Tarakohe Port Development
Appraisal - Safety Factors in Design
Stantec Proposal

Tasman District Council

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CONTENTS

Background and Context

Guard Safety were engaged by Tasman District Council to provide a safety perspective assessment of a development proposal for the port of Tarakohe, Tasman. Guard Safety is a health, safety and environmental consultancy specialising in the Maritime sector.

The Port of Tarakohe is located at the south eastern arm of Golden Bay and consists of a man made "horseshoe" shaped harbour opening to seaward with inner and outer breakwaters. The south eastern side of the inner "horseshoe" is the port berthing area which is currently used by recreational, commercial fishing and aquaculture vessels, in addition a barging operation uses the harbour to export large rocks from a nearby quarry. The south western side of the inner horseshoe and outer enclosed harbour area is used as an anchorage.

The proposal is conceptual in nature, outlining measures necessary to expand the ports operational capacity in response to an anticipated significant increase in demand from the aquaculture industry - specifically mussel farming. Expansion will result in increased activity for the port itself and the operations necessary to support aquaculture vessels. Any planned development will need to fully consider the impact of change, hazards present – or introduced - and include the risk controls necessary for safe and effective operations. Identified hazards can be better addressed at the design stage when they can be "designed out" or mitigated at the outset which in turn enables more efficient and sustainable facilities in the long term.

In this desk top assessment Guard Safety comment from a safety perspective and operational context on issues identified from the draft proposal authored by Stantec - a consultancy organisation.

The proposal is a comprehensive document with appendices including drawings, third party information and cost estimates. The Guard Safety assessment considers the proposal plans against the practical operational safety issues of port activities, compliance and good practice. Guard Safety staff also have operational experience of the Tarakohe commercial port area and use this to further inform the assessment.

Plans are at the proposal stage and the assessment comments are considered against "first principles" of safety in a port operational environment. Subsequent development of the proposals into final design will require a more detailed hazard identification process and risk assessment prior to the approval stages. These additional workstreams will include further modelling of the harbour wave environment and analysis of likely traffic, both marine and land, using the port.

The expansion of the port will present an increase in operational activities both in type and extent. These should be identified and analysed for their impact to ensure that safety considerations are incorporated at the detailed design stage and hazards are engineered out where possible.

This assessment makes recommendations based on the Tarakohe Port development concept proposals and should be considered in any subsequent project planning and design stages.

Documents

Document reviewed for this Assessment

#	Ref#	Title	Author	Type	Rev	Date	Received
1		Port Tarakohe	Stantec	Text including drawings / PDF	1	10/06/2019	10/06/2019
Note: *this document signed and marked "Draft for Steering Group Review"* *The document contains Appendices noted with original controls as below.*							

#	Ref#	Title	Author	Type	Rev	Status	Date
Appendix A: Layout Drawings							
	S01	Overall Site Plan Proposed Option	Stantec	Drawing / PDF	D	Working Plot	31/05/2019
2	S02	Commercial Plan Proposed Option	Stantec	Drawing / PDF	D	Working Plot	31/05/2019
3	S03	Recreational Plan 1 Proposed Option	Stantec	Drawing / PDF	D	Working Plot	31/05/2019
4	S04	Recreational Plan 2 Proposed Option	Stantec	Drawing / PDF	D	Working Plot	31/05/2019
Appendix B Structural Drawings							
5	S10	Commercial Sheet Pile layout	Stantec	Drawing / PDF	A	For Information	Undated
6	S11	Mooring Pile Layout Plan	Stantec	Drawing / PDF	A	For Information	Undated
7	S12	Structural Details	Stantec	Drawing / PDF	A	For Information	Undated
8	S13	Structural Section ***(2 Sheets - not noted)***	Stantec	Drawing / PDF	A	For Information	Undated
Appendix C: New Ablutions / Office Block Drawings							
9	1B	Port Tarakohe Bathrooms	Redbox architects	Drawing / PDF	IB	Progress Design	14/12/18
Appendix D: Geological Assessment of Port Tarakohe, Golden Bay (2 A4 Pages)							
10		Discussion document of previous geotechnical reports					
Appendix E: Water and Wastewater Review							
11		Port Tarakohe Upgrade Water and Wastewater Considerations	Stantec	Doc	1		31/05/19
Appendix F: Roading Study							
12		Port Tarakohe – Traffic Assessment	Stantec	Memo Doc		Memo to TDC	04/06/19
Appendix G: Planning Review							
13		Consent Assessment	Stantec	Doc / PDF		Final Report	06/06/2019
		This report has its own series of Appendices					

Appendix H: Cost Estimate							
14		Port Tarakohe Upgrade	Stantec	Doc		Spreadsheet Estimate	06/06/19 and 1/05/19
14		Port Tarakohe Upgrade *(optional items removed)*	Stantec	Doc		Spreadsheet Estimate	1/05/19

Assessment - Introduction

Simply put, the purpose of a Port is to facilitate the movement of goods and people from land to sea and vice versa. In order to fulfil this purpose a complex and wide-ranging number of activities take place. These activities not only present their own inherent hazards but also interact with others to form a complex risk environment. This is further complicated by the responsibilities of the organisations or individuals involved in Port management and operations. When assessing the proposal considerations will include – but not be limited to.

- Types of Goods
  - Cargo, Fin Fish, Mussels
  - Stores
  - Marine Farm equipment
- Movement of People
  - Crew
  - Passengers
  - Service personnel
  - Public
- Service / Port activity
  - Cranes
  - Forklifts
  - Vehicles – cargo/goods, service and private
  - Waste disposal
  - Fuelling
  - Replenishment / ice
- Stakeholder interests including:
  - Recreational needs
  - Commercial needs
  - Responsibilities of Persons in Control of a Business or Undertaking (PCBU)
  - Shared duties of PCBUs
- Hydrography of the Port Environment
- Vessel sizes, types and Port use
- Existing Port infrastructure and local infrastructure
- Environmental Protection

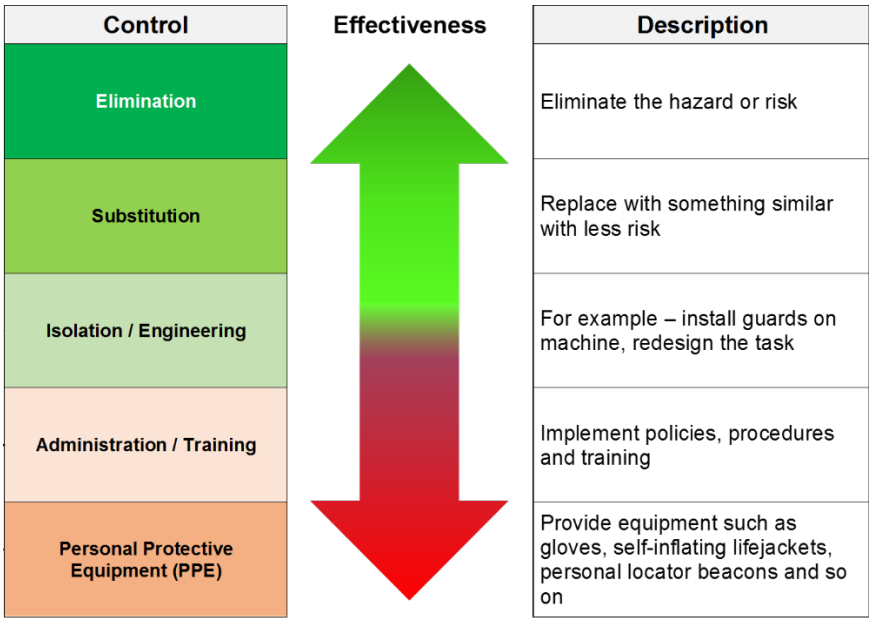
Port Activity

Assessment comments in this document are divided into “General”, “Marine” and “Land” and refer to risks arising as a result of a port activity. Marine activities are those which take place at the vessel / port area interface. Land activities are those which are a result of movement of goods and persons from outside the port boundary to the quayside, these include activities relating to port services ie: waste disposal, fuelling.

Risk Control

The control of risk starts with the identification of the hazard and assessment of the risk it presents. Under the Health and Safety at Work Act 2015 risks are required to be eliminated, if this is not possible, they must be minimised by controls being put in place (Refer: Health and Safety at Work Act 2015, Sec 30 1(a),(b).

The above risk control principles can be further broken down into specific areas following the hierarchy below.



Once the controls are identified to most effectively address the hazard the decision is: “With these controls in place is the risk tolerable?”

Port Hazards

Port operations have a range of hazards, the critical risks are identified as

- Man vs machine
- Falling from / working at heights
- Working on or near water
- Falling objects
- Uncontrolled energy release

In this assessment the risk control hierarchy is applied to the identified and presumed hazards.

Comments

General

The proposal covers a range of topics suited to a conceptual stage submission. When moving the project into the design stage further information and research is required on a range of subjects to confirm the scope and scale of port operations together with the capability required to operate at an acceptable level of risk. Capability does not simply refer to infrastructure, the other elements being personnel and the processes used to conduct activities. For the proposal this means that when designing the infrastructure and layouts consideration should be given to operational activities and any hazards that these may present.

Improvement in port capability will probably also generate additional hazards and demands. Some of these may be reasonably foreseen (ie: increased tourism) however when managing change the possibility of emerging risks should not be discounted. In order to better identify risks more research is required.

General Recommendations

1. Model the likely demand / movements of fishing vessels at the commercial wharf. Develop scenarios to identify likely land side traffic movements, cargo / goods transfer and capacity required on commercial wharf.
2. Model demand on ancillary services - Recommendation 1 will inform likely demand on ancillary services such as fuelling, icing, berthage and storing.

Marine Side

Hydrography

The proposal includes a previous wave modelling study, remarks upon its content and recommends a further study once the “final layout of the new infrastructure is finalised”. The issue of waves and surge within the harbour basin is a critical hazard and will define not only infrastructure design but operational practices from the outset. Wave motion in the recreational vessel side of the harbour would likely be deterrent to mooring alongside and may limit demand.

The port has a tidal range of 4.64 Metres, in addition there is a surge in and out of the basin which is reportedly in the region of 0.5m. The port is also subject to wind waves.

The stated (MDC) depth of the port is 4 metres below chart datum and the maximum length of vessel advertised at 150M. The port formerly served a cement export facility, hydrographic data indicates that a turning basin was dredged to accommodate the vessels that formerly served the port.

Vessel sizes / manoeuvrability

Plans indicate maximum vessel sizes for both the commercial and recreational berths.

Recreational berths for multi-hull vessels are limited to the pier ends of the intended recreational marina. These would be the berths most exposed to wind, waves and passing vessel wash.

Wharfage

The commercial wharf is set on piles and is approximately 2.5 metres above the highest point of the high tide marks on the pile legs. Commercial fishing vessels, particularly mussel harvesters, have a very low freeboard, coupled with the tide range this presents a very large difference in height between moored vessels and the quayside and consequently significant falling and dropped objects hazards. The height difference will also place a constraint on operating times if the vessel is self-unloading.

The existing commercial wharf has an "bumper" fender, designed to protect the wharf when larger vessels used the wharf. This structure is at the end of its life. The proposal indicates that this should be replaced and includes a drawing of a new piled fender structure.

The quayside is currently a high hazard area including risks of crushing, falling into water, fall from heights and being struck by something in the quay area. For personnel on vessels alongside there are additional hazards ie: loads / objects overhead, stored energy. Redesign of the wharf and associated fendering needs to fully consider the operational context of the quayside to include mooring, personnel transfer to quayside, loading / unloading practices and equipment.

Due to the tide range, vessel freeboard and height of the quay the vessel mooring lines are highly likely to be attached to the fender pile legs. Vessels may keep engines running to maintain position, this will present additional safety hazards and the risk of scouring the quay piles.

The proposal states "it is proposed to provide fuelling on the end of the existing floating concrete marina". The operational demands of the fuelling location and the likely traffic / vessel movements would indicate that this particular location may need reconsidering.

Maintenance Grid (Proposal 2.6)

Whilst the grid is a good suggestion from the port users its use and location would present significant hazards due to wave motions, vessel hull damage, mooring and navigation issues. The "Resilience Ramp" may fulfil the same purpose with significantly less risk.

Resilience Ramp

The ramp is noted on the drawing as 1:6 slope. Guidance for vehicle trailer combinations <8000Kg indicate 1:8 as a maximum. This would suggest that the ramp would not be suitable for trailer boat launching. Unless the ramp is secured from public use it may encourage risk taking behaviour as signage is unlikely to deter.

Marine Side Recommendations

1. Wave modelling within the harbour should be conducted with a number of infrastructure proposals control measures. Any design plan should include the basis of the hydrographic data and allowances made for storm surges.
2. Consideration should be given to whether maintaining current harbour depth is appropriate as the likely port users are relatively shallow draft vessels. The result of a shallower channel and its effect on the wave and surge inside the harbour may also be considered.
3. Consultation should be made with stakeholders to confirm berth sizes and manoeuvring areas are suitable and sustainable for future and new design harvest vessels.
4. New quay fendering and structure be designed to accommodate low freeboard vessels at all states of tide. Taking into account the operational context, ie: mooring, personnel access, loading / unloading.
5. Review access to the commercial area quayside from vessels alongside, if access is necessary design walkway and access platforms protected from the buffer face to facilitate safe access to / from the quay top to water level. If not necessary, ensure infrastructure, procedures and training in place to confirm access is prohibited.
6. Consider provision of a pontoon / floating platform / ladder to enable personnel transfer from sea level into the commercial area safely.
7. Review and risk assess any activity that places a person within 2 metres of the quay edge.
8. Review cargo / goods transfer with the objective of eliminating the use of vessel handling gear.
9. Equipment / cranage from the wharf side to provide safe view of vessel for operator. Options include extended cabs or remote control.

10. The proposal details wharf areas designated for cargo transfer, a maintenance area and lay by berths. Further design should include measures to ensure the commercial wharf is for transfer of cargo / product only. All other activity and personnel should take place away from the transfer area with pedestrians excluded.
11. Re-consider the fuelling berth location having considered the likely traffic flows, collision / allision risks and potential for bottlenecking.
12. Stakeholders should consider whether a "Maintenance grid "is appropriate for the port and who would take responsibility for it.
13. Consider reducing the Resilience Ramp slope in order to facilitate trailer boat launching.

Land Side

In the proposal the commercial wharf areas appear split between cargo transfer, storage and service areas. Appended documents include roading studies and drawings of a proposed ablutions block.

Traffic planning in the port and means of access will be a critical issue at the design phase. The proposal lists 5 possible traffic options without expressing a preferred option. Authors Stantec recommend that a "Safety in Design and Options report "is undertaken to find a preferred option. Discussion with operational staff, and road hauliers together with a review of the public access roads would indicate that any option which required large goods vehicles to use the tunnel is to be avoided. The use of the tunnel by heavy goods vehicles would appear to introduce additional risks for limited benefit.

It is understood that the port may include a weighbridge in the proposal. This is detailed in the costings but not on the plan drawings. The location of the weighbridge will, to a large extent, determine traffic flow and routing on site.

Any Safety in Design study in regard of the port and subsequent proposal should consider the operational context of the port activities. Critical port risks are:

- Man vs Machine
- Falling from / working at heights
- Working on or near water
- Falling objects
- Uncontrolled energy release

When designing traffic systems and port layout the above risks are "first principles" when determining risk controls, for example: physical exclusion of pedestrians in the cargo areas, barriers to prevent forklifts approaching the quay edge, location of electrical transformers, protection of fuel storage.

Traffic studies for the recreational boating and boat ramp area should be conducted to determine the amount and profile of vessels using the amenity in order to inform traffic routing and parking facilities.

The Harbourmaster office / ablution block should be sited and designed such that the office occupant has line of sight to the port entrances and the ability to verbally communicate with personnel in the secure and non-secure areas.

The proposal mentions that original deck loading design data for the commercial quay is not available. The drawings indicate fixed cranes at the commercial wharf and proposed maintenance wharf. In section 2.5 "Maintenance Wharf" the use of a crane is remarked. Deck loadings should be confirmed as basis for design whether or not fixed cranes are installed.

The proposal includes studies in regard of water supply it remains to be established whether sea water taken from the harbour is suitable for washing down. If sea water is to be used the suitability of the supply may need to be assured by use of inhibitors / water treatment. If the same system is to be used for firefighting equipment will be fit for saltwater service.

Land Side Recommendations

1. Traffic studies should be conducted for the port and recreational areas. The study should consider the current and likely operational demands on the port facilities.
2. The operational cargo / goods transfer area should be secure and restricted to operational staff only.
3. Procedures should be developed to ensure on site traffic is minimised. Goods vehicles should only be on site when the load and transfer forklift / crane is available.
4. The port operational area should be sufficient to enable a B Train vehicle to turn around without reversing.
5. Maintenance / fuelling / icing berths should be located outside the cargo transfer secure area.
6. The Harbourmasters office should afford a view of all port entrances.
7. Lighting should be installed in the areas designed for operations and access / egress ways.
8. Car parking should be outside the controlled areas.
9. Procedures and Port terms and conditions should be developed to minimise the storage of goods and equipment in the port cargo transfer area.
10. Consider locating the weighbridge offsite.
11. Cargo / goods traffic flow should be the preferred option through the single south access for the port. The North access can be used for stores, maintenance, public and crew parking access.
12. Develop a Code of Compliance for the Port where there are clear expectations set out for PCBU's.
13. Confirm firefighting / washdown supply.
14. Confirm deck loadings on concrete and new wharf areas.