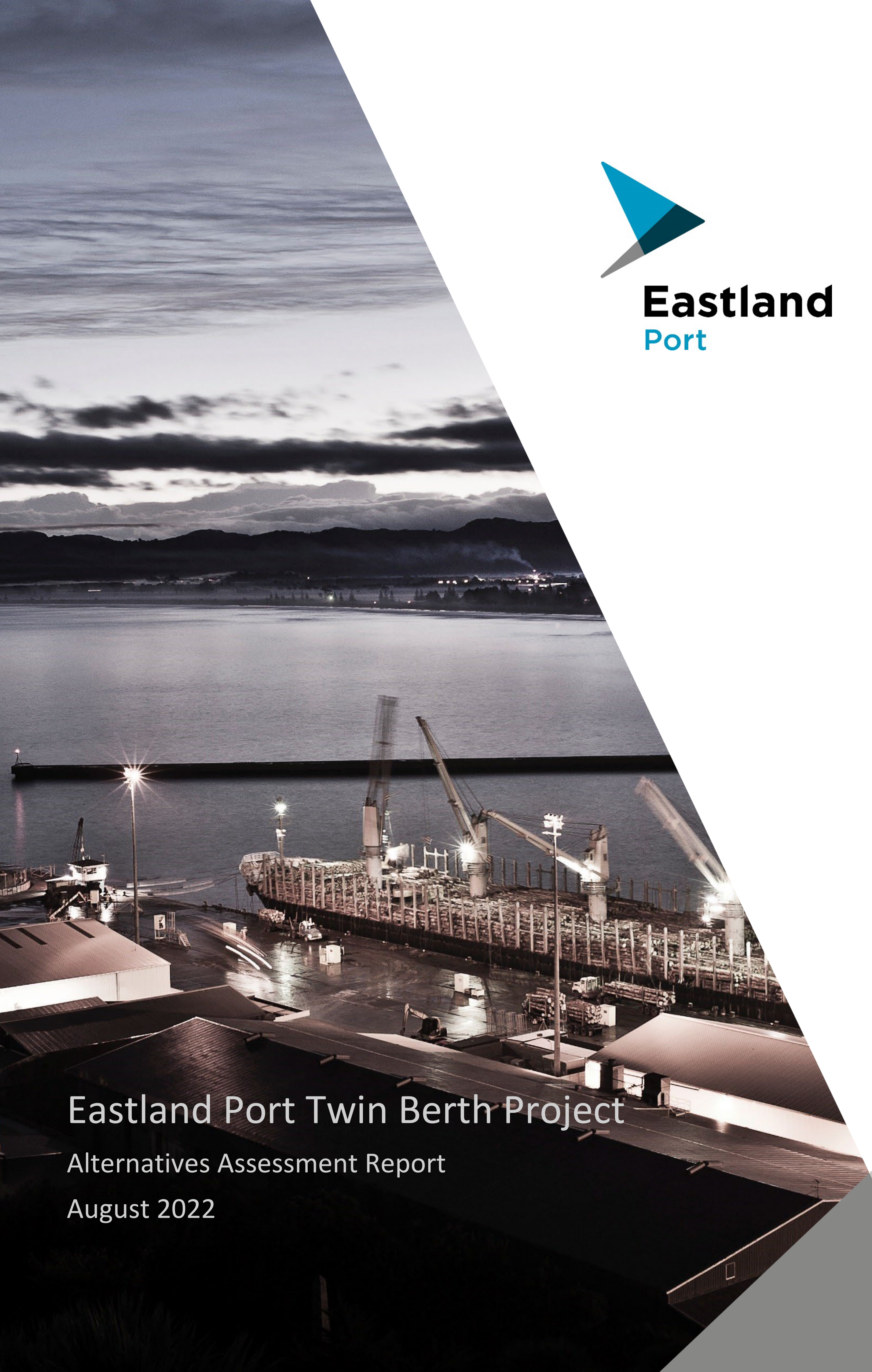

Eastland Port Twin Berth Project

Alternatives Assessment Report

August 2022

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Document Control

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1 Introduction

1.1 Context

Eastland Port Ltd (Eastland Port) operates the Port of Gisborne (Port) and is New Zealand's second largest log export port facilitating the current trade of up to 3.0m tonnes of forestry exports along with regional produce export. The Port is relied upon to service 23% of the region's Gross Regional Product, and is at the heart of Tairāwhiti-Gisborne's $2.3 billion economy.[1] The Port is a significant contributor to the local economy, with more than 200 people employed on-site and a further 5,630 people, or 26% of the full and part-time jobs across the region, working in associated industries primarily forestry and horticulture.

The Port's main cargo trade are logs ($536m and 9.7% of the total wood and wood products for NZ), kiwifruit ($30m and 0.8% of the total fruit exports in NZ), and squash ($18m and 3.7% of the total vegetable exports for NZ).[2] While the Port primarily services Tairāwhiti's export economy, there is also a growing tourism industry using the Port, with increasing numbers of cruise liners booked to call at the Port since the easing of COVID-19 restrictions.

The Port is facing significant growth across its existing cargo trades, as well as growth emerging in other products such as apples and the re-emergence of wood processing in the region. In addition to ensuring the Port infrastructure is able to service this current growth, Eastland Port recognises the need to future-proof the Port infrastructure for potential future growth (including container trade) and possible changes in the export market and processes. The continued efficient operation and development of the Port is essential to employment and prosperity across the region of Tairāwhiti. It is crucial that the Port infrastructure is robust and reliable, that can accommodate anticipated future growth and adapt to support the community and New Zealand's changing needs.

1.2 Purpose of this report

Eastland Port began this project in 2015 when it started planning for how to accommodate the Port's growth, as the existing infrastructure reaches its capacity. After looking at a range of options for upgrading and expanding the Port, Eastland Port identified what is now known as the Twin Berth Project (*TBP, or the Proposal*) as its preferred option. The TBP will allow two Handymax (logging) sized ships to berth and load simultaneously at Eastland Port, ensuring the Port is able to service Tairāwhiti's forecast forestry harvests as well as opening up the possibilities of shipping containers and other trade to and from the region.

The Proposal will also add much needed resilience to the region's export supply chain. Currently, the entire Tairāwhiti forestry industry is reliant on Wharf 8 to function. Emergency repairs required in 2021 meant that Wharf 8 was out of service for several weeks, disrupting the supply chain and forestry industry throughout the region significantly.

The Proposal has been split into two stages (Figure 1). The first stage, involving the redevelopment of Wharves 6 and 7 and the former slipway, was consented in December 2020 and construction work has already commenced. Stage Two, the subject of the current resource consent applications, will involve:

- the extension of the existing Wharf 8 and adjacent reclamation of the seafloor;
- upgrading of the existing breakwater;
- capital and maintenance dredging to deepen the turning basin and channels to accommodate larger vessel loads;
- upgrades to the stormwater collection and treatment facilities across the Southern Log Yard; and
- replacement of the existing Port coastal occupation permit that is due to expire in 2026.

[1] Regional gross domestic product: Year ended Mar-21 https://www.stats.govt.nz/information-releases/regional-gross-domestic-product-year-ended-march-2021/

[2] For the year ending 31 December, 2021. Statistics New Zealand NZ Stat Imports and Exports Tables https://www.stats.govt.nz/topics/imports-and-exports

In order to select its preferred option for upgrading the Port infrastructure, in accordance with the requirements of the Resource Management Act[3], the Tairāwhiti Resource Management Plan[4] and the New Zealand Coastal Policy Statement[5]. Eastland Port went through a careful assessment of alternative options that would achieve its objectives, as well as considering the 'do nothing' status quo option. Thorough consideration of all the possible options resulted in the finding that the Proposal is the preferred option.

This report describes the:

- measures already taken by Eastland Port to increase port efficiency (and thereby avoid, minimise or delay the need to expand the port operations);
- the alternative options considered by Eastland Port to upgrade the Port infrastructure to service the anticipated growth;
- the process undertaken to evaluate those alternatives; and
- how the Proposal was identified as the preferred option.

This report is supported by the appended technical assessment of the design requirements for the TBP as set out in Worley's *Twin Berth Development – Design Parameter Justification* (June 2022) report. The technical aspects within this report are largely derived from that technical assessment unless otherwise stated.

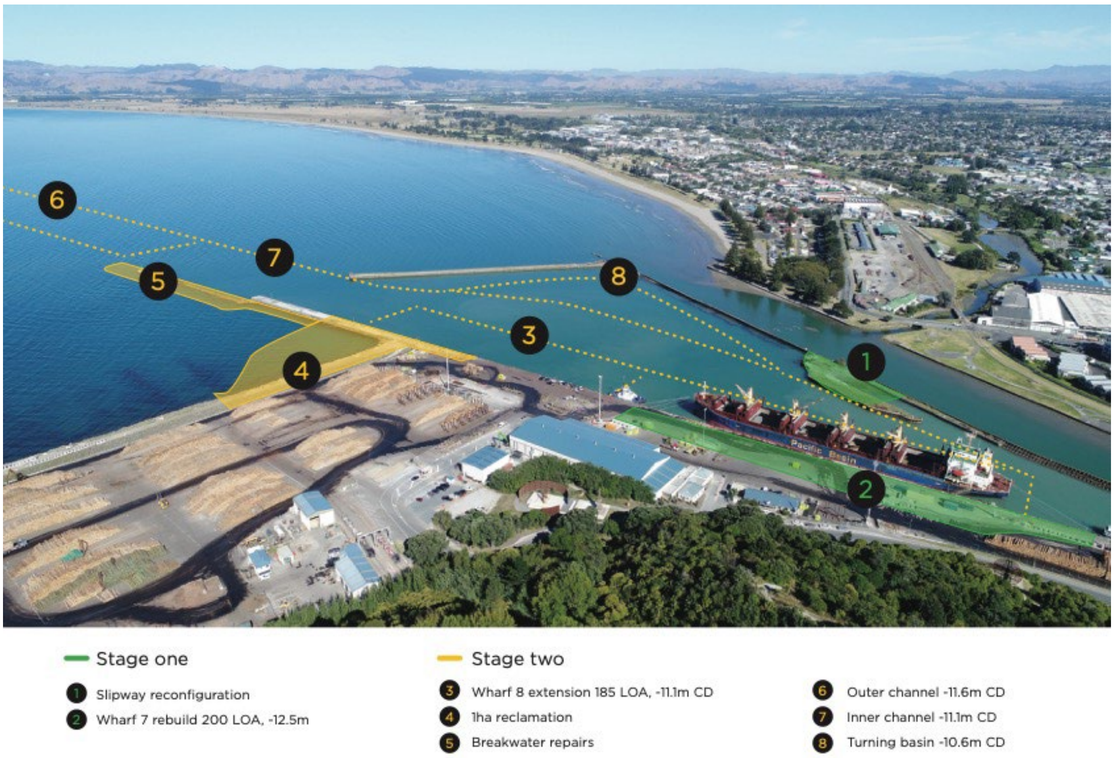

Figure 1. Eastland Port Twin Berth Project plans (the Proposal)

[3] Section 105 Matters relevant to certain applications

Schedule 4 Information required in application for Resource consent, 6 Information required in assessment of environmental effects

[4] The Tairāwhiti Resource Management Plan, Coastal Management C3.8.2, C3.8.3, C3.9.3 and C8.5.4. Objectives

Coastal Management C3.8.3 Policies

Coastal Management C3.9.3 Policies

Coastal Hazards C8.5.4 Coastal Hazard Policies – Regional Plan and Regional Coastal Plan

[5] New Zealand Coastal Policy Statement 2010 (NZCPS), Policy 9 Ports and Policy 10 Reclamation and de-reclamation

2 Objectives of the project

The Port has experienced significant growth in recent years in terms of overall tonnage, log volumes, other primary produce volumes and cruise vessel visits. The Port is currently facing several challenges due in large part to this growth, including:

1. Aged and damaged assets that require replacement or substantial upgrading;
2. More frequent and intense weather events causing increased levels of supply chain disruptions;
3. Water depth limitations in the Port Navigation Channel, Vessel Turning Basin and berth pockets of the outer Wharves 7 and 8 which restrict the vessels that can use the Port;
4. Increasing sizes of vessels which will be servicing the Port in the future and therefore need to be accommodated;
5. Very high levels of utilisation of current wharf and logyard facilities resulting in prolonged ship queuing and supply chain disruptions to Tairāwhiti primary industry (Figure 2);
6. Forecast increases in export log volumes; and
7. Restricted ability to provide for other forms of shipping and trade (both import and export) from Tairāwhiti.

In this context the key objectives of the project are to:

1. Provide necessary upgrades to ageing port infrastructure that will allow for the Port to be suitably resilient to natural hazards;
2. Increase the export capacity to cater to forecast export wood resource volumes;
3. Provide future opportunity for regional exports and other activities from the Eastland Port, and

Each of these objectives are considered below.

Figure 2. Vessels queuing in Tūranganui-a-Kiwa awaiting berth space at Eastland Port

2.1 Necessary Port upgrades

Eastland Port has numerous aging and damaged assets which are no longer fit for purpose. Many of these assets have exceeded or reached the end of their design life, compromising their structural integrity and ability to function reliably. Some of these can be remediated but many of them require replacing or upgrading to serve Tairāwhiti into the future. Further challenges to current Port infrastructure that support upgrade are outlined below.

Aged and damaged key assets

Eastland Port has several key assets that are in poor or fair condition, and/or past their design lives:[6]

- **Outer Breakwater**. Built in the 1920's. Poor, aging asset constructed on low quality ground in the marine environment. Situated on a deep layer of sediment, settling at various rates over its length. It is anticipated to sink below water level if not reinstated in years to come;
- **Inner Breakwater**. Built in the 1890's. Constructed from two rows of concrete block walls with fill in-between. Situated on sediment of varying depths which has caused differential settlement through the structure. Cracks have appeared in the top surface (Figure 3), and voids and settlement are visible throughout the structure side profile (Figure 4);
- **Wharf 8**. Built 1994. In reasonable condition for age with exception of occasional voids forming in underlying papa rock due to scour. Eastland Port's only current functioning wharf for log export;
- **Wharf 7**. Built 1967. Has passed end of its design life and is now load limited. Structural assessments found the piles have been significantly compromised through chloride ingress and it is now operationally severely limited;
- **Slipway**. Built 1923. Is in decay, remedial works required to maintain structural integrity. Sheet plies have significantly corroded, anchor rods have failed in many places.

This challenge was highlighted in 2020 and 2021 when Wharf 8 was closed for emergency repairs for two different failures. In 2020, submarine papa mudstone bedrock portions (>5 tonnes) broke away from underneath the superstructure and into the berth pocket preventing ships berthing (Figure 5). In 2021 voids were also found in the underlying substrate in an isolated area at the northern end of Wharf 8 due to scour preventing it from being driven over and loaded safely. Significant underwater dive repairs to the Wharf were required to ensure operations could resume. This asset and others are now monitored regularly for signs of these failures, however, they can still occur and cause prolonged operational disruptions with very little notice.

[6] Table 4 – Asset Function and Condition: Worley. 2022. Twin Berth Development – Design Parameter Justification.

Figure 3. Differential settlement cracks reflecting through Inner Breakwater structure

Figure 4. Differential settlement and voids in the Inner Breakwater

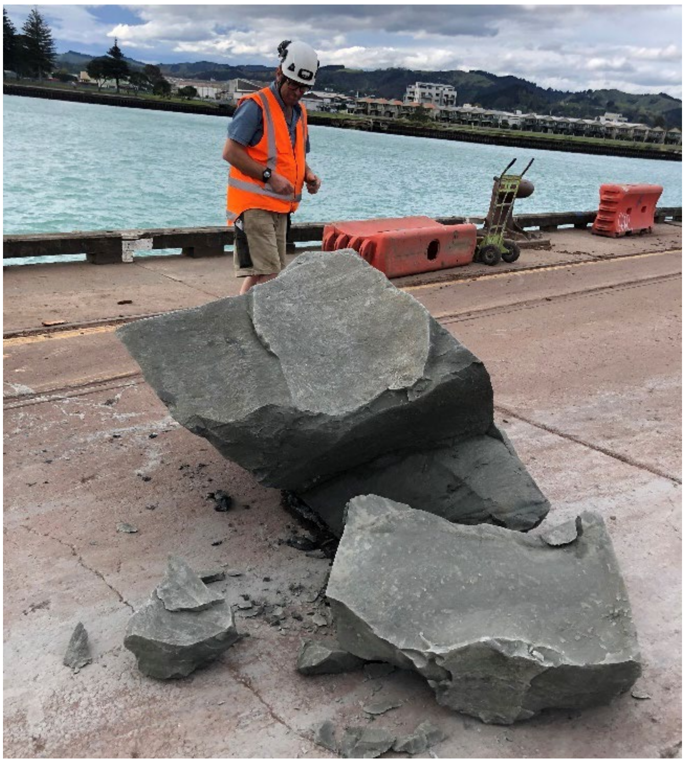

Figure 5. Portions of papa mudstone bedrock recovered from Wharf 8 berth pocket in 2020

More frequent and intense weather events

The impact of the weather on operations and industry has become more evident and felt throughout the industries that Eastland Port services, in particular in the forestry industry.

When Tairāwhiti forestry export volumes were lower (<2.7m tonnes exported/annum) there was still redundancy within the export supply chain to accommodate weather events while still satisfying customer export requirements. However, with the increased volumes now exported via the Port, weather events preventing shipping has caused significant disruptions to the industry. When disruptions occur, they often flow all the way back up through the supply chain to the forestry harvesting crews on the hillside, and therefore have a far-reaching effect.

On average, weather disruptions prevent a vessel from entering the harbour 17% per annum. With the effects of climate change becoming more frequent and intense, an increased level of redundancy is needed in the regional export supply chain. Another log vessel capable berth would achieve this.

These more frequent and intense events also bring more sediment down the rivers which flow into Tūranganui-a-Kiwa/Poverty Bay. This has resulted in the Port Navigation Channel filling up with sediment more frequently, reducing the declared depth and service offering of the Port, which increases the need for more frequent dredging.

Water depth limitations

Currently, only select Handymax vessels can load to full capacity at the Port due to the safety restrictions imposed by the depths the various parts of the harbour are able to be dredged to. As well as restricted export consignment sizes, bringing part loaded vessels into harbour is also a restricted operation.

These restrictions affect the ability of the Port to load vessels continuously without regular periods of downtime from vessels waiting on the berth to exit the harbour with full loads on the high tide. They also restrict the periods of time when shipping operations can bring vessels into the harbour. These restrictions impinge Eastland Port's customers' ability to run safe, reliable, efficient shipping operations out of Tairāwhiti.

Increase in vessel sizes

International shipping trends illustrate that vessels are continuing to increase in size and capability to take advantage of economies of scale.[7] These trends are most prevalent in container ships, but this trend is also mirrored in the breakbulk fleet of vessels that visit the Port and are increasingly likely to occur with consignment size steadily increasing over time as illustrated in Figure 6. Between April 2017 and February 2022, average log consignment size increased from 21,000 to 25,500 Japanese Agricultural Standard (JAS).

Eastland Port needs to keep up with these trends and accommodate larger vessels now and into the future. Vessel fleets are constantly being retired and replaced with bigger vessels. This means that, without upgrades, there will be fewer vessels available to service Eastland Port's customers in time.

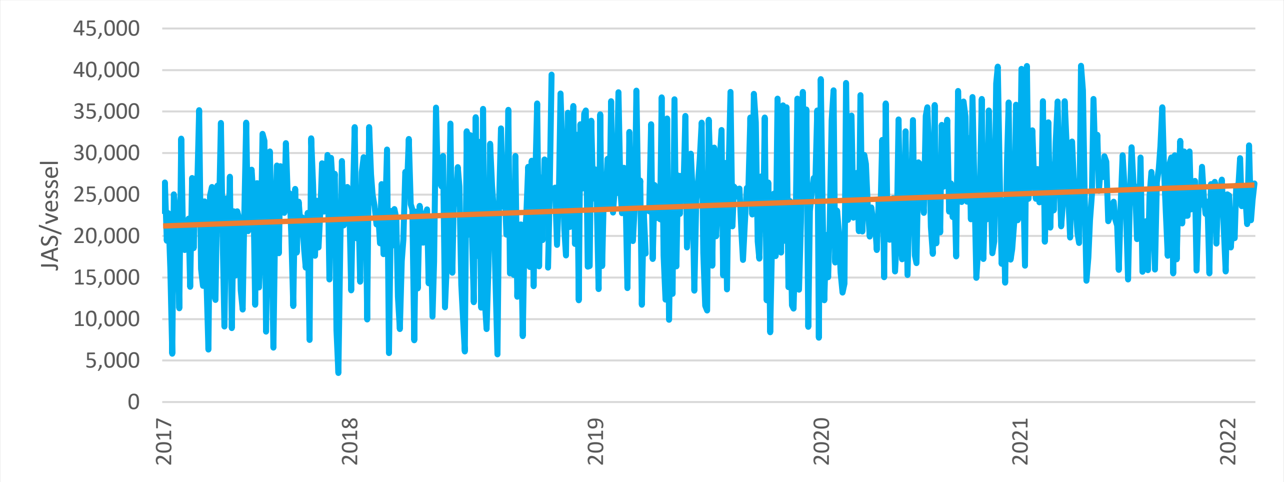

Figure 6. Average log vessel consignment trend April 2017 - February 2022

Currently, almost all the log export vessels that visit the Port are Handymax sized; 150-200m Length On Arrival (*LOA*) with a draft of between 11-12m and weighing between 35,000-50,000t. With increased dredge depths, the Port will be able to welcome Handymax sized vessels that will be able to load to capacity, and Supramax vessels will be able to load to much greater volumes. Supramax vessels range from 180-200m LOA with a draft of between 12-13m and weighing between 50,000-60,000t. With this increase in ship dimensions, the Port needs to upgrade its infrastructure to withstand the higher loads placed upon its wharf structures during berthing and while moored alongside.

2.2 Increased log export volumes

With its current assets, the Port's current log export capacity is approximately 3.0M JAS per annum. This capacity of 3.0M JAS per annum exported was reached in 2018 (Figure 7), however Tairāwhiti's wood resource harvest is expected to peak at approximately 4.2M JAS before 2030. With berth occupancy peaking at 70% along with vessels at anchorage awaiting berthage, Eastland Port has established that it has reached its capacity with a single berth.

Permanent International Association of Navigation Congresses (PIANC) guidelines provide context to this scenario highlighting that after 65% berth occupancy, Eastland Port would expect to see vessels queuing for extended periods awaiting berthage.[8] This is exactly what happened in 2020 with up to 16 vessels recorded as awaiting berthage at one time. Accordingly, the Port needs to increase its capacity to meet the forecast export volumes and a second berth is required to do so. To meet forecast export volumes, the Port must, at a minimum, be able to load two Handymax sized vessels simultaneously.

[7] The Maritime Executive, "How Container Ships Got so Big and Why They're Causing Problems", (1 April 2021) <https://maritime-executive.com/editorials/op-ed-no-need-to-scrap-megamax-boxships-after-suez-canal-grounding>.

[8] Working Group 158 *Masterplans for the Development of Existing Ports* Report #158, PIANC (2014).

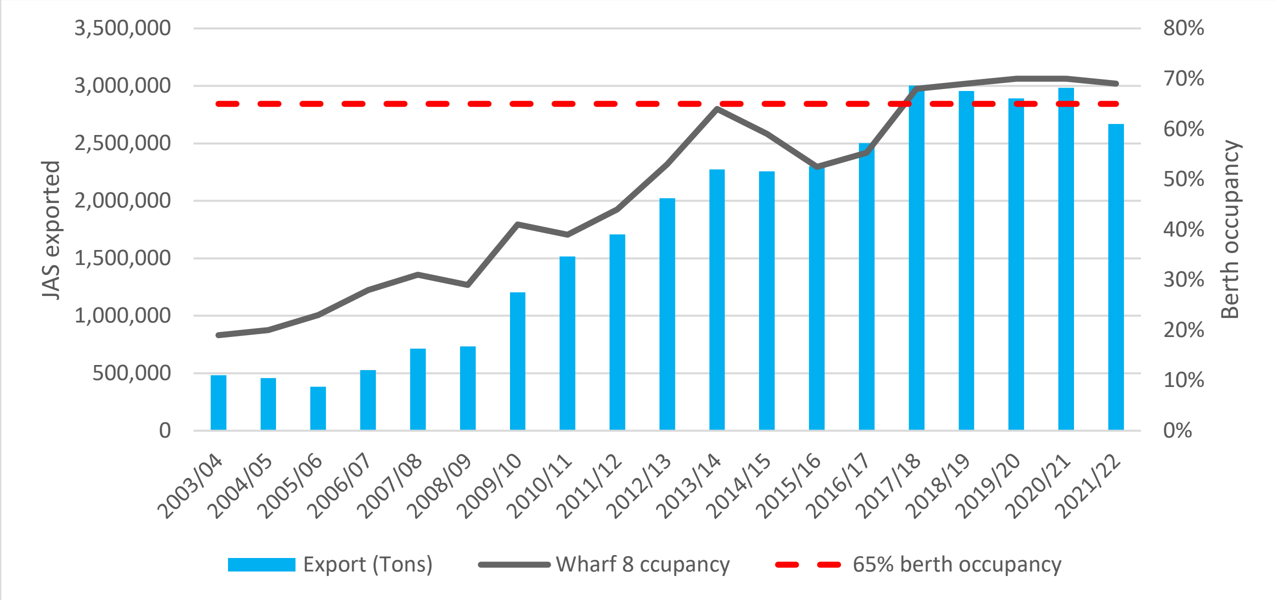

Figure 7. Eastland Port export log volumes & Wharf 8 berth occupancy

2.3 Future non-log opportunities

Alongside the log export trade, there is the potential for other products to be exported from the Port in the future that will require coastal shipping operators to berth and load. Eastland Port are exploring these opportunities with customers, but conversations are limited until the TBP is completed.

Through the Proposal, Eastland Port intends to future proof its assets in anticipation of future export growth in wood resources, whilst allowing for the exploration of opportunities in horticultural produce, wood processing, and other trades involving primary industry exports. Currently, a large volume of horticultural cargo leaves Tairāwhiti by truck to be exported by sea from Napier Port or the Port of Tauranga. This cargo would suit transportation via a coastal container service at the Port if it were available. Potential container freight numbers illustrate there is sufficient demand to explore a regular coastal container service out of Eastland Port (Table 1) especially given there is currently a coastal container service sailing past Tūranganui-a-Kiwa/Poverty Bay weekly.

Table 1. Potential container freight opportunities at Eastland Port[9] [10]

Product	Weight/TEU (tonnes)		Container size & number		Total tonnes
			20ft	40ft	
Processed timber	21	All year		1,720	36,120
Squash	28	Seasonal		1,070	29,960
Apples	23	Seasonal		1,183	27,209
Meat	20	All year	880		17,600
Maize	20	Seasonal	318		6,360
Other	20	All year	100		2,000
Citrus	20	Seasonal	35		700
Wine	24	All year	20		480
Kiwifruit*	20	Seasonal		652	13,040
Potential container freight			**1,353**	**4,625**	**133,469**

9 Gisborne Rail Reinstatement Update Assessment Project Team *Napier to Gisborne rail line potential reopening Final Report (2022)**Note Kiwifruit volume has been obtained from Zespri Annual report 2020/21*

10 Zespri *Zespri Annual Report 2020/21* (2021) at 12th May 2022.

These opportunities align with the New Zealand Governments' Climate Change Response (Zero Carbon) Amendment Act 2019. The carbon emissions of freight by coastal container from Eastland Port to either Napier or Tauranga is less than 10% of what is currently emitted from road freight to those destinations (Figure 8)[11].

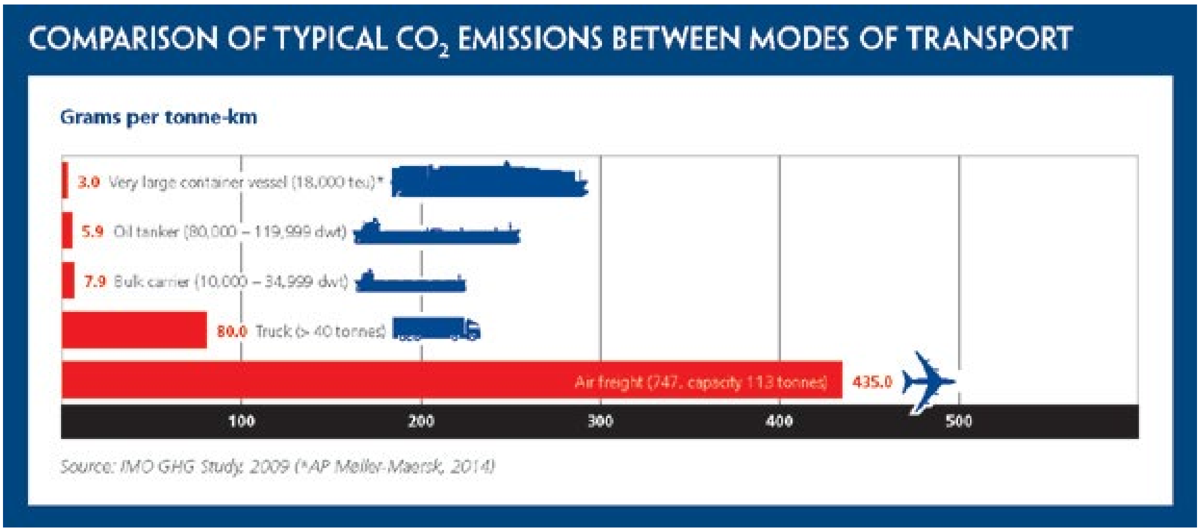

Figure 8. Comparison of typical CO_2 emissions between modes of transport

As well as containers there is the potential to export Tairāwhiti's wood resource in fibre form. The wood chip trade has occurred out of Tairāwhiti previously, and opportunities have been explored in recent years. However, as the smallest wood chip vessel available is the same size as a full Supramax, 200m LOA, it is recognised that this opportunity cannot be entertained without the Proposal being fully committed to or completed.

[11] International Chamber of Shipping "Environmental Performance: Comparison of CO_2 Emissions by Different Modes of Transport" Shaping the Future of Shipping <https://www.ics-shipping.org/shipping-fact/environmental-performance-environmental-performance/>.

3 Measures already implemented to maximise Port operational efficiency

Prior to pursuing the Proposal, significant work was undertaken by Eastland Port, both on-port and with the wider supply chain, to ensure the Port's operations and existing landside assets are used to their full capacity and to avoid, delay and/or minimise the need for the reclamation and other works associated with the Proposal.

This section describes those measures that have been explored and implemented at the Port to maximise Port efficiency and operational/storage capacity prior to the Proposal being put forward for regulatory consideration.

Eastland Port's focus has been on the forestry supply chain which has been considered collaboratively with the Port's customers and supply chain operators through the Port Efficiency Group forum. With this collaboration, the Port has had an increase in vessel load rates and the Port has now maximised its capacity with the current operations and technology available (Figure 9).

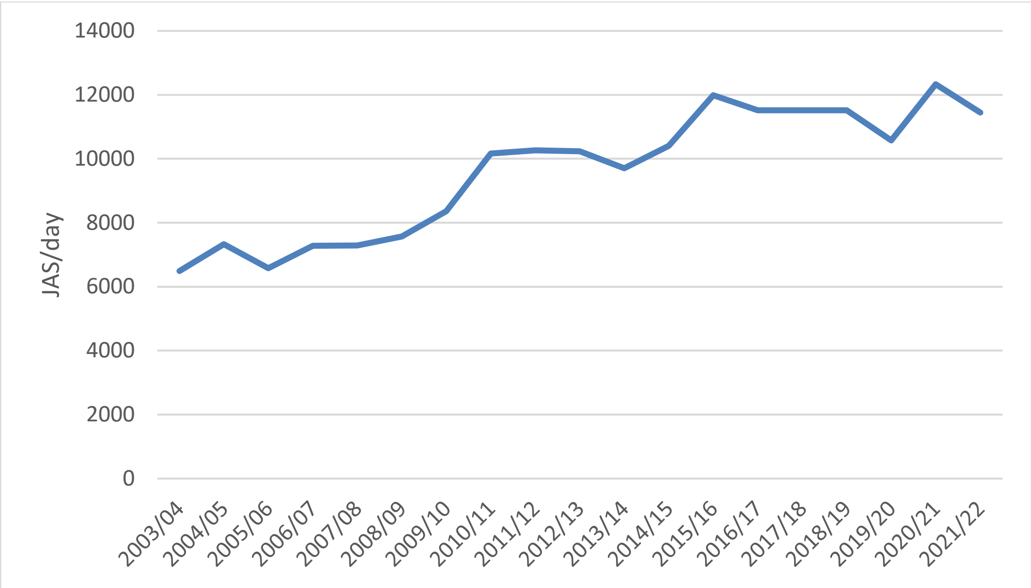

Figure 9. Average ship loading rates of logs over Wharf 8

These landside and operational improvements are important alternative options for consideration. Logs are a high volume/low value commodity that require efficient operations to be economical. Any additional costs in the supply chain must be minimised, which the Proposal aims to do.

Through these operational improvements and upgrades of the Port's land-based assets, the amount of reclamation required has reduced significantly from previous upgrade proposals, which involved between 38.5ha to 1.0ha. Although some additional storage will be achieved by any reclamation, this is secondary to its intent, the reclamation area is now designed to support shipping operations.

3.1 Shipping capacity

To improve shipping capacity, the Port has been active in managing its shipping supply chain and has explored and implemented new technology, within the confines of its current physical infrastructure. The Proposal seeks to upgrade and replace this infrastructure.

Since 2017, the Port has undertaken time-study analysis on every logging vessel that has visited the Port, in a project called 'Ladder to Ladder'. This time-study tracks what happens on a visit to the Port from when the pilot first steps on the ship's ladder (pilot on board) to bring a vessel into port, through to when the pilot steps off the ladder (pilot off) after navigating the vessel out of the harbour. Activities such as pilotage, mooring, stevedoring load rates, consignment volumes, and any breakdowns and downtime are all recorded, tracked and scored against expected times/rates. This analysis has allowed the Port to identify where time has been lost through the supply chain and to rectify or manage issues in accordance with the views of its customers and supply chain service providers at regular Port Efficiency Group meetings. This project helps with challenges 5 and 6 regarding improvement of the utilisation of current wharf assets, and accommodating increasing log volumes.

In 2018, the Port reconfigured its mooring systems from using shore lines to using ShoreTension, a proprietary constant tensioning mooring system.[12] Primarily this was a safety improvement, but also helps manage weather conditions and challenge 2 outlined in Section 2.

ShoreTension is a stand-alone mooring system that holds a vessel under permanent tension via dyneema mooring lines. The hydraulic ram units with control valves maintain the permanent tension (Figure 10). This system reduces the movements of a moored vessel caused by strong winds, swells and currents. By minimising the effects of weather, the Port is now able to hold vessels in harbour safely in conditions that it previously was not able to. Consequently, ShoreTension contributes to higher wharf utilisation or challenge 5.

Figure 10. ShoreTension units at work on Wharf 8

In 2019, the use of dynamic under keel clearance (*DUKC*) was implemented into Eastland Port marine operations, allowing ship navigation to move away from a static under keel clearance of 2m. Under keel clearance is the depth of water available underneath the vessel whilst it is underway, after allowing for the motions of a ship. DUKC manages a ships under-keel clearance and ensures it has sufficient under-keel clearance for a safe transit considering the environment conditions (Figure 11).

This allows the Port to manage shipping actively and optimise vessel consignment sizes instead of the static under keel clearance (S*UKC*) which by nature is inherently conservative in its approach to vessel management.

Adopting this technology contributes to addressing challenges 2, 3, 4, and 5, being weather events, limited water depth, increasing vessel size, and wharf utilisation, respectively.

12 Eastland Group "New mooring investment improves safety" (13 August 2018) <https://www.eastland.nz/2018/08/13/new-mooring-investment-improves-safety/>.

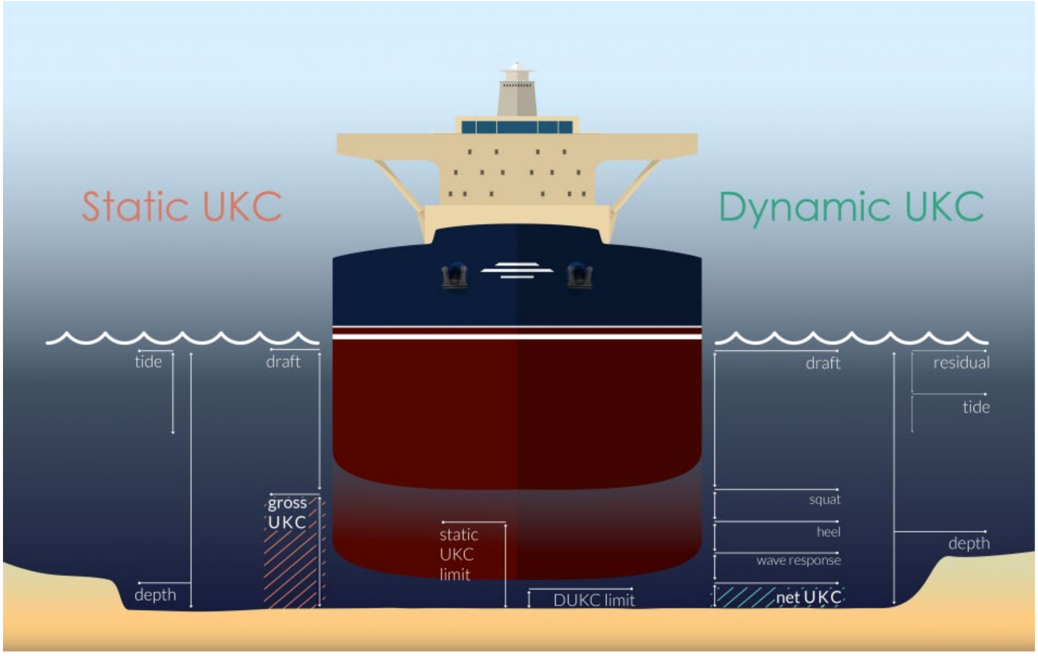

Figure 11. Comparison of Static UKC and DUKC[13]

3.2 Storage

A large focus over the last fifteen years at the Port has been the development and optimisation of the 15 ha of on-port land side assets, particularly the log yards for storage. This has seen the average volume stored on-port increase from 50,000 JAS to a peak of 93,000 JAS (Figure 12). The Port has invested over $50m in these assets to achieve this and has sought to optimise its operation.

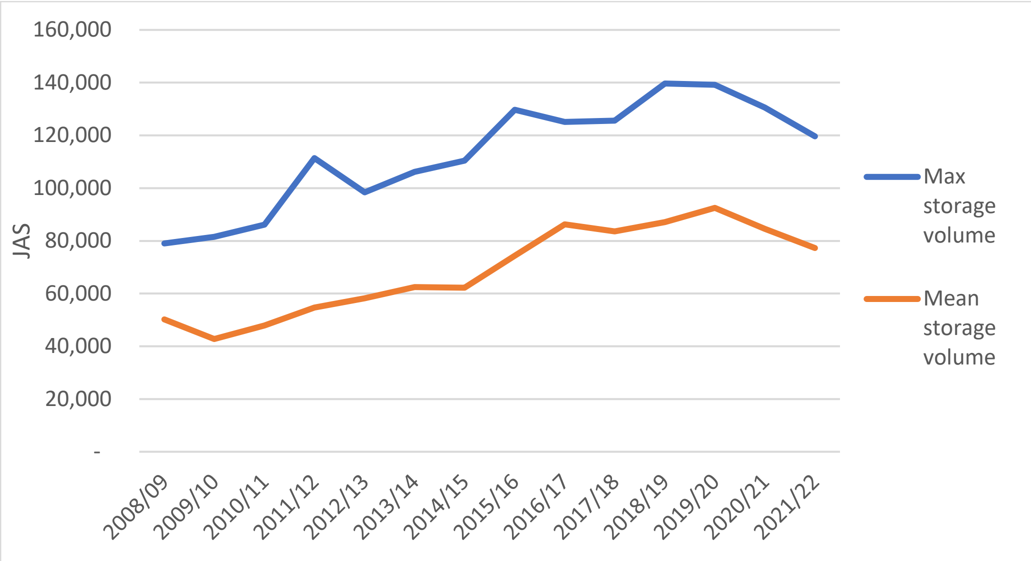

Figure 12. On port maximum log storage records per annum 2008-2021

The first significant earthworks project undertaken on port was the Rakaiatane Road Bypass in 2007. This involved a joint Gisborne District Council/Eastland Port project to reroute traffic through the Port to Kaiti Beach Road from the former Esplanade to Hirini Street and the new Rakaiatane Road. The underpass and Rakaiatane Road now contiguously links all three of the Port's yards

13 OMC International "Dynamic Under Keel Clearance" < https://omcinternational.com/products/dukc>.

together. This removed the need for internal port traffic from the Upper and Wharfside Log Yards to cross a public road to reach Wharf 8.

Following this, progressive redevelopment of the on-port yards took place to support better operations. The yards were made up of remnants from previous occupation and uses including building foundations and redundant plant. They were of various levels and impracticable shapes, consisting mostly of unbound aggregate pavements. The yards presented a series of environmental issues that required resolving, including the use of these areas for log storage and the resulting stormwater discharges.

Progressively, the Port's existing yards were developed to be more conducive to efficient port operations, resulting in hard-surfaced, heavy duty pavements and new stormwater treatment systems to meet environment standards required by the regulator. The yard projects include:

- Southern Log Yard. 6.8 ha development completed in 2013;
- Upper Log Yard. 3.2 ha development completed in 2016;
- Wharfside Log Yard. 2.0 ha development completed in 2020;
- Southern Log Yard Extension/Port Entry. 1.0 ha development completed in 2021

Prior to the Southern Log Yard Extension/Port Entry project, the Port decreased its dry and chilled storage on-port to make way for more log storage and improve internal traffic flow. Three large dry and chilled storage sheds (7,800 m²) were removed from the Port and the former abattoir freezer was refurbished to become a chilled store between 2016-2018. This rationalisation and maximisation of log storage area is illustrated in the changes between Figure 13 and Figure 14.

As well as on-port, Eastland Port has one 13 ha off-port storage yard, 9 km away from the Port at Matawhero. This is well located to the east of the Port and collects logs from the Port via State Highway 2 from the south. This yard was developed in five stages beginning in 2010 and being completed in 2020.

Figure 13. Dry stores and chilled stores on port 2016

Figure 14. Dry and chilled store rationalisation and Southern Log Yard Extension/Port Entry projects completed 2021

In addition to these civil projects undertaken, operational improvements have been made throughout the Port to optimise their use. Log storage bookends have been built to increase log storage densities (Figure 16) and log handling machinery has evolved to use Hi-stacker/material handlers (Figure 15) which are able to stack logs higher more safely and efficiently.

Figure 15. Hi-stacker/materials handler (left) and pivot-steer loader at Eastland Port

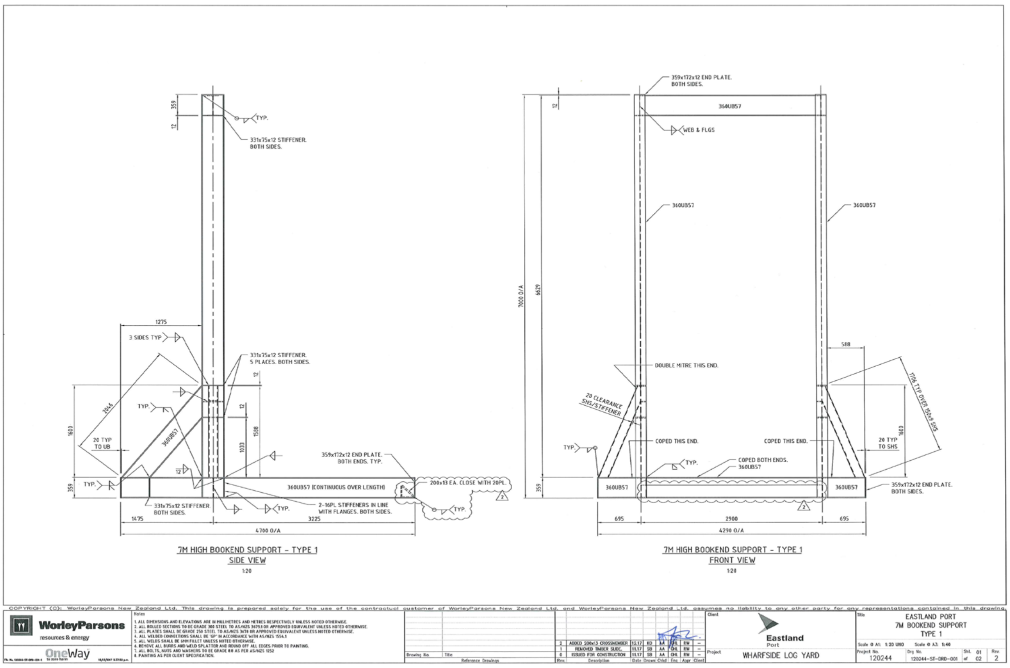

Figure 16. 7m high log storage bookend support design

Traffic management has been optimised to help ensure ship loading rates and road traffic across the Port happens efficiently and safely. At the completion of the on-port yard developments, the Eastland Port Traffic Management Plan (Figure 17) was revised to capture this and facilitate efficient operations.

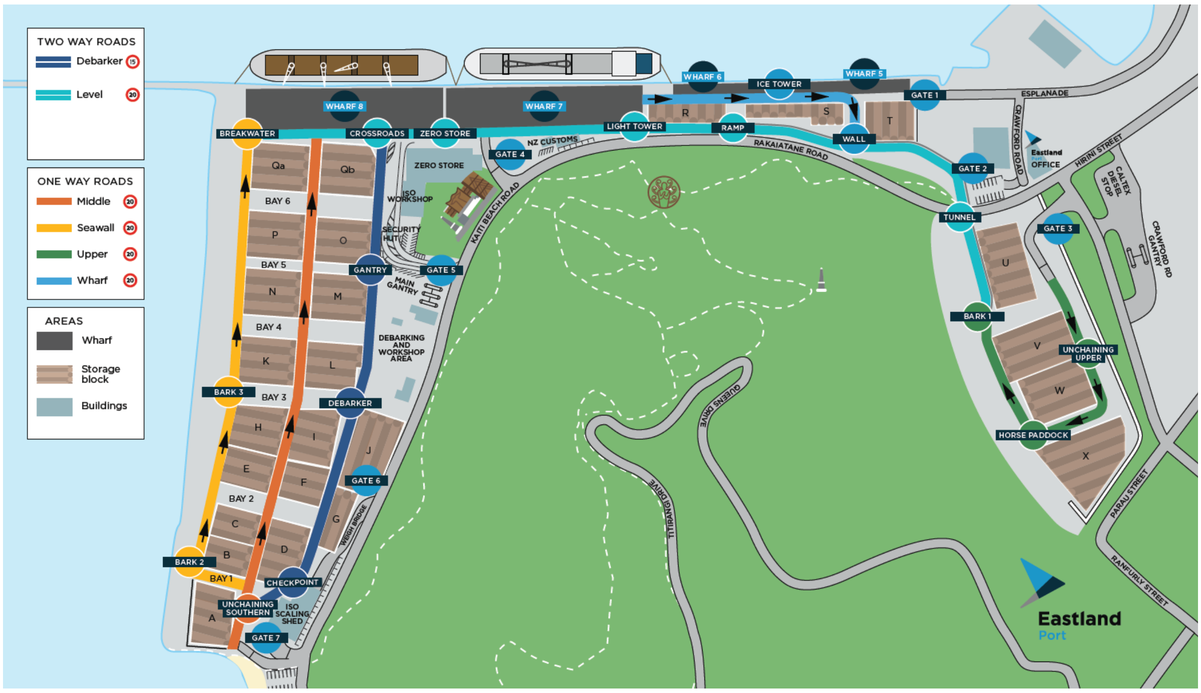

Figure 17. Eastland Port Traffic Management Plan 2022

The above measures have maximised Port efficiency and storage, ensuring that the Port has sufficient on-site storage capacity.

3.3 Summary of Port operational efficiency

Eastland Port has progressively worked to upgrade all its landside assets and optimise the use of these to increase port capacity prior to pursuing the Proposal outlined. This section illustrates the efforts gone to avoid, delay and/or minimise the need for the reclamation and other works associated with the Proposal. However the capacity of these assets and operations has now been reached and in order to meet the objectives of the project extra capacity must be found through the development of a second log vessel berth.

4 Description of alternative options considered

Before selecting and pursuing the Proposal, Eastland Port considered a range of alternatives options to address the capacity and capability challenges identified in Section 2 of this report. A description of each option to achieve each objective is provided below.

Several additional options for upgrading the Port were considered by Eastland Port in the initial stages of investigation but were not considered in extensive detail due to economic, construction risk, or other reasons meaning that they were not feasible options. Most of these were alternate options for the Outer Breakwater Refurbishment and feature in this section.

4.1 Options considered to increase shipping capacity

This section outlines the alternative options considered for physical structures to increase shipping capacity.

4.1.1 Option 1: Asset maintenance only (180m + 150m vessels simultaneously)

Option 1 involves undertaking only essential works required to maintain the Port assets as they are today. This option would only address the first of the seven challenges listed in Section 2 of this report; repairing, replacing, or upgrading aged and damaged assets. This option would involve:

- Rebuild of Wharf 7 to current dredged depth -8.6m;
- Slipway repairs & maintenance;
- Outer Breakwater repairs & maintenance; and
- Renewal of maintenance dredging consents of Port Navigation Channel, Vessel Turning Basin and berth pockets of the outer wharves 7 & 8.

These works would maintain the current shipping capacity the Port has today, which includes a logging vessel between 170-200m LOA and a small reefer vessel up the balance of a 390m quay line. Typically, with two vessels in the harbour, the logging vessel will need to be <180m for a 150m reefer vessel to be in Port simultaneously.

Historically, reefer vessels visiting the Port average 142m LOA but range between 130-150m. However, the modern larger reefer vessels, which service kiwifruit at Eastland Port, are 158m.[14] For this vessel to berth without affecting log trade, the logging ship needs to be shorter and/or the environment conditions favourable.

With no additional dredging undertaken, most Handymax sized vessels will still not be able to leave the Port with a full volume consignment.

The works that Option 1 involve would still require resource consents to be applied for and granted even though they would only be maintaining the status quo. As mentioned above, none of the other six objectives listed would be achieved by this option.

4.1.2 Option 2: Extension of Wharf 8 to berth two Handymax sized logging vessels (185m + 185m simultaneously) -

Option 2 accommodates the forecast forestry export volumes into the future, and provides some optionality for other freight. However, it only goes part of the way to resolving challenges 4 and 7; increasing vessel sizes visiting Eastland Port, and allowing for the provision of other forms of shipping and trade (both import and export) from Tairāwhiti, meaning the Port would not be 'future-proofed'. Option 2 would involve:

- Rebuild of Wharf 7 to dredged depth -12.5;

[14] Marine Traffic, Live Map <https://www.marinetraffic.com/en/ais/details/ships/shipid:6398769/mmsi:353369000/imo:9882372/vessel:KOWHAI MarineTraffic>.

- Slipway consolidation;
- Extension of Wharf 8 (115 m);
- Reclamation next to the Southern Log Yard & behind the extension of Wharf 8 (0.66ha) for vessel access;
- Capital dredging of Port Navigation Channel, Vessel Turning Basin and berth pockets of the outer Wharves 7 and 8 (140,600m3); and
- Outer Breakwater repairs and maintenance.

These works would increase the shipping capacity the Port has today to accommodate forecast forestry exports, a logging vessel between 170-200m LOA, and a reefer vessel within the balance of a 485m quay line. This would be able to accommodate all reefer vessels and coastal container vessels expected at Eastland Port at the same time a logging vessel is being loaded.

However, Option 2 would not offer the flexibility that is required for the largest vessels of up to 200m LOA to visit Eastland Port. Berthing a vessel this long would be possible, but it would be at the imposition of any other vessel berthed at the Port and therefore would undermine the intent of accommodating the forecasted forestry volumes.

With this option, dredge depths have been maximised to match the structural depths of the current and future developed infrastructure. This will open up the shipping parameters for vessels to access the Port through a wider range of tides, and allow larger consignments to leave the Port.

With these dredge depths, any Handymax vessel will be able to leave Eastland Port with a full uplift (up to 37,000t from the current ~34,000t restriction), however a Supramax sized vessel will still be load restricted. A Supramax vessel's full uplift is 55,000t and the current maximum that can be loaded at Eastland Port is ~40,500t. With these dredge depths, a Supramax vessel could be loaded to 53,000t in good conditions.

For Eastland Port to explore coastal container shipping, these vessels need to not be tidally restricted. A coastal container service vessel would be on a fixed, regular timetable and therefore would need to be able to enter the harbour without restriction, which these dredge depths would allow.

4.1.3 Option 3: Extension of Wharf 8 to berth two logging sized vessels (185m + 200m simultaneously)

Option 3 is Eastland Port's preferred option and forms part of the Proposal that is the subject of the current application. It addresses all seven of the challenges in Section 2. It includes the same works as those involved in in Option 2 with the following changes:

- Extension of Wharf 8 (130 m); and
- Reclamation next to the Southern Log Yard and behind the extension of Wharf 8 (0.70ha).

These changes would increase the Port's shipping capacity to accommodate all forecast forestry exports, and provide the optionality required to fit a Supramax sized vessel in Port at the same time as a Handymax sized vessel of up to 185m LOA with a 500m long quay line. This provides Eastland Port with a solution that maximises its current assets to their potential (Inner Breakwater, Wharf 8) while upgrading others to compliment these (Wharf 7, Port Navigation Channel, Vessel Turning Basin and berth pockets).

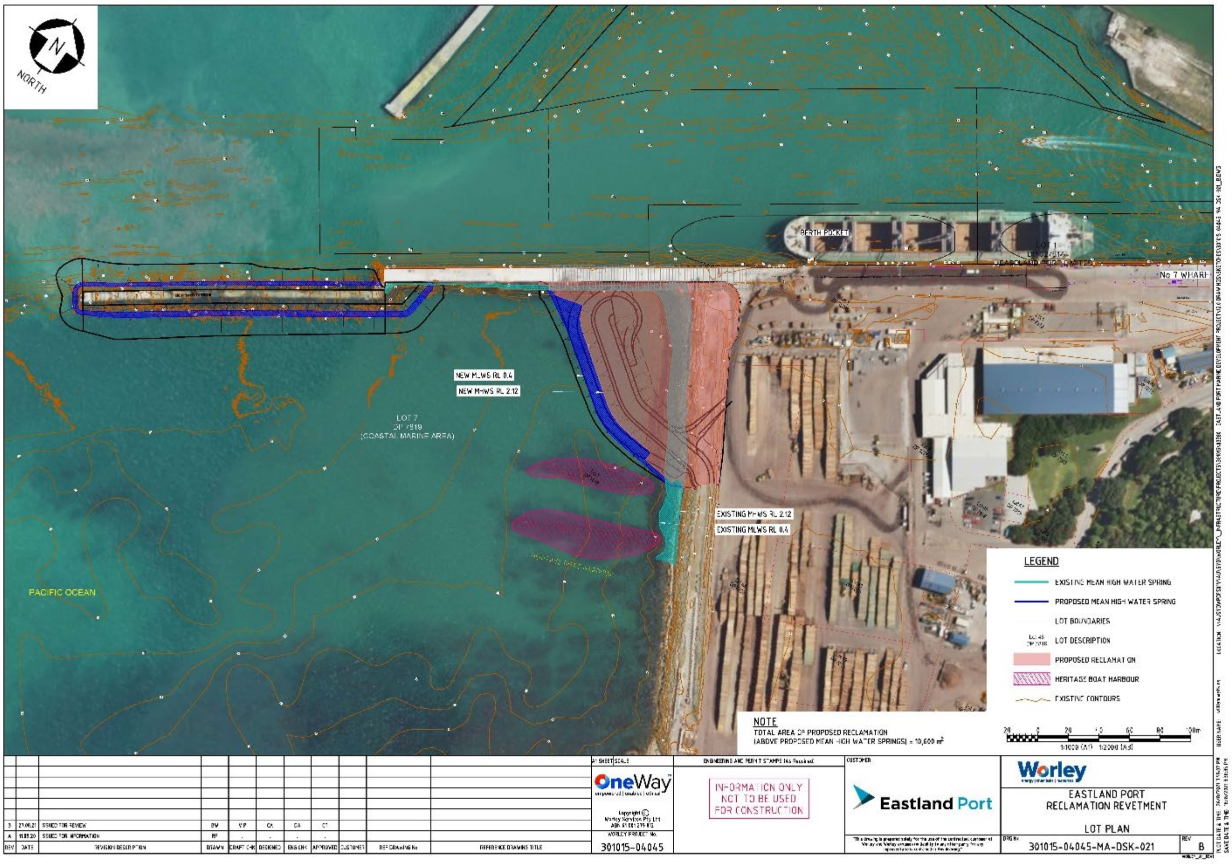

Figure 18. Option 3: Extension of Wharf 8 to berth two logging sized vessels (185m + 200m simultaneously)

4.1.4 Option 4: Extension of Wharf 8 to berth two logging sized vessels (200m + 200m simultaneously)

This option includes the same works as both Options 2 and 3 with the following changes:

- Extension of Wharf 8 (145 m); and
- Reclamation next to the Southern Log Yard & behind the extension of Wharf 8 (0.74ha).

It addresses all seven of the challenges in Section 2 and provides increased flexibility for shipping at Eastland Port. With this option the Port will be able to offer optimised options for vessel length up to 200m LOA on Wharf 7 . However, a vessel of this size berthing on Wharf 8 would still be restricted in the respective consignment uplift it could take with the limited dredge depth here. Significant additional works to Wharf 8 would be required to increase the draft of this structure beyond -10.9mCD.

4.1.5 Option 5: Breakwater Replacement

Eastland Port also considered replacing the existing Outer and Inner Breakwaters rather than refurbishing them in an effort to dredge the Port Navigation Channel deeper and achieve full uplifts off Wharf 8 with Supramax sized vessels. Three construction options were considered:

1. Encapsulate the existing breakwater with a piled retaining wall caisson founded to levels that would allow channel deepening;
2. Demolish the existing structure and use the spalls to rebuild a new rubble mound breakwater to the east, far enough to allow for channel deepening; and
3. Encapsulate the existing structure with a rubble mound. For future channel deepening, the channel side toe would need to be supported by a submarine piled wall.

Option 5 could contribute to addressing the challenges outlined above but would not resolve them. However, the cost and construction risks and practical challenges of undertaking the construction while continuing Port operations means that this option is not feasible. Instead, the option of encapsulating the existing Outer Breakwater structure with a rubble mound without the submarine piled wall was decided upon to protect the harbour environment.

4.2 Options considered to address storage capacity

This section explores the options that have been considered to create enough storage space and capacity to service the forecast log export volumes of 4.2m JAS/annum.

Storage requirements are correlated to the ability of a supply chain to load a ship efficiently. This alternative to additional storage has been explored in Section 3, where improvements over time in the supply chain and ship loading are evident. These improvements are reflected below in the reduced requirement of reclamation for storage.

4.2.1 Option 1: Reclamation

The area the Southern Log Yard now occupies was reclaimed at Kaiti Beach progressively through the 1980's. Consideration of potential options for further reclamation have since continued (Figure 19, 20, and 21). Over time, the amount of reclamation required to accommodate the region's trade has changed as has the volumes and products forecast. Previous historical plans show that up to 38.5 hectares of reclamation was considered in 1997 along with three new berths (Figure 21).

The 1997 plans were by far the most extensive and largely in response to the East Coast Forestry Project (*ECFP*). Previously up to 26.5 ha of additional reclamation had been proposed in 1994. The forecast volume from the ECFP lifted this by another twelve to 38.5 ha. The ECFP is a central government grant scheme introduced in 1991 to encourage the establishment of commercial exotic forestry on erosion-prone land on the East Coast. It resulted in large areas of land across Tairāwhiti but particularly in the head waters of the catchments of Mangatu, Tokomaru, and Ruatoria, being planted in exotic forestry with the height of plantings occurring in the mid 1990's. This has resulted in the fabled 'Wall of Wood'[15] volume which has begun arriving at the Port in recent years as these forests have reached maturity of +25 years.

More recently the 'Billion Trees' programme[16] also funded by central government has encouraged further planting of trees which may have similar effects in the future

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[15] https://www.newsroom.co.nz/are-we-ready-for-the-wall-of-wood Newsroom. "Are we ready for the 'wall of wood'?". Visited 15th February 2022(31 July 2018) <https://www.newsroom.co.nz/are-we-ready-for-the-wall-of-wood>.

[16] https://www.mpi.govt.nz/forestry/funding-tree-planting-research/one-billion-trees-programme/about-the-one-billion-trees-programme/ Ministry of Primary Industries. Visited 15th February 2022 "About the One Billion Trees Programme" (11 January 2022) < https://www.mpi.govt.nz/forestry/funding-tree-planting-research/one-billion-trees-programme/about-the-one-billion-trees-programme>.

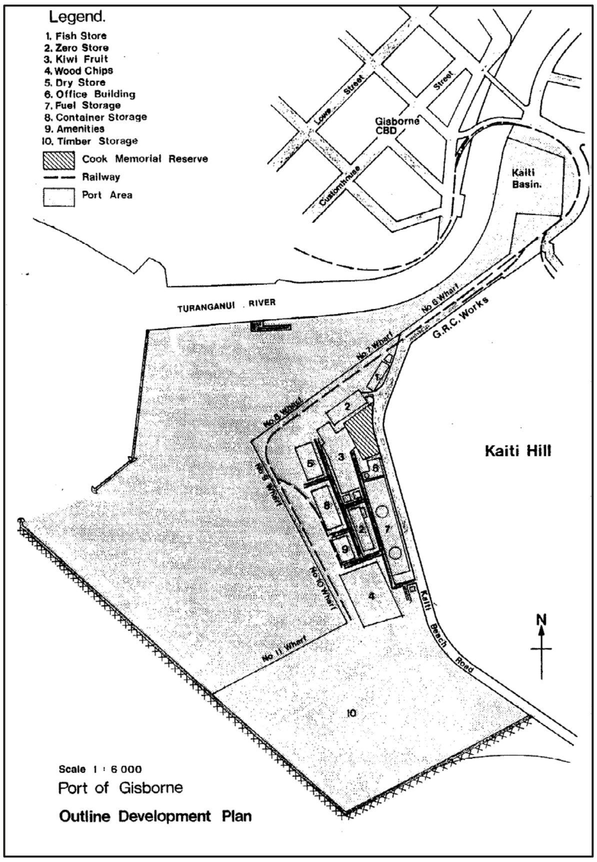

Figure 19. 1985 reclamation plans for 14.5 ha and three additional berths

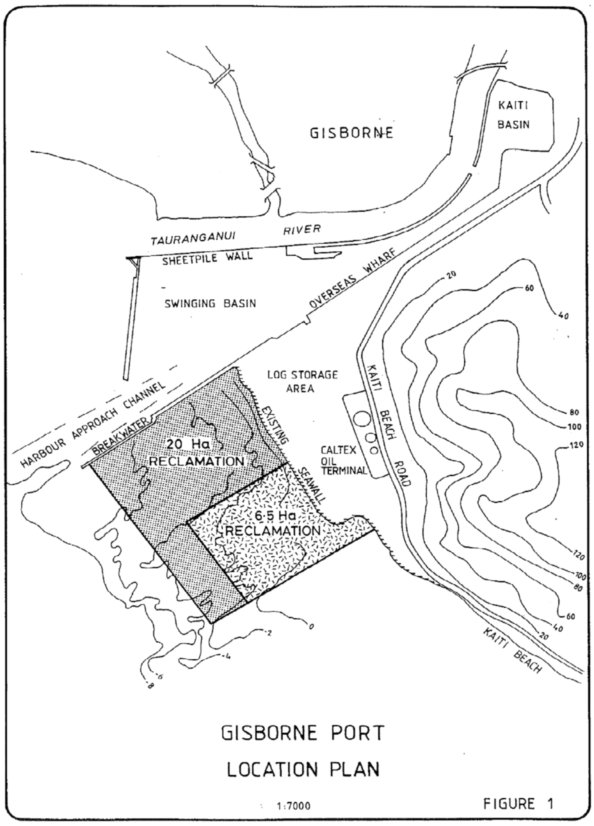

Figure 20. 1994 reclamation plans for 26.5 ha

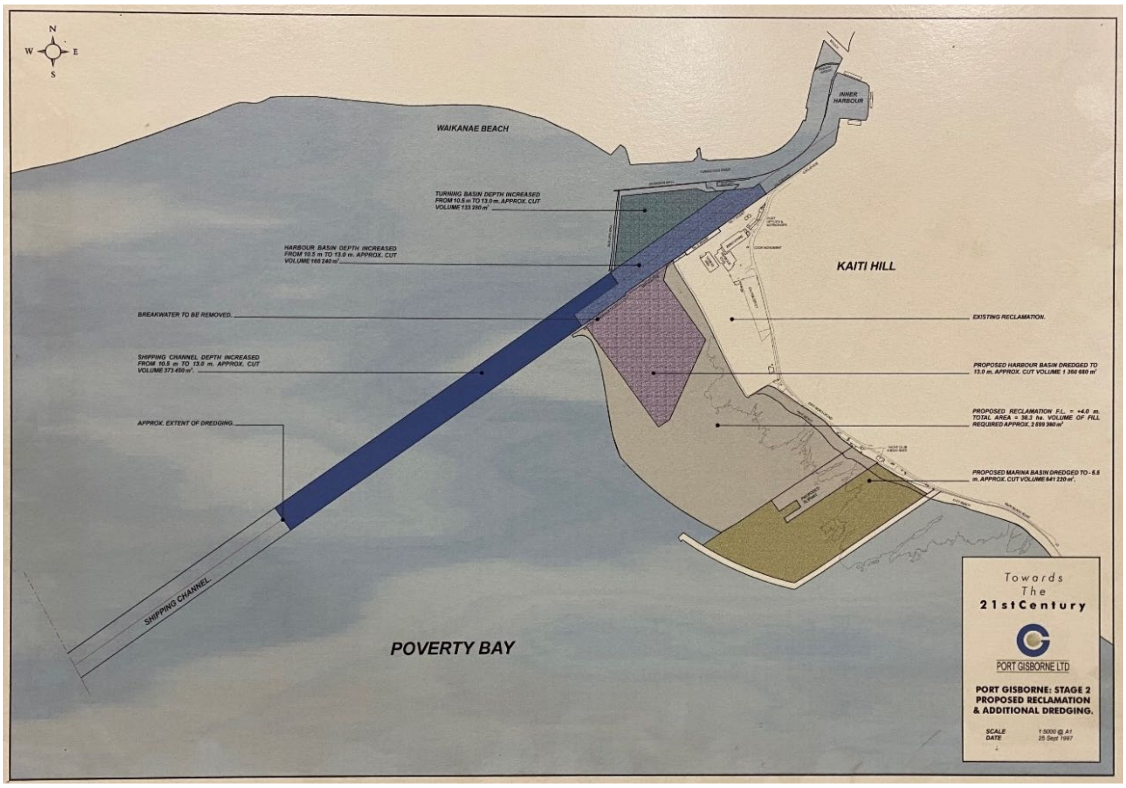

Figure 21. 1997 reclamation plans for 38.5 ha and three additional berths (bottom)

The area and additional berths required in 1997 are reflective of the ship loading rates present at that time which were ~6,000 JAS/day. Ship loading rates have increased significantly, almost doubling to a current average of 12,300 JAS/day, versus the average of 6,500 JAS/day in 2003/04 (Figure 9). This has resulted in far less reclamation being required for storage.

Taking these load rates into account, several reclamation options were considered to resolve challenges 6 and 7, regarding the forecast volume increases highlighted in Section 3. From a supply chain efficiency perspective, reclaimed land adjacent to the berth that is regular in shape is the most preferable additional storage to maintain consistently high load rates. These are provided for in reclamation options 1A and 1B at 5.0 and 5.9 hectares reclamation respectively (Figure 22 and 23).

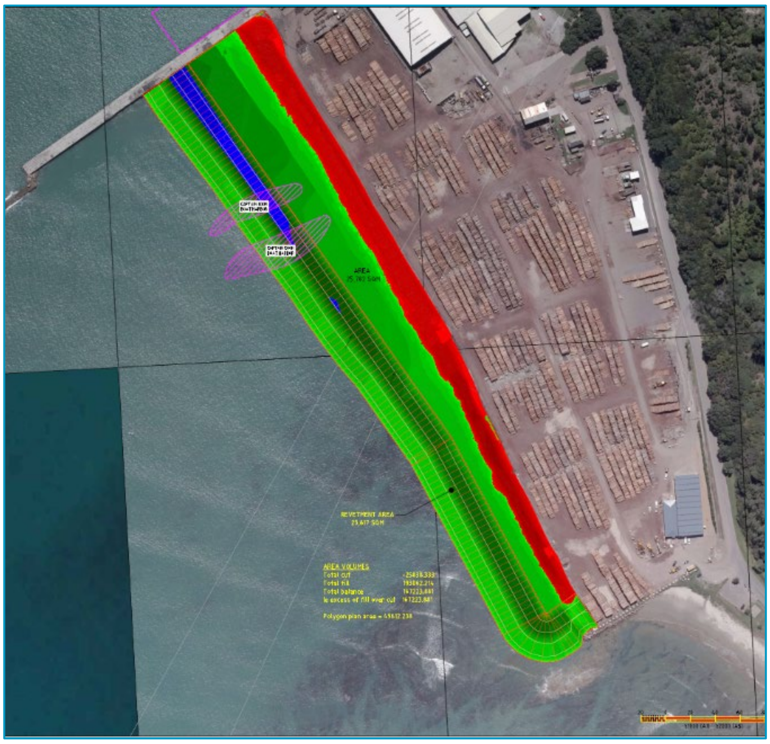

Figure 22. Option 1A: 5.0 ha of reclamation with 2.5 ha of additional storage yard (left)

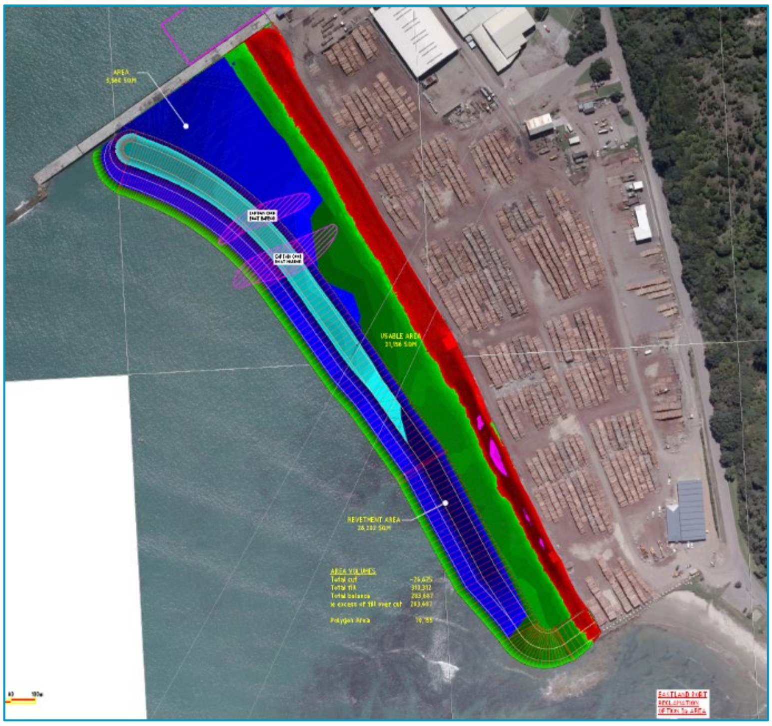

Figure 23. Option 1B: 5.9 ha of reclamation with 2.8 ha of additional storage yard (right)

Eastland Port also considered a third reclamation option (Option 1C) involving 4.1 ha for storage. Option 1C avoids reclamation over the still exposed portions of the Heritage Boat Harbour. While it provides 2.2 ha of storage area, its shape and restricted access by truck prevents it from being very efficient (Figure 24). This option 1C is also not preferable due to its extremely high construction costs and risks associated with building a large revetment/reclamation structure on unconsolidated, alluvial sediments.

Figure 24. Option 1C: 4.1 ha of reclamation with 2.1 ha of additional storage yard

4.2.2 Option 2: No additional storage on-port with alternate off-port storage developments

Constructing and using off-port satellite storage yards were also considered as an option to provide additional storage space and capacity. However, to function well this option is reliant on several aspects.

It is reliant on quality connectivity and efficient transport networks between off-port yards and the Port to ensure efficient functioning operations. It is also reliant on still being able to store a sufficient log volume on-port for export (the same or greater than today) and the unrestricted use of all the on-port storage yards within the rules of the TRMP to achieve the efficiency required.

The Port already has one 13 ha off-port storage yard which is 9 km away from the Port at Matawhero. This is well located to the east of the Port and collects logs arriving at the Port from the north and south via State Highway 2. The Matawhero Yard has been progressively expanding since 2010, reaching its current capacity which utilises the entire site. The availability of this site for overflow and additional volume has allowed the Port to export 3.0m JAS/annum.

The use of off-port storage has increased markedly since 2019/20, as illustrated in Figure 25. This increase in use coincides with safety improvements which restrict log stack heights to a maximum of 6m. Log storage requirements for the Port could be met by another off-port yard of similar size in the right location.

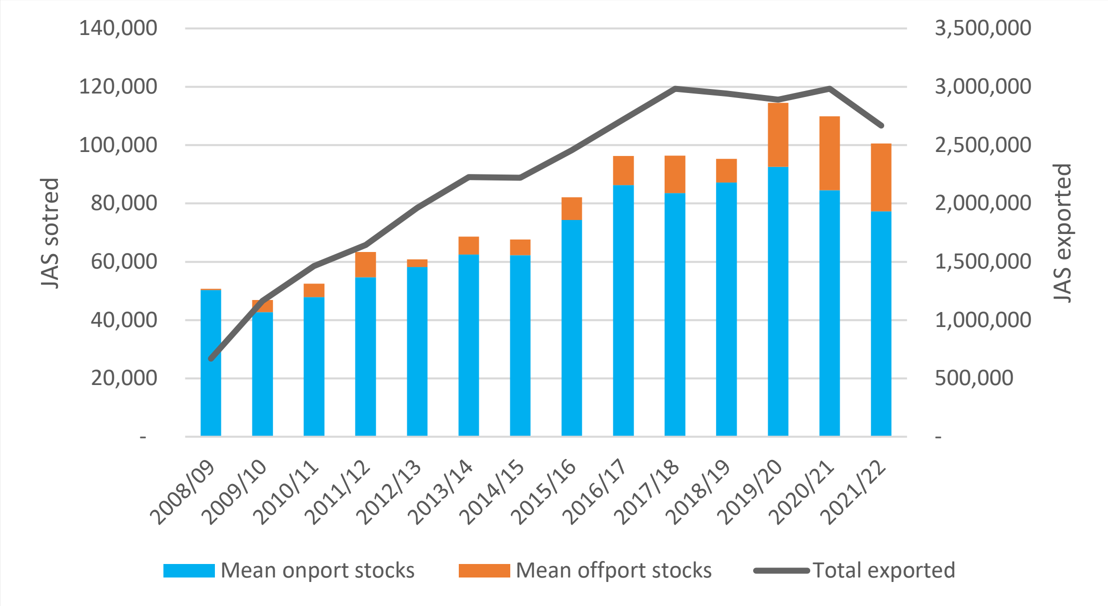

Figure 25. Average on-port and off-port stocks and total log volumes exported via Eastland Port.

Accordingly, the Port is currently progressing a resource consent application separate to the Proposal to develop a second off-port satellite storage yard to the north of Gisborne.

4.3 Options considered to for dredging material disposal

This section explores the options considered to dispose of the material to be dredged from both the capital and maintenance dredging consents that are the subject of the current application.

4.3.1 Option 1: Use in reclamation

The timeframes for dredging and reclamation in the Proposal theoretically allow for the dredged material to be used for the reclamation. However its natural consistency and the form in which it would be recovered would not be suitable for use in reclamation.[17]

Fill to be used in the reclamation would ideally be relatively non-compressible granular fill. The material that will be dredged does not fit this description. The silty dredged material has poor engineering quality characteristics with low strength, poor tillage, and poor drainage characteristics. If dredged silt or similar material were to be used, this would significantly increase the potential long-term settlement within the reclamation area. These characteristics make it unsuitable for use within the reclamation as it is without significant soil improvement and engineering processes.

Any rocky material obtained from dredging would comprise of slightly weathered mudstone and siltstone, which would be unsuitable for use in the proposed reclamation works also. This rocky material is also likely to break down over time once it is excavated and like the silt material would have settlement issues.

Irrespective of the suitability of the recovered material, the reclamation only requires 17,000m³ of fill material to complete the Proposal. This is a small fraction of the 140,600 m³ capital volume to be dredged, in addition to the maintenance dredging volume which can be up to 140,000 m³ each year. Consequently, a significant amount of the dredged material would still need to be accommodated through alternate means.

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17 Worley. 2022. Eastland Port Reclamation, Wharf 8 Extension and Outer Breakwater – Engineering Report for Consent Application.

This reclamation fill volume has been identified as preferable for the fill material that as part of the Proposal will come out of the portion of the existing seawall that requires demolition. Onsite recycling this demolition material in the reclamation also has the benefit of reducing traffic effects and overall environmental impact of the Proposal through avoiding the need to cart off material for disposal in a clean fill elsewhere.

4.3.2 Option 2: Offshore Spoil Disposal Ground

This option involves disposing of all dredging material in the Offshore Spoil Disposal Ground (*OSDG*). The OSDG is located approximately 4km to the south-west of the port (Figure 26). It is approximately 3km^2 in area and is located in water of a depth of 18-20m below Chart Datum (*CD*). The OSDG was first used in 2003 and early reports indicate that the site was chosen for the following reasons:

- the site is close to the mouth of the Waipaoa River and has a naturally muddy surficial seabed lithology;
- the muddy based benthic ecology was considered to be sparse and not of special ecological significance;
- there are no reefs close nearby;
- the area was not used significantly for fishing or other recreational boating activities; and
- the general direction of sediment transport in the area was offshore, reducing the likelihood of disposed material being captured in the inshore littoral system and potentially re-entering the Port or affecting the Gisborne city beaches.

The use of OSDG was first approved by the Gisborne District Council in 1998, with appeals to the decision subsequently resolved by way of Environment Court consent order in 2000. The Minister of Conservation accepted the recommendations of the Environment Court and approved the consents in September 2000. Since 2000, the OSDG has been the recognised area to dispose of dredge material from the Port.

Figure 26. Aerial photo of the OSDG in Tūranganui-a-Kiwa/Poverty Bay.

4.3.3 Option 3: Land based disposal

Onshore disposal is preferable where material is seriously contaminated, and where fine sediments are likely to impact sensitive marine environments.[18] Neither of these concerns are relevant to the Proposal.

Practically, this option would be very difficult to implement, requiring the acquisition of suitable land and a subsequent resource consent in order to be able to undertake this operation. For land disposal to be practical, a dewatering site must have enough available land that:[19]

- Is within approximately 1km of the dredging;
- Has little value in its existing state;
- Is large enough for containment bunds suitable for dewatering to be constructed;
- Is able to be secured so that quicksand-like properties of the fine dredged material present no safety risk;
- Is acceptable to remain in a degraded state for up to 12 months if an extended period for drying is required;
- Is sited so that it is practical for seawater to be discharged back into the sea or an estuary rather than into a freshwater stream, where impacts would be unacceptable;
- Is able to be drained in a way in which evaporative water loss from the bunded area is minimised so that excessive salt is not retained in the sediment;
- Is accessible to trucks if the site must be emptied prior to its next dredging; and
- Is acceptable to the informed public (considerable consultation with those parties that may be affected is necessary).

There is no land identified that meets the recommended criteria. Given the land acquisition and additional resource consents that would be required, this option does not support the objectives of the Proposal as set out in Section 2.

[18] Environment Protection Authority *Best Practise Environmental Management – Guidelines for dredging* Victoria, (2001).

[19] Ibid.

5 Evaluation of Alternative options

When evaluating alternative options to the Proposal, or aspects of the Proposal, Eastland Port has considered the following :

- Achieving key objectives;
- Impact on existing port operations;
- Environmental effects;
- Cost; and
- Feasibility of other options (e.g. availability of land/technology/equipment for other options).

5.1 Evaluation of options to achieve increased shipping capacity

5.1.1 Achieving key objectives

Of the alternatives considered, only two of the four options help achieve the key objectives of the overall project :

- Option 3: Extension of Wharf 8 to berth two logging sized vessels (185m + 200m simultaneously); and
- Option 4: Extension of Wharf 8 to berth two logging sized vessels (200m + 200m simultaneously).

5.1.2 Impact on existing port operations

Options 3 and 4 are feasible and able to be achieved with minor impacts on existing Port operations during construction. Accordingly, these options were further assessed against the remaining considerations being: environmental effects, cost, as well as the difference achieved between the two options.

5.1.3 Environmental effects

The difference in the environmental effects of the two options remaining (options 3 and 4) includes the additional reclamation required for Options 4's further 15m extension of Wharf 8, the additional reclamation required adjacent to this for access to the berth by port operations, and the additional capital dredging of the Wharf 8 berth pocket.

The additional area of seabed disturbance for reclamation associated with Option 4 is estimated to be 430m^2 and the additional area requiring capital dredging approximately 180m^2. The resultant volume of capital dredging material to be disposed at the OSDG would be approximately 640m^3.

5.1.4 Cost

The estimated cost to accommodate Option 3's 185m and 200m vessel simultaneously is approximately $170m in construction costs. The extra cost to accommodate Option 4's second 200m LOA vessel would result in an extra $3.2m, or a project total of $173.2m. The consideration then becomes whether there is value in these additional environment effects and cost.

Historical vessel visits to the Port suggest there is not, particularly when taking into account that 97% of vessels are <185m LOA. However, consideration needs to be made for the future with increasing vessel sizes, and also recognition that historical vessel visits at the Port are reflective of the economics of bringing large vessels to a port with current restricted drafts and shipping parameters.

5.1.5 Feasibility of other options

There are no other feasible methods to increase shipping capacity to achieve the objectives of the project other than either Options 3 or 4, Considerable effort and improvements have been made with port logging operations to ensure the supply chain and existing assets have been optimised as outlined in Section 3. The only option left to meet the project objectives is to expand shipping capacity to be able to berth a second logging sized vessel at the Port.

5.1.6 Summary of evaluation to achieve increased shipping capacity

For the Port to achieve the key objective of providing future opportunities for regional exports and other activities, at least one 200m LOA berth is required, but a second 200m berth is not warranted at this time. Consequently, on this measure Option 3 was preferred to Option 4.

Additionally, as noted in sections 1 and 2 of this report, to explore container trade, the Port needs to be able to offer a berth that does not have tidal restrictions for coastal container vessels. Option 3 enables this with its proposed changes to Wharf 8 with log trade still being supported under this Option as it would largely take place on Wharf 7 with overflow occurring on Wharf 8 in between time scheduled vessels.

Currently most log vessels are sub-185m LOA even though the maximum length of a vessel that the Port can accommodate is 200m LOA. While length can be accommodated, the harbour is draft restricted at -10.2m and therefore, chartering a longer vessel that can only part load is not economically favourable at this time. With Option 3's deeper drafts at Wharf 7 and the Port Navigation Channel, the Port can expect to see more Supramax sized vessels.

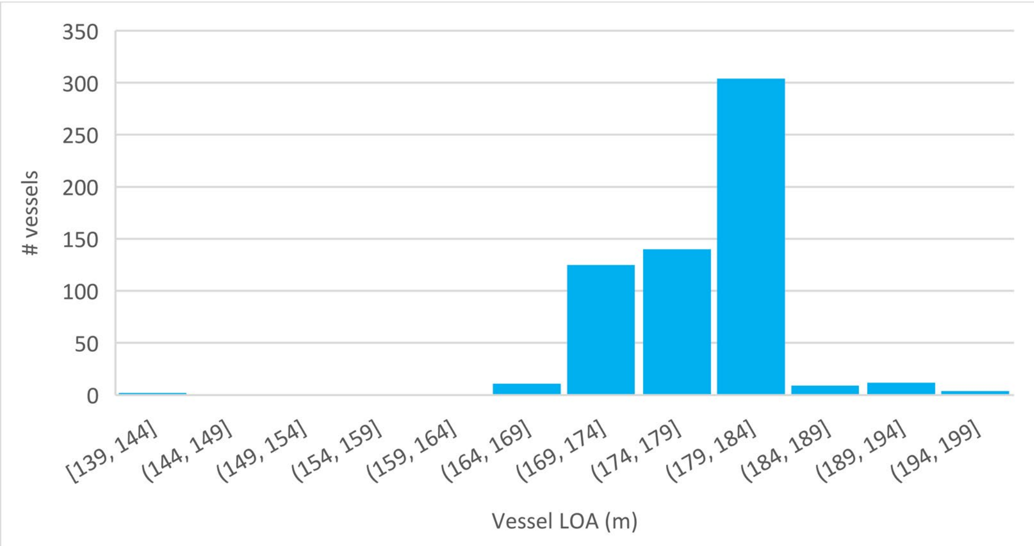

Figure 27. Historical LOA (m) distribution of vessels berthed on Wharf 8 2017-2022

Option 3 also has advantages not just for Eastland Port's log exporters, but for New Zealand's log export business more broadly. Currently, log vessels to New Zealand often stop at Eastland Port first to get their base load before moving on to another New Zealand port for the balance of their consignment for export. As the second largest log exporter in New Zealand, many of the Port's customers are forced into this operational bottleneck due to the large volume of wood they acquire from Tairāwhiti.

When combined with bad weather, this exacerbates queues, as illustrated in Figure 2, and causes industry demurrage costs from vessels waiting in the queue that need to be absorbed. Currently, daily demurrage costs for a vessel to wait at anchorage range from $USD25,000-38,000/day. The cost of this risk is ultimately reflected in a lower $/JAS rate received by the forest grower.

Option 3, will enable Eastland Port to provide a level of shipping operations more consistent with the other major log export ports throughout New Zealand. With this log export, customers will have a wider range of operational options available, and be able to shuffle shipping around NZ. This will reduce the need for vessels to visit Eastland Port first, and therefore will help reduce queues.

With these aspects evaluated, is it considered that the Port requires one 200m LOA berth and one independent 185m LOA berth to achieve the key objectives. The additional 200m LOA berth provided via Option 4 does provide some operation benefits however those benefits are limited and not justified when considering the additional effects, environmental and financial of further dredging and reclamation, as well as the additional associated costs. Therefore, Option 3 was chosen as the preferred option and has been pursued as part of the Proposal.

5.2 Evaluation of options for achieving increased storage

5.2.1 Achieving key objectives

Of the alternatives considered, all four of the options can help achieve the key objectives of the overall project :

- Option 1A: 5.0 ha reclamation with 2.5 ha of additional storage yard.
- Option 1B: 5.9 ha reclamation with 2.8 ha of additional storage yard.
- Option 1C: 4.1 ha reclamation with 2.1 ha of additional storage yard.
- Option 2: No additional storage on-port with alternate off-port storage developments

However, all four options come with different operational requirements and compromises to take into consideration.

- Option 1B is the most preferable given its shape that evenly distributes operational congestion alongside the existing port assets. An extra 2.5 ha of storage yard is believed to be enough to store the forecast forestry volumes in conjunction with the existing off-port satellite storage facilities.
- Option 1A is similar to 1B in shape and has the same operational advantages but is of less area. The balance of storage capacity would need to be found otherwise on port or at additional off-port satellite storage facilities in conjunction with the existing off-port satellite storage facilities. Previous Section 3.2 explains that all practical extra storage on-port has already been optimised.
- Option 1C is designed to avoid reclamation over the Heritage Boat Harbour, and is of similar area to 1A. Its shape is not conducive to efficient operations as it would create congestion points through the storage yards which could affect ship loading rates. Like 1A the balance of storage capacity would need to be found otherwise on port or at additional off-port satellite storage facilities in conjunction with the existing off-port satellite storage facilities.
- Option 2 places all additional storage off-port. It is believed the Port can achieve the forecast forestry volumes with another yard of similar size to the existing yard strategically placed to the north of Gisborne city on State Highway 35. This comes with other operational considerations though. To be practical it relies on the large majority of log storage to still be provided on-port. It also relies on quality connectivity and efficient transport networks between off-port yards and the on-port yards in order to function effectively.

5.2.2 Impact on existing port operations

All options are feasible and able to be achieved with nil to minor impacts on existing Port operations during construction. Additional reclamation would bring additional traffic to port which would impact port operations temporarily, off-port storage would have no impact on on-port operations. Consequently, all options were further assessed against the remaining considerations beings: environmental effects, cost, as well as the difference achieved between the options.

Post construction the different options would have significantly different impacts. These are largely explained above in Section 5.2.1. The largest operational impact and challenge will be the proportion of log volumes that will need to consistently be brought to port from the off-port satellite storage yards while maintaining the current ship loading rates.

- Option 1B would maintain operational congestion at levels experienced on port today with the extra storage area being proportional to the forecast forestry volumes. This is the most preferable option to maintain ship loading rates.
- Option 2 being increased storage requirements provided by off-port storage, will increase traffic congestion with extra volume through the same footprint on-port. This will create operational challenges to overcome to maintain ship loading rates with increased congestion in the storage yards likely. This is the least preferable storage option with the most potential impact on port operations.
- Yard congestion and effects on ship loading rates from Options 1A and 1C would lie in between these two extremes.

5.2.3 Environmental effects

The difference in the environmental effects of the four feasible options is primarily the area of reclamation each options presents. A secondary item requiring consideration is the Heritage Boat Harbour identified in the Archaeology and Heritage Effects Assessment and marked in Figures 21-23.

- Option 1B has the largest environment effect at 5.9 ha and it proposes to reclaim over the Heritage Boat Harbour.
- Option 1A has the second largest environment effect at 5.0 ha and it also proposes to reclaim over the Heritage Boat Harbour.
- Option 1C is the smallest of the proposed reclamation areas at 4.1 ha and is shaped to avoid reclaiming over the Heritage Boat Harbour.
- Option 2 has the least environmental effect with no reclamation proposed with additional storage to be accommodated through the development of additional off-port satellite storage facilities.

A fifth reclamation option does feature in the Proposal which is outlined in Section 4.1.3 and Figure 18. It should be noted this 0.7 ha of reclamation is proposed for the purpose of trucks with cargo for export accessing the extended Wharf 8 to load and is not for the purpose of storage. Given its shape and proximity to the berth it will provide a minimal amount of storage though. At 0.7 ha it is also significantly less than Options 1A, 1B, or 1C; and like 1C is specifically shaped to avoid reclamation over the Heritage Boat Harbour.

5.2.4 Cost

The financial cost of additional storage is significant and the options considered range from $126m to $174m. There are also high construction risks associated with several of these options.

- Option 1B is estimated to have a construction cost of $140m (2019 estimate). The construction risks associated with this option are high, a large portion of the area is located on unconsolidated, alluvial sediments which are likely to settle over time once loaded much like the Outer Breakwater has. This settlement risk would cause operational issues but could be mitigated through ground improvements at great cost however this would likely add to the estimated cost. The option also creates horizontal loading issues on the existing Inner Breakwater structure.
- Option 1A is the second largest reclamation option and estimated to have a construction cost of $126m (2019 estimate). The construction risks associated with this option are much lower with only a small portion of the area is located on unconsolidated, alluvial sediments with settlement risk.
- Option 1C is the smallest of the proposed reclamation options but is the most expensive at an estimated construction cost of $174m (2019 estimate). Most of area is located on unconsolidated, alluvial sediments of various depths and has a high risk of settlement over time. It also creates the same issue of horizontal loading on both the Inner and Outer Breakwaters but over a much longer distance.
- Option 2 has no associated reclamation and the costs of it are subject to the site selected and how much is built. However, based on historical construction costs off-port storage facilities have an estimated construction cost of $2.5m per hectare. A facility the same size as the Matawhero Storage Yard (9ha) could be expected to cost $22.5m.

5.2.5 Feasibility of other options

Alternative log volume storage can be achieved using additional off-port storage rather than through land reclamation in the CMA as outlined as Option 2. This can be achieved through the alternative options and avenues already implemented at Eastland Port as outlined in Section 4.

However, for this off-port storage strategy to be practical it relies on the large majority of log storage to be provided on-port. It also relies on quality connectivity and efficient transport networks between off-port yards and the on-port yards in order to function effectively.

Through this strategy, the on-port storage yards will become a predominantly 'just-in-time' facility. The Port will have reliance on other storage facilities located away from the Port to accommodate overflow log volumes, and consolidate other future trade volumes before export. This strategy, while not the optimum operational solution, helps achieve the three key objectives of the project and aligns with the policies of the New Zealand Coastal Policy Statement.

It should be noted there is still a portion of reclamation that is planned as a part of the Proposal as highlighted in Section 4.1.3 and Figure 18. While it will provide some limited storage, the reclamation is predominantly designed for traffic to reach the berthed vessel with cargo for export.

5.2.6 Summary of evaluation to achieve increased storage capacity

With the five evaluation aspects considered, Option 2: No additional storage on-port with the use of off-port storage developments has been identified in the Proposal as the method to achieve the storage the Port needs to support the project but is not included in the consents being sought. These will come in time once applications for suitable sites are provided and processed.

Option 2 is not the optimal solution for port operations, ideally more storage would be created on Port however financial costs and environmental effects need to be taken into consideration. However reclamation for storage is not a financially affordable option for Eastland Port and the Tairawhiti region at this time. With the costs and risks of building on alluvial sediments to the south-west, and the Heritage Boat Harbour to the south-east, the reclamation area is restricted to that in the Proposal and serves the purpose of creating access for traffic with cargo to get alongside a vessel berthed in the extended Wharf 8 safely.

5.3 Evaluation of options for disposing of dredging material

The options for Dredging disposal have been considered against the evaluation considerations and Option 2 has been selected as the preferred option and therefore forms part of the Proposal. Options 1 and 3 were ultimately considered not feasible due to the reasons explained which generally relate to those options not being practical, or environmentally sustainable.

Option 1 involves the reuse of the dredging disposal in the reclamation. However, the reclamation could only accommodate a very small portion of the overall dredged material and an additional disposal area would still be needed for the remainder, and vast majority, of the material. The small volume of fill needed for the reclamation will already be recycled from the adjacent seawall that needs demolition as a part of the Proposal.

In relation to Option 3, which involves land-based disposal, there is no land identified in the vicinity of the harbour that meets the criteria outlined in section [3.3.3] above and that would support a dewatering site or the volume of material to be dredged. The requirements outlined for land disposal describes a salt water, estuarine environment of low value, there are no such sites available in Tūranganui-a-Kiwa/Poverty Bay. Any other land used would be subject to significant degradation through disposal of saline material. Accordingly, Option 3's land-based disposal would come at not only significant financial cost but also significant environmental cost as well.

Option 2, involves the continued use of the OSDG for disposal of dredging material. The suitability of the OSDG for continued disposal has been the subject of detailed assessment in several reports comprising this application including in relation to ecological effects, coastline response to dredging disposal, and surf break response.

The 4Sight Twin Berth Assessment of Ecological and Water Quality Effects concluded that the ecological effect of disposal at the OSDG is categorised as 'Low' under Ecological Impact Assessment Guidelines for New Zealand (EIANZ 2018).

The assessment by MetOcean of the morphological response of the coastline within Turanganui-a-Kiwa/Poverty Bay summarised in Section 4 of the Effect of Capital & Maintenance Dredging Summary of Reports finds that the effect of the disposal mound on the nearshore wave climate would be negligible.

Similarly, the surf break risk assessment of breaks of regional and national significance within Turanganui-a-Kiwa/Poverty Bay undertaken by Tonkin + Taylor found that the maximum consequence for individual surfing elements would be minor, the maximum likelihood would be unlikely, and the overall risk of the proposed activity on surfing would be low.

In light of these assessments, Option 2 was considered to be the preferred option for the disposal of dredging material and was selected and forms part of the Proposal.

6 Conclusion

Eastland Port has identified a range of alternative options to achieve the Project through the work the Port has completed over the past fifteen years with its export customers and the wider supply chain optimising asset utilisation and operations. Those options have been thoroughly assessed and considered.

As a result of the Alternatives Assessment carried out in relation to the various options to achieve the Project objectives, it was concluded that:

- Option 3: Extension of Wharf 8 to berth two logging sized vessels (185m + 200m simultaneously), is the preferred option to achieve the shipping capacity objectives.

- Option 2: No additional storage on-port with alternate off-port storage developments, is the preferred option to achieve the storage capacity objectives.

- Option 2: Offshore Spoil Disposal Ground is the preferred option for the disposal of dredging material.

Consequently, these options have been included in the Proposal. Together they will achieve the key objectives of the Project. Available alternative options have therefore been the subject of detailed consideration in accordance with the relevant statutory provisions of the RMA, NZCPS and TRMP. The Proposal represents a considered and balanced practical solution for Eastland Port to implement for the benefit of the Port, and the Tairāwhiti community.

The Proposal will increase the Port's footprint in the CMA through reclamation, but only to the extent necessary to service the shipping capacity required to facilitate the forecast volumes, as well as future-proof the Port for other identified trade and further opportunities. The majority of storage areas required to support the identified Project objectives will be created through alternatives to reclamation by utilising off-port storage facilities, with the smallest reasonably necessary and essential reclamation area required for increased shipping capacity provided for as part of the Proposal.

The off-port storage facility strategy however comes with other operational considerations though. To be practical it relies on the large majority of log storage to still be provided on-port. It also relies on quality connectivity and efficient transport networks between well located off-port yards and the on-port yards in order to provide a practical and functional alternative.

Alternative disposal of dredged materials has also been explored in detail. The potential alternative options are either impractical or unsustainable such that the only viable option is to continue to utilise the OSDG. Use within the reclamation area is not of sufficient scale and is uneconomical; land disposal would have a high cost, both financially and environmentally, and there are no identified viable sites. Consequently, the preferred option is for the Proposal to the use the existing OSDG.

Having undertaken a detailed alternatives assessment Eastland Port is confident that the Proposal represents a preferred and balanced solution for Eastland Port, Tairāwhiti and New Zealand, that meets the requirements of the RMA, NZCPS, and TRMP.

Appendix A - Twin Berth Development – Design Parameter Justification report. Worley July 2022

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