9.0 TECHNICAL SECTION

MARINE WORKS

Lyttelton Port Company

Edition 1/December 2018

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Te Ana Marina clean armour rock
(image © LPC)

9.1 INTRODUCTION

This Technical Section provides guidance to Contractors working in the marine environment, to help them prepare the Marine Works Section of their CEMP.

Use this Section to complete your CEMP if you are doing work in, on, or above the marine environment such as (but not limited to):

- mobilisation of marine plant;
- piling;
- wharf demolition;
- reclamation;
- sea wall construction; and
- construction dredging (dredging required as part of a construction project).

Activities which are not addressed in this Technical Section are:

- manoeuvring and anchoring vessels as part of works activities;
- salvage;
- annual maintenance dredging; and
- capital dredging programme including navigational channel and berth pocket deepening.

Throughout this Section, any references to "you" or "your' are directed to the Contractor.

This Section is intended to provide prescriptive guidance on what must be controlled and when. However, for marine works, a well-thought out construction method is often the most critical step in achieving good environmental management. Therefore, this Section also includes a process for you to discuss project constructability from an environmental perspective with your LPC Project Manager and LPC's Environmental Advisors[1].

The requirements in this Section are accurate as of December 2018. However, it must be appreciated that the regulatory requirements are subject to change. Changes or new requirements arising from any subsequent regulatory changes take precedence.

This Section sets out:

- the activities with a marine works component this Section applies to;
- the relevant rules and permitted activity standards;
- a risk assessment of typical construction activities in the context of the sensitivity of the receiving environment;
- performance criteria for marine works;
- maps identifying areas of higher risk (contamination, currents) for marine works; and
- approaches and measures to manage effects on the marine environment, and advice on how to incorporate these into the CEMP.

This Section is designed to be worked through from start to finish. A flow chart summarising the content of each Section is provided over the page.

1 This is part of LPC's risk register process, which includes a series of risk workshops incorporating design, operations, construction and all other relevant project design aspects. There are several workshops as the project progresses from concept design, detailed design through to construction.


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ASSESSMENT

9.2 ROLES & RESPONSIBILITIES

9.2.1 CONTRACTOR

As Contractor for projects involving marine works, you must:

- discuss environmental constructability with your LPC Project Manager (for medium and high risk works);
- complete the project risk register process with the Engineer (designer), LPC Project Manager and LPC Environmental Advisor ensuring specific details around working over the marine environment are included as a risk;
- prepare the Marine Works section of the CEMP and implement the control measures at all times during the works; and
- keep records of monitoring, maintenance, incidents, and revisions to the CEMP made in response to observations during works.

9.2.2 LPC PROJECT MANAGER

- Direct the Contractor to undertake investigations, monitoring and methodology changes if required in light of monitoring results.
- Notify Te Hapū o Ngāti Wheke of spills or incidents of concern, including any on-site accident that results in a death, or the drowning of a person in the harbour.

ASSESSMENT

9.3 SETTING

Lyttelton Port is located in Lyttelton/Whakaraupō Harbour. The harbour is a naturally turbid environment with high sediment loads from the surrounding hill sides. The harbour is exposed to easterly and southerly wind events; as such during periods of high winds the harbour environment is rough and very turbid.

This technical section applies to all works in, on, or above the marine environment within Lyttelton Port operational and navigational areas. For the purpose of this technical section the marine area of LPC is split into three separate areas (Map 1).

1. **The Inner Harbour:** north of the moles and contains Jettys 1–7, Te Ana Marina, the Dry Dock and Oil Berth. This area is highly modified and naturally turbid.
2. **Contaminated Sediment Zone:** a portion of the Inner Harbour with known seabed contamination.
3. **The Outer Harbour:** this area includes the Port operational area that is located outside of the moles. It includes Cashin Quay Wharfs, the marine environment south of the coal yard and navigational structures. The outer harbour is highly turbid and is less modified than the Inner Harbour, with Battery Point being a notable natural area close to the developed area of the Port.

9.3.1 CONTAMINATED SEDIMENT ZONE

Contaminated sediment is known to be present in some areas (Map 1). The contaminants are tributyl tin, mercury, copper, zinc, and DDT from historic activities at the Port. The contamination is lower than human health guidelines, but it can be hazardous to marine species if sediment is disturbed and moved.

9.3.2 INNER HARBOUR & LOW CURRENT ZONE

Disturbing the seabed can cause turbidity and spreading of sediment. Hydrodynamic assessments[1] and the experience of LPC's Pilots identify the Inner Harbour as a low current zone (Map 2). Sediment disturbed in the Inner Harbour is unlikely to be transported to the outer harbour.

1 Mulgor Consulting Limited. 2016. Oil Berth Dredging Consents: Hydrodynamics. Overlay of figures showing tidal currents and particle tracking to identify low current zone.

Technical Section 9.0 Marine Works

MAP 1: Inner Harbour Contaminated Sediment Zone

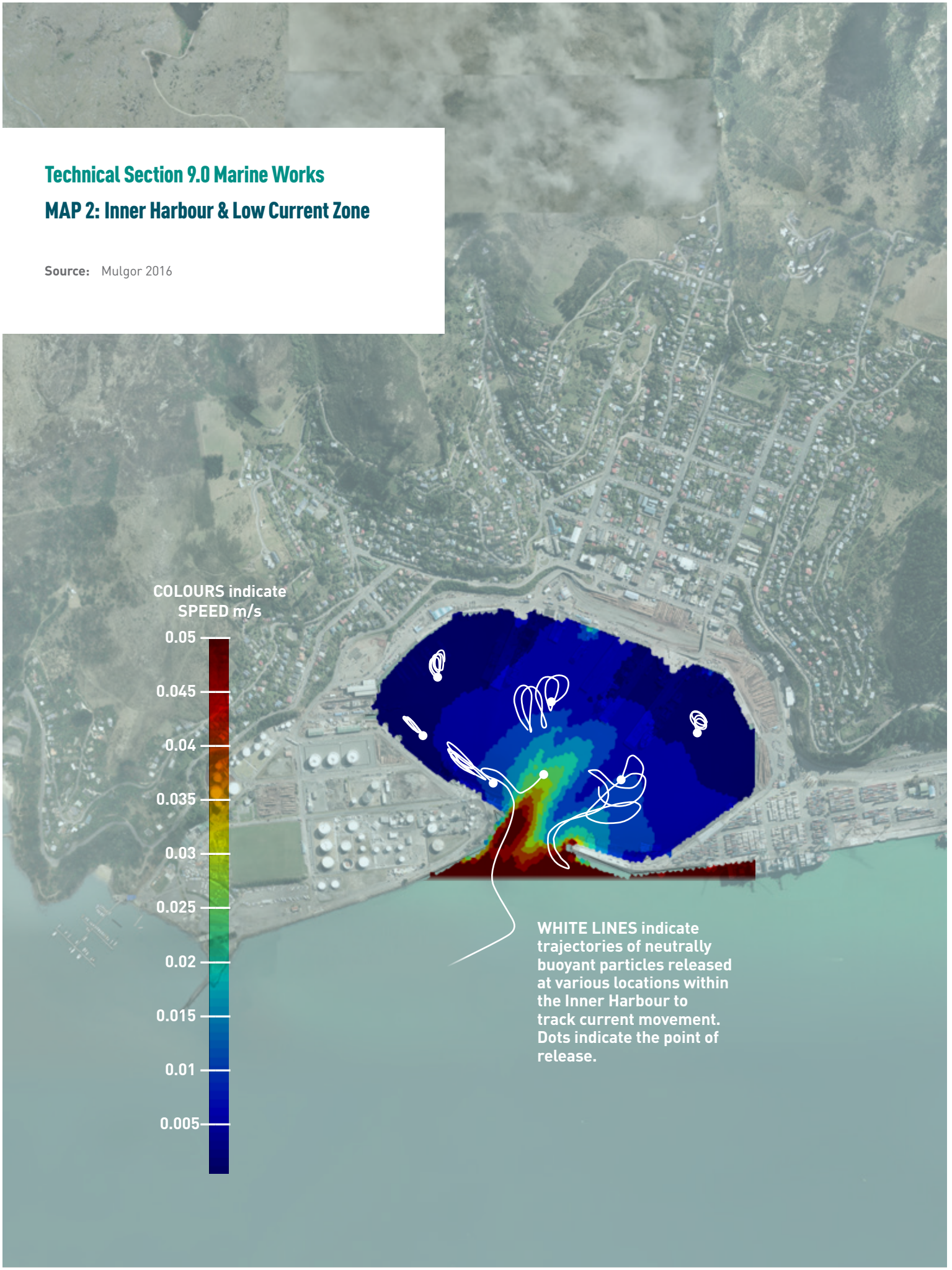
Source: RCEP Map 10.8


Coal
Stockyard
Battery
Point
Cashin Quay

Technical Section 9.0 Marine Works

MAP 2: Inner Harbour & Low Current Zone

Source: Mulgor 2016



9.3.3
CULTURAL VALUES

Te Hapū o Ngāti Wheke is the Ngāi Tahu Papatipu Rūnanga representing the tangata whenua who hold mana whenua and mana moana over Whakaraupō. In 2014, Ngāti Wheke provided LPC with a report identifying the potential effects on their values and interests from construction projects, and providing guidance on how to avoid or mitigate those effects.

Values that are particularly sensitive to effects from marine works are mahinga kai (traditional food gathering sources) and marine mammals, and it is important to minimise effects on and disturbance to these values. This Section includes requirements that address Ngāti Wheke's management recommendations. In particular, it requires that for all marine works Contractors have appropriate and effective measures in place to:

- avoid discharge of contaminants to water, have a Contingency Plan, and follow the Spill Management Plan if a discharge (emergency incident) occurs;
- minimise transport of suspended sediment;
- contain contaminated sediment within the Inner Harbour;
- monitor the performance of controls and modify them to ensure performance standards are met; and
- notify LPC (so that LPC can promptly notify Ngāti Wheke) of spills or incidents of concern, including any on-site accident that results in a death, or the drowning of a person in the harbour.

Effects of underwater noise and vibration are covered in the Technical Sections on Noise and Wildlife.

Reclamation debis boom maintenance
(image © LPC)

ASSESSMENT

9.4 RISK ASSESSMENT

The first step in working out what controls are required to manage construction activities in the marine environment is to assess risk level assigned to the activity. To determine the risk you need to understand the nature and the scale of the activity and the sensitivity of the receiving environment.

Map 3 provides a geographic risk assessment based on the sensitivity of the receiving environment. Use Map 3 to identify the risk rating based on the location of construction activities. Use the table in section 9.6.3 to identify activity specific control measures relevant to the location of the project and the construction activities to be completed.

The table in section 9.6.4 provides descriptions and examples of control measures appropriate for managing works in the marine environment. Refer to this table to understand circumstances where specific control measures are to be applied.

If your project rates "high" for any of the criteria, your projects overall risk rating is high.

The ranking will be translated into your CEMP as a **high (red)**, **medium (orange)** or **low (green)** box where specified in the template.

Technical Section 9.0 Marine Works

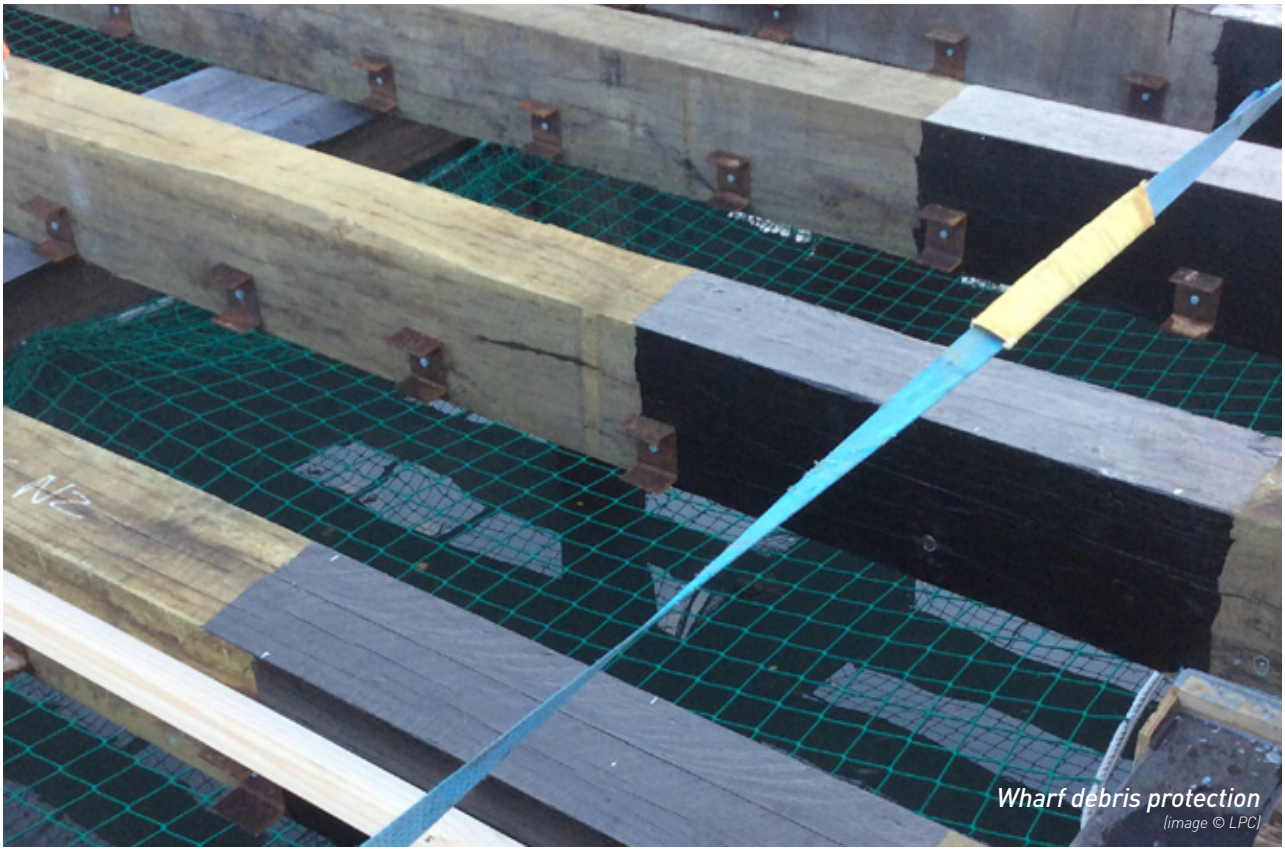
MAP 3: Risk Location


LOW
RISK
ZONE

DESIGN & OPERATION ii

9.5 PERFORMANCE STANDARDS

Your works in and over the marine environment are subject to the provisions of the Resource Management Act 1991, the Regional Coastal Environment Plan for the Canterbury Region (RCEP) permitted activity rules, and in some cases specific resource consents. Refer to part 2, Chapter 10 (Lyttelton Port of Christchurch) in the RCEP.



Wharf debris protection
(image © LPC)

DESIGN & OPERATION ii

9.6 CONTROL MEASURES

9.6.1 PRINCIPLES

The overriding principles of the control measures are to:

- Minimise disturbance of sediment and sediment plumes;
- Capture waste and prevent contaminated discharges to the marine environment; and
- Prevent spread of contaminated sediment.

There are also zone-specific control principles including:

- In the High (contaminated sediment zone), you must minimise seabed disturbance to the extent practicable, and contain sediment as close as possible to the work area when you can't avoid disturbing the seabed. No sediment may be discharged to sea without express approval of LPC and would likely require additional control measures to limit distribution of any sediment plumes. Also refer to Section 3.0 of the CEMP (Contaminated Soil) for works on land adjacent to the coastal edge.
- In the Low (outside of the Inner Harbour), you must include controls to minimise sediment movement.
- For works along the harbour edge, terrestrial ecology may mean there are timing constraints. Controls for potential effects on wildlife are in the Wildlife Management Technical Section.

9.6.2 CONTROL MEASURES FOR ALL PROJECTS

Work method

Marine works require careful planning and a full team effort on land and sea to minimise environmental effects. There are very few effective ways to capture sediment and other contaminants within the harbour. The method, sequencing of works and the selection of materials is usually the most effective means of minimising discharges and effects on the marine environment during works. For marine works, your method must consider the following:

- **Planning the work**
  - Develop the method for all aspects of the project before work commences.
  - Minimise disturbance to the greatest extent practicable.
  - You must discuss your work method and proposed controls with the LPC Project Manager, to:
    - understand all consent requirements or other standards that apply to the works;
    - identify risk factors (refer Section 9.4); and
    - confirm performance standards to be applied.
  - Where relevant and practicable:
    - Plan works around tidal cycles.
    - Set triggers that can be monitored (e.g., turbidity, visual) to check if additional controls or changes to method are required.

- **Challenge the construction method.**
  - Include constructability risk item within the LPC risk register process.
  - Aspects for challenge include materials selection and specification, construction method and sequencing.

Equipment (plant)

Clean and well maintained equipment significantly reduces the risk of discharges during construction.

- Equipment must be clean, and cleaning must occur away from the marine environment. Clean machinery minimises the risk of contaminants being washed into the marine environment during rain or when machinery is subject to wave splash.
- Equipment must be well maintained to minimise the risk of discharges to the environment. Failures such as blown hydraulic lines can result in discharges of oils and other contaminants.
- Ensure that all machinery is in good working order with a low risk of machinery failure. Equipment must be well maintained to minimise time delays. Poorly maintained equipment is more likely to result in lost time. Methods that are programmed to minimise environmental effects are often based on meeting specific construction windows or timeframes (e.g., working around tides, avoiding breeding seasons). Machinery failure can prevent such timeframes being met, and can also inhibit the timely completion of other activities necessary to minimise discharges and off-site effects, such as the maintenance of sediment control measures.
- Where possible use biodegradable grease/oils to protect against accidental spills in to the marine environment.
- Wherever possible, maintenance and refuelling must be carried out away from the marine environment to minimise the risk of discharges and spills.
- Daily machine checks must be completed on all plant and any defects, leaks or other issues must be repaired prior to the equipment being used.

Mobilisation of Marine Plant to Lyttelton

If you bring marine-based machinery onto the site from offshore, you must follow the Ministry for Primary Industries' biosecurity procedures to prevent introduction of marine pests. You must discuss your proposed controls with your LPC Project Manager and include them in your CEMP for your project.

Material selection

It is difficult and costly to install barriers between the sea and construction areas therefore the selection of construction materials and machinery is an efficient and cost effective control method.

For repair or extension of the harbour edge (e.g., reclamation, seawalls) the most effective way of minimising sediment discharge is careful material selection and construction methodology. Use materials that will not generate sediment (e.g., if fill is to be deposited directly in water, use non-erodible clean rock or clean aggregate). Material selection and potential for sediment generation during construction must be specifically discussed with the Engineer specifying materials for the works.

Fill material with high clays or silt content must be isolated from wave and tidal action. Stabilisation of silts and clays with binding agents such as lime or cement would require a very high level of control, due to the potential consequences (e.g., fish kill) of these high-pH materials in the marine environment, should a discharge occur. If binding agents must be used to stabilise fill, the fill site must be fully isolated from the marine environment until the binding agents have cured. Silt fences or sediment curtains will not prevent the discharge of binding agents.

Hazardous substances

If your works require that you use grout or cement on the harbour edge below the water line (e.g., to fill voids), you must use a quick-set variety and an environmentally preferable (e.g., not ecotoxic) product. The selection of materials must be raised as a risk in the project risk register.

9.6.3
ACTIVITY SPECIFIC CONTROL MEASURES

Control measures for managing works in the marine environment depend on the risk rating. Having determined your risk rating in section 9.4 you need to work out suitable control measures for different construction activities based on the risk category. The table below sets out marine works control measures that should be considered based on your risk category. In addition to the control measures listed below it is important control measures listed in 9.6.2 are implemented.

The list provided in the table below is not exhaustive and other methods may also be put in place to control marine works. You need to tailor these control measures to work for your project and detail them in your CEMP.

Control Measures for Low, Medium & High Risk Areas

ACTIVITY	CONTROL MEASURES	RISK CATEGORY WHERE CONTROL MEASURES APPLY		
		HIGH	MEDIUM	LOW
PILING Vibro, impact or screw piles	Control measures used to manage environmental effects that may arise from piling differ depending on the piling method. Vibro, impact and screw piling methods normally create the least sediment disturbance. Other piling methods such as excavation, auguring and concreting have the potential to disturb more sediment. *A marine mammal piling management plan is required for piling in the marine environment; please refer to appendix 6A in the noise and vibration section of the CEMP.*			
	Monitor area (guide: 50 m in the High, 100 m Medium and Low) for visible sediment plumes.	✓	✓	✓
	Use sediment plume monitoring form (Appendix 9A) to record visual sediment plume monitoring.	✓	✓	✓
	Review piling method and install appropriate control if visual sediment plumes extend past the specified monitoring zone (50 m High zone, 100 m Medium and Low zone).	✓	✓	✓
	Install full casings that extend above the high tides and wave crest level.	✓	✓	✓
	If piling method requires dewatering of pile casings treatment of the discharged water may be required. Trigger level for dewatering requirement is on the sediment plume dispersion 50 m High zone, 100 m Medium and Low zone. Dewatering methods include bunded containment areas or dewatering treatment devices.	✓	✓	✓
	If piling method requires disposal of disturbed material to land, dispose material to an appropriately authorised location. In the high risk zone sediment analysis must be completed to determine appropriate disposal location.	✓	✓	✓
	If piling method requires concrete pours and discharge of concrete displaced water, monitor the pH of the receiving environment as water is discharged. If the pH of the receiving water falls above or below the 6.0–9.0 range, dewatering must stop and the water being discharged must be treated to neutralise pH.	✓	✓	✓

ACTIVITY		CONTROL MEASURES	RISK CATEGORY WHERE CONTROL MEASURES APPLY		
			HIGH	MEDIUM	LOW
PILE REMOVAL		Control measures for pile removal are similar to pile installation; the method of piling removal will determine the amount of sediment disturbance, in most cases sediment disturbed in this process is relatively minor. ***A marine mammal piling management plan is required for piling in the marine environment; please refer to appendix 6A in the noise and vibration section of the CEMP.***			
		Monitor area (guide: 50 m in the High, 100 m Medium and Low) for visual sediment plumes.	✓	✓	✓
		Use monitoring form Appendix 9A to record visual sediment plume monitoring.	✓	✓	✓
		Review piling method and install appropriate control if visual sediment plumes extend past the specified monitoring zone (50 m or 100 m).	✓	✓	✓
		If piling removal method requires disposal of disturbed material to land dispose material to an appropriately authorised location. In the high risk zone sediment analysis must be completed to determine appropriate disposal location.	✓	✓	✓
RECLAMATION & SEAWALL CONSTRUCTION & REPAIR		The design, materials used and construction method is crucial to managing environmental effects. ***Controls around white flippered penguins and other wildlife will be required; refer to the Wildlife Management chapter of the CEMP.***			
	Reclamation	Use non erodible fill when depositing material directly into the harbour.	✓	✓	✓
		Use bunds to isolate the reclamation area from the harbour if erodible fill is to be placed into the water. Bunds must be armoured with non erodible material such as armour rock.	✓	✓	✓
		Use a debris boom for reclamation material that contains floatable material.	✓	✓	✓
		Monitor area (guide: 50 m in the High, 100 m Medium and Low) for visual sediment plumes.	✓	✓	✓
		Use monitoring form Appendix 9A to record visual sediment plume monitoring .	✓	✓	✓
		Review reclamation method and install appropriate control if visual sediment plumes extend past the specified monitoring zone (50 m or 100 m).	✓	✓	✓
	Sea wall construction & repair	Use non erodible fill when depositing material directly into the harbour.	✓	✓	✓
		Monitor area (guide: 50 m in the High, 100 m Medium and Low) for visual sediment plumes.	✓	✓	✓
		Use monitoring form Appendix 9A to record visual sediment plume monitoring	✓	✓	✓
		Review construction method and install appropriate control if visual sediment plumes extend past the specified monitoring zone (50 m or 100 m)	✓		

ACTIVITY	CONTROL MEASURES	RISK CATEGORY WHERE CONTROL MEASURES APPLY		
		HIGH	MEDIUM	LOW
DEMOLITION	Control measures for the demolition of structures over water consist of managing debris and contaminants that may fall into the water.			
	Install a debris boom to contain any floating debris	✓	✓	✓
	Inspect and clear debris caught in the boom on a daily basis	✓	✓	✓
	Use the debris monitoring form Appendix 9B to record boom inspections and record the amount of debris collected.	✓	✓	✓
	Inspect areas surrounding the works site for debris and collect any debris that may have fallen into the water and floated away from the works site	✓	✓	✓
	Use concrete cutting method to contain/control concrete discharges.	✓	✓	✓
CONCRETE WORKS	Concrete discharges to marine environments can cause an increase in pH, which can have an adverse effect on fish and other aquatic organisms. The extent of the pH increase depends on the volume, intensity, and location of the discharge.			
	Use form work to create a water tight seal to contain concrete run-off.	✓	✓	✓
	Use concrete cutting method to contain/control concrete discharges.	✓	✓	✓
	Use wet vacs to collate and contain discharges from concrete works and dispose of waste appropriately.	✓	✓	✓
	If construction activity requires discharge of concrete displaced water, monitor the pH of the receiving environment as water is discharged. If the pH of the receiving water falls above or below the 6.0–9.0 range, dewatering must stop and the water being discharged must be treated to neutralise pH.	✓	✓	✓
	Use concrete cutting method to contain/control concrete discharges.	✓	✓	✓
GROUTING	Grout is very similar to concrete, discharge of grout to the marine environment can cause an increase in pH which is harmful to aquatic life.			
	Plan works around the tides to ensure grouting is undertaken well above the tide line.	✓	✓	✓
	Use quick setting and low ecotoxicity grout.	✓	✓	✓
	Ensure appropriate spill kits and spill response plans are in place to respond to grout spills.	✓	✓	✓
ACCESS PLATFORMS	Access platforms are used when construction sites or structures cannot be reached from land, they are often used to complete works under wharfs at low tide and involve working directly over the harbour or seabed.			
	Install kickboard on the edge of the platform to provide a bunded works area.	✓	✓	✓
	Ensure spill kits are kept on the platform.	✓	✓	✓
	Ensure any floating debris that may drop into the harbour is removed.	✓	✓	✓

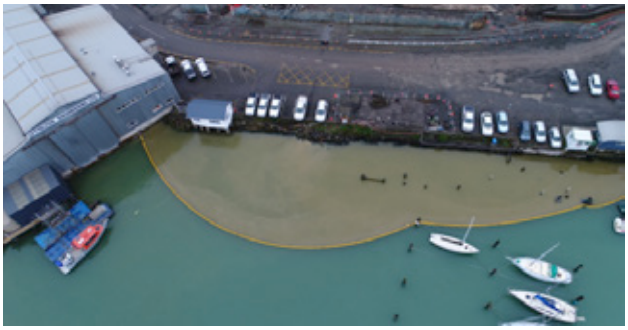
9.6.4 DESCRIPTION & EXAMPLES OF CONTROL DEVICES

This Section provides descriptions and examples of control devices used in the marine environment. Use it to assess the types of control measures and if they are applicable to your construction activities/method.

Silt Curtain

Silt curtains provide a physical barrier to slow the flow of water to allow suspended sediment to settle and drop of out the water column on the seabed. Silt curtains do not prevent sediment being disturbed. They only limit the distance that sediment will travel during works. Silt curtains are only a backup to an effective construction method.

Silt curtains are practical in shallow, low-current areas of the Inner Harbour. Silt curtains should extend deep enough into the water column at high tide to be effective and must be anchored well.



TOP: Silt Curtain at Te Ana Marina 2017 capturing sediment laden discharges from the stormwater network in this area.

BOTTOM: Small silt curtain installed in a high current zone to manage discharge from the Quarry Haul Road project. Note because this area is subject to high currents, the silt curtain used was short in length and depth.

Derbis Boom and Debris Curtain

Debris booms are like silt curtains but only contain the flotsam that sits on the top of the water column. Their purpose is to capture floating materials, such as litter and material that could be lost from a site during construction. They are not effective at retaining sediment. However, they can serve a valuable purpose in marking the extent of the controlled work environment.

Debris curtains are shorter (approx. 0.6–2 m depth) than a silt curtain. They provide a dual role of capturing floating debris/litter and limiting the extent of surficial sediment plumes. They do not capture sediment through the full water column.

Both debris booms and curtains are only effective if they are regularly cleaned of debris and maintained in a good working order.

Photo showing a debris boom used to contain wooden debris dropping into the water during demolition of Gladstone Pier.

Oil Booms

Oil containment booms can be used to contain oil discharges to limit the spread of a spill and to facilitate easier clean-up. They usually are a float with short curtain attached. They are typically used to minimise the spread of oil for recovery by another method (e.g. vacuum), but they may also be lined with absorbent materials to help recover spilled oil.

The boom is placed down-current of the spill. Oil is recovered from inside the boom.

They are only effective in calm water with low currents; otherwise oil can be carried over or under the boom. In open water, a secondary boom outside or up-wind of the primary boom might help protect the boom from chop.

Deploying an oil boom around machinery during works is one way of providing additional protection during works.

If your works carry a high risk of a spill, then you must have an oil boom deployed.

Example of an oil containment boom, reducing the possibility of polluting the harbour

Seawall construction

For the construction or repair of seawalls the most effective way of minimising sediment discharge is methodology and material selection. Clean armour rock or aggregates must be used on the exposed face of the reclamation or seawall. If small fines and silts are mixed amongst the armour rock the rock must be washed to remove fines before it is placed into the harbour.

If construction of the seawall requires bulking, filter cloth such as bidum cloth can be used to "wrap" the erodible fill and the armour rock can be placed on top.

TOP: Te Ana Marina seawall construction with clean armour rock – armour rock delivered to site was contaminated with fines and sediment. The armour rock was washed prior to placement in the harbour.

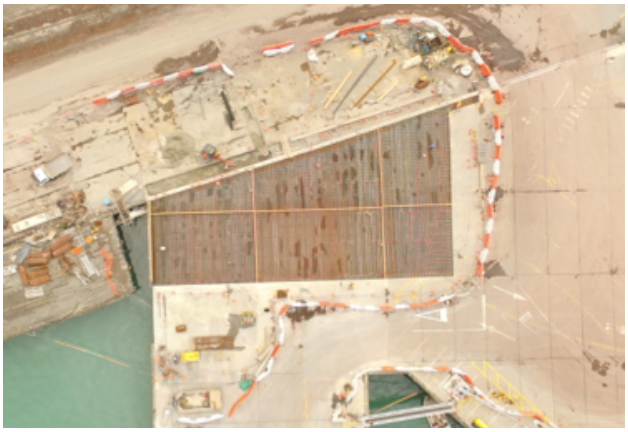
BOTTOM: Waterfront House seawall construction using bidum cloth to provide a physical barrier between bulk fill and the armour rock.

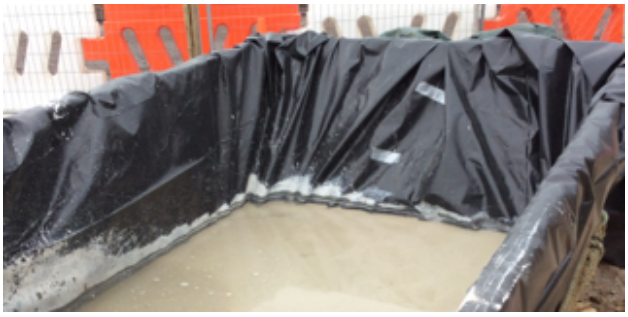
Concrete Works

Concrete discharges to marine environments can cause an increase in pH, which can have an adverse effect on fish and other aquatic organisms. The extent of the pH increase depends on the volume, intensity, and location of the discharge.

An effective method of managing concrete discharges is to ensure sealed boxing is used to contain any concrete runoff.

When undertaking concrete cutting use wet vacs (concrete slurry vacuum cleaners) to suck up concrete slurry discharges. Concrete slurry discharges must be contained and discharged to an appropriate location (discharge to ground with ample ground soakage or disposal to waste acceptance facility.





TOP: Aerial photo on Jetty 3 showing sealed formwork used to contain concrete discharges into the harbour.

MIDDLE: Wet vac used to suck up concrete slurry discharges.

BOTTOM: Covered skip bin used to collect and contain concrete discharges – it is often left to set and then disposed to an appropraite location.

Cofferdam

Cofferdams can be useful if you need to isolate an inflow of water to your works area. They can be used on the seaward side to allow works on the harbour edge or seabed to be carried out without ingress of water or discharges to the marine environment. Cofferdams will usually be driven from land-based machinery.

Dewatering of the isolated construction area is often required to create a dry working area. Discharges may require treatment including methods such as a bunded containment or dewatering treatment devices.

Cofferdams are not often used at LPC as they are costly to install and manage. Cofferdams should only be considered when all other control measures are exhausted. Smart design and construction methods often remove the need for cofferdams.

Example of a steel cofferdam.

OPERATION

9.7 MONITORING & REPORTING

You must carry out monitoring to check your activity is meeting performance standards and reporting to document the controls you have put in place.

Monitoring must include:

- Visual monitoring (photographs) of sediment plumes for all works that disturb sediment (Appendix 9A sediment plume monitoring form);
- Debris monitoring must be completed for demolition works or works where debris may fall into the harbour (Appendix 9B debris monitoring and inspection form);
- Inspections of control devices to check for good performance; and
- Turbidity monitoring for works that have specific trigger values.

You must discuss the frequency of monitoring with your LPC Project Manager including how often monitoring and inspection records must be issued to LPC.

You must keep the following records and provide them to LPC on a monthly basis (or more frequently, if requested by LPC):

- Training of your staff, including briefings on the content of the CEMP.
- Maintenance you carry out on plant or sediment control equipment to ensure good performance.
- Timing of your works for all works that have tidal restrictions.
- Duration of works for all works in and over the marine environment.
- Any incidents involving spills or releases to the marine environment, including response actions taken.
- Any updates to the CEMP based on monitoring.
- All complaints received related to sediment plumes, including response actions.

You must notify LPC immediately in the event of an on-site accident that results in the drowning of a person in the harbour or a death. LPC will notify Te Hapū o Ngāti Wheke.

OPERATION

9.8 CONTINGENCY

You must prepare a contingency plan that sets out your proposed approach to manage unexpected but not unforeseen conditions.

These may include:

- Controls not achieving performance standards.
- Prolonged, inclement weather or sea state that prevents work progressing.

If monitoring shows that the controls you have in place are not achieving good environmental performance, then you must review the works method and controls, and update the CEMP.

If environmental conditions (weather, sea state) are such that the controls cannot be effectively implemented, you must implement a contingency plan and update the CEMP.

The contingency plan must identify back up controls and stop-work points. It must be discussed with the LPC Project Manager and should also be discussed with the project's Design Engineer.

9.9 APPENDICES

APPENDIX 9A
SEDIMENT PLUME MONITORING & INSPECTION FORM

Sediment Plume Observations

Monitoring date/time:	
Monitoring undertaken by:	
Weather conditions:	

Construction activities to be completed during the monitoring period:

Monitoring standard	Standard met	Comments
Sediment plume observations undertaken to ensure sediment plumes generated from the works site are not visible more than 50m (high risk zone) or 100m (medium and low risk zones) from the construction area.		

Take photographs to identify extend of plume during construction activities.

Attach relevant photos.

APPENDIX 9B
DEBRIS MONITORING & INSPECTION FORM

Debris Monitoring Form

Project:		**Date**:	
Inspection By:		**Time**:	
Current Weather Condition (e.g. sunny, cloudy, rain)			
Wind Direction/Strength (e.g. strong, moderate, light, still):			
Areas(s) inspected:			

SCOPE OF INSPECTION	Circle the relevant item			COMMENTS
Is there visible demolition debris in the water?	**Y**	**N**	**N/A**	
Is any demolition debris contained by the boom?	**Y**	**N**	**N/A**	
Is debris contained in the boom cleared at the end of each day and deposited to land?	**Y**	**N**	**N/A**	
Is there demolition debris outside of the boom?	**Y**	**N**	**N/A**	
Has any demolition debris that outside of the boom been collected and deposited to land?	**Y**	**N**	**N/A**	

RECOMMENDATIONS

Priority (H/M/L)	ACTIONS	By Whom	By When	Completed Y/N

Outer Harbour booms
(image © LPC)

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