

APPENDIX 21

EFFECTS ON MARINE SPILL RISK

Port of Lyttelton

Assessment of port changes to the risk of a marine oil spill occurring

Prepared by AMOSC; November 2014



Approval Sheet

This form records the approval and acceptance of the following document:

Document	Version	File Location
Assessment	1.0	Passed via email to LPC

Name	Role	Signature & Date	Caveats
Nick Quinn (NQ)	AMOSC GM	<i>(signed) 9 Nov 2014</i>	Require Client to accept report.

Compilation and Distribution Summary

Version	Date	Author	Comments/Feedback/Reviewer
0.1	4/11/2014		Draft requiring AMOSC review
0.2	/11/2014		AMOSC Review
0.3	/11/2014	NQ	Draft finalisation
0.4	10/11/2014	NQ	Draft to Tonkin&Taylor Ltd for client review
1.0	13/11/2014		Revisions
1.0	13/11/2014	NQ	Version 1.0 finalised; Tonkin& Taylor acceptance

Glossary and References

Glossary	
ADIOS	Automated Data Inquiry for Oil Spills
AMOSC	Australian Marine Oil Spill Centre
ISM (Code)	International Safety Management Code, to provide an international standard for the safe management and operation of ships and for pollution prevention.
OCIMF	Oil Companies International Marine Forum
OPRC 90	Oil Pollution Preparedness and Response Convention 1990
SOPEP	Shipboard Oil Pollution Emergency Plan
References	
ISGOTT	International Safety Guidelines for Tankers and Terminals – STS bunkering
OCIMF	Oil Companies International Marine Forum – STS bunkering
MARPOL 73/78	International Convention for the Prevention of Pollution From Ships
OPRC 90	International Convention on Oil Pollution Preparedness, Response and Co-operation

1 Introduction

1.1 Situation

Lyttelton Port was severely damaged by the 2010 and 2011 earthquake sequence. Lyttelton Port Company and Environment Canterbury have been directed to prepare a Lyttelton Port Recovery Plan.

This includes the repair, rebuild and reconfiguration needs of the port, and its restoration and enhancement, to ensure the safe, efficient and effective operation of Lyttelton Port and supporting transport networks

The proposed works comprise four broad projects:

- Reclamation and berths to serve larger vessels at Te Awaparahi Bay;
 - Reinstatement of Cashin Quay which again can serve larger vessels;
 - Inner Harbour redevelopment, including reinstatement of the Oil berth; and
 - Development of a cruise ship berth either in the Inner Harbour or south of Naval Point
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- The purpose of this report is to assess potential increases to the risk of a marine oil spill occurring as a result of the above changes. In particular, The Australian Marine Oil Spill Centre (AMOSC) has been requested by the Lyttelton Port of Christchurch (LPC) to assess whether the change in the ports configuration (outer cruise ship berth, new container terminal and bigger ships) change the marine spill risk; and
 - Assess whether the change requires any amendments to the current marine spill management plans prepared by Lyttelton Port Company and Environment Canterbury)

At this stage in the process the following were not included in the scope:

1. Quantitative risk assessment (only qualitative methods were used)
2. AMOSC to visit the port for visual checks and interview key personnel.
3. AMOSC discussions with J Dilley, LPC Harbourmaster
4. Tier1 site plan review of the LPC spill contingency plan

The Australian Marine Oil Spill Centre (AMOSC):

- Has knowledge and experience in/around the Port of Lyttelton for spill preparedness and response issues;
- Understands the NZ marine oil spill system; and
- Undertakes marine oil spill risk assessment reviews regularly in Australia

2 Relevant Information

2.1 Area of Operations

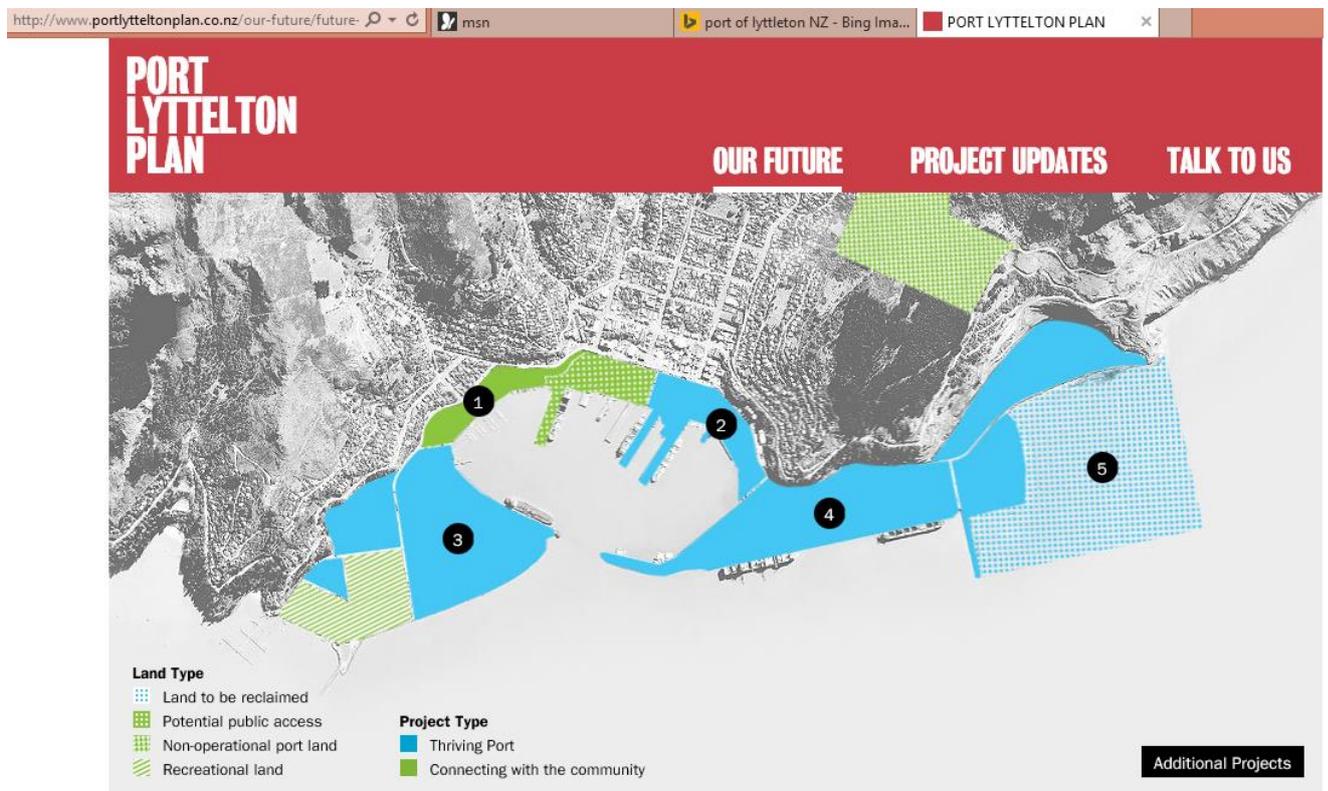


Figure 1; <http://www.portlytteltonplan.co.nz/our-future/future-map.html>

The area includes:

1. The coastal sea area delineated in the 'Pilotage Area' (Area "A" of P&H Risk Assessment)
2. The harbour reaches of Lyttelton (Area "B")
3. Inner Harbour (Area "C")
4. Wharf area south of Naval Point

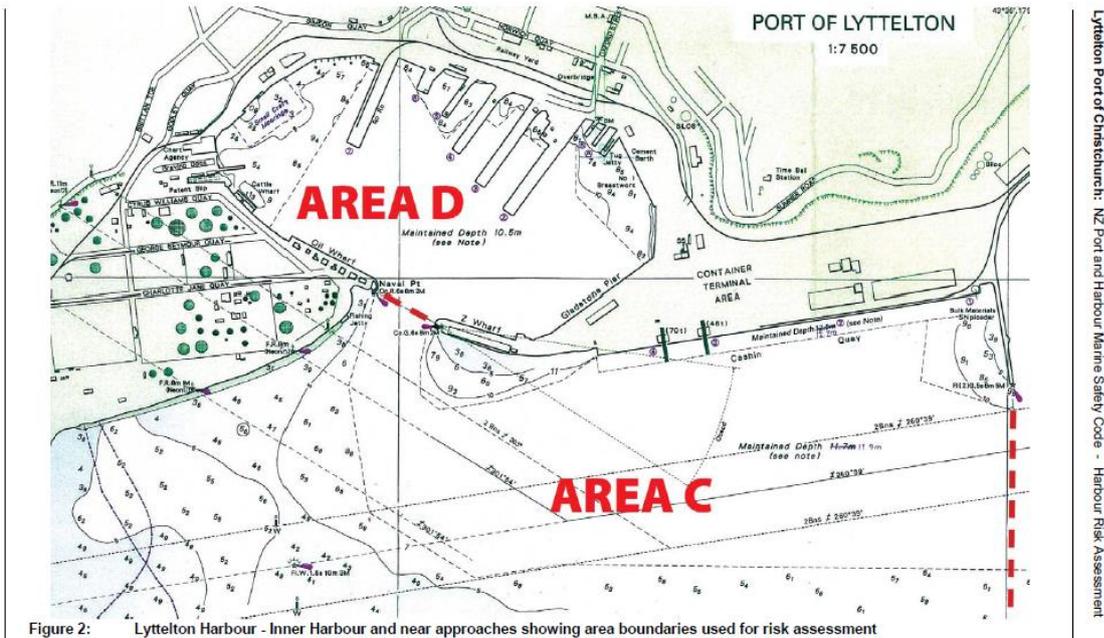


Figure 2: Lyttelton Harbour - Inner Harbour and near approaches showing area boundaries used for risk assessment

Figure 2; Lyttelton Harbour Port & Harbour marine safety code risk assessment July 2009

2.2 Key Questions

To achieve the scope, the following issues have been raised with the LPC ;

1. Does the change in the ports configuration (outer cruise ship berth, new container terminal and bigger ships) change the marine spill risk?

- Current and future projected numbers of ship visits and movements per year?
 - LPC is expecting 1018 ship visits this Financial Year (FY14/15), with a predicted 2% year on year increase in the future. . These figures do not include cruise ships, which could be around 85 to 90 additional ship visits per year max
- Bunkering trends ie. how many intended refuelling operations?
 - Currently only larger (100m+) fishing vessels bunker at Lyttelton, and we assume this will continue. Due to draught restrictions at the Oil Berth it is highly unlikely that large cargo/container vessels would bunker in Lyttelton
- Size and type of vessels berthing at Lyttelton
 - The user requirements document sets our predicted design vessel moving forward. As a rule ships are getting longer, deeper and wider.
- A General Arrangement (GA) or berthage plan – for current and future vessel berthage
 - Not provided
- ECANs Port & Harbour risk assessment for Lyttelton conducted in 2008/2009 – as forwarded to MNZ circa 2009
 - Forwarded 21/10/2014
 - Forwarded 22/10/2014 also Risk Assessment on Lyttelton Pilotage area Sept 2014
- LINZ zone of confidence around the bathymetry of the harbour approaches, the channel and the port
 - LPC has a high degree of certainty around the channel and berthage pockets. LPC undertakes quarterly hydrographic surveys which form

the basis of management decisions. The level of accuracy is approximately 100mm

2. Does this change mean that changes will need to be made to the current marine spill management plans (ECans or LPCs)

- Can be assessed using the risk review and combining it with the forwarded Tier 2 spill plan – initially AMOSC assesses this as ‘yes’ as the plan will need to become more specific to region and Lyttelton on issues such as preventative booming for bunkering etc.

Additionally AMOSC notes the 2010 Maritime NZ spill risk assessment outcomes specific to the Banks Peninsular area below;

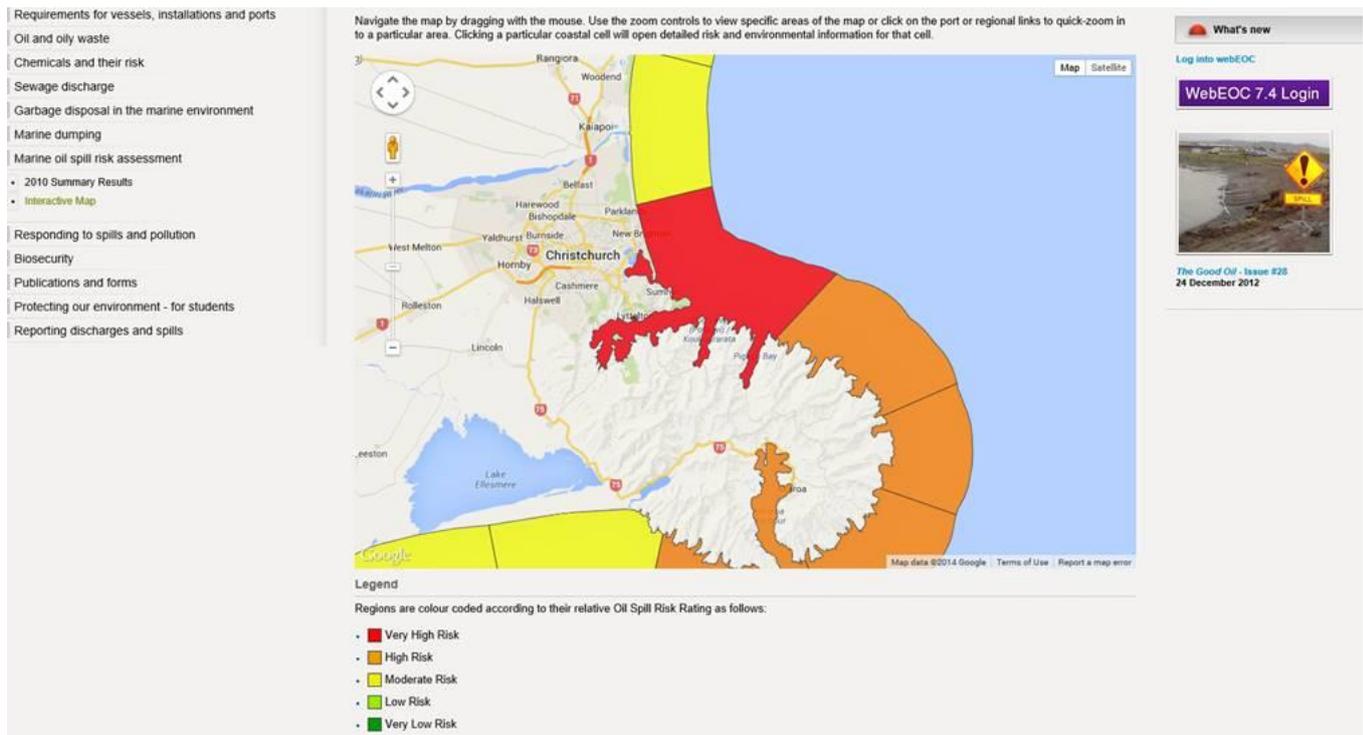


Figure 3; 2010 MNZ Risk Assessment for marine based oil spills

2.3 Contingency Plans

Appendix 1 refers to the relevant sections used to assist the findings of this assessment.

Also the recently released Maritime NZ “New Zealand Oil Spill Response Strategy 2015-2019” endorses the IPIECA Joint Industry Project (Project 12 – Tiered Preparedness) doctrine around definitions of Tier’s being;

Tier 1 oil spills are responded to and resolved by the operator. Oil spill response capability is based on risk. The level of response is expected to consist of a timely ‘first-strike’ and includes the capacity to assist if there is an escalation to a Tier 2 or Tier 3 response.

Tier 2 oil spills are generally those beyond the capability of the operator acting alone and the response is led and resolved by the local regional council. The specific capacity required by the regional council is based on the risks at their location.

Tier 3 oil spills are generally more complex, of longer duration and impact, and beyond the response capability of the regional council or operator. The response is nationally led and coordinated by Maritime NZ.

The tiered approach is recognised and used internationally and recognises the need to escalate through the Tiers in order to achieve and cascade resources into a spill location to assist the affected region.

In the case of Lyttelton, the Tier 1 spill contingency plan is the responsibility of LPC. This plan has not been assessed in this case, but experience of reviewing Tier 1 plans by AMOSC would suggest that the Tier 1 plan will require to be updated to reflect on site first strike response that LPC would undertake to the immediate area affected by a spill.

Generally Tier 1 plans reflect;

1. Investigate the cause and attempt to stop the leak
2. Activate local resources and apply 'on hand' equipment to the local spill site
3. Gain initial situational awareness for reporting purposes
4. Notify local/regional authority (ECAN)
5. Prepare to support the direction of the appointed On Scene Commander (ECAN)

The Tier 2 ECAN Marine Oil Spill response Plan has suitable command/control organisations described and appears reasonably current with its identification of resources and prime locations of equipment to support the plan needs. This plan is also held by Maritime NZ who have 'accepted' the plan as a legitimate plan for ECAN. There is a note within the current plan noting that in 2013/2014 this plan will require to be updated; AMOSC suggests this is timely to reflect the new port configuration and capture the risks to enable ECAN to reassess Tier 1 resources and requirements (including training and on water support to respond to Tier1 spills). The Tier 2 plan appears satisfactory to respond to a Tier 2 spill in or around Lyttelton and also recognises the method to escalate to a Tier 3 spill and handover control to Maritime NZ.

3 Assessment

3.1 Scope 1; will port changes change marine oil spill risk?

Summary of Risk Assessments in/around Lyttelton;

Maritime NZ; the 2010 MNZ Risk Assessment of the Christchurch marine area (Cell) assesses a Very High risk factor based on; a Class V assessment on the estuarine salt marshes and sheltered rocky bays; a high rating based on cultural and heritage values of the harbour being the Koukourarata and Rapaki Mataitai which cover 8 and 1 square kilometres of coastline respectively.

*AMOSC Comment; this assessment will not change with LPC port changes to berths. The consequence risk remains **very high** based on the MNZ assessment that was conducted on the known risks in 2010. Figure 2 refers.*

ECAN's P&H Risk Assessment; the report summarised at S2.4 (Appendix 1) notes several areas that will be impacted by the port reconfiguration. For instance while shipping movements in 2008 totalled 1214 movements, the advice provided by the Client indicates a reduction of shipping movements to 1018 this FY. However the intention to route up to 8000TEU vessels and increase the tanker vessel dimensions to draughts of 14.5m in a berthage area of 13.1m with a tidal range of 0.4m (MLWS) – 2.4m (MHWS) will decrease the safety margins around potential groundings and therefore increase the risk of a marine oil spill. This safety margin reduction is also impacted by the manoeuvring of vessels within their decreased limiting lines of depth. It is understood that a dredging plan will increase the channel depths and widths in both the channel and port berth areas which will increase these

margins once the dredging has occurred and been authenticated by a hydrographic survey with the appropriate high data fidelity required for 100mm x 100mm surveys.

The 10 Worst Credible Risks should not change with the reconfiguration of the port. The 10 most likely risks should not change either; the associated risk mitigators remain relevant.

AMOSC Comment; bigger vessels forecast for the Port of Lyttelton will increase the risk of a marine oil spill occurring. The cause of a spill is increased with groundings and also greater windage incurred by bigger vessels berthing/departing or while alongside in strong winds. New design measures to newbuild vessels in accordance with MARPOL 73/78 will provide mitigations including bunkers not mounted to the hull, double hulled tankers, and bunkers of IFO180. There will however be a potential reduction of ship movements which will offset some frequency issues around the higher risk profile.

Normal operational reasons for spills appear unaffected; while tanker cargoes will increase with vessel size, the preventative measures around cargo transfers of products while alongside the Oil Wharf are critical in limiting spill risks; the move to use bunker oils of IFO180 cST in 2016 should have a limited effect in reducing the consequences of a bunker spill occurring in this area – due to IFO180 still being a persistent (but less viscous than HFO 380) oil.

ECAN's Tier II Spill Plan; this plan notes a quantitative spill assessment of the spills due to different scenarios occurring at the potential spill sites around Lyttelton. There is no reference to Cashin Quay being a potential spill site due to bunkering. If the intention is to bunker cruise vessels or other commercial vessels then this will need to be reviewed. Apart from this volume assessment, the plan notes that any spill above the threshold of 'where the Port operator can be expected to respond to', then the Regional Council firstly, followed by MNZ will respond. This speaks not to risk, but response – with a clear intent that any spill that exceeds the capability of the LPC to respond will be dealt with at a regional or national level.

AMOSC Comment; apart from Tier I local and small spills (and LPC has to inform and respond as determined by the ROSC), then the response will be handled by ECAN or MNZ.

Scope 1 Conclusion; An increase to vessel size (Tanker vessels, container vessels and cruise vessels) will increase the marine oil spill risk through greater potential of groundings with greater sized bunkers (& fuel carried). Collisions will not obviously increase the risk. Newbuild vessels to MARPOL 73/78 conditions will have greater inherent safety margins. The shift to IFO180 bunker fuel in 2016 will have a marginal consequence alleviation given the environmental conditions in Lyttelton.

3.2 Scope 2; are changes required to the spill management plans?

On review of the current Tier II plan, there may be some context setting around the increasing size of vessels to enter Lyttelton Harbour. It is noted that "The Plan is not in a finished format and will be reviewed over the 2013/2014 year to ensure it reflects best current practice within the Canterbury region". This may be opportune for LPC to inject this new scenario into a suitable document that will register the change in risk profile around commercial vessels in Lyttelton .

Otherwise the Tier II plan has a good structure around accepting the role of a response organisation for a spill greater than what the Port can manage. As previously discussed, this structure includes escalation criteria for MNZ to become involved. For an example of a grounding of a major commercial vessel in or around a harbour such as Lyttelton, the escalation criteria in the plan is appropriate and does not need alteration.

There is a reliance on the LPC communications network based in the port – LPC would need to test this arrangement for the flow of information around the port areas and also for the

upward communication/activation of the ECAN resources to support either a Tier1 or Tier 2 level spill.

Minor changes to the LPC reporting and notification flowcharts could include;

- Reporting within 2 hours (Objective 5) to allow;
- The ECAN ROSC to evaluate and assess within 1 hour (Objective 4)

Scope 2 Conclusion; there can be some minor changes to the Tier II plan but otherwise the plan appears robust enough to handle the change in the risk profiles. Changes may be needed to internal Port processes to enable effective reporting (within 2 hours of a spill occurring) into the ECAN ROSC.

The change in bunker fuel types from HFO 380 to IFO 180 in 2016 will not dramatically alter the consequence of a persistent oil spilled in Lyttelton harbour. There no changes to plans are recommended for this spill type.

The change in risk profiles would not appear to require any changes to a minor spill plan (Tier I) that would affect the Port. Therefore no changes in Tier I spill plans are recommended.

4 Summary

AMOSC has undertaken an assessment of the configuration changes proposed based on the information and references contained within this report.

The key points are;

1. Tier 1 plan – not assessed in this review but noting the level of information usually contained in a Tier 1 plan, then changes will be required to update this document for LPC to clearly understand its obligations and responsibilities during a spill
2. Tier 2 plan – is satisfactory to address a Tier 2 spill and also any potential escalation to Tier 3. Noting the plan is being reviewed 2013/2014, LPC should consult with ECAN to have the new operations around the port recognised in terms of both risk and preparedness/response to an incident where oil is also spilled into the marine environment
3. Changes to vessel size and port reception facilities including changes to port resources will alter the risk profile of Lyttelton. Noting the relatively new Port & Harbour Risk assessment (July 2009) then these configuration changes can be inserted into the July 2009 assessment to aptly capture the new risks.
4. The MNZ 2010 risk assessment rates Lyttelton port and harbour as a **very high** risk ranking due predominantly to 2 factors; this is th highest risk ranking of a spill occurring and will not be affected by the port configuration change.

Appendix 1 – Relevant sections from ECAN Plans to this Assessment

C13C 153156 Environment Canterbury Tier II Marine Oil Spill Plan

The following excerpts are considered relevant to this assessment;

- Pg 5; 1.1 - The Plan is not in a finished format and will be reviewed over the 2013/2014 year to ensure it reflects best current practice within the Canterbury region.
- Pg 8; 1.3.1 – Objective 1; Tier 1 Site Marine Oil Spill Contingency Plans or Shipboard Oil Pollution Emergency Plans (SOPEP)
1.3.4 – Objective 4; Evaluation & assessment within 1 hour
1.3.5 – Objective 5; Alerting within 2 hours
- Pg 14; 2.2.2 - Employees of the Lyttelton Port Company Ltd and the Port of Timaru Ltd shall only initiate an appropriate response operation when responding to the instructions of the Regional On-Scene Commander or the National On-Scene Commander.
- Pg 32 ; Annex 1; 1.2.4 – LPC spill equipment
- Pg 87; Annex 1; 4.1 – Oil Spill credible spill risk volumes
- Pg 117; Annex 4; 4.4.3 – Response options

Lyttelton Port of Christchurch New Zealand Port and Harbour Marine Safety Code Harbour Risk Assessment (2)

The following excerpts are considered relevant to this assessment;

- Pg 9; Fig 1 – chart area of Area's A,B,& C
- Pg 13; 10.1 – depth alongside Cashin Quay – 10.1m below CD.
- Pg 14; 10.3 – Statistics – ship movements in 2008; depth of departing Panamax 12.4m
- Pg 16; 15 – Conclusions – last para pg 17
- Pg 28; 10 Worst credible risks
- Pg 30; 10 most likely risks
- Pg 32 - 75; risk reports per scenario & area