



## Port of Geelong



### Risk Assessment

for Geelong Channel Deepening Studies  
- Geotechnical

April 2019

**Document Control**

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## INTRODUCTION

The Port of Geelong is the second largest port in Victoria, and handles approx. 14 million tonnes of bulk cargo per annum. The activities of the port and port related companies are a major contributor to the economy of the region and the state, supporting thousands of jobs in Geelong and the surrounding region. The port attracts over 600 ship visits per annum, requiring more than 1200 ship transits of the shipping channels.

Victorian Regional Channels Authority (VRCA) is responsible for the provision of safe access for commercial vessels visiting Victoria's regional ports. VRCA has primary responsibility for assets to ensure the safety of vessel access to the ports of Geelong, Hastings and Portland.

There has been a steady and continuing growth in the size of ships in the global commercial shipping fleet. To inform the future planning of channel improvements in response to this trend in global shipping, VRCA has undertaken site investigations in recent years to determine the geotechnical conditions in areas which could be affected by future channel improvements.

A basalt rock outcrop in the vicinity of Wilson Spit is a major potential risk to future channel improvement projects, and has been the subject of recent geophysical surveys to map the surface profile and the variability of the subsea bed materials. A program of geotechnical investigations including the drilling of marine boreholes is now required to corroborate and calibrate the results of the geophysical surveys, in order to fully understand the nature of the material and the technologies required for its removal. The investigations will be used to reduce the construction, contractual and environmental risks associated with future channel improvements.

The proposed actions are entirely within Geelong Port Waters and are consistent with current Victorian government policy frameworks.

The investigations will consist of the drilling of marine geotechnical boreholes and conducting of field and laboratory testing to determine physical properties. Drilling will be undertaken by a drilling rig mounted either on a barge stabilised by spud legs or a jack up barge to provide a stable working platform.

## SUMMARY

A risk assessment workshop for the VRCA's geotechnical survey was held in Geelong in January 2019.

The aim of the workshop was to reassess and expand on hazards identified for previous similar assessments, with particular emphasis on i) refining the definitions of hazards to minimise linguistic uncertainty, ii) acknowledging and retaining any uncertainty evident during the assessment, and iii) updating risk ratings in the light of recent additional project knowledge. Individual hazards were recorded based on the collective thought process of the four participants subjectively assessed across six domains.

Nineteen existing hazards were considered in this round of assessment – 7 environmental and 12 in other categories.

No environmental hazards were found to pose an extreme or high risk, three had an upper bound of moderate. After additional controls – all environmental risks were assessed as low.

No other hazards were found to pose an extreme risk but three had an upper bound of high. Of the other high risks, four related to safety, one regulatory, six financial / operational in nature and one stakeholder management. In relation to the safety hazards, it was noted that additional project-specific controls may reduce the likelihood of accidents occurring, but the potential consequences may be such that the risk

rating of these hazards remains high as an appropriate reminder that vigilance is always required in matters of health and safety.

## METHODS

### 2.1. Workshop

A workshop to review the geotechnical survey was held on 22<sup>nd</sup> January, 2019 at the Geelong offices of VRCA.

### 2.2. Risk assessment template

The template used was a similar model that was used in previous VRCA risk analysis. The final range of risk ratings (i.e. upper and lower bounds) was based on the bounds given by all assessors.

Definitions of likelihood and consequence (Tables 1 and 2) and the risk matrix (Fig. 1) were based on the template to better suit the nature of VRCA projects.

Table 1. Definitions of Likelihood

Rating		
Almost certain	75-100%	Expected to occur in almost all similar projects
Likely	50-75%	Expected to occur in most similar projects
Possible	25-50%	Expected to occur in about half of similar projects
Unlikely	5-25%	Expected to occur in some similar projects
Rare	0-5%	Expected to occur in almost no similar projects

Table 2. Definitions of Consequence

Rating	Financial / Contractual	Regulatory / Approvals	Safety
Catastrophic	Direct loss or increased cost of greater than \$5million	Approval denied	Multiple fatalities
Major	Direct loss or increased cost of between \$500,000 and \$5million	Major obstacles to achieving approval (extended delays of 3 months or more)	Single fatality
Moderate	Direct loss or increased cost of between \$50,000 and \$500,000	Approval obtained after extensive negotiation (1 - 2 months delay)	Serious injury
Minor	Direct loss or increased cost of between \$5,000 and \$50,000	Approval obtained after authority request for additional information	Injury
Insignificant	Direct loss or increased cost of less than \$5,000	Approval obtained in statutory time and without	Injury requiring only first-aid

Level	Environmental	Operational	Stakeholder Management
Catastrophic	Irreversible widespread damage	Blockage of the channel for more than	Community outrage; potential large-scale class

Major	Major damage; long-term recovery (5-10 years)	Blockage of the channel for 1 day	High profile community concerns raised, requiring significant rectification
Moderate	Measurable damage; medium-term recovery (1-5 years)	Blockage of the channel for between 6 - 12	Community group complaints voiced privately; minor rectification measures
Minor	Medium-term immaterial effect (1-5 years)	Blockage of the channel for 2 - 6 hours	Several public complaints received; no rectification measures
Insignificant	Short-term transient effect (less than 1 year)	Blockage of the channel for less than 2 hours	A public complaint received; no rectification measures required

Table 2.1

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	High	High	High
Unlikely	Low	Low	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Within the realm of risk assessment, there is variation in the way particular terms are applied. For the VRCA assessment, the following definitions were used based on ISO 31000:2018:

Hazard - event or condition with the potential to cause harm; may be defined in terms of specific consequences

- Risk - chance of something happening that will have an impact on objectives; may be measured in terms of likelihood and consequence
- Initial risk - risk assessed in the light of current management practices
- Residual risk - risk after consideration of any additional management controls

### 2.3. Workshop process and subsequent steps

In this workshop all hazards currently listed in the VRCA risk register were considered with reference to previous risk assessment conducted by VRCA. Where changes to a hazard were identified, discussion among the assessors then focused on what effect those changes might have on the likelihood of the hazard eventuating and the magnitude of the consequences should it do so. Such hazards were then formally assessed.

Consideration was given to identify additional hazards relevant to this project. New hazards were assessed and appropriate controls identified. Scoring of hazards generally followed the approach adopted in previous workshops:

- Hazards were grouped by domain (e.g. financial/contractual, environmental, safety). They were explicitly defined in terms of a worst foreseeable outcome (Table 3) in order to avoid assessors considering different scenarios when scoring hazards.
- Hazards were scored in terms of likelihood and consequence, using a 5-point scale for each (Tables 1 and 2). The level of risk associated with each combination of likelihood and consequence is shown in the risk matrix presented in Figure 1. Assessors were not obliged to select a single rating for either likelihood or consequence, but were able to express uncertainty by selecting upper and lower bounds for either or both. Any uncertainty was carried through to the overall level of risk presented in the summary risk register (Table 3), where risk was also presented with upper and lower bounds.
- Judgements of assessors were discussed in a group discussion, and consensus agreed on the agreed level of risk

#### 2.4. Assessors

Four participants subjectively assessed hazards across all domains. The size of the risk assessment panel was believed appropriate to the scale of the project.

The participants were Mr. Ian Clydesdale (VRCA) and Mr. Stuart Christie (VRCA), Mr John Milne (Mainsail Management Pty Ltd) and Dr. Jan Watson (Marine Science & Ecology Pty Ltd)

## RESULTS

Results of the assessment are summarised in the risk register (Table 3).

### 3.1. Summary of risks

No hazards were rated as extreme, but three had an upper bound of high for the initial risk. For safety hazards, no additional controls could be identified to reduce the risk below high.

**Hazard 76 (Environment)**      Spills of oil or pollutants on deck of barge entering the marine environment.

Additional controls include Project Environmental Management Plan and Contractors Environmental Plan"

*Risk: Initially assessed as moderate– downgraded to low*

**Hazard 77 (Environment)**      Localised physical loss/damage to benthos at drilling sites  
Additional controls include drilling fluids and cuttings to be retained on barge and pumped down borehole as casing is withdrawn.

*Risk: Initially assessed as moderate– downgraded to low*

**Hazard 78 (Environment)**      Contamination from drilling muds at drilling sites leading to loss of benthos.

Additional controls include use of biodegradable drilling fluids or sea water.

*Risk: Initially assessed as moderate– downgraded to low*

**Hazard 5 (Safety)**      Drilling accident causing injury or death

*Risk: High*

- Hazard 9** (Financial / Contractual) Conflict of interest in awarding contact  
*Risk: Initially assessed as moderate– downgraded to low*
- Hazard 19** (Financial / Contractual) Breakdown of drilling rig  
*Risk: Initially assessed as moderate– downgraded to low*
- Hazard 35** (Safety) Accident with recreational craft with drilling operations  
*Risk: High*
- Hazard 73** (Safety) Accident with commercial vessel near dredging operations resulting in death.  
*Risk: High*
- Hazard 58** (Financial / Contractual) Major non-compliance with approval conditions  
*Risk: Initially assessed as moderate– downgraded to low*
- Hazard 62** (Regulatory) DELWP delay approval Delay of project  
*Risk: Initially assessed as moderate– downgraded to low*

#### **SUMMARY**

In accordance with the requirements of the Marine and Coastal Act consent, VRCA has completed a risk assessment in regard to the proposed geotechnical survey. Controls identified in the risk assessment will be implemented during the project and where relevant included in the project's environmental plan.



**Table 3:  
Environmental:**

Point Wilson geotechnical investigation - Risk Assessment outcome								
ID	Category	Hazard defined in terms of Outcome		Initial risk assessment		Remaining risk rating		
		Potential Hazard	Worst Foreseeable Outcome	Likelihood	Consequence	Likelihood	Consequence	Risk Rating
76	Environment	Spills of oil or pollutants on deck of barge entering the marine environment		Possible	Minor		Low	
77	Environment	Localised physical loss/damage to benthos at drilling sites		Likely	Insignificant	Environmental Management Plan - Drilling fluids and Possible cuttings to be retained on barge and pumped down borehole as casing is withdrawn	Insignificant	Low
78	Environment	Contamination from drilling muds at drilling sites leading to loss of benthos		Possible	Minor	Environmental Management Plan Contractors Environmental Management Plan	Insignificant	Low
79	Environment	Contaminated barge or other vessels leading to introduction of non-indigenous invasive marine species		Unlikely	Minor	Contractors Environmental Management Plan - Investigate operating history of vessels prior to contract award - Project Environmental management plan - Contractor Environmental Management Plan	Minor	Low
80	Environment	Disturbance of birds and marine life arising from artificial lighting on drilling barge		Rare	Insignificant	Contractors Environmental Management Plan	Insignificant	Low
81	Environment	Injury to fish or marine mammals due to noise or vibration arising from drilling operations		Rare	Insignificant	Contractors Environmental Management Plan	Insignificant	Low
82	Environment	Damage to seabed habitat from spillage of drilling cuttings and fluids		Possible	Insignificant	Contractors Environmental Management Plan Drilling fluids and cuttings to be retained on barge and pumped down borehole as casing is withdrawn	Insignificant	Low

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	High	High	High
Unlikely	Low	Low	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High





## Finance, operational, regulatory, safety and stakeholder management:

Point Wilson geotechnical investigation - Risk Assessment outcome

ID	Category	Hazard defined in terms of Outcome		Initial risk assessment			Remaining risk rating				
		Potential Hazard	Worst Foreseeable Outcome	Current Management Controls	Likelihood	Consequence	Risk Rating	Additional Controls (if required)	Likelihood	Consequence	Risk Rating
5	Safety	Drilling accident causing injury or death	Death	SEMP, Standard port operating procedures	Possible	Catastrophic	High	Contractors health and safety system	Unlikely	Catastrophic	High
8	Financial / Contractual	Specifications not clear enough	Legal action	VRCA tendering team familiar with tenders and process	Unlikely	Minor	Low		Rare	Minor	Low
9	Financial / Contractual	Conflict of interest in awarding contract	Excessive cost of contract, or replacement of contractor	Detailed tender evaluation.	Unlikely	Moderate	Moderate		Rare	Minor	Low
10	Financial / Contractual	Lack of competition reduces options	Excessive cost of contract, or replacement of contractor	Detailed investigation of tenders	Unlikely	Minor	Low	VRCA's has a fraud prevention and procurement policy designed to avoid this situation.	Rare	Minor	Low
19	Financial / Contractual	Breakdown of drilling rig	Delays (additional cost borne by contractor)	Hazard is function of the state of the market. Flexibility in timing of project delivery.	Unlikely	Minor	Moderate		Unlikely	Minor	Low
27	Stakeholder Management	Public concern over drilling (specific) - Confusion with dredging	Protests and calls to politicians to stop levelling	Community consultation, communications, media briefings	Possible	Minor	Moderate	Contractor's risk. Contractors vetted during tender process.	Unlikely	Minor	Low
35	Safety	Accident with recreational craft with drilling operations	Death	Warnings of drilling operations be provided in Notices to Mariners and also in media releases to the public. Declaration of an exclusion zone around barge. Patrol boats if necessary at critical times.	Unlikely	Minor	Low		Rare	Minor	Low
51	Financial / Contractual	Financial failure of contractor	Delays and additional cost.	Due diligence on tender before awarding contract.	Rare	Catastrophic	High		Rare	Catastrophic	High
58	Financial / Contractual	Major non-compliance with approval conditions	Major cost increase	Regular monitoring. Implementation of EMP.	Unlikely	Minor	Low		Unlikely	Minor	Low
62	Regulatory	DEWLP delay approval	Delay of project		Unlikely	Minor	Moderate	Contract terms.	Unlikely	Minor	Low
73	Safety	Accident with commercial vessel with drilling operation	Death	All vessels under direct control of Geelong Harbour Control Notices to Mariners.	Possible	Catastrophic	High		Unlikely	Minor	Low
75	Safety	Collision between drilling barge and other vessel leading to spill of oil and other pollutants	Death	Port Operating Handbook Harbour Master's Directions	Rare	Catastrophic	High		Rare	Catastrophic	High
					Unlikely	Minor	Low	Daily communication protocols with Marine Control. Notices to Mariners Community consultation plan. Environmental Management Plan	Rare	Minor	Low