of the Freyberg wharves and yard, and limited connectivity between the two terminals, the capacity of the terminal and throughput of the berth have been reduced by 35%. This is due to productivity being less than the main terminal, and the wharves would only be able to service small vessels such as coastal and Pacific trades. Even with this expansion, POAL will hit operational capacity limits for container freight by approximately 2053.

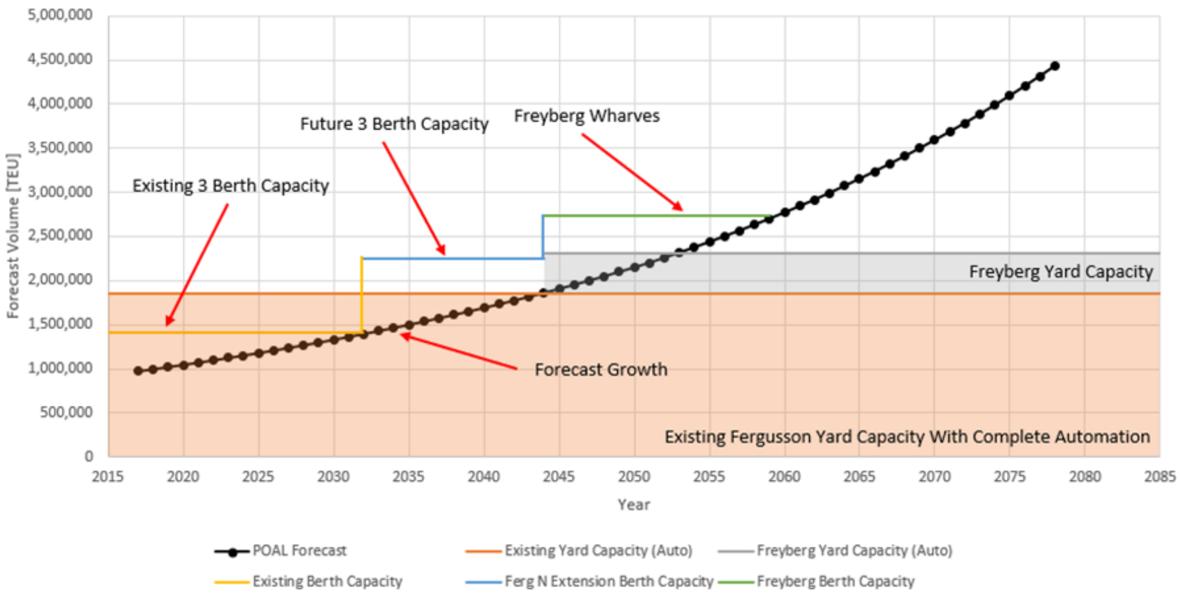



*Figure 4-1: Scenario A POAL – container capacity plot*

#### *4.2.1.2 Required Infrastructure*

Listed below are the investments required to cater for the 30 year forecast volume (2052/53) in accordance to the POAL 30-year plan [4]:

- Fergusson North Wharf extension – consent required
- Reclamation (piled wharf structure) behind expanded Fergusson North Wharf – already consented
- Channel and berth pocket dredging to allow larger vessels – Consent required
- Expansion of Freyberg wharf
- Demolition of Marsden Wharf – Consent required
- Redevelopment of Bledisloe South Wharf for Car Carries (Also known as Roll-on Roll-off vessels (RoRo)) – Consent required
- Construction of Bledisloe North Wharf – Consent required
- Demolition part of B1 wharf (Location of existing multistorey carpark) – already consented
- Relocation of admin and engineering workshops

From this list, it can be seen that several significant projects are required to meet the forecast growth at POAL, some of which are not consented. Figure 4-2 shows the expansion into Freyberg Wharf and expansion of Fergusson North Wharf.

However, for the 2077/78 forecast container volumes future expansion is required beyond POAL's masterplan. This expansion requires an additional 800 m of quay with associated reclamation of 21 Ha to the east of Fergusson Terminal. This would require the relocation of the facilities at Judges Bay and Mechanics Bay.


*Figure 4-2: Scenario A POAL – required container terminal area 2077/78 forecast container volumes*

#### *4.2.1.3 Cost Estimate*

Table 4-2 shows the required investment to cater for the 2077/78 volumes, which have been estimated in 10 year timeframes. Total development cost to accommodate all of POAL current and forecast growth within the existing port precinct is $1.3 Billion.

*Table 4-2: Scenario A POAL infrastructure cost estimate*

| Base Case POAL | Item | Unit | 2020 Amount | 2020 Cost | 2030 Amount | 2030 Cost | 2040 Amount | 2040 Amount | 2050 Amount | 2050 Cost | 2060 Amount | 2060 Cost | 2070 Amount | 2070 Cost | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Port** | Dredging | $m^3$ | | | 2,500,000 | $37,500,000 | | | 240,000 | $3,600,000 | | | | | [12] |
| | Reclamation | $m^3$ | | | | | | | 2,460,000 | $110,700,000 | | | | | |
| | Quay Wall | m | | | | | | | 800 | $126,700,000 | | | | | |
| | Piled Wharf | m | | | 450 | $76,500,000 | 280 | $49,300,000 | | | | | | | New Berth and assumed refurbishment |
| | Wharf demolition | m | | | 280 | $32,220,000 | | | | | | | | | Demolition of Marsden and B1 |
| **Container Facilities** | Pavement and utilities | Ha | | | | | 7.1 | $39,050,000 | 23.4 | $128,480,000 | | | | | |
| | Quay Cranes | ea | | | 2 | $43,200,000 | | | 3 | $64,800,000 | 4 | $86,400,000 | 4 | $86,400,000 | |
| | ASC | ea | | | | | | | | | | | | | |
| | AutoStrad | ea | 10 | $46,000,000 | 10 | $46,000,000 | 12 | $55,200,000 | 16 | $73,600,000 | 22 | $101,200,000 | 22 | $101,200,000 | |
| | MHC | | | | | | 4 | $30,000,000 | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | No Logs through POAL |
| **Vehicles Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | Assumed sufficient area |
| | **Total (NZD)** | | **$46,000,000** | | **$235,000,000** | | **$174,000,000** | | **$434,000,000** | | **$188,000,000** | | **$188,000,000** | | **$1,265,000,000** |
| **Comments** | | | | | Development of southern Bledisloe Wharf.<br>Fergusson North Wharf extension and Reclamation, & channel dredging<br>New cranes | | North Bledisloe Wharf Construction<br>Freyberg Wharf development | | Provision for expansion of the container terminal beyond current and planned footprint | | | | | | |

### 4.2.1.4 Construction Timeline

Figure 4-3 shows the construction timeline for Scenario A POAL to cater for the 2077/78 forecast growth.

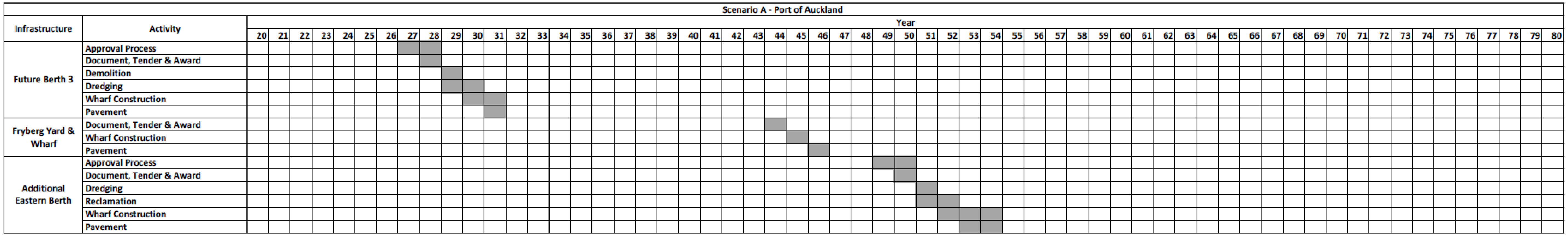



*Figure 4-3: Scenario A POAL infrastructure construction schedule*

#### 4.2.1.5 Risks

There are several risks associated with expanding POAL to cater for the forecast volumes as highlighted in Table 4-3.

*Table 4-3: Scenario A for POAL infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
| --- | --- | --- | --- |
| POAL unable to attain dredging consent | High | Unable to service larger vessels | - |
| POAL unable to attain Fergusson North Wharf extension consent | High | Unable to service larger vessels | - |
| Fergusson reclamation denied | Medium | Unable to expand yard, and if wharf extension is completed there would be no land to back it. | - |
| Unable to expand eastward of Fergusson Terminal | High | Unable to cater for future growth | - |
| POAL unable to attain Bledisloe North and South Wharf construction consent | High | Unable to cater for increase in vehicle imports | - |
| POAL unable to attain Demolition of Marsden Wharf consent | High | Unable to cater for increase in vehicle imports | - |
| Loss of social license | High | Unable to develop port to cater for future freight | - |
| Freyberg wharves and yard are not productive compared to Fergusson terminal | Medium | Unable to service the required future throughput | - |

### 4.2.2 Port of Tauranga

POT has been separated into three areas according to dominate commodity type, which are containers, bulk, and logs.

It has been assumed that POT's capacity to handle dry bulk and liquid commodities will remain sufficient throughout the forecast period. This is due to the port's ability to expand into acquired land surrounding the port to stockpile bulk materials.

#### *4.2.2.1 Capacity Plot*

As discussed in Section 2, it has been assumed that POT will be able to cater for future bulk and log throughput. It has also been assumed that one bulk liquid berth will be sufficient through until 2077/78 based off estimated throughputs equating to approximately one vessel per fortnight.

Figure 4-4 shows the capacity of the Sulphur Point Container Terminal overtime with the forecast growth shown in black. This plot shows that the Sulphur Point Container Terminal will reach operational capacity for current operations by 2022 where conversion to ASC will be required. However, operational berth capacity will be reached by 2056 upon which future expansion areas within the existing port precinct will be required. These areas have been identified as a Northern Berth on Sulphur Point and between the liquids berth and Mount Maunganui Wharves with associated terminal hardstand backing.

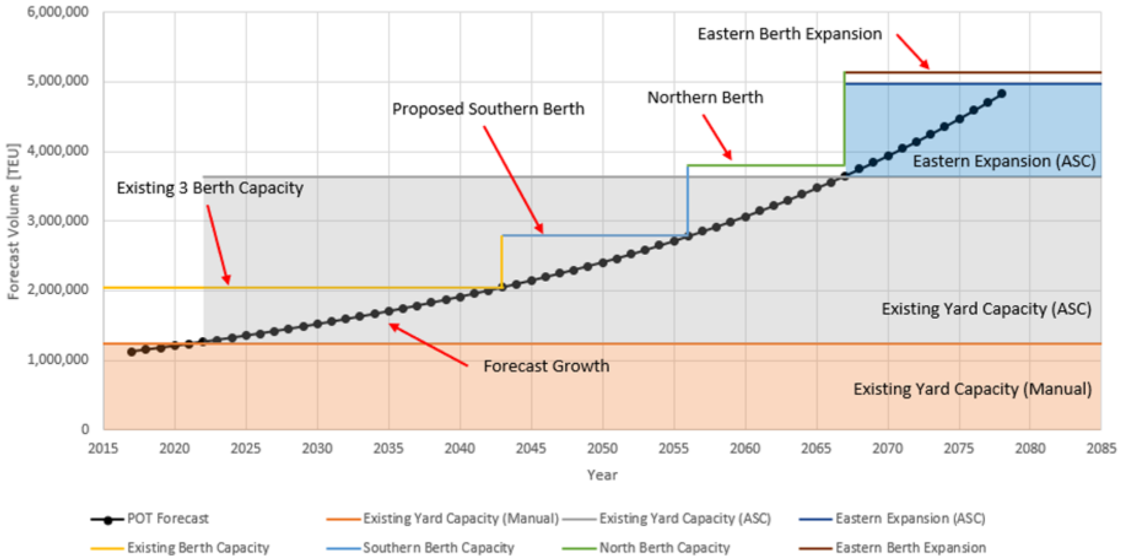



*Figure 4-4: Scenario A POT – container capacity plot*

#### *4.2.2.2 Required Infrastructure*

From the forecast container volumes, the existing terminal yard with minor expansion area is sufficient, however the berth length is the limiting issue. Therefore, expansion into the Mount Maunganui wharves was considered with minor impact on existing berths as shown in Figure 4-5.

Construction of the 290 m Southern Berth on Sulphur Point is required within the next 10 years to allow for the development of ASC in the existing empty container yard to minimise disruption on existing operations. As throughput increases, additional ASC stacks can be developed northward into the existing terminal area. However, after 2056, additional berths are required beyond the current plan presented by POT.

Due to the proximity of the airport runway flightpath, the construction of wharves further south of the Southern Berth may not be possible without altering the existing airport operations due to air-draught restrictions. Therefore, construction of a 380 m wharf on the northern breakwater of Sulphur Point and to the south of the Mount Maunganui Wharves, with 9 Ha of terminal, has been suggested to provide for future expansion sufficient to cater for the forecast 2077/78 container freight.

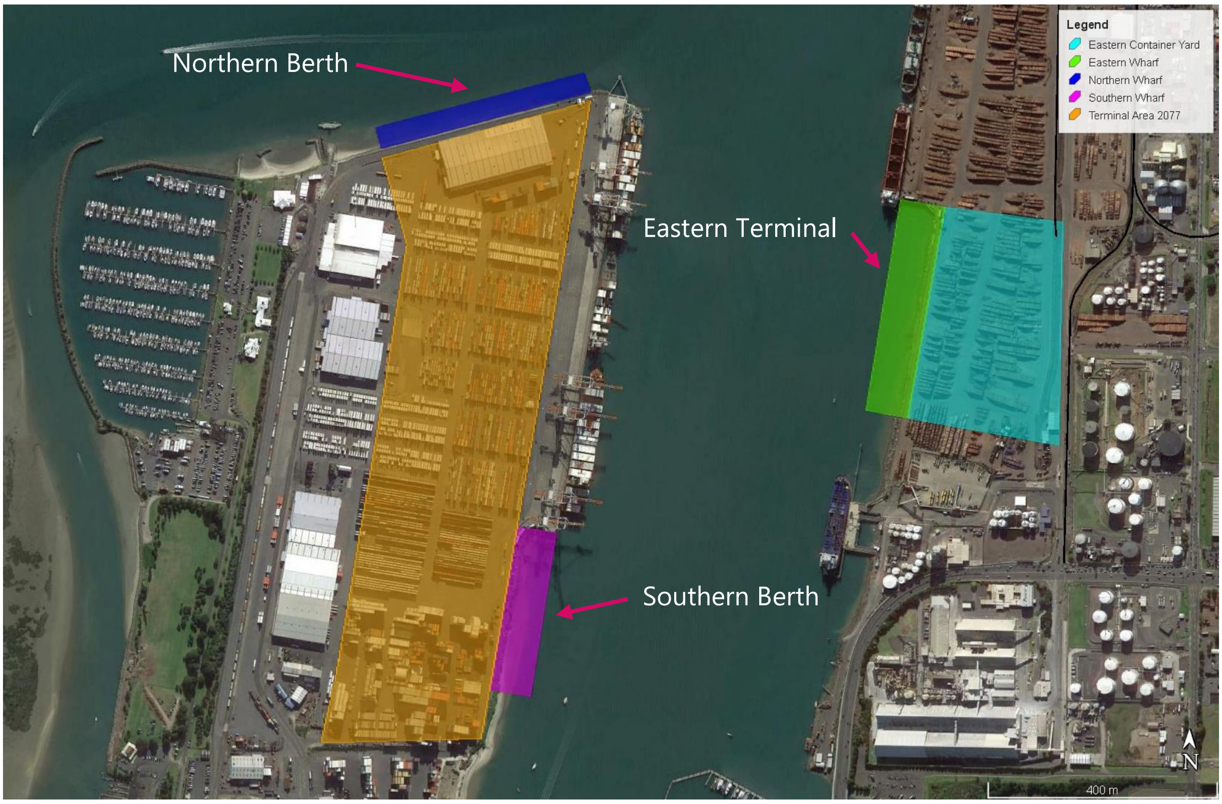



*Figure 4-5: Scenario A POT – required container terminal area 2077/78 forecast container volumes*

### 4.2.2.3 Cost Estimate

Table 4-4 shows the required investment to cater for the 2077/78 volumes, which have been estimated in 10 year timeframes. Total development cost to accommodate all of POT current and forecast growth through to 2077/78 is $1.6 Billion.

*Table 4-4: Scenario A POT infrastructure cost estimate*

| Base Case POT | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Item** | **Unit** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Amount** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Cost** | |
| **Port** | Dredging | $m^3$ | 3,106,000 | $46,590,000 | | | | | 610,500 | $9,158,000 | 148,000 | $2,220,000 | | | |
| | Reclamation | $m^3$ | | | | | | | | | | | | | |
| | Quay Wall | m | 290.0 | $48,798,000 | | | | | 370 | $61,018,000 | 370 | $61,018,000 | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | | | | | | | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | 12.6 | $69,138,000 | 3.3 | $18,358,000 | 4.2 | $23,121,000 | 5.6 | $30,689,000 | 7.4 | $40,667,000 | 7.5 | $41,482,000 | |
| | Quay Cranes | ea | | | 2 | $43,200,000 | 2 | $43,200,000 | 3 | $64,800,000 | 4 | $86,400,000 | 4 | $86,400,000 | |
| | ASC | ea | 12 | $242,400,000 | 4 | $80,800,000 | 4 | $80,800,000 | 6 | $121,200,000 | 7 | $141,400,000 | 7 | $141,400,000 | |
| | Straddle | ea | | | | | | | | | | | | | Assume Existing Straddle Fleet is sufficient to service ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | Sufficient area and berths |
| **Vehicles Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | No Vehicles |
| | **Total (NZD)** | | **$407,000,000** | | **$142,000,000** | | **$147,000,000** | | **$287,000,000** | | **$332,000,000** | | **$269,000,000** | | **$1,584,000,000** |
| **Comments** | | | Wharf not required now but will be built with ASC in southern yard to minimise destruction. Dredging includes channel deepening | | | | | | Northern Breakwater Wharf | | Mount Maunganui Terminal | | | | |

#### 4.2.2.4 *Construction Timeline*

Figure 4-6 shows the construction timeline for Scenario A POT to cater for the 2077/78 forecast growth.

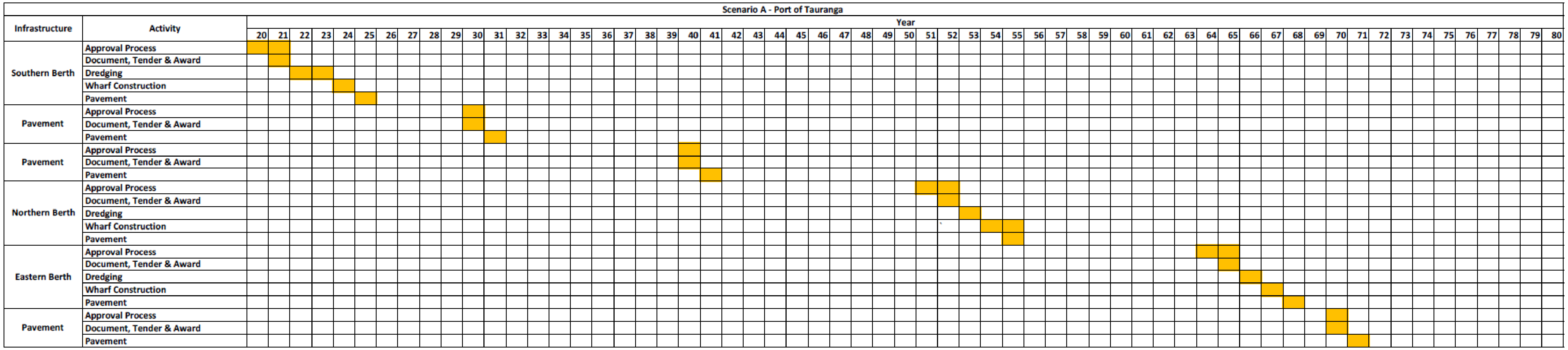



*Figure 4-6: Scenario A POT infrastructure construction schedule*

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#### 4.2.2.5 *Risks*

There are several risks associated with expanding POT to cater for the forecast volumes as highlighted in Table 4-5.

*Table 4-5: Scenario A for POT infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
|---|---|---|---|
| POT unable to attain consent to construct and dredge either the Southern or Northern Berths | High | Unable to expand capacity at Sulphur Point Terminal | - |
| Port is tidally restricted due to currents | Low | Windowed departure and arrival times may lead to congestion in future | Further navigation studies and the use of larger/additional tugs |
| Southern Berth impacts airport flight path | High | Unable to expand capacity at Sulphur Point Terminal | Further studies and consultation with airport |
| POT unable to attain consent to construct and dredge the Mt Maunganui container terminal | Medium | Unable to cater for the throughput from 2069 | - |

### 4.2.3 Northport

NP has been separated into three areas according to dominant commodity type: containers, woodchip, and logs.

As the main commodities through NP are logs and breakbulk, it has been assumed that the Port will be able meet forecast demand under the current three-port assumption with minimal capital expenditure.

## 4.3 Scenario B – All POAL Freight to POT

The scenario to relocate the majority of the freight from POAL to POT, as per [1], will require substantial investment in infrastructure over the next 60 years.

### 4.3.1 Capacity Plot

With the addition of POAL current and forecast freight, the container throughput through POT approximately doubles to 9M TEU. As shown in Figure 4-7, the existing Sulphur Point Terminal, with the infrastructure outlined in Section 4.2.2.2, will reach capacity in 2055, where it is assumed that POAL has relocated by 2030. At this point future expansion area concepts such as extending the Southern Berth, substantial reconfiguration of the Mount Maunganui Wharves, and relocation of the Tauranga Airport would be required to accommodate the growth to 2077/78.

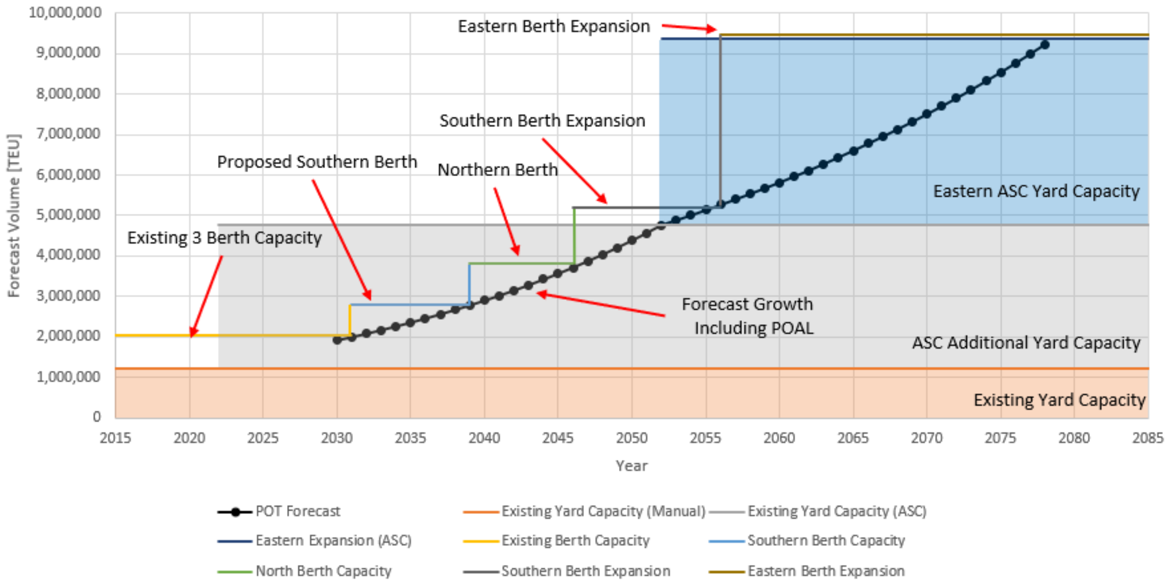


*Figure 4-7: Scenario B POT – container capacity plot showing a hypothetical growth curve of the combined POAL and POT growth starting from 2030*

### 4.3.2 Required Infrastructure

Figure 4-8 shows the future expansion areas to accommodate the current and forecast growth of POT to 2077/78. This expansion is within the existing port precinct and adjacent industrial land and has minimal impact to existing operations both inside and outside the port.

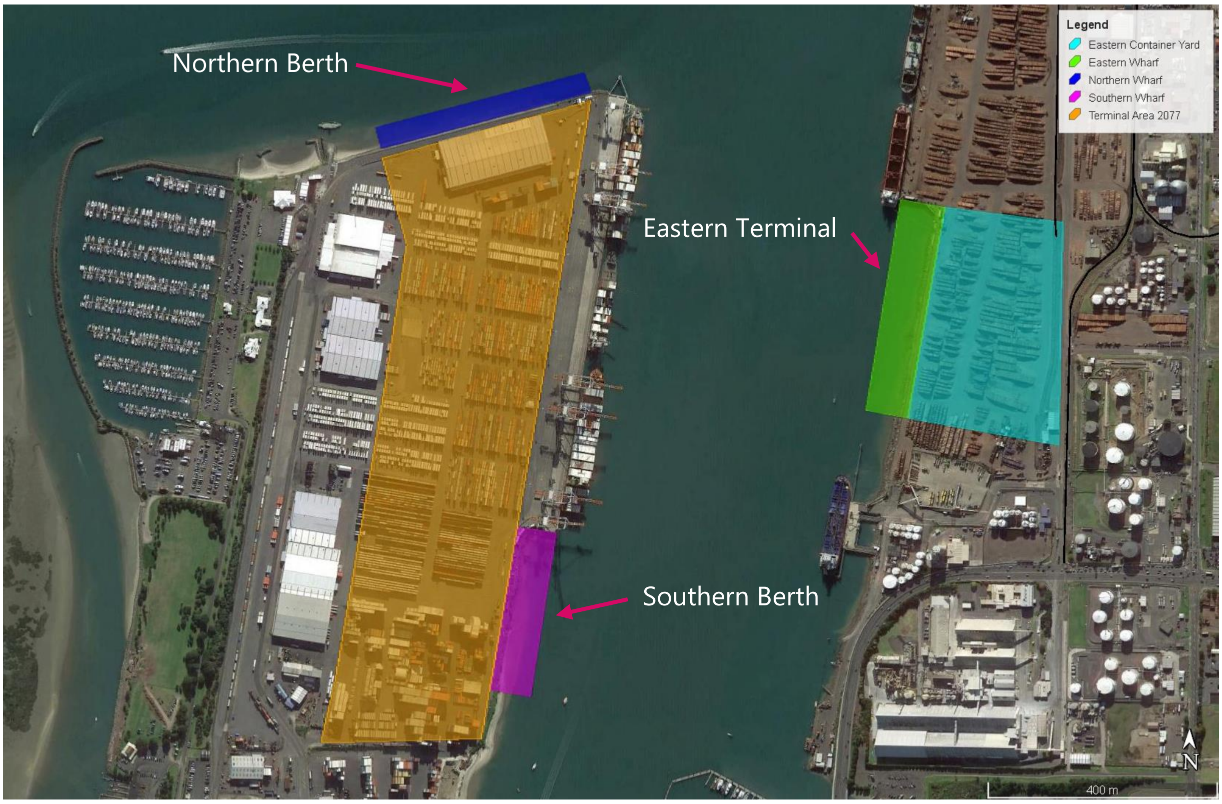


*Figure 4-8: Required container terminal area for POT own current and 2077/78 forecast container volumes*

Figure 4-9 shows the required area to accommodate the current and forecast growth of POT and the relocation of current and forecast POAL freight. Substantial development of container facilities beyond the existing port precinct and adjacent industrial land will be required, along with the repositioning of the existing liquids berth, highway (Tauranga Harbour Bridge), marina, and airport; however, the relocation of the highway, marina, and airport have not been costed.

Additional container facilities would be provided at the southern end of both Sulphur Point and Mount Maunganui Wharves. The Southern Berth extension would need to be 820m length in total, with associated container yard of 40 ha. The Mount Maunganui Wharves would need to be extended south 1.6 km in length with 32 ha of container hardstand backing it on the eastern side. Two RoRo berths are required with a third shared with cruise vessels. Two log and bulk berths are located in between the container terminal and relocated liquids berth.

It has been assumed that POT would be able to accommodate the increase in bulk freight due to the availability of off-port land. Also, vehicle imports and exports will utilise existing paved areas on port therefore negating the required to pave vacant land.

Similar to Scenario A, it has been assumed that one liquids berth of 360 m length will be sufficient to service bulk liquid imports and exports for POT through to 2077/78.


*Figure 4-9: Scenario B POT – required container terminal area 2077/78 forecast container volumes*

### 4.3.3 Cost Estimate

Table 4-6 shows the required investment to cater for the 2077/78 volumes, which have been estimated in 10 year timeframes. Total development cost to accommodate all of POT plus POAL current and forecast growth through to 2077/78 is $3.5 Billion. This is compared to the $1.6 Billion cost to develop POT to accommodate its current and forecast growth.

*Table 4-6: Scenario B POT infrastructure cost estimate*

| Scenario B | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Item** | **Unit** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Amount** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Cost** | |
| **Port** | Dredging | $m^3$ | 3,106,000 | $46,590,000 | 610,500 | $9,158,000 | 642,000 | $9,630,000 | 2,547,257 | $38,209,000 | | | | | |
| | Reclamation | $m^3$ | | | | | | | 1,075,000 | $16,125,000 | | | | | |
| | Quay Wall | m | 290.0 | $48,798,000 | 370 | $61,018,000 | 535 | $86,221,000 | 1,600 | $248,959,000 | | | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | | | | | 200 | $19,800,000 | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | 15.6 | $85,983,000 | 8.3 | $45,736,000 | 12.6 | $69,081,000 | 12.1 | $66,686,000 | 14.3 | $78,621,000 | 14.6 | $80,366,000 | |
| | Quay Cranes | ea | 4 | $86,400,000 | 5 | $108,000,000 | 8 | $172,800,000 | 8 | $172,800,000 | 9 | $194,400,000 | 9 | $194,400,000 | |
| | ASC | ea | 15 | $303,000,000 | 8 | $161,600,000 | 12 | $242,400,000 | 12 | $242,400,000 | 14 | $282,800,000 | 14 | $282,800,000 | |
| | Straddle | ea | | | | | | | | | | | | | Assume Existing Straddle Fleet is sufficient to service ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | Sufficient area and berths |
| **Vehicles Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | Cars to utilise existing pavement |
| | **Total (NZD)** | | **$ 571,000,000** | | **$ 386,000,000** | | **$ 580,000,000** | | **$ 805,000,000** | | **$ 556,000,000** | | **$ 558,000,000** | | **$ 3,456,000,000** |
| **Comments** | | | Wharf not required now but will be built with ASC in southern yard to minimise destruction. Dredging includes channel deepening | | Northern Berth | | Southern Berth Expansion | | Eastern Berth | | | | | | |

### 4.3.4 Construction Timeline

Figure 4-10 shows the construction timeline for Scenario B POT to cater for the 2077/78 forecast growth.

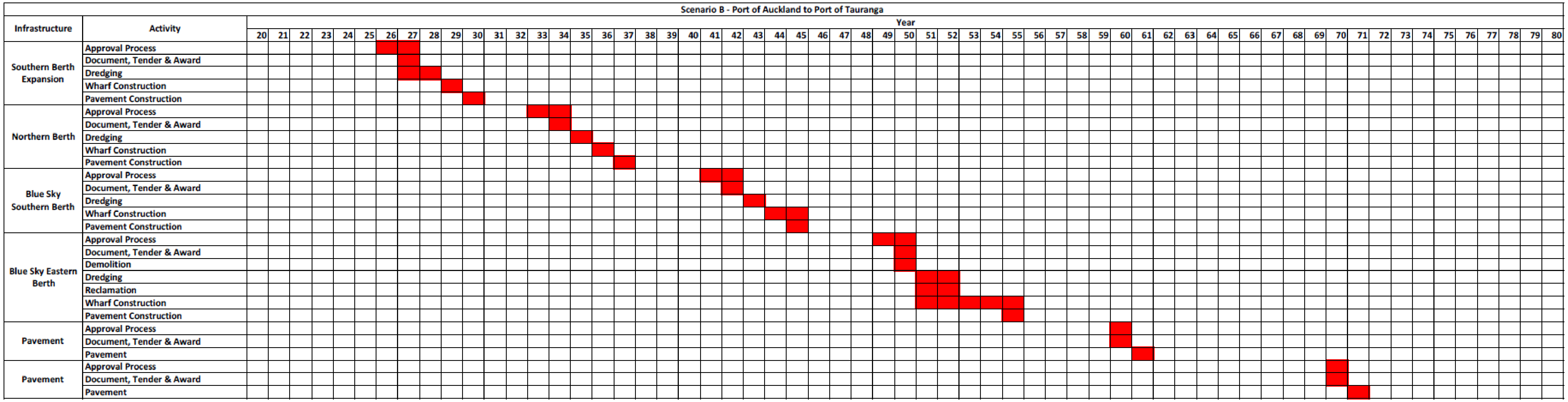


*Figure 4-10: Scenario B POT infrastructure construction schedule*

### 4.3.5 Risks

There are several risks associated with expanding POT to cater for POAL freight as highlighted in Table 4-7.

*Table 4-7: Scenario B for POT infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
|---|---|---|---|
| POT unable to attain consent to construct and dredge either the Southern or Northern Berths | High | Unable to expand capacity at Sulphur Point Terminal | - |
| POT unable to attain consent to construct and dredge the Eastern Container Terminal | High | Unable to accommodate POAL freight | - |
| Port is currently tidally restricted due to currents | Medium | Windowed departure and arrival times may lead to congestion impacting vessel operations and ultimately limiting port capacity | Further navigation studies and the use of larger/additional tugs |
| Southern and Eastern Berths impacts airport flight path | High | Unable to expand capacity at Sulphur Point Terminal or Eastern Container Terminal | Further studies and consultation with airport |
| POT unable to attain consent to construct and dredge the Mt Maunganui container terminal | Medium | Unable to cater for the throughput from 2069 | - |
| Unable to relocate marina, highway and airport | High | Unable to accommodate POAL freight | - |
| Incident closes POT | High | No freight import and exports for the Upper North Island except through regional ports | - |

Further to the table, the practicality of relocating all of POAL freight to POT will mean substantial shipping through the Port which will be challenging given the tidal restrictions. Although there are ports which handle large volumes of vessels, such as Port of Newcastle in Australia, they however are typically bulk vessels where the freight is not as time sensitive as typical container freight. Further studies would be required to determine if this amount of shipping is possible.

## 4.4 Scenario C – All POAL to NP

The scenario to relocate majority of the freight from POAL to NP, as per [1], will require substantial investment in infrastructure over the next 60 years.

### 4.4.1 Capacity Plot

Figure 4-11 shows NP berth and yard expansion required to accommodate all of POAL's current and forecast freight growth. To achieve these increases in capacity, it is assumed that the port expands beyond the east and west constraints as discussed in Section 2.4.1. Without this expansion, berth constraints mean the port cannot accommodate the additional container growth from POAL beyond 2058. However, there is more than sufficient land capacity available to cater for all NP and POAL current and forecast freight.

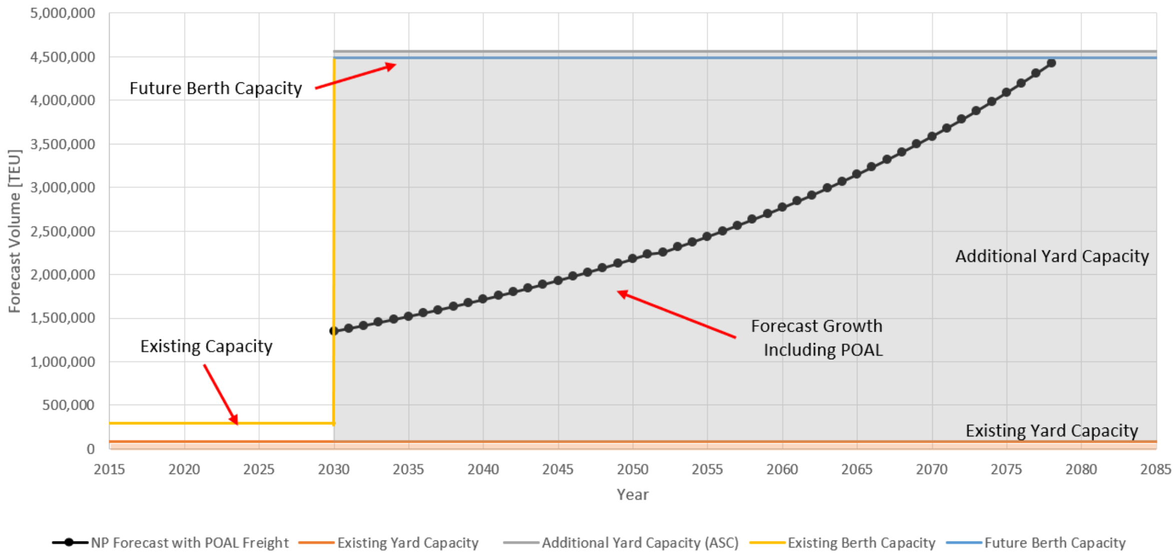


*Figure 4-11: Scenario C NP – container capacity plot showing a hypothetical growth curve of the combined POAL and NP growth starting from 2030*

### 4.4.2 Required Infrastructure

Figure 4-12 shows the concept layout which extends west in accordance with existing Port plans, and east to include the existing Refining NZ liquids berths as outlined in Section 2.4.1 This development has sufficient berth capacity for all POAL freight until 2058. There are no land constraints as there is significant land backing onto the port available which can be utilised for intermodal terminals and "off-site" style storage. The capital works include the following:

- 300 m long wharf to the west for log and bulk operations, and 10 ha of associated reclamation which equates to 2 x 200 m Log and Bulk berths
- 1.5 km of wharf to the east for car, container, and liquid operations with 38 ha of associated reclamation including:
  - 2 x RoRo Berths
  - 3 x 360 m container berths

– 1 x 300 m liquids berth

- Demolition of existing Refining NZ liquid berths
- Construction of pavements for vehicles, logs, and containers

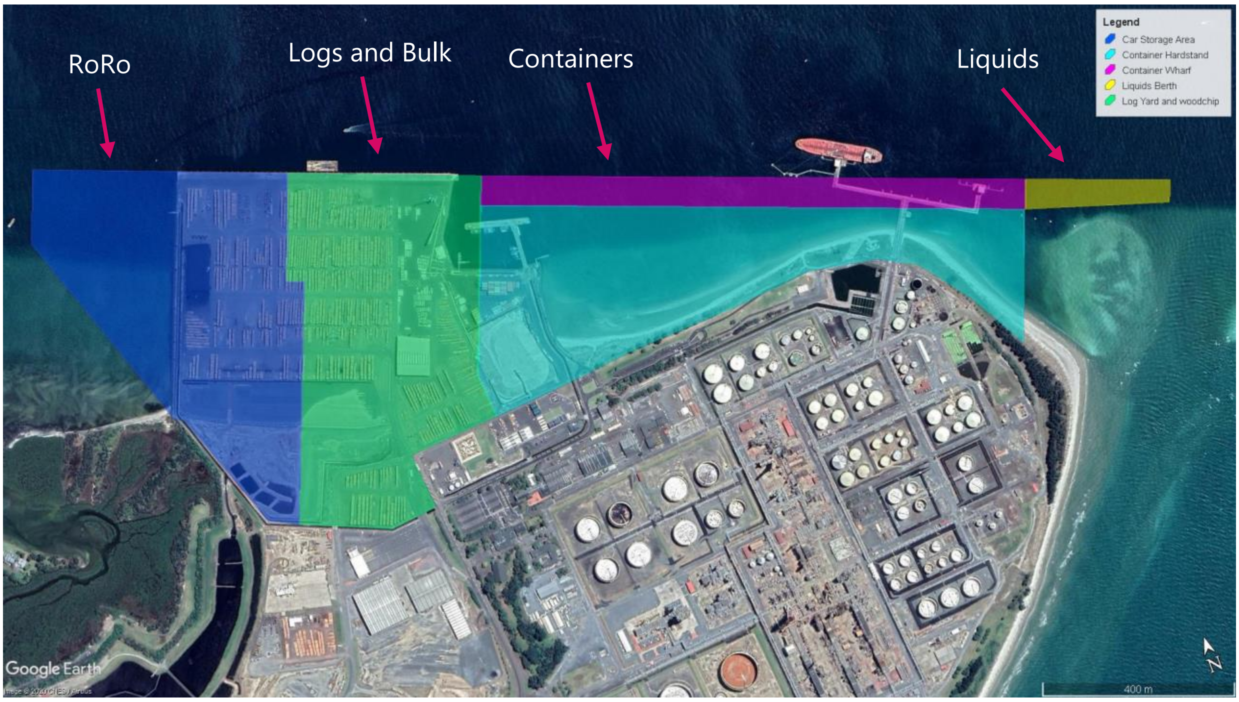


*Figure 4-12: Scenario C NP – available terminal areas within the assumed constraints from Section 2.4.1*

Figure 4-13 shows the required area to accommodate the current and forecast growth of NP and the relocation of current and forecast POAL freight. Required development includes a 2 km long container quay line with associated dredging and reclamation. This concept layout extends further west than existing Port plans, which would increase visual and noise impacts on residents at Marsden Cove, and impact coastal processes. The concept layout also extends east beyond the existing Refining NZ liquids berths, which would impact on coastal processes. Further studies are required to determine the extent of impact and mitigation measures.

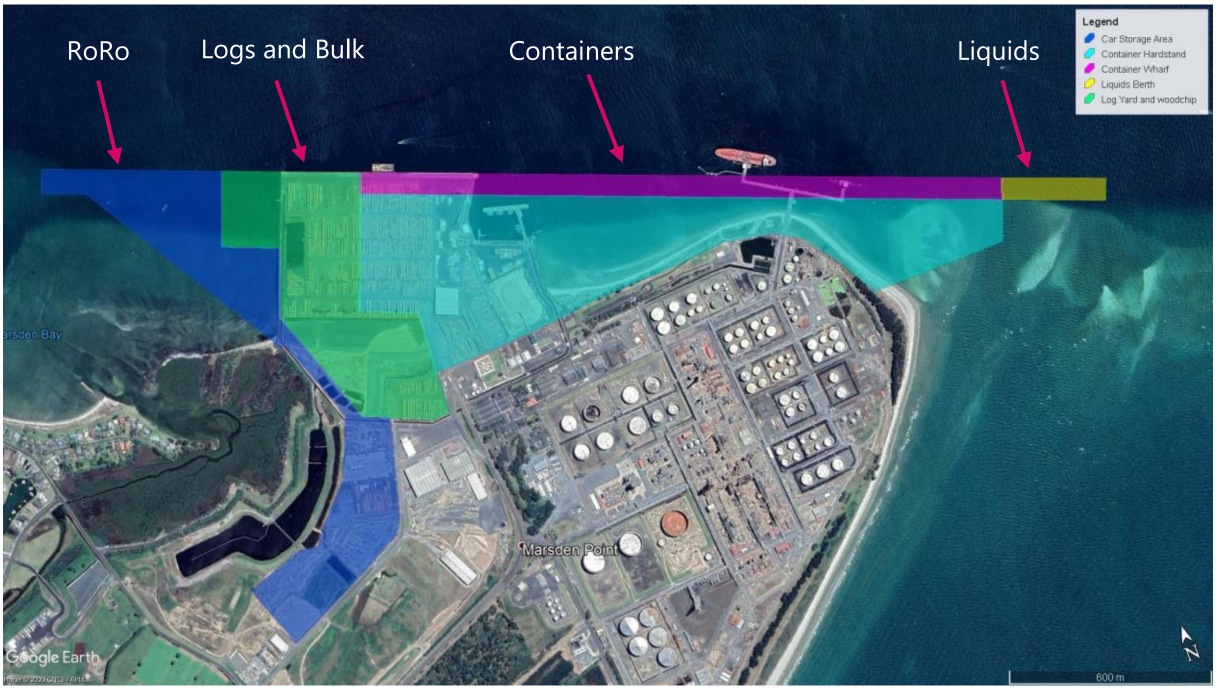


*Figure 4-13: Scenario C NP – required container terminal area 2077/78 forecast container volumes*

### 4.4.3 Cost Estimate

Table 4-8 and Table 4-9 show the required investment to cater for the 2058 and 2077/78 volumes, which have been estimated in 10 year timeframes, respectively. Total development cost to accommodate all of NP plus POAL current and forecast growth through to 2077/78 is $2.5 Billion.

*Table 4-8: Scenario C NP infrastructure cost estimate for 2058 container volume capacity*

| Scenario C | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Item** | **Unit** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Amount** | **Amount** | **Cost** | **Amount** | **Cost** | **Amount** | **Cost** | |
| **Port** | Dredging | $m^3$ | | | 638,000 | $9,570,000 | | | | | | | | | |
| | Reclamation | $m^3$ | | | 4,495,500 | $71,933,000 | | | | | | | | | |
| | Quay Wall | m | | | 1,840 | $281,060,000 | | | | | | | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | 928 | $91,872,000 | | | | | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | | | 14.5 | $79,986,000 | 3.9 | $21,651,000 | 5.0 | $27,503,000 | | | | | |
| | Quay Cranes | ea | | | 9 | $194,400,000 | 2 | $43,200,000 | 3 | $64,800,000 | | | | | |
| | ASC | ea | | | 17 | $343,400,000 | 4 | $80,800,000 | 5 | $101,000,000 | | | | | |
| | Straddle | ea | | | 34 | $78,200,000 | 8 | $18,400,000 | 10 | $23,000,000 | | | | | Assume average of 2 straddle per ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | 23.0 | 126,500,000 | | | | | | | | | Assume resurfacing due to change of operations |
| **Vehicles Facilities** | Pavement | $m^2$ | | | 13.3 | $36,523,000 | | | | | | | | | Assume resurfacing due to change of operations |
| | **Total (NZD)** | | | | **$1,313,000,000** | | **$164,000,000** | | **$216,000,000** | | | | | | **$1,693,000,000** |
| **Comments** | | | Assume no investment this decade beyond natural growth | | Assume construction starts in this decade. Tug wharf and liquids berth demolition to allow for new commodities | | | | | | | | | | |

*Table 4-9: Scenario C NP infrastructure cost estimate for 2077/78 container capacity*

| Scenario C | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Item | Unit | Amount | Cost | Amount | Cost | Amount | Amount | Amount | Cost | Amount | Cost | Amount | Cost | |
| **Port** | Dredging | $m^3$ | | | 1,153,200 | $17,298,000 | | | | | | | | | |
| | Reclamation | $m^3$ | | | 7,020,000 | $109,800,000 | | | | | | | | | |
| | Quay Wall | m | | | 2,590 | $395,623,000 | | | | | | | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | 928 | $91,872,000 | | | | | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | | | 14.5 | $79,986,000 | 3.9 | $21,651,000 | 5.0 | $27,503,000 | 6.9 | $38,190,000 | 7.1 | $39,127,000 | |
| | Quay Cranes | ea | | | 9 | $194,400,000 | 2 | $43,200,000 | 3 | $64,800,000 | 4 | $86,400,000 | 4 | $86,400,000 | |
| | ASC | ea | | | 17 | $343,400,000 | 4 | $80,800,000 | 5 | $101,000,000 | 7 | $141,400,000 | 7 | $141,400,000 | |
| | Straddle | ea | | | 34 | $78,200,000 | 8 | $18,400,000 | 10 | $23,000,000 | 14 | $32,200,000 | 14 | $32,200,000 | Assume average of 2 straddle per ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | 23.0 | $126,500,000 | | | | | | | | | Assume resurfacing due to change of operations |
| **Vehicles Facilities** | Pavement | $m^2$ | | | 13.3 | $36,523,000 | | | | | | | | | Assume resurfacing due to change of operations |
| | **Total (NZD)** | | | | **$1,474,000,000** | | **$164,000,000** | | **$216,000,000** | | **$298,000,000** | | **$299,000,000** | | **$2,451,000,000** |
| **Comments** | | | Assume no investment this decade beyond natural growth | | Assume construction starts in this decade. Tug wharf and liquids berth demolition to allow for new commodities | | | | | | | | | | |

### 4.4.4 Construction Timeline

Figure 4-14 and Table 4-14 show the construction timeline for Scenario C NP to cater for the 2058 and 2077/78 forecast growth respectively.

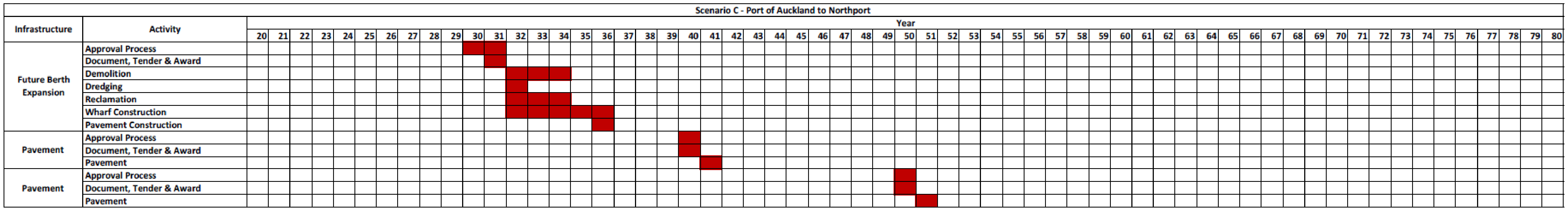


*Figure 4-14: Scenario C NP infrastructure construction schedule*

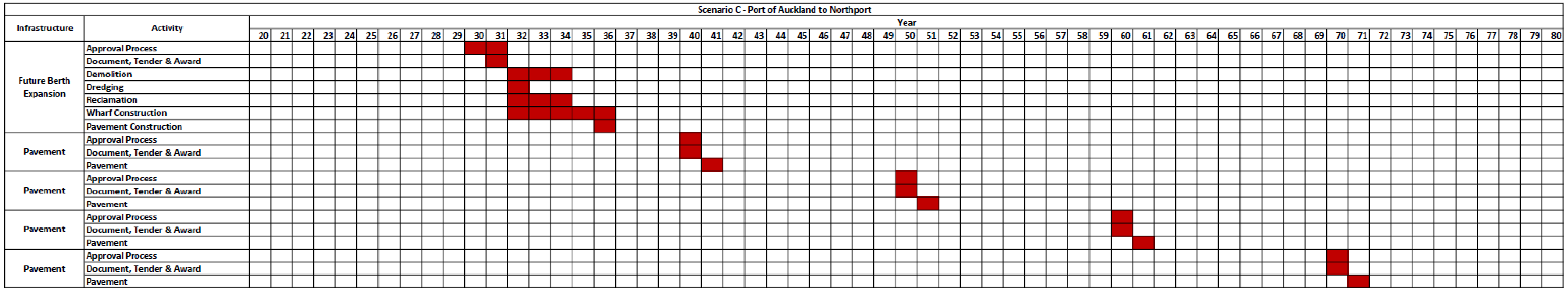


*Figure 4-15: Scenario C NP infrastructure construction schedule for 2077/78 freight volumes*

### 4.4.5 Risks

There are several risks associated with expanding NP to cater for POAL freight as highlighted in Table 4-7.

*Table 4-10: Scenario C for NP infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
|---|---|---|---|
| NP unable to attain consent to construct and dredge either the eastern or western berths | High | Unable to accommodate additional freight from POAL | - |
| Unable to relocated Refining NZ liquids berths | High | Unable to expand the container terminal to accommodate POAL freight | - |
| Port is currently tidally restricted due to currents | Medium | Windowed departure and arrival times may lead to congestion impacting vessel operations | Further navigation studies and the use of larger/additional tugs |
| Navigational issues due to strong currents | Low | Unable to service the larger vessels | Conduct thorough navigational studies |
| Incident closes NP | Medium | Will required POT to accommodate significant growth until the port is operational | - |
| Strong currents at the berth | Low | Excessive motions at the berth preventing container operations | Invest in active mooring systems such as Cavotec MoorMaster to limit motions |

## 4.5 Scenario D – POAL Split Between POT and NP

Scenario D has assumed an equal split of vehicles and freight between POT and NP, therefore reducing the number of RoRo berths at each port to a minimum of one. The container freight was split according to the operational capacity at NP, with the remainder going to POT at an approximate split of 0.27:0.73 to POT and NP respectively. However, it is noted that this split may not be practical due to proximity of existing industry and distribution centres to the two ports.

### 4.5.1 Capacity Plot

#### *4.5.1.1 POT*

With the addition of the partial POAL forecast freight, the container throughput through POT increases to 6M TEU. As shown in Figure 4-16, the existing Sulphur Point Terminal, with the infrastructure outlined in Section 4.2.2.2, will reach operational capacity in 2071, where it is assumed that POAL has relocated by 2030. After which, future expansion area concepts such as substantial reconfiguration of the Mount Maunganui Wharves will be required to accommodate the growth to 2077/78.

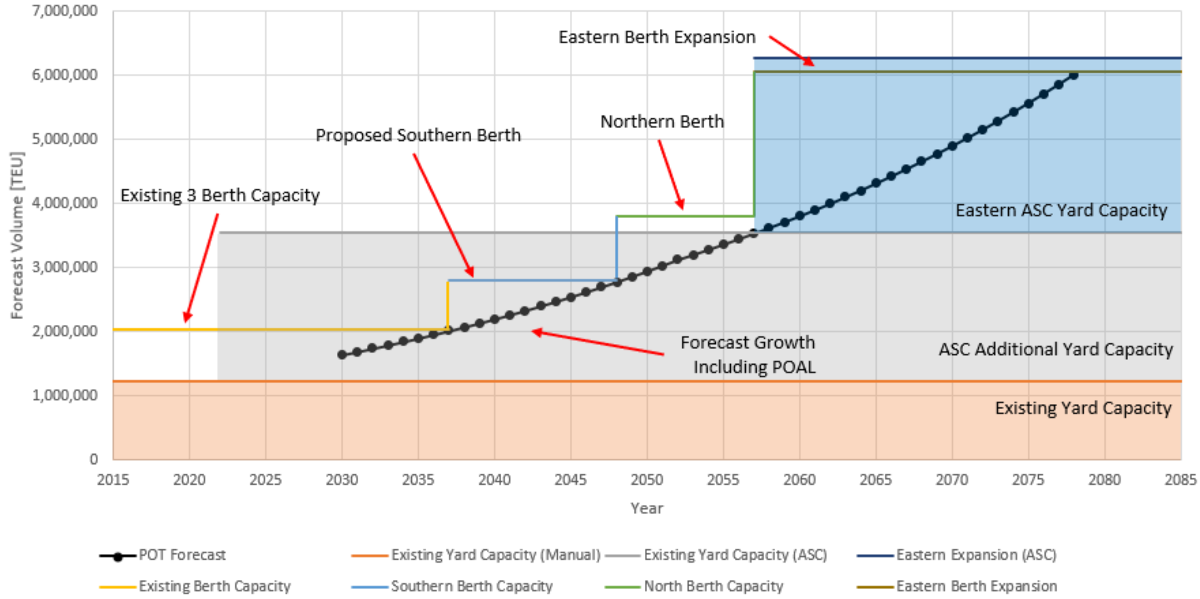


*Figure 4-16: Scenario D POT – container capacity plot showing a hypothetical growth curve of the combined POAL and POT growth starting from 2030*

#### *4.5.1.2 NP*

Figure 4-17 shows the required capacity improvements to NP to provide for the partial POAL freight, where it is assumed that POAL has relocated by 2030. However, due to the geometry of Marsden Point and the coastal processes that occur, the Port has limited growth opportunity to the east and west as discussed in Section 2.4.1. For this reason, the future berth capacity is capped at approximately 3.5M TEU (the container throughput has increased compared to Scenario C as only one RoRo berth is required because POT is taking half of the car freight). However, with the relocation of the Refining NZ berths further east there is more than sufficient land capacity available to accommodate all commodities through the Port.

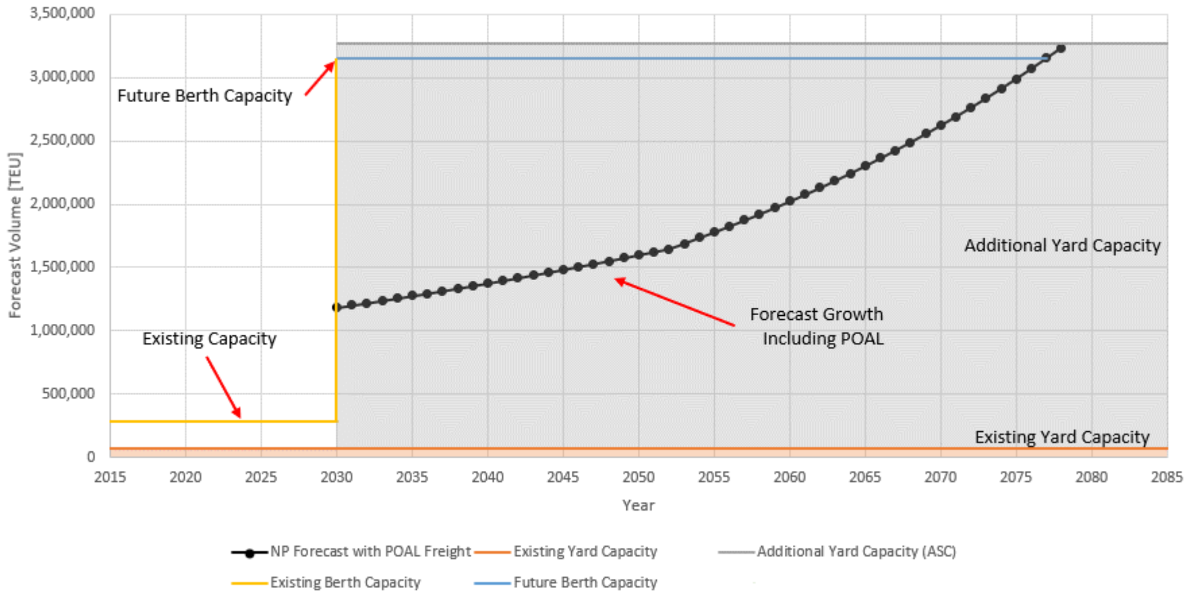


*Figure 4-17: Scenario D NP – container capacity plot showing a hypothetical growth curve of the combined POAL and NP growth starting from 2030*

## 4.5.2 Required Infrastructure

### *4.5.2.1 POT*

Figure 4-18 shows the required area to accommodate the forecast growth of POT and the partial relocation of POAL freight. Significant development of container facilities is required along with the repositioning of the existing liquids berth. Relocation of the highway (Tauranga Harbour Bridge) has not been costed. There is also a potential for the container terminal to interfere with the airport maximum air draught restrictions, thus requiring a change of operations at the airport or relocation of the runway, or specialised low profile cranes. This, however, has not been costed. Further consultation with the airport would be required.

It has been assumed that the additional freight from POAL will be relocated to the expanded Eastern Container Terminal to avoid expanding Sulphur Point Terminal into the line of the airport flightpath. A total of 850 m of container berths are required at the Eastern Terminal and 21 Ha of hardstand to support it. It has been assumed that one RoRo berth is required and a second would become available during the cruise off-season. Two log and bulk berths are located in between the container terminal and relocated liquids berth.

It has been assumed that POT would be able to accommodate the increase in bulk freight with minimal investment in additional infrastructure. Vehicle imports and exports will utilise existing paved areas on port avoiding the need to pave vacant land.

As discussed in Section 4.2.2, it has been assumed that POT will be able to cater for future bulk and log throughput. It has also been assumed that one bulk liquid berth will be sufficient through until 2077/78 based off estimated throughputs equating to approximately one vessel per fortnight.

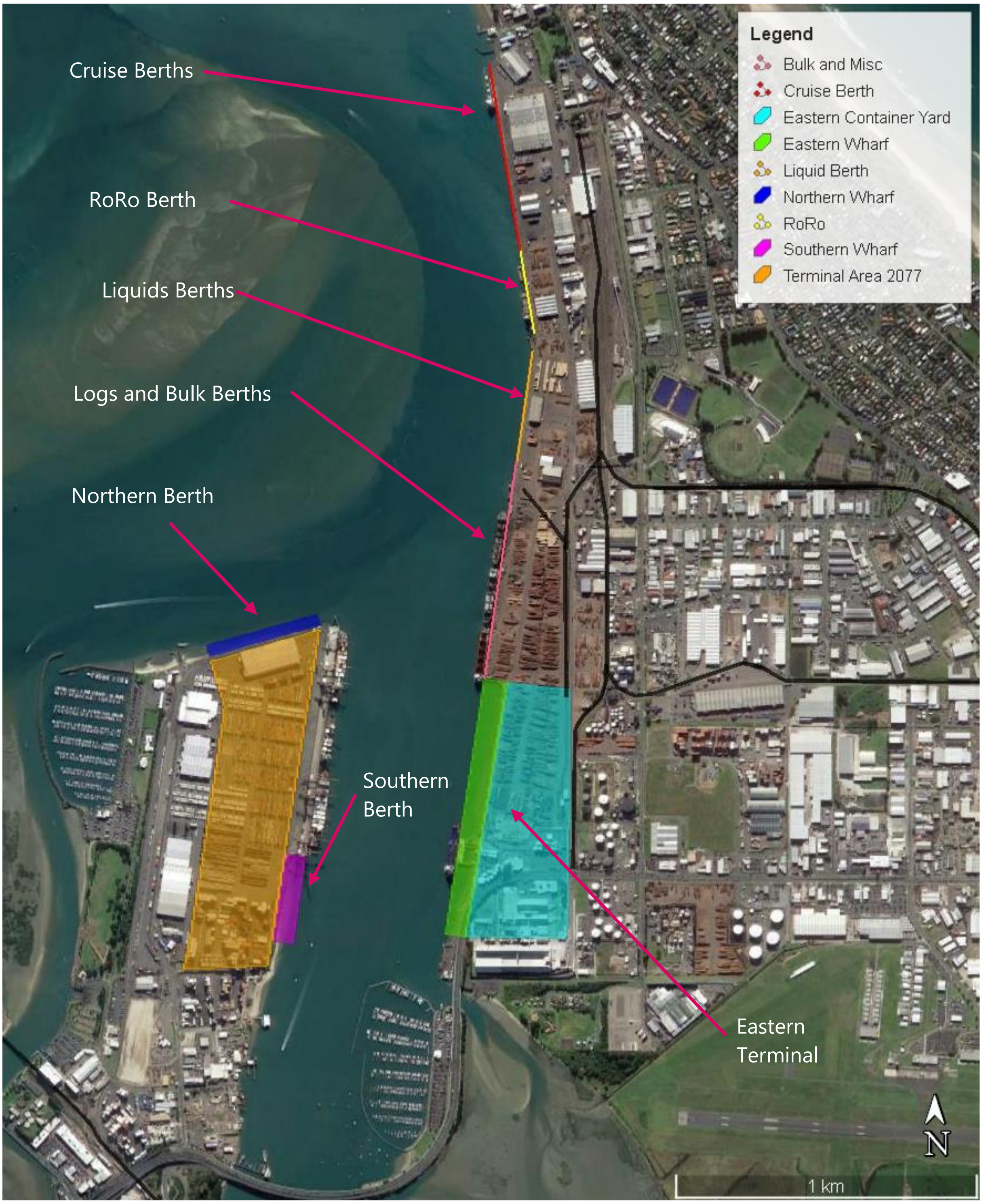


*Figure 4-18: Scenario D POT – required container terminal area 2077/78 forecast container volumes*

### *4.5.2.2 NP*

To cater for the partial POAL freight being relocated to NP, significant capital works are required as shown in Figure 4-19. However, as discussed in Section 2.4.1, expansion opportunities to the east and west are limited, however with the reduced RoRo berths, there is sufficient container capacity. The capital works comprise:

- 300 m long wharf to the west for log and bulk operations, and 10 ha of associated reclamation which equates to 2 x 200 m Log and Bulk berths
- 1.5 km of wharf to the east for car, container, and liquid operations with 38 ha of associated reclamation including:
  - 1 x RoRo Berths
  - Approximately 4 x 360 m container berths
  - 1 x 350 m liquids berth
- Demolition of existing Refining NZ liquid berths
- Construction of pavements for vehicles, logs, and containers

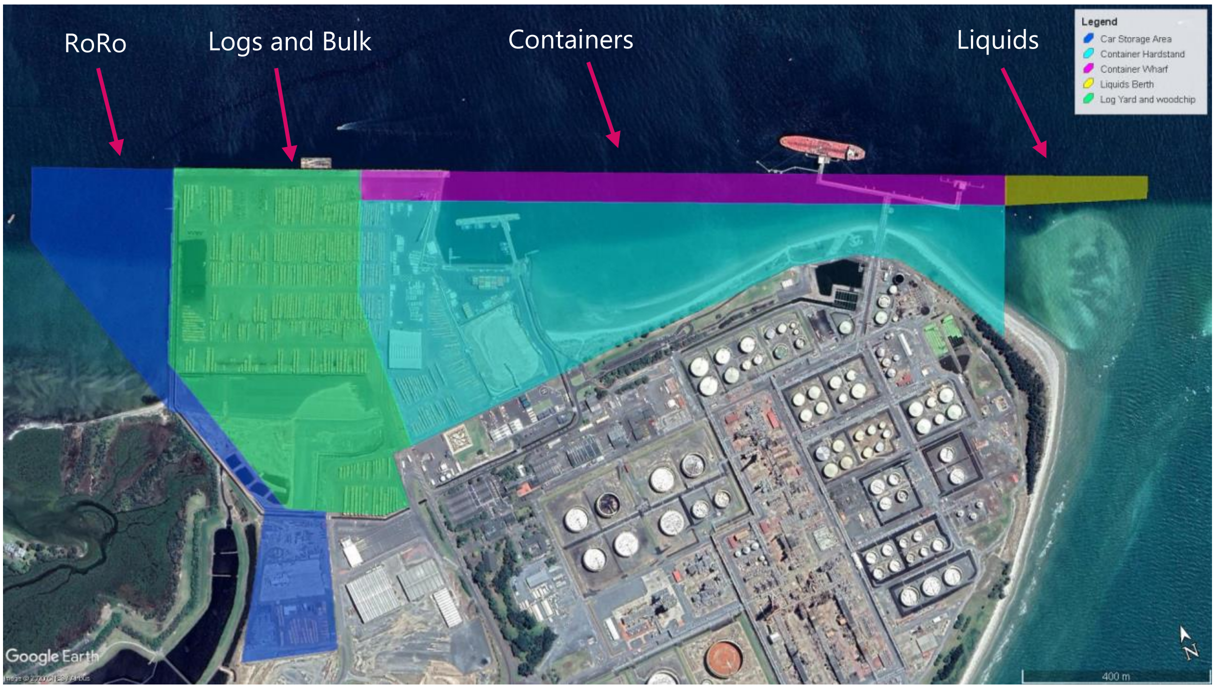


*Figure 4-19: Scenario D NP – required container terminal area 2077/78 forecast container volumes*

### 4.5.3 Cost Estimate

Table 4-11 and Table 4-12 show the required investment to cater for the 2077/78 volumes, which have been estimated in 10 year timeframes. The infrastructure cost for NP is increased compared to Scenario C due to the larger container throughput as only one RoRo berth is required. Therefore, additional container handling equipment is required.

Total development cost to accommodate a portion of POAL current and forecast growth through to 2077/78 at POT is $2.1 Billion, and at NP is $1.8 Billion.

#### 4.5.3.1 POT

*Table 4-11: Scenario D POT infrastructure cost estimate*

| Scenario D POT | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Item | Unit | Amount | Cost | Amount | Cost | Amount | Amount | Amount | Cost | Amount | Cost | Amount | Cost | |
| **Port** | Dredging | $m^3$ | 3,106,000 | $46,590,000 | | | 610,500 | 9,158,000 | 1,093,750 | $16,406,000 | | | | | |
| | Reclamation | $m^3$ | | | | | | | 1,075,000 | $16,125,000 | | | | | |
| | Quay Wall | m | 290.0 | $48,798,000 | | | 370 | $61,018,000 | 855 | $135,101,000 | | | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | | | | | 200 | $19,800,000 | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | 13.5 | $74,413,000 | 4.7 | $25,977,000 | 6.3 | $34,784,000 | 7.3 | $40,033,000 | 9.3 | $50,879,000 | 9.4 | $51,944,000 | |
| | Quay Cranes | ea | 2 | $43,200,000 | 3 | $64,800,000 | 4 | $86,400,000 | 4 | $86,400,000 | 5 | $108,000,000 | 6 | $129,600,000 | |
| | ASC | ea | 13 | $262,600,000 | 5 | $101,000,000 | 6 | $121,200,000 | 7 | $141,400,000 | 9 | $181,800,000 | 9 | $181,800,000 | |
| | Straddle | ea | | | | | | | | | | | | | Assume Existing Straddle Fleet is sufficient to service ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | Sufficient area and berths |
| **Vehicles Facilities** | Pavement | $m^2$ | | | | | | | | | | | | | No Cars |
| | **Total (NZD)** | | **$ 476,000,000** | | **$ 192,000,000** | | **$ 313,000,000** | | **$ 455,000,000** | | **$ 341,000,000** | | **$ 363,000,000** | | **$ 2,140,000,000** |
| **Comments** | | | Wharf not required now but will be built with ASC in southern yard to minimise destruction. Dredging includes channel deepening | | | | Northern Berth | | Eastern Berth | | | | | | |

### 4.5.3.2 NP

*Table 4-12: Scenario D NP infrastructure cost estimate*

| Scenario D NP | | | 2020 | | 2030 | | 2040 | | 2050 | | 2060 | | 2070 | | Notes and Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Item | Unit | Amount | Cost | Amount | Cost | Amount | Amount | Amount | Cost | Amount | Cost | Amount | Cost | |
| **Port** | Dredging | $m^3$ | | | 638,000 | $9,570,000 | | | | | | | | | |
| | Reclamation | $m^3$ | | | 4,495,500 | $67,433,000 | | | | | | | | | |
| | Quay Wall | m | | | 1,840 | $285,560,000 | | | | | | | | | |
| | Piled Wharf | m | | | | | | | | | | | | | |
| | Wharf demolition | m | | | 928 | $91,872,000 | | | | | | | | | |
| **Container Facilities** | Pavement and utilities | Ha | | | 11.5 | $63,321,000 | 1.9 | $10,412,000 | 3.6 | $19,723,000 | 5.1 | $27,915,000 | 5.2 | $28,600,000 | |
| | Quay Cranes | ea | | | 7 | $151,200,000 | 1 | $21,600,000 | 2 | $43,200,000 | 3 | $64,800,000 | 3 | $64,800,000 | |
| | ASC | ea | | | 12 | $242,400,000 | 2 | $40,400,000 | 4 | $80,800,000 | 5 | $101,000,000 | 5 | $101,000,000 | |
| | Straddle | ea | | | 24 | $55,200,000 | 4 | $9,200,000 | 8 | $18,400,000 | 10 | $23,000,000 | 10 | $23,000,000 | Assume average of 2 straddles per ASC |
| | MHC | | | | | | | | | | | | | | |
| **Log Facilities** | Pavement | $m^2$ | | | 23.0 | $126,500,000 | | | | | | | | | Assume resurfacing due to change of operations |
| **Vehicles Facilities** | Pavement | $m^2$ | | | 6.6 | $18,261,000 | | | | | 7.6 | $20,906,000 | | | Assume resurfacing due to change of operations |
| | **Total (NZD)** | | | | **$1,111,000,000** | | **$82,000,000** | | **$162,000,000** | | **$ 238,000,000** | | **$ 217,000,000** | | **$ 1,821,000,000** |
| **Comments** | | | Assume no investment this decade beyond natural growth | | Assume construction starts in this decade. Tug wharf and liquids berth demolition to allow for new commodities | | | | | | | | | | |

## 4.5.4 Construction Timeline

Figure 4-20 shows the construction timeline for Scenario D POT to cater for the 2077/78 forecast growth.

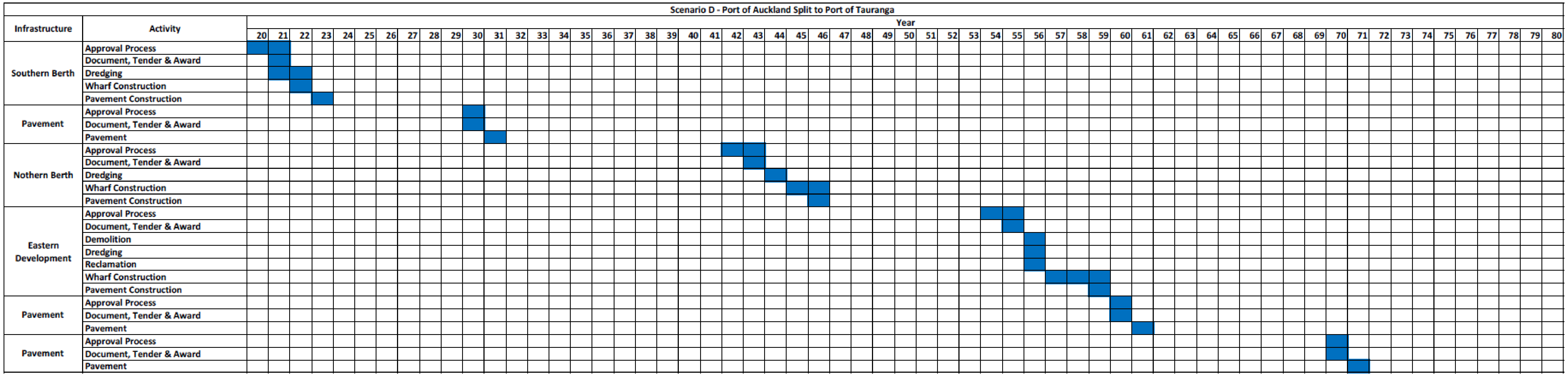


*Figure 4-20: Scenario D POT infrastructure construction schedule*

Figure 4-21 shows the construction timeline for Scenario D NP to cater for the 2077/78 forecast growth.

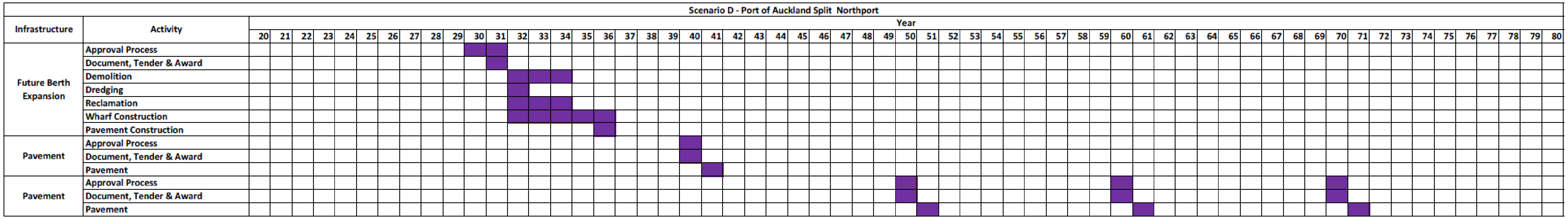


*Figure 4-21: Scenario D NP infrastructure construction schedule*

### 4.5.5 Risks

The risks for the Scenario D are similar to highlighted risks in Sections 4.3.5 and 4.4.5.

#### *4.5.5.1 POT*

There are several risks associated with expanding NP to cater for POAL freight as highlighted in Table 4-13.

*Table 4-13: Scenario D for POT infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
|---|---|---|---|
| POT unable to attain consent to construct and dredge either the Southern or Northern Berths | High | Unable to expand capacity at Sulphur Point Terminal | - |
| POT unable to attain consent to construct and dredge the Eastern Container Terminal | High | Unable to accommodate POAL freight | - |
| Port is currently tidally restricted due to currents | Medium | Windowed departure and arrival times may lead to congestion impacting vessel operations and ultimately limiting port capacity | Further navigation studies and the use of larger/additional tugs |
| Eastern Berths impacts airport flight path | High | Unable to expand capacity at Sulphur Point Terminal or Eastern Container Terminal | Further studies and consultation with airport |
| POT unable to attain consent to construct and dredge the Mt Maunganui container terminal | Medium | Unable to cater for the throughput from 2069 | - |
| Unable to relocate the highway | High | Unable to accommodate POAL freight | - |
| Incident closes POT | High | NP may struggle to accommodate the additional freight while POT is closed | - |

#### *4.5.5.2 NP*

There are several risks associated with expanding NP to cater for POAL freight as highlighted in Table 4-14.

*Table 4-14: Scenario D for NP infrastructure risks*

| Risk | Severity | Consequence | Mitigation |
|---|---|---|---|
| NP unable to attain consent to construct and dredge either the eastern or western berths | High | Unable to accommodate additional freight from POAL | - |
| Unable to relocated Refining NZ liquids berths | High | Unable to expand the container terminal to accommodate POAL freight | - |
| Port is currently tidally restricted due to currents | Medium | Windowed departure and arrival times may lead to congestion impacting vessel operations | Further navigation studies and the use of larger/additional tugs |
| Navigational issues due to strong currents | Low | Unable to service the larger vessels | Conduct thorough navigational studies |
| Incident closes NP | Medium | POT may struggle to accommodate the additional freight while POT is closed | - |
| Strong currents at the berth | Low | Excessive motions at the berth preventing container operations | Invest in active mooring systems such as Cavotec MoorMaster to limit motions |

Further to the tables, the practicality of relocating part of POAL freight to POT and NP will mean substantial shipping through the Ports which will be challenging given the tidal restrictions. Although there are ports which handle large volumes of vessels, such as Port of Newcastle in Australia, they however are typically bulk vessels where the freight is not as time sensitive as typical container freight. Further studies would be required to determine if this amount of shipping is possible.

# 5 Conclusion

This report concluded that to accommodate POAL's current and future forecast freight growth to the year 2077/78, both NP and POT will need to be fully utilised within existing port precincts and adjacent industrial areas. Alternatively, expanding either NP or POT beyond their existing port precinct will allow for sufficient expansion to accommodate POAL's current and future forecast freight growth to the year 2077/78.

## 5.1 Comparison to Previous Studies

A comparison between the current analysis and the work completed in the previous studies [2] and [3] was completed. The key differences between the three studies are:

- Growth rates vary between 2.1% and 5.0% for [2], 1.9% and 3.2% for [3], and approximately 2.6% for [1]
- Container terminal metrics vary between the three studies due to different benchmarks and supplied information from the ports

These changes account for discrepancies between the three studies, however the conclusion is similar, which is POAL will reach operational capacity for container freight in approximately the next 30 years unless either freight is relocated to other ports or the port is able to expand beyond its current precinct. The difference in timeframes is due to the starting volume and year for the volume forecast being different between the three studies, combined with a different growth rate and varied metrics for container capacity.

## 5.2 Scenario A

Scenario A, the base case, assumed no change in the current supply chain and the ports are allowed to grow within their existing port precinct and adjacent industrial areas. This scenario shows the ports' capacity and what level of investment is required to sustain their forecast growth.

From the provided freight forecast, POAL requires capital investment to achieve the required throughput for vehicles and containers as provided in the POAL 30-year plan [4]. For vehicles, the demolition of Marsden Wharf and construction of Bledisloe South and North are required to ensure sufficient berths are available for the forecast growth. However, this development is not currently consented. The existing Fergusson Container Terminal will reach operational capacity in approximately 2044, and thereafter, expansion into Freyberg wharf will be required which will expand capacity through to 2053. Beyond this, there are no expansion plans in [4] and further works would be required for the port to remain viable. These include potentially extending the terminal an estimated 800 m east of the existing Fergusson North Wharf and associated 24 Ha of reclamation to maintain sufficient berth capacity to service vessels until 2077/78. However, this level of reclamation may prove difficult to consent. The total cost of the development is estimated to be approximately $1.27 Billion.

POT is able to cope with its the forecast growth with the construction of two berths on Sulphur Point, and the development of a container facility on the Mount Maunganui Wharves on the eastern side of the port within the current port precinct. This development has little impact on current operations at the Port or the surrounding infrastructure. The total cost of the development was estimated to be approximately $1.58 Billion.

Similarly, as NP mainly handles bulk and log commodities, it has been assumed that the Port will be able meet forecast demand under the current three-port assumption with minimal capital expenditure.

## 5.3 Scenario B

Scenario B involved relocating all of POAL current and forecast freight to POT. The two ports combined current and forecast growth at 2077/78 was approximately 9M TEU - double POT's forecast growth. Therefore, the port would need to develop within the existing port precinct and adjacent industrial areas to accommodate the adopted forecast freight growth. The estimated cost to develop port infrastructure within this footprint to accommodate growth to 2056 is $1.6 Billion.

Beyond this, there are no expansion plans and further works would be required for the port to remain viable which are assumed to the south of the existing port precinct. This port expansion would require relocation of other significant infrastructure including the highway, marina, and airport. The estimated cost to develop port infrastructure to accommodate all growth to 2077/78 is $3.3 Billion. This cost does not include costs related to relocation of other infrastructure such as the highway, marina, and airport.

## 5.4 Scenario C

Scenario C involved relocating current and forecast POAL freight to NP and relocating the existing Refining NZ wharves further east. However, due to the assumed environmental constraints on both the eastern and western side of NP, the Port has a limited footprint for expansion. It was assumed the existing Refining NZ wharves will be relocated further east at the end of the container terminal. This puts a cap on the container throughput the Port can handle at approximately 2.6M TEU, which equates to the year 2058, and has an infrastructure cost of approximately $1.7 Billion. This scenario does not provide significant capacity beyond the estimated capacity of POAL by 2053.

However, to fully accommodate POAL current and forecast freight, expansion beyond existing port development plans and existing liquids berths would be required. The expansion may impact the coastal sand migration to the east of the port as well as the natural channel alignment as a result of the dredging and reclamation of the shallow sand flats to the west. Further studies would be required to determine the impact to existing natural coastal processes. The western expansion would also have adverse visual and noise impacts  for residents at Marsden Cove.

## 5.5 Scenario D

Scenario D involved reallocating POAL current and forecast freight to both POT and NP. It was assumed that an equal split of vehicle and bulk freight between POT and NP would occur, and a 0.27:0.73 container split to POT and NP respectively. This split was derived by determining the potential capacity of NP and assigning the remaining container growth to POT (however, it is noted that this split may not be practical due to proximity of existing industry and distribution centres to the two ports).

This split requires full development of NP, including relocating the Refining NZ berths further east at the end of the container terminal; and expansion of the eastern container terminal at POT from the Base Case. The infrastructure cost is approximately $2.14 Billion and $1.82 Billion for POT and NP respectively. The infrastructure cost for NP is increased compared to Scenario C due to the larger container throughput as only one RoRo berth is required. Therefore, additional container handling equipment is required.

This scenario would also require relocation of the Tauranga Harbour Bridge which is not costed. There is also a potential for the container terminal to interfere with the airport maximum air draught restrictions, thus requiring a change of operations at the airport or relocation of the runway, or specialised low profile cranes. This, however, has not been costed. Further studies and consultation with the airport would be required.

From the above analysis, the common limiting factor for container capacity in all three ports is available berth length. Therefore, to handle the forecast 2077/78 growth, future expansion area development is required at all locations and for all scenarios which is a similar outcome to the other studies. However, Scenario D involves the most practical future expansion area development, albeit with significant port investment and un-costed land, and potentially airport transport investment required.

Although, the practicality of relocating part of POAL freight to POT and NP will mean substantial shipping through the Ports which will be challenging given the tidal restrictions. Both POT and NP are estuary ports with natural navigation channels subject to strong currents. Such conditions make vessel navigation and turning difficult and can impact port capacity due to limitations on vessel sailing times. Based on experience with other ports, Advisian believes that the risk of port capacity limitations due to navigation issues can be reduced through the use of larger tugs and possible channel modifications (subject to navigation and coastal process studies).

Advisian
Worley Group

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[3] Ernst and Young, "Economic Analysis of Upper North Island Supply Chain Scenarios," Ministry of Transport, 2019.

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[9] Port of Tauranga, "Company Overview," Tauranga, 2020.

[10] Northport, "Northport Ltd - 2020," Marsden Point, 2020.

[11] Kalmar Global, "Fundamental Shift: DP World and Kalmar's cooperation has made the Port of Brisbane one of the most highly automated facilities in the world.," Helsinki.

[12] Beca, "Coastal Processes Assessment Report: Rangitoto Channel Shipping Lane Deepening," 2019.

# Appendix A
# Stakeholder Consultation

## A.1 Port of Tauranga

### A.1.1 POT Tour and Workshop

**Project no.:** 311015-00060

**Project:** Upper North Island Supply Chain Strategy Project

| Meeting | Port Workshop - POT | | |
|---|---|---|---|
| Date | 12/02/2020 | | |
| Start time | 09:00 | Finish time | 14:00 |
| Location | Port of Tauranga Offices | | |
| Attendees | David Moore and Gary Blick – Sapere<br>Patrick McCallum and Gabriel Tooker – Advisian<br>David Stimpson – Ministry of Transport<br>Leonard Simpson and Dan Kneebone – Port of Tauranga | | |
| Apologies | N/A | | |
| Recorder | Gabriel Tooker | Doc no. | |
| File location | | | |
| Copies | | | |

#### *A.1.1.1 Action items*

| No. | Description | By whom | Date due |
|---|---|---|---|
| 1 | Port Tour<br>- Capital dredging performed in 2016<br>- Vessel navigation windowed due to currents<br>- Potential to extend log berths further south<br>- Extension of Sulphur Point Wharf south is about to be submitted for consent<br>- Cold storage shed at north of logs could become car storage<br>- ~1% containers handled on eastern berths<br>- Log export vessels typically import bulk goods such as fertiliser<br>- 120 TEU capacity trains to MetroPort<br>- 3*1 km rail sidings on port | D.K. | |
| 2 | Port operations presentation | L.S. and D.K. | |

| No. | Description | By whom | Date due |
|---|---|---|---|
| | - POT is an export port, POAL is import port<br>- 310,000 TEU to MetroPort per annum<br>- 6-7 MTPA of logs is sustainable<br>- use cruise berth in off season<br>- Average of 35 crane moves per hour<br>- 9,500 TEU vessel each week<br>- 285 m Sulphur Point wharf extension is planned<br>- Would build ASC as same time as Sulphur Point wharf extension | | |
| 3 | POT to send through presentation | D.K. | 17/2/20 |
| 4 | Advisian to send through list of any further questions | G.T. | 21/2/20 |
| 5 | Sapere and MOT are OK with Advisian directly contacting POT | D.S. | |

| | |
|---|---|
| **Next meeting scheduled for:** | **Within the following weeks** |

### A.1.2 Post Workshop Meeting

**Project no.:** 311015-00060

**Project:** Upper North Island Supply Chain Strategy Project

| **Meeting** | **Post Workshop Meeting** | | |
|---|---|---|---|
| **Date** | 25/02/2020 | | |
| **Start time** | 09:00 AEDT | **Finish time** | 10:00 AEDT |
| **Location** | Phone call | | |
| **Attendees** | Patrick McCallum and Gabriel Tooker – Advisian<br>Leonard Simpson and Dan Kneebone – Port of Tauranga | | |
| **Apologies** | N/A | | |
| **Recorder** | Gabriel Tooker | **Doc no.** | |
| **File location** | | | |
| **Copies** | | | |

#### A.1.2.1 Action items

| No. | Description | By whom | Date due |
|---|---|---|---|
| 1 | POT to send through terminal areas for each commodity | D.K. | 28/2/20 |
| 2 | POT agree with methodology presented with refinement of metrics to be used | L.S. and D.K. | |
| 3 | Would require dredging to allow NeoPanamax Vessels to enter port | | |

**Next meeting scheduled for: N/A**

## A.2 Northport

### A.2.1 NP Tour and Workshop

**Project no.:** 311015-00060

**Project:** Upper North Island Supply Chain Strategy Project

| Meeting | Port Workshop - NP | | |
|---|---|---|---|
| Date | 13/02/2020 | | |
| Start time | 09:00 | Finish time | 15:00 |
| Location | Northport Offices | | |
| Attendees | David Moore and Gary Blick – Sapere<br>Patrick McCallum and Gabriel Tooker – Advisian<br>David Stimpson – Ministry of Transport<br>John Moore, Murray Jagger, Greg Blomfield, – Northport | | |
| Apologies | N/A | | |
| Recorder | Gabriel Tooker | Doc no. | |
| File location | | | |
| Copies | | | |

#### A.2.1.1 Action items

| No. | Description | By whom | Date due |
|---|---|---|---|
| 1 | Port operations presentation<br>- Significant vacant land zoned industrial surrounding port<br>- Log exports declining in the future<br>- Project cargo imports which can dwell in on port storage for months as port is not constrained<br>- Exports dominate existing container trade – mainly cement<br>- Swire and MSC for container trade<br>- 150-200 m vessel currently for tans-Tasman and SE Asian trade<br>- Consent for dredging for 16.5 m draught for Refining NZ<br>- Depth ranges alongside between 14.5-16m from west to east | J.M. & G.B. | |

| No. | Description | By whom | Date due |
|---|---|---|---|
| | - Dredged sand can be used for reclamation material<br>- 3 kn of tidal flow through berth and channel<br>- OMC commissioned Dynamic Under Keel Clearance (DUKC)<br>- NP have simulated a 325 m 11,000 TEU container vessel through existing channel and turning basin<br>- 20knt wind restriction on log vessels<br>- 294 m cruise vessel being brought in<br>- 165,000 T displacement vessel currently being brought in for Refining NZ<br>- Suezmax vessel (275*52*16.5) is max of current channel<br>- Currently berth vessels bow into tide<br>- 3 berths at 67% occupancy<br>- Plans for a drydock to be installed on the western expansion | | |
| 2 | Port Tour<br>- Sand waves occur<br>- Currently have 13 wide mobile harbour cranes<br>- 80 reefer points with the ability to upgrade to 200 | J.M. | |
| 3 | Advisian to send through list of any further questions | G.T. | 21/2/20 |
| 4 | Sapere and MOT are OK with Advisian directly contacting NP | D.S. | |

**Next meeting scheduled for:** **Within the following weeks**

Advisian
Worley Group

## A.3 Ports of Auckland

### A.3.1 POAL Tour and Meeting

**Project no.:** 311015-00060

**Project:** Upper North Island Supply Chain Strategy Project

| Meeting | Port Workshop - POAL | | |
|---|---|---|---|
| Date | 14/02/2020 | | |
| Start time | 09:00 | Finish time | 13:00 |
| Location | Sapere Offices | | |
| Attendees | David Moore, Gary Blick and Daniel Watt – Sapere<br>Patrick McCallum and Gabriel Tooker – Advisian<br>David Stimpson and Deb Hill – Ministry of Transport<br>Ben Wells – Treasury<br>Alistair Kirk and Matt Ball – Ports of Auckland<br>Glenn Curry – Black Quay Consulting<br>Hamish Bunn – Auckland Transport | | |
| Apologies | N/A | | |
| Recorder | Gabriel Tooker | Doc no. | |
| File location | | | |
| Copies | | | |

#### *A.3.1.1 Action items*

| No. | Description | By whom | Date due |
|---|---|---|---|
| 1 | Port Tour<br>- 90% through testing Autostrads, should turn on in March<br>- Will use Autostrad to load and unload trucks to yard. Will then use manual from yard to crane as auto cannot perform as high as manual<br>- new cranes have quad lift<br>- RoRo vessels<br>1 always<br>2 regularly<br>3 typically<br>4 rarely | A.K. & M.B. | |

| No. | Description | By whom | Date due |
|---|---|---|---|
| | - still handle coal and gypsum<br>- have installed container vessel hatch lid platforms on cranes<br>- coal unloading onto trucks<br>- scrap steel exports where coal was stockpiled (Freyberg wharf)<br>- use ships gear for pacific trade with forklifts<br>- Jellico wharf has Holcim cement imports, cars, containers, steel and timber imports and exports<br>- import aggregate and sand via barge on two wharves<br>- Bledisloe wharf is Golden Bay cement imports<br>- 40% of cars were high and heavy (>20m$^3$)<br>- 4-5 cars per truck<br>- 10% of cars and transhipped<br>- car dwell time is 2.5-3 days<br>- offshore dredge spoil location is ~150 km away | | |
| 2 | Port operations presentation<br>- POAL do not own Queens Wharf, just manage it<br>- POAL own Princess Wharf<br>- 33 Ha Waikato facility opened warehouses last year<br>- South Auckland Freight Hub becoming full rail to port<br>- Plan to do inland ports and hubs<br>- plan to bring freight to hubs and pack/unpack<br>- Mostly imports in Auckland<br>- Iron sands dropped in the past 18 months<br>- scrap steel is mostly from construction sites and domestic from the city and surrounds. 30,000 t every 2 weeks. 300,000 t in 2019<br>- Steel and Timber bulk exports<br>- 140 cruise vessels this year<br>- 151 booked<br>- ~1M TEU throughput is roughly maximum capacity of terminal<br>Analysis by TBA confirmed that POAL is ok for next 30 years with development of Freyberg wharf<br>- POAL cannot handle largest cruise vessels<br>- consent for channel dredging to be confirmed | A.K. & M.B. | |
| 3 | POAL to send through presentation | M.B. | 17/2/20 |

| No. | Description | By whom | Date due |
|---|---|---|---|
| 4 | Advisian to send through list of any further questions | G.T. | 21/2/20 |
| 5 | Sapere and MOT are OK with Advisian directly contacting POAL | D.S. | |

| Next meeting scheduled for: | Within the following weeks |
|---|---|

### A.3.2 Post Workshop Meeting

**Project no.:** 311015-00060

**Project:** Upper North Island Supply Chain Strategy Project

| Meeting | Post Workshop Meeting | | |
|---|---|---|---|
| Date | 26/02/2020 | | |
| Start time | 08:30 AEDT | Finish time | 10:00 AEDT |
| Location | Phone call | | |
| Attendees | Patrick McCallum and Gabriel Tooker – Advisian<br>Alistair Kirk and Matt Ball – Ports of Auckland | | |
| Apologies | N/A | | |
| Recorder | Gabriel Tooker | Doc no. | |
| File location | | | |
| Copies | | | |

#### *A.3.2.1 Action items*

| No. | Description | By whom | Date due |
|---|---|---|---|
| 1 | - Container dwell times are low (2 days) hence high container metrics<br>- 2.42 day dwell time for cars in 2019<br>- Fergusson reclamation consented by wharf extension is not<br>- To the east of Holcim dome, potential for expansion of other bulk goods in the future<br>- 300,000 units is just cars | | |
| 2 | - G.T. to send through assumed areas and berth lengths for POAL to comment | G.T. | 26/2/20 |
| 3 | - A.K. to confirm metrics and throughputs of machinery | A.K. | 28/2/20 |
| 4 | - POAL agree with methodology presented with refinement of metrics to be used | A.K. & M.B. | |

**Next meeting scheduled for: N/A**